

Precision Engineering

Factsheet 2011

At a glance

Precision engineering (PE) – a key pillar of complex manufacturing activities

The PE industry forms the backbone of Singapore's complex manufacturing activities and is a core enabler for industries such as electronics, marine, aerospace, oil & gas, and medical devices. With its highly specialised skill sets, it is the essential ingredient in the manufacturing of the smallest semiconductor chip, to the most cutting-edge of medical devices, and the largest drill bits used in oil exploration.

Singapore's unique strengths in PE are key reasons for our global leadership position in products such as refrigerator compressors (10% of global output), wire/ball bonders (70% of global output) etc. In addition to securing the manufacturing presence of established PE companies, Singapore also plays host to the headquarters and R&D functions of some of these companies.

Singapore's PE activities began in the 1970s to support the pioneering manufacturing investments. Today, Singapore's PE industry comprises two main sub-sectors – the design and assembly of machinery & systems (M&S) and the production of precision modules & components (PMC). The M&S sector includes key machine tools, semiconductor

and solar equipment makers the likes of Makino, Yamasaki Mazak, Applied Materials and KLA Tencor, while the PMC sector features companies involved in a wide range of manufacturing services (such as tool & die making, casting, plastic/metal/ceramic injection moulding, ultra-precision machining) and specialised components as diverse as bearings, motors, vacuum pumps and watch movements. Singapore PE sector has since developed into a critical pillar of Singapore's manufacturing sector and an industry in its own right, contributing about S\$18.3 billion in manufacturing output and S\$5.6 billion in value-added in 2009 alone.

Singapore's PE industry remains globally competitive as companies here move from being simple contract manufacturers to solution providers with strong design, prototyping, production and supply chain management capabilities. Increasing market demand for efficiency and innovation has also seen companies leveraging Singapore's well-established research and development infrastructure to gain competitive advantages over their competitors.

The local PE industry has continued to evolve in tandem with the increasing sophistication of manufacturing projects from industries such as aerospace, medical devices, electronics, industrial and marine & offshore equipment. To realise our targets for 2020, we will strengthen our base of machine-building capabilities especially in semiconductor and solar

equipment, refurbishment and assembly, as well as develop a strong and diverse precision modules and components supporting industry to serve emerging sectors such as medical technology, aerospace and clean technology.

Key investments in the PE industry in 2008

Makino, based in Tokyo, Japan and a world leader in metal cutting and manufacturing technology, launched its International Research and Development (IRD) Centre in October 2009. The first such R&D Centre outside of Japan, the new IRD centre will spearhead machine tool research in emerging technology areas such as medical, engineering, alternative energy and power generation. This will propel Makino Asia to gain a larger footprint in the region and around the world.

Applied Materials, based in Santa Clara CA, USA, and global leader in semiconductor equipment, officially opened its first manufacturing facility in April 2010. The plant will be a hub for its semiconductor equipment manufacturing worldwide, and its operations centre will support global supply chain operations and corporate functions. At full production, the facility will produce 50 percent of Applied's global semiconductor equipment supply and hire more than 800 employees.

PE industry supports other complex manufacturing activities

Electronics: Beyond manufacturing higher value-added components such as cell phone light guides in clean-room and fully automated environments, some PE companies such as Co-Active Technologies have now grown capabilities to design these modules. Meanwhile, companies like Heptagon Micro Optics have located their first-in-the-world wafer-level optics manufacturing plant in Singapore. Their pioneering manufacturing technique, developed from highly efficient semiconductor manufacturing methods, has already helped them produce more than 100 million camera lens module in Singapore since they begun production in 2007. Finally, a number of niche printer components such as optical encoders and toner transferring printer rollers are also designed and manufactured in Singapore by

companies such as GM Nameplate and Ten Cate Enbi.

Medical Technology: With Singapore's Medtech industry growing at a CAGR of 8%, precision engineering suppliers have observed increasing opportunities of outsourced medical device manufacturing. Today, Singapore offers a diverse range of capabilities in system integration, manufacturing automation, plastics processing, metal machining, optics and related secondary processing with TS13485 and GMP certification. With more suppliers like Sunningdale Tech, Meiban, Univac, Fischer Tech, and Nypro equipped with clean rooms, and prepared to weather the long qualifying process necessary to supply to medical device OEMs, Singapore precision engineering suppliers have improved their position to capture these opportunities. Currently manufacturing inhaler components, surgical lenses and special medical closures for important OEMs such as Schering Plough, Baxter and Becton Dickinson, the suppliers are gearing up to extend their capabilities to fully assemble drug delivery systems and make complex tooling for medical lenses with micro-curvatures.

Aerospace: UMS' US\$20 million announcement in 2007 to set up a facility in Singapore specially for machining aerospace parts and components signals the growing opportunities in aerospace for PE companies. Other PE suppliers are similarly in the process of acquiring new capabilities in 5-axis machining and machining on composite materials, as well as the necessary qualifications and certifications to capture these opportunities.

Oil & Gas: Singapore produces 70% of the world's jack up oil rigs, and is the regional leader in oilfield & gasfield equipment manufacturing. We have a growing base of PE suppliers that are moving into large format, multi-axis machining and other value-added services to support the growing outsourcing demands of key players such as **Schlumberger**, **Cameron** and **Halliburton**.

Complex Equipment: As more complex equipment players make Singapore their home, we are strengthening our base of PE companies who can support the growth of companies the likes of Applied Materials, KLA Tencor and Makino. Our suppliers are able to provide contract manufacturing services, as well as high quality components and secondary services, and include players such as VDL-Enabling

Technologies Group, Hup Fatt Brothers, Ultra Clean Technology and Flextronics.

Key development thrusts

Develop a strong PE supplier community

With some 2,700 companies in the PE sector, Singapore offers a wide spectrum of supply products and services. To encourage these supplier companies to remain relevant to the changing demands of customers, EDB introduced the Supplier Development Initiative (SDI) to enhance their capabilities and establish business linkages with larger PE companies. The Initiative enables manufacturers in the semiconductor equipment, aerospace, medical technology and electronics sectors to establish strategic business relationships with contract manufacturers and suppliers in Singapore.

Arising from the Economic Strategies Committee's (ESC) recommendations in 2010 and as part of the SDI, the Partnership for Capabilities Transformation (PACT) scheme will be launched to forge supplier partnerships with MNCs through which supplier qualification opportunities for locally based companies will be created. This scheme encourages OEMs to work closely with their suppliers and take a leadership role in helping to build up the suppliers' capabilities. It also helps foreign suppliers establish a presence in Singapore. Through this, the suppliers here will be able to offer a more compelling value proposition to manufacturers.

Strengthen Talent Pool for the future

A second key thrust is the development of PE talent for the future of the PE industry, which will require talent with good hands-on skills as well as design and integration capabilities. To this end, EDB is working with the various institutes of higher learning and the industry on manpower development programmes to build up this talent pool through both pre-employment training and in-employment upgrading.

In October 2007, EDB and SPRING Singapore launched a S\$76m, cross-agency PE Manpower Initiative with the support from Workforce Development Agency (WDA), the industry and training institutes like Nanyang Polytechnic (NYP) and the Institute of Technical

Education (ITE). The Initiative is Singapore's collective response to the global uphill challenge of attracting and retaining PE talents, and aims to attract fresh talents to join the PE industry, upgrade & retain local talents, retain foreign specialists and revamp the industry profile. It will train 2,000 PE professionals over a five-year period through two programmes - the National Precision Engineering Scholarship Programme and the Specialist Programme.

As part of this manpower initiative, the Centre for Digital and Precision Engineering (CDPE) was set up at NYP to train PE professionals and was officially opened in January 2010. Hosting state-of-the-art equipment, the centre will build up new competence areas such as Advanced Machining Technologies, Nanometrology and Digital Manufacturing Applications.

Increase Productivity

Productivity continues to be a key driver in ensuring Singapore's continued competitiveness in the global economy. The Singapore Government has recently announced a commitment of S\$1.1 billion a year over the next five years in the form of tax benefits, grants and training subsidies to support national efforts to raise productivity. Initiatives tailored to the needs of the PE industry will be launched to support locally-based firms in their constant drive towards higher productivity and to transform the industry in such a way that will strengthen and sustain the country's leadership in precision engineering.

Increasing Innovation Development

As Singapore continues to focus on knowledge intensive activities, the PE industry is transforming beyond production activities. EDB encourages companies to leverage on the research and development infrastructure in our institutes of higher learning and research institutes to innovate and commercialize. For example, the Precision Engineering Centre of Innovation (PE COI), hosted at the Singapore Institute of Manufacturing Technology (SIMTech), offers a broad spectrum of technologies and manpower training to upgrade PE companies' manufacturing capabilities and accelerate development of new products, equipment and processes.

Strengthen Base of Component OEMs

Component Original Equipment Manufacturers (OEMs) manufacture and market precision components under their own brand names. Such precision components include lasers, optics, interconnects, motors, pumps, valves etc. They are often differentiated by their proprietary technologies and strong engineering capabilities. EDB continues to support the growth of component OEMs to locate activities in Singapore to serve not only our local industry, but also the regional and global markets.

Extended Supply Chain

EDB will continue to encourage companies to conduct supply chain management activities through Singapore, leveraging Singapore's strong supplier base and vast connectivity to the region. Such companies could, through Singapore, source for critical materials and components in the region, thereby strengthening their manufacturing and assembly operations in Singapore.

Key figures from Singapore's PE industry

	2005	2006	2007	2008	2009 (projected)
Output (S\$billion)	19.7	22.2	23.2	22.9	18.3
VA (S\$billion)	6.2	6.7	7.1	6.7	5.6
Employment	92,776	96,419	100,882	100,221	91,374

About the Singapore Economic Development Board

The Singapore Economic Development Board (EDB) is the lead government agency for planning and executing strategies to enhance Singapore's position as a global business centre. EDB dreams, designs and delivers solutions that create value for investors and companies in Singapore. Our mission is to create for Singapore, sustainable economic growth with vibrant business and good job opportunities. EDB's 'Host to Home' strategy articulates how we are positioning Singapore for the future. It is about extending Singapore's value proposition to businesses not just to help them improve their bottom line, but also to help them grow their top line through establishing and deepening strategic activities in Singapore to drive their business, innovation and talent objectives in Asia and globally.

For more information on how EDB can help in your business and investment, please visit www.sedb.com

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