CARBON AND ALLOY STEEL WIRE ROD FROM BELARUS, ITALY, KOREA, RUSSIA, SOUTH AFRICA, SPAIN, TURKEY, UKRAINE, UNITED ARAB EMIRATES, AND THE UNITED KINGDOM

Testimony of Dr. Kiho Rhee, Ph.D., POSCO Quality Enhancement Researcher

Good afternoon. My name is Dr. Kiho Rhee. I am a quality engineer for POSCO.

POSCO first began trying to make tire cord wire rod in 1995. It took us over 5 years to finally arrive at production standards that yield a high quality output on a consistent basis. Our own history illustrates why U.S. rod producers still cannot consistently achieve the demanding standards that the tire cord wire makers insist upon.

The Commission is considering whether U.S. producers are able to produce tire cord wire rod using steel billets that have been produced in an electric arc furnace. Actually, it is theoretically possible to do this, but using EAF greatly compounds the practical difficulties of producing wire that can be used to make tire cord. I want now to discuss the major difficulties that POSCO itself has encountered when using steel produced in its own basic oxygen furnaces.

It is essential to first understand that the wire used to produce tire cord is extremely thin. It typically ranges from 0.15 millimeters to 0.40 millimeters in diameter. This wire must be extremely strong in order to withstand the stresses that a high performance tire performs under. However, when wire rod is being drawn into wire that is so thin, it can break due to numerous factors. For example, the use of high carbon steel increases the possibility of breakage during drawing. We also

experienced failures in our initial production efforts because the ladles into which molten steel was poured were lined with refractories that contained excess amounts of aluminum. The presence of aluminum also causes excessive breakage during the wire drawing process.

A second problem is non-metallic inclusions in the steel. These inclusions, if not minimized, can cause defects, breaks, or tears during the rolling or wire drawing process.

A third problem is "segregation." Segregation is what happens when the carbon content of the billet is not spread evenly.

A fourth problem is excess impurities in the molten steel, such as excess amounts of copper, nickel, chromium, vanadium, and titanium. This leads to difficulties in the drawability of the rod into wire, as well as excess breakage.

Other problems include surface defects, inconsistency in the diameter of the finished rod, and excess sulfur and phosphorus.

It took POSCO many years, substantial investments in production techniques, and countless trials and errors to reach the point where we are now able to successfully address all of these problems and satisfy our customers. And, it typically takes at least 2 to 3 years for our tire cord wire rod to become qualified.

In fact, tire cord wire rod is far more difficult to produce than any other wire rod product that POSCO makes, such as CHQ and bearing steel.

All of these problems and many more exist with the EAF process. For example, the use of scrap produces less clean steel than the BOF process. Although

there are techniques to minimize this significant problem, such as the addition of direct reduction iron in the steelmaking process, it is far from a complete solution.

EAF technology has been available for a long time. The fact that just one or two U.S. producers may have sold tire cord wire rod proves just how difficult it is to produce this type of product.

In conclusion, grade 1080 and higher tire cord and tire bead wire rod is by far the most difficult and complicated wire rod product that we produce. That is why we have been so successful in our domestic market and in the U.S. In contrast, the U.S. industry has not yet achieved the quality and consistency that the marketplace demands. And they show little interest in doing so.

That completes my testimony.