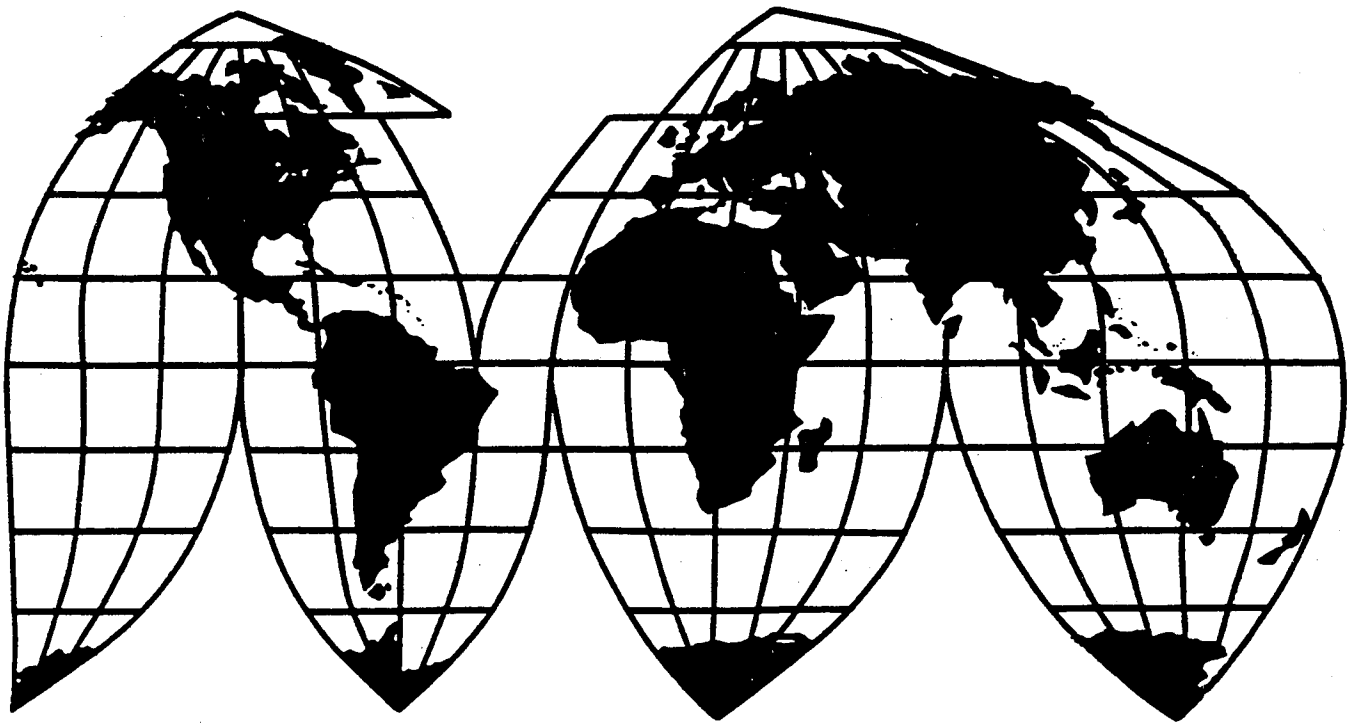
In the Matter of

Certain Variable Speed Wind Turbines and Components Thereof

Investigation No. 337-TA-376

Publication 3003 **November 1996**

U.S. International Trade Commission



Washington, DC 20436

U.S. International Trade Commission

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In the Matter of

Certain Variable Speed Wind Turbines and Components Thereof

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UNITED STATES INTERNATIONAL TRADE COMMISSION
Washington, DC 20436

In the Matter of

CERTAIN VARIABLE SPEED WIND TURBINES AND COMPONENTS THEREOF

Investigation No. 337-TA-376

'96 JUN 30 P3:08

NOTICE OF ISSUANCE OF LIMITED EXCLUSION ORDER

AGENCY: U.S. International Trade Commission.

ACTION: Notice.

SUMMARY: Notice is hereby given that the U.S. International Trade Commission has issued a limited exclusion order in the above-captioned investigation.

FOR FURTHER INFORMATION CONTACT: Mark D. Kelly, Esq., Office of the General Counsel, U.S. International Trade Commission, 500 E Street, S.W., Washington, D.C. 20436, telephone 202-205-3106.

SUPPLEMENTARY INFORMATION: The authority for the Commission's determinations is contained in section 337 of the Tariff Act of 1930, as amended (19 U.S.C. § 1337), and in section 210.45 and 210.50 of the Commission's Rules of Practice and Procedure (19 C.F.R. §§ 210.45 and 210.50).

This patent-based section 337 investigation was instituted by the Commission on May 30, 1995 (60 *Fed. Reg.* 28167) based on a complaint filed by Kenetech Windpower, Inc., of Livermore, CA. Complainant alleged violation of section 337 in the importation, sale for importation, and/or the sale within the United States after importation, of certain variable speed wind turbines and components thereof, by reason of infringement of claim 131 of U.S. Letters Patent 5,083,039 ("the '039 patent") and claim 51 of U.S. Letters Patent 5,225,712 ("the '712 patent"), both patents owned by complainant. Enercon GmbH of Aurich, Germany and The New World Power Corporation of Lime Rock, Connecticut were named as respondents.

The presiding administrative law judge (ALJ) held an evidentiary hearing on the merits beginning on January 31, 1996, and issued his final initial determination (ID) finding a violation of section 337 on May 30, 1996. The ALJ found that there had been a sale for

importation of the accused products; that claim 131 of the '039 patent has been literally infringed; that claim 51 of the '712 patent was not infringed, either literally or under the doctrine of equivalents; and that complainant's activities with respect to the '039 and '712 patents satisfied the domestic industry requirements of section 337. Respondents filed a petition for review of the ID and the Commission investigative attorney (IA) filed an opposition to the petition for review. On July 17, 1996, the Commission issued a notice of its determination to review certain portions of the ID and requested written submissions on the issues under review and on remedy, the public interest, and bonding. 61 Fed. Reg. 38473 (July 24, 1996).

Submissions on remedy, the public interest, and bonding and the issues under review were received from complainant, respondents, and IA. Complainant, respondents, and the IA also filed reply submissions on those issues. On August 30, 1996, the Commission determined to affirm the ALJ's conclusions on claim interpretation and infringement, thereby finding a violation of section 337.

Having reviewed the record in this investigation, including the written submissions of the parties, the Commission also made determinations on the issues of remedy, the public interest, and bonding. The Commission determined that the appropriate form of relief is a limited exclusion order prohibiting the unlicenced entry for consumption of variable speed wind turbines and components thereof manufactured and/or imported by Enercon GmbH of Aurich, Germany and/or The New World Power Corporation of Lime Rock, Connecticut, and that infringe claim 131 of U.S. Letters Patent 5,083,039.

The Commission also determined that the public interest factors enumerated in subsections 1337(d) and (f) do not preclude the issuance of the limited exclusion order, and that the bond during the Presidential review period shall be in the amount of 100 percent of the entered value of the articles in question.

Copies of the Commission's order, the Commission opinion in support thereof, and all other nonconfidential documents filed in connection with this investigation are or will be available for inspection during official business hours (8:45 a.m. to 5:15 p.m.) in the Office of the Secretary, U.S. International Trade Commission, 500 E Street, S.W., Washington, D.C. 20436, telephone 202-205-2000. Hearing-impaired persons are advised that information on this matter can be obtained by contacting the Commission's TDD terminal on 202-205-1810.

By order of the Commission.

Donna R. Koehnke

Donna R. Koehnke
Secretary

Issued: August 30, 1996

UNITED STATES INTERNATIONAL TRADE COMMISSION
Washington, DC 20436

In the Matter of

CERTAIN VARIABLE SPEED WIND TURBINES AND COMPONENTS THEREOF

Investigation No. 337-TA-376

96 MAY 30 P3:09

ORDER

This patent-based section 337 investigation was instituted by the Commission on May 30, 1995 (60 *Fed. Reg.* 28167) based on a complaint filed by Kenetech Windpower, Inc., of Livermore, CA. Complainant alleges violation of section 337 in the importation, sale for importation, and/or the sale within the United States after importation, of certain variable speed wind turbines and components thereof, by reason of infringement of claim 131 of U.S. Letters Patent 5,083,039 ("the '039 patent") and claim 51 of U.S. Letters Patent 5,225,712 ("the '712 patent"), both patents owned by complainant. Enercon GmbH of Aurich, Germany and The New World Power Corporation of Lime Rock, Connecticut were named as respondents.

The presiding administrative law judge (ALJ) held an evidentiary hearing on the merits beginning on January 31, 1996, and issued his final initial determination (ID) finding a violation of section 337 on May 30, 1996. The ALJ found that there had been a sale for importation of the accused products; that claim 131 of the '039 patent has been literally infringed; that claim 51 of the '712 patent was not infringed, either literally or under the

doctrine of equivalents; and that complainant's activities with respect to the '039 and '712 patents satisfy the domestic industry requirements of section 337. Respondents filed a petition for review of the ID and the Commission investigative attorney (IA) filed an opposition to the petition for review. On July 17, 1996, the Commission issued a notice of its determination to review certain portions of the ID and requested written submissions on the issues under review and on remedy, the public interest, and bonding. 61 Fed. Reg. 38473 (July 24, 1996). Submissions on the issues under review and on remedy, the public interest, and bonding were received from complainant, respondents, and the IA. Complainant, respondents, and the IA also filed reply submissions on those issues.

Having reviewed the record in this investigation, including the written submissions of the parties, the Commission has made its determination regarding violation of section 337 and on the issues of remedy, the public interest, and bonding. The Commission has determined that there is a violation of section 337 and that the appropriate form of relief is a limited exclusion order prohibiting the unlicenced entry for consumption of variable speed wind turbines and components thereof manufactured and/or imported by Enercon GmbH of Aurich, Germany and/or The New World Power Corporation of Lime Rock, Connecticut, and that infringe claim 131 of U.S. Letters Patent 5,083,039.

The Commission has also determined that the public interest factors enumerated in 19 U.S.C. § 1337(d) and (f) do not preclude the issuance of the limited exclusion order, and that the bond during the Presidential review period shall be in the amount of 100 percent of the entered value of the articles in question.

Accordingly, the Commission hereby **ORDERS THAT --**

1. Variable speed wind turbines and components thereof covered by claim 131 of U.S. Letters Patent 5,083,039 (the" '039 patent") and manufactured and/or imported by or on behalf of Enercon GmbH of Aurich, Germany and/or The New World Power Corporation of Lime Rock, Connecticut, or any of their affiliated companies, parents, subsidiaries, licensees, contractors, or other related entities, or their successors or assigns, are excluded from entry for consumption into the United States for the remaining term of the patent, *i.e.*, until February 1, 2010, except under license of the patent owner or as provided by law.

2. Variable speed wind turbines and components thereof covered by claim 131 of the '039 patent and manufactured and/or imported by or on behalf of Enercon GmbH of Aurich, Germany and/or The New World Power Corporation of Lime Rock, Connecticut, identified in paragraph 1 above, are entitled to entry into the United States under bond in the amount of one-hundred (100) percent of the entered value of such items pursuant to subsection (j) of section 337 of the Tariff Act of 1930, as amended (19 U.S.C. 1337(j)), from the day after this Order is received by the President, until such time as the President notifies the Commission that he approves or disapproves this action, but no later than 60 days after the date of receipt of this Order by the President.

3. In accordance with 19 U.S.C. § 1337(l), the provisions of this Order shall not apply to variable speed wind turbines and components thereof imported by and for the use of the United States, or imported for, and to be used for, the United States with the authorization or consent of the Government.

4. Complainant shall file a written statement with the Commission, made under oath, on September 30, 1996, and every three months thereafter until and including the date which is three (3) months after the date of expiration of the '039 patent, setting forth:

a. the number of wind turbines covered by claim 131 of the '039 patent that have been produced by or on behalf of complainant in the United States during the three months preceding the date of the report;

b. the type and number of components for variable speed wind turbines covered by claim 131 of the '039 patent that have been produced by or on behalf of complainant in the United States during the three months preceding the date of the report;

c. the name and address of the facility(ies) at which the production referred to in subparagraphs (a) or (b) occurred and the nature or type of production activities performed at the facility (*e.g.*,

manufacture, assembly, research and development and quality control);

d. the nature and extent, if any, of complainant's activities with regard to repair, service, and/or maintenance of existing variable speed wind turbines covered by claim 131 of the '039 patent, including the number of employees involved and the name and address of the facility(ies) at which such activities occurred;

d. a description of those components, if any, of variable speed wind turbines produced pursuant to claim 131 of the '039 patent that were imported into the United States by or on behalf of complainant during the three months preceding the date of the report;

f. whether complainant has submitted bids or otherwise solicited sales of its variable speed wind turbines covered by claim 131 of the '039 patent, and, if so, from how many customers, during the three months preceding the date of the report; and

g. and agreements between complainant and any other entity which contemplate or provide for the sale, in whole or in part, of complainant's wind turbine business.

5. In addition to the reports submitted to the Commission pursuant to paragraph 4 of this Order, complainant shall submit, under oath, a summary of any plan of reorganization filed in connection with its Chapter 11 bankruptcy proceeding (whether such plan is filed by complainant or by another party to the proceeding), together with a copy of the plan of reorganization and disclosure statement. Complainant shall submit such summary, plan, and disclosure statement within five (5) business days after the date of filing of the plan with the court. If complainant's case under Chapter 11 is either dismissed or converted to a case under Chapter 7 (liquidation), complainant shall notify the Commission of such conversion or dismissal within five (5) days of the conversion or dismissal. If complainant shall, at any time, decide to discontinue or abandon its wind turbine business, whether through sale or in any other manner, it shall notify the Commission within five (5) business days of such decision.

6. The Commission may modify this Order in accordance with the procedure described in section 210.76 of the Commission's Rules of Practice and Procedure (19 C.F.R. § 210.76).

7. The Secretary shall serve copies of this Order upon each party of record in this investigation and upon the Department of Health and Human Services, the Department of Justice, the Federal Trade Commission, and the U.S. Customs Service.

8. Notice of this Order shall be published in the Federal Register.

By order of the Commission.

Donna R. Koehnke
Secretary

Issued: August 30, 1996

PUBLIC VERSION

UNITED STATES INTERNATIONAL TRADE COMMISSION
Washington, DC 20436

In the Matter of CERTAIN VARIABLE SPEED WIND TURBINES AND COMPONENTS THEREOF	Investigation No. 337-TA-376

COMMISSION OPINION

INTRODUCTION

On August 30, 1996, the Commission affirmed the presiding administrative law judge's (ALJ's) determination that there has been a violation of section 337 of the Tariff Act of 1930 (19 U.S.C. § 1337) in this investigation. The Commission adopted, with a minor modification, the administrative law judge's final initial determination (ID) which found U.S. Letters Patent 5,083,039 ("the '039 patent") valid and infringed. The Commission further concluded that a limited exclusion order is the appropriate remedy in this investigation, that the public interest factors enumerated in section 337(d) do not preclude such a remedy, and that the bond during the Presidential review period should be in the amount of 100 percent of the entered value of the articles in question.

PROCEDURAL BACKGROUND

The Commission instituted this investigation on May 30, 1995, based upon a complaint filed by Kenetech Windpower, Inc., of Livermore, CA, alleging that Enercon GmbH of Aurich, Germany, and The New World Power Corporation of Lime Rock, Connecticut, had violated section 337 in the sale for importation, importation, and/or sale after importation of certain variable speed wind turbines and components thereof, by reason of infringement of claim 131 of the '039 patent and claim 51 of U.S. Letters Patent 5,225,712 ("the '712 patent").[1] Both patents are assigned to complainant.

On September 22, 1995, the ALJ issued an order (Order No. 7) compelling responses from respondents by September 29, 1995, to certain discovery requests by complainant for the production of documents relating to the design, development, manufacture, assembly,

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[1] 60 *Fed. Reg.* 28167 (May 30, 1995).

structure, and operation of respondents' accused wind turbine, the Enercon E-40. Respondents did not produce the documents, but moved instead for leave to seek Commission review of Order No. 7. In Order No. 8, issued on October 5, 1996, the ALJ denied respondents' motion for leave and ordered production of the compelled documents "immediately." Respondents sought an extension of time until October 20, 1995, to comply with Order No. 8. The ALJ ordered respondents to file a statement that the documents would be produced by October 20 if the extension were granted. Respondents' counsel did file such a statement, and the ALJ granted the extension until October 20. On October 19, respondents moved for reconsideration of Order No. 8. That same day, the ALJ issued a notice warning respondents that, unless their motion for reconsideration was granted by the ALJ, they were still required to produce the compelled documents by close of business on October 20. The motion for reconsideration was not granted. Nevertheless, respondents never produced any documents in response to the ALJ's orders compelling production.

On January 24, 1996, the ALJ issued an order (Order No. 17) imposing sanctions for respondents' failure to comply with his previous orders compelling production of discovery. He noted that respondents "chose to pursue a course of open defiance of the discovery orders in this investigation."[2] He stated that an evidentiary sanction that the accused Enercon E-40 wind turbine operates within the scope of the asserted patent claims would be justified, but deferred ruling on whether to impose such a sanction until after the evidentiary hearing.[3] He did, however, impose as an evidentiary sanction that it was established that the accused Enercon E-40 is a "wind turbine [that] includes [a] generator and means for supplying generated electricity to [a] power converter that includes a switched inverter supplying the output electricity."[4]

In his final ID, the ALJ found a violation of section 337, based on findings (1) that there has been a sale for importation of the accused products; (2) that the accused products imported by respondents literally infringe claim 131 of the '039 patent; and (3) that a domestic industry exists.[5] The ALJ made the further finding that the accused products do not infringe the asserted claim of the '712 patent, either literally or under the doctrine of equivalents. The ALJ's findings of infringement were based, in part, and in the alternative, on the evidentiary sanctions imposed for failure to produce compelled discovery materials.[6]

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[2] Order No. 17 at 11.

[3] *Id.*

[4] *Id.* at 20.

[5] Respondents chose not to challenge the validity of either the '039 or '712 patents in this investigation. *See* ID at 39.

[6] ID at 58-66.

On June 13, 1996, respondents filed a petition for review of the ID with the Commission. They challenged the ALJ's findings (1) that they had made a "sale for importation" of the accused products; (2) that they infringed claim 131 of the '039 patent; and (3) that a domestic industry exists with respect to the broad category of "variable speed wind turbines and components thereof." No other petitions for review were received.[7] The Commission investigative attorney (IA) filed a response in opposition to respondents' petition for review on June 21, 1996.[8]

On July 17, 1996, the Commission determined to review portions of the subject ID and requested briefs from the parties on the issues under review, and on remedy, the public interest and bonding. The Commission identified the following specific violation issues for review, on which the parties were asked to submit briefs: (1) what is the correct interpretation of claim 131 of the '039 patent in light of the prior art Mohan *et al.* reference;[9] and (2) whether claim 131, as properly interpreted, is infringed by the accused wind turbines. In light of complainant's recent Chapter 11 bankruptcy filing, the Commission also posed a briefing question relating to remedy and the public interest.[10]

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[7] On June 18, 1996, complainant Kenetech Windpower, Inc. submitted a letter to the Commission stating that it had filed a voluntary petition for reorganization under Chapter 11 of the U.S. Bankruptcy Act (title 11 of the U.S. Code) on May 29, 1996. In general, under Chapter 11, a debtor is permitted to continue to operate its business and remain in possession of its assets pending confirmation by the bankruptcy court of an acceptable plan of reorganization. Complainant advised the Commission that it was not in a position to file a response to the petition for review because it was not authorized to continue to retain its attorneys, Howrey & Simon, without approval from the bankruptcy court. Complainant stated that such approval was not being sought.

[8] On June 27, 1996, respondents filed a motion for leave to reply to the IA's opposition to respondents' petition for review. The Commission denied the motion on July 8, 1996.

[9] Mohan *et al.*, Power Electronics: Converters, Applications and Design, John Wiley & Sons (1989).

[10] *See Notice of Commission Decision to Review Portions of an Initial Determination; and Schedule For The Filing of Written Submissions on The Issues Under Review, and on Remedy, The Public Interest, and Bonding*, issued July 17, 1996.

Submissions on the claim interpretation and infringement issues under review were received from complainant, respondents, and the Commission IA.[11] [12] Complainant, respondents, and the IA each filed reply submissions. Additional submissions in opposition to the issuance of an exclusion order based on public interest concerns were submitted by Texas Utilities Electric Company, an electric utility that has entered into a contract to purchase electricity generated using imported Enercon E-40 wind turbines from an affiliate of respondent New World Power Company; by Mr. Don Bain, an individual who states that he has been involved in the wind energy industry since 1975; and by Mr. Paul Gipe, a wind energy analyst and author.

This opinion explains the Commission's final disposition of this investigation, i.e., its determinations as to (1)-existence of a violation of section 337, (2) what remedy should be issued, (3) whether issuance of that remedy is precluded by the statutory public interest factors, and (4) the amount of the bond during the 60-day Presidential review period.

DISCUSSION

I. VIOLATION OF SECTION 337

The central violation issue under review involves claim interpretation, specifically whether a prior art reference proffered by respondents for the stated purpose of claim interpretation should have been considered by the ALJ in his claim interpretation analysis. The ALJ declined to consider this prior art -- excerpts from the 1989 Mohan *et al.* textbook on power electronics set forth in exhibit RX-11 and referred to in exhibit X-182C -- because he viewed respondents' arguments concerning the reference as directed not to claim interpretation but rather to the validity of claim 131, a question not in issue in this investigation.[13] Since respondents had not challenged the validity of claim 131, the ALJ refused to entertain arguments that Mohan *et al.* teaches what is claimed in claim 131. He explained that consideration of the Mohan *et al.* reference alone would be a one-sided portrayal of the prior art which lacked probative value since it had not been subjected to the scrutiny of the adversarial process. The ALJ then construed the claim in view of the specification, other claims of the '039 patent and the testimony of experts. In their petition

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[11] Complainant's submission on the violation issues under review and on remedy, the public interest, and bonding was prepared by its in-house counsel, who does not have access to the confidential record.

[12] While respondents argued that an exclusion order would not be in the public interest, their submission did not address the type of remedial order(s) or the amount of the bond to be posted by respondents during the Presidential review period.

[13] Respondents repeatedly stated to the ALJ that they would not challenge the validity of the patents in issue in this investigation. ID at 39.

for review, respondents took issue with the ALJ's construction of the word "rotating" in claim 131. They contended that the word "rotating" in the context of claim 131 must mean "rotational transformation" and not "phase shifting" as the ALJ found.

Because the ALJ refused to consider the Mohan *et al.* reference to determine its relevance, if any, to the issue of interpretation of claim 131 of the '039 patent, the Commission determined to review the issues of interpretation of claim 131 of the '039 patent and infringement of that claim in light of that interpretation, and to request briefs from the parties on the following specific questions:

> The U.S. Court of Appeals for the Federal Circuit stated in *Markman v. Westview Instruments, Inc.*, 52 F.3d 967, 34 USPQ2d 1321 (Fed. Cir. 1995)(*en banc*) *aff'd* __ U.S. __, 116 S.Ct. 1384, 64 U.S.L.W. 4263 (April 23, 1996):
>
> > "Extrinsic evidence may demonstrate the state of the prior art at the time of the invention. It is useful 'to show what was then old, to distinguish what was new, and to aid the court in the construction of the patent.'"
>
> *Markman*, supra at 34 USPQ2d 1330 (citation omitted).
>
> Relying only upon the excerpts of record from the Mohan *et al.* reference (X-182C):
>
> 1. Explain with regard to claim 131, how, if at all, the Mohan *et al.* reference may be used to demonstrate the state of the prior art at the time of the claimed invention; *i.e.*, how, if at all, the Mohan *et al.* reference may be used to show what was old at the time of the '039 invention, in order to distinguish what was new. Explain in detail how, if at all, the Mohan *et al.* reference should be used to aid in interpreting claim 131.
>
> 2. What are the differences, if any, between what the Mohan *et al.* reference discloses to one of ordinary skill in the art at the time of the claimed invention and the invention of claim 131, as interpreted by the ALJ?
>
> 3. What are the differences, if any, between what the Mohan *et al.* reference discloses to one of ordinary skill in the art at the time of the claimed invention and the invention of claim 131, as interpreted by respondents?

A. The Claim in Question

Claim 131 of the '039 patent reads as follows:

A method for converting electricity generated by a variable speed wind turbine into fixed frequency output electricity, wherein the wind turbine includes a generator and means for supplying generated electricity to [a] power converter that includes a switched inverter supplying the output electricity, the method comprising the steps of:

forming a reference waveform;

rotating the reference waveform by a selected power factor angle to yield a template waveform;

using the template waveform to define desired output currents; and

controlling the switched inverter to produce output currents corresponding to the desired output currents.

(Emphasis added.)

B. Respondents' Position on the Review Questions

Respondents presented a detailed technical background of the prior art, the patented technology, and respondents' accused device; however, they provided few citations to the record for their technical background, and for that reason it sheds little light on the issues under review. Respondents contend that the word "rotating" as used in claim 131 means "rotational transformation" when the claimed invention is viewed in light of the prior art, and that the ALJ erred by refusing to consider the Mohan *et al.* prior art.[14]

Respondents argue that Mohan *et al.* describes "switch-mode DC-to-AC inverters" used to shape AC current prior to placement onto a power grid, and that Mohan *et al.* devotes all of Chapter 6 to "switch-mode DC-to-AC inverters" which perform current shaping, a term not involved in the subject claim. Respondents state that these switch-mode DC-to-AC

[14] Respondents offered into evidence three prior art publications in support of their argument that "rotating" could not possibly include all forms of phase shifting. These publications were not a part of the prosecution history of the patent before the PTO, and only one of the publications, excerpts from the power electronics textbook by Mohan *et al.*, was admitted into evidence by the ALJ. In their petition for review, respondents did not address the issue of whether the ALJ correctly excluded the other two exhibits, nor did they otherwise seek to appeal the ALJ's exclusion of these exhibits. The ALJ ruled RX-4 (the Ooi article) and RX-9 (the Thoborg article) inadmissible because of their late production to complainant and to the IA. (Order No. 22, page 2.) The ALJ also struck from the record any testimony concerning these exhibits (*Id.* n.2).

inverters make use of the particular type of switching transistor (an insulated-gate bipolar transistor (I.G.B.T.)) that is employed in the preferred embodiment of both the '039 patent and the accused devices. The use of I.G.B.T.'s is not, however, a limitation of claim 131. Respondents note that Mohan *et al.* teaches that there are a number of methods by which the switching transistors may be instructed to shape alternating current into preferred waveforms, and that the reference teaches that a power electronic interface is needed "to connect renewable energy sources such as ... wind ... to the utility system."[15] They also note that Mohan *et al.* teaches that a variable speed generator turbine, like that of the '039 patent, optimizes the efficiency of power generation, and that the variable frequency alternating current output from the wind-driven generator may be rectified into DC and then interfaced with a utility source by means of a switch-mode converter "of the type discussed in chapter 6 [of Mohan *et al.*]."[16] Respondents assert that Mohan *et al.* reveals the method used by respondent Enercon to perform the current shaping of its interface to the utility grid (tolerance-band-control inverter).[17] They state that Mohan *et al.* explicitly teaches one of ordinary skill in the art how to effect the shaping and phase shifting of current waveforms derived from electricity produced by wind turbines for placement on a utility power grid. Respondents argue that the term "rotating" distinguishes claim 131 from respondents' accused devices "and, for purposes of maintaining validity, potentially from all processes that went before it."[18]

C. The IA's Position on the Review Questions

The IA states that respondents' argument poses the question of whether the scope of a patent claim can be altered by extrinsic evidence. He asserts that, under *Markman v. Westview Instruments, Inc.*, 34 USPQ2d 1321 (Fed. Cir. 1995)(*en banc*), extrinsic evidence (i.e., all evidence other than the patent and its prosecution history) cannot be used to vary or contradict the terms used in a claim, and that it is a matter of discretion for the trier of fact whether to utilize extrinsic evidence to understand the technological background of the invention and the meaning ascribed to claim terms by persons of ordinary skill in the art. The IA argues that the ALJ properly exercised his discretion in refusing to consider the Mohan *et al.* reference. He asserts that, while Mohan *et al.* could have been used to show the state of the prior art at the time of the '039 invention, it does not assist the ALJ in understanding the meaning of the disputed claim term. The IA also states that Mohan *et al.*

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[15] Respondents' Opening Brief in response to the Commission's Order dated July 17, 1996 (ROB) at 8.

[16] *Id.*

[17] ROB at 7.

[18] ROB at 11.

does not make any reference to the use of inverters in a variable speed wind turbine.[19] He contends that although Mohan *et al.* describes the need for a power electronics interface in connection with a variable speed wind turbine to convert DC to AC, and although the reference states generally that the DC to AC conversion may be accomplished by means of a *switch-mode* converter, it does not suggest which type of converter to use. The IA also notes that respondents rely on Chapter 17 of Mohan *et al.* as demonstrating the required phase shifting, but that complainant's expert Zavadil stated in his expert report that the converter disclosed in Chapter 17 operates predominately in the rectifier mode (changing AC to DC) instead of the required inverter mode (changing DC to AC). The IA states that the converter used in claim 131 is required to be current controlled and that Chapter 6 of Mohan *et al.* provides both current and voltage controlled inverters and gives no guidance as to which inverter would be appropriate for use with variable speed wind turbines.[20]

The IA argues that Mohan *et al.* fails to disclose the ability to select any power factor angle (leading, lagging, or zero), thereby supplying or absorbing selectable amounts of reactive power, which, according to the IA, is a key feature of the claimed invention.[21] He notes the 1995 edition (as distinct from the 1989 edition) of the Mohan *et al.* book[22] describes recent advances in connection with renewable energy resources such as wind turbines and he characterizes the 1995 edition of Mohan *et al.* as stating that the ability to selectively adjust the power factor in the context of renewable energy sources such as wind turbines is new.[23]

The IA states that courts are not permitted to read limitations from the specification into the claims, and that the Commission would be doing just that by interpreting the term "rotating" to mean "rotational transformation." The IA emphasizes that Mohan *et al.* does not provide any assistance in understanding the meaning of the disputed terms of art used in claim 131; specifically, the reference does not teach that "rotate" means "rotational transformation" to one of ordinary skill in the art or that "rotating" means "phase shift."

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[19] IA's Brief in Response to Notice of Commission Decision to Review Portion of the ID (IA's Brief) at 16.

[20] IA's Brief at 19.

[21] IA's Brief at 20.

[22] Exhibit CX-123 (admitted into evidence by ALJ Order No. 22). The '039 patent was filed on February 1, 1991 and issued on January 21, 1992. Thus, the 1995 edition of the Mohan *et al.* text is not prior art.

[23] We note that this excerpt pertains to thyristor inverters and not I.G.B.T. inverters, which are employed in the wind turbines of both complainant and respondents.

D. Analysis

The primary issue before the Commission with regard to the Mohan *et al.* reference is claim interpretation. It would be improper for the Commission to consider patent validity where, as here, validity has not been raised as a defense by one of the parties. [24]

Patent infringement analysis involves two steps: (1) construction of the meaning and scope of the asserted claim, and (2) determination of whether the accused product infringes the properly construed claim.[25] The first step, claim interpretation, is a matter of law, which is reviewed *de novo*.[26]

In construing claims, a court has numerous sources that it may look to for guidance. The court should first look to the intrinsic evidence of record, *i.e.*, the patent itself, including the claims, the specification, and, if in evidence, the prosecution history.[27] Such intrinsic evidence is the most probative for giving legally operative meaning to the disputed claim language.[28]

Extrinsic evidence is to be used for the court's understanding of the patent, not for the purpose of varying or contradicting the terms of the claims.[29] Extrinsic evidence is not to be used for purposes of resolving --

> [a]mbiguity, undue breadth, vagueness, and triviality [which] are matters that go to claim validity for failure to comply with 35 U.S.C. § 112 - ¶ 2, not to interpretation or construction. . . . This does not mean there is never a need for extrinsic evidence in a patent infringement suit. A judge is not usually a person conversant in the particular technical art involved and is not the hypothetical person skilled in the art to whom a patent is addressed. Extrinsic evidence, therefore, may be necessary to inform the court about the language in which the patent is written. But this evidence is not for the purpose of

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[24] *Lannom Manufacturing Company, Inc. v. United States Intn'l Trade Comm'n*, 799 F.2d 1572 (Fed. Cir. 1986).

[25] *Markman v. Westview Instruments, Inc.*, 52 F.3d 967, 976, 34 USPQ2d 1321, 1326 (Fed. Cir.) (*en banc*) (aff'd. __ U.S. ___, 116 S.Ct. 1384, 64 U.S.L.W. 4263 (April 23, 1996).

[26] *Markman*, 34 USPQ2d at 1329.

[27] *Id.*

[28] *Vitronics Corp. v. Conceptronic, Inc.*, __ USPQ2d ____, ____ (Fed. Cir. 1996)(Docket No. 96-1058, July 25, 1996).

[29] *Markman*, 34 USPQ2d at 1331.

> clarifying ambiguity in claim terminology. It is not ambiguity in the document that creates the need for extrinsic evidence but rather unfamiliarity of the court with the terminology of the art to which the patent is addressed.[30]

The accused infringing device plays no role in the claim interpretation stage of the analysis.[31] The focus in construing disputed terms in claim language is on the objective test of what one of ordinary skill in the art at the time of the invention would have understood the term to mean.[32]

It is well settled that a court may, in its discretion, admit and rely on prior art proffered by one of the parties, whether or not cited in the specification or the prosecution history. This prior art can often help to demonstrate how a disputed term is used by those skilled in the art. "[P]rior art references may . . . be more indicative of what all those skilled in the art generally believe a certain term means. Once again, however, reliance on such evidence is unnecessary, and indeed improper, when disputed terms can be understood from a careful reading of the public record."[33] While the effect of the prior art on the scope of the claims in controversy is to be considered, use of the prior art should not be a "camouflaged or backhanded attack on the validity of the patent in suit."[34]

The only term in dispute in claim 131 is the word "rotating." In concluding that "rotating," as used in claim 131, means "phase shifting," the ALJ looked to the testimony of experts and those of ordinary skill in the art. He noted that Mr. Jito Coleman, chief technology officer of respondent New World, testified that, in the context of the '039 patent, "rotating" means "phase shifting." Mr. Zavadil, complainant's expert, and the inventor, Dr. Erdman, also testified that they understood "rotating" to mean "phase shifting."[35]

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[30] *Markman*, 34 USPQ2d at 1335.

[31] *SRI International v. Matsushita Electric Corp. of America*, 227 USPQ 577, 583 (Fed. Cir. 1985).

[32] *Markman*, 34 USPQ2d at 1335.

[33] *Vitronics Corp. v. Conceptronic, Inc.*, __ USPQ2d ____, ____ (Fed. Cir. 1996)(Docket No. 96-1058, July 25, 1996) (*citing Kearns v. Chrysler Corp.* 32 F.3d 1541, 1547 (Fed. Cir. 1994)). *See also Tandon Corp. v. International Trade Comm'n*, 831 F.2d 1017, 1021, 4 USPQ2d 1283, 1286 (Fed. Cir. 1987).

[34] *Thomas & Betts Corp. v. Litton Systems, Inc.*, 720 F.2d 1572, 1580 (Fed. Cir. 1983) *(citing Bendix Corp. v. U.S.*, 600 F.2d 1364, 1373, 204 USPQ 617, 624 (Ct.Cl. 1979)) .

[35] We note that the Federal Circuit has stated in *Markman* that the inventor's own testimony on the proper construction to be given the claims is entitled to "no deference," *Markman* 34

(continued...)

The ALJ also looked to dependent claim 136 (which depends from claim 134, a claim dependent on claim 131) and noted that claim 136 calls for "**periodically calculating** the template waveform" as opposed to "rotating." (Emphasis added.) The ALJ stated that claim 136 appears to be narrowed in a way that brings it closer to the preferred embodiment of the specification since phase shifting calculations are performed periodically, every 125 microseconds.[36] The ALJ observed that dependent claims, when properly drafted, are, by their nature, less inclusive than the independent claims from which they depend, citing *In re Johnson*, 589 F.2d 1070, 1080 (C.C.P.A. 1978).[37]

Under the doctrine of claim differentiation, where there are two claims and one claim recites an element in generic terms and the other recites the same element in specific terms, the first claim will not be limited to the more specific term in the second claim. To do so would result in impermissibly treating one of the two claims as redundant.[38] At the same time, however, it has long been recognized that "claims may be multiplied . . . to define the metes and bounds of the invention in a variety of different ways. . . . Thus two claims which read differently can cover the same subject matter."[39] We agree with the ALJ that the use of "periodically calculating" in dependent claim 136 lends further support to the conclusion that the term "rotating," as used in claim 131, is to be construed more broadly than just "rotational transformation."

The specification of the '039 patent, though it teaches a rotational transformation implemented on a digital signal processor to perform the required phase shift, does not define the word "rotating." In the absence of any definition in the specification of "rotating," or any suggestion that the inventor sought to assign to this term anything but its ordinary and accustomed meaning, that is the meaning that must be given to the term. [40] While claims

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[35] (...continued)
USPQ2d at 1332. However, the Federal Circuit has stated subsequent to *Markman* that an inventor's testimony may be used when it is cumulative to the other evidence. *Hoechst Celanese Corporation v. B. Chemicals Limited*, 78 F.3d 1575, 1580 (Fed. Cir. 1996).

[36] ID at 35.

[37] Additional support for the ALJ's analysis is found in U.S. Patent and Trademark Office rule 1.75(c), which provides: "one or more claims may be presented in dependent form, referring back to **and further limiting** another claim or claims in the same application (emphasis supplied)." 37 C.F.R. § 1.75(c).

[38] *See, Tandon Corp. v. U.S. International Trade Commission*, 831 F.2d 1017, 1023, 4 USPQ2d 1283, 1288 (Fed. Cir. 1987).

[39] *Id.*

[40] *Athletic Alternatives v. Prince Manufacturing*, Inc. 37 USPQ2d 1365,1370 (Fed. Cir.
(continued...)

are to be read in light of the specification, and with a view toward ascertaining the invention, limitations from the specification may not be read into the claims.[41]

The case of *Kearns v. Chrysler Corp.*[42] is instructive, since it addressed the question of claim interpretation in view of a prior art reference where validity was not in issue. In *Kearns*, Chrysler attempted to introduce prior art patents, ostensibly for the purpose of aiding the court in interpreting the claims at issue, although it had expressly stipulated that it would not assert patent invalidity as a defense. Chrysler argued that Kearns' interpretations of the claims would make them impermissibly broad in that they would read on, or be rendered obvious in view of, the prior art. The district court, however, construed the claims according to their plain meaning and refused to consider the prior art references, characterizing them as a "back-door attack" on the validity of the patents.[43] The Federal Circuit affirmed the district court, noting that the lower court's reasoning adequately supported its refusal to admit the proffered evidence. The Federal Circuit commented that the fact that it might have reached a different result, or might have affirmed had the district court decided the case the other way, were insufficient bases for reversal under the abuse of discretion standard applicable to this part of the court's judgment.[44]

Unlike the district court judge in *Kearns*, the ALJ in this investigation did not construe the disputed claim term of the claim in issue according to its "plain meaning." Instead, he considered some extrinsic evidence, viz., the testimony of experts, to understand the meaning of "rotating" in the context of claim 131. We believe the better approach would have been to consider the Mohan *et al.* reference along with all the other extrinsic evidence of record to determine whether Mohan *et al.* is useful in demonstrating the state of the prior art at the time of the invention, *i.e.*, to determine what was then old, to distinguish what was new, and to aid the decision maker in construction of the patent. At the same time, where validity is not in issue, we are cognizant that the prior art must not be used in a way that amounts to a "back-door attack" on the validity of the patent.

We have carefully considered the excerpts of record from the Mohan *et al.* reference as they pertain to claim interpretation. We agree with the IA that Mohan *et al.* does not provide any direct guidance on how to interpret the claim term in dispute, *i.e.*, it does not tell us what the term "rotating" means to one of ordinary skill in the art in the context of

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[40] (...continued)
1995), *Intellicall v. Phonometrics, Inc.*, 21 USPQ2d 1383, 1386 (Fed. Cir. 1992).

[41] *Sjolund v. Musland*, 6 USPQ2d 2020, 2027 (Fed. Cir 1988).

[42] 32 F.3d 1541 (Fed. Cir. 1994)

[43] *Kearns*, 32 F.3d at 1547.

[44] *Id.*

claim 131 of the '039 patent. We note that Chapter 16 of Mohan *et al.* briefly mentions that a power electronics interface is needed to connect renewable energy sources such as wind to the utility grid. The text does observe that, in order to obtain optimal energy transfer, wind driven turbines may allow the generator speed to vary according to the wind speed. Mohan *et al.* also teaches that variable frequency AC output from a variable speed wind-driven generator may first be converted to DC and then reconverted to AC "by means of a switch mode converter [sic] of the type discussed in Chapter 6."[45] Several different types of switch mode inverters are discussed in Chapter 6. However, Chapter 6 does not suggest which type of inverter should be incorporated in a variable speed wind driven generator application. Nor do any of the inverters of Chapter 6 suggest that one may rotate the reference waveform by a selected power factor, as that term was interpreted by the ALJ in claim 131.[46]

Respondents point to Chapter 17 for additional support that Mohan *et al.* anticipates claim 131. However, the section of Chapter 17 referred to by respondents (17-6-4), describes control of switch mode converters which operate predominately in the rectifier mode (converting AC to DC).[47] Mohan *et al.* suggests the use of these circuits for bi-directional power flow applications in connection with motor drives with regenerative braking, not wind energy conversion. It thus appears that there are significant differences between what Mohan *et al.* teaches and the invention of claim 131 as interpreted by the ALJ.

Respondents' analysis focuses on a single claim term, "rotating." A claim, however, must be read as a whole and all of the limitations of the claim must be present, either explicitly or inherently, in order for a prior art reference to invalidate a claim. Respondents assert that "rotating" must not mean all forms of phase shifting because the specification only discloses rotational transformation.[48] They fail to note, however, that the function of a patent specification is to enable a person skilled in the art to make and use the invention;[49] the

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[45] Mohan *et al.* at 404.

[46] With regard to the claim limitation "by a selected power factor angle," the ALJ concluded that the term means that a power factor angle may be chosen from a range of possible values (including an angle of zero) and, further, that the power factor angle can be changed at intervals or continuously. ID at 42.

[47] For example, the figure shown on page 9 of respondents' brief is a block diagram representation of a control circuit for regulating rectified (DC) voltage V_d at its reference value V_d*.

[48] Respondents Reply Brief (RRB) at 3.

[49] 35 U.S.C. § 112 ¶ 1 provides: The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, (continued...)

specification "does not delimit the right to exclude. That is the function and purpose of claims."[50] We are satisfied that the ALJ's construction of claim 131 of the '039 patent would not change in view of the Mohan *et al.* reference. We agree with the ALJ that testimony of experts and those of ordinary skill in the art is helpful in order to understand the meaning of the disputed claim term. The record is clear that the term "rotating" in the context of claim 131 means shifting the phase angle of a waveform to persons of ordinary skill in the art.[51] Read in context, the term is not ambiguous, it is simply broad. As the ALJ noted, "rotating" encompasses rotational transformation but is not limited to it. We therefore affirm the ALJ's claim interpretation and infringement analysis, as modified by this opinion.[52] Accordingly, we find a violation of section 337 in this investigation.

E. COMPLAINANT'S RECENT CHAPTER 11 BANKRUPTCY

Although the Commission, by determining not to review the portion of the ID finding a domestic industry, has already determined that a domestic industry exists in this investigation, we revisit this issue now in order to consider how complainant's changed financial circumstances may bear upon it. The existence of a domestic industry also bears on the question of whether complainant should be required to report periodically on its exploitation of the patented technology.

In order to prove a violation of section 337 in a patent-based case, the complainant must show that "an industry in the United States, relating to the articles protected by the patent, . . . exists or is in the process of being established."[53] In other words, there are two domestic industry requirements: (a) that an industry exists, or is in the process of being established, and (b) that the industry practices the patent at issue. In order to meet the first requirement, the so-called economic prong of the domestic industry test, an industry must satisfy the criteria set out in section 337(a)(3), which states:

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[49] (...continued)
and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same, and shall set forth the best mode contemplated by the inventor of carrying out his invention.

[50] *Markman*, 34 USPQ2d at 1330.

[51] ID at 29-32.

[52] We note that the ALJ's infringement analysis was based, in the alternative, on evidentiary sanctions imposed for respondents repeated failure to produce compelled discovery, an issue respondents did not address in their petition for review

[53] 19 U.S.C. § 1337(a)(2).

> [A]n industry in the United States shall be considered to exist if there is in the United States, with respect to the articles protected by the patent, copyright, [registered] trademark, or mask work concerned --
>
> (A) significant investment in plant and equipment;
>
> (B) significant employment of labor or capital; or
>
> (C) substantial investment in its exploitation, including engineering, research and development, or licensing.

The domestic industry requirement is met by satisfying any one of the three criteria listed above.[54] There is no requirement in the statute that an industry must be of any particular size.[55]

In his final ID, the ALJ found the existence of a domestic industry based on (1) the exploitation by complainant's KVS-33 wind turbine of claim 131 of the '039 patent, and (2) complainant's activities related to the manufacture of the KVS-33 at its facility in Livermore, CA.[56] In addition, it was stipulated by the parties that the KVS-33 practices claim 131 of the '039 patent.[57]

1. The Economic Prong of the Domestic Industry Requirement

Complainant's economic circumstances have changed significantly since the ALJ issued his final ID. As noted above, complainant filed a voluntary petition for reorganization under Chapter 11 of the U.S. Bankruptcy Act on May 29, 1996. The ALJ did not receive notice of the bankruptcy prior to the issuance of his final ID and thus was not able to consider the effect of complainant's bankruptcy filing and changed economic circumstances in his domestic industry analysis.[58] According to the August 6, 1996, declaration of complainant's general counsel, James Eisen, complainant is currently operating as a debtor-in-possession in

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[54] *Certain Concealed Cabinet Hinges and Mounting Plates*, Inv. No. 337-TA-289, Comm'n Op. at 19-20 (1990).

[55] *In re Von Clemm*, 229 F.2d 441, 444, 43 C.C.P.A. 56, 59, 108 USPQ 371, 373 (1955).

[56] The ALJ noted that a domestic industry need not exist with respect to claim 51 of the '712 patent since he determined there was no infringement of the '712 patent. He found, however, that complainant had demonstrated the existence of a domestic industry with respect to the '712 patent. ID at 72.

[57] ID at 72.

[58] *See* n.7, *supra*.

the case.[59] Mr. Eisen also represented in his declaration that, as of August 5, 1996, complainant employed **** persons, **** of whom were engaged in the design, engineering, and manufacturing of power converters. He stated that complainant is continuing to manufacture and remanufacture components for power converters and other subassemblies of installed 33M-VS wind turbines.[60] Mr. Eisen does not state whether the 33M-VS wind turbine is the same as or similar to the KVS-33, upon which the ALJ's domestic industry analysis is based. However, the complaint filed in this investigation indicates that the 33M-VS and the KVS-33 are the same product.[61] Mr. Eisen represented that complainant may sell its manufacturing business as a going concern and is presently in the process of negotiating with the unsecured creditors committee about the terms of such a sale, and identifying prospective purchasers.[62] In an earlier filing with the bankruptcy court, complainant represented that it was --

> **formerly** in the business of manufacturing utility-scale wind powered electric power plants ("windplants") and providing operation and maintenance services with respect to those Windplants. [Complainant] recently ceased its manufacturing and developing activities but continues to provide operation and maintenance services to approximately 4,600 wind turbines throughout the world.[63]

Mr. Eisen does not state that complainant continues to engage in the manufacture of the subject wind turbines.[64] The ALJ's findings on the economic prong of the domestic industry requirement, *i.e.*, his findings concerning complainant's manufacturing activities, significant investment in plant and equipment, significant employment of labor and capital, substantial

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[59] Declaration of James J. Eisen on Behalf of Complainant Kenetech Windpower, Inc. Regarding Respondent's Opening Brief, dated August 6, 1996, ¶ 6.

[60] Declaration of James J. Eisen on Behalf of Complainant Kenetech Windpower, Inc. Regarding Respondent's Opening Brief, dated August 6, 1996, ¶ 10.

[61] Complaint, ¶ 2.2.

[62] ID at ¶ 11.

[63] "Emergency Motion for Order (1) Approving Rejection of Executory Contracts Relating to Windplant Operations; and (2) Approving New Interim Maintenance and Operation Agreements," Case No. 96 44426T, United States Bankruptcy Court Northern District of California. ROB, Exhibit P at page 2 (emphasis supplied).

[64] The ALJ rejected respondents' arguments that he should confine his domestic industry analysis to only those investments and activities shown to pertain to the wind turbine's inverter. ID at 70.

investment in engineering, research, and development, all relate to the KVS-33 wind turbine.[65]

As the ALJ noted, the domestic industry determination is not made by application of a rigid formula and is no longer confined to those portions of the domestic production facilities that manufacture under the patent in controversy.[66]

2. The Technical Prong of the Domestic Industry Requirement

It is clear from complainant's submissions in this investigation and complainant's submissions to the bankruptcy court that it has discontinued development and manufacture of windplants. Mr. Eisen states that complainant is continuing to operate and maintain 19 windplants, and is continuing to manufacture and assemble power converters and other subassemblies of installed 33M-VS wind turbines. While it appears that complainant has, at least for now, ceased manufacturing the KVS-33, there is evidence that it is still exploiting claim 131 of the '039 patent by operating and maintaining its 33M-VS wind turbines,[67] and by manufacturing and remanufacturing power converters and subassemblies of the 33M-VS turbines.[68]

3. Analysis

In *Battery-Powered Ride-On Toy Vehicles*,[69] the patent owner, who clearly had a domestic industry when the invention was developed and patented, had stopped practicing his patent because sales had declined, and was producing new, improved, *Toy Vehicles* by the time the final ID issued. The Commission concluded that complainant was still entitled to relief because of its past extensive research and development expenditures, as well as its inventory of patented products, which were still being sold as replacement parts.[70] The same reasoning would appear to apply with respect to complainant's past activities in this

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[65] ID at 72-75.

[66] For an example of the domestic industry analysis under section 337 prior to the 1988 amendments, *see In re Certain Caulking Guns*, 223 USPQ 388, 409 (1984).

[67] Mr. Eisen has stated that complainant continues to operate and maintain 33M-VS variable speed wind turbines installed at various locations throughout the United States. Declaration of James J. Eisen dated July 30, 1996 at 4; Declaration of James J. Eisen dated August 6, 1996 at 4-5. As noted above, paragraph 2.2 of the complaint states that Kenetech's model KVS-33 was formerly designated as the 33M-VS.

[68] *Id.* at ¶ 10.

[69] Inv. No. 337-TA-314, ID, December 5, 1990 (partly unreviewed, Judge Saxon).

[70] *Id.* at 19-21.

investigation, *i.e.*, a domestic industry can be found based on complainant's past activities in exploiting the '039 patent. While there have been circumstances where not practicing the patent claim in issue for a significant time has defeated a section 337 investigation,[71] we note that in this case it has only been a matter of several months, at most, since the ALJ found that complainant was, in fact, exploiting the '039 patent. Because it has been only a matter of months since complainant ceased its manufacturing activities with respect to the KVS-33, and because of complainant's substantial investment in plant and equipment, significant employment of labor and capital, and substantial investment in engineering, research and development related to the patented technology,[72] as well as evidence that it continues to exploit the patent (albeit in a more limited fashion), we reaffirm our determination that there is a domestic industry in this investigation.

As discussed below, however, we have issued a limited exclusion order containing a quarterly reporting requirement to monitor complainant's practice of claim 131 of the '039 patent. If it becomes clear from its reports that complainant has suspended or ceased practice of claim 131, the Commission will consider whether to suspend or revoke the exclusion order, as may be appropriate.

II. REMEDY, THE PUBLIC INTEREST, AND BONDING

A. The RD

The ALJ issued a recommended determination (RD) on remedy and bonding on June 12, 1996, in which he recommended that the Commission issue a limited exclusion order prohibiting the importation of Enercon wind turbines and components that infringe claim 131 of the '039 patent.[73] He noted that there is no evidence of a significant U.S. inventory of infringing Enercon wind turbines that would provide a basis for the issuance of a cease and desist order and thus did not recommend that the Commission issue such an order.

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[71] *See Certain Grain Oriented Silicon Steel* (Docket No. 1479, complaint filed in December 1988). In *Silicon Steel*, the Commission refused to institute a patent-based section 337 investigation where complainant's most recent activities devoted to exploitation of the technology covered by the patent in question had occurred more than 8 years prior to filing the complaint.

[72] ID at 73-75.

[73] The ALJ noted that the Enercon E-40 wind turbines are covered by claim 131 of the '039 patent, and that the parties stipulated that there are no differences between the Enercon E-40 and E-30 model wind turbines that affect the infringement analysis. RD at 4, n.1.

The ALJ also recommended that the bond to be posted by respondents during the Presidential review period be set in the amount of 100 percent of the entered value of the article concerned.

In making his recommendations, the ALJ was not able to take into account the fact that complainant has filed for bankruptcy reorganization, since his RD issued before the Commission received notice of complainant's bankruptcy filing.

B. The Parties' Arguments on Remedy, the Public Interest, and Bonding

1. The IA's Position

The IA argues that the appropriate remedy in this case is a limited exclusion order directed to variable speed wind turbines and components thereof that infringe claim 131 of the '039 patent and are manufactured and/or imported by, or on behalf of, respondents.

The IA also recommends that the amount of the bond during the Presidential review period be set at 100 percent of the entered value of such variable speed wind turbines or components thereof. The IA bases the 100 percent figure on the ALJ's findings that Enercon's E-40 gearless wind turbines, though they are more expensive initially than complainant's KVS-33 wind turbines, are cheaper to operate over time. The IA notes, in accord with the ALJ's RD, that a bond reflecting a straight price comparison would not accurately reflect the factors that would motivate prospective purchasers to choose one machine over another, and that in cases where no reliable pricing information is available, the Commission has imposed a 100 percent bond.[74]

The IA submits that both uptower and downtower components should be included in the Commission's exclusion order. The IA notes that respondents argued that discovery related to "uptower" components is irrelevant because it is the Enercon "grid management system" that performs the method accused of infringing claim 131.[75] The IA points out, however, that the ALJ imposed as an evidentiary sanction for respondents' failure to produce discovery that "uptower and downtower components constitute an integral unit, and that both sets of components are encompassed in the term 'variable speed wind turbines and components

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[74] *See, e.g., Certain Wire Electrical Discharge Machining Apparatus and Components thereof, Inv.* No. 337 -TA-290, *Comm'n Op. at 20 (Mar 16, 1990); Certain Amorphous Metal Alloys and Amorphous Metal Articles*, Inv. No. 337-TA-143, USITC Pub. at 11-12 (November 1984).

[75] We note that respondents have not raised the argument that the exclusion order should be limited to downtower components in their briefs on remedy, the public interest, and bonding.

thereof.'"[76] The IA recommends against issuance of a cease and desist order because there is no evidence of record that respondent New World, the domestic respondent and importer, has any U.S. inventory of infringing articles.

The IA argues that exclusion of respondents' infringing imports would not be contrary to the public interest, stating that testimony from respondent New World establishes that wind turbines from other manufacturers have been installed by New World and that these other wind turbines will continue to be available to U.S. consumers, including New World, should the Commission issue an exclusion order.[77] He also argues that the amount of electricity generated from wind power constitutes only a small percentage of the electricity consumed in the United States and that changes in state and Federal laws in recent years have resulted in reduced subsidies for renewable energy resources, such as wind-generated electricity.

In response to the Commission's question concerning the relevance, if any, of complainant's bankruptcy reorganization to the question of remedy, the IA notes the declaration of James J. Eisen, Kenetech's general counsel, that Kenetech continues to manufacture power converters for variable speed turbines and to operate and maintain variable speed wind turbines located at various locations in the United States. The IA argues that Kenetech's financial difficulties should not preclude issuance of an exclusion order in this investigation. However, in view of complainant's bankruptcy filing, the IA suggests that complainant be required to report to the Commission on a quarterly basis regarding the extent of its business activities, including any plans to discontinue its domestic production of articles protected by the patent in issue, so that the Commission can determine whether modification or termination of the exclusion order is appropriate at some point in the future.

2. Complainant's Position

Complainant requests that the Commission issue an order excluding the subject articles from entry into the United States and cease and desist orders prohibiting respondents from engaging in unfair acts in the importation of such articles. Complainant does not offer any explanation as to why these remedies would be appropriate and does not discuss respondents' bond during the Presidential review period. Complainant does state, however, that the pendency of its Chapter 11 bankruptcy reorganization should not affect the issuance of a remedy because complainant "is continuing to manufacture power converters for variable speed wind turbines in the ordinary course of its business and is continuing to operate and

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[76] Order No. 17 (January 24, 1996) at 20.

[77] IA's reply brief at 8-10.

maintain variable speed wind turbines in the United States."[78] Complainant also states that it may sell its manufacturing business as a going concern and that it is presently identifying third parties who may be interested in purchasing various aspects of its business and patented technology.[79]

3. Respondents' Position

Respondents argue that the public interest does not favor issuance of an exclusion order because of the exceptional capability of respondent Enercon's imported wind turbines to meet the growing U.S. demand for such devices. They state that U.S. consumers should not be deprived of Enercon's superior gearless wind turbines,[80] particularly in light of complainant's weakened financial condition and bankruptcy, and reports of the frequent mechanical failure of complainant's KVS-33 wind turbine.[81] Respondents also note that complainant represented in a filing before the bankruptcy court on May 29, 1996, that it has ceased all manufacturing of wind turbines.[82] They assert that, other than complainant, there is no significant manufacturer of wind turbines in the United States and that U.S. consumers would be effectively deprived of an important alternative energy source.[83] Respondents also contend that an exclusion order should not be issued because of the importance to U.S. consumers of having available renewable energy resources, such as electricity from wind turbines, in contrast to electricity generated by burning fossil fuels, which results in air pollution, acid rain, and possibly global warming.[84]

4. Submissions from Other Interested Parties

As noted above, the Commission received submissions in opposition to the issuance of an exclusion order from the Texas Utilities Electric Company, which has entered into a contract to purchase electricity generated using Enercon E-40 wind turbines from an affiliate of respondent New World Power Company; from Mr. Don Bain, an individual who

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[78] Declaration of James J. Eisen, General Counsel, Vice-President and Secretary of complainant Kenetech Windpower, Inc., dated July 30, 1996.

[79] *Id.*

[80] Despite the alleged superiority of their Enercon E-40 wind turbine, respondents have consistently maintained that they have yet to make a sale of the device in the United States.

[81] Complainant's KVS-33 is the product found by the ALJ to practice claim 131 of the '039 patent and upon which the economic prong of complainant's domestic industry determination is based.

[82] ROB at Exhibit P.

[83] ROB at 13, 23-25.

[84] ROB at 14-22.

represents that he has been involved in the wind energy industry since 1975; and from Mr. Paul Gipe, a wind energy analyst and author. The Texas Utilities Electric Company states that, if it is prohibited from purchasing the Enercon model E-40 wind turbines, the electric service that it provides to its customers will be less competitive, less reliable, and more costly. It states that Kenetech's bankruptcy is evidence that the wind power industry, although flourishing elsewhere in the world, is in decline in the United States, and that the viability of its 40-megawatt wind power project in Big Spring, Texas will be lessened if an exclusion order is issued against Enercon.[85]

Mr. Bain's submission states that the U.S. wind industry is currently in a precarious position and that the domestic industry does not have the size or capital to overcome barriers, such as historically low gas[86] prices, "deregulation,"[87] and the restructuring of electric utilities. He states that domestic use of wind technology, regardless of the country of origin of that technology, will provide direct benefits to U.S. citizens in the form of employment, an increased tax base in rural counties, land rent in depressed areas, and decreased pollutants from domestic use of fossil fuels. He also accuses complainant Kenetech of using litigation as a tool to undermine legitimate competition in the wind power business.

Mr. Gipe's letter emphasizes environmental concerns, competitive disadvantages to the U.S. wind power industry, and increased costs to U.S. consumers, all of which he says will result if the Commission should issue a remedy in this investigation.

C. Analysis

Where a violation of section 337 has been found, the Commission must consider the issues of remedy, the public interest, and bonding. Under subsections 337(d) and (f), the Commission may issue an exclusion order, a cease and desist order, or both, depending on the circumstances. The Commission has broad discretion in selecting the form, scope, and extent of the remedy in a section 337 proceeding.[88] The Commission may make factual

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[85] On February 28, 1994, New World submitted its bid for the Texas Utilities project in Big Spring, Texas, stating its intention to use Enercon E-40 wind turbines. ID at 11. It is this project that formed the basis for the allegations of importation of infringing articles in the complaint. *See* Complaint, pages 1 and 6. This transaction also formed the basis for the ALJ's conclusion that there has been a sale for importation within the meaning of section 337. *See* ID at 19.

[86] Mr. Bain does not make clear whether he is referring to natural gas or gasoline. We presume he means natural gas.

[87] Mr. Bain does not specify what "deregulation" is of concern to him.

[88] Viscofan, S.A. v. United States International Trade Commission, 787 F.2d 544, 548 (continued...)

determinations in the remedy phase of a section 337 investigation, to the extent necessary, in order to reach its determination, which may be based on the evidence of record, or on the basis of submissions of the parties on remedy, the public interest, and bonding.[89]

1. REMEDY

a. The Exclusion Order

There are two types of exclusion orders: general exclusion orders and limited exclusion orders. A general exclusion order instructs the U.S. Customs Service to exclude from entry all articles which infringe the involved patent, without regard to source. It is the broadest type of relief available from the Commission, potentially extending beyond the parties and articles involved in the investigation. Therefore, the Commission exercises caution in issuing general exclusion orders and requires that certain conditions be met before one is issued.[90] No evidence has been presented in this investigation which would provide a basis for issuance of a general exclusion order and none of the parties has requested the issuance of such an order. A limited exclusion order instructs the Customs Service to exclude from entry all articles which infringe the involved patent claims and that originate from a firm that was a party to the Commission investigation. The ALJ has recommended the issuance of a limited exclusion order directed to variable speed wind turbines and components thereof covered by claim 131 of the '039 patent, and manufactured and/or imported by or on behalf of Enercon GmbH of Aurich, Germany and/or The New World Power Corporation of Lime Rock, Connecticut. Complainant and the IA concur. We agree that a limited exclusion order is appropriate in this investigation. Respondent Enercon has been found to be actively

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[88] (...continued)
(Fed. Cir. 1986) (affirming Commission remedy determination in Certain Processes for the Manufacture of Skinless Sausage Casings and Resulting Products, Inv. Nos. 337-TA-148/169, USITC Pub. 1624 (December 1984)); Hyundai Electronics Industries Col, Ltd. v. U.S. International Trade Commission, 899 F.2d 1204 (Fed. Cir. 1990) (affirming Commission remedy issued in Certain Erasable Programmable Read-Only Memories, Components Thereof, Products Containing Such Memories, and Processes for Making Such Memories, Inv. No. 337-TA-276, USITC Pub. 2196 (May 1989)).

[89] Sealed Air Corporation v. U.S. Int'l Trade Comm'n, 645 F.2d 976 (C.C.P.A. 1981).

[90] These conditions were set forth by the Commission in Certain Airless Paint Spray Pumps, Inv. No. 337-TA-90, 216 U.S.P.Q. 465 (ITC 1981), where the Commission stated that it would "require that a complainant seeking a general exclusion order prove both a widespread pattern of unauthorized use of its patented invention and certain business conditions from which one might reasonably infer that foreign manufacturers other than the respondents to the investigation may attempt to enter the U.S. market with infringing articles." 216 USPQ at 473.

engaged in the manufacture of articles that infringe claim 131 of the '039 patent. It has also been found that a sale for importation has taken place between respondent Enercon and respondent New World, and there is no indication that such activities will be halted in the absence of a remedy from the Commission. As the ALJ noted in his RD, during the course of the investigation it became more and more certain that an importation of infringing goods would occur.[91] We have therefore determined to issue a limited exclusion order prohibiting the entry into the United States of variable speed wind turbines and components thereof covered by claim 131 of the '039 patent, and manufactured and/or imported by or on behalf of Enercon GmbH of Aurich, Germany and/or The New World Power Corporation of Lime Rock, Connecticut.

b. Type of Entry

As the Commission stated in Certain Devices for Connecting Computers Via Telephone Lines,[92] although the Commission's remedial authority is quite broad, it has applied this authority "in measured fashion and has issued only such relief as is adequate to redress the harm caused by the prohibited imports."[93] Complainant has provided no evidence in this investigation that it is likely to be affected by entries other than for consumption of the accused infringing wind turbines. We therefore determine that the limited exclusion order be directed to entries for consumption only.

c. Cease and Desist Order

A cease and desist order is an order to a person who was a party to the Commission investigation to cease its unfair acts. Unlike an exclusion order, it is enforced by the Commission, through the courts, not by the Customs Service. The Commission normally issues cease and desist orders when the evidence indicates that the respondents have in U.S. inventory a "commercially significant" amount of infringing imported product which they can sell, thus undercutting the effect of any exclusion order.[94] In this investigation, there is no evidence that respondents maintain a commercially significant inventory of infringing imported product. We have therefore determined not to issue a cease and desist order.

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[91] RD at 4.

[92] Inv. No. 337-TA-360, Commission Opinion, December 12, 1994

[93] *Id.* at page 9.

[94] *See, e.g.*, Certain Crystalline Cefadroxil Monohydrate, Inv. No. 337-TA-293, USITC Pub. 2391 (March 15, 1990)

2. THE PUBLIC INTEREST

Prior to issuing relief, the Commission is required to consider the effect of such relief on the public health and welfare, competitive conditions in the U.S. economy, the production of like or directly competitive articles in the United States, and U.S. consumers.[95] If a proposed remedy, based on a violation of section 337, is found by the Commission not to be in the public interest, then the proposed remedy will not be ordered.

The Commission has found the public interest concerns to be overriding in only three cases to date. In *Certain Automatic Crankpin Grinders,*[96] the Commission found issuance of an exclusion order would deprive the domestic automotive industry of a tool needed to supply the domestic market with parts for fuel efficient automobile engines. In *Inclined Field Acceleration Tubes,*[97] the Commission determined that continuing basic atomic research using high quality imported acceleration tubes was an overriding public concern and declined to issue an exclusion order. In *Fluidized Support Apparatus,*[98] the Commission found that the domestic manufacturer was unable to meet the demand for the patented hospital beds for burn patients and that no comparable product was available.

By contrast, in *Telecommunication Chips,*[99] the Commission held that the public interest considerations did not preclude the issuance of a remedy, since the infringing tone dialer chips and low end telephone sets which were to be excluded were not products that impacted on the general health and welfare, and complainant and its licensees, and other manufactures of like goods, had sufficient manufacturing capacity to supply the needs of U.S. consumers. The Commission also stated that the public interest in protecting intellectual property rights of complainants in section 337 proceedings outweighed the added expense encountered by domestic manufacturers or the harm to their competitive positions by being prevented from disposing of their inventories of cheap infringing telecommunication chips.[100]

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[95] 19 U.S.C. §§ 1337(d) and (f).

[96] Inv. No. 337-TA-60 (1978).

[97] Inv. No. 337-TA-67, USITC Pub. No. 1119 (1980).

[98] Inv. No. 337-TA-182/188, USITC Pub. No. 1667 (1984)

[99] Inv. No. 337-TA-337 (1993), Comm. Op. at 38-39.

[100] *Accord: Acid-Washed Denim Garments and Accessories*, Inv. No. 337-TA-324 (1992) (general exclusion order issued); *Plastic Encapsulated Integrated Circuits*, Inv. No. 337-TA-315 (1992) (limited exclusion order issued despite arguments that relief would undermine U.S. competitiveness, threaten U.S. jobs, cripple customers requiring product, including defense contractor); *Tape Dispensers*, Inv. No. 337-TA-354 (ITC Pub. 2786 (1994).

As noted above, complainant and the IA argue that the issuance of relief in this case would not be contrary to the public interest.

With regard to the submission of Texas Utilities Electric Company, the Commission has previously rejected the plea of a domestic concern for special treatment based on hardship that would result to it in the event an exclusion order were entered.[101] In *Microwave Filters*, the Commission reiterated the holding of *Telecommunication Chips* that the public policy of enforcing valid U.S. intellectual property rights overrides a request for an exception to an exclusion order based on hardship.

We find nothing here which would distinguish the request for an exception to an exclusion order based on hardship made by Texas Utilities Electric Company from the request for an exception made by the domestic manufacturer in *Microwave Filters*. According to Jito Coleman, respondent New World's chief technical officer, Vestas Wind System's model V-39 wind turbine could be substituted for the infringing Enercon E-40 in the Texas Utilities Electric Company project at Big Spring, Texas.[102] Michael Best, executive vice president of New World, testified that the Vestas turbine would be the next choice after the Enercon E-40 and would not add to the cost of the project.[103] Thus, any difficulty encountered by the Texas Utilities Electric Company as a result of the exclusion of the Enercon E-40 appears not to be serious enough to jeopardize the project for which the infringing wind turbines were intended. We also note that the Texas Utilities Electric Company has had ample notice of the pendency of this investigation and an opportunity to make alternative plans to protect itself in advance of the issuance of a remedy in this investigation.

The Commission has not previously addressed the kind of environmental public interest concerns raised by respondents and other interested parties in determining whether to issue a remedy in a section 337 investigation. We have carefully considered the arguments of respondents and Messrs. Bain and Gipe that an exclusion order should not be issued because of the importance to U.S. consumers of having available renewable energy resources, such as electricity from wind turbines, in contrast to electricity generated by burning fossil fuels. We do not find, however, that issuance of a limited exclusion order would adversely affect the public interest. As the IA has noted, there are manufacturers other than complainant and respondent that can provide comparable wind turbines to the U.S. market.

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[101] *Certain Dielectric Miniature Microwave Filters and Multiplexers Containing Same*, Inv. No. 337-TA-359 (Microwave Filters).

[102] IA's Reply brief at 9.

[103] *Id.*

While Congress has made it clear that the public interest test of section 337 should not reintroduce the requirement of efficient and economic operation of an industry in intellectual property-related investigations,[104] the Commission is mindful of the fact that it is being requested to issue an exclusion order to protect a complainant currently in bankruptcy and not presently engaged in manufacturing the product that formed the basis for the domestic industry determination. Complainant has represented that it is may sell its manufacturing business as a going concern, and protection of the '039 patent via a limited exclusion order may have a bearing on its ability to complete a sale of these assets in the bankruptcy. The coming months will be critical for complainant and the likelihood of its success in Chapter 11 will become clearer as complainant attempts to put together a plan of reorganization.

3. BONDING

Section 337(j)(3) provides for the entry of infringing articles upon the payment of a bond during the 60-day Presidential review period.[105] The bond is to be set at a level sufficient to "protect complainant from any injury" during the Presidential review period.[106] We agree with the ALJ and IA that respondents' bond in this investigation should be set in the amount of 100 percent of the entered value of the infringing wind turbines because of the difficulty in quantifying the cost advantages of respondents' imported Enercon E-40 wind turbines and because of price fluctuations due to exchange rates and market conditions.[107]

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[104] In 1988, Congress eliminated the injury and efficient and economic operation requirements of section 337 for, *inter alia*, patent-based investigations. *See* Omnibus Trade and Competitiveness Act of 1988, Pub. L. 100-418 (Aug. 23, 1988).

[105] 19 U.S.C. § 1337(e); 19 C.F.R. § 210.50(a)(3).

[106] *Id.*

[107] *See, e.g.*, *Certain Wire Electrical Discharge Machining Apparatus and Components thereof, Inv.* No. 337 -TA-290, *Comm'n Op. at 20 (Mar 16, 1990); Certain Amorphous Metal Alloys and Amorphous Metal Articles*, Inv. No. 337-TA-143, USITC Pub. at 11-12 (November 1984).

PUBLIC VERSION

UNITED STATES INTERNATIONAL TRADE COMMISSION
Washington, D.C.

In the Matter of	)	
	)	
CERTAIN VARIABLE SPEED WIND TURBINES AND COMPONENTS THEREOF	)	Investigation No. 337-TA-376
	)	

INITIAL DETERMINATION
Administrative Law Judge Sidney Harris

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UNITED STATES INTERNATIONAL TRADE COMMISSION
Washington, D.C.

In the Matter of	)	
	)	
CERTAIN VARIABLE SPEED WIND TURBINES AND COMPONENTS THEREOF	)	Investigation No. 337-TA-376
	)	

INITIAL DETERMINATION
Administrative Law Judge Sidney Harris

Pursuant to the Notice of Investigation, 60 Fed. Reg. 28167 (Tuesday, May 30, 1995), this is the Administrative Law Judge's Initial Determination in the Matter of Certain Variable Speed Wind Turbines and Components Thereof, United States International Trade Commission Investigation No. 337-TA-376. 19 C.F.R. § 210.42(a).

The Administrative Law Judge hereby determines that a violation of section 337 of the Tariff Act of 1930, as amended, has been found in the importation or sale for importation of certain variable speed wind turbines and components thereof by reason of infringement of claim 131 of U.S. Letters Patent 5,083,039.

The Administrative Law Judge hereby determines that there is no violation of section 337 of the Tariff Act of 1930, as amended, in the importation or sale for importation of certain variable speed wind turbines and components thereof by reason of infringement of claim 51 of U.S. Letters Patent 5,225,712.

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I. BACKGROUND

A. PROCEDURAL HISTORY

By publication in the Federal Register on May 30, 1995, this investigation was instituted pursuant to an Order of the United States International Trade Commission which issued on May 23, 1995, after consideration of a complaint filed on April 21, 1995 on behalf of Kenetech Windpower, Inc. ("Kenetech"), 6952 Preston Avenue, Livermore, California 94550. 60 Fed. Reg. 28167-28168 (1995); 19 C.F.R. § 210.10(b).

The Commission's Order required that pursuant to subsection (b) of the Tariff Act of 1930, as amended, an investigation be instituted to determine whether there is a violation of 19 U.S.C. § 1337(a)(1)(B) in the importation into the United States, the sale for importation, or sale within the United States after importation of certain variable speed wind turbines and components thereof, by reason of infringement of claim 131 of U.S. Letters Patent 5,083,039 or claim 51 of U.S. Letters Patent 5,225,712, and whether there exists an industry in the United States as required by 19 U.S.C. § 1337(a)(2). Id.

The Commission named Kenetech as the Complainant, and the following companies as Respondents:

Enercon GmbH
Dreekamp 5, D-26605
Aurich, Germany

The New World Power Corporation
558 Lime Rock Road
Lime Rock, Connecticut 06039.

Thomas S. Fusco, Esq. of the Office of Unfair Import Investigations ("OUII") was designated as the Commission Investigative Attorney.

On June 23, 1995, a preliminary conference was held at which Kenetech, Enercon GmbH ("Enercon"), The New World Power Corp. ("NWP" or "New World"), and OUII were represented. Kenetech, Enercon, New World and OUII remain the only parties in this investigation.

On October 19, 1995, Order No. 11 issued, denying Respondents' motion to terminate this investigation for lack of subject matter jurisdiction.

On January 24, 1996, Order No. 17 issued, granting in part and deferring in part Complainant's motion for sanctions. Additional sanctions are contained below in this Initial Determination in section IV of the opinion on the issue of infringement.

On January 26, 1996, Order No. 18 issued, denying Respondents' motion for summary determination, and denying Complainant's cross-motion for summary determination on the issue of importation or sale for importation.

On January 30, 1996, Order No. 19 issued, denying Complainant's motion for partial summary determination with respect to domestic industry.

On March 1, 1996, Complainant's Motions 376-30, -31, -32 to admit certain exhibits were granted in Order No. 20.

On May 3, 1996, in Order No. 22, Respondents' Motion 376-33 to admit certain exhibits was granted in part, and OUII's Motion 376-35 to admit certain exhibits was granted.

On May 23, 1996, in Order No. 23, Respondents' Motion No. 376-36 to reopen the record to admit their expert witness's deposition as an exhibit was denied.

Any motions not previously ruled upon are hereby denied.

The hearing in this investigation commenced on January 31, 1996, and concluded on February 7, 1996. All parties were represented at the hearing. The Commission's personal jurisdiction over the parties has not been contested.

This Initial Determination is based on the entire record of this proceeding. Proposed findings not herein adopted, either in form or in substance, are rejected as not being supported by the evidence or as involving immaterial matters.

The findings of fact include references to supporting evidentiary items in the record. Such references are intended to serve as guides to the depositions, exhibits, and testimony supporting the findings of fact; they do not necessarily represent complete summaries of the evidence supporting each finding. Some findings of fact are contained only in the opinion.

The following abbreviations are used in this Initial Determination:

ALJX - Administrative Law Judge's Exhibit

CX - Complainant's Exhibit (followed by its number and the reference page(s)).

CPX - Complainant's Physical Exhibit

RX - Respondents' Exhibit (followed by its number and the reference page(s)).

RPX - Respondents' Physical Exhibit

SX - Commission Investigative Staff ("OUII") Exhibit

X - Exhibit used during deposition, subsequently relied on by any party

FF - Finding of Fact

Dep. - Deposition

Tr. - Transcript.

B. TECHNICAL BACKGROUND

In an alternating current ("AC") electric power system, the current and voltage vary with time, and the variations of current or voltage may be plotted as a function of time. When that is done the variations may be represented as a sine wave. FF I 1.

A single cycle of a sine wave begins with an amplitude of zero, increases to its maximum positive value, decreases to zero and then to its maximum negative value, and then finally increases to zero to complete the cycle. FF I 2. A complete cycle of the sine function in a fixed frequency system can be defined in terms of time or as 360 degrees. FF I 4. In North American power systems, the number of cycles completed by an AC current (or voltage) every second is sixty. Thus measured in Hertz (Hz), the frequency is 60 Hz. FF I 3.

The current that corresponds to the power generated or consumed is said to be "in phase" with the voltage if the current waveform and the voltage waveform are arranged so that the peaks and zero crossing points of the two waveforms are coincident. FF I 6. If the peak and zero crossing point of the current waveform occurs prior to the peak and zero crossing point of the voltage waveform, there is a time difference between the zero crossing points, and the current is said to be "leading" the voltage. FF I 7. If the peak of the current waveform occurs after the peak of the voltage waveform, there is a time difference between them and the current is said to be "lagging" the voltage. FF I 8.

The time difference between two sinusoidal fixed frequency waveforms is conventionally referred to as a phase shift. FF I 9. In the electric power industry, the phase difference is referred to as phi (ϕ), or the "power factor angle." FF I 10.

If the voltage and current waveforms are in phase, all of the power delivered is composed of "real," or usable, power. FF I 11. If the voltage and current waveforms are out of phase, a portion of the overall or apparent power consists of "reactive power." FF I 12.

The relationship between real power, reactive power, and power factor angle (or phi) can be demonstrated through the use of a right triangle. One leg of the right triangle represents the real component of the electrical power present, while the other leg of the triangle represents the reactive component of the electrical power present. The hypotenuse of the right triangle represents the "apparent" power. The power factor angle is represented by the angle between the real component and the apparent power. The power factor angle represents the time difference between the grid voltage and the current that is out of phase. FF I 13. The "power factor" is defined as the cosine of the power factor angle phi (ϕ). FF I 14.

Utilities transmit electrical energy from generating facilities to end users through utility power grids. FF I 5. Utility companies prefer to supply power at a unity power factor, i.e.,with the current and voltage exactly in phase. FF I 15. However, loads on a utility power grid often tend to pull the current out of phase with the voltage. FF I 16. Shifting a current waveform so that it is intentionally leading the voltage waveform provides the ability to offset or cancel out currents that are lagging the voltage. FF I 17.

Loads on a utility power grid may require reactive power to facilitate their operation, and management of reactive power is an important concept behind operating electric power systems. FF I 19.

Increasing phi while maintaining the real power at a constant value will increase the time difference between the current and voltage waveforms, and will cause an increase in the reactive power and the apparent power. Decreasing phi while maintaining the real power at a constant value will decrease the time difference between the current and voltage waveforms, and will cause a decrease in the reactive power and the apparent power. FF I 20.

Wind turbines have particular characteristics as concerns the supplying of power to a utility grid. In a constant speed wind turbine, rotational speed of the blades is generally dictated in some manner by the frequency of the grid to which the turbine is connected. However, in a variable speed wind turbine that restriction is removed, and the wind turbine blades can operate at a range of rotational speeds that are not necessarily related to the frequency of the utility grid. Therefore, in a constant speed wind turbine that is directly connected to a grid in North America, the frequency of the output electricity will be 60 Hz. However, in a similarly employed variable speed wind turbine, the output electricity of the turbine is not automatically restricted to 60 Hz. FF I 21.

One of ordinary skill in the art relevant to this investigation is an individual with at least a Bachelor's degree in a technical engineering field such as electrical engineering, and three to five years of wind turbine and/or utility experience. FF I 24.

II. SALE FOR IMPORTATION AND IMPORTATION

Section 337 declares various acts to be unlawful, including the following:

> The importation into the United States, the sale for importation, or sale within the United States after importation by the owner, importer, or consignee, of articles that --

(i) infringe a valid and enforceable United States patent ....

19 U.S.C. § 1337(a)(1)(B).

The statute also provides that such acts "when found by the Commission to exist shall be dealt with, in addition to any other provision of law ...." 19 U.S.C. § 1337 (a)(1).

Indeed, this investigation was instituted to determine, in part, whether there is a violation of section 337 "in the importation into the United States, the sale for importation, or the sale within the United States after importation" of accused products. 60 Fed. Reg. 28167-28168 (1995).

Complainant and OUII take the position that Respondents have violated section 337, and that the Commission may issue a remedy because a sale for importation has occurred of accused devices, i.e., model E-40 wind turbines made in Germany. They also argue that the importation of accused devices is imminent or "incipient" thereby conferring upon the Commission the ability to issue a remedy against Respondents.

Respondents take the position that no sale of accused devices has occurred between them, and further that the Commission has no authority over "incipient acts" when sale for importation or importation has not actually occurred.

A. There Has Been a Sale for Importation

1. The Definition of a Sale

The term "sale" is not defined within section 337. As held by the Supreme Court, "[i]n the absence of such a definition, we construe a statutory term in accordance with its ordinary or natural meaning." FDIC v. Meyer, 510 U.S. -- , 114 S.Ct. 996, 1001 (1994) (relying on Black's Law Dictionary).

Black's Law Dictionary states that "[t]he general law governing the sale of goods is the Uniform Commercial Code (Art. 2)."[1] Therefore in consideration of U.C.C. § 2-106(1), a "sale" of the accused products shall be found if it is determined that Respondents have entered into a contract for the accused products.

Section 2-204(1) of the U.C.C. provides that "a contract for the sale of goods may be made in any manner sufficient to show agreement, including conduct by both parties which recognizes the existence of such a contract ... even though the moment of its making is undetermined." Accord Restatement (Second) Contracts § 19 (1981)("Restatement")("The manifestation of assent may be made wholly or partly by written or spoken words or by other acts or by failure to act." Restatement § 19(1)).

The Court of Appeals for the Federal Circuit has held that the terms of a contract must be definite enough so that a court may: (1) determine whether the parties in fact intended to contract at all; and (2) determine when a breach has occurred and formulate an appropriate remedy. Aviation Contractor Employees, Inc. v. United States, 945 F.2d 1568, 1572 (1991)(citing, inter alia, Restatement § 33). However, even an agreement which specifies that certain terms will be agreed on by future negotiation is sufficiently definite because it impliedly places an obligation on the parties to negotiate in good faith. 945 F.2d at 1572.

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[1] In their briefs, Respondents and OUII have relied to some extent on the provisions of the Uniform Commercial Code to argue the question of whether or not there has been a sale for importation. Furthermore, Complainant has had admitted into evidence a portion of the U.C.C., i.e., U.C.C. § 2-305 (CX-134).

2. Discussion of the Facts and Application of the Law

In this case, there is a long and well-established course of conduct, including contemporaneous writings, that demonstrates the existence of a contract between New World and Enercon for the sale of accused model E-40 wind turbines for importation into the United States.

In mid-1993, New World was considering a number of projects, including one in the state of Washington. At that time and until late last year, the president of NWP's grid power division was Mr. Brian Clare Lees. He was in charge of the building and operating of NWP's wind farms. FF II 4. Mr. Lees wrote to Enercon in mid-1993 to request a price quotation for 100 E-40 wind turbines. FF II 9.

In a document dated August 18, 1993, which was sent to Mr. Lees, Enercon made an offer to sell New World a quantity of 100 E-40 wind turbines at a price of [ ] per machine, to be delivered on the west coast of the United States. The offer stated that it remained valid until March 31, 1994. FF II 6, 7. The offer was signed by Mr. Aloys Wobben, as well as Ms. Juanita Fromme. FF II 6. Mr. Wobben is the owner and manager of Enercon, and the designer of Enercon's E-40 wind turbines. FF II 1. Ms. Fromme is the head of Enercon's export division. FF II 2.

There is no evidence that New World accepted Enercon's specific August 18, 1993 offer to sell 100 wind turbines to NWP for delivery on the west coast. In fact, New World did not pursue the project in Washington. FF II 9. However, the offer set a precedent for the sale price of [ ] per E-40 wind turbine when sold in the quantity of 100. See FF II

38. Furthermore, the experience that Enercon and NWP had with the August 1993 price quotation and offer to sell, established channels of business communications which were used for the continued dealing between the two companies.

On September 20, 1993, shortly after receiving Enercon's offer, Mr. John Kuhns and Mr. Lees traveled to Aurich, Germany to meet with Mr. Wobben and Ms. Fromme. Mr. Kuhns is the founder, chairman and CEO of New World. FF II 3. The topics discussed during the September 1993 meeting included the advantages of the E-40 technology. FF II 12.

On February 10, 1994, Mr. Kuhns and Mr. Lees of NWP made another trip to Germany to meet with Mr. Wobben, accompanied by Mr. Mickey Craig of Westinghouse. FF II 13. Westinghouse is a shareholder in New World, and a company representative is a member on NWP's board of directors. Westinghouse and New World also have a business alliance under which Westinghouse will serve as NWP's construction manager on certain projects. FF II 14.

Following the February 1994 meeting in Germany involving New World, Westinghouse and Enercon, Ms. Fromme sent two communications of record concerning the meeting.

In a letter dated February 15, 1994, Ms. Fromme thanked Mr. Kuhns for his visit and stated, in part: "We once again would like to point out that we will be prepared to fulfil your requirements starting in 1995 as discussed and are looking forward to a most fruitful and long-term relationship with you and your organization." FF II 17.

Ms. Fromme also sent a telefax message dated February 16, 1994 to Mr. Mark

Haller, who in mid-February 1994, began working for Enercon in the United States. He reported to Mr. Wobben and to Ms. Fromme. His office is the U.S. sales office of Enercon. FF II 15, 16. Ms. Fromme informed Mr. Haller of the "price details as discussed on February 10th 1994 ...." The price structure detailed in Ms. Fromme's message to Mr. Haller was such that 100 E-40 wind turbines cost [ ] each.

As with the earlier quotation from Enercon, the price was for turbines imported from Germany. FF II 18. This price was, however, quoted in connection with a Texas Utilities project in Big Spring, Texas. FF I 19.

At New World, the price quoted by Enercon was passed on to Mr. Michael Best, executive vice president of New World in charge of project financing. He is responsible for overseeing the "business package" for bids New World has submitted on domestic wind energy projects. FF II 19, 20.

On February 28, 1994, shortly after New World and Westinghouse representatives made their trip to Germany, New World submitted its bid for the Texas Utilities project in Big Spring, Texas. In the bid, New World stated its intention to use Enercon E-40 wind turbines. FF II 22.

On March 14, 1994, Mr. Haller reported to Mr. Wobben and Ms. Fromme that Messrs. Lees and Best of New World wanted him to attend a meeting with Texas Utilities representatives. Mr. Haller was encouraged by Enercon to attend. FF II 23.

On April 8, 1994, Mr. Haller reported to Mr. Wobben and Ms. Fromme that he met with representatives of New World, Westinghouse and Texas Utilities. FF II 24. When he visited Texas Utilities, he answered technical questions about the E-40. FF II 25.

In May 1994, Mr. Wobben, Ms. Fromme and Mr. Haller, all of Enercon, met with Mr. Kuhn and Mr. Lees at New World's headquarters in Connecticut to discuss future activities in the United States, including the Big Spring, Texas project. Also in May 1994, Mr. Haller reported to Mr. Wobben about the customs duty that would placed on the E-40 wind turbines upon importation. FF II 27, 28.

On June 1, 1994, Mr. Haller reported in a memorandum to Ms. Fromme[2] that it appeared the entire Texas Utilities bid would be awarded to New World Power. He stated in part, as follows:

> Congratulations are probably already in order for an eighty machine sale! Ausgezeichnet! *Now we have to deliver them.*

FF II 29 (emphasis added).

On June 3, 1994, Mr. Haller reported in a memorandum sent by facsimile to Ms. Fromme that the entire 40 megawatt Texas Utilities project had been awarded to New World. He stated in part, as follows:

> The good news is that all of it went to New World. No one else. Forty megaWatts to *NWP/Westinghouse/Enercon*. *We* won!
>
> ***
>
> Also, TU has sent letters to the nine other companies that bid and announced to them that it is *NWP/Enercon*. By Monday, the entire industry will know.

FF II 30 (emphasis added).

In response to Mr. Haller's June 2, 1994 memo, Ms. Fromme conveyed Enercon's

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[2] Mr. Haller often communicated with Ms. Fromme at Enercon because she is his conduit to Enercon generally, and to Mr. Wobben in particular. FF II 26, 33.

elation at hearing the news, as well as congratulations and thanks. FF II 31.

The evidence discussed above and further discussed below shows that prior to the summer of 1994 an agreement had been reached between New World and Enercon for Enercon to sell New World the E-40 wind turbines for the Big Spring, Texas project. The parties had formed a contract and thus a sale had been made.

Unlike New World's previous experience with the project in the state of Washington for which NWP initially received a price quotation, NWP not only got the same price quotation on wind turbines for the Big Spring, Texas project, it subsequently made a bid for the project based on the use of Enercon machines. While is not clear from the evidence whether New World accepted the price quoted by Enercon for the E-40, NWP was nonetheless encouraged to base its bid on the use of Enercon machines.

A price need not be specified at the time that a contract is entered into if the parties otherwise intend for a sale to take place. It is clear that no question of price prevented the parties in this case from forging ahead with their plans to have Enercon supply wind turbines for the Big Spring, Texas project. After the May 1994 meeting in Germany, Enercon remained a participant in discussions with New World, Westinghouse and Texas Utilities about the Big Spring, Texas project. When it appeared that New World and Westinghouse would be awarded the project, Enercon's sales representative in the United States stated that all that was left to do was to make delivery of the turbines. By the summer of 1994, Enercon's sales representative in the United States realized that a successful bid meant that "we" won. In fact, Enercon's sales representative quite correctly wrote in terms of "NWP/Westinghouse/Enercon" and "NWP/Enercon" inasmuch as Enercon expected to

participate in the Big Spring, Texas project along with New World and Westinghouse.

The conduct of New World Power and Enercon that shows the existence of a contract between them continued, through 1994 and into 1995. In addition, they have left no doubt that at least some of the turbines to be supplied by Enercon would be imported.

On July 22, 1994, there was a meeting of Enercon, New World and Westinghouse representatives in Germany. Mr. Wobben, Ms. Fromme and Mr. Haller attended on behalf of Enercon. During the meeting it was stated that the inverters of the E-40 are to come from Germany. FF II 36. In fact, Mr. Wobben testified at his deposition and at the hearing that although he wanted to set up a United States manufacturing facility, even if those plans proceeded, at least the first Enercon machines would be imported from Germany. FF II 37.

In September 1994, New World and Texas Utilities signed an energy purchase agreement which provides that unless agreed otherwise by the parties in writing, all wind turbines supplied by New World must be Enercon model E-40. FF II 39.

In October 1994, Mr. Kuhns, the CEO of New World, visited Mr. Wobben and Ms. Fromme in Germany. FF II 40. Although the parties had been discussing matters for some time, Ms. Fromme requested during the meeting that Mr. Kuhns prepare a document setting forth a more formal indication of New World's intent to purchase E-40 wind turbines. Consequently, Mr Kuhn had drawn up and signed during the meeting a document dated October 17, 1994, which is captioned: "Purchase Order for 140 Enercon E 40 Wind Turbines for Texas and California." While Ms. Fromme may not have suggested use of the term "purchase order," she suggested the form of the document. The document states that New World "is pleased to confirm, subject to the conditions below, its purchase order for a

total of 140 E-40 turbines." FF II 40-44.

With respect to the Big Spring, Texas project, the purchase order signed by Mr. Kuhns provides that NWP's purchase is conditioned upon the approval by the Texas Public Utilities Commission of the deal reached with Texas Utilities, and the confirmation of financing. FF II 45.

The existence of a contract between the parties for the sale of imported E-40 wind turbines is not dependent upon the existence of the October 17, 1994 purchase order from New World to Enercon. Indeed, there is no evidence that the document was intended to serve as an integrated writing that memorializes the extent of the agreement between the parties. Nevertheless, the purchase order should been seen for what it was intended to be, which is written evidence directed to Enercon of New World's commitment to buy Enercon's E-40 wind turbines for the Big Spring, Texas project.

Respondents argue that the purchase order from New World for 140 E-40 wind turbines was signed only by Mr. Kuhns of New World, and that it was never accepted by Enercon. Quoting from Foremost Pro Color, Inc. v. Eastman Kodak Co., 703 F.2d 534, 538 (9th Cir. 1983), cert. denied, 465 U.S. 1038 (1984), Respondents take the position that such a purchase order is not an enforceable contract. Respondents' Post-Hearing Br. at 2-3.

The case relied on by Respondents does not diminish the significance of the purchase order. In Foremost, the Court of Appeals for the Ninth Circuit stated: "The weight of authority is that purchase orders such as those at issue here are not enforceable contracts until they are accepted by the seller." 703 F.2d at 538. However, the purchase order in this case is dissimilar to those at issue before the Ninth Circuit in Foremost.

Unlike the purchase orders in Foremost, the purchase order signed by Mr. Kuhn was not unsolicited. Rather, it was executed at Enercon's request to formalize and confirm the discussions that had already taken place between New World and Enercon. Furthermore, in Foremost, the Ninth Circuit, applying California law based on the U.C.C., stated that while a court is permitted to find an enforceable contract in the absence of a written agreement, the conduct cited by the plaintiff in that case was insufficient to find that a contract existed. The facts in this case even without the existence of the purchase order weigh heavily in favor of a finding that Enercon and New World agreed to the sale of E-40 wind turbines by Enercon to New World. The Purchase Order merely adds further weight to the evidence.

Respondents argue that because the October 17, 1994 purchase order contains unfulfilled conditions, there has been no sale.

Section 224 of the Restatement provides as follows:

> A condition is an event, not certain to occur, which must occur, unless its non-occurrence is excused, before performance under a contract becomes due.

Thus, for example, a contract may provide that the obligations of the parties are conditioned upon the buyer obtaining financing. That is a classic case of contracting parties agreeing to qualify a duty under a contract. However, such conditions do not negate the formation of a contract. See Restatement § 224, comments a and c.

In this case, the fact that New World did not want Enercon's wind turbines if it could not use them in the Big Spring, Texas project, or could not pay for them, does not indicate that the parties failed to agree to the sale of the turbines. In view of the applicable law which allows contract formation even in the presence of conditions on the duties of the

parties, such as the ability of the buyer to obtain financing, the conditions attached to the October 17, 1994 purchase order do not defeat the existence of a contract between New World and Enercon for the sale of wind turbines.

Furthermore, at least one of the conditions of the purchase order is now fulfilled, and the other may be completely or substantially fulfilled under the terms of the purchase order. Specifically, on February 23, 1996, the Texas Public Utilities Commission approved the energy purchase agreement between New World and Texas Utilities. FF II 53. In addition, New World has accepted a proposal from Chemical Securities to raise the capital needed to finance the Big Spring project. FF II 54. It is not clear from the record, however, whether Chemical Securities has in fact raised the needed capital.

Respondents also argue that there has been no sale, relying on the provision of the purchase order concerning price.

The October 17, 1994 purchase order states that: "The price of each E 40 shall be as mutually agreed between New World and Enercon, subject to being stipulated by November 30, 1994." It has not been shown that a price was stipulated by the parties by that date.

However, the U.C.C. provides that parties may conclude a contract for sale even though the price is not settled, and further that the price will be determined to be a reasonable price at the time for delivery if the price is left to be agreed by the parties and they fail to agree. U.C.C. § 2-305.[3] At the hearing Mr. Wobben testified that Mr. Kuhns

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[3] Although U.C.C. § 2-305 (Open Price Term) provides that in some cases the parties may intend not to be bound unless a price can first be fixed or agreed, in other cases, the parties can intend and "conclude a contract for sale even though the price is not settled." In such cases, the price is a "reasonable price at the time for delivery," if: (footnoted con't)

and he agreed that the prices would be determined at a later date.[4] FF II 47. In this case, the parties may have agreed at their October 1994 meeting to settle on a definite price by November 30, 1994, and may have failed to do so. Yet, there is no indication that the parties intended to halt their deal if the price was not settled by that date. The parties were planning to have Enercon ship its turbines to the United States even before Mr. Kuhn agreed to draw up his October 17, 1994 purchase order.

In fact, the events following the execution and receipt of the purchase order add further weight to a finding of a contract between the parties, as New World and Enercon continued to act in anticipation of the award of the Big Spring, Texas project and Enercon's participation in it.

Near the end of 1994, Enercon investigated the cost involved in shipping 25 E-40 wind turbines to Big Spring from Germany. FF II 49.

On February 2, 1995, Ms. Martina Kuhlmann, Mr. Wobben's executive assistant, reported to Mr. Haller that Mr. Wobben directed Ms. Fromme to work with Westinghouse to prepare materials for the American Wind Energy Association ("AWEA") conference in March 1995. FF II 51.

(a) nothing is said as to price; or

(b) the price is left to be agreed by the parties and they fail to agree; or

(c) the price is to be fixed in terms of some agreed market or other standard as set or recorded by a third person or agency and it is not so recorded.

[4] At a meeting in Germany, Mr. Wobben told Mr. Kuhns of New World Power that if New World wanted Enercon machines in Texas, Enercon would provide them on a cost effective basis. FF II 59.

A few weeks before the conference, Ms. Fromme provided a model of the E-40 for the New World/Westinghouse booth at the AWEA conference. Subsequently, the booth at the AWEA conference had one poster depicting the Enercon E-40, and another describing the Big Spring project and its expected use of E-40 wind turbines. FF II 52, 53.

3. Conclusion

Based upon the evidence on the issue of sale for importation, including the parties' writings and their conduct, the Administrative Law Judge finds that the evidence demonstrates, by more than a preponderance, that Respondents New Word and Enercon have entered into a contract for the sale and importation of accused devices. Therefore, there has been a "sale for importation" of accused devices as provided for in section 337.

B. Imminent Importation and the Prevention of Unfair Acts in Their Incipiency

Complainant and OUII argue that the Commission may issue a remedy against Respondents in this investigation because of the imminent importation of articles that allegedly infringe at least one of the patent claims at issue. In arguing that the Commission may take action against a respondent for the "imminent importation" of infringing goods, Complainant appears to argue that a sale for importation need not necessarily have occurred.

Prior to the amendment of section 337 by the Omnibus Trade and Competitiveness Act of 1988, the statute did not have the express "sale for importation" provision currently contained therein. Rather, the statute provided in pertinent part as follows:

> Unfair methods of competition and unfair acts in the importation of articles into the United States, or in their sale by the owner, importer, consignee, or agent of either ... are declared unlawful ....

However, in cases arising under the former provisions of section 337, the

Commission determined that it had the authority to prevent unfair acts prior to importation.

In Certain Apparatus for the Continuous Production of Copper Rod, Inv. No. 337-TA-89, a foreign respondent had entered into an agreement with a domestic respondent for the sale of a continuous copper rod system. At the time of the temporary relief phase of the investigation, only portions of the complete system for practicing the accused process had been delivered. The Commission found, however, that it had authority over the respondents and could issue relief, if otherwise required, because as in the case of the Federal Trade Commission Act, section 337 conferred upon the Commission the authority to reach unfair acts "in their incipiency."[5] 214 U.S.P.Q. 892, 895 (Comm'n Op. 1980) (citing Fashion Originators Guild v. FTC. 312 U.S. 457 (1941)). Indeed, the Commission based its decision in part on the earlier statement of the Senate Finance Committee that: "The provision relating to unfair methods of competition in the importation of goods is broad enough to prevent every type and form of unfair practice ...." 214 U.S.P.Q. at 895 (citing S. Rep. No. 595, 67th Cong., 2d Sess. (1922)).

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[5] In Certain Steel Rod Treating Apparatus and Components Thereof, Inv. No. 337-TA-97, 215 U.S.P.Q. 229, 234 (Comm'n Mem. Op., June 30, 1981), the Commission denied a respondent's interlocutory appeal of an order denying a motion to dismiss for lack of jurisdiction, holding that when an article is "constructively present by virtue of its sale and imminent importation," the requisite "minimum contacts" with the United States exist. The Commission's decision in Steel Rod addresses questions of in personam and in rem jurisdiction. The decision does not appear to address questions concerning the limits of subject matter jurisdiction under section 337, nor does it address the question of whether section 337 provides a remedy for circumstances in which there has not been at least a sale for importation. As far as the Administrative Law Judge's Recommended Determination of violation in Steel Rod is concerned, Complainant acknowledges that a domestic respondent had entered into an agreement with a foreign respondent for the sale of the accused article. Complainant's Post-Hearing Br. at 29 (citing Steel Rod, Recommended Determination (Aug. 18, 1981)).

However, no party has cited a case in which the Commission recognized its authority to take action against a respondent for the incipient or imminent importation of goods when there has been no sale for importation.

In changing the wording of the statute in 1988 to its present form, it is clear that Congress did "not intend to change the interpretation or implementation of current law as it applies to the importation or sale of articles that infringe certain U.S. intellectual property rights." H.R. Conf. Rep No. 576, 100th Cong. 2d Sess. 633 (1988). In fact, the 1988 amendments were intended to strengthen the statute's effectiveness in addressing the problems caused by the importation of goods that infringe U.S. intellectual property rights. S Rep. 71, 100th Cong., 1st Sess. 128 (1987). By including "sale for importation" as a specifically proscribed act, Congress did not intend to retreat or limit the Commission's authority to reach unfair acts in their incipiency, which was present in the prior law.

Presumably, there could be an imminent importation without a sale, for example, in the case of a single respondent that already owns a stock of infringing goods overseas and is threatening to bring the goods into the United States in short order. However, the issue as to whether and to what extent the Commission could act against such a respondent need not be answered in this case. In this case, there is a domestic respondent that has contracted for the sale of foreign goods (the Enercon E-40) to the Texas Utility Commission, that does not have the ability to import the accused products except through the purchase of goods from a foreign respondent.[6] One need not reach the question of the Commission's ability to reach

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[6] Although Enercon's owner and manager is now uncertain as to Enercon's ability to export its E-40 wind turbines into the United States due to pending litigation, the evidence does not support a conclusion that Enercon will refrain from sending the accused products

unfair acts in their incipiency without a sale for importation, since it has been demonstrated that a sale for importation has taken place, in satisfaction of the plain language of the statute as it is currently written.

III. CLAIM CONSTRUCTION

At issue in this investigation are allegations that the products sold by Enercon to New World, if operated in the United States, would infringe two claims contained in two patents assigned to Complainant, i.e., claim 131 of the '039 patent and claim 51 of the '712 patent. In order to perform a patent infringement analysis, any claim must first be construed to determine its proper scope and meaning. Palumbo v. Don-Joy Co., 762 F.2d 969, 974 (Fed. Cir. 1985); Lemelson v. General Mills, Inc, 968 F.2d 1202, 1206 (Fed. Cir. 1992), cert. denied, 506 U.S. 1053, 113 S.Ct. 976 (1993). Therefore, the proper constructions of the two patent claims at issue are determined below.

A. General Law of Claim Construction

The construction of patent claims is a matter of law. Markman v. Westview Instruments, Inc., 52 F.3d 967, 979 (Fed. Cir. 1995), aff'd, -- U.S. --, 64 U.S.L.W. 4263 (Apr. 23, 1996); Tandon Corp. v. Int'l Trade Comm'n, 831 F.2d 1017, 1021 (Fed. Cir. 1987).

Claims should be construed as one of ordinary skill in the art would construe them. SmithKline Diagnostics, Inc. v. Helena Laboratories Corp., 859 F.2d 878, 882 (Fed. Cir. 1988).

Nevertheless, "[c]laims must be read in view of the specification, of which they are a

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into the United States absent a remedy from the Commission or a court. FF II 60-61.

part." Markman, 52 F.3d at 979 (quoting Autogiro Co. v. United States, 384 F.2d 391, 397 (Ct. Cl. 1967)). The specification may serve as a sort of dictionary which explains the invention and may define terms used in the claims. 52 F.3d at 979. In fact, it has often been said that "a patentee is free to be his own lexicographer." Id. at 980 (quoting Autogiro, 384 F.2d at 397). However, "any special definition given to a word must be clearly defined in the specification." 52 F.3d at 980 (citing Intellicall, Inc. v. Phonometrics, Inc., 952 F.2d 1384, 1388 (Fed. Cir. 1992)).

In considering the claims in view of the specification, it must be remembered that "[t]he written description part of the specification itself does not delimit the right to exclude. That is the function and purpose of the claims."[7] Markman, 52 F.3d at 980.

To construe claim language, one "should also consider the patent's prosecution history, if it is in evidence." Id. Indeed, the prosecution history (or "file wrapper") "is of primary importance in understanding the claims." Id. Although the prosecution history should be used to understand the language of the claims, like the specification, it cannot enlarge, diminish or vary the claims. Markman, 52 F.3d at 980 (quoting Goodyear Dental Vulcanite, 102 U.S. 222, 227 (1880)). The prosecution history "limits the interpretation of claim terms so as to exclude any interpretation that was disclaimed during prosecution." Southwall Technologies, Inc. v. Cardinal IG Co., 54 F.3d 1570, 1576 (Fed. Cir. 1995).

Extrinsic evidence may also be used to construe patent claims. Such evidence "consists of all evidence external to the patent and prosecution history, including expert and

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[7] All elements of a patent claim are material, with no single part of a claim being more important or "essential" than another. Markman, 52 F.3d at 988.

inventor testimony, dictionaries, and learned treatises." Markman, 52 F.3d at 980. Extrinsic evidence may, for example, help to explain scientific principles, technical terms, or the state of the art at the time of the invention. Id.

A "court may, in its discretion, receive extrinsic evidence in order 'to aid the court in coming to a correct conclusion' as to the 'true meaning of the language employed' in the patent." Id. (quoting Seymour v. Osborne, 78 U.S. (11 Wall.) 516, 546 (1871)). A trial judge has sole discretion to decide whether or not he needs, or desires, an expert's assistance to understand a patent. Markman, 52 F.3d at 981 (quoting Seattle Box Co. v. Industrial Crating & Packing, Inc., 731 F.2d 818, 826 (Fed. Cir. 1984)). Extrinsic evidence is to be used to understand the patent, not to vary or contradict the terms of the claims.[8] 52 F.3d at 981.

"When, after considering the extrinsic evidence, the court finally arrives at an understanding of the language as used in the patent and prosecution history, the court must then pronounce as a matter of law the meaning of that language." Id. (citing Loom Co. v. Higgins, 105 U.S. 580, 586 (1881)).

B. Construction of Claim 131 of the '039 Patent

Claim 131 of the '039 patent is as follows:

> 131. A method for converting electricity generated by a variable speed wind turbine into fixed frequency output electricity, wherein the wind turbine includes a generator and means for supplying

[8] Extrinsic evidence "may be necessary to inform the court about the language in which the patent is written. But this evidence is not for the purpose of clarifying ambiguity in claim terminology." Markman, 52 F.3d at 986.

> generated electricity to [a] power converter that includes a switched inverter supplying the output electricity, the method comprising the steps of:
>
> > forming a reference waveform;
> >
> > rotating the reference waveform by a selected power factor angle to yield a template waveform;
> >
> > using the template waveform to define desired output currents; and
> >
> > controlling the switched inverter to produce output currents corresponding to the desired output currents. . . . . .

X-16, col. 42, line 64 - col. 43, line 10; FF III 2.

Claim 131 is directed to a method of converting variable frequency AC electricity generated by a variable speed wind turbine to constant frequency AC electricity for delivery to a utility system, and of delivering the AC electricity to the utility system at the desired angle between voltage and current. FF III 1. See Section I B (Technical Background).

As an evidentiary sanction for failure to provide compelled discovery, it was established that the accused device (i.e., Enercon's E-40) is a "wind turbine [that] includes [a] generator and means for supplying generated electricity to [a] power converter that includes a switched inverter supplying the output electricity." Order No. 17 at 20. A similar stipulation was entered during the hearing. See Tr. 46; Respondents' Post-Hearing Br. at 12-13. Thus, the accused device exemplifies the type of wind turbine required by the first portion of claim 131. An examination of the evidence and the parties' briefs shows that the dispute among the parties is not based on the meaning of the words preceding the

enumerated "steps of" the claimed method, but rather concerns some of the enumerated claim elements, a discussion of which follows:

1. forming a reference waveform

The reference waveform provides the timing information needed to supply the desired output currents which have the same frequency as the grid voltage. FF III 3. The reference waveform primarily provides knowledge of the zero crossing point of the voltage waveform on the utility grid. FF III 5.

The most direct way of obtaining the appropriate synchronization information is to look directly at the voltage waveform of the grid, and to use that information for timing. FF III 6. Thus, for example, in the preferred embodiment described in the specification of the '039 patent, a signal from the utility grid is carried to the inverter control unit, and is used to form the reference wavefo m. FF III 7.

2. rotating the reference waveform by a selected power factor angle to yield a template waveform

a. rotating the reference waveform

All parties agree that "rotating the reference waveform" results in a waveform that has undergone a phase shift, or a change in timing.

Complainant and OUII take the position that, at least in the context of claim 131 of the '039 patent, "rotating the reference waveform" simply means that a change or phase shift is to occur, i.e., that a waveform will be shifted by a power factor angle. See Complainant's Post-Hearing Br. at 11; OUII Post-Hearing Br. at 15.

Complainant's expert witness, Mr. Zavadil, used the term "phase shifting" interchangeably during the hearing with the term "rotating" in reference to claim 131 of the

'039 patent. FF III 9. He testified that to him the term "rotating" in claim 131 of the '039 patent means that an angular displacement is added to what exists or is in the reference waveform. FF III 10.

Respondents take the position that "the '039 patent does not suggest any way of effecting a phase shift other than rotational transformation." Respondents' Post-Hearing Br. at 19. Respondents' expert witness testified that to him the term "rotating" as used in claim 131 of the '039 patent refers to "rotational transformation," and that "rotational transformation" has a specific meaning. See, e.g., Ehsani, Tr. 418-419.

There is no dispute that "rotational transformation" is disclosed in the specification of the '039 patent. See FF III 20. However, there is disagreement as to whether rotational transformation is used only in the preferred embodiment, or whether claim 131 when properly construed is restricted to methods that use "rotational transformation."

The evidence shows that simply moving a point from the original zero crossing point to another point on the zero line by a phase angle ϕ is called a "phase shift." However, such an operation in and of itself it is not a "rotational transformation." FF III 23. Rather, rotational transformation is well understood to be a very specific technique used in power electronics and motor drives in electrical engineering. FF III 24. Rotational transformation has its roots in mathematics, and specifically the rotation of frames of reference in Cartesian coordinates. FF III 25. In mathematical terms, a rotational transformation results from turning the entire plane about a fixed point in the plane, through a change of variables. The change of variables may be effected trigonometrically or in the form of a rotational transformation matrix. FF III 26, 27, 28.

Applying rotational transformation to an inverter, one samples the line voltage in very small steps in time, such as thousands of times per second in transforming the input signal to an output signal. Thus, rotational transformation operates to shape the wave point-by-point along the sinusoid, rather than just at the zero-crossing point. The phase angle can be changed in mid-stroke. FF III 29, 31. By using rotational transformation, one maintains tight control of the formation of the reference waveform. In fact, one is capable of effecting subcycle changes in the reference current. FF III 30.

Using a rotational transformation technique one could read the line voltage and perform mathematical equations, for example every 125 microseconds, step-by-step along the sinusoid to output the proper voltage. Using this technique, one could simultaneously create a new sinusoid waveform while receiving the incoming sinusoid. In that sense, one would be working in "real time" on a live sine wave.[9] FF III 34.

In what Respondents' expert called a "real time" methodology, or rotational transformation, there is digital signal processing of one sinusoid to create another. Indeed, it takes an advanced fast-operating computer to perform rotational transformation with electrical, sinusoidal waveforms. FF III 39. This "real time" approach is the major relevant

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[9] As applied, there may be advantages or disadvantages to using a "real time" or "rotational transformation" technique to effect phase shifting of sinusoidal waveforms. For example, while one can use a device that can adjust voltage on a subcycle basis (and not wait for the zero crossing point of the signal from the AC line), the device might detect a "blip" or other anomaly on the AC line that is not properly filtered out, and thus effect a rotational transformation that is based on noise on the line instead of a true change in voltage. The resulting output would be undesirable in that instance. FF III 38.

difference between rotational transformation and the classic phase shift. FF III 35.[10]

Although the "real time" methodology using rotational transformation differs from a zero-crossing, time-delay methodology using a synthesized sinusoid, both methodologies affect the timing of current relative to voltage.[11] FF III 36. Nevertheless, it must be determined whether use of the term "rotating" in claim 131 refers only to rotational transformation, or whether it has a more general meaning.

Respondents' expert admitted that many times he has heard the word "rotation" and the term "phase shift" used interchangeably to describe the phenomenon of the displacement of a sine wave. He does, however, find that to be a loose way of using terminology. FF III 40. Nevertheless, there is substantial evidence that "rotating" means phase shifting to those whose job it is to generate power and supply it to a utility grid, i.e., to those of ordinary skill in the art.

Mr. Clint "Jito" Coleman does not describe himself as an electrical engineer or a circuit designer. However, he is New World's chief technology officer. He is involved in, and often makes recommendations with respect to, the technological direction of the company. FF III 16.[12]

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[10] For a discussion of the need for advanced technology in order to effect a rotational transformation in an electrical application such as that of the '039 patent, see FF III 39 and the portions of the Ehsani transcript cited therein.

[11] The result of a rotational transformation is a sinusoid waveform at a phase variance to the original sinusoid waveform. FF III 37.

[12] As discussed above in the section on technical background, a person of ordinary skill in the relevant art in this investigation is an individual who has at least a Bachelor's degree in a technical engineering field, such as electrical engineering, and three to five years of wind turbine and/or utility experience. X-166, ¶ 3; Zavadil, Tr. 76-77; CPX-8C (Coleman Dep.) at 7-9, 12-15; FF I 24. [Footnote con't]

Mr. Coleman was asked during his deposition, as an engineer who works with wind power, to explain his understanding of claim 131 of the '039 patent. He had the '039 patent in front of him during the questioning; he had read it before; and he provided a review of the patent to New World prior to deposition testimony. FF III 18.

Mr. Coleman understood "forming a reference waveform" in claim 131 of the '039 patent to refer to a sinusoidal wave. He recognized that there are many ways of determining where the wave should start and stop, which he described as the sinusoidal wave's "phase angle." He then proceeded to the next element, "rotating the reference waveform by a selected power factor to yield a template waveform."[13] FF III 19.

Mr. Coleman testified, as follows:

> A. *** They would then rotate the reference waveform by a select[ed] power factor angle. In this case the reference waveform is probably going to end up being the current waveform. They are going to rotate it by a selected power factor angle, which means they are going to make a decision and going to shift it either leading or lagging, which it doesn't say what they are doing. And that becomes the reference, the template waveform. That becomes something they are trying to build, the template.
>
> Q. So they can do it either leading or lagging?

While Mr. Coleman's undergraduate degree is not like that of the hypothetical or ideal person of ordinary skill in the art, his Master's degree is in an engineering field and his experience clearly shows him to have extensive knowledge of wind turbines and the requirements necessary to connect them successfully to utility grids. In 1975, Mr. Coleman received a Master's degree in mechanical engineering from the University of Nevada, Reno. As early as 1976, he began working with wind turbine design, and has since 1980 been employed by New World and its predecessor. He has had extensive experience with various electrical designs and the connection of wind turbines to electrical utility grids. FF III 17. It is respondent New World that employs him as its chief technology officer. FF III 16.

[13] Prior to the hearing, Respondents' expert did not know of the testimony of NWP's Mr. Coleman concerning the meaning of claim 131 of the '039 patent. FF III 41.

A. That's what it suggests. It just says rotate.

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FF III 19 (emphasis added).

According to Mr. Coleman, rotating the reference waveform "means they are going to make a decision and going to shift it either leading or lagging ...." With respect to determining the phase angle, Mr. Coleman explicitly stated in this portion of his testimony that there are "[a] thousand ways of doing that." FF III 19. However, he did not choose among the many ways of effecting a phase shift. His testimony indicates that "rotating" in claim 131 means only shifting the phase angle of a waveform.

This understanding of claim 131 is also supported by the specification of the '039 patent:

> Turning now to the inverter side of the wind turbine system, the details of the inverter control unit 88 are shown in FIGS. 13-15. Like the generator control unit 76, the inverter control unit is preferably implemented with a digital signal processor, a Texas Instruments model TMS320C25. Computer code for implementing the inverter control function in a DSP is disclosed in the microfiche appendix.
>
> * * *
>
> As shown in FIG. 13, the inverter control unit uses the output voltage as a sinusoidal waveform reference, rotates the reference waveform by a certain phase angle to generate a rotated reference waveform, or "template", then multiplies the template waveform by a factor, I_{ref}, derived from the DC link voltage, v_{dc}, to generate a desired current waveform. The actual currents are compared to the desired currents to generate the PWM commutation signals for the inverter switches. All of the calculations of the inverter control unit are performed periodically. In the preferred embodiment, the DSP cycles through its calculations every 125 microseconds, equal to a rate of 8 kHz.

FF III 11 (emphasis added).

As may be seen from the quotation above, the specification contemplates the use of rotational transformation and advanced technology but labels it the preferred embodiment, implying a distinction from the invention generally. Indeed, claim 131 does not mention "rotational transformation" nor does it mention the use of a digital signal processor or the performance of a large number of calculations per second. There is no justification for reading those features of the preferred embodiment into claim 131.

"Generally, particular limitations or embodiments appearing in the specification will not be read into the claims." Loctite Corp. v. Ultraseal Ltd., 781 F.2d 861, 867 (Fed. Cir. 1985). See also E.I. duPont de Nemours & Co. v. Phillips Petroleum Co., 849 F.2d 1430, 1433 (Fed. Cir.), cert. denied, 488 U.S. 986 (1988)(prohibiting the reading of limitations from the specification into the claims 'wholly apart from any need to interpret what the patentee meant by particular words or phrases in the claim"). In this case, there is no indication in the specification that the patentees defined the term "rotating" as rotational transformation or anything other than its ordinary meaning which, as seen through the testimony of Mr. Coleman, is "phase shifting." The mathematics associated with rotational transformation are described as the preferred embodiment. See X-16 ('039 Patent) at col. 19, lines 29-48; FF III 20. There is nothing in the specification to indicate that the trigonometry of rotational transformation and the advanced technology associated with it serves as a definition of the term "rotating" as used in claim 131.

As indicated above, Complainant's expert used the terms "rotating" and "phase shifting" interchangeably in reference to claim 131 of the '039 patent. He further testified that the term "rotating" in claim 131 means that an angular displacement is added to what

exists or is in the reference wave form. FF III 9, 10. Finally, Dr. Erdman, one of the two inventors of the '039 patent, testified during his deposition that "phase shifting and rotation are the same thing, are essentially equivalent."[14] FF III 15. This testimony offered by Complainant is confirmed by Mr. Coleman's testimony.

In this instance, the patentees chose to use simple and broad language in their claim, yet to disclose a complex and advanced preferred embodiment. In doing so, they followed the law which requires them to disclose their preferred embodiment. The language of Claim 131 gives no indication that it was intended to be restricted to the preferred embodiment.

Generally the prosecution history may provide evidence helpful in claim construction. In this instance, the prosecution history reveals no rejection of the claims by the Examiner, or amendment by the applicants. The prosecution history contains very few statements by or on behalf of the inventors, other than those contained in the patent specification. See CX-30, K 00738.

The prosecution history contains an Examiner's Statement of Reasons for Allowance, which provides in pertinent part, as follows:

> Independent Claims 115, 121, 130, 131 and 138 require an inverter controller responsive to the desired phase angle between output voltage and current and/or means for defining a distortion index indicative of current errors between the actual and desired output currents and/or a template waveform that is offset by a desired phase angle. This is not suggested by Kos et al.

CX-30, Notice of Allowability at 2 (K 00601); FF III 12.

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[14] It is not expected that by using the term "equivalent," Dr. Erdman was hazarding a legal opinion, nor would his testimony be so credited. The meaning of Dr. Erdman's testimony is understood to be that although one might not say the same words, in fact "phase shifting" and "rotation" in this context mean the same thing.

According to the Complainant, the significance of this statement by the Examiner is that while he singled out the "offset" by a desired phase angle in connection with allowability, he did not mention rotational transformation. Although this statement may lend some indirect support to the conclusion that while "rotational transformation" was disclosed in connection with the preferred embodiment, it played no other role in the patent prosecution, the Administrative Law Judge gives little weight to this statement of the examiner. It is the statements of the applicant during the prosecution of the patent that may limit the interpretation of claim terms. Southwell Technologies, 54 F.3d at 1576.

In determining the proper construction of a claim, it may also be helpful to compare it to other claims in the patent. See Specialty Composites v. Cabot Corp., 845 F.2d 981, 987 (Fed. Cir. 1988)(The scope of a particular claim can often be determined on inspection of other claims.). In this case, it is helpful to compare claim 131 to other claims of the '039 patent, especially claim 136 which depends from claim 131 through claim 134.[15]

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[15] Claim 134 of the '039 patent is as follows:

> 134. A method for converting electricity as recited in claim 131 further comprising the steps of creating a sinusoidal reference waveform synchronized with the output electricity, defining a template waveform that is offset from the reference waveform by the power factor angle, and converting the template waveform into the desired output currents.

X-16, col. 43, lines 21-27; FF III 13.

In addition to the use of "offset" in place of "rotating," claim 134 differs from claim 131 in that it requires the sinusoidal reference waveform to be "synchronized with the output electricity," whereas claim 131 requires that the reference waveform be rotated by a selected power factor angle to yield a template waveform which is used to "define desired output currents."

Claim 136 of the '039 patent is, as follows:

> 136. A method for converting electricity as recited in claim 134 wherein the step of defining a template waveform includes the step of periodically calculating the template waveform by shifting the reference waveform by the power factor angle.

X-16, col. 44, lines 1-5 (emphasis added); FF III 14.

In contrast to claim 131, claim 136 includes "the step of periodically calculating the template waveform."[16] Claim 136 appears to be narrowed in a way that brings it closer to the preferred embodiment by inserting "periodically calculating the template waveform" as a limitation.[17] As described in the specification, the calculations in the preferred embodiment are performed periodically, every 125 microseconds. FF III 11.

In its plain language claim 136 is not limited to embodiments that calculate every 125 microseconds. However, in order to define a sine wave, one must define at least the zero crossing point of the waveform, and therefore calculate at least once per cycle. See FF III 5, 36. Thus, by limiting claim 136 to cover methods that "periodically" calculate the template waveform, the patentees have written claim 136 so as to cover embodiments that perform subcycle adjustments in the template waveform. Although claim 136 is not expressly limited to the use of a DSP[18] or the calculations used in the preferred embodiment, it is narrower

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[16] It also uses the term "shifting" instead of "rotating."

[17] Since none of the parties has made this argument, there is little or no direct evidence concerning the meaning of "periodically calculating the template waveform" in claim 136. If this phrase meant simply calculating the template waveform once each cycle, it would be totally duplicative of claim 131 and the other claims depending from claim 131. Logically then, it should refer to periodic calculation of the template waveform within a cycle such as is contemplated in the preferred embodiment.

[18] Practically speaking, it may be impossible to perform periodic calculation of the template waveform without use of a DSP.

than claim 131, which appears to require only one calculation per cycle. Consequently, a comparison of claims 136 and 131 provides additional support for the construction of claim 131 as a broad claim that does not require rotational transformation.[19]

Dependent claims, when properly drafted, are by nature less inclusive than their associated independent claims. See In re Johnson, 589 F.2d 1070, 1080 (C.C.P.A. 1978). Therefore, by choosing to make claim 136 a narrower, dependent claim associated with the preferred embodiment, there is further evidence that the term "rotating" as used in claim 131 is a term with a broad meaning that is not restricted to rotational transformation.

In support of its position that "'rotating' a waveform by a power factor angle will result in a waveform "shifted" by that power factor angle, Complainant relies in part on M. Kuznetsov, Fundamentals of Electrical Engineering. See Complainant's Post-Hearing Br. at 11; CFF 5.10. In Kuznetsov's Fig. 132, a sine wave form is shown with an initial phase displacement. The "initial *phase angle*" is shown as the Greek letter psi (ψ). Figure 132 shows a leading time-shifted sine wave. Thus, in the vector diagram, the sine wave is illustrated by showing a rotating vector (t=0) that is rotated (in a counterclockwise direction) from the horizontal axis by the same angle, psi (ψ).[20] FF III 46.

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[19] If the change from claim 131 to claim 136 were merely a change from "offset" to "shifting," as Complainant and OUII suggest, it would be no change at all, because there is agreement that these terms have identical meaning.

[20] Kuznetsov's Fig. 132, shows the vector (t=0) rotating with an angular velocity of omega (ω). Thus, the diagram shows the vector from a stationary frame of reference, as one standing by the side of a road might see a car speed by at a certain velocity. However, Fig. 132 also shows the starting point of the vector and the angle psi (ψ) from a rotating frame of reference, as one in a car moving at the same speed as the rotating car who from such a vantage point might be able to judge how many yards ahead or behind one is compared to the rotating car. FF III 47. Therefore, although it is not explicitly stated, Kuznetsov's Fig.

Complainant has argued that use of the term "rotating" in the Kuznetsov text means phase shifting, and that the use of the term "rotated" to mean "shifted" has its roots in the fact that a vector may be represented as rotating in a diagram. Kuznetsov in fact shows a phase shift by advancing, or rotating, a vector by the angle psi (ψ). FF III 43, 44. However, the Kuznetsov text does not actually use the term "rotating" or "rotated" in that manner. Therefore, there is inadequate evidence in the Kuznetsov text to find that the root of the term "rotating" as used in claim 131, and as used by those of ordinary skill in the art, goes directly to the rotating vectors and phase angles as illustrated in Kuznetsov.

Counsel for Complainant stated during the hearing that he intended to put on a brief rebuttal case through Dr. Erdman, at least to present evidence about the representation of sine waves as rotating vectors. However, on the day that Complainant's rebuttal was to commence, Complainant's counsel stated that no rebuttal evidence would be offered. Tr. 348-350, 494, 497, 533. Such testimony might have provided enough evidence to state with unassailable certainty why the terms "rotating" and "shifting" are used interchangeably. However, notwithstanding the question concerning derivation of the term, the preponderance of the evidence shows that rotating is not limited to rotational transformation.

b. by a selected power factor angle

Complainant's expert has stated that "selected power factor angle" means that a power factor angle is chosen from a range of possible values, and further that the power factor angle can be changed at intervals or changed continuously. He based his understanding of the claim on the patent and the intention of the invention to provide

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132 combines a stationary and a rotating frame of reference.

flexibility for reactive power control. FF III 48. This understanding of claim 131 is supported by additional evidence.

Respondents propose an interpretation of the term "selected power factor angle" which distorts the plain meaning of the claim language. Referring to the portion of the specification that describes the preferred embodiment they argue that the term "selected power factor angle" refers to the "type of power factor control" which is "specified" by the operational mode signal which is input into the power factor controller. For this interpretation Respondents also rely on a comparison of claims 131 and 132, as well as their view of the prior art. Respondents' Post-Hearing Br. at 19-20.

Respondent NWP's chief technology officer, Mr. Coleman, confirms the plain meaning of the claim language. He understood claim 131 of the '039 patent to mean that the reference waveform is rotated by a selected power factor angle so as to be either leading or lagging. FF III 49. Consequently, he also read claim 131 to permit one to select a phase angle from a range of values.[21]

A judge may find the content of the prior art helpful in understanding the context in which a particular claim arises. Respondents have relied on certain prior art materials[22] to

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[21] A careful reading of claim 131 shows that there is nothing in the claim language that requires the desired phase angle to result in a waveform that is leading or lagging. One may select a power factor angle of zero. FF III 59. In fact, it is proper to speak of an angle, and indeed of a phase angle in electrical engineering, as being equal to zero degrees. For example, in Kuznetsov (Fundamentals of Electrical Engineering), where the "angle α is called the *phase angle*," the text describes a case in which $\alpha = 0°$. CX-135 at 172-173, FF III 59. See also Webster's New World Dictionary of Mathematics at 11 (A "*zero* angle is one of 0°." An "*acute* angle is one between 0° and 90°.").

[22] Respondents argue that as early as 1988, Thorborg (RX-9) showed that variable voltage electricity generated by a wind turbine could be output to an AC line at a zero power

argue for their "operational mode construction of the claim language." Respondents attempt to argue that claim 131 must be given a particular meaning because otherwise it would be covered by the prior art. Such arguments essentially use the prior art to raise the specter of invalidity. However, respondents repeatedly stated that they would not challenge the validity of the patents at issue in this investigation. See, e.g., Prelim. Conf. Tr. 37-47; Hearing Tr. 14-23. Therefore, the analysis proposed cannot be permitted inasmuch as Respondents did not assert invalidity in view of the prior art.[23]

If Complainant knew that invalidity would be raised yet failed to respond to Respondent's arguments, the consequences of its inaction might be that the court would rely only on Respondent's selection from the prior art. In the circumstances presented in this investigation, Complainant was under no obligation to prepare a response to an invalidity attack. Consequently, despite Complainant's opportunity to cross-examine, the result of Respondents' introduction of the aforementioned exhibits represents only its selection from the prior art, and could be a one-sided and narrow selection, which was not scrutinized through the adversary process. Such a selection from the prior art would not be helpful to the Administrative Law Judge, because it is an insufficient basis upon which to draw

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factor angle, and further that Ooi (RX-4) and Mohan (X-182C, Tab B/RX-11) had earlier suggested power factor control of switched inverters that were not specifically linked to wind turbines. Respondents' Post-Hearing Br. at 19. Exhibits RX-4 and RX-9 were not admitted into evidence. See Order No. 22.

[23] Thomas & Betts Corp. v. Litton Sys., Inc., 720 F.2d 1572, 1574, 1580 (Fed. Cir. 1983)("[A]lthough the effect of the prior art on the scope of the claims in suit is to be considered, our approach should not be a 'camouflaged or back-handed attack' on the validity of the ... patent.") See also Baxter Healthcare Corp. v. Spectramid, Inc., 49 F.3d 1575, 1583, cert. denied, 116 S.Ct. 272 (1995) ("Questions of obviousness in light of the prior art go to validity of claims, not to whether an accused device infringes.").

inferences relating to claim construction. Indeed, if a question of validity in view of the prior art had been raised by Respondents, the scope and content of the prior art would have been determined and analyzed after both sides had adduced evidence and made arguments concerning the state of the prior art.[24]

As illustrated in the '039 patent's preferred embodiment, the invention may be used in either of two modes. The two modes are described in the specification, as follows: "the power factor controller ... can control the power factor angle, ϕ, or the magnitude of reactive power to supply vars (volt-ampere-reactive) to the utility."[25] FF III 51.

In the first mode of operation a constant power factor angle is controlled to provide a desired constant ratio between the real power and reactive power. In the second mode, the actual amount of reactive power to be delivered by the converter is controlled, the power factor controller determines the power factor angle needed to deliver the amount of reactive power. A feedback loop continually adjusts the power factor angle according to that determination. FF III 54.

In both modes, there is a selected power factor angle. In the first mode, the angle selected is constant. In the second mode, the power factor angle is selected to vary in order

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[24] As discussed above in connection with the Markman case, a judge may consider extrinsic evidence to help explain scientific principles, technical terms, or the state of the art at the time of the invention. See 52 F.3d at 980. For example, an expert witness may testify as to the technological background of a claimed invention, and be subject to cross-examination on the subject. However, Respondents do not seek to use extrinsic evidence in that manner. Respondents seek to use selected pieces of alleged prior art to suggest patent invalidity in order to secure a limited construction of claim 131.

[25] In the electric power industry, the phase difference between two sinusoidal fixed frequency waveforms is referred to as phi (ϕ), or the power factor angle. FF III 52. Thus, in the first mode of operation, the power factor angle is the same as phi ϕ. FF III 53.

to deliver the constant amount of reactive power needed. FF III 55. There is no language in claim 131 to limit its scope to either the first mode or the second mode, both of which are disclosed in the patent specification. FF III 56. Furthermore, there is nothing in the language of claim 131 to indicate that the phrase "selected power factor angle" requires that the power factor angle must be selected electronically as Respondents argue. FF III 57.

The portions of the specification referred to by Respondents for their proposed interpretation that this step concerns the selection of a mode of operation, i.e., col. 7, lines 15-19 and col. 5, lines 43-46, pertain only to the preferred embodiment, and not to the invention as a whole. Elsewhere in the specification, it is stated that even in the preferred embodiment, the wind turbine supplies "high quality power at an adjustable power factor to a utility grid." X-15, col. 5, lines 6-9 (emphasis added). In this context it is clear that the "selected power factor angle" covered in this step of claim 131 is not merely a selection between the two modes of operation; rather it is an adjustment of the power factor angle itself.[26]

Further, a comparison of claim 131 with dependent claim 132 does not require a different understanding of the independent claim. Claim 132 covers the method of claim 131 "further comprising the steps of sensing the level of reactive power in the output electricity, and selecting the power factor angle according to a desired level of reactive power." X-16, col. 43, lines 11-15; FF III 60. This claim is properly written to be more restrictive than

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[26] Contrary to Respondents' argument, see Respondents' Br. at 19, there is nothing "superfluous" in specifying that the power factor angle is "selected" when that selection is expressed in terms of a numerical value. Indeed, when numerical values are involved, there seems to be all the more reason to state, as the patentees did in their claim, that a specific value may be selected.

claim 131, and covers the selection of the power factor angle when operating a device under certain conditions in the reactive power mode (i.e., the second mode). Claim 132 does not demand that the term "selected power factor angle" in claim 131 be given the meaning proposed by Respondents in order to avoid duplication with claim 132. Claim 131 covers the selection of power factor angle in a broader formulation of the invention.

The evidence in this investigation shows, by more than a preponderance, that the term "selected power factor angle" means that a power factor angle may be chosen from a range of possible values (including an angle of zero), and further that the power factor angle can be changed at intervals or changed continuously.

c. to yield a template waveform

The "template waveform," as defined in the '039 patent, is a "rotated reference waveform." FF III 11.

Thus, once the reference waveform has been rotated (i.e., shifted) by a selected power factor angle,[27] the reference waveform has become the template waveform. See FF III 19.

3. using the template waveform to define desired output currents

According to the plain language of claim 131, this step requires only that the template waveform, which was obtained by carrying out the preceding steps, be used to define the desired output currents. X-16 ('039 Patent), col. 43, lines 6-7.

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[27] In reference to the preferred embodiment, the specification of the '039 patent states: "the inverter control unit uses the output voltage as a sinusoidal waveform reference, rotates the reference waveform by a certain phase angle to generate a rotated reference waveform, or 'template'...." FF III 11.

Respondent New World's chief technology officer understood the claim as follows:

> [T]hey are using the template to then generate the current waveform and controlling the switched inverter to produce output currents corresponding to the desired output currents, so they are taking the templates, using the inverter switch to reproduce that template waveform on the current side.

FF III 19.

The description of the preferred embodiment contained in the specification provides the details of specific calculations for use with rotational transformation and digital processing. In the preferred embodiment, the inverter control multiplies the template waveform by a factor, I_{ref}, derived from the DC link voltage, v_{dc}, to generate a desired current waveform. The actual currents are compared to the desired currents to generate the PWM commutation signals for the inverter switches. In the preferred embodiment, the DSP cycles through its calculations every 125 microseconds, equal to a rate of 8 kHz. FF III 11.

Respondents' proposed construction of this step would essentially read the limitations of the preferred embodiment into the claim itself by requiring that I_{ref} be used as a multiplier for a rotationally transformed voltage waveform, and that the rotational transformation, the calculation of I_{ref} and the multiplication of the rotated waveform by I_{ref} be performed in a digital microprocessor many times in each cycle of AC electricity. Respondents' Post-Hearing Br. at 20-21.

Respondents' arguments are based on their assertion that "rotating" means rotational transformation and that the claim must be read so as to differentiate it from certain prior art (i.e., the Mohan book EX 125). They further assert that the patent fails to disclose any other factor that could be substituted for I_{ref}, or that there is any way of using the template

waveform to define a desired output current other than that of multiplying by I_{ref}. Furthermore, Respondents implicitly argue that if their proposed construction is not adopted, the claim is invalid.

It was found above that rotational transformation is not required by claim 131. The multiplication of I_{ref} as carried out in the preferred embodiment is not required by the plain language of the claim; and there is evidence that one of ordinary skill in the art also understands the claim in broader terms. This step as recited in claim 131 requires only that a device use the template waveform to define desired output currents.

4. controlling the switched inverter to produce output currents corresponding to the desired output currents

The parties agree that this step in the method of claim 131 must be deemed to have a broad scope. See, e.g., Respondents' Post-Hearing Br. at 21. The specification teaches that even in the preferred embodiment the current controller of the inverter control unit can be implemented in several different ways. FF III 61. However, the claim requires that the inverter be a current regulated inverter. FF III 62.

C. Construction of Claim 51 of the '712 Patent

Claim 51 of the '712 patent is as follows:

> 51. A method of converting electricity generated by a variable speed wind turbine into fixed frequency output electricity having a selected reactive power, wherein the wind turbine includes a generator and a means for supply[ing] generated electricity to a power converter that includes an inverter supplying the output electricity, the method comprising the steps of:
>
> (a) providing a reactive power control signal indicative of the reactive power to be supplied by the inverter; and

(b) controlling a current flow through the inverter to provide the reactive power specified by the reactive power control signal.

X-17 ('712 Patent), col. 37, lines 26-38; FF III 63.

It is argued by all parties that the '712 includes an improvement over the '039 patent which provides for independent control of the amount of reactive power to be supplied. Complainant also argues that in addition claim 51 of the '712 patent includes the first mode of operation of the '039 patent, i.e., that claim 51 includes a method of controlling reactive power based on power factor angle. See, e.g., Complainant's Post-Hearing Br. at 12, 24.

Respondents and OUII take the position that a proper construction of claim 51 is restricted to a method in which real power can be independently controlled.[28] See, e.g., Respondents' Post-Hearing Br. at 27-35; OUII Post-Hearing Br. at 21-25.

The plain language of claim 51 speaks of "providing reactive power control signal indicative of the reactive power to be supplied to the inverter," and the control of current flow through the inverter to provide the reactive power specified by the reactive power control signal. The phrase "reactive power control signal," indicates on its face that the claim covers a method of supplying reactive power that is based on information about the desired reactive power and not information about other potential variables, such as the power factor angle.

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[28] There is no dispute among the parties concerning the type of variable speed wind turbine required by the first part of claim 51, i.e., that portion of the claim from its beginning through the phrase "comprising." Furthermore, as an evidentiary sanction it has already been determined that the first part of claim 51 reads on the devices accused in this investigation. Thus, Enercon's accused devices exemplify a variable speed wind turbine as required by the claim. See Order No. 27 at 20; Respondents' Post-Hearing Br. at 27.

Reading claim 51 to cover only independent control of reactive power reflects the improvement of the claimed invention over that of the '039 patent. The inventor, Dr. Erdman, testified that the ability of the invention disclosed in the '712 patent to control reactive power independently is an improvement over the invention disclosed in the '039 patent. FF III 67. Complainant concedes that "the improved implementation provides for independent control of the amount of reactive power to be supplied." However, Complainant contends that "the reactive power control signal of claim 51 can be either the power factor angle or the constant reactive power value." Complainant's Post-Hearing Br. at 13.

The specification of the '712 patent describes two inverter control units, designated as 88a and 88b. FF III 68. The specification states that inverter control unit 88a cannot control reactive power independently of real power, whereas inverter control unit 88b can operate in either a VAR (reactive power) mode or in the mode that provides control of the power factor angle. FF III 69, 70.

Based upon their reading of the specification, and in consideration of the fact that the '712 patent was a continuation-in-part of the '039 patent, Respondents argue that claim 51, as well as its dependent claims, all relate to and cover the operation of inverter control unit 88b alone. Respondents' Post-Hearing Br. at 27-28.

OUII argues that the inventor apparently disclaimed the embodiment that can exercise only power factor angle control (i.e., with inverter control unit 88a) and that "[a]ccordingly, the Staff is of the view that claim 51 covers only those methods where it is possible to independently control the real power and reactive power such as with inverter control unit 88b." OUII Post-Hearing Br. at 24 (footnote omitted).

Indeed, the applicant, through his patent attorney, made statements and arguments to the Examiner that under applicable law allow no construction of claim 51 of the '712 patent other than that the claim includes only independent control of reactive power.

In Markman, the Federal Circuit held that a court should consider a patent's prosecution history if it is in evidence, and explained that the prosecution history "is of primary significance in understanding the claims." 52 F.3d at 980, aff'd, 64 U.S.L.W. 4263. In Standard Oil Co. v. American Cyanamid Co., 774 F.2d 448 (Fed. Cir. 1985), the Federal Circuit stated that:

> [T]he prosecution history (sometimes called "file wrapper and contents") of the patent consists of the entire record of proceedings in the Patent and Trademark Office. This includes all express representations made by or on behalf of the applicant to the examiner to induce a patent grant, or, as here, to reissue a patent. Such representations include amendments to the claims and arguments made to convince the examiner that the claimed invention meets the statutory requirements of novelty, utility, and nonobviousness. Thus, the prosecution history (or file wrapper) limits the interpretation of claims so as to exclude any interpretation that may have been disclaimed or disavowed during prosecution in order to obtain claim allowance.

774 F.2d at 452 (emphasis added).

In order to obtain allowance of the claims of the '712 patent, arguments were made on behalf of the applicant to the Examiner during prosecution that served both to explain the claims in a clear manner and to disavow any other interpretation.

On November 27, 1991, Dr. Erdman filed at the United States Patent and Trademark Office ("PTO") his Application No. 799,416 which issued as U.S. Patent No. 5,225,712. The application was a continuation in part of the application that issued as U.S. Patent No. 5,083,039, the other patent at issue in this investigation. FF III 77.

In an Office Action, dated June 15, 1992, the PTO Examiner rejected all claims contained in the application, i.e., claims 1-59. FF III 78. The Examiner rejected the claims on various grounds, including double-patenting.[29] He stated in part, as follows:

> 1. Claims 1-59 are rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over Claims 1-138 of U.S. Patent No. 5,038,039. *** The inverter controller that is responsive to a distortion index representing a power factor would be obvious to one of ordinary skill in the art as regards the parent case claims and as disclosed ....

FF III 79.

In a paper entitled "Amendment and Response to First Office Action," received by the PTO on October 5, 1992, the applicant, through his patent attorney, disagreed with the Examiner, discussed the rejection under obvious-type double patenting, did not file a terminal disclaimer, and in the Remarks section of the filing argued that the application was patentably distinct from the '039 patent.[30] FF III 80.

In particular, with respect to the aforementioned grounds concerning the inverter controller, the patent attorney stated that the "feature is a substantial improvement over the prior art." The Remarks continued as follows:

> Regarding reactive power, the parent case specifies providing a power factor, but the present application discloses independent control of the real and the reactive power as opposed to power

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[29] "To prevent extension of the patent right beyond statutory limits, the doctrine of obviousness-type double patenting rejects application claims to subject matter different but not patentably distinct from the subject matter claimed in a prior patent." In re Goodman, 11 F.3d 1046, 1052 (Fed. Cir. 1993) (citing In re Braat, 937 F.2d 589, 592 (Fed. Cir. 1991)).

[30] No amendment was made to claim 51 with respect to these grounds, although an amendment was made in response to a rejection under 35 U.S.C. § 112, first paragraph.

> factor control. Independent control would not be obvious from the claims of the parent application. Independent control allows reactive power to be supplied to the utility even if the wind turbine is not producing electrical energy. This advantage is discussed in the background, for example at page 5, lines 11 through 24. In comparison, the power factor control disclosed in the parent case requires a specific real power flow in addition to the reactive power flow. It is therefore submitted that the independent control of real and reactive power, as disclosed in the present application, is substantially different than the power factor control disclosed in the parent application, and therefore would not be obvious. Reactive power control is claimed specifically in independent Claims 30, 51, and 56. Reactive power control together with large electrical energy storage, which will be discussed in the next paragraph, is claimed in independent Claim 46.

FF III 81 (emphasis added).

The applicant's arguments, when taken in context, show that the patent was obtained by representing to the examiner that the invention of the '712 patent stands in contrast to that of the '039 patent. The arguments were not, as Complainant suggests, simply an effort on the part of the applicant to point out what subject matter the '712 patent claims in addition to that of the '039 patent. The patent attorney stated that the new patent related to independent control of real and reactive power in distinction to the '039 patent. He stated that "the parent case specifies providing a power factor, **but** the present application discloses independent control of the real and reactive power **as opposed to** power factor control." Id. (emphasis added). A fair reading of the patent attorney's arguments leaves no doubt that he represented the claimed invention to lie exclusively in independent reactive power control.

Complainant takes the position that even if the Remarks to the Examiner can be construed as limiting claim 51 to independent control only, then that limitation applies only when the device is operating in the constant VAR mode. Complainant argues that even if the

remarks are found to limit claim 51 to independent control, then the remarks must be seen as error, which does not control construction of the claims. See Complainant's Post-Hearing Br. at 24.

There is no indication in the applicant's representations to the Examiner that he was speaking only with respect to any particular mode and that additional subject matter was also claimed. Furthermore, the case law upon which Complainant relies, Intervet America, Inc. v. Kee-Vet Labs., Inc, 887 F.2d 1050, 1054 (Fed. Cir. 1989), does not provide support for Complainant's position.

In Intervet, the Federal Circuit held that:

> When it comes to a question of which should control, an erroneous remark by an attorney in the course of prosecution of an application or the claims of the patent as finally worded and issued by the Patent and Trademark Office as an official grant, we think the law allows for no choice. The claims themselves control.

887 F.2d at 1054.

However, a discussion of the underlying facts by the Federal Circuit in the Intervet case shows that at issue there was an "erroneous remark" in the ordinary sense, i.e, a mistake. In that case, the patent attorney wrote in a so-called "Remarks" section accompanying an amendment that "the claims" had been amended in a particular fashion when in fact only one of the asserted claims had been so amended.

In contrast, at issue in this case is the meaning of an argument submitted to the Examiner the substance of which was intended to obtain allowance of rejected claims. The portion of the Intervet opinion relied on by Complainant is not applicable here. Indeed, in the Intervet opinion, immediately following the portion quoted above, the Federal Circuit

stated, as follows:

> There are, of course, situations in which what an attorney says or does during prosecution may be held against a patentee on the theory of estoppel. For example, when a patentee attempts to *expand* the literal meaning of a claim under the patent law doctrine of equivalents and the prosecution history shows that the expanded scope would be inclusive of subject matter the attorney had represented to the examiner was *not* intended to be included in order to get the claim allowed, the patentee may be estopped to contend otherwise. *Graver Tank & Mfg. Co. v. Linde Air Prods. Co.*, 339 U.S. 605, 70 S.Ct. 854, 94 L.Ed. 1097 (1950). But that is not the situation here where the patentee was granted broad claims in spite of the statement by the attorney that he was amending them, though he never did so. The examiner was not misled or deceived. The erroneous remark was not the end of the prosecution. The examiner was fully aware of what claims he was allowing.

887 F.2d at 1054 (emphasis in original).[31]

In this case, the reasonable conclusion based upon the prosecution history is that the first of the situations envisaged by the Federal Circuit in Intervet transpired with respect to the '712 patent. Based on arguments made to overcome a rejection presented by the applicant through his patent attorney, the Examiner allowed claim 51 because he understood it to pertain only to independent control of reactive power, which was not included in the '039 patent. Therefore, the law requires that claim 51 must be construed in the same manner as covering only independent reactive power control.

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[31] Arguments submitted to the Examiner in order to obtain a patent can create prosecution history estoppel as effectively as amendments made in response to a prior art rejection. Haynes Int'l, Inc. v. Jessop Steel Co., 8 F.3d 1573, 1579 (Fed. Cir. 1993); Hughes Aircraft Co. v. United States, 717 F.2d 1351, 1362 (Fed. Cir. 1983)(citing Coleco Indus., Inc v. United States Int'l Trade Comm'n, 573 F.2d 1247 (C.C.P.A. 1978)). Consequently, Complainant would be estopped from obtaining a range of equivalents for claim 51 that would not be limited to independent reactive power control.

Another issue raised by Complainant in connection with the prosecution history concerns the fact that the rejection by the Examiner was for obviousness-type double patenting. Complainant argues that under the law applicable at the time of the prosecution, the statement made by the patent attorney "cannot be interpreted to mean that the claim is restricted to cover only independent control, but that the statement should be interpreted to mean that independent control is included within the scope of the claim." See Complainant's Post-Hearing Br. at 20-23.

First, regardless of the showing required of the applicant in order to overcome a rejection for obviousness-type double patenting at the time of the patent prosecution, the fact is that the statements and arguments made on behalf of the applicant read plainly to describe the invention of the '712 patent as consisting of independent reactive power control, in clear distinction from the matter covered by the '039 patent. In these circumstances the motivation for the remarks, and the type of rejection the remarks were directed to are irrelevant. The remarks are clear on their face.

Second, Complainant argues that the state of the law of double patenting at the time of the patent prosecution might help to understand the patent attorney's Remarks. Yet, it appears that Complainant is in error as to the applicable law at the time of the prosecution at issue; and even if Complainant were correct in this argument no light would be shed on the attorney's remarks.

During the prosecution of the application for the '712 patent, and about the time that the applicant's patent attorney made his Remarks to the PTO, the Federal Circuit issued its opinion in General Foods Corp. v. Studiengesellschaft Kohle MbH, 972 F.2d 1272 (Fed.

Cir. 1992), a case relied on by Complainant. The Federal Circuit held therein that '[i]f the rejected claim defines *more* than an obvious variation, it is *patentably* distinct." 972 F.2d at 1278 (emphasis in original). In reviewing prior cases concerning double patenting, the court stated, "the determining factor in deciding whether or not there is double patenting is the existence vel non of *patentable difference* between two sets of claims." 972 F.2d at 1278-79 (emphasis in original). In General Foods, the court also recognized that allowance of a patent application whose claims dominate claims of another patent that already issued will extend protection for the invention of the earlier-issued patent. However, the court held that such an extension of protection does not necessarily control whether or not a subsequent patent should issue. 972 F.2d at 1278-79 (quoting In re Braat, 937 F.2d at 594, and In re Borah, 354 F.2d 1009, 1017 (C.C.P.A. 1966)).

Shortly after the issuance of General Foods, (albeit after issuance of the '712 patent), the Federal Circuit explained in In re Goodman, that in certain situations (such as that of Braat) an earlier-filed, but later-issued, patent is allowed to issue without a reduction in its protection (as through the filing of a terminal disclaimer) because the application of the later-issued patent was not delayed by the applicant but rather by the rate of progress of the application through the patent office. 11 F.3d at 1053. Cf. In re Stanley, 214 F.2d 151 (C.C.P.A. 1954)(holding that the broad genus of an earlier-filed application was patentable even though a patent had already issued for a species of that genus). However, the Federal Circuit affirmed the rejection of a continuation-in-part application that contained a broad (genus) claim from which a narrow (species) claim had already issued. The court held that in such a situation the special circumstances of cases like Braat or Stanley did not exist, and

that "[b]y adopting the easy course of filing a continuation or divisional application to gain a narrow claim, a patentee could gain an extension of the term on a species when the broad genus later issued." 11 F.3d at 1053. The court in disapproving of such a practice did not announce a new rule, and quoted from a Supreme Court opinion that issued well before the General Foods opinion or the '712 patent issued. The court held that "[a] second application -- 'containing a broader claim, more generical in its character than the specific claim in the prior patent' -- typically cannot support an independent valid patent." In re Goodman, 11 F.3d at 1053, quoting, Miller v. Eagle Mfg. Co., 151 U.S. 186, 198 (1894). See In re Van Ornum, 686 F.2d 937, 944 (C.C.P.A. 1982)(without a terminal disclaimer, species claims preclude issuance of generic application).

Thus, even if one needed to know the motivation for the Remarks made to the Examiner on behalf of the applicant for the '712 patent, it does not appear that the law at the time of the patent prosecution merely required that a patentable difference (i.e., independent reactive power control) be shown in the claims of the '712 patent application. A terminal disclaimer would have been required if the claims were overlapping.

The parties also included in their briefs arguments comparing claim 51 to other claims in the '712 patent. Due to the binding arguments presented to the patent Examiner during prosecution, claim differentiation is of little value in considering construction of claim 51 of the '712 patent. Claim differentiation does not allow the expansion of claims beyond the explanations and representations made to the PTO in order to obtain allowance. Tandon Corp. v. United States Int'l Trade Comm'n, 831 F.2d 1017, 1023-24 (Fed. Cir. 1987).

Furthermore, only a small amount of evidence was adduced during the investigation

that bears directly on the dependent claims relied on by Complainant in its briefs. The various claims relied on by the parties would provide little evidence to assist in the interpretation of claim 51. Indeed, the doctrine of claim differentiation serves as a guide in understanding a claim, not as a rigid rule. Autogiro Co. v. United States, 384 F.2d 391, 404 (Ct. Cl. 1967); Jonsson v. The Stanley Works, 711 F. Supp. 1395, (N.D. Ohio 1989), aff'd, 903 F.2d 812 (Fed. Cir. 1990).

Claims 52 and 53 of the '712 patent depend from claim 51. It is clear from the words of the claims that claim 52 requires "a reactive power control signal indicative of a power factor angle of output electricity;" and claim 53 requires, in an alternative "power factor mode," "a reactive power control signal indicative of a power factor angle of output electricity." However, it is not apparent that such claim language means that the independent control of reactive power is lacking. Furthermore, the specification discloses that even in an application in which the reactive power control signal is indicative of the power factor angle, the real waveform is generated independently of the imaginary waveform. See X-17, col. 28, lines 10-35, 58-66, Figs. 22 and 23; FF III 72.

In any event, the primary consideration in this investigation is the proper construction of claim 51. If claim 51 as originally filed was intended by the applicant to have a meaning broader than the independent control to which it is now limited, e.g. to support the dependent claims, such broader meaning was disclaimed by the patent attorney in his Remarks following rejection of the application's claims.[32]

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[32] The Administrative Law Judge agrees with Complainant's position that given the fact that alleged invalidity was not raised as an issue in this investigation, it is inappropriate at this time to undertake an analysis to determine whether the '712 patent is valid, or invalid

In summary, a preponderance of the evidence shows that claim 51 of the '712 patent covers only a method in which there is independent control of real and reactive power.

IV. INFRINGEMENT

A. GENERAL LAW OF INFRINGEMENT

To establish literal infringement, every limitation set forth in a claim must be found in an accused product, exactly. Southwall Technologies, 54 F.3d at 1575. Accord Graver Tank & Mfg. Co. v. Linde Co., 339 U.S. 605, 607 (1950)(Literal infringement of the asserted claim occurs "[i]f accused matter falls clearly within the asserted claim ....").

Limiting patent enforcement exclusively to literal infringement "would place the inventor at the mercy of verbalism and would be subordinating substance to form." Graver Tank, 339 F.2d at 607. Thus, if the accused product or process does not literally infringe the patent at issue, it may infringe under the doctrine of equivalents. See In re Certain Doxorubicin and Preparations Containing Same, 20 U.S.P.Q.2d 1602, 1608 (United States Int'l Trade Comm'n 1991)("An allegation of infringement under the doctrine of equivalents presumes that literal infringement does not exist, i.e., that the asserted patent claims, properly interpreted, do not in terms cover the accused device or process.").

In Hilton Davis Chem. Co. v. Warner-Jenkins Co., Inc., 62 F.3d 1512 (Fed. Cir. 1995)(per curiam), the Court of Appeals for the Federal Circuit held that the doctrine of equivalents "applies if, and only if, the differences between the claimed and accused products

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due to impermissive double patenting, or on any other grounds.

or processes are insubstantial."[33] 62 F.3d at 1517 (citing Graver Tank, 339 U.S. at 610). "[T]he vantage point of one of ordinary skill in the relevant art provides the perspective for assessing the substantiality of the differences." Hilton-Davis, 62 F.3d at 1519 (citing Valmont Indus., Inc. v. Reinke Mfg. Co., 983 F.2d 1039, 1043 (Fed. Cir. 1993)).

In Hilton Davis, the court stated that "[i]n applying the doctrine of equivalents, it is often enough to assess whether the claimed and accused products or processes include substantially the same function, way and result." 62 F.3d at 1518. In many cases, the substantiality of the differences between the claimed and accused products or processes have been measured by reliance on the "so-called triple identity, or function-way-result, test ...." Yet, the court held that "[i]t goes too far, however, to describe the function-way-result test as 'the' test for equivalency announced by Graver Tank."[34] Id. at 1518. An "important factor" to be considered in making the equivalence determination is "whether persons reasonably skilled in the art would have known of the interchangeability of an ingredient not contained in the patent with one that was." Id. at 1519 (quoting Graver Tank, 339 U.S. at 609).

"Infringement, whether literal or under the doctrine of equivalents, is a question of fact." Hilton-Davis, 62 F.3d at 1520 (citing, inter alia, Winans v. Denmead, 56 U.S. (15 How.) 330, 338 (1854)); Graver Tank, 339 U.S. at 609-10.

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[33] The Federal Circuit has held similarly in other cases. See, e.g., London v. Carson, Pirie, Scott & Co., 946 F.2d 1524, 1538 (Fed. Cir. 1991); Perkin-Elmer Corp. v. Westinghouse Elec. Corp., 822 F.2d 1528, 1535 (Fed. Cir. 1987).

[34] Nevertheless, in determining whether equivalence exists, an element by element comparison must be made. Pennwalt Corp. v. Durand-Wayland, Inc., 833 F.2d 931 (Fed. Cir. 1987), cert. denied, 485 U.S. 1009 (1988).

A party alleging infringement has the burden of proving infringement by a preponderance of the evidence. Envirotech Corp. v. Al George, Inc., 730 F.2d 753, 758 (Fed. Cir. 1984); Hughes Aircraft Co. v. United States, 717 F.2d 1351, 1361 (Fed. Cir. 1983).

B. CLAIM 131 OF THE '039 PATENT IS INFRINGED

Complainant and OUII take the position that claim 131 of the '039 patent reads literally on the Enercon's E-40 and E-30,[35] and in the alternative, that any differences between those devices and the claim are insubstantial and insufficient to avoid liability under the doctrine of equivalents.

Respondents take the position that Enercon's products are not covered by claim 131 of the '039 patent either literally or under the doctrine of equivalents.

The dispute among the parties on the issue of infringement is not based on the first paragraph of the claim. There is no dispute that Enercon's accused devices are covered by the preamble (or all the words preceding the phrase "the method comprising the steps of") of claim 131 of the '039 patent. Furthermore, as an evidentiary sanction for failure to provide compelled discovery, it was established that the accused device (i.e., Enercon's E-40) is a "wind turbine [that] includes [a] generator and means for supplying generated electricity to

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[35] Enercon's E-40 wind turbine was the primary focus of the evidence adduced at the hearing. As discussed above it has been shown that Enercon and New World have entered into a contract for the sale of E-40 wind turbines and components thereof. However, it was also stipulated during the hearing that the only difference between the E-40 and the E-30 is not pertinent to this case. Tr. 46. In addition, the evidence shows that the E-40 outputs electricity at a fixed frequency. It has a power converter with a rectifier, a DC link, and a switched inverter. The device also has a means for supplying generated electricity to the power converter. FF IV 1.

[a] power converter that includes a switched inverter supplying the output electricity." Order No. 17 at 20. A similar stipulation was entered during the hearing. See Tr. 46; Respondents' Post-Hearing Br. at 12-13.

As discussed below, the remaining steps of claim 131 read literally on the accused Enercon device.

1. forming a reference waveform

The reference waveform provides the timing information needed to supply the desired output currents which have the same frequency as the grid voltage, and primarily provides knowledge of the zero crossing point of the voltage waveform on the utility grid. Furthermore, the most direct way of obtaining the appropriate synchronization information is to look directly at the voltage waveform of the grid, and to use that information for timing. See claim construction discussion, above.

The E-40 uses [

]. FF IV 3. The timing information is provided [ ]. Within the [ ] there is [

].[36] FF IV 4. The [

] are all that are needed to define a reference waveform.[37] FF IV 6.

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[36] The existence of [ ] in the E-40 is admitted by Enercon and also can be inferred from the way in which the Enercon machines operate. For example, at the hearing Mr. Wobben acknowledged that one can see how the [

]. Wobben, Tr. 268-271.

[37] Mr. Wobben admitted that [

]. FF IV 5.

Thus, the evidence demonstrates that the E-40 forms a reference waveform as required by claim 131 of the '039 patent.

There are also alternate grounds upon which to find that the Enercon machines satisfy this portion of claim 131.

Discovery relating to the design, structure and operation of the E-40 was compelled in this investigation, including software listings and other documents. See Orders 7, 8 and 17. Nevertheless, Mr. Wobben admitted that Enercon failed to produce the discovery relating to [ ] produced by Enercon's machines. Wobben, Tr. 268-272. Therefore, the formation of a reference waveform by Enercon's machines is also established as a sanction for failure to produce discovery in this investigation.

2. rotating the reference waveform by a selected power factor angle to yield a template waveform

A substantial portion of the evidence adduced at the hearing, and a substantial portion of the parties' briefs directly address this portion of the claim. In fact, Respondents' expert testified at the hearing that it was primarily this step which led him to his opinion that the E-40 does not perform the steps stated in claim 131. Ehsani, Tr. 416-418. Much of Respondents' argument for non-infringement is based on Respondents' rejected argument that the term "rotating" in claim 131 must be read to require the particular method of effecting a phase shift, or offset, known as "rotational transformation." As discussed above: 1) the term "rotating" has the same meaning as "shifting," and does not require rotational transformation; 2) the term "selected power factor angle" means that a power factor angle may be chosen from a range of possible values (including an angle of zero), and that the power factor angle can be changed at intervals or changed continuously; and 3) the "template

waveform," as defined in the '039 patent, is a "rotated reference waveform."

In the E-40, the desired value of the power factor angle is input [

]. The [ ] in the Enercon machines [ ]

obtained from the utility grid voltage waveform as per the [ ].

FF IV 7. In a diagram of the E-40 by Mr. Wobben, the specific portion of the

[ ] In this manner the Enercon

machines rotate the reference waveform as required by claim 131.

The E-40 uses a "selected power factor angle" as required in the second step of claim 131 in that one is able to select from a range of values for phi (ϕ) and subsequently change the value if desired. FF IV 8.

Enercon brochures describing the Enercon machines state that they are able to control cosine phi, that is, control the reactive power. They also describe a "freely selectable power factor." FF IV 9. Enercon has videotapes describing its machines which state that the phase angle can be selected freely. FF IV 10. Mr. Wobben also wrote an article for the magazine Windpower in which he stated that with the E-40, the phase angle (cosine phi) between the grid voltage and current can be selected via a data input, and that it is possible to select a different phase angle. FF IV 11.

Respondents contend that the power factor angle in the Enercon machines is

[ ]. Respondents rely on statements made by Mr. Wobben in connection with this investigation and pending District Court litigation. Respondents' Post-Hearing Br. at 24 (citing RFF 57, 59) Respondents argue that the Enercon brochures were intended for "politicians and possible customers for wind turbines such as utility companies and farmers,

and, as such, the brochures are not, strictly speaking, accurate on technical details of Enercon wind turbines." RFF 15 (citing Wobben, Tr. 255-256).

The preponderance of the evidence establishes that contrary to certain statements made by Mr. Wobben in connection with this investigation and litigation in District Court, his other statements to potential customers (including utility companies and those skilled in the art) show that the Enercon machines, including the E-40, have selectable power factor angle.[38]

Furthermore, in the alternative, it should be found as a sanction for failure to produce compelled discovery that Enercon's machines rotate the reference waveform by a "selected power factor angle." Complainant attempted to obtain software, manuals (or portions thereof) or other documents that could demonstrate the functioning of Enercon's machines, including how the power factor angle is controlled in the E-40. Nevertheless, in contravention of discovery orders in this investigation, Enercon refused to provide relevant documents, except within certain self-selected narrow bounds established by Enercon. Orders 7, 8, and 17; Wobben, Tr. 263-265, 269-272, 274-275, 277, 282; CPX-4C (Wobben Dep.), at 87.

It would be manifestly unfair to allow Enercon to make litigation-induced statements that may serve to take the E-40 out from under the '039 patent, while at the same time to

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[38] There is also strong evidence that even if certain Enercon machines have [ ] power factor angle, those are not the E-40 machines that would be exported to the United States in connection with the Big Spring, Texas project. Under the agreement entered into by New World, the wind turbines must be able to operate at lagging as well as leading power factor angles. X-9; CPX-4C (Wobben Dep,) at 287-288, 356-358; Wobben, Tr. 323-324.

permit Enercon to disavow earlier statements (such as its brochures, videos, etc.) that contradict such self-serving statements, and to refuse discovery into the technical details of how the Enercon machines are prepared for operation and how they function.

Therefore, in addition to the evidence that shows Enercon's machines use a "selected power factor angle," it is also established as a sanction for failure to produce compelled discovery that Enercon's machines use a selected power factor angle as required by this step of claim 131 of the '039 patent.

As discussed above in the section on claim construction, the rotated reference waveform serves as the template waveform. [

] is used by the Enercon machines to define a template waveform. FF IV 7.

Consequently, the E-40 rotates the reference waveform by a selected power factor angle to yield a template waveform as required by this step of claim 131.

3. using the template waveform to define desired output currents

This step as recited in claim 131 requires only that a device use the template waveform to define desired output currents.

The evidence adduced at the hearing establishes that the Enercon machines use the template waveform to define desired output currents, and thus practice this step of the claim.

In the Enercon machines, [

]. FF IV 12, 14. [ ] the template waveform is scaled, i.e., multiplied by a factor which is shown in Mr. Wobben's diagram of the E-40 as

"F_{RPM}". FF IV 17. It is noted that even in the preferred embodiment disclosed in the '039 patent, the template waveform is multiplied by a scaling factor. See X-16 ('039 Patent), col. 16, line 67 - col. line 11; FF III 11. Similarly, in the Enercon machines, the scaled template waveform represents the desired output currents. FF IV 12.

Respondents argue that the Enercon machines never have a "template waveform" as that term is used in claim 131, and that the machines multiply [ ] by F_{RPM} which depends on the speed of the revolutions per minute of the wind turbine rotor. Respondents' Post-Hearing Br. at 23.

However, Respondents' arguments do not show the method of the Enercon machines to differ from that of claim 131.[39] As discussed above, the Enercon machines use a reference waveform. [ ] to by Respondents in their brief is in fact the reference waveform which is rotated to yield the template waveform in the Enercon machines. See FF III 13.

Furthermore, as a sanction Respondents must be precluded from relying on information concerning the factor "F_{RPM}" or the operations and transmission of information from the rotor blade. Respondents refused to provide compelled discovery relating to the E-40 from the rotor blade to the generator. Thus, there was no way for Complainant, Complainant's expert or OUII to draw their own conclusions about the overall operation of the Enercon machines, including the functioning of the E-40's rotor blade and the connections between the rotor blade and the E-40's "down tower" components. See, Orders, 7, 8, 17; Wobben, Tr. 278 ("I refused to produce all the documents, starting from the rotor

[39] The question here is largely one of semantics.

blade and ending at the generator."). Thus, the Enercon E-40 uses the template waveform to define desired output currents.

4. controlling the switched inverter to produce output currents corresponding to the desired output currents

The Enercon E-40 performs this last step of the method in claim 131. The Enercon machines use a comparator to compare the desired output current to the actual current on the utility power grid. The information derived from the comparison is passed to a switch mode inverter where the switches are configured to achieve the desired output current. FF IV 17.

Conclusion

It has been demonstrated by a preponderance of the evidence, and alternately by reason of evidentiary sanctions that the accused devices, i.e., Enercon's E-40 wind turbines, operate literally to infringe claim 131 of the '039 patent.

Complainant takes the position that if literal infringement is not found, then infringement should be found under the doctrine of equivalents.

A finding of infringement under the doctrine of equivalents presumes that literal infringement does not exist. See Doxorubicin, 20 U.S.P.Q.2d at 1608. As discussed above, it has been determined that the method practiced by Enercon's machines falls clearly within claim 131 of the '039 patent. Thus, there is no need for a separate finding of infringement under the doctrine of equivalents. Nevertheless, given the evidence in this case, any differences that might exist between the claim 131 as construed herein and Enercon's machines would be insubstantial.

It is noted, however, that if claim 131 were construed to require "rotational transformation," then the Enercon machines would not literally fall within claim 131, and

there is strong evidence that a phase shift or offset obtained through rotational transformation differs substantially from the more simple [ ] technique used by the Enercon machines (which employ a [ ] and are not capable [ ]).[40] See FF III 23-25, 29-31, 34-39. Thus, if claim 131 is construed to require "rotational transformation" there would be no infringement either literally or under the doctrine of equivalents.

C. CLAIM 51 OF THE '712 PATENT IS NOT INFRINGED

Complainant takes the position that Enercon's machines infringe claim 51 of the '712 patent either literally or under the doctrine of equivalents. Respondents and OUII argue that Enercon's machines do not infringe claim 51 literally or under the doctrine of equivalents.

Complainant adduced evidence at the hearing which demonstrates that in the Enercon machines, the reactive power to be supplied by the inverter is indicated by the power factor angle (ϕ). Complainant's arguments concerning alleged infringement are directed to Complainant's assertion that claim 51 covers both independent and dependent control, rather than an assertion that the Enercon machines practice independent control. See, e.g., Complainant's Pre-Hearing Statement at 23-25; Complainant's Post-Hearing Br. at 19-24. Complainant's expert admitted that the Enercon machines control reactive power through the

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[40] With respect to the so-called triple identity, or function-way-result test, it is clear that at a minimum, the Enercon machines would obtain a phase shift in a "way" that differs substantially from that which would be required by claim 131, if construed to require rotational transformation. There would also be substantial evidence to support a conclusion that the "result" would differ as well. In the preferred embodiment the DSP cycles through its calculations every 125 microseconds, equal to a rate of 8 kHz, thus producing a sine wave that can be altered in mid-cycle. See FF III 11. The E-40 is not capable of such "real time" adjustments.

power factor angle. He concluded that the Enercon machines satisfy the requirements of a "reactive power control signal" because he understood that requirement to be broad enough to encompass methods of controlling reactive power that are dependent on the power factor angle. That construction of claim 51 is rejected above.

Thus, the testimony of Complainant's expert demonstrates that the Enercon machines do not practice "independent" control of reactive power which is required by claim 51 of the '712 patent. FF IV 18, 19; see FF IV 8, 9, 10, 11. Indeed, in responding to the patent Examiner's rejection of claim 51 during prosecution, the applicant's patent attorney drew a distinction between precisely the type of power factor control practiced by Enercon's machines, and "independent" reactive and real power control as claimed in the '712 patent. See FF III 81 ("[T]he parent case specifies providing a power factor, but the present application discloses independent control of the real and the reactive power as opposed to power factor control." CX-29 (Prosecution History), K00215).

Therefore, claim 51 of the '712 patent does not read literally on the operation of Enercon's machines.

Complainant contends, in the alternative, that infringement should be found under the doctrine of equivalents, and that any differences between claim 51 and the operation of Enercon's machines are insubstantial. Complainant's Post-Hearing Br. at 19 n.12. However, Complainant's assertion is based on its overly broad interpretation of claim 51 which would cover both dependent and independent control of reactive power.

Given the proper construction of claim 51, it cannot be concluded that Enercon's machines would infringe under the doctrine of equivalents inasmuch as the evidence shows

there is a substantial difference between dependent and independent control of reactive power. The arguments made to the patent Examiner to distinguish the independent control claimed by the '712 patent from the method of the '039 patent, are based on the substantial differences between the two methods. See FF III 81 ("In comparison, the power factor control disclosed in the parent case requires a specific real power flow in addition to the reactive power flow. It is therefore submitted that the independent control of real and reactive power, as disclosed in the present application, is substantially different than the power factor control disclosed in the parent application." CX-29 (Prosecution History), K00215).

Moreover, the applicant's patent attorney made statements and arguments to the patent Examiner which overcame the Examiner's rejection of claim 51 for double patenting, and which draw a clear distinction between dependent and independent control of reactive power. Complainant is therefore estopped from arguing that dependent control of reactive power, e.g., the control of reactive power based on power factor, is covered by claim 51 of the 712 patent under the doctrine of equivalents. See Section on claim construction above.

Therefore, it has not been demonstrated that Enercon's machines infringe claim 51 of the '712 patent.

V. DOMESTIC INDUSTRY

A. General Law Applicable to the Domestic Industry Requirement

Section 337(a)(1)(B), which is asserted against Respondents in this investigation, applies "only if an industry in the United States, relating to the articles protected by the patent. . . exists or is in the process of being established." 19 U.S.C. § 1337(a)(2).

The requisite domestic industry is defined in section 337 as follows:

> (3) For purposes of paragraph (2), an industry in the United States shall be considered to exist if there is in the United States, with respect to the articles protected by the patent . . . concerned --
>
> (A) significant investment in plant and equipment;
>
> (B) significant employment of labor or capital; or
>
> (C) substantial investment in its exploitation, including engineering, research and development, or licensing.

19 U.S.C. § 1337(a)(3).

The domestic industry requirement is satisfied by meeting the criteria of any one of the three factors listed above. Certain Concealed Cabinet Hinges and Mounting Plates, Inv. No. 337-TA-289, Comm'n Op. at 19-20 (1990). Complainant bears the burden of establishing that the domestic industry requirement is satisfied. Id. at 22.

Complainant takes the position that its investments and activities with respect to the Kenetech KVS-33 wind turbine satisfy the economic prong of the domestic industry requirement, and further that the KVS-33 implements both the '039 and '712 patents at issue in this investigation. Complainant's Post-Hearing Br. at 41-42.

Respondents argue that while complainant Kenetech's KVS-33 wind turbines exploit claim 131 of the '039 patent, they do not exploit claim 51 of the '712 patent. Respondents' Post-Hearing Br. at 36. Furthermore, they contend that the economic requirements of the statute are not met because the method steps of claim 131 are all conducted by an inverter control unit which is an adjunct to the inverter, yet Complainant failed to show significant investment with respect to those components. Id. at 36-37.

OUII takes the position that Complainant's KVS-33 wind turbines practice both claim 131 of the '039 patent and claim 51 of the '712 patent, and further that Complainant's investments and activities satisfy the economic component of the domestic industry requirement. OUII Br. at 26-31.

B. Discussion

1. Definition of the Domestic Industry; Article of Commerce

Before determining whether Complainant meets the criteria of any or all of the three factors enumerated in 19 U.S.C. § 1337(a)(3), it must be decided whether all of Complainant's investments and activities with respect to its KVS-33 wind turbine should be taken into account, or whether, as argued by Respondents, only the portion shown to pertain to the device's inverter should be considered.

The domestic industry determination is not made by the application of a rigid formula. The determination is made by an examination of the facts in each investigation, the article of commerce, and the realities of the marketplace. Thus, a domestic industry has been found to exist in a variety of circumstances. Certain Diltiazem Hydrochloride and Diltiazem Preparations, Inv. No. 337-TA-349, Initial Determination at 139 (United States Int'l Trade Comm'n Feb. 1, 1995), 60 Fed. Reg. 17366 (1995)(Comm'n determination not to review); Certain Double-Sided Floppy Disk Drives and Components Thereof, Inv. No. 337-TA-215, 227 U.S.P.Q. 982, 989 (United States Int'l Trade Comm'n 1985)(Comm'n Op. on temporary relief).

For example, In Floppy Disks, only the head assemblies incorporated in the disk drives were covered by the claims of the patent-in-suit. The head assembly was used every

time a disk drive was used; and the disk was useless without a head assembly. Consequently, the Commission affirmed the finding of the Administrative Law Judge that the domestic industry was defined as domestic production of disk drives, and not merely the patented head assemblies. See Initial Determination (on temporary relief) at 51-56; 50 Fed. Reg. 37067 (1985)(Comm'n determination to affirm).

Similarly, in Certain Personal Computers and Components Thereof, Inv. No. 337-TA-140, 224 U.S.P.Q. 270, 284 (United States Int'l Trade Comm'n 1984), the patented and copyrighted elements were manufactured overseas yet were essential components of the personal computers assembled in the United States. Thus, the Commission found that the article of commerce was the complete personal computer, and required the domestic industry to be defined in terms of such computers. See also Certain Modular Structural Sys., Inv. No. 337-TA-164, USITC Pub. 1668 (June 1984)("[I]t may happen that the article resulting from the exploitation of the involved intellectual property is not itself an actual article of commerce, but is physically incorporated in an article of commerce." Comm'n Op. at 12).

With respect to wind turbines, it is the industry practice to sell them as an integral unit, including their so-called uptower and downtower components. FF V 1. Accordingly, Kenetech's KVS-33 wind turbine, including its uptower and downtower components, is marketed as an integral whole. FF V 5. Indeed, the KVS-33 wind turbine, including uptower and downtower components, operates as an integral whole. FF V 4. Furthermore, it is noted that each of the patent claims at issue is drawn to require an entire wind turbine.

Therefore, the domestic industry shall be defined in terms of wind turbines, including their uptower and downtower components, specifically Kenetech's KVS-33 wind turbines.

2. Complainant's Practice of the Patents at Issue

It is stipulated that Complainant Kenetech's KVS-33 wind turbine practices claim 131 of the '039 patent. FF V 6. Therefore, Complainant's investments and activities, which are discussed below, are attributable to a domestic industry that practices claim 131 of '039 patent.

With respect to claim 51 of the '712 patent, Respondents argue that it was admitted at trial that the inverter control unit capable of practicing the claim has only been installed in a few prototype wind turbines, and that the patent is not being exploited. Respondents' Post-Hearing Br. at 36.

As discussed above in the sections on claim construction and alleged infringement, it has been found that claim 51 of the '712 patent does not cover Enercon's machines either literally or under the doctrine of equivalents. Therefore, it is not necessary for a domestic industry to exist with respect to the '712 patent inasmuch as no relief can be granted to Complainant with respect to that patent. Nevertheless, Complainant has demonstrated that such an industry exists under criteria of the statute.

The evidence shows that Complainant has implemented the improvement covered by claim 51 of the '712 patent on a small number of wind turbines in a test area in California. FF V 7, 8. Although sales have not yet been made of the new version of the KVS-33 that is covered by claim 51, it is now ready for commercialization. FF V 10.

Inasmuch as the domestic industry should be defined in terms of the entire wind turbine, a significant amount of the investments that Complainant has already made in wind turbine manufacturing and technology is attributable to the old version of the KVS-33, and

also to the new version that implements the improvement of claim 51 of the '712 patent.

3. Complainant's Investments and Activities

a. significant investment in plant and equipment

Kenetech manufactures the KVS-33 at its facility in Livermore, California. Kenetech has invested over [ ] in its facility. FF V 11, 12. Over [ ] square feet of the facility have been allocated for activities related to the KVS-33 such as direct production, inspection and performance testing. FF V 13.

Kenetech has invested nearly [ ] in equipment used in tooling for the KVS-33 wind turbines. FF V 14. Kenetech has invested over [ ] in equipment used in the inspection and testing of components of the KVS-33 wind turbine. FF V 15. Moreover, Kenetech has invested over [ ] in equipment used at the Livermore facility to monitor and regulate the operation and maintenance of KVS-33 wind turbines as well as an additional [ ] in monitoring equipment located elsewhere in the United States. FF V 16.

In addition, Kenetech has invested over [ ] in equipment used to perform repairs at or near the Livermore facility. FF V 17.

Therefore, the domestic industry requirement of section 337 is satisfied by Complainant Kenetech's significant investment in plant and equipment.[41]

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[41] The downtower components of a KVS-33 wind turbine account for approximately [ ] of the total material cost of a KVS-33. FF V 18. If one were to allocate [ ] of Kenetech's investment in equipment used in inspection and testing, monitoring, and regulation of the KVS-33 to the downtower components, the resulting figure would be in excess of [ ]. FF V 19. Of the [ ] square feet of manufacturing space devoted to the KVS-33, approximately [ ] was devoted to the assembly of the downtower components. FF V 20. Therefore, even if only the downtower components were included in the domestic industry, Kenetech's investment in plant and equipment would be significant.

b. significant employment of labor or capital

Complainant's activities also meet the domestic industry requirement with respect to its employment of labor and capital.

Assembly of the KVS-33 occurs at the Livermore facility of Kenetech. FF V 20. Kenetech currently employs approximately [ ] people to work in the area of fabrication and assembly of KVS-33 wind turbines at the facility. FF V 22. Kenetech employs an additional [ ] people in the United States for the domestic operation and maintenance of the KVS-33 units. FF V 23.

Furthermore, the evidence shows that in addition to the capital spent on plant and equipment, as discussed above, Kenetech makes a sizeable outlay for each machine. The total cost of materials for the KVS-33 is about [ ] per wind turbine. FF V 24.

c. substantial investment in engineering, research and development

In 1993 and 1994, Kenetech invested in excess of [ ] in the United States in engineering, and research and development of the KVS-33 and related variable speed technology. FF V 29.

Although the parties have not specifically raised this question, presumably some of the expenditures related to the implementation of the '039 technology would be separable from some expenditures related to the '712 improvement. A conservative estimate of the amount of Kenetech's expenditures related to research and development of downtower components is [ ]. FF 30. Thus, a substantial amount of Kenetech's expenditures have been related to the research and development of downtower components. Nevertheless,

Complainant did not perform an analysis stating precisely how much of its expenditures belong exclusively to the implementation of each of the patents asserted herein. However, it appears from the magnitude of the expenditures involved that a substantial expenditure has been made with respect to each patent's technology, and with respect to areas common to both technologies.

Moreover, Complainant has adequately demonstrated the existence of a domestic industry under the first two factors discussed above, so that it need not rely on this third factor in order to satisfy the domestic industry requirement.

C. Conclusion

Complainant has established that there exists a domestic industry as required by section 337, with respect to both claim 131 of the '039 patent and claim 51 of the '712 patent.

I. TECHNICAL BACKGROUND

1. In an alternating current ("AC") electric power system, the current and voltage vary in time. The variations of current (or voltage) may be plotted as a function of time. When that is done the variations may be represented as a sine wave. Zavadil, Tr. 19.

2. A single cycle of a sine wave begins with an amplitude of zero, increases to its maximum positive value, decreases to zero and then to its maximum negative value, and then finally increases to zero to complete the cycle. CPX-14; Zavadil, Tr. 19.

3. In North American power systems, the number of cycles completed by an AC current (or voltage) in one second is its frequency, measured in Hertz (Hz). At 60 Hz, the cycle repeats itself sixty times every second. Zavadil, Tr. 19, 21.

4. A complete cycle of the sine function in a fixed frequency system can be defined in terms of time or as 360 degrees. Zavadil, Tr. 21.

5. Utilities transmit electrical energy from generating facilities to end users through utility power grids. Zavadil, Tr. 9-12; CPX-13.

6. The current that corresponds to the power generated or consumed is said to be "in phase" with the voltage if the current waveform and the voltage waveform are arranged so that the peaks and crossing points of the two waveforms are coincident. Zavadil, Tr. 19; CPX-14.

7. If the peak of the current waveform occurs prior to the peak of the voltage waveform, there is a time difference between the zero crossings and the current is said to be leading the voltage. Zavadil, Tr. 19; CPX-14.

8. If the peak of the current waveform occurs after the peak of the voltage

lagging the voltage. Zavadil, Tr. 20; CPX-14.

9. The time difference between two sinusoidal fixed frequency waveforms is conventionally referred to as a phase shift. Zavadil, Tr. 20.

10. In the electric power industry, the phase difference is referred to as phi (ϕ), or the power factor angle. Zavadil, Tr. 20.

11. If the voltage and current waveforms are in phase, all of the power delivered is composed of real, or usable, power. Zavadil, Tr. 22.

12. If the voltage and current waveforms are out of phase, a portion of the overall or apparent power consists of reactive power. Zavadil, Tr. 22-23.

13. The relationship between "real power," "reactive power," and "power factor angle" (or phi) can be demonstrated through the use of a right triangle. The legs of the right triangle represent the "real" and "reactive" components of the electrical power present. The hypotenuse of the right triangle represents the "apparent" power. The power factor angle is represented by the angle between the real component and the apparent power. Zavadil, Tr. 23-24; CPX-15. The power factor angle represents the time difference between the grid voltage and the current that is out of phase. Zavadil, Tr. 24.

14. The "power factor" is defined as the cosine of the power factor angle ϕ. Zavadil, Tr. 27.

15. Utility companies prefer to supply power at a unity power factor, i.e.,with the current and voltage exactly in phase. X-17, col. 3, lines 35-37.

16. Loads on a utility power grid often tend to pull the current out of phase with the voltage. X-17, Col. 2, lines 37-39; Zavadil, Tr. 21.

17. Shifting a current waveform so that it is intentionally leading the voltage waveform provides the ability to offset or cancel out currents that are lagging the voltage. Zavadil, Tr. 22.

18. Traditionally, utilities have relied on banks of capacitors to help pull the current back into phase with the voltage. X-16, col. 4, lines 7-11; X-17, col. 2, lines 46-48; Zavadil, Tr. 27.

19. Loads on a utility power grid may require reactive power to facilitate their operation, and management of reactive power is an important concept behind operating electric power systems. Zavadil, Tr. 21-22.

20. Increasing phi while maintaining the real power at a constant value will increase the time difference between the current and voltage waveforms, and will cause an increase in the reactive power and the apparent power. Decreasing phi while maintaining the real power at a constant value will decrease the time difference between the current and voltage waveforms, and will cause a decrease in the reactive power and the apparent power. Zavadil, Tr. 25-26.

21. In a constant speed wind turbine, rotational speed of the blades is generally dictated in some manner by the frequency of the grid to which the turbine is connected. However, with a variable speed wind turbine that restriction is removed, and the wind turbine blades can operate at a range of rotational speeds that are not necessarily related to the frequency of the utility grid to which the turbine is connected. Therefore, in a constant speed wind turbine that is directly connected to a grid in North America, the frequency of the output electricity will be 60 Hz. However, in a similarly employed variable speed wind

turbine, the output electricity of the turbine is not automatically restricted to 60 Hz. Zavadil, Tr. 12-13.

22. The most common method used in the wind turbine industry to control reactive power or power factor has been the installation of "shunt" or capacitor banks connected in parallel, which supply reactive power that cancels out the reactive power required by some older, constant speed wind turbines. Shunt-connected (parallel-connected) capacitor banks would not be connected in series with an electric supply line. They would be connected to ground or in parallel to the supply. Rotary condensers and static bar condensers which are connected in shunt are other examples of techniques that may or have been used. Zavadil, Tr. 27-28.

23. The inverter described in the '039 patent is not shunt connected. It connects the system to the utility grid while simultaneously passing the power generated by the system to the utility grid. Thus, the inverter may be said to be in "series" or "in line." Zavadil, Tr. 28-29.

24. One of ordinary skill in the art relevant to this investigation, especially in 1991, is an individual with at least a Bachelor's degree in a technical engineering field, such as electrical engineering, and three to five years of wind turbine and/or utility experience. X-166, ¶ 3; Zavadil, Tr. 76-77; CPX-8C (Coleman Dep.) at 7-9, 12-15.

II. SALE FOR IMPORTATION AND IMPORTATION

1. Mr. Aloys Wobben is the owner and manager of Respondent Enercon. He is the design manager of the E-30 and E-40 model wind turbines. Wobben, Tr. 220-221.

2. Ms. Juanita Fromme is the head of Enercon's export division. CPX-11C (First

Fromme Dep.) at 8; Wobben, Tr. 301.

3. Mr. John Kuhns founded New World and became its chairman and chief executive officer. Mr. Kuhns has a B.A. from Georgetown University, an M.A. in fine arts from the University of Chicago, and an M.B.A. from Harvard's business school. After receiving his M.B.A., Mr. Kuhns joined the finance department at Salomon Brothers, where he worked on financing for electric utilities. CPX-9C (Kuhns Dep.) at 7-9, 14, 20-21. Mr. Wobben knows Mr. Kuhns as a shareholder of New World, and its decision maker. Wobben, Tr. 261.

4. Mr. Brian Clare Lees, until late last year, was president of New World's grid power division. He was the head of New World's wind farm operations, i.e., the building and operating of New World's wind farms. CPX- 7C (Lees Dep.) at 1, 8; CPX-9C (Kuhns Dep.) at 28.

5. Mr. Clint "Jito" Coleman is New World's chief technology officer. He is involved in, and often makes recommendations, with respect to the technological direction of the company. CPX-8C (Coleman Dep.) at 6-7; CPX-9C (Kuhns Dep.) at 26-27.

6. On August 18, 1993, Mr. Wobben and Ms. Fromme made an offer to Clare Lees of New World Power for the sale of 100 E-40 wind turbines at a price of [ ] per machine to be delivered on the west coast of the United States. X-123C; Wobben, Tr. 366.

7. In August 1993, Respondent Enercon in a document signed by Mr. Wobben and Ms. Fromme, wrote to Respondent New World, to thank NWP for an inquiry, and to state that Enercon would "like to offer" 100 E-40 wind turbines to NWP. It was stated that the "offer is valid until March 31st 1994." Included in the correspondence was a price

quotation. X-123C; Order No. 18 at 8-9.

8. The August 18, 1993 offer was made in response to a request to Ms. Fromme from Mr. Lees for a price on 100 E-40 wind turbines. CPX-7C (Lees Dep.) at 36.

9. Mr. Lees probably requested the price quotation because New World was considering a bid on a project in Washington. New World did not pursue that project. New World was also considering a number of other possible projects at the time he made his request to Ms. Fromme for a price quotation. CPX-7C (Lees Dep.) at 36-37.

10. The August 18, 1993 offer sets forth terms of payment and terms of delivery for a site in the western United States. The site was located in the state of Washington. X-123C; Wobben, Tr. 366.

11. On September 20, 1993, John Kuhns and Clare Lees traveled to Aurich, Germany to meet with Mr. Wobben and Ms. Fromme. In a letter confirming travel arrangements, Ms. Fromme indicated to Mr. Lees that they would discuss "your project." X-122C.

12. During the September 20, 1993 meeting, Mr. Wobben and Mr. Lees discussed the advantages of the E-40 technology, including the ability of the grid management system to control power factor. Wobben, Tr. 367-368; CPX-7C (Lees Dep.) at 31.

13. On February 10, 1994, Messrs. Lees and Kuhns of NWP, accompanied by Mr. Mickey Craig of Westinghouse, met with Mr. Wobben in Germany. CPX-7C (Lees Dep.) at 48; CPX-21C (Second Wobben dep) at 90-91.

14. Westinghouse is a shareholder in New World, and has a member on NWP's board of directors. Westinghouse and New World have a business alliance, under which

Westinghouse will serve as NWP's construction manager on certain projects, including the project at Big Spring, Texas. CPX-9C (Kuhns Dep.) at 30-31, 117-118, 142; CPX-7C (Lees Dep.) at 20; X-95C; X-51C.

15. Mr. Mark Haller began working for Enercon in mid-February, 1994. CPX-6C (Haller Dep.) at 25. Mr. Haller reported to Mr. Wobben and Ms. Fromme. Wobben, Tr. 301-302.

16. Mr. Haller's office is the U.S. sales office of Enercon. Wobben, Tr. 369.

17. In a letter dated February 15, 1994, Ms. Fromme thanked Mr. Kuhns for the February 10 visit and stated "We once again would like to point out that we will be prepared to fulfil your requirements starting in 1995 as discussed and are looking forward to a most fruitful and long-term relationship with you and your organization." X-148C.

18. In a telefax message dated February 16, 1994, Ms. Fromme informed Mr. Haller of the "pricedetails [sic] as discussed on February 10 th, 1994 ...." The price structure included 100 E-40 wind turbines at [ ] each. The "[p]rices are to be understood ex factory - at present Germany." The message also mentioned the fact that Mr. Wobben had already informed Mr. Haller "on our future plans regarding John Kuhns and his organization." X-126C.

19. Enercon quoted a price to New World in connection with the Texas Utilities project in Big Spring, Texas. The price quoted by Enercon was passed on to Mr. Michael Best, executive vice president of New World. CPX-10C (Best Dep.) at 105-106; CPX-9C (Kuhns Dep.) at 27-28. He is executive vice president in charge of project financing. CPX-9C (Kuhns Dep.) at 27.

20. Mr. Best is the person responsible for overseeing the "business package" for bids New World has submitted on domestic wind energy projects. CPX-10C (Best Dep.) at 36.

21. The price quoted in connection with the Texas Utilities project was the same price quoted in connection with the project in the state of Washington. CPX-7C (Lees Dep.) at 56; X-101C.

22. On February 28, 1994, New World submitted its bid for the Texas Utilities project in Big Spring, Texas. In the bid, New World stated its intention to use Enercon E-40 machines. X-94C.

23. On March 14, 1994, Mr. Haller reported to Mr. Wobben and Ms. Fromme that Mr. Lees and Mike Best of New World wanted Mr. Haller to attend a meeting with Texas Utilities representatives to discuss the bid for the Big Spring, Texas project. Mr. Haller was encouraged by Enercon's headquarters to attend the meeting. X-134C; CPX-21C (Second Fromme Dep.) at 71-72.

24. On April 8, 1994, Mark Haller reported to Mr. Wobben and Ms. Fromme that he and representatives of New World and Westinghouse had met with members of Texas Utilities. X-14C.

25. When Mr. Haller visited with Texas Utilities, he answered technical questions, including questions about the ability of the E-40 to control power factor. CPX-6C (Haller Dep.) at 66-67.

26. Mr. Haller often wrote to Ms. Juanita Fromme at Enercon. Ms. Fromme is Mr. Haller's conduit to Enercon generally, and to Mr. Wobben in particular. CPX-6C (Haller Dep.) at 259-260.

27. In early May, 1994, Mr. Wobben, Ms. Fromme and Mr. Haller of Enercon met with Mr. Kuhns and Mr. Lees of New World at the headquarters of New World in Lime Rock, Connecticut to discuss future activities in the United States, including the Texas Utilities project. Wobben, Tr. 371-372; X-207C.

28. On May 30, 1994, Mr. Haller reported to Mr. Wobben and Ms. Fromme that an E-40 would be subject to customs duty of 4.2% upon its importation into the United States. Wobben, Tr. 372; X-13C.

29. On June 1, 1994, Mr. Haller reported in a memorandum to Enercon that it appeared the entire Texas Utilities bid would be awarded to New World Power. He stated in part, as follows:

> Congratulations are probably already in order for an eighty machine sale! Ausgezeichnet! *Now we have to deliver them.*

X-12C (emphasis added).

30. On June 3, 1994, Mr. Haller reported in a memorandum sent by facsimile to Ms. Fromme that the entire 40 megawatt Texas Utilities project had been awarded to New World. He stated in part, as follows:

> The good news is that all of it went to New World. No one else. Forty megaWatts to *NWP/Westinghouse/Enercon*. *We* won!
>
> ***
>
> Also, TU has sent letters to the nine other companies that bid and announced to them that it is *NWP/Enercon*. By Monday, the entire industry will know.

X-83C (emphasis added); CPX-6C (Haller Dep.) at 259-260; X-192C, E001948-E001949.

31. In response to Mr. Haller's memorandum of June 3, 1994, Ms. Fromme

conveyed Enercon's elation at hearing the news, and congratulations and thanks. X-192C, E001949.

32. Mr. Haller stated that the award of the Texas Utilities bid meant that congratulations were in order for an "eighty-machine sale." X-12C.

33. Mr. Haller reported the news of the Texas Utilities award to Ms. Fromme because she was Mr. Haller's conduit to Mr. Wobben. CPX-6C (Haller Dep.) at 260.

34. On July 22, 1994, there was a meeting of representatives of Enercon, New World and Westinghouse in Bremen, Germany. Messrs. Wobben and Haller and Ms. Fromme attended on behalf of Enercon, and Messrs. Kuhns, Lees and Coleman attended on behalf of New World. Messrs. Mickey Craig and Hiener Moller attended on behalf of Westinghouse. X-62C

35. Mr. Jito Coleman of New World took notes at the meeting in Bremen. In an August 4, 1994 memo to Ms. Fromme, Mr. Haller characterized Mr. Coleman's notes as accurate. X-84C; CPX-6C (Haller Dep.) at 260-261.

36. Mr. Coleman's notes of the Bremen meeting state that the inverters of the E-40 are to come from Germany. X-84C.

37. Mr. Wobben testified in his deposition and at the hearing that even if a U.S. manufacturing facility is established to supply wind turbines to the Big Spring, Texas project, at least the first Enercon machines in the United States will be imported from Germany. CPX-4C (First Wobben Dep.) at 710-711; CPX-20 (Second Wobben Dep.) at 99, 105, 108; Wobben, Tr. 373-374.

38. In August, 1994, Mr. Haller reported to Ms. Fromme that he understood that the

Texas bid was based on price quotes that Enercon had supplied New World in connection with the Washington bid in 1993. X-101C.

39. New World and Texas Utilities signed an energy purchase agreement in mid-September, 1994 that provides that unless agreed otherwise by both parties in writing, all wind turbines in the Renewable Resource Facility must be Enercon model E-40, 500 kW wind turbines. X-9, Art. 1.01

40. In October, 1994, Mr. Kuhns visited Mr. Wobben and Ms. Fromme in Germany. CPX-9C (Kuhns Dep.) at 128.

41. At this meeting, Ms. Fromme requested that Mr. Kuhns prepare a document setting forth a more formal indication of New World's intent to purchase E-40 wind turbines. The parties had been discussing matters for some time, and Ms. Fromme wanted a more formal indication. Although Ms. Fromme may not have specifically suggested use of the term "purchase order," she suggested the form of the document. CPX-9C (Kuhns Dep.) at 130-131. 42. The document drawn up during the October 1994 meeting is captioned "PURCHASE ORDER FOR 140 ENERCON E 40 WIND TURBINES FOR TEXAS AND CALIFORNIA" and is dated October 17, 1994. X-51C.

43. The document states that New World "is pleased to confirm, subject to the conditions below, its purchase order for a total of 140 E-40 turbines." X-51C.

44. In October 1994, the CEO of Respondent NWP, Mr. Kuhns, visited Respondent Enercon in Germany, at which time he signed a "Purchase Order for 140 Enercon E 40 Wind Turbines For Texas and California." Order No. 18 at 9; X-51C.

45. The purchase order states that: "The price of each E 40 shall be as mutually

agreed between New World and Enercon, subject to being stipulated by November 30, 1994." With respect to the Big Spring project, the document provides that New World's purchase of the E-40's in question is conditioned upon: 1) approval of the New World-Texas Utilities power purchase agreement by the Texas Public Utilities Commission and 2) confirmation of financing. X-51C.

46. Upon the occurrence of these events, New World would convert the document "to a firm, non-conditional purchase order." The document further provides that the final price shall be mutually agreed between New World and Enercon. X-51C.

47. At the hearing Mr. Wobben testified with respect to his October 1994 meeting in Germany with Mr. Kuhns as follows:

> Q And should we also assume that you and he agreed that the prices would be determined at a later date?
>
> A Yes, because I could not give him a price at that time because we were just beginning to consider manufacturing in the United States.

Wobben Tr. 328.

48. Shortly after New World submitted its conditional purchase order to Enercon, Mr. Best provided Mr. Wobben, "per your discussion with John Kuhns," a copy of New World's total project budget for Texas. X-194C.

49. Near the end of 1994, Enercon investigated the costs involved in shipping twenty-five E-40's to Big Spring from Germany. X-79C.

50. In a memorandum to Ms. Fromme dated January 3, 1995, Mr. Haller characterized Big Spring as one of the "expected deliveries" for 1995. X-81C.

51. On February 2, 1995, Ms. Martina Kuhlmann, Mr. Wobben's executive

assistant, reported to Mr. Haller that Mr. Wobben had directed Ms. Fromme to work with Westinghouse in the preparation of materials for the American Wind Energy Association conference in March, 1995. X-80C at E001405; CPX-21C (Second Wobben Dep.) at 129-130.

52. A few weeks before this conference, Ms. Fromme provided a model of the E-40 for the New World/Westinghouse booth. CPX-20C (Second Fromme Dep.) at 86-88; SPX-6C.

53. The booth depicted two posters. One of the posters depicted the Enercon E-40, and another described the Big Spring project and its expected use of E-40 machines. SPX-6C; SPX-9.

54. On February 23, 1996, the Texas Public Utilities Commission approved the energy purchase agreement between New World and Texas Utilities. CX-136.

55. New World has accepted a proposal from Chemical Securities -- a securities dealer firm owned by Chemical Bank -- to raise the capital needed to finance the Big Spring project. CPX-9C (Kuhns Dep) at 88-89; CPX-10C (Best Dep.) at 171-173.

56. Mr. Kuhns, of New World, testified at his deposition in part, as follows:

> Q. What is the status of financing for the TU Big Spring project?
>
> A. We have a proposal which we have accepted from Chemical Bank to finance the project, and they are qualifying participants now on the equity side, and they have committed to make loans on the debt side.
>
> Q. Are they helping to provide all the financing needed for the project?
>
> A. They are going to provide all the financing needed. That's

what their proposal offers.

Q. And when was this arrangement with Chemical Bank concluded?

A. I think our board accepted their proposal at our last board meeting, which was the 25th of July, I guess. Is that right? Yes. It was a couple weeks ago.

CPX-9C (Kuhns Dep.) at 88-89.

57. New World is prepared to convert the proposal of Chemical Securities to a firm commitment upon approval of the Big Spring project by the Texas Public Utilities Commission. CPX-10C (Best Dep.) at 172.

58. Mr. Haller, with Mr. Wobben's knowledge, arranged to have an Enercon videotape shown at the 1995 AWEA conference. CPX-21 (Second Wobben Dep.) at 133-134.

59. At a meeting in Aurich, Mr. Wobben told Mr. Kuhns of New World Power that if New World wanted Enercon machines in Texas, Enercon would provide them on a cost effective basis. Mr. Wobben's statement may have been based on the assumption that manufacturing could commence in the United States. Wobben, Tr. 300-301.

60. Mr. Wobben testified at his deposition that he would not agree to refrain from importing because it would deprive him of a degree of freedom. CPX-21 (Second Wobben Dep.) at 123-124.

61. During the hearing, Mr. Wobben testified that the actions pending against him at the Commission and in District Court have caused him "to stop everything while these actions were still underway...." He testified that: "I first want to see what is the outcome of these actions, legal actions." Wobben, Tr. 258-259.

III. CLAIM CONSTRUCTION

A. CONSTRUCTION OF CLAIM 131 OF THE '039 PATENT

1. Claim 131 of the '039 patent is directed to a method of converting the variable frequency AC electricity generated by a variable speed wind turbine to constant frequency AC electricity. The claim is also directed to the delivery to a utility system of constant frequency AC electricity at any desired angle between the voltage and current. Zavadil, Tr. 9; X-16 ('039 Patent), col. 3, lines 17-27.

2. Claim 131 of the '039 patent is as follows:

> 131. A method for converting electricity generated by a variable speed wind turbine into fixed frequency output electricity, wherein the wind turbine includes a generator and means for supplying generated electricity to power converter that includes a switched inverter supplying the output electricity, the method comprising the steps of:
>
> forming a reference waveform;
>
> rotating the reference waveform by a selected power factor angle to yield a template waveform;
>
> using the template waveform to define desired output currents; and
>
> controlling the switched inverter to produce output currents corresponding to the desired output currents.

X-16, col. 42, line 64 - col. 43, line 10.

3. The reference waveform in the method of claim 131 of the '039 patent provides the timing information needed to supply the desired output currents which have the same frequency as the grid voltage. Zavadil, Tr. 35.

4. Once the timing information is known, and one also knows the shape of the

waveform -- as for example [ ] -- the reference waveform has been effectively defined. Zavadil, Tr. 52, 107.

5. The reference waveform primarily provides knowledge of the zero crossing point of the voltage waveform on the utility grid. Thus, the reference waveform provides information for synchronizing the output currents that will be produced to the utility grid. Zavadil, Tr. 35, 52.

6. The most direct way of obtaining the appropriate synchronization information for the reference waveform is to look directly at the voltage waveform of the grid, and to use that information for timing. Zavadil, Tr. at 35.

7. Thus, for example, in the preferred embodiment, the reference waveform is indicated as V_{01}, V_{02} , and V_{03} in Figure 13 of the '039 patent, which shows an overview of the current regulation circuit. Figure 2 of the '039 patent illustrates the inverter control unit's use of a signal from the grid to form the reference waveform. Zavadil, Tr. 34-35; X-16, Figs. 2, 13.

8. Complainant's expert, Mr. Robert M. Zavadil, received a Bachelor of Science degree in electrical engineering with highest honors from South Dakota State University in 1982. He has been a Registered Professional Engineer in Nebraska since 1986, and is a member of the Institute of Electrical and Electronics Engineers (IEEE) Power Engineering Society, and the IEEE Industry Applications Society. For the past ten years, he has worked with electric utilities and/or wind power applications. He was qualified at the hearing in this investigation as an expert in the field of generation of electricity from wind turbines, interfacing wind turbine systems with utility grids and power quality issues in such

interfaces. X-166C, ¶¶ 27-32; Zavadil, Tr. 5-7.

9. Complainant's expert, Mr. Zavadil, used the term "phase shifting" interchangeably with the term "rotating" in reference to claim 131 of the '039 patent. Zavadil, Tr. 53-55.

10. Complainant's expert testified that to him the term "rotating" in claim 131 of the '039 patent means that an angular displacement is added to what exists or is in the reference wave form. Zavadil, Tr. 82.

11. The '039 patent provides in part, as follows:

> As shown in FIG. 13, the inverter control unit uses the output voltage as a sinusoidal waveform reference, rotates the reference waveform by a certain phase angle to generate a rotated reference waveform, or "template", then multiplies the template waveform by a factor, I_{ref}, derived from the DC link voltage, v_{dc}, to generate a desired current waveform. The actual currents are compared to the desired currents to generate the PWM commutation signals for the inverter switches. All of the calculations of the inverter control unit are performed periodically. In the preferred embodiment, the DSP cycles through its calculations every 125 microseconds, equal to a rate of 8 kHz.

X-16 ('039 Patent), col. 16, line 67 - col. line 11.

12. The prosecution history reveals no rejection of the claims by the Examiner, or amendment by the applicants. The prosecution history contains very few statements by or on behalf of the inventors, other than those contained in the patent specification. CX-30, K 00738. However, the prosecution history contains an Examiner's Statement of Reasons for Allowance, which states, in pertinent part, as follows:

> Independent Claims 115, 121, 130, 131 and 138 require an inverter controller responsive to the desired phase angle between output voltage and current and/or means for defining a distortion index indicative of current errors between the actual and desired

> output currents and/or a template waveform that is offset by a desired phase angle. This is not suggested by Kos et al.

CX-30, Notice of Allowability at 2 (K 00601).

13. Claim 134 of the '039 patent is as follows:

> 134. A method for converting electricity as recited in claim 131 further comprising the steps of creating a sinusoidal reference waveform synchronized with the output electricity, defining a template waveform that is offset from the reference waveform by the power factor angle, and converting the template waveform into the desired output currents.

X-16, col. 43, lines 21-27.

14. Claim 136 of the '039 patent is, as follows:

> 136. A method for converting electricity as recited in claim 134 wherein the step of defining a template waveform includes the step of periodically calculating the template waveform by shifting the reference waveform by the power factor angle.

X-16, col. 44, lines 1-5.

15. Dr. Erdman, one of the two inventors of the '039 patent, testified during his deposition that "phase shifting and rotation are the same thing, are essentially equivalent." CPX-2 (Erdman Dep.) at 151-152.

16. Mr. Clint "Jito" Coleman does not describe himself as an electrical engineer or a circuit designer. However, he is New World's chief technology officer. He is involved in, and often makes recommendations with respect to, the technological direction of the company. CPX-8C (Coleman Dep.) at 6-7, 220; CPX-9C (Kuhns Dep.) at 26-27.

17. Mr. Coleman has a Bachelor's of Science in wood science and technology (forestry division) from the Colorado State University; and in 1975, he received a Master's degree in mechanical engineering from the University of Nevada, Reno. As early as 1976,

Mr. Coleman began working with wind turbine design, and has since 1980 been employed by New World and its predecessor. He has had extensive experience with various electrical designs and the connection of wind turbines to electrical utility grids. CPX-8C (Coleman Dep.) at 6-22.

18. Mr. Coleman was asked during his deposition, as an engineer who works with wind power, to explain his understanding of claim 131 of the '039 patent. He had the '039 patent in front of him during the questioning; he had read it before; and he provided a review of the patent to New World prior to deposition testimony. CPX-8C (Coleman Dep.) at 130-132, 138-139, 207-208.

19. At his deposition, Mr. Coleman understood "forming a reference waveform" in claim 131 of the '039 patent to refer to a sinusoidal wave. He recognized that there are many ways of determining where the wave should start and stop, i.e., its "phase angle," as he said. He then proceeded to the next element, "rotating the reference waveform by a selected power factor to yield a template waveform." He testified, as follows:

> A. *** Supplying the output electricity, the method comprising the steps of: Forming a reference waveform, it's sinusoidal. Where does it start, where does it stop, what's the -- its phase angle. A thousand ways of doing that. Rotating the reference waveform by a selected power factor. Rotating the reference waveform by a selected power factor angle to yield a template waveform. Okay. Understood.
>
> Q. Well not by me.
>
> A. That means they take a signature. When they say waveform they don't have to take a signature. So I assume they are going to take a signature. They don't say that. Waveform I assume is a generic term that would include signature again, although that's a legal interpretation. They would then rotate the reference waveform by a select[ed] power factor angle. In this case the

> reference waveform is probably going to end up being the current waveform. They are going to rotate it by a selected power factor angle, which means they are going to make a decision and going to shift it either leading or lagging, which it doesn't say what they are doing. And that becomes the reference, the template waveform. That becomes something they are trying to build, the template.
>
> Q. So they can do it either leading or lagging?
>
> A. That's what it suggests. It just says rotate. And then using the template to define the desired output currents, okay, so they are using the template to then generate the current waveform and controlling the switched inverter to produce output currents corresponding to the desired output currents, so they are taking the templates, using the inverter switch to reproduce that template waveform on the current side.

CPX-8C (Coleman Dep.) at 208-211.

20. "Rotational transformation" is disclosed in the '039 patent in connection with the preferred embodiment disclosed in the specification. X-16 ('039 Patent), col. 17, lines 29-48; Zavadil, Tr. 82-83; Ehsani, Tr. 418-419, 422.

21. Respondents' expert is Dr. Mehdrad (Mark) Ehsani. Dr. Ehsani was recently elected a fellow of the IEEE for his contributions to the field of power electronics and motor drives. He has a Bachelor's of Science and a Master's of Science in electrical engineering from the University of Texas, and a Ph.D in electrical engineering from the University of Wisconsin, Madison. Ehsani, Tr. 407-411; X-180.

22. Power electronics is the technology of applying solid state electronics to the control of larger amounts of electrical current or voltage for the purpose of driving electrical loads from sources of electric power when the characteristics of the source of power and the load are not compatible, and thus some interfacing or conditioning of power is required.

Power electronics was formerly called "power conditioning." Ehsani, Tr. 411.

23. Simply moving a point from the original zero crossing point to another point on the zero line, by a phase angle ϕ is called a "phase shift," and it is not a "rotational transformation." Ehsani, Tr. 440.

24. Rotational transformation is well understood to be a very specific technique used in power electronics and motor drives in electrical engineering. Ehsani, Tr. 419.

25. Rotational transformation has its roots in mathematics, and specifically the rotation of frames of reference in Cartesian coordinates in mathematics. Rotational transformation is applied to the rotating vectors of voltages in electrical engineering in power electronics. Ehsani, Tr. 418-419, 422.

26. The rotational transformation testified to by Respondents' expert, relying in part on the The Harper Collins Dictionary of Mathematics (1991), results from turning the entire plane about a fixed point in the plane, through a change of variables. The change of variables may be effected trigonometrically or in the form of a rotational transformation matrix. Ehsani, Tr. at 421; see RX-3 at 515.

27. In order to find a definition of rotational transformation in Webster's New World Dictionary of Mathematics, respondents' expert used a definition of "transformation," and relied on what was contained under the subheading of rotation or rotation of axes. Ehsani, Tr. 425; RX-8 at 274-275 ("Transformation of Coordinates").

28. Webster's New World Dictionary of Mathematics (1989) states in pertinent part, as follows:

> A *rotation of axes*, or *coordinates*, in the plane is a transformation in which the axes X, Y of one rectangular system are rotated about

the origin O through an angle θ to locate the axes X', Y' of the second coordinate system.

RX-8 at 275.

29. Using rotational transformation, one samples the line voltage in very small steps in time, such as thousands of times per second, and transforms the input signal to an output signal under rotational transformation. Thus, the phase angle can be changed in mid-stroke. Ehsani, Tr. 433-435.

30. By using rotational transformation, one maintains tight control of the formation of the reference waveform. In fact, one is capable of effecting subcycle changes in the reference current. Ehsani, Tr. 435-436.

31. Rotational transformation operates point-by-point on the sinusoid, so that before the cycle is over, it could go to another phase shift. Ehsani, Tr. 490.

32. Although the methodology of rotational transformation would allow one to have more than a single reference current in each cycle as one is processing the AC current for delivery to the grid, Respondents' expert read the '039 patent such that "the basic intent is to have substantially [a] single reference current ...." Ehsani, Tr. 436.

33. The rotational transformation described in the '039 patent has time functions in it, which indicates that the rotation is performed in a stationary frame of reference. Ehsani, Tr. 426-428.

34. One may use a technique such that with a line voltage, step-by-step along the sinusoid, for example every 125 microseconds, one reads the line voltage and performs the mathematical equations to put out the proper voltage. So, in effect one creates another

sinusoid waveform simultaneously while the whole sinusoid is coming in. One is working in "real time" on a live sine wave. That operation done in a computer is called "rotational transformation." Ehsani, Tr. 433-434.

35. In what Respondents' expert called a "real time" methodology, or rotational transformation, there is digital signal processing of one sinusoid to create another by a very specific mathematical technique called rotational transformation. This "real time" approach is the major relevant difference between the rotational transformation and the classic phase shift. Ehsani, Tr. 470.

36. Although the "real time" methodology, using rotational transformation differs from a zero-crossing, time-delay methodology [ ], both methodologies affect the timing of current relative to voltage. Ehsani, Tr. 469-470, 474-475.

37. The result of having performed a rotational transformation is a sinusoid waveform at a phase variance to the original sinusoid waveform. Ehsani, Tr. 433.

38. In an applied electrical engineering context, there may be advantages or disadvantages to using a "real time" or "rotational transformation" technique to effect phase shifting of sinusoidal waveforms. For example, while one can use a device that can adjust voltage on a subcycle basis (and not wait for the zero crossing point of the signal from the AC line), the device might detect a "blip" or other anomaly on the AC line that is not properly filtered out, and thus effect a rotational transformation that is based on noise on the line instead of a change in voltage. The resulting output would be undesireable in that instance. Ehsani, Tr. 435-440.

39. It takes an advanced computer to perform rotational transformation with

electrical, sinusoidal waveforms; and the computer must operate fast. Ehsani, Tr. 440-441, 471, 487-489, 491.

40. Respondents' expert admitted that many times he has heard the word "rotation" and the term "phase shift" used interchangeably to describe the phenomenon of the displacement of a sine wave. He does, however, find that to be a loose way of using terminology, and does not believe that it would be appropriate for a patent. Ehsani, Tr. 478-481.

41. Prior to the hearing, Respondents' expert did not know of the testimony of NWP's Mr. Coleman concerning the meaning of claim 131 of the '039 patent. Ehsani, Tr. 482.

42. Respondents' expert understood "preferred embodiment" to mean the most likely way that the inventor had in mind when he wrote the patent. Ehsani, Tr. 492. He understood the patent to allow minor variations, but not major variations from the preferred embodiment. Id.

43. M. Kuznetsov in Fundamentals of Electrical Engineering ("Kuznetsov") states that "[p]ractical electrical engineering has given preference to electrical quantities that obey the sine law," and discusses sinusoidal qualities, including the concept of "phase angle." CX-135 at 172.

44. Kuznetsov illustrates that "a quantity obeying the sine law can be represented in equation form, by a vector diagram (phasor diagram), or by a sine-wave form." CX-135 at 173. Thus, Kuznetsov's Fig. 131 shows a sine wave, and its development as a rotating vector. The sine wave shown in Fig. 131 is drawn with the uniform counterclockwise

rotation of a radius vector (or phasor) of length equal to the peak value of the quantity. Id. The sine wave shown is not displaced from the zero point. Thus, the vector is on the horizontal axis in the vector diagram. Id.; Ehsani, Tr. 516.

45. A sine wave may be shown by the counterclockwise rotation of a vector. The vector may be illustrated as an arrow whose length show the amplitude of the sinusoid. CX-135 at 172-173; Ehsani, Tr. 422, 430, 516; CX-3 at 515.

46. Kuznetsov's Fig. 132 shows a sine wave form with an initial phase displacement. The "initial *phase angle*" is shown as the Greek letter psi (ψ). CX-135 at 173. The Figure shows a leading time-shifted sine wave. Thus, in the vector diagram, the same sine wave is illustrated by showing a rotating vector (t=0) that is rotated (in a counterclockwise direction) from the horizontal axis by the same angle, psi (ψ). Id.; Ehsani, Tr. 516-517.

47. Kuznetsov's Fig. 132, shows the vector (t=0) rotating with an angular velocity of omega (ω). Thus, the diagram shows the vector from a stationary frame of reference, as one standing by the side of a road might see a car speed by at a certain velocity. Ehsani, Tr. 529-530. However, Fig. 132 also shows the starting point of the vector and the angle psi (ψ) from a rotating frame of reference, as one in a car moving at the same speed as another car might be able to judge how many yards ahead or behind the other car one's own car were traveling. Ehsani, Tr. 529-530. Therefore, although it is not explicitly stated, Kuznetsov's Fig. 132 combines a stationary and a rotating frame of reference.

48. Complainant's expert testified that in claim 131 of the '039 patent, the term "selected power factor angle" is used to mean that a power factor angle is chosen from a range of possible values, and further that the power factor angle can be changed at intervals

or changed continuously. He based his understanding of the claim on the patent and the intention of the invention to provide flexibility for reactive power control. Zavadil, Tr. 36-37.

49. Respondent NWP's chief technology officer, Mr. Coleman, understood claim 131 of the '039 patent to mean that the reference waveform is rotated by a selected power factor angle so as to be either leading or lagging. CPX-8C (Coleman Dep.) at 208-211.

50. In describing the invention as claimed in claim 131 of the '039 patent, the Examiner referred to "an inverter controller responsive to the desired phase angle between output voltage and current and/or means for defining a distortion index indicative of current errors between the actual and desired output currents and/or a template waveform that is offset by a desired phase angle." CX-30, Notice of Allowability at 2 (K 00601).

51. As illustrated in the '039 patent's preferred embodiment, the invention may be used in either of two modes. The two mode are described in the specification, as follows: "the power factor controller 54 can control the power factor angle, ϕ, or the magnitude of reactive power to supply vars (volt-ampere-reactive) to the utility." X-16 ('039 Patent), col. 18, lines 44-47.

52. In the electric power industry, the phase difference between two sinusoidal fixed frequency waveforms is referred to as phi (ϕ), or the power factor angle. Zavadil, Tr. 20; see FF I 9, 10.

53. In the first mode of operation, the power factor angle is the same as phi ϕ. X-16 ('039 Patent), col. 18, lines 44-45.

54. In the first mode of operation the angle is controlled to provide a desired

constant ratio between the real power and reactive power. In the second mode, the actual amount of reactive power to be delivered by the converter is controlled. The power factor controller determines the power factor angle needed to deliver the amount of reactive power, and a feedback loop continually adjusts the power factor angle according to that determination. X-16, col. 18, lines 53-59; Zavadil, Tr. 29-31; X-166C, ¶ 8.

55. In both modes, there is a selected power factor angle. In the first mode, the factor is selected to be a constant factor angle. In the second mode, the power factor angle is selected to vary in order to deliver the constant amount of reactive power needed. X-16; X-166C, ¶ 8-9; see CPX-4C (Wobben Dep.) at 321-323.

56. There is no language in claim 131 to limit its scope to either the first mode or the second mode, both of which are disclosed in the patent specification. See X-16.

57. There is nothing in the language of claim 131 to indicate that the phrase "selected power factor angle" requires that the power factor angle must be selected electronically. Nor is there anything in the specification to support such a definition. X-16; X-166C, ¶ 9.

58. Under claim 131 of the '039 patent, one may select a power factor angle of zero. The fact that zero degrees is selected does not make the angle any less a "selected power factor angle." X-16; X-166C, ¶ 9, 12.

59. It is proper to speak of an angle, and indeed of a phase angle in electrical engineering, as being equal to zero degrees. In fact, in Kuznetsov (Fundamentals of Electrical Engineering), where the "angle α is called the *phase angle*," the text describes a case in which $\alpha = 0°$. CX-135 at 172-173. See Webster's New World Dictionary of

Mathematics at 11 (A "*zero* angle is one of 0°." An *acute* angle is one between 0° and 90°.").

60. Claim 132 of the '039 patent is as follows:

> 132. A method for converting electricity as recited in claim 131 further comprising the steps of sensing the level of reactive power in the output electricity, and selecting the power factor angle according to a desired level of reactive power.

X-16 ('039 Patent), col. 43, lines 11-15.

61. The specification teaches that even in the preferred embodiment the current controller of the inverter control unit can be implemented in several different ways. X-16 ('039 Patent), col. 17, line 56 - col. 18, line 43.

62. The inverter used in the invention of claim 131 must be a current regulated inverter. Zavadil, Tr. 74.

B. CONSTRUCTION OF CLAIM 51 OF THE '712 PATENT

63. Claim 51 of the '712 patent is as follows:

> 51. A method of converting electricity generated by a variable speed wind turbine into fixed frequency output electricity having a selected reactive power, wherein the wind turbine includes a generator and a means for supply[ing] generated electricity to a power converter that includes an inverter supplying the output electricity, the method comprising the steps of:
>
> (a) providing a reactive power control signal indicative of the reactive power to be supplied by the inverter; and
>
> (b) controlling a current flow through the inverter to provide the reactive power specified by the reactive power control signal.

X-17 ('712 Patent), col. 37, lines 26-38.

64. The '712 patent discloses a method of maintaining a constant value of reactive power when the power factor is large. Zavadil, Tr. 67-68.

65. The method disclosed in the '712 patent provides for independent, direct control of the amounts of real power and reactive power, as opposed to indirect control of reactive power through controlling the power factor angle, ϕ . Zavadil, Tr. 68-69.

66. In the method disclosed in the '712 patent, phi (ϕ) is controlled by the amount of reactive power. Zavadil, Tr. 69.

67. The ability of the invention disclosed in the '712 patent to control reactive power independently is an improvement over the invention disclosed in the '039 patent. Erdman, Tr. 116, 127-128.

68. The specification of the '712 patent describes two inverter control units. The inverter control units are designated 88a and 88b. X-17, col. 22, lines 31-39.

69. The specification of the '712 patent states that inverter control unit 88a cannot control reactive power independently of real power. X-17, col. 26, lines 20-28.

70. In the preferred embodiment of the '712 patent, inverter control unit 88b can operate in either a VAR mode or in the mode that provides control of the power factor. Zavadil, Tr. 101; X-17, col. 22, lines 37-42.

71. The '712 patent specification states that inverter control unit 88b can operate in a mode in which the real power and the reactive power are controlled independently. Inverter control unit 88b is better suited than inverter control unit 88a for providing a static number of VARs, and may also be used to exercise a degree of power factor control. X-17, col. 26, lines 50-55.

72. In the preferred embodiment using inverter control unit 88b, the reactive power waveform is generated using a VAR multiplier. The VAR multiplier may be a signal that indicates the exact number of VARs desired (i.e., a "VAR control signal"), or the VAR multiplier may be a signal that indicates that a certain power factor angle is desired. In either case, the signal is used to generate the imaginary power waveform, and is thus indicative of the reactive power to be supplied to the inverter. Furthermore, the imaginary power waveform is generated independently of the real power waveform. X-17, col. 27, lines 37-47, col. 28, lines 10-35 and 58-66, Figs. 22 and 23; Zavadil, Tr. 101-103.

73. After the generation of the real and imaginary power waveforms, the preferred embodiment adds the waveforms together to obtain necessary "control waveforms," which are applied to a current regulator which controls the inverter. X-17, col. 28, line 67 - col. 29, line 10, Fig. 24.

74. According to the specification, the VAR signal can be selected manually by an operator, or it can be selected automatically. X-17, col. 28. lines 31-39.

75. Figures 22 and 23 of the '712 patent specification illustrate the operation of inverter control 88b. Erdman, Tr. 127-128; Zavadil, Tr. 68; X-17, col. 26, lines 41-43.

76. Figures 22 and 23 of the '712 patent specification describe independent control of reactive power as disclosed in the '712 patent. Erdman, Tr. 127-128.

77. On November 27, 1991, Dr, Erdman had filed at the United States Patent and Trademark Office ("PTO") his Application No. 799,416 which issued as U.S. Patent No. 5,225,712. The application was a continuation in part of the application that issued as U.S. Patent No. 5,083,039, the other patent at issue in this investigation. X-15 ('712 Patent; CX-

20 (Prosecution History of the '712 Patent).

78. In an Office Action, dated June 15, 1992, the PTO Examiner rejected all claims, i.e., claims 1-59, contained in the application. CX-29, K 00198.

79. The Examiner rejected the claims on various grounds, including double-patenting. He stated in part, as follows:

> 1. Claims 1-59 are rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over Claims 1-138 of U.S. Patent No. 5,038,039. *** The inverter controller that is responsive to a distortion index representing a power factor would be obvious to one of ordinary skill in the art as regards the parent case claims and as disclosed ....

CX-29, K 0199.

80. In a paper entitled "Amendment and Response to First Office Action," received by the PTO on October 5, 1992, the applicant, through his patent attorney, discussed the rejection under obvious-type double patenting in the Remarks section of the filing. Applicant made specific reference to the grounds stated above in the preceding Finding, concerning the inverter controller. No amendment was made to claim 51 with respect to these grounds, although an amendment was made in response to a rejection under 35 U.S.C. § 112, first paragraph. The applicant made arguments in the Remarks section of the filing in order to persuade the Examiner to allow claim 51. CX-29, K00212-00213, K00214-00215, K00217-K00218, (Amendment and Response at 2, 4-5, 7-8).

81. In particular, with respect to the aforementioned grounds concerning the inverter controller, the applicant stated that the "feature is a substantial improvement over the prior art." The applicant continued as follows:

> Regarding reactive power, the parent case specifies providing a

> power factor, but the present application discloses independent control of the real and the reactive power as opposed to power factor control. Independent control would not be obvious from the claims of the parent application. Independent control allows reactive power to be supplied to the utility even if the wind turbine is not producing electrical energy. This advantage is discussed in the background, for example at page 5, lines 11 through 24. In comparison, the power factor control disclosed in the parent case requires a specific real power flow in addition to the reactive power flow. It is therefore submitted that the independent control of real and reactive power, as disclosed in the present application, is substantially different than the power factor control disclosed in the parent application, and therefore would not be obvious. Reactive power control is claimed specifically in independent Claims 30, 51, and 56. Reactive power control together with large electrical energy storage, which will be discussed in the next paragraph, is claimed in independent Claim 46.

CX-29, K00215 (Amendment and Response at 4-5).

IV. INFRINGEMENT

1. The E-40 outputs electricity at a fixed frequency. It has a power converter with a rectifier, a DC link, and a switched inverter. The device also has a means for supplying generated electricity to the power converter. Zavadil, Tr. 42-45.

2. The raw reference waveform is used in the E-40 [

].

Zavadil, Tr. 51-52; CX-131C.

3. The Enercon machines utilize [ ] to determine the timing information of the utility grid voltage. Zavadil, Tr. 51, 107; X-184C (Wobben District Court Declaration), drawing 1.

4. The timing information [ ] is provided to [

]. [

]. Zavadil, Tr. 51; Wobben, Tr. 270.

5. Mr. Wobben testified that [

], completely defines a sine wave. Wobben, Tr. 331-336.

6. [

] Zavadil, Tr. 51-52, 107-108.

7. In the Enercon E-40, the desired value of the power factor angle [

]. Zavadil, Tr. 53; X-184C (Wobben District Court Declaration), drawing 1. The [

] In a diagram drawn by Mr. Wobben, [

] Zavadil, Tr. 53; X-184C; CX-131C.

8. The E-40 uses a "selected power factor angle" in the second step in that one is able to select from a range of values for phi and subsequently change the value if desired. Wobben, Tr. 287, 294-296; X-32.

9. Brochures describing the Enercon machines state that the machines are able to control cosine phi, that is, control the reactive power. They also describe "freely selectable power factor." Wobben, Tr. 287; X-18, p. 10; X-29, p. 14.

10. Enercon has videotapes describing its machines which state that the phase angle can be selected freely. Wobben, Tr. 294-296.

11. Mr. Wobben wrote an article for the magazine Windpower in which he stated that with the E-40, the phase angle (cosine phi) between the grid voltage and current can be selected via a data input, and that it is possible to select a different phase angle. Wobben, Tr. 297; X-32 at E000147.

12. In the E-40, [

]. Zavadil, Tr. 53-54, 109; X-184C (Wobben District Court Declaration), drawing 1. The [ ] is scaled, i.e., multiplied by F_{RPM}. Zavadil, Tr. 62-63; X-184C (Wobben District Court Declaration), drawing 1. This scaled template waveform represents the desired output currents. Zavadil, Tr. 63.

13. The E-40 rotates [

]. Zavadil, Tr. 52-55; CX-131C.

14. The [

]. Zavadil, Tr. 53; CX-131C.

15. The [ ] template waveform of the E-40 is used to define the desired output currents. The [ ] template waveform is scaled by a multiplier to produce the desired output currents. Zavadil, Tr. 62-63; CX-131C.

16. The waveform labeled "reference waveform" on CX-131C is a desired output current. CX-131C; Zavadil, Tr. 63.

17. The E-40 uses a comparator to compare the desired output current to the actual current on the utility power grid. The E-40 uses a current regulated inverter. The information derived from the comparison is passed to a switch mode inverter where the

switches are configured to achieve the desired output current. Zavadil, Tr. 63-64, 74; X-184C (Wobben District Court Declaration), ¶ 14, drawing 2; CX-131C.

18. In the Enercon E-40, the reactive power to be supplied by the inverter is indicated by the power factor angle (ϕ). Complainant's expert testified that in the Enercon machines the "reactive power control signal" required by claim 51 of the '712 patent is a power factor angle. Zavadil, Tr. 71-72.

19. Complainant's expert testified to the ability of the Enercon devices to operate in response to a signal that indicates that a certain power factor angle is desired. Zavadil, Tr. 68-72.

V. DOMESTIC INDUSTRY

1. It is the practice in the wind power industry to sell wind turbines as an integral unit, including their so-called uptower and downtower components. Carrier, Tr. 179-180; Erdman, Tr. 181.

2. Mr. Bruce A. Carrier is Complainant Kenetech's Director of International Accounting and Joint Ventures. Carrier, Tr. 144, 145. He has had primary responsibility for the product analysis of the KVS-33 wind turbine. He is familiar with Kenetech's accounting records that pertain to the KVS-33. He was at one time comptroller of the division that had responsibility for the KVS-33 as a new product. He has regular access to the business and accounting records of Kenetech, and communicates regularly with the Kenetech's comptroller and cost accounting manager. Carrier, Tr. 146-149.

3. Mr. Carrier is aware of no sale by Kenetech consisting of only the KVS-33 downtower electronics. Carrier, Tr. 179-180.

4. Complainant Kenetech's KVS-33 wind turbine, including uptower and downtower components, operates as an integral whole. Erdman, Tr. 181.

5. Kenetech's KVS-33 wind turbine, including its uptower and downtower components, is marketed as an integral whole. Erdman, Tr. 181.

6. It is stipulated that Complainant Kenetech's KVS-33 wind turbine practices claim 131 of the '039 patent. Tr. 113; Respondents' Post-Hearing Br. at 36.

7. Complainant has implemented the improvement covered by claim 51 of the '712 patent on a small number (two to five wind turbines) in a test area in California. Erdman, Tr., 117-118.

8. The new version of the KVS-33 is covered by claim 51 of the '712 patent. See Erdman, Tr. 119-125; Respondent's Post-Hearing Br. at 36.

9. The new version of the KVS-33 wind turbine is capable of practicing claim 131 of the '039 patent, or claim 51 of the '712 patent. Erdman, Tr. 118-122.

10. Sales have not yet been made of the new version of the KVS-33 that is covered by claim 51, however it is now ready for commercialization. Erdman, Tr. 118-119.

11. Kenetech manufactures the KVS-33 at its facility in Livermore, California. Carrier, Tr. 154.

12. Kenetech has invested over [ ] in its Livermore facility. Carrier, Tr. 154; CX-109C.

13. At the Livermore facility, over [ ] square feet of space have been allocated for activities related to the KVS-33 such as direct production, inspection and performance testing. Carrier, Tr. 154, 165; CX-109C.

14. Kenetech has invested nearly [ ] in equipment used in tooling for the KVS-33 wind turbines. Carrier, Tr. 155; CX-109C, ¶ 7.

15. Kenetech has invested over [ ] in equipment used in the inspection and testing of components of the KVS-33 wind turbine. Carrier, Tr. 155; CX-109C, ¶ 6.

16. Kenetech has invested over [ ] in equipment used at the Livermore facility to monitor and regulate the operation and maintenance of KVS-33 wind turbines as an well as an additional [ ] in monitoring equipment located elsewhere in the United States. Carrier, Tr. 156, 158; CX-109C, ¶ 8.

17. Kenetech has invested over [ ] in equipment used to perform repairs at or near the Livermore facility. Carrier, Tr. 157; CX-109C, ¶ 9.

18. The downtower components of a KVS-33 wind turbine account for approximately [ ] of the total material cost of a KVS-33. Carrier, Tr. 158.

19. If one were to allocate [ ] of Kenetech's investment in equipment used in inspection and testing, monitoring, and regulation of the KVS-33 to the downtower components, the resulting figure would be in excess of [ ]. Carrier, Tr. 159-161; CPX-18.

20. Of the [ ] square feet of manufacturing space devoted to the KVS-33, approximately [ ] is devoted to the assembly of the downtower components. Carrier, Tr. 182-183.

21. Assembly of the KVS-33 occurs at the Livermore facility of Kenetech. Carrier, Tr. 154, 165.

22. Kenetech currently employs approximately [ ] people at the Livermore facility to

work in the area of fabrication and assembly of KVS-33 wind turbines. Carrier, Tr. 161; CX-132C, ¶ 2.

23. Kenetech employs an additional [ ] people in the United States for the operation and maintenance of the KVS-33 units in the U.S. Carrier, Tr. 161-162; CX-132C, ¶ 3.

24. The total cost of materials for the KVS-33 is about [ ] per wind turbine. Carrier, Tr. 158; CX-109C, ¶ 11.

25. Kenetech purchases its downtower components and subassemblies from suppliers located in the United States that assemble such items using many parts, some of which are of foreign origin. CX-109C, ¶ 12.

26. Kenetech purchases its IGBT components for the KVS-33 from a company called [ ], which acts as the marketing representative of [ ]. Erdman, Tr. 182; CX-109C, ¶ 12.

27. Kenetech pays [ ] for its engineering support for the IGBT modules through the payment of a mark-up on the module. Engineering support includes the testing of modules to ensure they meet specifications. Erdman, Tr. 182, 186.

28. Kenetech performs testing of subassemblies of the KVS-33 components, and performs testing of the whole integrated wind turbine system at its Livermore, California facility. Erdman, Tr. 186-187.

29. In 1993 and 1994, Kenetech invested in excess of [ ] in the United States in engineering and research and development of the KVS-33 and related variable speed technology. Carrier, Tr. 162.

30. A conservative estimate of the amount of total expenditures allocated to downtower components is [ ]. See Carrier, Tr. 162-163; Erdman, Tr. 183.

CONCLUSIONS OF LAW

1. The Commission has personal jurisdiction over the parties and subject matter jurisdiction over this investigation. See Op. at 1-3.

2. There has been a sale for importation of accused products. See Op. at 19.

3. Claim 131 of the '039 patent reads literally on Enercon's accused E-40 wind turbines. See Op. at 65.

4. It has not been demonstrated that claim 51 of the '712 patent reads on Enercon's E-40 wind turbines either literally or under the doctrine of equivalents. See Op. at 68

5. Complainant's investments and activities with respect to the '039 and '712 patents satisfy the domestic industry requirement of section 337. See Op. at 75.

6. There is a violation of section 337(a)(1)(B). See Conclusions of Law 1-5.

INITIAL DETERMINATION AND ORDER

Based on the foregoing opinion, findings of fact, conclusions of law, the evidence, and the record as a whole, and having considered all pleadings and arguments as well as proposed findings of fact and conclusions of law, it is the Administrative Law Judge's INITIAL DETERMINATION ("ID") that a violation of § 337 exists in the importation of certain variable speed wind turbines and components thereof, or in their sale, by reason of infringement of claim 131 of the '039 patent.

The Administrative Law Judge hereby CERTIFIES to the Commission this ID, together with the record of the hearing in this investigation consisting of the following:

1. The transcript of the hearing, with appropriate corrections as may hereafter be ordered by the Administrative Law Judge; and further

2. The exhibits accepted into evidence in this investigation as listed in the attached exhibit lists.

In accordance with 19 C.F.R. § 210.39(c), all material found to be confidential by the Administrative Law Judge under 19 C.F.R. § 210.5 is to be given in camera treatment.

The Secretary shall serve a public version of this ID upon all parties of record and the confidential version upon counsel who are signatories to the Protective Order issued by the Administrative Law Judge in this investigation, and the Commission Investigative Attorney. To expedite service of the public version, counsel are hereby ordered to serve on the Administrative Law Judge by no later than June 7, 1996, a copy of this ID with those sections considered by the party to be confidential bracketed in red.

Pursuant to 19 C.F.R. § 210.42(h), this ID shall become the determination of the Commission 45 days after its date of service unless the Commission within those 45 days shall have ordered review of this ID, or certain issues herein, pursuant to 19 C.F.R. § 210.43(d) or § 210.44.

Sidney Harris
Administrative Law Judge

Issued: May 30, 1996