



# Prospect for Taiwanese Fastener Industry

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## Current Industry Status

The annual production value of Taiwan fastener industry is NTD 121.3 billion, with the average price per kilogram at NTD 84, only one third of the price of Japanese fasteners, and one sixth of Swiss fasteners. The proportion of production volume is 18.2%, ranked No.2 in the world; and the proportion of production value is 13.6%, ranked No.3 in the world (refer to [Table 1](#) & [Table 2](#) for details). We can assume that the production value of Taiwanese fastener industry is high, but the average price is rather low. So there is still a lot of room for improvement. Simply by raising the price by 50% to NTD 126 per kilogram, the annual production value will be able to reach above NTD 180 billion. The main goals include improving material quality, heat treatment, spheroidization, the uniformity of coating, etc. A critical point lies in a better control of spheroidization rate and decarburization. As for tooling, by upgrading the designing ability, prolonging tooling's life span and lowering the cost, Taiwan will be able to head for high-end products, such as automobile, aerospace, 3C precision fasteners, and achieve targeted production value.

Table 1. Analysis on Fastener Industry, Production Value and Price.

Country	US\$/KG	Proportion of Production Volume	Proportion of Production Value
Switzerland	17.1	0.9%	4.1%
UK	11.5	1.0%	3.1%
Japan	9.9	4.1%	11.0%
France	9.6	2.1%	5.3%
Germany	8	9.7%	2.07%
Italy	5	5.3%	7.1%
USA	4.3	9.9%	11.4%
Netherlands	3.9	2.7%	2.8%
Taiwan	2.8	18.2% (No.2)	13.6% (No.3)
China	1.7	46.0%	20.8%
AVG	3.7	100.0%	100.0%

compiled from MIRDC

## Problems of Taiwan Fastener Industry Explained Via Fastener Industry Chain

60% of wire rod materials are products from China Steel Corp. Quality, quantity and price must be stable and supply must be sufficient. Additionally, Taiwan should uplift the standard for wire rod clarity to ensure the material's quality.

Heat treatment and spheroidizing equipment are mostly imported. In order to deal with problems in spheroidization rate and decarburization, it is necessary to accelerate the localization of equipment development and head for automation.

So far, metallographic examination is a manual operation. It's slow and subjective with unstable spheroidization rate, so it's hard to process accurately. This will affect the wire drawing process and the stability of quality afterward; therefore digital inspecting instruments should be developed to stabilize the process and product quality by gaining digitized spheroidization rate. On the other hand, using cloud inspection can shorten the inspection time and keep on track with delivery date. The detail of the problems and solutions is listed in [Table 3](#).

## Using Fastener Product Life Cycle to Study and Plan for Future Development

Taiwanese fasteners are mostly industrial fasteners that have finally reached mature development in Taiwan. Taiwan should also develop fasteners that have just started domestic development or are under continuous improvement, such as automotive fasteners, micro fasteners and aerospace fasteners.

What Taiwan needs is the innovation ability that can serve industrial demand and increase competitiveness as a whole. Taiwan also needs the ability to combine technology with hardware or software to create automated products,

Pic. 1 Fastener Manufacturing

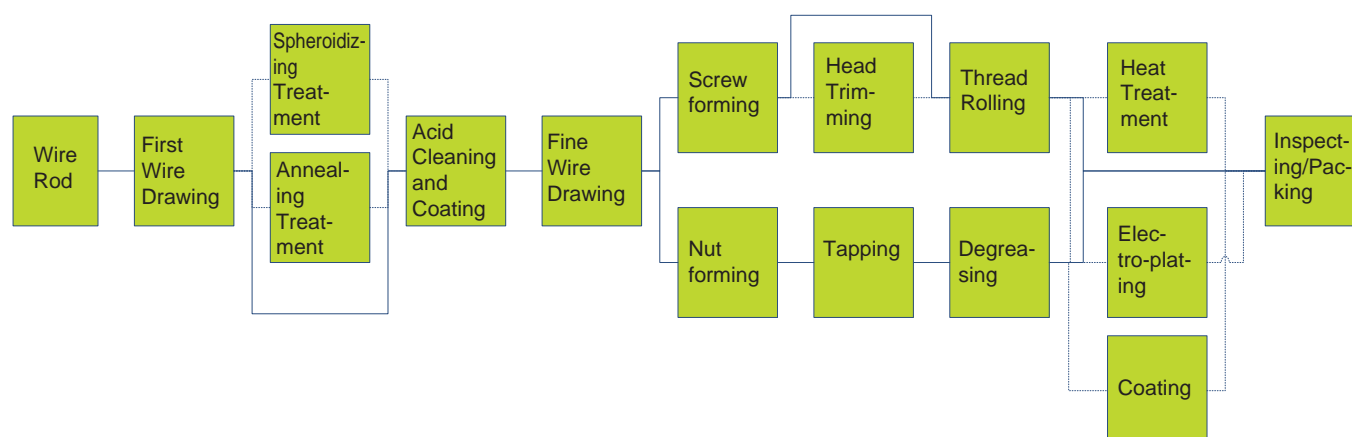


Table 2. The Main Fastener Exporters in the World

Top 5 Fastener Exporting Countries in the World (Unit : Million USD)										
Rank	2012		2011		2010		2009		2008	
	Country	AMT	Country	AMT	Country	AMT	Country	AMT	Country	AMT
1	China	6,049	China	6,086	Germany	4,794	Germany	3,742	China	6,004
2	Germany	5,737	Germany	6,064	China	4,650	China	3,382	Germany	5,111
3	Taiwan	3,821	Taiwan	3,985	Taiwan	3,225	USA	2,297	Taiwan	3,180
4	USA	3,700	USA	3,355	Japan	2,971	Japan	2,096	USA	2,870
5	Japan	3,431	Japan	3,214	USA	2,844	Taiwan	2,072	Japan	2,487
Before year 2001, the top 5 were USA, Taiwan, Germany, Japan, and Italy										
In year 2002, Germany ranked the 1st and China ranked the 5th										
In 2005, China officially to exceeded Taiwan										
In 2008, China became the top one										

Compiled from Steelnet

Table 3. Problems and Solutions Regarding the Quality of Taiwanese Fasteners

Problems	Solutions
Requires inspection equipment to ensure fastener quality. Inspection equipment is highly-priced. Manual operation is subjective and not precise.	Develop digital inspection software, stabilize manufacturing process and quality, and precisely obtain digitalized spheroidization rate. Develop equipment for local markets.
Inspection and analysis require professional knowledge and experience. Inspection service is usually performed in plants or by a third party. It requires long time, and cannot cope with emergency. It also has difficulty in data preservation.	Establish digital inspection software, facilities, and cloud inspection service in order to build data bank rapidly and efficiently.
Tooling design ability and tooling life span still need to be improved.	Build a data bank to shorten the time for design and manufacturing process. Use sub-zero treatment to eliminate the remaining stability and internal stress of austenite.

Table 4. Life Cycle of Fastener Products

Stage	Introduction	Rapid Growth	Mature
Fastener Products' Market	<ul style="list-style-type: none"> <li>Aerospace Fastener</li> <li>Lightweight Fastener</li> </ul>	<ul style="list-style-type: none"> <li>Micro Fastener</li> <li>Automotive Fastener</li> <li>Lock Fastener</li> <li>Special Fastener</li> </ul>	<ul style="list-style-type: none"> <li>Mid-Carbon Steel Fastener</li> <li>Industrial Fastener</li> <li>Rail Fastener</li> <li>Stainless Steel Fastener</li> </ul>

and aims at manufacturing automotive, aerospace and micro fasteners. Moreover, imported inspection equipment and cost should be reduced to enhance productivity and management.

Detail on digitized inspection technology, automated production, equipment localization, management informatization and cloud service are included in **Table 5** and **Table 6**.

### Talent Cultivation

It is difficult for Taiwanese fastener industry to recruit new technicians. Furthermore, the current aging staff is a problem that will create technical gap in Taiwan. Therefore, on-the-job training becomes an important subject. Training centers like Vocational Training Center,

MIRDC, Kao Yuan University and National Kangshan Agricultural & Industrial Vocational Senior High School have started to satisfy the demand by providing training service in respective specialties. The training employs multiple teaching materials, and adds practical lessons including metallographic grinding and digital software inspection.

### Conclusion

Fastener is a promising industry. Taiwanese government should include it into strategic counseling.

Product development should start from industrial fasteners to automotive, micro and aerospace fasteners.

Upgrade production inspection and eco-friendly technology. Talent cultivation should be emphasized more.

Table 5. Suggested R&D Development

Inspection Technology	Automated Production	Facility Localization	Modernized Business Operation and Management	Cloud Service
<ul style="list-style-type: none"> <li>Establish digitalized inspection system for metal goods.</li> <li>Utilize cloud technology to provide inspection service.</li> </ul>	<ul style="list-style-type: none"> <li>Combine upstream and downstream suppliers countrywide to work on developing software for automated production.</li> </ul>	<ul style="list-style-type: none"> <li>Cooperate with heat treatment suppliers and fastener manufacturers to develop localized facilities.</li> <li>Reduce dependence on imports and facility maintenance time.</li> </ul>	<ul style="list-style-type: none"> <li>Increase management efficiency</li> <li>Develop customized management software</li> </ul>	<ul style="list-style-type: none"> <li>Provide inspection service using cloud technology</li> <li>Decrease repetitive facility installment and set-up time</li> <li>Shorten inspection time</li> <li>Boost storage capacity.</li> </ul>

Table 6. Suggested R&D Development

