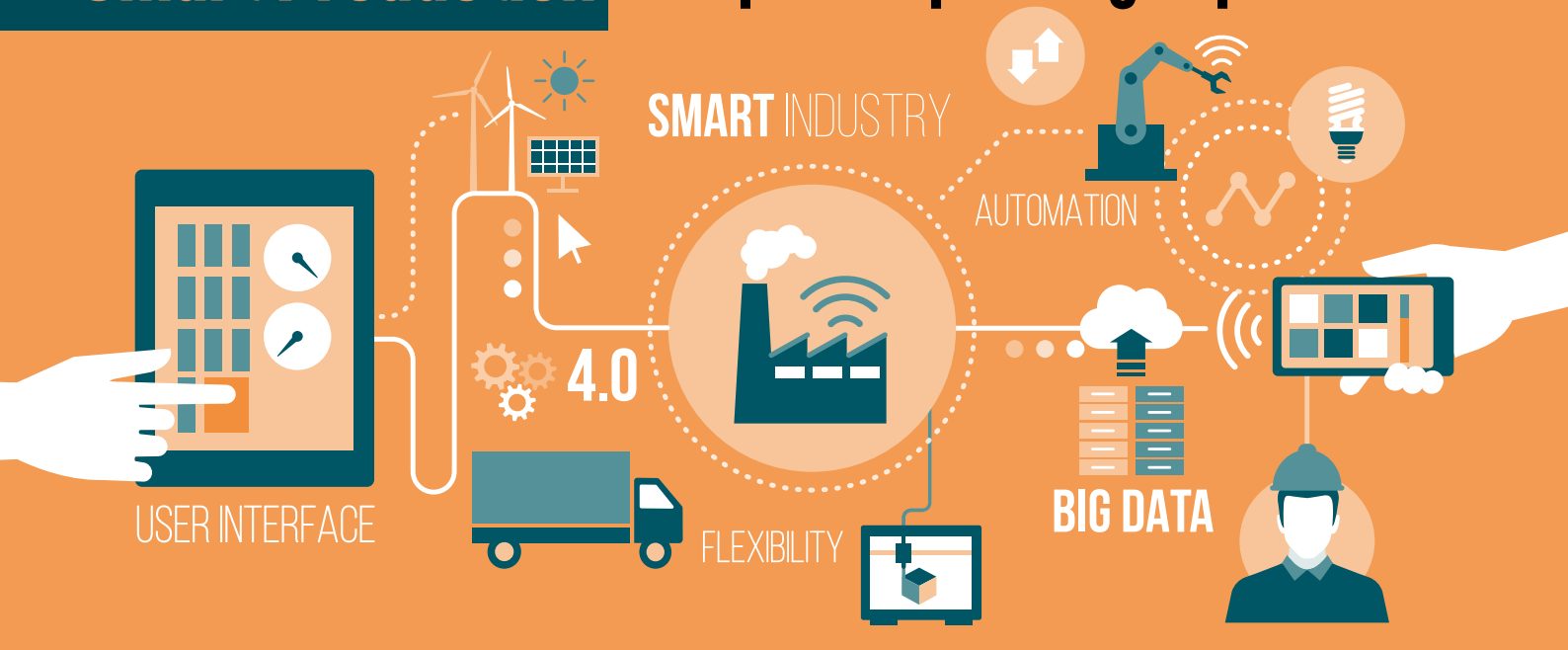


A Dim Q4 2022

How Taiwan Fastener Industry Should Use

Smart Production to Improve Operating Capabilities



The third quarter of 2022 ended with 3 negative shock waves— inflation-inflicted Fed interest rate hike, Russia-Ukraine war plus the energy crisis, immediate depreciation of Asian currencies. The shock waves proclaim that the fourth quarter has been hovered by a darkened mist. This article will analyze the reasons behind the impact and potential influences to Taiwan fastener industry, and provide suggestions as counter-strategies.

The U.S. Continues Raising Interest Rate Due to Inflation

To counter COVID, the Fed announced a QE plan in March 2020 of unlimited purchases of U.S. government bonds and mortgage-backed securities, denoting purchases of bonds with no upper limits. The act did ease COVID's impact on U.S. finance, but excessive capital that inflicted inflation as a side effect caused another disaster. Consumer Price Index (CPI) is a general indicator of domestic inflation, as well as a critical data for the Fed to set currency policies. After the announcement of QE plan, CPI was 0.12% in May 2020, 4.94% in May 2021, 8.52% in May 2022, and up to 9.06% in June 2022. After 4 raises of the interest rate, CPI slipped to 8.3%, far from Jerome Powell's anticipated 2% inflation target. Based on the latest published profit map, the U.S. base interest rate will be raised to 4.4% at the end of 2022 and even to 4.6% or higher next year. Fed could be planning another raise by the end of 2022. The interest raise and deficient drop of CPI were a far cry from what was expected by Wall Street investment banks and economists, triggering U.S. stock plunge where the 4 major American stock indexes were at the lowest

since the end of June. The US Dollar Index was a 20-year high at 111.57. The 2-Year US Bond Yield breached 4% embarking the U.S. dollar value on a rapid uptrend. The USD value hike benefits U.S. import of products. The increased purchasing power of USD will effectively press down merchandise prices, greatly easing inflation in the U.S. From my perspective, the continual interest raise in the U.S. and the stronger USD will last until 2023 or even 2024, until the American CPI is down to a range that is acceptable to Fed.

The Russia-Ukraine War & Energy Crisis

Russia launched the war with Ukraine on February 24, 2022. Russia thought it got Ukraine in the bag by taking down eastern Ukraine and most part of southern Ukraine, but with continuous next-generation weapon support from the U.S. and other European countries, Ukraine countered back and kept winning back since the start of September. President Zelenskyy claimed to have reclaimed 6,000 square kilometers of Ukrainian land and it spurred the morale of Ukrainian soldiers and boosted confidence of Western advocates. On the other hand, at the time



of writing this article, Donetsk and Luhansk, as well as Zaporizhzhia Kherson to the south had a sham referendum from September 23 to 27, after which the Russian President Putin announced to annex those 4 places on September 30. According to a Russian press, Moscow was planning to merge those places with Crimea annexed in 2014 into the new Crimea Republic, and to claim the occupied area as part of the Russian territory. Any battles in these places will be considered an act of war against Russia, thereby providing a leverage to intimidate the U.S. and EU advocates to stop providing weapons to Ukraine. Dmitry Medvedev, deputy chairman of the Security Council of Russia made a statement on September 20 after the annexation that any intrusion into the Russian territory will be met with full-on military defense. What's concerning is that, given that Russian weaponry is not as good as high-end weapons provided by the West, Putin hinted at the possibility of launching a nuclear attack during his recruiting civilian soldiers of 300,000 people on September 21. British Conservative Party politician Bob Seely who visited Kiev thinks nuclear threat is most likely for the sake of intimidation so that the West will cease weapon supply to Ukraine.

After the war, Russia leveraged energy as a weapon to counter against EU, leading to energy price hike in EU. Furthermore, the extreme climate driven by emission of green house gases greatly reduces rainfall. Over 50% of land in Europe is about to or has reached a state of drought that impacts not only crop production, but also hydroelectric power which is one of the important energy sources for Europe. At present, Europe's hydroelectric power generation has reduced 20%, further worsening Europe's energy

crisis. The Russia-Ukraine war caused capital outflows from Europe. Energy price heightens in Germany, France and UK, and the value of euros (against USD) plunged to a 20-year low. In Germany, a trade deficit appeared for the first time in the last 30 years. Unfortunately, the two Nord Stream natural gas pipes were damaged and put a double whammy on the European economy. An American Financial press analyzes that in a worst-case scenario, GDP in the euro zone could reduce 5.6%, much worse than the economic depression in the financial crisis in 2009. The European economy could be getting deeper into the mire of decline.

Rapidly Depreciating Asian Currencies

USD is currently the strongest currency in the world, which increases the Americans' purchasing power and effectively suppresses inflation in the U.S. After the Fed announced on September 21 to raise the interest rate by 0.75 percentage point, the value of RMB against USD dropped.

Offshore Chinese Yuan (CNY) was 7.1 Chinese Yuan against 1 USD, and the RMB value against USD dropped 11.6%, a record low since June 2020. The Japanese yen against USD dropped to a record low below 144 yens since 1998. So far, The Japanese yen value has dropped over 25%, larger than the drop margin in 1979. The South Korean Won took a plunge as well, at

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1422 won against 1 USD for the first time in 13 years. The value of won dropped as much as 19.7%. For NTD, it was NTD 27.895 per USD at the beginning of 2022 and NTD 31.75 against 1 USD by September 30. The NTD value dropped over 13.82%. Asian currencies have started to quickly depreciate. The tense relation between the U.S. and China is worsening and EU has a lot on its plate. There is no external power to curb the depreciating Asian currencies. Taiwan was facing capital outflows due to its political tension with China. The depreciating Asian currencies will speed up the capital outflows. Taiwan Stock Exchange Weighted Index went from 18,619 points on January 2 to 13,424 points on September 30, 2022, down 27.9%. With foreign investors selling a great deal of stocks and the capital outflows, Taiwan will face harsher inflation.

Bringing down prices of Taiwanese products and less hurdle on product export is the advantage with depreciated NTD. To Taiwanese fastener companies, the depreciation can effectively increase profitability, and ease up on the currency loss due to appreciation in the last two years. It can indeed improve corporate sales. However, currencies of places other than the U.S. are depreciating. It means Taiwanese fastener companies are on the same position with overseas rivals. A country with higher capacity for depreciation owns the bigger currency advantage that provides an edge in exporting products. This is a reason that Asian countries are depreciating their currencies. On the other hand, the drawback of depreciated NTD is higher price for importing products, as well as the increase of electricity and gas bills and gasoline price, which adds pressure to running a fastener business in Taiwan.

I have rounded up in **Table 1** the export data of Taiwanese steel fasteners from August 2021 to August 2022 (HS Code 7318: steel screws, bolts, nuts, automotive screws, rivets, cotters, cotter pins, washers). Compared to the export data last year, **Taiwanese steel fastener export didn't decline in August 2022, and in that month Taiwan exported USD 537 million worth of fasteners,**

Table 1. Taiwanese Steel Fastener Export from Aug. 2021 to Aug. 2022

Item (Month, Year)	Value	Weight
	(USD 1,000)	Ton
Aug., 2021	467,473	137,599
Sep., 2021	441,309	127,272
Oct., 2021	486,325	140,706
Nov., 2021	542,529	150,444
Dec., 2021	458,407	122,934
Jan., 2022	545,462	147,883
Feb., 2022	463,432	125,391
Mar., 2022	580,476	154,970
Apr., 2022	520,836	138,023
May, 2022	533,521	140,025
Jun., 2022	539,327	138,798
Jul., 2022	536,941	137,216
Aug., 2022	537,884	139,999

weighted a total of 139,999 tons, which was brilliant. I think the reason is that Taiwan was delivering products from backlogs. The amount of orders burst with an explosive growth during 2021 and mid-2022, and it used to take over 6 months to make delivery. I presume that there remained several orders left to be processed. Currently, most of the fastener backlogs have been delivered and the number of days to delivery is back to normal.

According to Economic Climate Observation by Chung-Hua Institution for Economic Research, after Taiwan's PMI ceased the 24-month increase and decreased in July 2022, it then dropped 0.6 percentage point to 47.2% in August, the fastest contraction recorded since July 2020. The top 5 Taiwanese industries reported PMI contraction in August 2022, and in terms of speed of contraction, in ascending order they are: transportation vehicle industry (40.0%), electrical equipment industry (43.3%), fundamental materials industry (44.2%), electronics and optical industry (45.7%), chemical and bio-medical industry (47.1%). I also used Business Indicator Database by National Development Council to incorporate manufacturing PMI and amount of additional orders into **Table 2**. Compared to August 2021, manufacturing PMI dropped 23.99% from 62.1% to 47.2% in August 2022. Amount of additional orders dropped as much as 33.23%, from 62.3% to 41.6%. From the progression graph in **Figure 1** we can see the apparent downtrend indicating a worrisome outlook for Q4 of Taiwan's manufacturing sector.

Using Smart Production to Improve Operating Capabilities

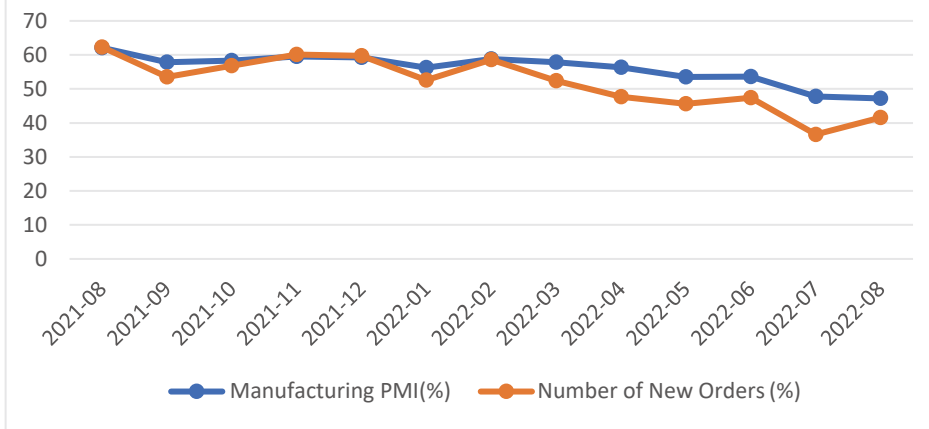
Taiwanese fastener industry largely consists of small and medium companies. Company scale is limited and so are the resources. Facing greater and greater external competition, it is time for Taiwanese fastener industry to think about industrial upgrade.

Table 2. Manufacturing PMI & Number of New Orders

Item (Month, Year)	Manufacturing PMI(%)	Number of New Orders (%)
	Aug., 2021	62.1
Sep., 2021	57.8	53.5
Oct., 2021	58.3	56.8
Nov., 2021	59.5	60.1
Dec., 2021	59.3	59.7
Jan., 2022	56.2	52.6
Feb., 2022	58.8	58.6
Mar., 2022	57.8	52.4
Apr., 2022	56.3	47.7
May, 2022	53.5	45.6
Jun., 2022	53.6	47.4
Jul., 2022	47.8	36.6
Aug., 2022	47.2	41.6



Figure 1. Manufacturing PMI & Number of New Orders



The humans broke free from the constraints of human and animal labor with the first industrial revolution at the end of 18th century. They used water and steam as the power for production and transport, making manufacturing, coal mining, transportation and agriculture faster and more effective. The second industrial revolution in 1920 was driven by electricity which replaced water and steam as the new power source, and entered the phase of using machines for production. Ford introduced the concept of multi-station assembly for mass-production to replace automotive assembly by a single or several workers. The workers could speedily assemble complicated machines and cars with no technique. To this day, there are many industries like photovoltaic power and 3D electronic products that use Manufacturing 2.0 for production.

In the 1970s, the third industrial revolution heralded the era of automated and precise production, using electronic device and information technology to improve capacity, turning mechanical products into mostly mechanical and partially electrical, electronic, programmable equipment and vehicles. Industry 3.0 already comes with supervisory control and data acquisition (SCADA) in charge of collecting various sensors data or production data as well as monitoring production status. The main purpose of SCADA in the production lines or factories is to transmit collected data from the factory to SCADA. SCADA can record according to past history, and lay out production conditions under normal scenarios. When there is a change to the conditions, SCADA will send an alert through text messaging, telecommunication software and email to notify managers for them to react and put down records.

The problems with the third industrial revolution is that the operating environment impacts machines with vibration and that the aging of components and materials impact machine precision, leading to malfunction or erroneous precision on products. Formerly, data collection modules were installed onto machines to collect the aforementioned data. When machines acted up, operators needed to take portable vibration detectors to the spot and ran a series of labor-consuming diagnostics on potential problems. The Hannover Show in 2011 introduced the concept of Industry 4.0, a step further into smart sensing, combining with Big Data, IoT, machine connectivity, cloud

computing, big analysis and AI to achieve high automation, equipping production sites with self-sensing, self-learning, self-strategizing, self-execution and self-adaptation.

Take a Taiwanese automotive transmission shaft maker for instance, the company's 4.0 production line integrated 15 workstations, changed human-to-human communication to machine-to-machine communication, and used machining parameters and used the duration machine tools in use for analysis. This greatly reduces defection and decreases 15 work days to just 2 minutes, and saves up to 80% labor, greatly increasing corporate competitiveness. However, it takes a lot of money for Taiwanese fastener companies to invest in 4.0 production line. This is not affordable to ordinary companies. Therefore, **Industry 3.0 which integrates SCADA and various sensors, production data and production status is one option for them. On the market, there are a lot of companies helping others with smart production using ERP and MES integrated with AIoT.** ERP can provide efficiency for required automation processes and smart functions. MES is a software used to help companies take orders, manufacture, control workflow until the final product, collecting and monitoring data in the process of manufacturing to ensure product quality. An ERP-MES-combined system integrates the cores of a company's production including order taking, supplier management, production, equipment maintenance, and product yield control. It visualizes management information within the factory by displaying the number of finished products from the production line, data analysis by quality inspection unit on defective products, monitor screens, machine parameters control and anomaly alert, effectively reducing the risks with production control and improve production efficiency. The era of technology is ever-changing and companies need to be digitalized and change their business models to adjust internal structures and resource deployment. Smart applications such as an IoT platform and visualized data engineering can help create corporate competitiveness and new business values.

The fourth quarter of 2022 will be the start of a difficult time for Taiwanese fastener industry. With heightened inflation, escalating interest rates, the war, energy crisis, the American and European market demand contraction, depreciating Asian currencies, decline of new orders, and export competition, companies confronting with these factors need to do better on cost control, keep their eyes on collectible payments and financial management, enhance corporate system, integrate new technology with craftsmanship, and accumulate corporate competitiveness to cope with the ever-changing world situation. ■

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