*The information and statistics set out in this section and other sections of this document were extracted from the report prepared by CIC, which was commissioned by us, and from various official government publications and other publicly available publications. The information from official government sources have not been independently verified by us, the Sole Sponsor, the [REDACTED], the [REDACTED], the [REDACTED], the [REDACTED], the [REDACTED] and the [REDACTED] or any other party (other than CIC) involved in the [REDACTED] and no representation is given as to their accuracy or completeness.*

## SOURCES OF INFORMATION

CIC was commissioned to conduct an analysis of, and to report on, the global and Singapore's precision engineering industry and optical metalens industry, at a fee of approximately US$93,000. The commissioned report was prepared by CIC independent from the influence of the Company and other interested parties. CIC's services include, among others, industry consulting, commercial due diligence, and strategic consulting. Its consulting team has been tracking the latest market trends in multiple business sectors, including the internet, environment, industry, energy, chemicals, healthcare, manufacturing, consumer goods, transportation, agriculture, and finance, and has the relevant and insightful market intelligence in the above industries.

During the preparation of the commissioned report, CIC conducted both primary and secondary research using a variety of resources. Primary research involved interviewing key industry experts and leading industry participants. Secondary research involved analysing data from various publicly available data sources, such as Singapore Department of Statistics, Department of Statistics Malaysia, Semiconductor Equipment and Materials International (SEMI), etc. The information and data collected by CIC have been analysed, assessed, and validated using CIC's in-house analysis models and techniques.

The market projections in the commissioned report are based on the following key assumptions: (i) the overall social, economic, and political environment in Singapore is expected to remain stable during the forecast period; (ii) the Singapore's economy is likely to maintain a steady growth trajectory during the forecast period; (iii) the relevant key industry factors are likely to continue to drive the precision engineering market across the world and Singapore, e.g. growing end-use industries including semiconductor, aerospace, and oil & gas, and advancement of high-precision machine tools provides a higher level of accuracy, repeatability, and efficiency; (iv) there is no extreme force majeure or unforeseen industry regulations under which the market may be affected in either a dramatic or fundamental way; and (v) global economy will gradually recover from the negative effects of the COVID-19 pandemic.

## OVERVIEW OF THE PRECISION ENGINEERING INDUSTRY

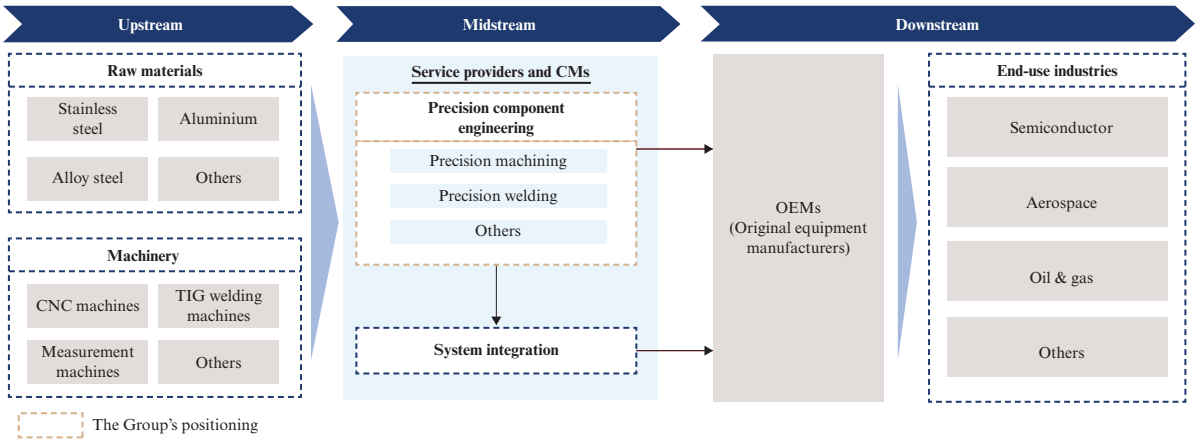
According to the CIC Report, the precision engineering industry comprises precision component engineering and system integration. Precision component engineering refers to metal components manufacturing primarily through precision machining and precision welding, the main value-added processes, with tight tolerance. System integration refers to full systems and subsystems that are assembled together with components and/or other subsystems. The industry serves a wide range of end-use industries, such as the semiconductor, aerospace, and oil & gas industry. In particular, the industry also serves various segments such as display, consumer electronics, and data storage. As such, the growth of the industry is highly related to the growth and broad trend of the end-use industries.

Customers in certain end-use industries often require their suppliers to obtain industry-specific certifications. The lengthy certification process may take from six months to two or three years. For instance, Standardized Supplier Quality Assessment (SSQA), a certification for quality management system used in the semiconductor industry, is a key pre-requisite for industry leading semiconductor original equipment manufacturers (OEMs) when selecting suppliers.

### Value chain analysis of the precision engineering industry

The value chain of the precision engineering industry can be divided into upstream, midstream, and downstream. Midstream players create substantial value through precision component engineering and system integration.

**Value chain of the precision engineering industry**




*Source: CIC Report*

The upstream of the precision engineering industry consists of raw materials and machinery suppliers. Stainless steel, aluminium, and alloy steel are commonly used raw materials in the industry. There are many types of machinery used including Computer Numerical Controls (CNC) machines and Tungsten Inert Gas (TIG) welding machines, etc. Currently, CNC machines are the dominant tools for machining materials.

The midstream of the precision engineering industry involves precision engineering service providers and contract manufacturers (CMs). The differences between service providers and CMs are that: (i) the main responsibility of the service providers is provision of precision component engineering and related services, while that of the CMs is to manufacture and assemble precision engineering components in accordance with the specifications provided by OEMs, and (ii) the service providers receive orders from both CMs and OEMs, whereas the CMs directly receive orders from OEMs and may subcontract part of the production process to service providers. It is common for service providers and CMs to outsource part of the process to other service providers along the value chain.

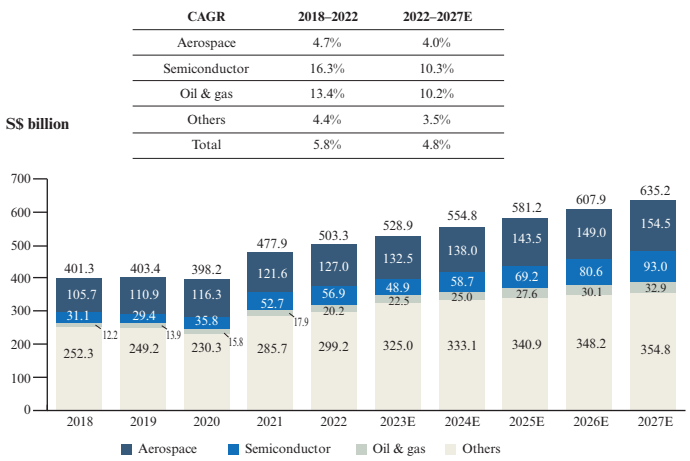
The downstream of the precision engineering industry consists of OEMs and diverse end-use industries of their products, mainly including the semiconductor, aerospace, and oil & gas industry. OEMs outsource all or a portion of the engineering and manufacturing of the final products to the specialised suppliers, including CMs and service providers. OEMs may require CMs to source components from certain certified service providers to ensure the quality of products.

**Market size of the global precision engineering industry**

The global output value of the precision engineering industry increased from S$401.3 billion in 2018 to S$503.3 billion in 2022 at a CAGR of 5.8%, and is expected to increase to S$635.2 billion in 2027, indicating a CAGR of 4.8% between 2022 and 2027.

With a broad range of drivers including increasing demand for mobile devices driven by evolving 5G technology, new CPU architectures, and the development of cloud, artificial intelligence, and machine learning applications, the global semiconductor market has witnessed significant growth during 2021 and 2022. As a result, the semiconductor sector of the precision engineering industry has also been growing rapidly, with a CAGR of 16.3% between 2018 and 2022, and is expected to reach S$93.0 billion by 2027 with a CAGR of 10.3% between 2022 and 2027. The oil & gas sector of the precision engineering industry is expected to register a CAGR of 10.2% between 2022 and 2027 considering the oil & gas industry is currently and will remain critical to the global economic activity and prosperity.

**Total output value of the precision engineering industry, by industry sector, Global, 2018–2027E**

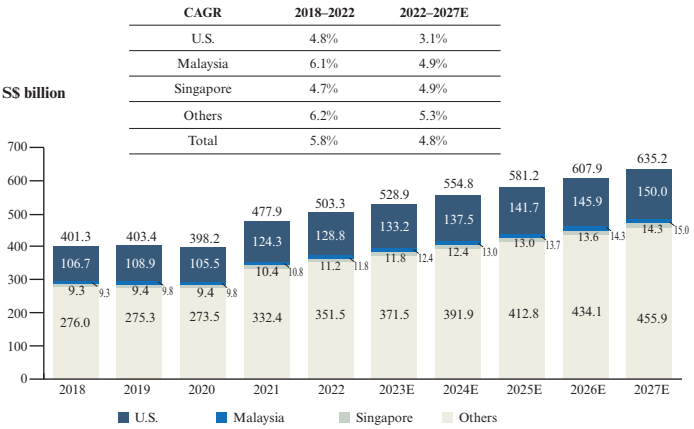



*Note:* Others include medical devices and automotive, etc.

*Source: SEMI, CIC Report*

The U.S. represents the largest market in the global precision engineering industry in 2022. Its output value increased from S$106.7 billion in 2018 to S$128.8 billion in 2022, registering a CAGR of 4.8% during the period, and is expected to further increase to S$150.0 billion in 2027, indicating a CAGR of 3.1% between 2022 and 2027. Singapore and Malaysia represent 2.2% and 2.3% of the global precision engineering industry in 2022, respectively, and are expected to grow with a CAGR of 4.9% and 4.9%, respectively, between 2022 and 2027. Other countries include China, Japan and Germany, etc.

**Total output value of the precision engineering industry, by geographic location, Global, 2018–2027E**



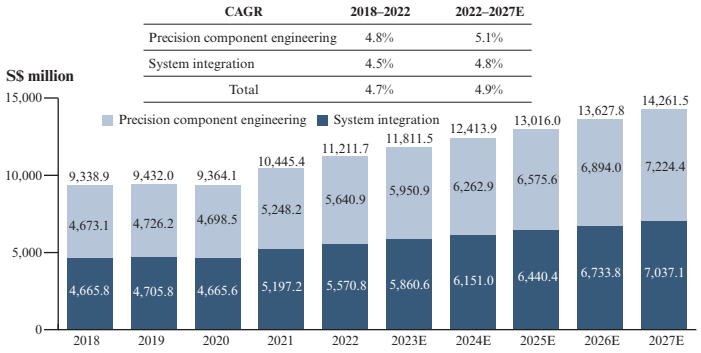

*Note:* Others include China, Japan and Germany, etc.

*Source: The World Bank, Singapore Department of Statistics, Department of Statistics Malaysia, CIC Report*

## OVERVIEW OF SINGAPORE'S PRECISION COMPONENT ENGINEERING INDUSTRY

The Singapore government values the importance of the precision engineering industry and has introduced favourable policies and measures such as Industry Transformation Maps (ITMs) and Precision Engineering Industry Digital Plan (IDP) to support the development and growth of the industry. The precision engineering industry comprises precision component engineering and system integration. The output value of precision component engineering in Singapore increased from S$4,673.1 million in 2018 to S$5,640.9 million in 2022, registering a CAGR of 4.8% during the period. It is expected to further increase to S$7,224.4 million in 2027, indicating a CAGR of 5.1% between 2022 and 2027. The output value of system integration in Singapore also increased from S$4,665.8 million in 2018 to S$5,570.8 million in 2022, registering a CAGR of 4.5% during the period, and is expected to increase to S$7,037.1 million in 2027 with a CAGR of 4.8% between 2022 and 2027.

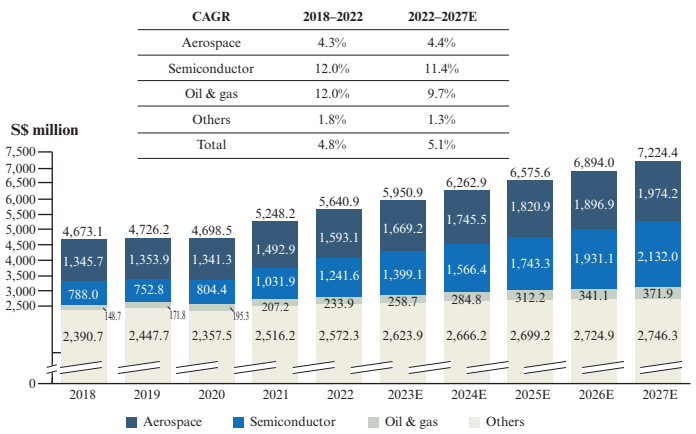
**Total output value of the precision engineering industry, Singapore, 2018–2027E**




*Source: Economic Development Board, CIC Report*

The downstream segments of the precision component engineering industry include aerospace, semiconductor and oil & gas industry. In the semiconductor segment in Singapore, the output value of precision component engineering increased from S$788.0 million in 2018 to S$1,241.6 million in 2022 with a CAGR of 12.0%. The semiconductor sector of the precision component engineering industry in Singapore is expected to further grow to S$2,132.0 million in 2027, indicating a CAGR of 11.4% between 2022 and 2027, due to the rapid development of downstream industries such as 5G technology, consumer electronics, and cloud service.

**Total output value of the precision component engineering industry, by industry sector, Singapore, 2018–2027E**




*Note:* Others include medical devices and automotive, etc.

*Source: Economic Development Board, CIC Report*

**Key growth drivers of Singapore's precision component engineering industry**

***The rapid growth of downstream industries such as semiconductor, aerospace, and oil & gas industry:*** Precision component engineering is widely applied to produce components with complex structures or certain special technical parts in many growing industries including the semiconductor, aerospace, and oil & gas industry. Revenue of global semiconductor industry is projected to reach US$879.9 billion in 2028 with a CAGR of 10.5% between 2023 and 2028. Global sales of semiconductor manufacturing equipment increased from US$61.7 billion in 2019 to US$100.9 billion in 2023, registering a CAGR of 13.1% between 2019 and 2023. The global semiconductor manufacturing equipment market is expected to witness a transition year in 2024 and have a strong rebound in 2025. Driven by capacity expansion, new fab projects, and high demand for advanced technologies and solutions across the front-end and back-end segments, the global sale of semiconductor manufacturing equipment is expected to further increase to US$180.6 billion in 2028, registering a CAGR of 12.3% between 2023 and 2028. The global aerospace and defence market and the global energy investment (including investment in the oil & gas industry) are expected to register a CAGR of 4.3% and 9.8% between 2023 and 2028, respectively. The continual growth of the semiconductor, aerospace, and oil & gas industry in the world drives up the demand and presents more opportunities for precision components and supports the further development of Singapore's precision component engineering industry.

***The advancement of high-precision machine tools provides a higher level of accuracy, repeatability, and efficiency:*** The scope of the precision component engineering industry is expanding due to the advancement of high-precision machine tools. Major advancements include (i) multi-axis CNC machines; (ii) more automated operations; and (iii) more integrated machining centres. These advancements provide a higher level of accuracy, repeatability and efficiency during production. Currently, major downstream sectors of the

precision component engineering industry, such as automobile and semiconductor industries, are showing a trend toward more precise and miniaturised components which poses the need for advanced high-precision machine tools. With the rising technological capabilities, further development of high-precision machine tools is expected and will continue to fuel the industry in the long run.

***The favourable business environment that supports the development of the precision component engineering industry in Singapore:*** The favourable policies and incentives in Singapore promises the precision component engineering industry a high potential future and drives this industry towards a digital revolution and global expansion. The Singapore government values the importance of the precision component engineering industry and has introduced various encouraging policies and measures to help the industry prosper. Under the Research, Innovation and Enterprise (RIE) 2025 Plan, the Singapore government planned to invest S$25 billion in research, innovation and enterprise activities between 2021 and 2025. One of the objectives is to leverage the national research and development efforts to reinforce Singapore's position as a global business and innovation hub for advanced manufacturing and connectivity. RIE 2025 efforts will be organised along four strategic domains, among which the Manufacturing, Trade and Connectivity (MTC) is the key focus area. To support the manufacturing activities in Singapore, Agency for Science, Technology and Research ("A*STAR"), Singapore's lead public sector R&D agency, has established three public-private partnership platforms to drive innovation, knowledge transfer and Industry 4.0 technology adoption, which aim to provide continuous support to companies, including those in precision engineering industry, to gain access to research infrastructure and expertise. RIE 2025 also pays great attention to strengthening the R&D capabilities in the semiconductor industry in Singapore. According to the RIE 2025, innovation is and will continue to be critical to the nextbound of Singapore's industry transformation and economic growth. To reinforce this initiative, ITM 2025 (Industry Transformation Maps 2025) also provides that "EDB will continue to attract manufacturing investments to strengthen Singapore's leadership position in high-value components such as semiconductors" and "enable the precision engineering industry to capitalise on digital manufacturing technologies and platforms to innovate and deliver competitive products and services for global markets". Such plans are expected to bolster the development of the precision engineering industry in Singapore and hence the Group's business and future prospects. Precision Engineering Industry Digital Plan (IDP) was developed in 2021 to support small-to-medium companies in Singapore that provide precision engineering services with digital solutions and training to enhance employees digital skills. The favourable business environment for the precision component engineering industry in Singapore is expected to continue in the future, and therefore will support the further development of the industry.

**Future trends of Singapore's precision component engineering industry**

***One-stop-shop manufacturing service:*** The production of precision engineering equipment involves many manufacturing processes including metal fabrication, precision machining, precision welding, surface treatment, cleaning & packaging, assembly, etc. Service providers and CMs usually have different mix of in-house manufacturing capabilities which consist of one or more of such services. Major downstream customers

have been streamlining and consolidating their supply chains due to convenience and cost-effectiveness considerations. They are looking for manufacturers who can provide a one-stop-shop manufacturing service, covering an extensive range of services. Manufacturers may also strengthen their competitiveness by expanding their service scopes through vertical integration of different manufacturing processes. One-stop-shop manufacturing service providers can reduce the lead time spent on production and transportation, reduce operational costs, ensure stability of the deliverables and increase overall efficiency.

***Increasing requirements for high-end equipment and skilled manpower:*** The end-use industries of the precision component engineering industry are continuously evolving in technology, applications and equipment. Also, in order to minimise massive capital commitment in each manufacturing process, high-end precision manufacturers are dividing the entire production processes into more parts and outsourcing to different midstream CMs and service providers. Therefore, midstream CMs and service providers in the precision component engineering industry are expected to demand for more advanced capabilities in high-end equipment and skilled manpower to meet their customer's requirements.

***The continuous supportive regulatory environment in Singapore:*** Precision component engineering has been identified as one of the key growth factors for Singapore's manufacturing sector, supporting the production of various complex components required in end-use industries including semiconductors, oil & gas, aerospace, and consumer electronics. More supportive policies, including the refreshed *Industry Transformation Maps (ITMs)* which reflected Singapore's 2025 ambition for building a vibrant ecosystem of digitalised precision engieering enterprises with a global footprint, are expected to be carried out to support the development of Singapore's precision component engineering industry, providing a supportive regulatory environment for future growth.

## COMPETITIVE LANDSCAPE OF SINGAPORE'S PRECISION COMPONENT ENGINEERING INDUSTRY IN THE SEMICONDUCTOR SEGMENT

Singapore has a world-class manufacturing ecosystem with a combination of advanced technology, manufacturing excellence, and globalisation in operations management. It has attracted many multinational advanced manufacturing companies, to establish their Asia Pacific headquarters in Singapore. To estimate the market share and ranking of our Group compared to other comparable companies in the semiconductor segment, where our Group mainly operated in, the following metrics are considered: (i) similar industry segment focus (i.e. the semiconductor equipment industry); (ii) similar manufacturing capabilities (i.e. manufacturing precision components mainly through precision machining and precision welding); (iii) the interview result of estimated ranking, revenue, and business segmentation from verified industry experts; and (iv) the research result from annual reports, articles, and government database such as Singapore Department of Statistics.

The competitive landscape of Singapore's precision component engineering industry in the semiconductor segment is fragmented with at least 300 market participants and dominated by the leading players. In 2022, the top ten market players, in terms of revenue,

accounted for approximately 56.1% of the market share of semiconductor segment of precision component engineering industry in Singapore. Market participants include service providers and CMs with in-house production capabilities, including internationally renowned companies with advanced manufacturing capabilities. It is not uncommon for market participants in the semiconductor segment of precision component engineering industry to have a highly concentrated customer base since the end-use semiconductor manufacturing equipment industry is concentrated and dominated by a limited pool of advanced semiconductor equipment manufacturers with the top three market players accounting for more than 40% of the global market share in terms of revenue, and precision components are often customised to meet the specific needs of a particular customer, which leads to a strong mutual relationship between the supplier and the customer. The semiconductor industry requires a high level of accuracy, repeatability and efficiency in the production process of precision component engineering and is thus, characterised by significant barriers to entry, including advanced technologies and know-how, requisite licences and certificates, large capital investments, and well-established customer relationships. Service providers, CMs and OEMs build a mutual dependence and complementary business relationship, which poses OEMs a high switching cost to assess and perform due diligence on new suppliers and to ensure the quality of products supplied by new suppliers conforms with their requirements, resulting in more and more market share gradually accumulated by top players over time.

In 2022, our Group ranked seventh in the semiconductor segment of the precision component engineering industry in Singapore, with a market share of 2.9%, in terms of revenue.

**Top ten market participants in the semiconductor segment of precision component engineering industry, in terms of revenue, Singapore, 2022**

| Rank | Company | Company background | Segmented revenue[(1)], 2022, S$ million | Market share |
|---|---|---|---|---|
| 1 | Company A | Established in 2000, Company A is a listed company headquartered in Singapore specialising in manufacturing semiconductor equipment components and (sub)systems | 170.2 | 13.7% |
| 2 | Company B | Established in 1999, Company B is a listed company headquartered in the United States specialising in manufacturing fluid delivery components and (sub)systems | 152.4 | 12.3% |
| 3 | Company C | Established in 2005, Company C is a non-listed company headquartered in Singapore specialising in manufacturing precision flow control components and (sub)systems | 129.2 | 10.4% |

| Rank | Company | Company background | Segmented revenue[(1)], 2022, S$ million | Market share |
|---|---|---|---|---|
| 4 | Company D | Established in 1992, Company D is a non-listed company headquartered in Singapore specialising in manufacturing precision metal components and (sub)systems for various end-use industries including the aerospace, oil & gas, and semiconductor industries | 71.9 | 5.8% |
| 5 | Company E | Established in 1999, Company E is a listed company headquartered in Singapore specialising in manufacturing metal and plastic components and (sub)systems for various end-used industries including the automotive, medical & healthcare, and semiconductor industries | 49.0 | 3.9% |
| 6 | Company F | Established in 2000, Company F is a listed company headquartered in Singapore specialising in manufacturing precision metal components and (sub)systems for the semiconductor and electronics test industries | 42.9 | 3.5% |
| **7** | **Our Group** | Established in 2000, our Group is a one-stop build-to-print precision engineering services provider principally based in Singapore, specialising in providing complex integrated precision machining and welding services for reputable international customers | **35.7** | **2.9%** |
| 8 | Company G | Established in 1983, Company G is a listed company headquartered in Singapore specialising in manufacturing high precision components and tools for the wafer-fabrication and assembly processes | 17.3 | 1.4% |
| 9 | Company H | Established in 1980, Company H is a listed company headquartered in Singapore specialising in manufacturing precision metal components for the semiconductor and machinery industries | 16.5 | 1.3% |
| 10 | Company I | Established in 1989, Company I is a non-listed company headquartered in Singapore specialising in manufacturing precision metal components and (sub)systems for the data storage, automotive, and semiconductor industries | 11.0 | 0.9% |
| | Subtotal | | 696.1 | 56.1% |
| | Others | | 545.5 | 43.9% |
| | Total | | 1,241.6 | 100.0% |

*Source: CIC Report*

*Notes:*

(1) Segmented revenue includes revenue of precision component engineering in the semiconductor segment.

**Competitive advantages of the Group**

The competitive advantages of our Group include (i) established long-standing business relationships with reputable international customers, (ii) seasoned and visionary management team supported by technical talents, (iii) machinery and technological know-how, and (iv) possession of necessary certifications and qualifications. First, through establishing a proven track record in providing quality and efficient services, our Group has been selected by our customers as a strategic and long-term supplier. Specifically, our Group has built and maintained strong relationships with world-class OEMs and CMs customers for many years. Second, our Group has accumulated an extensive operational and managerial experience in the industry and has built a dedicated and experienced workforce to cater for our customers' product requirements and support our continuous business growth. Third, our Group has precision machinery, including large and multi-axis CNC machines for producing large format vacuum chambers with an accuracy of +/– 10μm while the industry average accuracy is around +/–100 μm to +/–10 μm (the lower the μm, the higher the accuracy), and accumulated technological know-how through years of operation. This has equipped our Group with an advanced capability in the industry and allows our Group to produce highly complex components efficiently when compared to industry peers. Fourth, our Group has been accredited with industry-essential qualifications in the production technologies and quality control systems and become an approved supplier of Customer A. The processes of obtaining such certifications and becoming a qualified supplier take time and are testimony of recognition in the industry.

The Singapore's precision component engineering industry is highly fragmented and dominated by small and medium enterprises, which normally focus on certain end-markets and/or product segments. As a high value-added process in the precision engineering industry, manufacturing know-how and proven record of success are important to the end-customer which require a significant period of time to accumulate. Due to the necessity to obtain components on a consistent and reliable basis, downstream customers generally prefer to work with a limited number of reliable and reputable suppliers with proven capability and product quality which allow them to purchase highly complex components efficiently. The mutual dependence and complementary business relationship between suppliers and customers is therefore established based on trust and reliability. Therefore, proven capability and established long-standing business relationship with internationally renowned customers have formed the core competitive advantages of the Group in the highly fragmented market.

**Entry barriers for the precision component engineering industry**

***Large capital investment in high-end machinery:*** Existing market participants have continuously invested significantly over years. To compete with existing market participants, new entrants need to invest a large amount of capital in purchasing advanced equipment and building the relevant infrastructure to achieve high accuracy, repeatability and efficiency. For instance, a five-axis CNC cutting machine costs millions of

SGD. Also, the cost related to equipment maintenance and upgrading is substantial, making it difficult for new entrants to compete with existing players if they do not process the ability to make such huge capital commitment.

***Possession of skilled workers and technological know-how:*** The precision component engineering industry serves highly technical sectors, such as the semiconductor industry. Due to the high technical skills required by the industry, there is only a limited number of skilled workers available on the market. Technicians for precision component engineering are under intense competition in Singapore and Malaysia, making it hard for new entrants to recruit a sizeable pool of qualified workers. Also, existing market participants have accumulated considerable technological know-how, which is essential to the success of their business, through years of operations. It requires new entrants a long period of time to acquire sufficient knowledge and experience to compete with existing players.

***Proven capability and stable relationships with customers:*** Downstream customers of the precision component engineering industry are mostly leading companies in semiconductors, aerospace, automobile, and oil & gas industry. Due to the necessity to obtain the required components on a consistent and reliable basis, downstream customers generally prefer to work with a limited number of reliable and reputable suppliers with proven capability and product quality. The mutual dependence and complementary business relationships between suppliers and customers in the industry is established based on trust and reliability. It is hard for new entrants to compete with existing players because they lack the relative experience and are unable to establish a stable relationship with downstream customers within a short period of time.

***Qualification and certification requirements:*** Market participants need to comply with local regulations and are expected to obtain certain qualifications and certifications, such as ISO 9001:2015. Also, professional standard organisations, such as American Society of Mechanical Engineering (ASME) and American Welding Society (AWS), make rules and classifications for welding positions, techniques and procedures. ASME provides ASME Boiler and Pressure Vessel Code (BPVC) certification and AWS provides Certified Welder (CW) certification and Certified Welding Inspector (CWI) certification. Welders must be certified in each welding position to perform the respective type of welds. Leading downstream customers also require their suppliers to obtain certain industry-specific certifications, such as SSQA for the semiconductor industry. The whole process of obtaining such certifications is time-consuming and may last from six months to two or three years, deterring new entrants from entering the market easily.

**Key success factors for the precision component engineering industry**

***Ability to train and sustain skilled and experienced employees:*** The precision component engineering industry is a highly technical industry. The success of a business depends on the retention and/or recruitment of new skilled and experienced employees. Companies with more competitive compensation packages and systematic training courses are more likely to attract and recruit skilled and experienced employees, and thus, contributing to their long-term development.

***Reliable and cost-advantageous supply chain for sourcing raw materials and service providers:*** Maintaining a reasonable level of raw material stock and a list of reliable service providers are important to the operation of the business. Therefore, it is important to have a reliable supply chain to ensure stability of the cost and transportation time in order to avoid or minimise any delay or shortage in the supply of raw material or delay in delivery of products, which may undermine the company's reputation.

***Continuously upgrading equipment and software to maintain competitiveness:*** The technology keeps evolving and downstream customers are posing higher requirements for precision components. To maintain competitiveness, companies may need to upgrade and debottleneck the existing equipment and software in a timely manner.

***Consistent production of quality components:*** As the downstream customers are highly concentrated and usually prefer to work with only a limited number of reliable suppliers, companies that prove their ability to deliver high-quality products consistently are likely to receive more orders and gain more market shares in the long term.

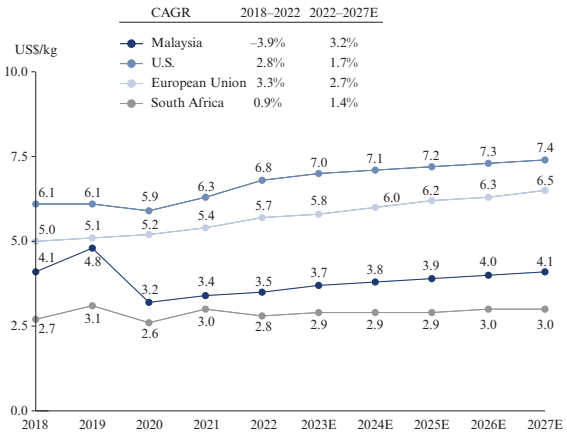
***Strong and long-standing relationship with customers:*** It is important for service providers and CMs to maintain strategic long-term relationships with the OEMs for business opportunities. Therefore, the establishment of mutual dependence and complementary business relationship with customers provides for more sustainable business growth in the future.

**Cost analysis of the precision component engineering industry in Singapore**

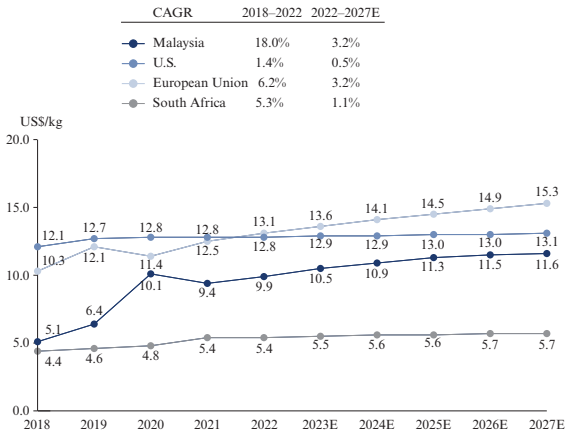
The primary cost of precision component engineering service providers include raw material costs and labour costs. Raw materials mainly include iron, steel and aluminium.

The prices of iron & steel and aluminium directly affect the cost of raw materials in the precision component engineering industry in Singapore. Metal raw materials in Singapore mainly rely on imports from certain major economies such as Malaysia, U.S., the European Union (EU) and South Africa. Prices of iron & steel and aluminium in Malaysia, U.S., EU and South Africa generally maintained an upward trend from 2018 to 2022 without much material fluctuation, except for a drop in iron & steel prices from US$4.8/kg to US$3.2/kg and a rise in aluminium prices from US$6.4/kg to US$10.1/kg in Malaysia from 2019 to 2020, which could affect the operation costs of the service providers in the precision engineering industry in Singapore and Malaysia, including our Group. The drop in iron & steel prices in 2020 was due to the lockdown measures during COVID-19 pandemic which reduced demand and prices for steel in key end-use industries, and the rise in aluminium prices was due to a large amount of aluminium being demanded and exported to China from Malaysia as China was then under pressure of environmental protection commitment and limited the production of aluminium domestically, which drove up demand and prices of aluminium from Malaysia. The prices of iron & steel and aluminium are expected to steadily grow further at CAGRs ranging from 1.4% to 3.2% and 0.5% to 3.2% in Malaysia, U.S., EU and South Africa over the period from 2022 to 2027.

**Price of iron & steel[(1)], Malaysia, U.S., EU and South Africa, 2018–2027E**




**Price of aluminium[(1)], Malaysia, U.S., EU and South Africa, 2018–2027E**



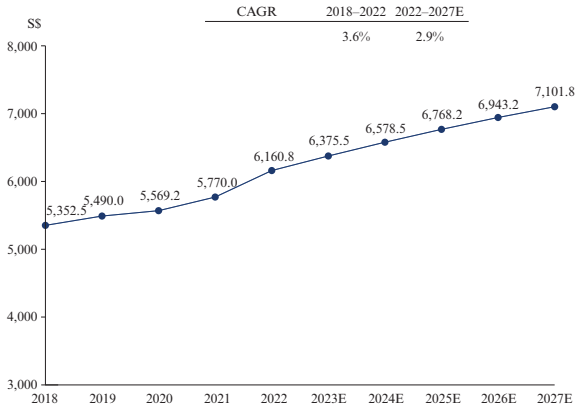

*Source: The World Bank, CIC Report*

*Note:*

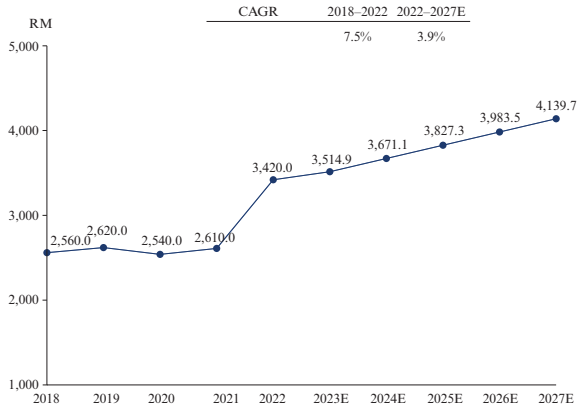
(1) The prices are based on average import and export prices in Malaysia, the U.S., the EU and South Africa.

With the continuous development of the economy, the average monthly salaries in the manufacturing industry in Singapore and Malaysia have been continuously increasing during 2018 to 2022 with the CAGR of 3.6% and 7.5%, respectively. In particular, the average monthly salaries in the manufacturing industry increased by 6.8% and 31.0% in Singapore and Malaysia, respectively in 2022 due to economic recovery from COVID-19 pandemic in both countries and the increase in minimum wage in Malaysia. With the expected gradual recovery of the global economy (including Singapore and Malaysia) from the COVID-19 pandemic, the average monthly salaries in the manufacturing industry in Singapore and Malaysia are expected to maintain steady growth over the next five years with the CAGR of 2.9% and 3.9%, respectively from 2022 to 2027.

**Average monthly salaries in the manufacturing industry, Singapore, 2018–2027E**




**Average monthly salaries in the manufacturing industry, Malaysia, 2018–2027E**




*Source: Singapore Department of Statistics, Department of Statistics Malaysia, CIC Report*

**Future threats and challenges of the precision component manufacturing industry**

***Shortage of skilled and experienced manpower:*** The precision component engineering industry in Singapore generally faces a shortage of skilled and experienced manpower, attributable to factors, including the Singapore government's policy restricting foreign manpower hiring and the ageing working population.

***Regional competition:*** The precision component engineering industry is fragmented and highly competitive. Singapore's position in the precision component engineering industry is threatened by the growth and entry of service providers and CMs from overseas countries.

***Digitalisation:*** The precision component engineering industry is becoming increasingly digital, with the use of digital design tools and simulation software. This presents opportunities to improve efficiency and quality, but also requires new skills and knowledge.

***Influence by end-use industries:*** The major end-use industries of precision component engineering industry, including semiconductor, aerospace and oil & gas, are highly dependent on the factors such as global economic cycle, political environment and demand-supply relationship, which can ultimately affect the development of the precision component engineering industry.

## OVERVIEW OF THE OPTICAL METALENS INDUSTRY

The optical metalens is defined as a flat lens technology that uses metasurfaces to focus light. The technology can be used in optical applications that take advantage of the flat surface, with higher focusing efficiency, tunability, etc. to reduce thickness and increase optical performance, compared to classic curved refractive lenses mainly used in conventional optical devices.

The current global optical metalens market is still at its early stage of commercialisation with China and the U.S. leading at the forefront of the research and development. As the design and manufacturing technology gradually get mature and as the technology awareness increases across the global market, it is expected that more companies will enter the field in the future.

**Value chain of the optical metalens industry**

Value chain of the optical metalens industry can be divided into upstream, midstream, and downstream. The upstream of the optical metalens industry value chain is composed of raw materials for substrate and metasurfaces such as silicon dioxide ($SiO_2$), silicon (Si), germanium (Ge), etc. The midstream of the optical metalens industry value chain is the manufacturing of optical metalenses. Based on metasurface materials, optical metalenses are normally categorised into dielectric optical metalenses and plasmonic optical metalenses. The downstream industries of optical metalenses include end-use industries such as new energy vehicle (NEV), smartphone, AR/VR, IoT, biomedical, security monitoring, aerospace, industrials, etc.

**Key growth drivers of the optical metalens industry**

Key growth drivers of the optical metalens industry include (i) the rapid growth of the NEV industry, (ii) the continuous development of the 5G smartphone industry, and (iii) the advancement of global manufacturing technology. The NEV and 5G smartphone industries around the world have been developing rapidly. As optical metalenses are potential substitutes for conventional optical components in NEVs and 5G smartphones, the continuously growing NEV and 5G smartphone industries are set to provide the optical metalens market with strong growth momentum. Meanwhile, driven by progress constantly made in information technology, advanced manufacturing technology is rapidly evolving across the world. This is expected to provide the optical metalens industry with more advanced manufacturing techniques and resources, and ultimately drive the market to grow.