



Key Innovative Industries in Taiwan  
**Smart Machinery**



Information Security	New Generation Automobiles	Communications Industry	Circular Economy	Green Energy
Biopharmacy	Smart Machinery	Semiconductors	Internet of Things	International Logistics and E-commerce





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Policy Initiatives —

# Promoting Taiwan as a "Center for High-end Manufacturing in Asia"

In response to the revolutionary changes to life and industries brought about by IoT, 3D printing, AI, and robot technologies, and the reorganization of the global supply chain due to the China-US trade war and the COVID-19 epidemic, Taiwan has continued with the "smart machinery industry promotion program," which started in 2016, to enhance Taiwan's edge in semiconductors, ICT, and machinery industries. Taiwan proposed the "Center for High-end Manufacturing in Asia" strategy in 2020 with the aim of expediting the adoption of 5G and AI applications to accelerate smart industries, digital transformation, and innovative applications - thereby creating smart industry value chains and expand industrial output.



## 1 | Smart Machinery Promotion Office |

The Smart Machinery Promotion Office was established in February 2017. The office aims to leverage Taiwan's precision machinery and ICT industries and forge "local, future, and global connections" to help companies introduce robotics, IoT, big data, CPS, lean management, 3D printing, sensors, and other smart value-added elements to develop solutions. Another aim is to help key industries apply smart manufacturing to achieve "industrialization of smart machinery" and "smart mechanization of industries". The Smart Machinery Promotion Office can help foreign companies participate in testing facilities or exchange platforms and establish supply chain and partner networks in Taiwan.

### Contact Information

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## 2

## Smart Manufacturing Technology Test Site

The Smart Manufacturing Technology Test Site is a national proofing center equipped with 100% domestically produced high-end machinery processing equipment. The site links digital product systems that are domestically developed and produced, develops machinery processing application service modules, and has realized 9 mixed-model smart manufacturing production lines for parts and components. As a domestic test site for smart manufacturing, the planning center also showcases the capabilities of domestic equipment in Industry 4.0 applications.

Since the site was opened in September 2018, more than 10,118 visits have been made, and 15 equipment demonstration sites have been created. It has also attracted major international system companies (Dassault Systèmes and Mitsubishi) and professional assistance teams have been formed to support more than 110 projects, including the incubation of 23 SI companies. The test site has helped 84 domestic automobile, motorcycle, aerospace, and semiconductor makers complete more than 600 proofing services (with a yield rate of more than 95%), and facilitated the digital transformation of 1,240 machines. These efforts increased investments by more than NT\$2.95 billion.

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#### Smart Manufacturing Technology Test Site

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### 3 | Smart Machinery Park |

In coordination with industry characteristics, requirements, and the locations of industrial clusters, the Taichung City Government has expanded the Fengzhou Technology Park in Taichung during Phase 2 development to build the Smart Machinery Park, which supports the transformation of traditional industries in Taichung City and the development of industries that support the Central Taiwan Science Park. With an area of 55.86 hectares, the park is expected to accommodate 100 companies and create nearly 8,540 job opportunities, furnishing an annual output of approximately NT\$27 billion.

Contact  
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# Overview of Industrial Development

## 1 | Output Value |

The machinery industry has long played a critical but silent role in the upgrade of Taiwan's industries. In recent years, the machinery industry has benefited from the rise of smart applications and value-added data services. As a result, observers are highly optimistic with regards to the prospects for further development of the machinery industry, which became Taiwan's third largest industry in terms of output value in 2017, after the semiconductor and panel industries.

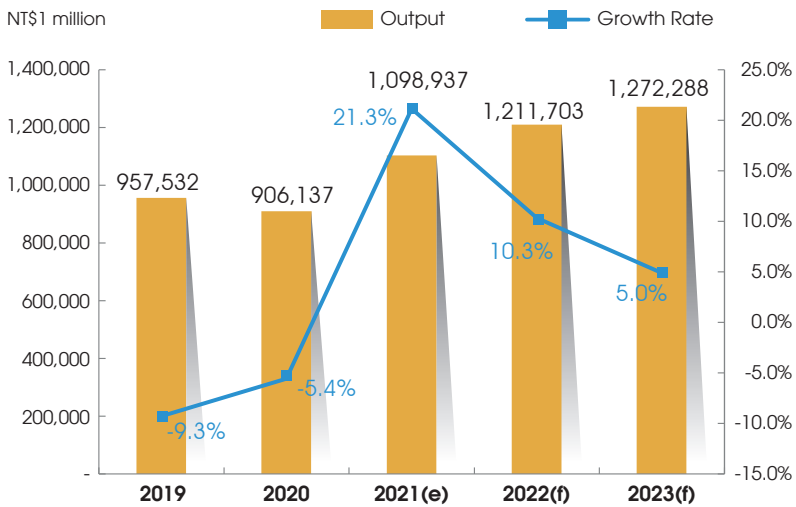
According to the data from the ITRI Industry, Science and Technology International Strategy Center, intensification of trade disputes between the United States and China and a significant decrease in demand for industrial machinery caused the output value in 2019 to decline 9.3% from 2018 to NT\$957.532 billion. The COVID-19 pandemic and escalation of the China-US trade war further reduced demand for machinery and equipment in 2020, causing output to fall to NT\$906.137 billion. As the pandemic is gradually subsiding and different countries are paying more attention to supply chain resilience, we expect these developments to create digital market opportunities for machinery manufacturing. In 2022, output is expected to rise to pre-pandemic levels of approximately NT\$1.2 trillion (Figure 1).<sup>1</sup>

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<sup>1</sup> [https://ieknet.iek.org.tw/iekppt/ppt\\_detail.aspx?actiontype=ppt&indu\\_idno=1&domain=2&slid\\_preid=6205](https://ieknet.iek.org.tw/iekppt/ppt_detail.aspx?actiontype=ppt&indu_idno=1&domain=2&slid_preid=6205).



According to figures released by the Taiwan Machine Tool & Accessory Builders' Association (TMBA), machine tool exports from Taiwan came to US\$2.78 billion in 2021, a significant increase of 29.1% from US\$2.15 billion in 2020. Taiwan's main machine tool export markets were mainland China (including Hong Kong), the United States, Turkey, Russia, and Vietnam, which imported approximately US\$1.68 billion from Taiwan, thus accounting for 60.4% of Taiwan's global machine tool exports. <sup>2</sup>



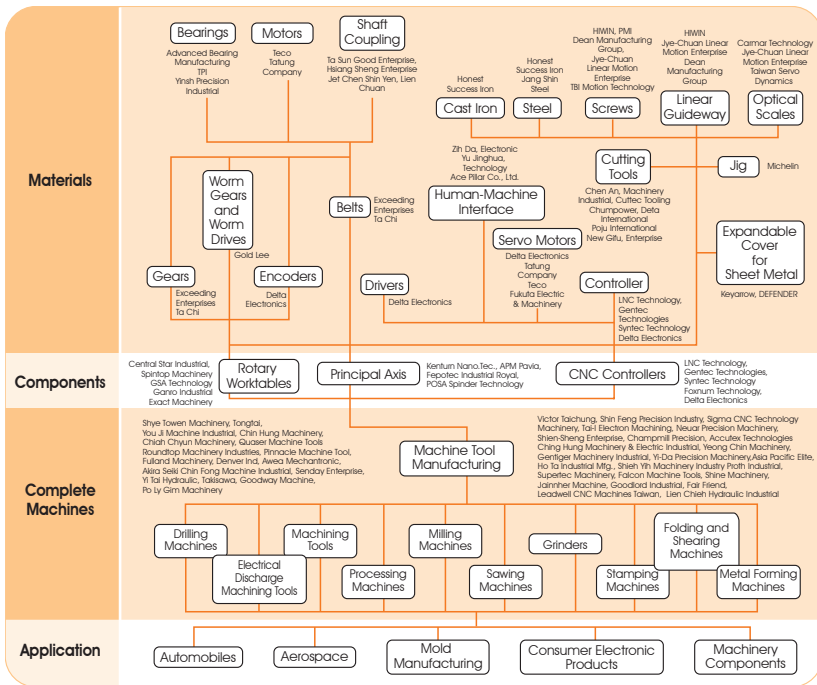
Source: Industry, Science and Technology International Strategy Center, ITRI.

**Figure 1 Taiwan's Machinery Industry Output Value, 2019-2023**

<sup>2</sup> [http://www.maonline.com.tw/market\\_inside.php?i=312](http://www.maonline.com.tw/market_inside.php?i=312).

## 2 | Industry Value Chains |

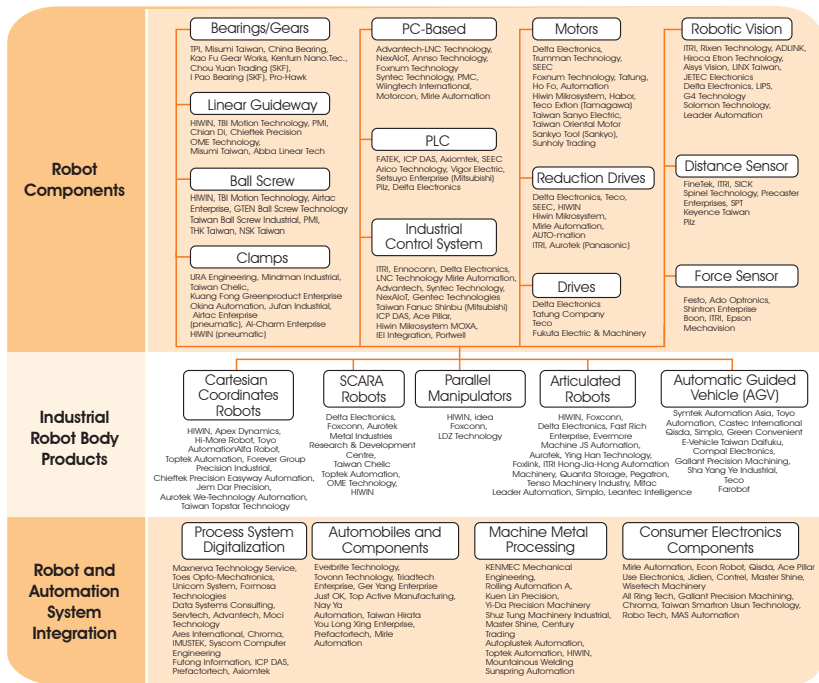
Taiwan has comprehensive industrial clusters for machine tools and accessories, with firms engaged in the production of materials, accessories, and complete machines that make their way into applications in such sectors as automobiles, aerospace, molds and dies, and consumer electronics (Figure 2). These companies have high production efficiency and flexibility that enable them to satisfy foreign companies' demand for machine tools and accessories.



Source: Industry, Science and Technology International Strategy Center, ITRI.

Figure 2 Machine Tool Manufacturing Industry Value Chain in Taiwan

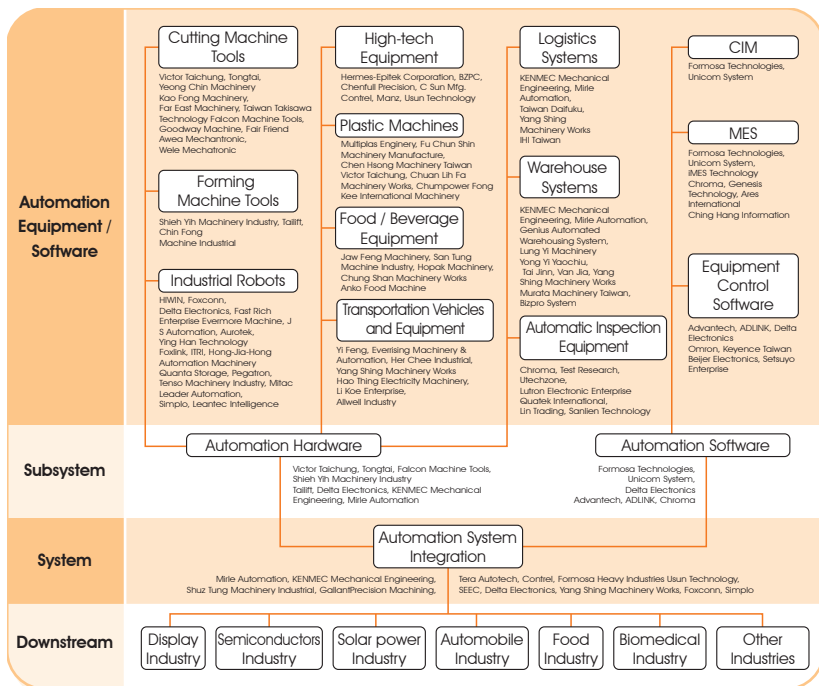
Taiwan's industrial robotics companies have been moving steadily forward in obtaining international quality certifications. They have also significantly increased their independence and formed an industrial cluster in Central Taiwan. The current industrial robot industry value chain includes components, robot bodies, and systems integration (Figure 3). Based on the development trends of human-machine collaboration and the industrial Internet of Things (IIoT), companies will continue to improve their customized engineering services.



Source: Industry, Science and Technology International Strategy Center, ITRI.

Figure 3 Industrial Robotics Industry Value Chain in Taiwan

Taiwan's smart automation systems can be divided into hardware and software. Hardware includes machinery and equipment while software consists mainly of CIM, MES, and equipment control software (Figure 4). These automation systems are integrated for use in such industries as displays, semiconductors, solar energy, automotive, food, and biomedicines. The importance of intelligent automation will continue to increase in the post-pandemic era, and the effort to increase the added value of automation system services has become an important focal point of development for Taiwan's manufacturers.



Source: Industry, Science and Technology International Strategy Center, ITRI.

Figure 4 Smart Automation and Industrial Value Chains in Taiwan



### 3 | Industrial Clusters |

Taiwan's machinery industry mainly consists of SMEs. According to statistics from the Statistics Department of the Ministry of Economic Affairs (MOEA), Taiwan currently has approximately 18,000 machinery companies which collectively employ over 300,000 people. Industrial clusters have formed in northern, central, and southern Taiwan, and these have fostered the establishment of many important companies.

#### 1. Clusters in Northern Taiwan

The northern Taiwan industrial cluster in New Taipei City, Taoyuan, and Hsinchu specializes in precision sensing equipment, electronics and semiconductor production equipment, automated components and systems integration, industrial computers, and controllers.

#### 2. Clusters in Central Taiwan

An industrial cluster of firms in such areas as machine tools and accessories, integrated ball screws, linear guides, industrial machinery (carpentry, textiles, rubber and plastics machinery), smart robots, automation components, and systems integration has formed in Taichung and Changhua. As "Industry 4.0" becomes an important trend in global development, an unstoppable wave of revolution in the machinery industry is also driving active transformation in other industries.

### 3. Clusters in Southern Taiwan

The southern cities of Chiayi, Tainan, and Kaohsiung are home to industrial clusters for machine tools and parts and components, industrial machinery (screw forming and processing, and rubber and plastic machinery), semiconductor equipment, smart robots, controllers, and precision molds. Among the best known firms in these fields are "Tongtai Machine & Tool," "CCM," and "E&R Engineering Corp."

An overview of Taiwan's precision machinery industrial clusters is provided in the figure below:

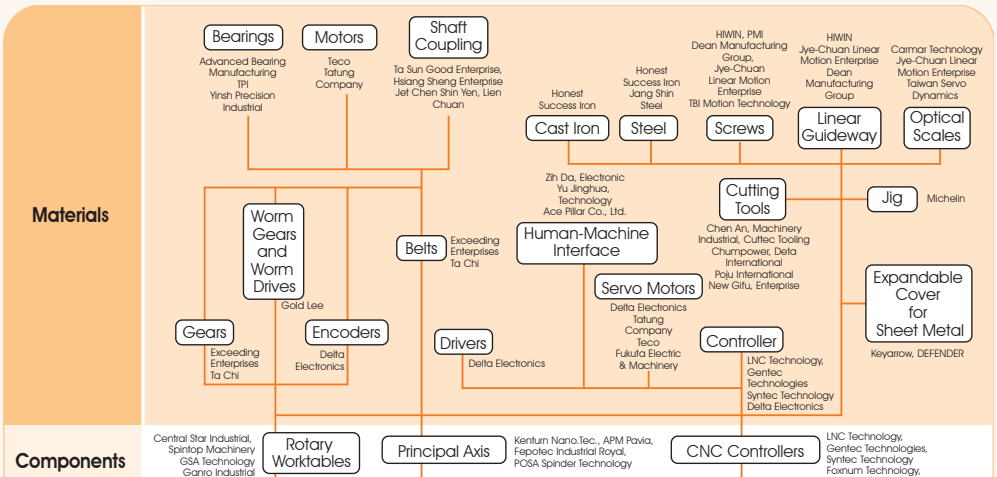


Figure 5 Taiwan's Precision Machinery Industrial Clusters



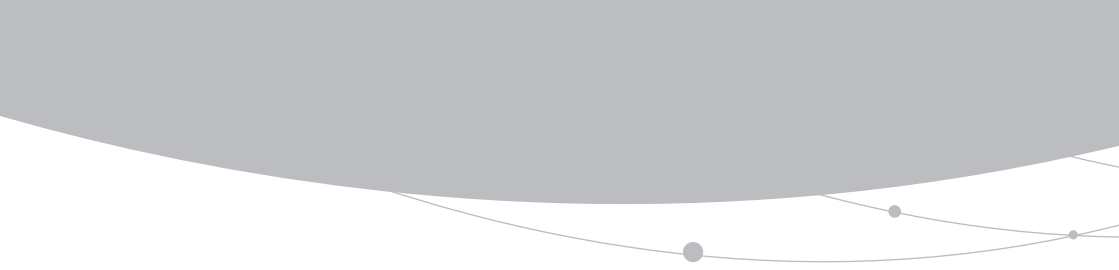
# Potential Investment and Collaboration Opportunities in Taiwan

## 1 | Joint Development of Smart Manufacturing Applications

Taiwan has developed complete industrial clusters in such sectors as semiconductors, ICT, metal processing, auto parts and components, and petrochemicals. The presence of diverse industries and a tightly knit machinery industry supply chain, as well as the government's active promotion of industrial parks and preferential taxes, means that foreign companies can find optimal sites for developing and verifying innovative smart manufacturing application projects. Due to the US-China trade war, COVID-19 pandemic, and geopolitical upheavals, many countries now attach greater importance to industry supply chain resilience, and the manufacturing industry's demand for digital and intelligent applications has continued to increase. Taiwan has robust R&D capacity and has already accumulated a wealth of successful experiences in digital simulation and analysis, product life cycle management, big data analysis, machine learning, and AI. Taiwan is in a unique position to help foreign companies pursue opportunities for smart manufacturing in the post-pandemic era and, for foreign companies, the best partner with whom to seize business opportunities in smart machinery.

## 2 | Cross-industry Supply Chain Collaboration Brings R&D Breakthroughs

Companies are now placing a greater emphasis on supply chain resilience due to the US-China trade wars and the pandemic. As such, the private sector is accelerating the redistribution of capacity and markets, and adopting a



more aggressive approach for digitalization and intelligent applications. Future trends in industry development include integrating robots with machinery and equipment, as well as applications for IoT and cloud technologies. New applications combining machinery with robots have become quite common place. Developments in IoT and cloud applications, powered by 5G technologies, will strengthen intelligent applications and be the key competitive factor for the machinery industry. Taiwan has comprehensive industrial clusters and supply chains for the machinery industry, which are best exemplified by the rapid mobilization of the "Disease Control Mask National Production Team" when the pandemic first struck. Taiwan's advantages in the ICT and semiconductor industries, robust R&D capacity, and ability to swiftly respond to customer needs and implement flexible adjustments have successfully connected more than one thousand companies in the United States, Japan, and Taiwan. A "smart machinery cloud" has also been established for the production process, which will help foreign companies set up cross-sector R&D or production sites in Taiwan and accelerate productization of R&D results.

### 3 | Exploration of the Continuously Growing Smart Machinery Market

Industry 4.0 has become an important trend in global industrial development. The trade war between the United States and China has also compelled companies to readjust production capacity. Supply chains that were previously concentrated in a handful of production sites have gradually become more regional and dispersed. The COVID-19 pandemic has forced industries to attach greater importance to supply chain resilience and risk management issues, prompting the industry to shift its mindset from "just-in-time delivery" to "assured supply," and led to the construction of new plants in different industries and the growth of demand for smart upgrades to existing machinery and equipment. This is accompanied by an increased demand for intelligent service robots, equipment, and integrated systems in sectors such as education, cleaning, and medicine. Foreign companies can seize business opportunities in Taiwan's smart machinery industry by investing in Taiwan or engaging in technical cooperation with related companies - approaches which will enable them to further expand into the future regional/global market.



# Investment Incentive Measures

## 1 | Tax Incentives |

The income tax rate for profit-seeking enterprises in Taiwan is 20%. To encourage foreign investments in Taiwan, support industrial innovation, and promote industry-academia collaboration, Taiwan offers the following preferential taxes to foreign companies (Table 1):

**Table 1 Preferential Taxes**

Item	Preferential Measures
Research, Development, or Introduction of Technologies or Machinery Equipment	<ul style="list-style-type: none"> <li>Up to 15% of the company's R&amp;D expenditures may be deducted from its profit-seeking enterprise income tax for current year; or up to 10% of such expenditures may be credited over three years against the profit-seeking enterprise income tax payable by the company.</li> <li>Royalty payments to foreign companies for imported new production technologies or products that use patents, copyrights, or other special rights owned by foreign companies are, with the approval of the Industrial Development Bureau, MOEA, exempt from the corporate income tax.</li> <li>Companies are exempt from import tariffs for importing any machinery equipment that local manufacturers cannot produce.</li> </ul>
Employee Stock Compensation	<ul style="list-style-type: none"> <li>A company employee who has obtained stock compensation worth a combined total of less than NT\$5 million and continuously held the stock while remaining in the company's employ for at least two years may choose to be taxed on the market price of the stock at either the time the stock was obtained or the time the stock is sold, whichever is lower.</li> </ul>

Item	Preferential Measures
Investment in Smart Machinery / 5G / Information Security	<ul style="list-style-type: none"> <li>● Smart machinery: Use of big data, AI, and IoT in brand-new hardware, software, technology, or technical services for automatic schedules, flexible, or mixed-model production lines.</li> <li>● 5G: Investments in new hardware, software, technology, or technical services that are related to 5G communication systems.</li> <li>● Information security: Companies' investments and purchases of brand-new hardware, software, technology, or technical services for information and communication security products or services are included in the scope of investment offsetting.</li> <li>● For investments between NT\$1 million and NT\$1 billion, companies can choose from either "5% of investment spending deducted from profit-seeking enterprise income tax (current FY)" or "3% of investment spending deducted from profit-seeking enterprise income tax if the total spending is spread over three years" may be selected, but the total amount deducted may not exceed 30% of corporate income tax that year.</li> <li>● Applicable until December 31<sup>st</sup>, 2024.</li> </ul>
Special Foreign Professionals	<ul style="list-style-type: none"> <li>● Special foreign professionals who meet certain criteria are eligible for a 50% deduction of total income tax for amounts exceeding NT\$3 million.</li> </ul>
Industrial Park Locations	<ul style="list-style-type: none"> <li>● Companies that set up operations in export processing zones, science industrial parks, or free trade ports are eligible for exemptions on import duties, commodity tax, and business tax for the import of machinery and equipment, ingredients, fuel, materials, and semi-finished products for their own use.</li> </ul>
Others	<ul style="list-style-type: none"> <li>● Companies that use undistributed earnings to engage in substantive investments may exclude the invested amount when calculating their profit-seeking enterprise income tax.</li> </ul>



## 2 | Subsidies |

### 1. Global Innovation Partnership Initiatives Program

Foreign companies that complement Taiwan's industries are encouraged to invest in Taiwan's R&D innovation and work with Taiwanese companies to jointly develop forward-looking technologies, key technologies, or integrated technologies beyond our current capacities. Such businesses could exert a key influence on Taiwanese industry by: (a) inspiring R&D work on industrial technologies as well as the establishment and development of supply chains; (b) improving R&D efficiency; (c) accelerating the timetable from R&D to production; and (d) contributing actively to the expansion of international markets. Foreign companies successful in endeavors relating to this program will be eligible, upon approval from the MOEA, for subsidies of up to 50% of total R&D expenditures.

### 2. Pioneers for Innovation Leadership on Technology Program

The program aims to transform Taiwan into a high-tech R&D center and encourage leading international manufacturers to establish cutting-edge R&D bases in Taiwan, empowering their work in forward-looking technologies in Taiwan and connecting with Taiwan's supply chain, thereby creating a division of labor in the areas of research, co-creation, and development, with an eye to strengthening the technological competitiveness of Taiwan's leading industries and accelerating the formation of clusters in emerging industries. Program funding of up to 50% of total expenditures may be granted for any project that has been approved by the Ministry of Economic Affairs.

### 3. Industrial Upgrading Innovation Platform Guidance Program

To guide industries in Taiwan to develop high-value products and encourage corporations to enter the high-end market to increase the industry's added value, the Industrial Development Bureau, Ministry of Economic Affairs, and the Ministry of Science and Technology are promoting the "Taiwan Industry Innovation Platform Program". The program provides companies that have R&D teams in Taiwan with funding of up to 40%-50% of the project budget for themed R&D projects and funding of up to 40% for projects independently conducted by corporations.

# Leading Taiwanese Companies

## 1 | Machine Tools |

### 1. Fair Friend Group

Fair Friend Group, headquartered in Taipei, has three business divisions – Machine Tools Division, Industrial equipment, and Green Energy Division. The company has 52 brands and 79 production bases in total and has been actively promoting smart manufacturing in recent years. Fair Friend has also been working with NexAloT on a smart machinery production line for Industry 4.0 to create a smart processing system.

### 2. Tongtai Machine & Tool

Besides developing cutting machine tools and conducting application research, Tongtai Machine & Tool expanded into advanced processes for ultrasound-assisted processing, laser processing, and metal 3D printing to provide customers with one-stop services for smart machinery.

### 3. Yeong Chin Machinery

Yeong Chin Machinery Industries Co., Ltd. was founded in 1954 and is one of the few machine tool makers in Taiwan with in-house casting facilities. The machine tool manufacturer has full capacities to support integrated production operations including casting, machining, machine assembly, inspection, packaging, and shipping. Yeong Chin Machinery relies on intelligent equipment, automation, production management, software development, numerous patents, and a complete product line to provide customers with a full range of automated and customized services.



## 2 | Industrial Robots |

### 1. HIWIN

HIWIN specializes in research, development, and production of precision integrated ball screws, linear transmission components, and industrial robots. To align with industrial development trends, HIWIN is gradually transitioning from individual parts and components to system development, and is actively investing in medical devices, solar power, wind power, semiconductors, ICT, and precision machine tools to aid the development of Taiwan's industries towards smart manufacturing.

### 2. Delta Electronics

Delta Electronics has capacity for the production, research, and development of smart machinery applications, including inverters, servo drive systems, power management, sensors, logic and motion control, industrial robots, SCADA software, and industrial information management systems.

### 3. Techman Robot

Techman Robot was founded in 2016 as a subsidiary of Quanta Group, one of the largest computer and laptop manufacturers in the world, and is the first collaborative robot manufacturer in Taiwan – with the second largest market share in the world for a company of its kind. Collaborative robots from Techman have built-in vision systems, smart factory management software, and solutions.

## 3 | Smart Automation |

### 1. Advantech

Advantech is a leader in comprehensive system integration and design services in Taiwan, and offers products and solutions such as remote I/O modules, industrial communication equipment, automation controllers and I/O, embedded automated industrial computers, industrial tablet PCs, smart factory cloud integration, and smart equipment automation.

### 2. Mirle Automation Corporation

Mirle Automation Corporation was founded in 1989 and has become a major manufacturer for automation engineering services in Taiwan. The corporation provides automation production and process application equipment and products such as integrated touch panel conveyor systems, clean room automatic material handling and storage systems, robot applications, computer network equipment services, and industrial controllers.

# Examples of Successes Achieved by Foreign Companies

## 1 | Production and Technology |

German company Beckhoff and Chumpower Machinery Corporation signed a letter of intent for collaboration in developing smart system solutions for the blowing machine production line to enhance their cooperation in information, communication, and transmission. US-based Energid and Taiwan's NEXCOM International Co., Ltd. jointly developed a 7-axis industrial robot. NEXCOM's subsidiary NexCOBOT Taiwan will continue to develop and expand its markets.

Japan's Yaskawa Electric Corporation invested in a technical service center and a robot exhibition center in Taiwan. Omron purchased a 10% stake in Techman Robot to strengthen their strategic alliance and partnership. Switzerland's Tornos Group decided to invest NT\$500 million in a plant in Taichung to shift the production capacity of certain machines to Taiwan.



## 2 | Inter-Disciplinary Industrial Cooperation |

In January 2020, Keysight Technologies, a leading test and measurement equipment provider from the United States, and MediaTek, a semiconductor maker in Taiwan, announced a technology cooperation partnership for future business opportunities in 5G. With Keysight Technologies' 5G simulator solution and mmWave technologies, MediaTek can establish appropriate network connection formats for various innovation and R&D needs. The partnership is expected to increase R&D testing capacity and provide access to business opportunities in 5G applications. In addition, Rockwell Automation, a major American industrial automation company, recently helped a special generic drug company in Taiwan introduce smart solutions for its production process. Rockwell also plans to use the project as a template for providing customized smart factory services, such as traditional production process upgrade, high-tech system predictive maintenance, machinery connections, and plant energy conservation, for different industries in Taiwan.







### 3 | Cooperative Testing Facilities |

The "Smart Machinery Cloud Science and Technology Development Project" successfully connected US companies Autodesk and Microsoft, Japanese company Mitsubishi Electric, Taiwanese companies Advantech and CoreTech System, and other reputable companies to jointly sustain digital transformation of the machine tool makers in Taiwan. Dassault Systèmes established an R&D center in Taiwan and formed an alliance with the Fair Friend Group to seize business opportunities related to smart factories. Dassault is also working with the Industrial Technology Research Institute (ITRI) to create the Technical Verification Site of Intelligent Manufacturing. An MOU was also signed between Dassault and the Taichung City Government to collaborate in projects relating to IoT, startup ecosystem, and innovation and R&D hubs.

### 4 | Cooperation on Talent Development |

Germany-based Bosch and National Cheng Kung University jointly established a smart manufacturing innovation center to cultivate Industry 4.0 talent. Rockwell Automation of the US and Feng Chia University signed an MOU to form an industry-academia alliance. Besides introducing smart equipment and offering courses on smart machinery, the MOU also established a "corporate IoT application laboratory" which serves as a training classroom, and a "smart manufacturing laboratory" which serves as a demonstration venue to assist in the cultivation of mid- to high-level talent for smart machinery in Taiwan.



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