

## The Industrial Robotics Industry in China: Demand and Domestic Innovation

Robert Casanova, [Robert.casanova@usitc.gov](mailto:Robert.casanova@usitc.gov), (202) 708-2719

*China is the world's largest market for industrial robots largely due to government policies promoting the modernization of the country's manufacturing sector. Policy initiatives include the National High-Tech R&D program, Made in China 2025, and the Robotic Industry Development Program, which called for more investments in automation and robotics. This paper describes the Chinese programs that have driven demand in industrial robots, the growth of the Chinese domestic industry, and the impact of China's demand on the global market for robots.*

China's investments in high technology are aimed at making it a global leader in the future of manufacturing. Modernizing its manufacturing industry has been an important initiative for China since 1986, when the government created the National High-tech R&D Program (also referred to as the 863 Program). During the 10<sup>th</sup> (2001-2005) five year plan, the government reinforced its policy of upgrading the industrial sector through increased investments in high technology, and by 2013 China surpassed Japan as the largest consumer market for industrial robots.

### Programs to promote Chinese robotics growth: National High-tech R&D Program

The Chinese government created the National High-Tech R&D program (863 Program) "to meet the challenges of new technology revolution and competition."<sup>1</sup> The 10<sup>th</sup> five-year plan also called for China to "master key new materials and advanced manufacturing technologies to boost industrial competitiveness."<sup>2</sup> What resulted was a push to invest in new technologies, and industrial robotics – as an advanced manufacturing technology – received large sums of investment. From 2008 to 2013, China had an average yearly increase of 36 percent in the total shipments of robots, and in 2013, China surpassed Japan as the largest market for industrial robots with 36,560 units sold in China (valued at \$1.9 billion).<sup>3</sup> Additionally, creating a manufacturing sector that relies more on domestic technology than foreign technology is an important Chinese initiative.

### *Made in China 2025 and the Robotics Industry Development Program (2016-2020)*

Announced in 2015, President Xi Jinping outlined a plan that identified several key tasks the country would focus on to make China more reliant on homegrown industries by the year 2025. The program called for China to be a "leading manufacturing power by the year 2049," the 100<sup>th</sup> anniversary of the People's Republic of China.<sup>4</sup> Among the program's initiatives were additional investments in technology and an emphasis on domestic technology. Further, the plan listed 10 key sectors China would seek to foster, which included "numerically controlled machine tools and robots."<sup>5</sup> Additionally, China developed a plan that specifically targeted the industrial robotics industry. Following Made in China 2025, the Robotics Industry Development Program (2016-2020) was unveiled to promote robots in manufacturing, attract foreign investment, and increase domestic production of robots.<sup>6</sup> Under this initiative, the Chinese government indicated its goal to triple its annual production of industrial robots to 100,000 by 2020. Data for global production of industrial robots is not readily available, but shipments totaled 381,335 units in 2017. Additionally, shipments experienced a 19 percent compound average annual growth rate from 2012 to 2017.<sup>7</sup> Assuming this trend continues, total shipments would reach 642,610 units in 2020. Using this data as a proxy for production, Chinese production of 100,000 units of industrial robots would account for 15 percent of global shipments in 2020.

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<sup>1</sup> Ministry of Science and Technology of the People's Republic of China, *National High-tech R&D Program (863 Program)*. [Accessed](#) August 13, 2018.

<sup>2</sup> Ministry of Science and Technology of the People's Republic of China, *National High-tech R&D Program (863 Program)*. [Accessed](#) August 13, 2018.

<sup>3</sup> International Federation of Robotics. *World Robotics Industrial Robots 2014*. 2014. p. 12.

<sup>4</sup> The State Council of the People's Republic of China, *'Made in China 2025' plan issued*. May 19, 2015. [Accessed](#) August 13, 2019.

<sup>5</sup> The State Council of the People's Republic of China, *'Made in China 2025' plan issued*. May 19, 2015. [Accessed](#) August 13, 2019.

<sup>6</sup> China Briefing, *The Robotics Industry in China*. May 14, 2018. [Accessed](#) August 13, 2019.

<sup>7</sup> International Federation of Robotics. *World Robotics Industrial Robots 2014*. 2014. p. 78.

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**China’s domestic industrial robotics industry**

China’s domestic robotics industry grew by 1,686 firms in 2017 to over 6,500, and they compete with foreign firms and their Chinese subsidiaries (table 1).<sup>8</sup> While the country does not differentiate between parts makers or robot system integrators,<sup>9</sup> the growth has impacted sales of domestic robots in China. China’s share of industrial robots was 36 percent of the global market with 137,900 industrial robots sold in China, and Chinese firms accounted for 34,700 units of domestic sales in 2017.<sup>10</sup> A 29 percent increase from the previous year demonstrates China’s resolve to increase sales of domestic industrial robots within China. Furthermore, through public and private partnerships aimed at robotics research, China is seeking to continue this upward trend.

**Table 1: List of prominent Chinese industrial robot manufacturers and major foreign firms with Chinese subsidiaries**

Domestic Firms	Foreign Firms & Chinese Subsidiaries
Saisun Robot & Automation Co., Ltd	FANUC (Japan)/ Shanghai-FANUC Robotics Co., Ltd
Nanjing Estun Automation Company	Yaskawa Electric Corporation (Japan)/Yaskawa Robotics Co., Ltd
Beijing Research Institute of Automation for Machinery Industry	ABB Group (Switzerland)/ABB (China) Ltd.
Harbin Boshi Automation Co. Ltd	KUKA AG (formerly of Germany, but purchased by Chinese firm Midea Group in 2016)

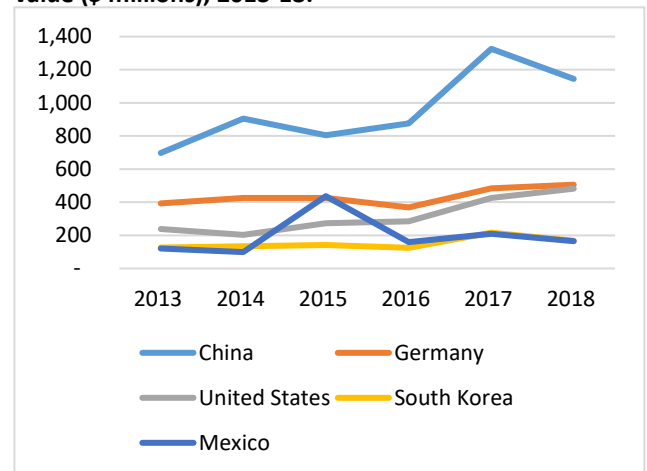
Source: Author’s compilation

The National Robot Innovation Center, a joint initiative between Shenyang Institute of Automation and the Chinese Academy of Sciences, Harbin Institute of Technology, and other companies was launched in the summer of 2018.<sup>11</sup> The Shenyang Institute stated that among other responsibilities, it would focus on “forward looking robotics that can help boost industrial transformation and upgrading.”<sup>12</sup> This center is one example of the Chinese public and private sectors working to achieve the goals laid out in Made in China 2025 and the Robotics Industry Development Program.

**Impact of China’s demand on the industrial robotics industry**

In 2018, China continued to be the largest global importer of industrial robots because of its policies aimed at further automating the manufacturing sector (figure 1). By comparison, the United States was the third largest importer. Among countries that produce and export robots, Japan is one of the largest exporters of industrial robots to China. Furthermore, major Japanese manufacturers have invested in partnering with Chinese firms. Shanghai-FANUC Robotics Co., Ltd, a subsidiary of FANUC (Japan), is located in Shanghai, China. Yaskawa Electric Corporation (Japan), completed construction of a third robotics manufacturing plant in China by its Chinese subsidiary, Yaskawa Robotics Co., Ltd.<sup>13</sup> Like Japan, major European firms have invested in robot manufacturing in China. ABB Group (Switzerland) announced plans to build an advanced robotics factory in Shanghai, China, worth \$150 million.<sup>14</sup>

**Figure 1: Top five global importers of industrial robots, by value (\$ millions), 2013-18.**



Source: Global Trade Atlas

Note: The HTS six-digit statistical reporting number for industrial robots for multiple uses is 8479.50.

<sup>8</sup> Xinhuanet. *China sees booming robotics industry*. May 10, 2018. Accessed August 15, 2019.

<sup>9</sup> Robotics & Automation News. *Almost 7,000 robotics companies now established in China*. May 10, 2018. Accessed August 15, 2019.

<sup>10</sup> The electrical/electronics and automotive industries were the major drivers of industrial robots sales in China. International Federation of Robotics (IFR). *World Robotics Industrial Robots 2018*. 2018. p. 178.

<sup>11</sup> Nanjing Estun Automation, *National Robot Innovation Center Officially Launched*. June 20, 2018. Accessed August 13, 2019.

<sup>12</sup> Shenyang Institute of Automation Chinese Academy of Science. *CAS launches robotics innovation institute in northeast China*. December 12, 2018. Accessed August 15, 2019.

<sup>13</sup> Yaskawa Global, *Completion of the Third Plant at YASKAWA (CHINA) ROBOTICS CO., LTD*. July 20, 2018. Accessed August 13, 2019.

<sup>14</sup> ABB Group. *ABB to build the world’s most advanced robotics factory in Shanghai*. October 27, 2018. Accessed August 15, 2019.

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