中國銀河國際
CHINA GALAXY INTERNATIONAL

2018年11月5日

槟杰科达 [1665.HK]

精准定位；首次覆盖并予买入评级

*槟杰科达是一家总部位于马来西亚、由Pentamaster Corporation Berhad [PENT.MK]分拆出来的公司。槟杰科达为半导体、电信、消费电子和汽车行业的跨国制造商提供自动化技术和解决方案，覆盖亚太地区、北美和欧洲。公司目前拥有380多名内部工程师，他们通过创新、设计、制造和安装自动化设备和自动化制造解决方案，为客户提供广泛的产品和解决方案。公司已完成建设在马来西亚的第二家新生产工厂，这将扩大其产能。市场对半导体行业的增长前景感到担忧，因为多家行业龙头发布了2018年四季度指引，这给槟杰科达带来了压力。然而对槟杰科达来说，工业和汽车行业为公司的供应链带来增长动力。通过接触到这两个细分市场，我们相信槟杰科达将继续实现健康增长。另外，由于市场关注贸易战的影响，更多供应链正在搬迁到其他地区，料槟杰科达将因此受益。我们预计公司2017 - 2019年收入复合年增长率为43.7%，EBITDA复合年增长率为69.9%，净利润年复合增长率为69.4%。尽管近期股价表现较弱，但我们认为目前估值10.0倍2018年市盈率提供了进场的良机。首次覆盖并予**买入**，目标价为1.36港元（基于13倍2018年市盈率，低于区内同业）。*

- **优质的投资主题。**若投资者对半导体设备、生产自动化、新光学技术的采用以及快速增长的汽车电子业务等投资主题感兴趣，槟杰科达为投资者带来另一选择。尽管市场关注智能手机出货量放缓，但槟杰科达一直在与客户合作开发一个新项目，预计该项目将在2019年一季度开始产生销售。汽车和医疗、餐饮和消费品等其他行业，都可能会为公司的中长期增长带来贡献。由于对市场对MLCC和功率转换器的测试设备和测试处理器存在需求，槟杰科达受惠于汽车市场的良好增长。预计汽车行业将成为槟杰科达的主要增长动力之一，特别是公司积极与汽车电子领域的一些领先企业合作。来自现有客户的订单和潜在客户的新订单（在过去几个月内进行协商）将支持槟杰科达2017 - 2019年每股盈利录得43.7%的年均复合增长率。
- **强大的订单支持增长。**在2018年三季度，公司的未交付手头订单为2.857亿林吉特（较2018年上半年的2.357亿令吉逐步增长21%，2017年底为2.492亿令吉），约占我们对2019年收入预测的50%。由于交货时间为6-12个月，现有的手头订单将转化为2018年四季度和2019年的收入。预计公司在峇都交湾的新工厂将投产，并将提升其整体制造产能以刺激新产品的销售增长。
- **若更多供应链搬迁将使公司受益。**中美贸易战可能为槟杰科达带来进入新市场的机会。随着更多供应链搬迁以避免受到美国对中国实施贸易措施带来的影响，槟杰科达可能会受益。槟杰科达将通过在晶圆级测试和基于VCSEL的设备上进行研发来扩展其产品组合。
- **催化剂：**公布2018年四季度业绩、新产品发布、市场关注度增加以及取得更多新的中国客户。
- **风险：**全球电子行业大幅放缓、产能增速低于预期、波动的汇率走势。

主要财务指标（百万元人民币）	2015	2016	2017	FY18E	FY19E
截至12月底止年度					
收入	75.1	73.7	141.8	421.0	561.0
变动（同比%）	(90.8)	(1.9)	92.5	55.0	33.3
毛利润	21.7	20.7	45.1	135.6	179.3
毛利润率（%）	28.9	28.1	31.8	32.2	32.0
净利润	9.1	9.6	31.3	89.2	113.7
净利润率（%）	12.1	13.0	22.1	21.2	20.3
每股收益（基本）	0.01	0.01	0.02	0.06	0.07
变动（同比%）	(91.6)	5.7	226.3	125.0	27.5
每股股息	$0.000	$0.000	$0.000	$0.000	$0.014
净资产收益率（%）	9.9	20.3	46.4	41.9	33.1
股息收益率（%）	-	-	-	-	2.55
市盈率（倍）	93.2	28.6	22.5	10.0	7.9
市净率（倍）	17.2	10.8	7.0	3.0	2.3
自由现金流收益率（%）	0.61%	1.24%	3.48%	1.30%	5.65%
资本开支（百万元）	(0.4)	(2.0)	(2.7)	(85.0)	(45.0)
每股自由现金流	0.0	0.0	0.0	0.0	0.1
净负债比率（%）	净现金状态	净现金状态	净现金状态	净现金状态	净现金状态

来源：公司, 中国银河国际证券研究部估计

TMT行业

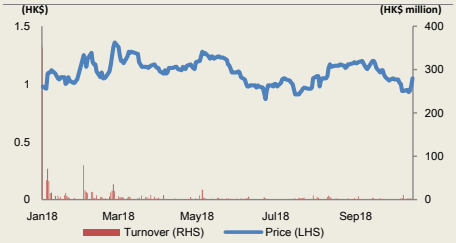
硬件

买入

收盘价：1.05港元（2018年11月2日）

目标价：1.36港元（+29.8%)

股价表现



来源：彭博，中国银河国际证券研究部

市值	2. 14亿美元
已发行股数	16亿股
核数师	Grant Thornton
自由流通量	29.0%
52周交易区间	0.87-1.36港元
三个月日均成交量	90万美元
主要股东	Pentamaster Corporation Berhad (63.1%)

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中國銀河國際
CHINA GALAXY INTERNATIONAL

November 5, 2018

Pentamaster International Limited [1665.HK]

Precise Positioning. Initiate with BUY.

*Pentamaster International Limited [1665.HK] (Pentamaster) is a Malaysia-based company and a spin-off of Pentamaster Corporation Berhad [PENT.MK] (PCB). Pentamaster provides automation technology and solutions to multinational manufacturers in the semiconductor, telecommunications, consumer electronics and automotive sectors, spanning APAC, North America and Europe. The Company currently has over 380 in-house engineers providing a broad range of products and solutions by innovating, designing, manufacturing and installing automated equipment and automated manufacturing solutions. It has completed its second new production plant in Malaysia, which will expand its production capacity. The market has concerns about the growth outlook for the semiconductor industry after leading names released their guidance for Q4 2018, which put pressure on Pentamaster. However, the industrial and automotive sectors are growing segments in Pentamaster's supply chain. With exposure to these two segments, we believe that Pentamaster will continue to deliver healthy growth. Pentamaster is also expected to benefit from any supply chain relocation due to concerns about the impact of the trade war. We forecast revenue CAGR of 43.7%, EBITDA CAGR of 69.9%, and net profit CAGR of 69.4% in 2017-2019E. Despite its recent share price underperformance, we believe the current valuation of 10.0x 2018E PER offers a good entry point. Initiate with **BUY** with a target price of HK$1.36 (based on 13x 2018E PER, lower than that of its regional peers).*

- **Exceptional investment theme.** Pentamaster provides another choice for investors who are interested in investment themes such as semiconductor equipment, production automation, the adoption of new optical technology, and the fast-growing auto electronics business. Despite concerns about a slowdown in smartphone shipments, Pentamaster has been developing a new project with its customer which is expected to ramp up in Q1 2019. The automotive and other industries, including medical, F&B and consumer products, are likely to contribute to the Pentamaster's medium- to long-term growth. Pentamaster witnessed satisfactory growth in the automotive segment, driven by demand for testing equipment and test handlers for MLCC and power converters. The automotive sector is expected to be one of the key growth sectors for Pentamaster, especially since the Company is actively engaging with some leading players in the auto electronics segment. Orders from existing clients and new orders from potential customers (negotiated in the past several months) will support the Company's 43.7% CAGR top-line growth in 2017-2019E.
- **Strong order book to support growth.** In Q3 2018, Pentamaster's outstanding order backlog came in at MYR285.7m (up 21% sequentially from MYR235.7m in 1H 2018 and MYR249.2m as at the end of 2017), which is around 50% of our estimated revenue for 2019. With 6-12 months' lead time, the existing order backlog will translate into revenue in Q4 2018 and 2019. Pentamaster's new plant in Batu Kawan is expected to come on-stream and will lift its overall manufacturing capacity to allow the potential ramp-up of new products.
- **Beneficiary of a potential shift in the supply chain.** The trade fiction between China and the US may offer an opportunity for Pentamaster to penetrate into new markets. The Company may benefit from the potential relocation of the supply chain to avoid any disruption from US trade measures against China. Pentamaster will expand its product portfolio by conducting R&D on wafer-level testing and VCSEL-based equipment.
- **Catalysts.** Q4 2018 results announcement, new product launches, increasing market attention, and new Chinese customers.
- **Risks.** Massive slowdown in the global electronics industry, slower-than-expected capacity ramp-up and unfavorable currency movement.

Key Financials (in MYRm)	2015	2016	2017	FY18E	FY19E
FY Dec					
Revenue	75.1	73.7	141.8	421.0	561.0
Change (YoY %)	(90.8)	(1.9)	92.5	55.0	33.3
Gross Profit	21.7	20.7	45.1	135.6	179.3
Gross Margin %	28.9	28.1	31.8	32.2	32.0
Net Profit	9.1	9.6	31.3	89.2	113.7
Net Margin %	12.1	13.0	22.1	21.2	20.3
EPS (Basic)	0.01	0.01	0.02	0.06	0.07
Change (YoY %)	(91.6)	5.7	226.3	125.0	27.5
DPS	$0.000	$0.000	$0.000	$0.000	$0.014
ROE (%)	9.9	20.3	46.4	41.9	33.1
Dividend Yield (%)	-	-	-	-	2.55
PER (x)	93.2	28.6	22.5	10.0	7.9
PBR (x)	17.2	10.8	7.0	3.0	2.3
FCF Yield (%)	0.61%	1.24%	3.48%	1.30%	5.65%
Capex (m)	(0.4)	(2.0)	(2.7)	(85.0)	(45.0)
Free cash flow per share	0.0	0.0	0.0	0.0	0.1
Net Gearing (%)	Net Cash	Net Cash	Net Cash	Net Cash	Net Cash

Sources: Company, CGIS Research estimates

TMT Sector

Hardware

BUY

Close: HK$1.05 (Nov 02, 2018)

Target Price: HK$1.36 (+29.8%)

Share Price Performance

Source: Bloomberg, CGIS Research

Market Cap	US$214m
Shares Outstanding	1,600m
Auditor	Grant Thornton
Free Float	29.0%
52W range	HK$0.87-1.36
3M average daily T/O	US$0.9m
Major Shareholding	Pentamaster Corporation Berhad (63.1%)

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Investment positives

1) A strong player in the back-end semiconductor equipment industry in Malaysia.

Pentamaster is a strong player in Malaysia.

According to a Frost & Sullivan Report, Pentamaster ranked second in terms of revenue from 2014 to 2016 among listed companies on Bursa Malaysia in back-end semiconductor equipment. Pentamaster provides automation technology and solutions for multinational manufacturers in the semi-conductor, telecommunications, consumer electronics and automotive sectors, spanning Asia Pacific, North America and Europe. Pentamaster's major clients are involved in different market segments, allowing Pentamaster to diversify risk by not concentrating on a particular company or industry sub segment. Since the scope of the Factory Automation Solutions (FAS) industry is vast, and there are many players, each with their unique attributes in various niche segments, the FAS industry is fragmented.

Reaping benefits from the electronic era.

The Automated Test Equipment (ATE) market is driven mainly by the semiconductor industry, due to the development of applications in the automotive, computing, consumer electronics, industrial, medical and telecommunications sectors. Computing and telecommunications, especially wireless communication, are the two major segments for global semiconductor sales. In 2016 and 2017, global semiconductor sales were distorted by rising memory prices. But the memory segment is more volatile than the non-memory segment, which is driven by downstream markets, such as wireless communications, automotive, industrial and consumer electronics. Demand for equipment for the non-memory segment (which Pentamaster focuses on) is more stable than for equipment for the memory segment. Demand for new applications will also drive demand for equipment for the non-memory segment.

Malaysia is a potential safe harbour from the US-China Trade War.

There is market concern that the ongoing China-US trade tensions may result in a major change in the global supply chain. We share the view that ASEAN may be impacted by China-US trade tensions, as most ASEAN countries have a close trade relationship with China. But there is also discussion about a potential shift in manufacturing facilities by TMT hardware companies from China to Southeast Asia, such as Singapore and Malaysia, to avoid the impact of trade fiction between China and the US. Malaysia, especially Penang, has been building up its position as a semiconductor manufacturing hub, especially back-end semiconductors, accounting for over 10% of global back-end semiconductor output. Malaysia has built up a semiconductor ecosystem that includes (1) IC design (e.g. Key Asic [KEYA.MK], Oppstar, Symmid, Infiecs, and IC Microsystems), (2) wafer fabrication (e.g. SilTerra and MIMOs), (3) assembly (e.g. Unisem [UNI.MK] and MPI), (4) testing (Globetronics and Inari Amertron), and (5) equipment (e.g. Vitrox Aemulux, Pentamaster, Elsoft, MMS Ventures, VisDynamics, JF Technology and Testhub). Penang has been developed as a technology hardware hub, and some of the names mentioned above have their headquarters or production facilities there. Malaysian semiconductor names, especially equipment makers such as Pentamaster, could benefit from a potential shift in the global electronics supply chain. The equipment makers have strong R&D capability and are penetrating into new growth areas in the hardware industry. They also have long-term relationships with leading global players, which should translate into more business opportunities ahead. Pentamaster, in line with its peers, has been working on new product launches every six months to create growth potential.

One recent M&A case confirms the geographical diversification theme. In mid-Sep 2018, Tianshui Huatian [002185.CH], and the founders of Unisem [UNI.MK], Mr John Chia, Mr Alexander Chia, Jayvest Holdings and SCQ Industries, proposed a takeover of Unisem at an offer price of RM3.30/share, which implies over 22x 2018 PER. This move will allow Tianshui Huatian to diversify its manufacturing foothold from China to Malaysia and Indonesia. The consideration paid by Tianshui Huatian makes Malaysian names such as Pentamaster look interesting.

Investment positives

2) Exposure to growing sub-segments.

While demand for automated equipment and automated manufacturing solutions has been traditionally strong in the semiconductor and telecommunications industries, Pentamaster believes automation solutions are becoming equally prevalent in other industries. Therefore, the Company intends to leverage its established reputation, experience, customer relationships, supplier network and technical expertise in automation to expand and diversify its presence into other high-growth-potential industries to broaden Pentamaster's customer base. We believe that Pentamaster has exposure to key potential growth areas which could help the Company deliver satisfactory performance despite the softness in overall semiconductor demand in the smartphone segment. In particular, we believe the 3D sensing, especially VCSEL, medical and automobile, could drive Pentamaster's growth in the medium term.

Optical technology development a new growth driver.

The wider application of 3D-sensing especially VCSEL-based will drive business growth despite the slowdown in total handset shipments. The key development trend in the optical field is 3D sensing, especially SL, TOF and multi-cam. Apple remains committed to 3D-sensing development, so the market expects to see the adoption of 3D sensing in iPhones, iPads and iMacs. The slower-than-expected adoption of 3D sensing by the Android camp is due in part to constraints in the supply chain. Pentamaster management mentioned that based on its understanding, there should be no supply chain issues for 3D sensing in 2018 and 2019. Pentamaster's products can perform testing on both structure light SL and TF. Apart from SL, the Company secured orders for TOF from a Chinese name in the Android camp, but the orders are small at the moment. There are still technical barriers for TOF to be adopted in rear-end cameras at this stage. Apart from 3D sensing, management shares the view that multi-cam models and wearables will create a growth opportunity. There is concern about the outlook for Pentamaster after ams and Win Semi announced their Q3 2018 results and guidance for Q4 2018. ams released guidance for Q4 2018 which was lower than market expectations and triggered concerns about potential ASP erosion for its suppliers such as Pentamaster. However, at this stage, we haven't seen any news flow on major ASP changes by Pentamaster. ams also announced that the Company will de-emphasise its drive in environmental sensing, as it intends to increase it focus on mid- and long-term products, such as photonic elements. We believe that the news flow reaffirms Pentamaster's focus on 3D-sensing products.

Newly built high hygienic grade clean room may bring opportunities from the medical device industry.

The Company's new production plant will be equipped with a clean room with an ISO Class 9 environment. This is a prerequisite for a number of potential customers in the medical device sector to facilitate its diversification into this sector, which is spearheaded by Pentamaster's automated manufacturing solutions segment. In this connection, as highlighted by Frost & Sullivan, factory automation is a natural progression for precision manufacturing, particularly for sectors such as medical devices, whose manufacturing is subject to rigorous regulations.

Shipments of electric vehicles (EVs) are forecast to grow strongly in 2014-2040F at a CAGR of 15-20%. Semiconductor ICs are widely used in the automotive industry, from vehicle safety systems and powertrains to audio and video systems and body electronics. Revenue from semiconductor ICs in the automotive sector amounted to US$22.9bn in 2016, and is expected to grow at a CAGR of 10.3% from 2015 to 2020. There were at least 2m EVs on the roads worldwide in 2016, with China and US accounting for 32.2% and 28.0%, respectively. In a conventional vehicle, semiconductor ICs contribute about US$320 to the bill of materials, while in an EV, the cost is about US$700. The rapid adoption of EVs is likely to drive semiconductor applications in the automotive industry, which will in turn drive the semiconductor ATE industry. Globally, the EV market was expected to reach about 1m units for the first time by the end of 2017. In 2016, total unit shipments of EVs in China was about 351,000 units, accounting for 45.4% of the global market share.

Investment positives

The increasing adoption of electronic parts by the automotive sector and the continuing growth in electric vehicles ensures that Pentamaster's revenue from automation solutions will remain robust.

The Industry 4.0 initiatives and adoption rate provide further impetus for the Company's automation solutions. The contribution from the automotive sector is expected to see a major YoY increase in 2018. The entry barrier in the automotive sector is high, as it takes 2-4 years to get certification from customers. Pentamaster has gone through the certification process and is now seeing order inflow. Management highlighted that the Company is benefiting from development of new energy vehicles and the wider application of electronic components in conventional vehicles. Regarding orders from the automotive industry, MLCC and battery pack testing are two growing areas. The contribution from the automotive sector reported good growth in 1H 2018, and management expects the growth momentum to continue in 2H 2018. The automotive industry is expected to account for a turnover percentage in the mid-teens in 2018, after an increase of 12% in 1H 2018. A substantial portion of new capacity has been secured by a Japanese customer in the automotive industry.

Investment positives

3) A small but interesting company because of its focus

Decent order book continues to support its growth

Q4 2018 and 2019 outlook remains upbeat. Despite concerns about the outlook for the TMT hardware sector, triggered by disappointing results from other handset component names, Pentamaster is expected to record good operating performance in 2H 2018, supported by its current order book. The Company's secured order book fell from MYR314.5m as at 31 Mar 2018 to MYR235.7m as at 30 Jun 2018, but it was close to the figure of MYR239.2 as at the end of 2017. The order book increased again to MYR285.7m as at the end of Q3 2018. Management explained that the Company's order book at the end of Q1 was somewhat on the high side and said the order backlog of MYR240-250m was sustainable. The order book is expected to support the Company's growth in 2018 and 2019. Demand for the Company's automated test equipment and automated manufacturing solutions will be driven by: a) the increasing volume and complexity of smart sensors, b) the prevalence of 3D-sensing technology, c) the Company's continuous diversification and expansion into new segments, particularly the automotive and medical industries, and e) the Company's increased floor space with the completion of the new production plant. Pentamaster will continue to focus on its operational capabilities and strategic initiatives by leveraging its extensive experience, skill set and technical know-how built over the years in this dynamic marketplace, which requires continuous technological advancement.

Figure 1: PentaMaster's outstanding value of secured purchase orders

	Purchase order secured as at (MYR m)			
	31 Dec 2017	**31 Mar 2018**	**30 Jun 2018**	**30 Sep 2018**
Automated Equipment	242.0	296.9	189.4	N/A
Automated Manufacturing Solutions	7.2	17.6	46.3	N/A
Total	249.2	314.5	235.7	285.7

Source: Company Data, CGIS Research

A small company with exceptional investment theme.

We believe that the potential slowdown in the TMT hardware sector, especially the semi industry, may create concerns for investors about Pentamaster. But solid order flow from clients in the telecommunications and automotive industries will support the Company's near-term growth. We believe that Pentamaster's penetration into new technologies and applications, such as Industry 4.0, IoT, electrical vehicles, 3D sensing, 5G communications and artificial intelligence, will support its medium- to long-term growth.

Despite its relatively small business scale, Pentamaster looks interesting, given its exposure to segments the market is focusing on: a) semiconductor equipment, b) production automation, c) optical technology development, and d) auto electronics. We share the view that the high client concentration may create concerns. The Company is expected to benefit from wider application of new technologies. Pentamaster doesn't look expense given the historical figures and compared with major names such as ASM Pacific [0522.HK] and K&S (bear in mind that Pentamaster is not really in the same segment as ASM Pacific and K&S).

Given the limited news flow on the Company, we believe that it will take time for the market to understand the business model and industry outlook. Negative industry news flow may create volatility for the Company's shares.

Business

1) Products

PentaMaster's products can be categorized into two major segments:

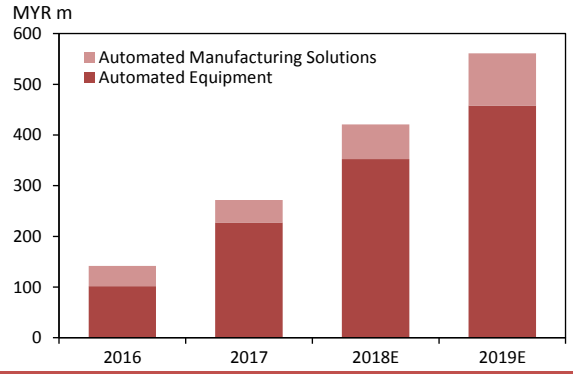
(1) **Automated Equipment**, which comprises products and solutions catering for its customers' need for automated functionality testing of components and/or end products in the manufacturing process; and

(2) **Automated Manufacturing Solutions (AMS)**, which comprise products and solutions to address the specific needs of customers in various industries (including telecommunications, consumer electronics, food and beverages, and medical devices) for automating their manufacturing process.

The Company's main revenue is from its automated equipment segment. In 2014, 2015, 2016, 2017 and Jan–Sep 2018, revenue derived from the automated equipment segment amounted to approximately MYR55.5m, MYR45.4m, MYR101.7m, MYR232.6m and MYR258.9m, respectively, representing approximately 74.0%, 61.7%, 71.7%, 85.6% and 84.8% of total revenue, respectively.

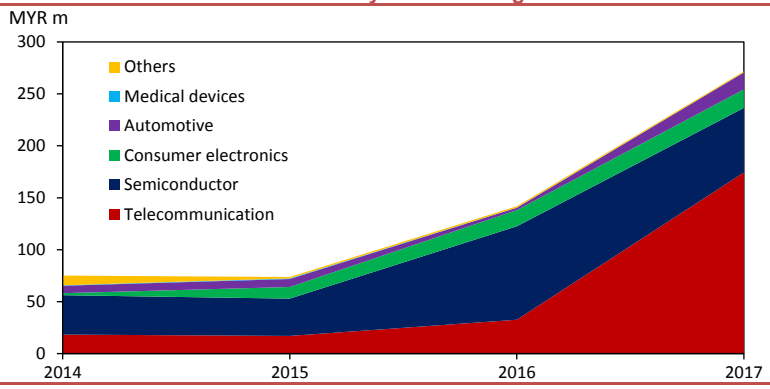
In 2014, 2015, 2016, 2017 and Jan–Sep 2018, revenue derived from the AMS segment amounted to approximately MYR19.5m, MYR28.2m, MYR40.1m, MYR39.0m and MYR46.3m, respectively, representing approximately 26.0%, 38.3%, 28.3%,14.4% and 15.2% of total revenue, respectively.

Figure 2: Pentamaster's turnover breakdown by product segment



Source: Company Data, CGIS Research

Figure 3: Pentamaster's turnover breakdown by customer segment



Source: Company Data, CGIS Research

Figure 4: Pentamaster's business overview

	Automated equipment	AMS (automated manufacturing solutions)
Classification	Part of the back-end semiconductor ATE (automated test equipment) market	Part of the FAS (factory automation solution) market
Main Contents	• Provides standardized and customized standalone automated equipment for (i) semiconductor electronic components testing for smart sensors and ICs (integrated circuits); and (ii) end products testing for consumer electronics, telecommunications products and LEDs • Addresses customers' functionality testing requirements during various stages of their manufacturing process	• Customizes and automates integrated manufacturing system consisting of automated assembly and test modules, material handling equipment, robotics technology, auto inspection and MES (manufacturing executive system) • Caters to specific manufacturing needs for automation across various sectors, including telecommunications, consumer electronics, food and beverages as well as medical devices
Key market trends	IoT (Internet of Things) revolution in end user industries such as telecommunications, automotive and medical devices has presented new applications for semiconductor ICs, especially those embedded with intelligence. Semiconductor ATE is used to verify the DUT (device under test) (e.g. ICs or sensors) functions according to design specifications or to identify and diagnose faults. Such functionality tests are usually an automated process because of the sheer volume of devices to be tested as well as the micro sizes of the test points on each DUT.	Factory automation is typically part of the modern assembly line production where components are integrated or processed with computerization and automation of the whole manufacturing process. Industry 4.0 has been integrating smart automation solutions and real time data exchange into the manufacturing sector. Accordingly, all manufacturers are potential customers.
Revenue contribution (amount,%)	2014: MYR 55.5m, 74.0% 2015: MYR 45.4m, 61.7% 2016: MYR 101.7m, 71.7% 2017: MYR 232.6m, 85.6% Jan - Sep 2018: MYR 258.9m, 87.4%	2014: MYR 19.5m, 26.0% 2015: MYR 28.2m, 38.3% 2016: MYR 40.1m, 28.3% 2017: MYR 39.0m, 14.4% Jan - Sep 2018: MYR 46.3m, 15.2%

Source: Company Data, CGIS Research

Figure 5: Pentamaster's main products and solutions

Automated Equipment		**Automated Manufacturing Solution (AMS)**	
Semiconductor Electronic Components Testing Solution	End-product Test Solution	AMS Module	i-ARMS (intelligent automated robotic manufacturing system) Solution
• MEMS (micro electro mechanical systems) & smart sensor test handlers solutions • Automated vision inspection handler solutions • Intelligent sortation system	• LED test & burn-in handler • LED burn-in oven system • Wafer probing test system • End-product test system • Digital tune & test system • Automatic leak test system	• Material handling equipment • High-speed sorters • Assembly & test modules • MES	• Automated assembly system for food tray • Automated conveying, boxing, weighting, sortation, storage and palletizing system • Vacuum cleaner filter automated assembly solution
⇑⇑⇑	⇑⇑⇑	⇑⇑⇑	
Pentamaster Technology	Pentamaster Instrumentation	Pentamaster Equipment	

Source: Company Data, CGIS Research

(1) Automated Equipment segment

Pentamaster provides standardized and customized stand-alone automated equipment for (i) semiconductor electronic components testing for smart sensors and ICs, under Pentamaster Technology, a 100%-owned subsidiary; and (ii) end product testing for consumer electronics, telecommunications products and LEDs, under Pentamaster Instrumentation, a 100%-owned subsidiary. Products and solutions offered under the automated equipment segment primarily address customer demand for automated functionality testing of semiconductor electronic components, and electrical and electronic end products in large-scale manufacturing. The Company adopts a customer-oriented approach and aims to provide high value-added customized products and solutions to its customers. The Company offers standard and customized products and solutions under either its own "Pentamaster" brand or its customers' brands in the form of contract manufacturing and original design manufacturing.

(i) Semiconductor Electronic Component Testing Solutions subsegment: PentaMaster offers functionality testing for components and semi-finished goods at various manufacturing stages. Its major products include a) MEMS and smart sensor test handler solutions; b) automated vision inspection handler solutions; and c) intelligent sortation systems for customers in the semiconductor, telecommunications, automotive and consumer electronics sectors.

(ii) End Product Test Solutions subsegment: Pentamaster provides integrated systems, which comprise electronic hardware (i.e. testing machines), firmware and software, to perform various tests on electrical and electronic end products. These products and solutions are customized according to the tests and DUT required. The prices of its end product test systems ranged from US$127,000 to US$891,000, while sales volume amounted to 11, 4, 12 and 14 machines/systems in 2014, 2015, 2016 and 1H17, respectively. Customers for Pentamaster's end product test systems are primarily manufacturers of consumer electrical appliances and LED products. Pentamaster's end product test solutions have two major functions: a) burn-in and probing tests on LEDs or transceivers; and b) functional quality tests on consumer electrical appliances.

(2) Automated Manufacturing Solutions segment

To address the specific needs of its customers in various industries for automating their manufacturing process, Pentamaster customizes and automates manufacturing processes by integrating automated assembly and test modules, material handling, robotics technology, auto inspection and MES under Pentamaster Equipment. In this segment, the Company provides two main products: (i) AMS modules, and (ii) i-ARMS solutions.

(i) AMS Modules subsegment: Pentamaster offers diverse automated functions that can be applied to different processes in a manufacturing line in this subsegment. They can be broadly categorized into a) MES, b) assembly and test modules, c) high-speed sorters, and d) material handling equipment.

(ii) i-ARMS Solutions subsegment: To address demand for automation and data exchange in manufacturing technology (commonly known as Industry 4.0), in 2016, the Company launched i-ARMS solutions. i-ARMS is a comprehensive automated manufacturing system integrating various AMS modules (such as material handling equipment, high-speed sorters, and assembly and test modules) with other technology components (such as vision devices, sensor devices and RFID). For example, i-ARMS can automate the manufacturing of production components according to the engineering requirements programmed in MES to perform intelligent pick-and-place, assembly, test and sortation processes. Compared to the traditional mass production of identical products, Pentamaster's i-ARMS can be configured to process a mix of various products in different volume at any one time in order for customers to achieve shorter time-to-market. Prices of Pentamaster's i-ARMS solutions ranged from US$158,000 to over US$922,000, with sales volume of 29 and 40 systems for 2016 and 1H17, respectively.

Figure 6: Semiconductor Electronic Components Testing — products and solutions

	MEMS & smart sensor test handler solutions	Automated vision inspection handler solutions	Intelligent sortation system
Description	Provide (i) ATE to test, calibrate and qualify MEMS devices or smart sensors to ensure their functionality under particular working conditions, before they are used or enter into subsequent processes of the customers' manufacturing line; and (ii) multiple test sites stimulus and handling systems to support ATE during the testing, calibration and qualification processes, by simulating particular working conditions	Provide image- based inspection on industrial components such as semiconductor electronic components, plastic parts and metal parts	Provide image-based inspection and electrical functionality testing with grading sortation for semiconductor electronic components
Functionality test/inspection matter	Light, temperature, sound, distance, pressure and humidity	Dimension, shape, position and visual defects	Electrical functional parameters
Test/inspection subject	Light sensors, proximity sensors, microphone, gyroscope and accelerometer, pressure sensor and humidity sensor	Semiconductor components, plastic molding parts, metal casting parts and ferrite cores	Semiconductor components (i.e. IC)
Price range	US$127,000 - US$1.0 million	US$60,000 - US$188,000	US$60,000 - US$188,000
Sales volume by units of machines/systems	2014: 22 2015: 18 2016: 20 1H17: 32	2014: 100 2015: 68 2016: 39 1H17: 42	2014: 17 2015: 12 2016: 52 1H17: 2
Other features	High-speed testing	High-speed testing	High-speed testing

Source: Company Data, CGIS Research

Figure 7: A selection of MEMS & smart sensor test-handler solutions and automated vision inspection handler solutions

	MEMS & smart sensor test handler solutions			
Products	Light sensor test handler 	Light sensor test handler 	Microphone test handler 	Gyroscope & accelerometer test handler 
Description and application	An ATE used to test, calibrate and qualify light sensors under various testing conditions.	An ATE used to test, calibrate and qualify proximity and distance sensors under various testing conditions.	An equipment providing various test stimulus and handling function to support ATE in testing and calibrating microphones.	An equipment providing various test stimulus and handling function to support ATE in testing and calibrating gyroscope and accelerometer.
	Automated vision inspection handler solutions			**Intelligent sortation system**
Products	Automated vision inspection handler PM3590TT 	Automated vision inspection handler PM3590TT 	Automated vision inspection handler PM42 ST/DT 	Automated test and vision inspection handler PM35 
Description and application	An equipment used to inspect the product package marking, dimension and surface quality of certain type of semiconductor.	An equipment used to inspect the marking, dimension and surface quality of semiconductor product packages, plastic molding parts, metal casting parts and ferrite cores.	An equipment used to inspect the marking, orientation, dimension and sealing quality as well as validate the item quantity of semiconductor product packaged in tape.	An equipment used to test and inspect the product package marking, dimension and surface quality of certain type of semiconductor and provide grading sortation.

Source: Company Data, CGIS Research

Figure 8: End Product Test Solutions — products and solutions

Burn-in and probing test on LED or transceivers	**Functional quality test** on consumer electrical appliances
Burn-in test places the tested subjects under supervised conditions, such as high temperature, high humidity or high voltage and keeps the tested subjects working during a pre-set burn-in period, which forces certain failures of the tested subjects to occur so as to understand the load capacity of the test subjects and identify the weak products. The probing test, whereby a testing instrument of the system transmits test signals to the tested subject via a prober and the signals are then returned from the device, is used to examine the functionality of the test subjects. Pentamaster's probing test system is able to perform such test in a wafer level at high speed.	Functional quality test uses temperature sensors, humidity sensors and precision air manometer to tune and test the subjects for consistency

Source: Company Data, CGIS Research

Figure 9: Selected end product test systems

Products	LED test and burn-in handler 	LED burn-in oven system 	Wafer probing test system 
Description and application	An equipment used to perform burn-in test on certain type of LED products under high temperature and high current to select and phase out items of early mortality caused by defects at LED wafer level.	An equipment used to perform burn-in test on certain type of LED products under high humidity, high temperature and high current to monitor the reliability of performance of such products.	An equipment used to test the conductivity of certain materials at wafer level by probing the wafer under controlled temperature and measuring the wafer voltage and current over time.
Products	End product test system 	Digital tune and test system 	Automatic leak test system 
Description and application	An equipment used to test the performance of hair dryers to predetermined specifications.	An equipment used to control the air flow rate, humidity, temperature, power, current and voltage to simulate particular working conditions for the testing of certain consumer appliances.	An equipment with automatic leak test and airflow tuning functions.

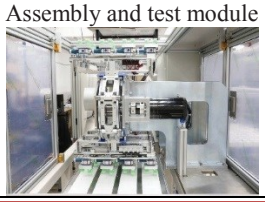
Source: Company Data, CGIS Research

Figure 10: AMS Modules — products and solutions

MES	MES is a real time control and monitoring software platform used in an automated manufacturing system. It ensures correct sequence for all processes in a manufacturing line and provides real time tracking of the performance and production throughput of each process.
Assembly and test modules	Assembly and test modules are generally installed to perform different assembly and functionality tests on the subjects at various manufacturing processes.
High-speed sorters	High-speed sorters sort the subjects based on the test results or next programmed processes.
Material handling equipment	Material handling equipment serves as a conveyor system to transfer the subjects from one manufacturing process to another.

Source: Company Data, CGIS Research

Figure 11: Selected AMS modules

Products	Assembly and test module 	High-speed sorter 	Material handling equipment 

Source: Company Data, CGIS Research

Figure 12: Selected i-ARMS solutions

Products	Automated assembly system for food tray 	Automated conveying, boxing, weighing, sortation, storage and palletising system 	Vacuum cleaner filter automated assembly solution 
Description and application	An automated assembly system using robotic arms to assemble food and beverage into catering trays for airlines.	An automated robotic system used to convey, package, sort, store, retrieve and palletise items as part of a manufacturing line.	An automated assembly system with conveyors, vibrator feeder bowl, vision system and robotic arms used to assemble vacuum filter for cleaning machines.

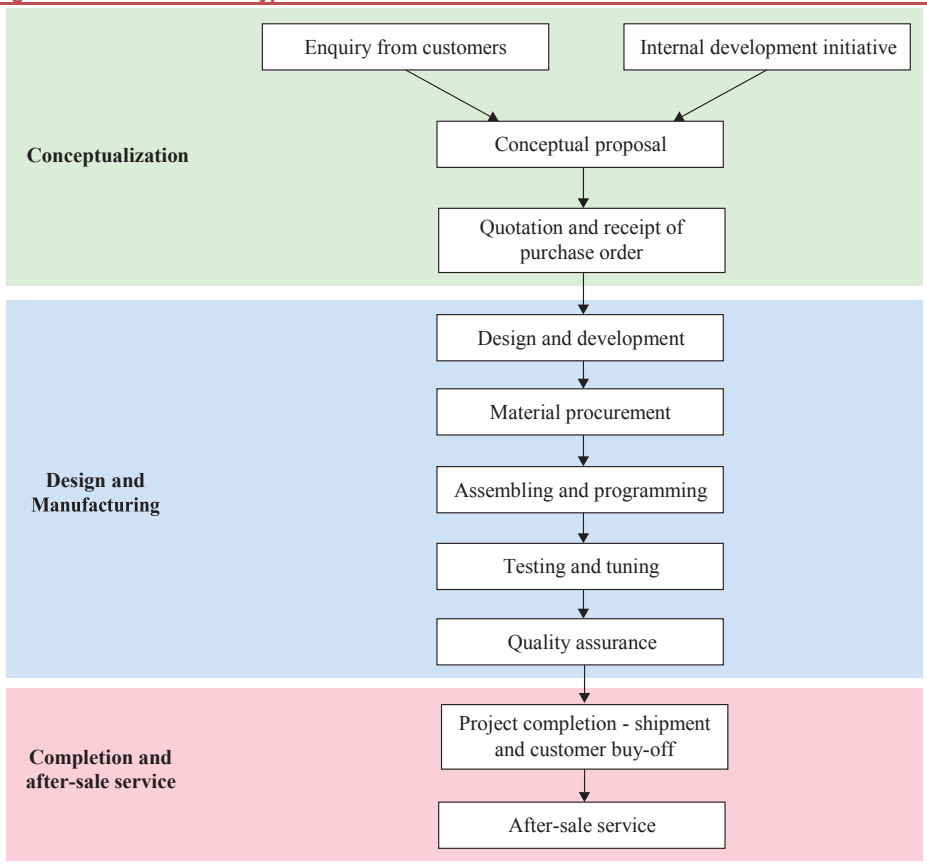
Source: Company Data, CGIS Research

2) Operations

A project team with members selected based on their relevant expertise and experience is formed for each project. The size and composition of the project team depend on the project's technology specifications, time commitment and complexity. In general, a project team consists of a project manager, production engineers and design engineers with expertise in areas such as robotics, mechanical engineering, vision inspection, control optimization, optics, software automation and firmware programming. Generally, the formation of the project team takes place as early as the preparation of the conceptual proposal, and the same project team follows through until project completion. The project manager is also actively engaged with the customer after project completion to ensure the quality of after-sales service.

As shown in Figure 13, Pentamaster's business workflow typically includes three parts: (i) conceptualization, (ii) design and manufacturing, and (iii) completion and after-sales service. The business workflow may differ for repeated or standard products, to which the conceptual proposal, and design and development stages may not apply. PentaMaster normally has a relatively short project lead time of 8 to 12 weeks, but it can be as short as 4 weeks and as long as 24 weeks. The length of each project's lead time depends on the complexity of the products and solutions required (which may substantially affect the time required for design and manufacturing), as well as the supply chain situation for the materials required.

Figure 13: Pentamaster's typical business workflow



Source: Company Data, CGIS Research

(i) Conceptualization

A project may originate from a customer enquiry or from an internal development initiative to introduce new products and solutions for existing or potential customers. Pentamaster's senior technical personnel first communicate with the customer to understand the project specifications and requirements. Based on the information obtained, they form a project team with engineers with expertise in the relevant areas to come up with a conceptual proposal. The proposal is subject to further discussion and alignment before finalization.

If the customer agrees with the conceptual proposal, a formal quotation is prepared based on Pentamaster's internal cost structure and profit margin determined by the management team, based on product category in terms of the technology involved, customer profile and historical patterns, if any. The quotation includes key terms and conditions, such as payment structure and credit terms, order cancellation, logistics arrangements, warranty, and after-sales service, as shown in figure 14. The cost structure takes into account various factors, including the materials required, the timeline for design and assembly, labour costs, and other overhead costs.

Figure 14: Pentamaster's key terms and conditions for transactions with its customers

Payment structure and credit term	The payment structure offered to Pentamaster's customers varies on a case-by-case basis, depending on factors such as project scale, complexity of design, cost of materials required, project lead time, customer relationship and customer's credit standing, amongst other things. In general, Pentamaster offers its customers progress payment in two to three instalments at different stages such as deposit upon receipt of purchase order, upon delivery and/or upon customer buy-off. Credit term for each customer is determined with reference to business relationship, customers' financial conditions, credit record and business reputation, amongst others. Pentamaster closely monitor outstanding past due receivables and take appropriate measures to collect such outstanding amount.
Purchase order cancellation	Pentamaster provides its customers with a cancellation window of five working days upon receipt of purchase orders, during which the customers may withdraw their purchase orders without any recourse. After the cancellation window ends, any cancellations of purchase orders are subject to a charge by Pentamaster ranging from 40.0% to 100.0% of the total amount of the relevant purchase order, depending on the days lapsed after the cancellation window.
Delivery terms	Based on the complexity of the project as well as the condition of the supply chain for the materials required, the timeline for delivery of Pentamaster's products and solutions (i.e. the project lead time) may vary from 8 to 12 weeks from the date of finalisation of the design. The delivery term is mutually agreed between Pentamaster and its customers. Generally, Pentamaster's customers are responsible for the delivery arrangements. In the event that Pentamaster is required to arrange for delivery, Pentamaster engages third party logistic companies to deliver its products with insurance coverage.
Warranty	Pentamaster generally provides one-year warranty on its products and solutions to customers, during which it offers free field services support including addressing customer enquiries and maintenance of its products and solutions. Pentamaster's engineers also provide installation service and training service in relation to the use of the products and solutions as and when necessary.

Source: Company Data, CGIS Research

(ii) Design and manufacturing

Design and development: Upon acceptance of the quotation by the customer and receipt of a purchase order, the project team prepares a project schedule and execution plan. The engineers on the project team then commence the full detailed engineering design, based on the final functional specifications and requirements provided by the customer. The full project team conducts a Failure Mode and Effects Analysis (FMEA) on the engineering design to identify all possible potential failures and weaknesses of the design. If new technology is involved, a prototype for proof of concept is required as part of the design process. The engineering design may be enhanced after the FMEA and proof of concept, if necessary. The final design must be approved by the respective heads of the relevant engineering departments. Upon approval, the project team generates a list of materials required for the project, based on the final engineering design.

Materials procurement: Based on the list of materials required for each project, the procurement department conducts materials planning via Pentamaster's ERP system, which controls the materials inventory. For materials that are readily available in inventory, the Company's procurement department generates an internal job order to release the materials from inventory to manufacturing. Otherwise, Pentamaster purchases materials from suppliers. To control the quality of its products and solutions, it purchases only from approved suppliers that meet its quality standards with an on-time delivery record. In addition, Pentamaster may conduct random sampling or comprehensive checks on the quality of materials received from its suppliers. Quality checks of incoming materials are mandatory for fabrication parts, sheet metal parts and critical components. The quality checks include visual inspection of the material's appearance, dimensional checks, and fitting tests with the mating parts. Materials that fail the quality check are rejected and returned to the suppliers for rework or replacement.

Assembling and programming: Based on the engineering design, Pentamaster's production engineers and production technicians assemble the material parts (such as fabrication parts, sheet metal parts and standard components) into modules. The modules are then integrated into the machine frame, together with wiring, to form the complete machine. Pentamaster's software engineers develop programs for incorporation into the machine for the automation of the machine's operations.

Testing and tuning: Once the machine and the software are integrated, the project team examines the functionality by running and testing the product. The project team fine-tunes and aligns the product to ensure its functionality is in conformance with the customer's specifications.

Quality assurance (QA): QA of outgoing products is performed before shipment and customer buy-off. QA mainly involves various inspections on the conformance of product with the specifications and product trial running to ensure its stability and robustness. Products failing the QA tests are fine-tuned and further enhanced to ensure they meet the customer's requirements. Certain customers may choose to attend the QA inspection on Pentamaster's premises. The QA reports are provided to all customers whether they are in attendance or not.

(iii) Completion and after-sales service

Project completion – shipment and customer buy-off: The project team usually attends the buy-off for final acceptance by the customer on the customer's premises. Should any malfunctions be detected, the Pentamaster team deals with them on-site. In the unlikely event that the issues cannot be addressed on-site, the product is shipped back to the Company's premises for rework.

After-sales service and product warranty: Pentamaster generally provides its customers with up to one-year warranty on its products upon customer buy-off, except for (i) the warranty of standard components, which is usually one year from the date of manufacture; and (ii) the warranty of fabrication parts, which varies depending on their respective lifespan. During the warranty period, Pentamaster offers free service and support to its customers in terms of product maintenance and replacement of the relevant components or modules (excluding consumable parts, i.e. those subject to wear and tear).

3) Quality Control

Pentamaster's quality control process is recognised with ISO9001:2015 accreditation. Additionally, as it serves customers in North America and Europe, its products have been accredited with international safety, health and environmental standards, such as the CE (Conformite´ Europe´ene) mark and the SEMI S2-0310 standard.

4) Production Plants

In 2017, Pentamaster's existing production plant, located in Penang, Malaysia, had a gross floor area of approximately 90,310 sq.ft., with a design area of approximately 29,000 sq.ft., production floor space of approximately 23,500 sq.ft. and warehouse space of approximately 4,000 sq.ft.

Pentamaster is in the process of expanding its existing production plant to add approximately 13,000 sq.ft. of production floor space and 1,000 sq.ft. of warehouse space, which is expected to be completed by 2018. In 1H18, Pentamaster completed its second production plant in Penang with a gross floor area of approximately 97,033 sq.ft., including production floor area of approximately 47,700 sq.ft. and warehouse space of 6,000 sq.ft..

The expansion of the existing production plant and the addition of the new production plant are expected to expand Pentamaster's production capacity and capabilities, (i) by adding a clean room ISO Class 9 environment, which is a prerequisite for a number of potential customers in the medical device sector; as highlighted by Frost & Sullivan, due to this sector's demand for precision manufacturing, this is a high-potential market for factory automation; and (ii) higher ceilings to cater for prototyping and assembling of Pentamaster's i-ARMS solutions; its comprehensive automated manufacturing systems generally require more production space than standalone ATE machines.

5) Strategies

Pentamaster's business model focuses on (i) developing core technology, with approximately 70% of its staff technically oriented; (ii) continuous innovation in customer-centric R&D; and (iii) providing high value-added customized technological products and solutions for its customers. Pentamaster believes this customer- and technology-centric approach will enable it to stay abreast of the latest technology, and in turn, meet the ever-changing requirements of its customers.

Following the completion of the second production plant with a gross floor area of approximately 97,033 sq.ft., the Company will have over 180,000 sq.ft. of production space. It expects to win more projects involving large-scale factory automation lines in 2H18. As the core of its business model is innovation and customized design, the Company does not operate or maintain any mass production lines, and its production capacity depends on the availability of in-house engineers, the complexity and size of projects on hand, production space, and the types and size of products being produced. Pentamaster maintains a representative office in the China for customer liaison support in this area.

Pentamaster intends to further strengthen its market position and expand its business by (i) keeping abreast of the latest technological changes in the various industries it serves; (ii) increasing its presence in key geographical markets, such as the Greater China region and the U.S.; (iii) diversifying into other high-growth-potential industries, such as automotive, healthcare equipment, medical devices and energy, to broaden its customer base; and (iv) expanding and enhancing its production capacity and capability.

Pentamaster's directors expect to (i) increase its exposure and raise its profile in the Greater China region market, covering the largest semiconductor market, the China, as well as key semiconductor markets, such as Taiwan; and (ii) leverage the enhanced prestige offered by overseas listing status in an international financial centre to attract new talent, whose ongoing cultivation and retention is key to the future of Pentamaster, as innovation and customized design form the pillar of its business model.

Suppliers and Customers

1) Suppliers

In general, Pentamaster's major suppliers are manufacturers, agents and distributors for (i) fabricated parts made of metal or plastic; (ii) sheet metal parts for machine structure; and (iii) standard components, such as pneumatics, motors, sensors, switches and power supplies. Other suppliers include subcontractors, to whom Pentamaster outsources the wiring and assembly tasks involved in its manufacturing process.

Pentamaster is dependent on reliable sources of materials to maintain the quality and timely delivery of its products and solutions. Therefore, Pentamaster has a stringent supplier-selection process and inventory-management policy. Nevertheless, since 2016, Pentamaster management has observed increasingly longer lead times for certain components commonly used in its products and solutions. Pentamaster has therefore strengthened its supply chain by expanding its supplier network in preparation for its business expansion. In early 2017, Pentamaster invested in Penang Automation Cluster, together with two independent third parties, which was established to build and manage the local supply chain ecosystem and fund its development.

Each purchase order Pentamaster issues to its suppliers provides the terms and conditions covering pricing terms, raw materials specifications, quantity, payment terms and date of delivery. The purchase order is legally binding once it is accepted by the supplier. Pentamaster's suppliers generally grant Pentamaster credit terms up to 120 days after receipt of invoice and the right to replace or refund the delivered goods in case of defective products. Pentamaster generally settles its payments to its suppliers by bank remittance or cheque.

Pentamaster maintains a list of approved suppliers for each type of sourced item, as shown in Figure 15. All Pentamaster's suppliers are required to apply for registration as an approved supplier prior to any engagement. The applications must be approved by the manager of Pentamaster's procurement department, by the CFO and by the Directors, depending on the criteria. Once approved, the supplier is registered on Pentamaster's list of approved suppliers. Pentamaster's procurement department conducts an annual assessment of Pentamaster's major suppliers based on the quality of items supplied, the delivery record, service performance and pricing. Any supplier with a poor rating in the assessment is requested by Pentamaster's procurement department to improve or be discontinued as a supplier.

Figure 15: Pentamaster's criteria to qualify as an approved supplier

Pentamaster's supplier must
be a legally registered business entity;
have stable financial conditions;
be able to provide service and respond to Pentamaster's enquiries effectively;
be able to provide sustainable supply; and
be able to provide competitive prices for the items it supplies.

Source: Company Data, CGIS Research

For each transaction, when selecting a suitable supplier from the approved supplier list, Pentamaster considers factors such as pricing, lead time required, shipment terms, payment terms, service and support provided, product quality, warranty, and minimum order requirements.

Top suppliers: In 2014, 2015, 2016 and 2017, Pentamaster's top five suppliers accounted for approximately 24.6%, 24.0%, 26.5% and 45.7% of Pentamaster's total purchases, respectively, and the largest supplier in each period accounted for approximately 7.4%, 6.4%, 14.7% and 14.9 of its total purchases.

2) Customers

Pentamaster's customers are generally manufacturers or suppliers from various sectors, including the semiconductor, telecommunications, consumer electronics, automotive, food and beverage, and medical devices sectors. PentaMaster's scope covers various parties in the value chain of each industry sector. For instance, Pentamaster's customers in the electronics and semiconductor value chain range from IC manufacturers to smart sensor producers and end product manufacturers. Pentamaster's customer base includes a number of multinational corporations that are spearheading technological advances in various sectors, such as the smart mobile device market in the telecommunications industry and household appliances in the consumer electronics industry. As demand for its automation solutions stems from the final consumer market, the successful launch of the final product may induce strong growth in such demand, although this may be accompanied by high customer concentration in a particular period.

Top customers: In 2014, 2015, 2016 and 2017, Pentamaster's top five customers accounted for approximately 56.2%, 52.7%, 77.8% and 80.0% of Pentamaster's total revenue, respectively, and for the respective periods, the largest customer accounted for approximately 17.7%, 17.2%, 40.5% and 57.1% of Pentamaster's total revenue. Its largest customer in 2015 and 2016 was a former subsidiary of PCB. The company was disposed of in July 2015 as part of Pentamaster Group's efforts to rationalise its financial and capital resources, and became an independent third party. Pentamaster focused on the fast-growing areas of the electronics industry and has successfully to secured orders from existing key customers and new customers to drive growth. The decline in business with some customers has had no major impact on the Company's growth profile.

Pricing: Pentamaster generally adopts a cost-plus pricing model. It determines the prices of its products and solutions based on estimated costs plus an expected profit margin determined by its management team, based on product category in terms of the technology involved, customer profile and historical trends. Pentamaster adopts a standard cost structure to facilitate quotations. The cost structure takes into account, among others, material costs, the timeline for design and assembly, labour costs, and other overhead costs expected to be incurred for a project. Other factors, such as the relationship with the customers, their business nature and order size, are also taken into consideration. Customers may require Pentamaster to source materials from designated suppliers from time to time, in which case the room of mark-up may be limited, which may affect Pentamaster's profitability.

Quotation success rate: Pentamaster issues formal quotations to its potential customers after approval of its conceptual proposals, and the quotations are subject to final acceptance by its potential customers. Pentamaster consistently maintained its quotation success rate (whereby its conceptual proposals are accepted by customers) at above 45.0% (from 2014 to 1H17).

Figure 16: Pentamaster's Top 5 Customers in 2017

Customer	Type of corporation	Description	Business relationship since	Products and solution provided by Pentamaster	Percentage of Revenue in	
					2017	1H18
Customer 1	Listed on SIX Swiss Exchange	Customer 1 operates as a subsidiary under an Austrian company listed on SIX Swiss Exchange in 2017. It engages in the design and manufacture of advanced sensor solution. Established in 1993 in Singapore, it focuses on micro optic and high performance optical packaging. It is headquartered in Singapore and has offices in Switzerland, US and China. The market capitalization of its parent company as at 19 December 2017 was approximately CHF85bn.	2009	MEMS & smart sensor test handler solutions and intelligent sortation system	57.1%	56.6%
Customer 2	Listed on Nasdaq Stock Market	Customer 2's business scope includes design, manufacture, marketing of mobile communication, media devices, personal computers and portable digital music players. It also sells a variety of related software, services, accessories, networking solution and third-party digital content and applications. It has more than 110,000 employees in over 40 countries. Its revenue in 2017 exceeded US$229.2bn whilst its market capitalization as at 19 December 2017 was approximately US$896.1bn.	2012	i-ARMS solution and AMS modules	6.6%	7.0%
Customer 3	Private	Customer 3's is a private company incorporated in the United Kingdom in 1991. Its business scope includes design and manufacture of household appliances such as vacuum cleaners, hand dryers, bladeless fans, heaters and hair dryers. Its products are sold in over 65 countries and it has over 7,000 employees. In 2016, the revenue of Customer 3 was approximately £2.5bn.	2015	End product test solution And ancillary products	5.1%	0.3%
Carsem (M) Sdn. Bhd.	Listed on Bursa Malaysia	Carsem was founded in 1972 in Malaysia and provides turnkey packaging and test services to the semiconductor industry. It has three factories and over 9, 000 employees. It is part of a conglomerate in South East Asia with operations covering banking and financial services, manufacturing and distribution, property development and investments, hospitality and leisure and principal investments. The market capitalization of Carsem's group of companies as at 19 December 2017 was approximately MYR2.4bn.	2006	Automated vision inspection handler solution	4.6%	1.0%
Dixin Automation Sdn. Bhd.	Private	Trading of automated equipment	2006	Intelligent sortation system and ancillary products	5.9%	0.5%

Source: Company Data, CGIS Research

3) Sales and Marketing

As Pentamaster's business includes products and solutions that are customized, the product knowledge is highly commercially sensitive. Pentamaster's customer relationship management is anchored by its technological know-how, mutual trust, and tacit understanding with its customers, which can only be cultivated over time with a track record.

Given the nature of the automation industry, reputation and word-of-mouth recommendations are crucial. Pentamaster benefits from customer referrals and promotes its broad range of automation products and solutions through its website. Pentamaster encourages direct communication between its technical staff and its customers. This direct involvement of technical staff across all levels in customer relationship management enables Pentamaster to display its technological strengths while encouraging technological collaboration with its customers. Pentamaster's R&D activities are customer-centric and are generally carried out after listening to and understanding its customers' requirements. Nevertheless, Pentamaster has also initiated R&D projects voluntarily. Pentamaster participates in industrial exhibitions, such as SEMICON West in the U.S. and SEMICON China in China.

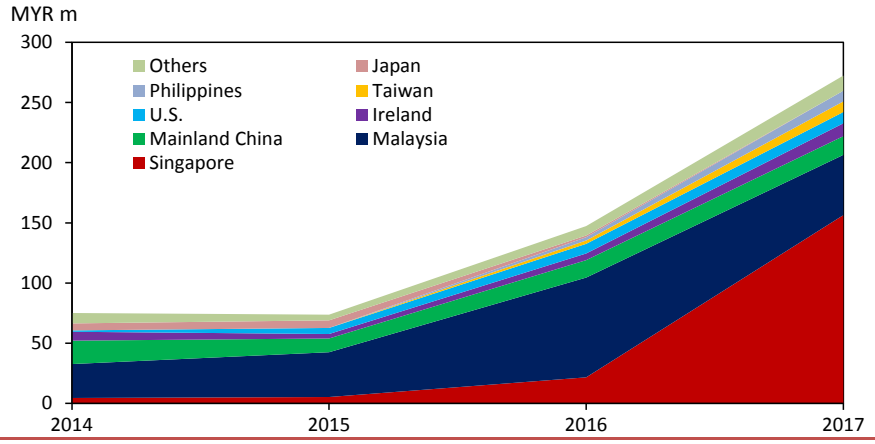
In addition to direct sales, Pentamaster promotes and sells its products and solutions through agents, which Pentamaster considers to be a cost effective way of broadening its sales network. Pentamaster's arrangement with these agents is such that when a referral by an agent is converted into a successful purchase order, Pentamaster provides the agent with a certain percentage of the sales amount set out in the referred purchase order as commission for the referral service.

Figure 17: Pentamaster's key terms and conditions in the agency agreements with its agents

Territory	Each agent is allowed to promote our products and solutions only within the agreed territory.
Scope of work	In addition to the referral services, the agents may from case to case provide different level of sales and service support to the customers referred by them.
Commission rate	The commission rates offered to the agents ranged from 2.0% to 15.0%, depending on (i) the scope of work covered; (ii) the profit margin of the referred purchase order; (iii) the level of competition in the market they cover; and (iv) relationships with the agents.
Payment	The commission is only payable to the agent after the receipt of payment from our customer for the referred purchase order.

Source: Company Data, CGIS Research

Figure 18: Pentamaster's revenue breakdown by geographic area



Source: Company Data, CGIS Research

R&D and Intellectual Property

To align Pentamaster's R&D efforts and its customers' needs and to stimulate synergy among different divisions, a team comprising talent from each division who have a strong understanding of Pentamaster's customers' requirements is formed for each R&D initiative. The personnel involved in the R&D activities are all tertiary educated and have expertise in their respective disciplines, such as robotics, mechanical engineering, vision inspection, control optimisation, optics, software automation and firmware programming.

Intellectual property: As shown in Figure 19, as at June 30 2017, Pentamaster had (i) four trademarks and three patents registered in Malaysia; (ii) two patents registered in the U.S.; and (iii) two trademarks and one patent registered in China.

Figure 19: Pentamaster's patents

(i)	Pressurised air-chamber testing device for semiconductor elements and a method thereof
(ii)	Apparatus/test handler for testing un-molded IC devices using air-flow system and the method of testing the same
(iii)	An improved device for high-speed inspection of ICs and a method therefor
(iv)	An apparatus for burn-in test
(v)	Apparatus/test handler for testing un-molded IC devices using air-flow system and the method of testing the same
(vi)	Apparatus and method for isolating articles

Source: Company Data, CGIS Research

When considering whether to patent a technology, Pentamaster takes into account, among others, the benefits of the protection offered from successful registration, the potential trade-off from having to release the intricacies of Pentamaster's innovations to the public, Pentamaster's confidentiality obligations to its customers, and the estimated cost, time and effort pertaining to the registration process.

Pentamaster currently owns the domain name www.pentamaster-international-ltd.com, which is the website of Pentamaster.

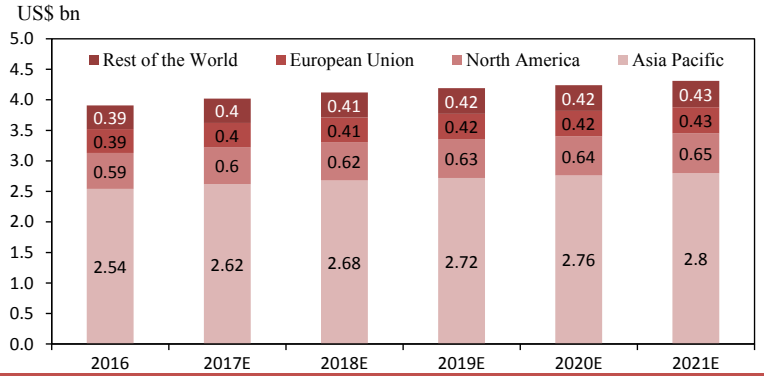
Industry Overview

Pentamaster supplies 1) automated equipment for the **back-end automated test equipment (ATE)** market, and 2) automated manufacturing solutions (AMS) for the **factory automation solutions (FAS)** market. ATEs are an essential component in the semiconductor manufacturing process because they are used to verify the functionality of the fabricated devices and identify faults. FAS provide customised automation and digitisation solutions to enhance manufacturing productivity and flexibility.

The ATE and FAS markets are strongly correlated with the telecommunications, automotive and medical devices industries, whose key components are **semiconductor ICs**. The digitization of our world has spearheaded the requirements for advances in the semiconductor value chain. In today's digital age, computing platforms have become a necessity, with widespread applications across industries. Semiconductor ICs may be the core of a smartphone, but they are also crucial components in the machines that fabricate ICs. Therefore, the market for ICs with embedded intelligence has expanded tremendously across industries.

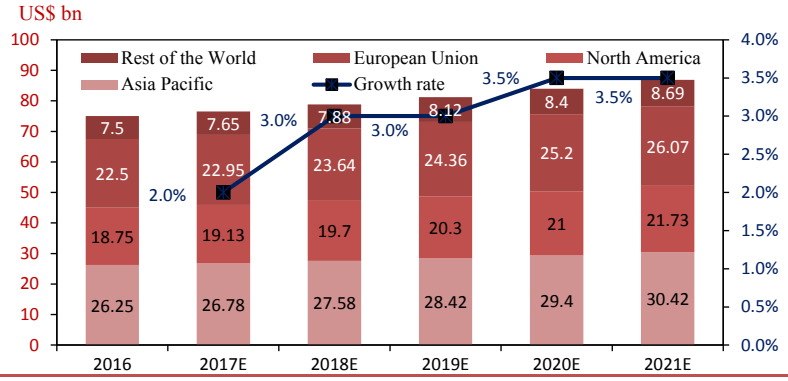
According to Frost & Sullivan, 1) For ATE, the worldwide semiconductor test equipment market is expected to increase from US$3.9bn in 2016 to US$4.31bn in 2021, representing a CAGR of 2.0% (Figure 20). 2) For FAS, the worldwide market size is expected to increase from US$75b in 2016 to US$86.9bn in 2021, representing a CAGR of 3.0% (Figure 21).

Figure 20: Global back-end semiconductor test equipment market



Source: F&S Report, CGIS Research

Figure 21: Global factory automation solutions market



Source: F&S Report, CGIS Research

China and the US are key consumer markets for the telecommunications, automotive and medical devices sectors, and are therefore driving demand for semiconductor ICs. Over the past decade, China has increased its influence in the global semiconductor market. According to the World Semiconductor Trade Statistics (WSTS), China is the world's largest semiconductor market, accounting for 31.8% (US$107.6bn) of the global market in 2016. China witnessed the highest growth in annual semiconductor sales from 2015 to 2016, with a YoY growth rate of 9.2%. In terms of semiconductor manufacturing equipment, the China market increased by 32.0% from 2015 to 2016, overtaking Japan and North America. The growth of the China's telecommunications, automotive and medical devices sectors, along with the flourishing consumer electronics segment, are driving China's semiconductor industry.

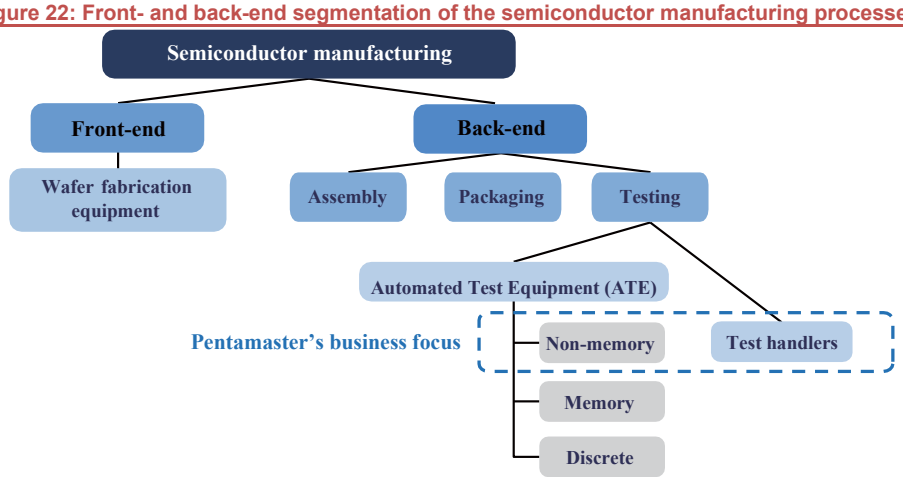
China is likely to maintain its status as a global manufacturing powerhouse and is transitioning towards producing higher- value products. End user industries, such as telecommunications, automotive and medical devices, are increasingly reliant on semiconductor ICs. As these ICs increase in complexity, more advanced testing equipment will be needed to comprehensively verify their functionality. Therefore, Pentamaster may benefit from this wave of technological innovation in the semiconductor industry by increasing its market share.

As Industry 4.0 gradually takes off, FAS are critical for the digital transformation of manufacturing facilities. Pentamaster's strength in this domain is in its R&D capability to seamlessly integrate automation systems using its proprietary software and solutions. Cyber-physical systems are the overarching theme for Industry 4.0, and many industrialized nations are beginning to automate their production floors. The "Made in China 2025" program aims to upgrade and boost the country's manufacturing sector, especially in terms of producing high-tech items. Meanwhile, the U.S. has experienced a resurgence in manufacturing activity since the Trump administration took office in 2017. This will spur the demand for FAS, especially since the U.S. is also keen on increasing its manufacturing competitiveness through Industry 4.0 initiatives. Pentamaster is poised to seize business opportunities in this growing market for FAS.

1) Back-end semiconductor ATE market

As shown in Figure 22, the assembly, packaging and testing of dies are commonly referred to as back-end semiconductor processing. In the back-end segment, Pentamaster is involved in the non-memory ATE and test handler markets. Test handlers are estimated to constitute about 10.0% to 12.0% of the back-end test equipment market.

Figure 22: Front- and back-end segmentation of the semiconductor manufacturing processes



Source: Company Data, CGIS Research

Telecommunications. Smartphones are currently the largest application for ICs. In the typical smartphone, there are generally at least five sensor modules. More complex smartphones have additional features, such as a fingerprint sensor and a barometer. Each sensor is likely to have or require semiconductor ICs to analyse the data. The major smartphone manufacturers, such as Apple, Samsung, Oppo and Huawei, launch new smartphone products at least once a year. Therefore, the shorter product launch cycles and accelerated technology innovations will likely result in unprecedented demand for ATEs. Based on the Frost & Sullivan Report, the pervasiveness of electronic sensors is compounded by worldwide smartphone unit shipments, which were estimated at 1.5bn units in 2017 and are expected to reach 1.8bn units in 2021. This implies rising demand for ATEs to verify their functionality.

Automotive. Semiconductor ICs are widely used in the automotive industry, including vehicle safety systems, powertrains, audio and video systems, and body electronics. Revenue from semiconductor ICs in the automotive sector amounted to US$22.9bn in 2016, with an expected CAGR of 10.3% for 2015 to 2020. There were at least 2m electric vehicles (EVs) on the roads worldwide in 2016, with China and US accounting for 32.2% and 28.0%, respectively. In a conventional vehicle, semiconductor ICs make up about US$320 to the bill of materials, while in EVs, the cost is about US$700. The rapid adoption of EVs is likely to drive semiconductor applications in the automotive industry, which will in turn drive the semiconductor ATE industry. Globally, the EV market is expected to reach about 1m units for the first time by the end of 2017. In 2016, about 351,000 EVs were shipped in China, accounting for 45.4% of the global market.

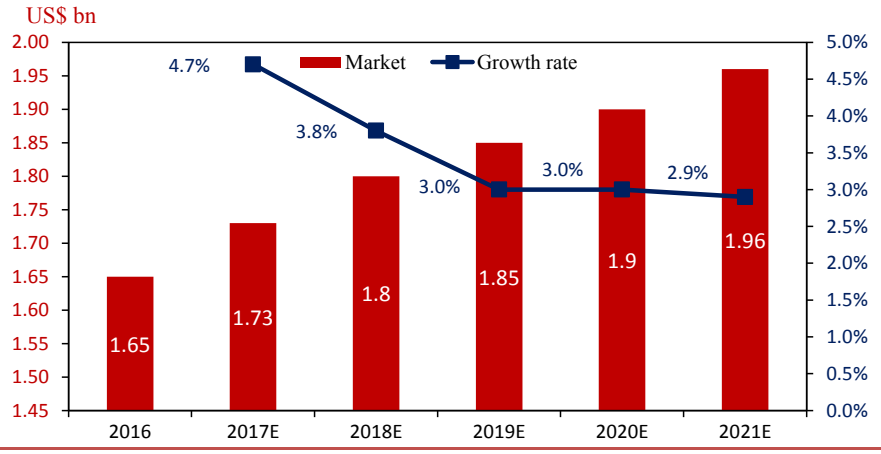
Medical devices. The ageing population constituted 13.0% of the global population in 2017, which equates to approximately 962m people over 60. While medical advances have prolonged the life of the general population, many elderly people require continuous medical care. The digital transformation occurring in the healthcare sector is centred on seamless connectivity between patients, healthcare providers and pharmaceutical companies. Advances in medical electronics have enabled remote and real-time patient data collection. This is where semiconductor ICs will play a major role in the healthcare industry. Frost & Sullivan estimates that the medical devices market in 2016 was a US$330.0bn industry, with forecast annual growth of 4.2% in 2017.

According to the Frost & Sullivan Report, the size of the worldwide semiconductor test equipment market increased 16.0% YoY to approximately US$3.9bn in 2016, with revenue generated in APAC accounting for at least 60% of this market. From 2014 to 2016, Pentamaster ranked second in terms of revenue among listed companies on Bursa Malaysia engaged in the semiconductor test equipment market.

The annual growth of the worldwide semiconductor test equipment market is expected to be 1.0% to 5.0% from 2017 onwards due to the following factors: (i) a marked increase in spending on semiconductor test equipment of 16.0% from 2015 to 2016; (ii) continued growth in expenditure on fabrication equipment beyond 2018 because several fabrication facilities began construction in 2017; and (iii) encouraging growth forecasts in the use of semiconductor ICs in IoT devices.

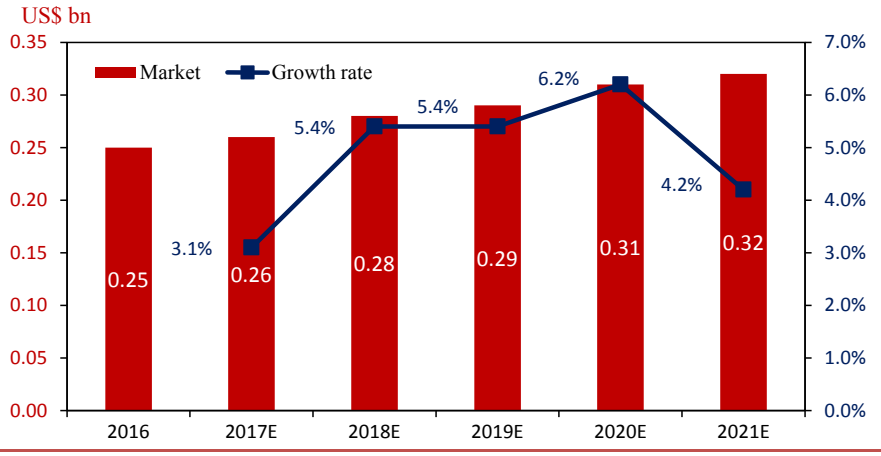
According to the Frost & Sullivan Report, non-memory ATE typically comprises 60% to 70% of the semiconductor test equipment market. Figure 23 shows the APAC market size for non-memory ATE, with forecast annual growth rates of 2.0% to 5%, based on demand for consumer electronics. Figure 24 shows the APAC market size of test handlers, with an expected annual growth rate of 3% to 6%.

Figure 23: Asia Pacific non-memory ATE market



Source: F&S Report, CGIS Research

Figure 24: Asia Pacific test handlers market



Source: F&S Report, CGIS Research

Key risks in the back-end semiconductor ATE market include (1) risks in the global supply chain, (2) increasing wage costs worldwide, and (3) economic and political conditions.

Barriers to entry in the back-end semiconductor ATE market include (1) track record and operational scale, and (2) rapid technological advances and a skilled workforce.

2) Factory Automation Solutions industry

Industrial automation is commonly categorised as process or factory automation. The former concerns the conversion of raw materials into finished products. A factory automation solution or system is typically part of modern assembly line production, whereby components are integrated or processed with computerisation and automation of the whole manufacturing process. All manufacturers are therefore potential customers.

The factory automation market is fragmented, with at least 11 multinational industrial corporations, such as Siemens, ABB, Schneider, Rockwell Automation, Fanuc and Mitsubishi Electric. Globally, the factory automation market in 2016 was estimated to be US$70bn to US$84bn. Year-on-year growth rates for 2017 and beyond are expected to be in the range of 1% to 5%. Growth drivers for FAS include (i) Industry 4.0 initiatives to integrate smart automation solutions in the manufacturing sector; (ii) maturing software for industrial electronics and many emerging and developed economies beginning to invest in FAS; and (iii) the rise in labour costs and shortage of skilled talent due to low rates of population growth in developed nations. Figure 21 shows the regional segmentation of the global factory automation market. APAC contributes about 35% of the revenue, as it is an electronics manufacturing hub. Within the APAC segment, China is expected to contribute about 35% of revenue.

The Frost & Sullivan Report also notes that most FAS system integrators in the market do not offer the same breadth of services as Pentamaster, or in most cases, they are not publicly listed. Further, given the vast scope of the FAS industry with many players, each with unique attributes in various niche segments, the industry is fragmented, so it is not practicable to ascertain the market share of Pentamaster.

Barriers to entry to the FAS market include (1) established networks and track records, and (2) diverse end user industries.

Earnings forecast

Steady turnover growth projected in 2018E & 2019E

- **Pentamaster is projected to deliver net profit growth of 125.0%/27.5% in 2018E/2019E, supported by steady turnover growth and margin improvement.**

- **We expect revenue from the AMS segment to grow at a CAGR of 43.7% from 2017 to 2019E.** Pentamaster's automated manufacturing solutions (AMS) segment experienced strong growth mainly due to a) increasing demand for Pentamaster's AMS modules in the telecommunications industry; and b) the launch of Pentamaster's i-ARMS solutions in 2016.

- In 2014, 2015 and 2016, Pentamaster derived most of its revenue from the semiconductor industry. As mentioned in a previous segment of this report, semiconductor ICs are fundamental components for the telecommunications, automotive and medical devices industries, among others.

- Despite concerns about a slowdown in global smartphone shipments, telecommunications is expected to remain one of the largest revenue and net profit contributors for Pentamaster in 2018 and 2019. The key growth driver for Pentamaster is the automotive sector, which is expected to account for about 20% of the Company's top line in 2018. Demand for the Company's automated test equipment and automated manufacturing solutions will be driven by: a) increasing volume and complexity of smart sensors, b) the prevalence of 3D-sensing technology, c) the Company's continuous diversification and expansion into new industries, particularly the automotive and medical industries, and e) the Company's increased floor space with the completion of the new production plant.

More sharing to drive business growth

- Pentamaster had outstanding purchase orders valued at MYR285.7m as at 30 Sept 2018. The outstanding orders already equal 50% of our 2019 revenue estimation. Pentamaster posted a gross profit margin of 28.1%, 31.8% and 28.4%, respectively, for 2015, 2016 and 2017. We expect Pentamaster's blended gross profit margin to be 32.2% and 30.0% for 2018 and 2018, respectively, given economies of scale and higher margins in the automotive and medical segments. We expect Pentamaster to control SG&A expenses tightly in 2018 and 2019 and expect the improvement in gross profit margin to translate into a higher net profit margin.

Strong financial position to support future development

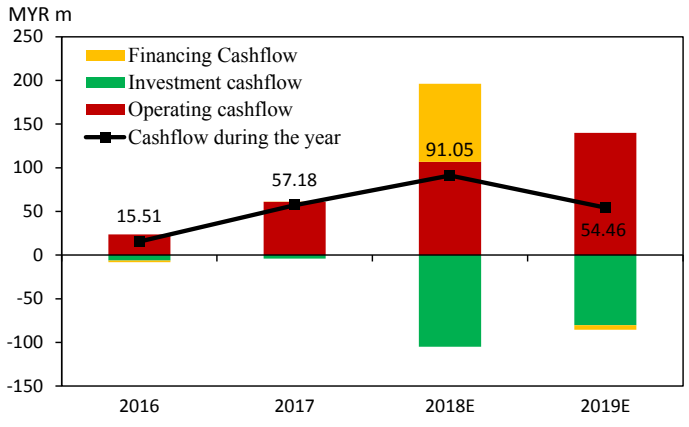
- Pentamaster raised about HK$171.3m from an IPO earlier this year. About 49.5% of the net proceeds will be used for capacity expansion, including the construction of a new production plant in Penang. About 22% of the net proceeds will be for expansion in the Greater China market. Pentamaster is also seeking M&A opportunities and targeting companies in the FAS industry with local clientele, supply networks or technology. Pentamaster will use 16.5% of the IPO proceeds to establish a sales office in California to better serve US-based clients and have more direct communication with potential customers.

Figure 25: Key Assumptions for Pentamaster

	2015	2016	2017	2018F	2019F
Turnover (MYR m)					
Automated Equipment	45.4	101.7	227.5	352.6	458.4
Automated Manufacturing Solutions	28.2	40.1	44.1	68.4	102.6
Total	73.7	141.8	271.6	421.0	561.0
YoY Change (%)					
Automated Equipment	n.a.	123.8	123.7	55.0	30.0
Automated Manufacturing Solutions	n.a.	42.0	10.0	55.0	50.0
Total	n.a.	92.5	91.5	55.0	33.3
Gross margin (%)					
Automated Equipment	13.5	31.1	29.1	37.0	29.2
Automated Manufacturing Solutions	9.2	22.6	26.4	18.6	19.0
Net margin (%)	13.0	22.1	14.6	21.2	20.3
Cost (MYR m)					
S,G&A	(12.0)	(17.9)	(37.6)	(52.1)	(69.4)
Financial Expenses	(5.2)	(0.3)	(0.0)	(0.0)	(0.0)
YoY Change (%)					
S,G&A	n.a.	49.0	110.6	38.3	33.3
Financial Expenses	n.a.	(95.0)	(97.3)	114.3	(20.0)
CAPEX (MYR m)	2.0	2.7	2.6	85.0	45.0
Net Gearing (%)	Net Cash	Net Cash	Net Cash	Net Cash	Net Cash

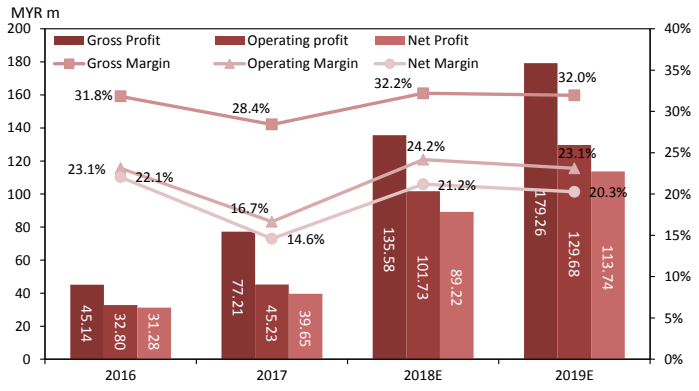
Source: Company Data, CGIS Research

Figure 26: Pentamaster's profits and margins



Source: Company data, CGIS Research

Figure 27: Pentamaster's profits and margins



Source: Company data, CGIS Research

Figure 28: Earnings projection

Income Statement (USDm)	FY2015	FY2016	FY2017	FY2018F	FY2019F
Revenue	**74**	**142**	**272**	**421**	**561**
Growth yoy%	*(1.9%)*	*92.5%*	*91.5%*	*55.0%*	*33.3%*
Gross Profit	**21**	**45**	**77**	**136**	**179**
Growth yoy%	*(4.7%)*	*118.3%*	*71.1%*	*75.6%*	*32.2%*
Selling General & Admin Exp.	(12)	(18)	(38)	(52)	(69)
Others Operating Expenses/Items	3	5	5	18	19
Operating Income	**11**	**32**	**44**	**101**	**129**
Growth yoy%	*n.a.*	*189.9%*	*36.6%*	*128.3%*	*27.5%*
Interest Expense	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)
Interest and Invest. Income	0.6	0.3	0.9	0.4	0.5
Income/(Loss) from Affiliates	0	0	(0.0)	(0.0)	(0.0)
Other Non-Operating Inc. (Exp.)	0	0	0	0	0
Impairment of Goodwill	-	-	-	-	-
Gain (Loss) On Sale Of Invest.	-	-	-	-	-
Gain (Loss) On Sale Of Assets	-	-	-	-	-
Income Tax Expense	(2)	1	(4)	(10)	(13)
Minority Int. in Earnings	(0)	(3)	(1)	(2)	(3)
Net Income	**10**	**31**	**40**	**89**	**114**
Growth yoy%	*5.7%*	*226.3%*	*26.8%*	*125.0%*	*27.5%*

Cash Flow Statement (USDm)	FY2015	FY2016	FY2017	FY2018F	FY2019F
Net Income	**11**	**32**	**45**	**99**	**126**
Depreciation & Amort.	2	3	2	8	11
Change in Working Capital	(1)	(12)	14	(0)	3
Cash from Ops.	**12**	**24**	**61**	**107**	**140**
Capital Expenditure	(2)	(3)	(3)	(85)	(45)
Sale of Property, Plant, and Equipment	-	-	-	-	-
Change in Investing Acitivities	(1)	(4)	(1)	(20)	(35)
Cash from Investing	**(3)**	**(6)**	**(4)**	**(105)**	**(80)**
Net increase in bank borrowings	(0)	(0)	4	2	2
Issuance of Common Stock	0	0	0	93	0
Common Dividends Paid	0	0	0	0	0
Special Dividend Paid	-	-	-	-	-
Other Financing Activities	(1)	(3)	(4)	(6)	(7)
Cash from Financing	**(1)**	**(3)**	**(0)**	**89**	**(5)**
Net Change in Cash	**8**	**14**	**57**	**91**	**54**

Balance Sheet (USDm)	FY2015	FY2016	FY2017	FY2018F	FY2019F
ASSETS					
Cash And Equivalents	11	26	82	172	226
Receivables	14	35	41	63	84
Inventory	7	18	122	188	251
Other Current Assets	0	3	0	0	0
Total Current Assets	**32**	**82**	**244**	**423**	**561**
Net Property, Plant & Equipment	38	38	38	115	149
Long-term Investments	-	-	-	-	-
Other Intangibles	-	-	-	-	-
Deferred Tax Assets, LT	-	-	-	-	-
Other Long-Term Assets	6	6	10	10	11
Goodwill	-	-	-	-	-
Accounts Receivable Long-Term	-	-	-	-	-
Total Long Term Assets	**44**	**44**	**48**	**125**	**160**
Total Assets	**77**	**126**	**292**	**549**	**721**
LIABILITIES & EQUITY					
Accounts Payable	9	25	148	230	306
Accrued Exp.	-	-	-	-	-
Short-term Borrowings	0	0	4	6	8
Curr. Port. of LT Debt	-	-	-	-	-
Curr. Income Taxes Payable	-	-	-	-	-
Unearned Revenue, Current	-	-	-	-	-
Other Current Liabilities	10	14	12	12	12
Total Current Liabilities	**19**	**39**	**164**	**248**	**326**
Long-Term Debt	0	0	0	0	0
Def. Tax Liability, Non-Curr.	3	0	0	0	0
Other Non-Current Liabilities	1	1	0	1	1
Total Liabilities	**23**	**40**	**165**	**248**	**327**
Common Stock	0	0	0	16	16
Additional Paid In Capital	-	-	-	-	-
Retained Earnings	52	83	127	282	373
Treasury Stock					
Comprehensive Inc. and Other	-	-	-	-	-
Minority Interest	1.8	4.0	0	2.4	5.4
Total Equity	**54**	**87**	**127**	**300**	**394**
Total Liabilities And Equity	**77**	**126**	**292**	**549**	**721**

Ratios	FY2015	FY2016	FY2017	FY2018F	FY2019F
Profitability					
Return on Assets %	12.3%	30.8%	18.9%	21.2%	17.9%
Return on Capital %	20.3%	46.4%	37.1%	41.0%	32.4%
Return on Equity %	20.3%	46.4%	37.7%	41.9%	33.1%
Margin Analysis					
Gross Margin %	28.1%	31.8%	28.4%	32.2%	32.0%
SG&A Margin %	16.3%	12.6%	13.9%	12.4%	12.4%
EBIT Margin %	16.0%	23.1%	16.7%	24.2%	23.1%
EBITDA Margin %	21.7%	26.3%	18.2%	26.5%	25.4%
Net Income Margin %	13.0%	22.1%	14.6%	21.2%	20.3%
Asset Turnover					
Total Asset Turnover	1.0x	1.1x	0.9x	0.8x	0.8x
Fixed Asset Turnover	1.7x	3.2x	5.7x	3.4x	3.5x
Accounts Receivable Turnover	4.3x	5.7x	7.2x	8.2x	7.7x
Inventory Turnover	11.3x	8.1x	2.2x	2.2x	2.2x
Liquidity					
Current Ratio	1.7x	2.1x	1.5x	1.7x	1.7x
Quick Ratio	1.3x	1.5x	0.7x	0.9x	0.9x
Avg. Days Sales Out.	71.1	90.9	54.4	54.4	54.4
Avg. Days Inventory Out.	32.4	45.2	163.3	163.3	163.3
Avg. Days Payable Out.	90.7	65.1	162.7	241.5	256.0
Avg. Cash Conversion Cycle	69.9	92.4	83.5	96.2	95.3
Net Debt to Equity	Net Cash	Net Cash	Net Cash	Net Cash	Net Cash
Growth Over Prior Year					
Total Revenue	(1.9%)	92.5%	91.5%	55.0%	33.3%
Net Income	5.7%	226.3%	26.8%	125.0%	27.5%
Payout Ratio %	0.0%	0.0%	0.0%	0.0%	20.0%

Source: Company Data, CGIS Research

Valuation

Trading at a discount to its listed global peers

We initiate our coverage of Pentamaster with a BUY recommendation and a target price of HK$1.36, based on a target 2018E PER of 13x. Our target PER is lower than the 45.7x average of HK and China semi names and the 18.6x average of its listed regional peers. This is supported by its earnings CAGR of 69.4% for 2017-2019E.

In Malaysia, Pentamaster's peers include ViTrox and Mi Equipment. Our target PER of 13x represents a substantial discount to MI Equipment's and ViTrox's current valuation of 23/21.3x 2018 PER. Despite its relatively small business scale, Pentamaster looks interesting, given its exposure to the segments the market is focusing on: a) semiconductor equipment, b) production automation, c) optical technology development, and d) auto electronics. We share the view that the high client concentration may create concerns. The Company is expected to benefit from the wider application of new technologies. Pentamaster doesn't look expensive, given the historical figures and compared with major names such as ASM Pacific [0522.HK] and K&S (bear in mind that Pentamaster is not really in the same segment as ASM Pacific and K&S). However, we believe that investors are willing to pay a premium for names with a unique angle. Based on our understanding, semiconductor testing equipment makers like Jingce Electronic [300567.CH] are trading at a much higher valuation. Pentamaster may look interesting to Mainland investors, even though its market cap is small at this stage.

Figure 29: Peer Comparison

Ticker	Company			PE			EV/EBITDA			P/B		ROE		ROA		Div yield		Share Price Performance			
		Price	Market Cap	2018F	2019F	2020F	2018F	2019F	2020F	2017	2018F	2017	2018F	2017	2018F	2017	2018F	1M	3M	6M	YTD
		Lcy	US$m	x	x	x	x	x	x	x	x	%	%	%	%	%	%	%	%	%	%
1665 HK	Pentamaster International Lt	1.05	214	10.0	7.9	n.a.	6.5	4.8	n.a.	7.0	3.0	46.4	41.9	18.9	21.2	0.0	0.0	-12.5	9.4	-8.7	n.a.
522 HK	Asm Pacific Technology	75.25	3,883	11.9	12.2	10.4	7.9	8.4	7.2	2.6	2.4	27.6	21.3	14.0	14.8	3.5	3.5	-11.5	-18.6	-29.5	-30.9
300567 CH	Wuhan Jingce Electronic Gr-A	58.80	1,396	35.5	24.6	17.5	29.7	20.2	15.5	11.3	8.6	21.3	24.2	14.8	16.2	0.4	0.9	-13.7	-24.4	-25.6	-11.8
ACMR US	Acm Research Inc-Class A	10.00	159	38.0	18.9	n.a.	n.a.	n.a.	n.a.	3.9	n.a.	n.a.	n.a.	-0.6	n.a.	0.0	n.a.	-9.3	-30.0	-1.6	90.5
002371 CH	Naura Technology Group Co-A	41.06	2,729	84.5	54.8	38.3	54.4	37.0	23.1	5.4	5.4	3.9	6.7	2.4	3.5	n.a.	0.1	-12.7	-19.8	-15.6	-0.9
002008 CH	Han'S Laser Technology In-A	35.20	5,451	19.3	15.5	12.4	19.3	14.4	11.2	4.3	4.5	27.1	24.6	10.7	13.4	n.a.	1.1	-16.9	-19.8	-25.4	-28.7
300316 CH	Zhejiang Jingsheng Mechani-A	10.33	1,925	19.3	14.6	11.8	17.8	12.9	10.1	3.5	3.2	11.3	15.4	9.8	9.3	n.a.	1.8	-8.1	-24.5	-43.3	-35.8
300236 CH	Shanghai Sinyang Semicondu-A	19.25	541	134.6	29.0	31.6	93.8	28.1	n.a.	3.0	2.9	5.7	1.7	1.3	1.1	n.a.	0.2	-15.6	-29.7	-48.7	-43.5
600206 CH	Grinm Advanced Material Co-A	6.60	811	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	1.9	n.a.	1.5	n.a.	1.9	n.a.	n.a.	n.a.	-12.9	-21.5	-38.5	-44.9
300236 CH	Shanghai Sinyang Semicondu-A	19.25	541	134.6	29.0	31.6	93.8	28.1	n.a.	3.0	2.9	5.7	1.7	1.3	1.1	n.a.	0.2	-15.6	-29.7	-48.7	-43.5
002916 CH	Shennan Circuits Co Ltd-A	78.74	3,200	35.3	26.1	19.7	n.a.	n.a.	n.a.	7.0	6.0	18.9	16.9	7.1	8.0	0.6	0.8	10.4	27.9	11.8	-9.7
300666 CH	Konfoong Materials Interna-A	43.98	1,396	118.9	87.4	71.2	n.a.	n.a.	n.a.	17.0	14.9	15.0	12.6	8.4	7.1	0.1	n.a.	-5.8	-18.3	-34.9	-36.4
002049 CH	Unigroup Guoxin Microelect-A	33.10	2,915	53.4	43.8	35.9	36.7	31.4	25.7	5.3	5.3	8.4	9.8	6.9	6.0	n.a.	0.2	-12.2	-24.3	-38.5	-31.0
603160 CH	Shenzhen Goodix Technology-A	81.50	5,401	59.4	32.2	26.2	86.0	31.9	27.5	10.4	9.4	28.5	15.4	23.2	12.0	0.7	0.6	1.7	12.8	-5.1	-15.9
603019 CH	Dawning Information Indust-A	44.54	4,157	64.6	45.1	33.7	40.3	29.5	23.1	8.0	8.1	10.2	12.7	3.8	5.1	n.a.	0.3	-5.0	-12.8	-13.8	10.7
300223 CH	Ingenic Semiconductor Co -A	18.74	546	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	3.3	n.a.	0.6	n.a.	1.3	n.a.	n.a.	n.a.	-12.8	-15.4	-26.7	-36.6
300077 CH	Nationz Technologies Inc-A	9.17	742	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	1.8	n.a.	-17.8	n.a.	-8.5	n.a.	n.a.	n.a.	9.6	14.5	-20.5	-8.3
000670 CH	Infotmic Co Ltd-A	3.36	398	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	8.6	n.a.	-61.2	n.a.	-64.4	n.a.	0.0	n.a.	-5.9	-18.0	-44.7	-51.3
603986 CH	Gigadevice Semiconductor B-A	73.18	3,023	30.5	22.6	18.1	34.0	22.1	16.8	11.7	9.2	26.2	27.2	18.7	20.4	0.4	0.6	-17.5	-39.3	-41.3	-37.2
300327 CH	Sino Wealth Electronic Ltd-A	19.35	649	26.1	19.9	15.8	21.1	14.0	9.4	5.1	5.1	18.1	19.8	16.7	17.2	n.a.	2.6	-10.3	-14.7	-27.6	-31.6
300613 CH	Shanghai Fullhan Microelec-A	92.88	611	27.5	19.4	17.8	n.a.	n.a.	n.a.	4.5	4.0	17.4	11.6	15.0	n.a.	0.3	0.3	-18.8	-25.9	-41.5	-55.7
600171 CH	Shanghai Belling Co Ltd-A	8.40	853	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	2.5	n.a.	8.2	n.a.	4.5	n.a.	n.a.	n.a.	-14.3	-22.9	-41.9	-48.4
300458 CH	All Winner Technology Co L-A	20.81	1,001	38.0	28.5	21.0	15.3	11.3	9.0	3.3	3.0	0.9	8.5	3.9	6.1	n.a.	0.8	-16.6	-7.9	-19.1	-26.9
85.HK	China Electronics Huada Tech	0.73	189	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	0.8	n.a.	11.9	n.a.	3.1	n.a.	4.1	n.a.	-6.4	-8.8	-40.7	-46.7
2878 HK	Solomon Systech (Intl) Ltd	0.24	75	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	0.9	n.a.	-10.7	n.a.	-9.3	n.a.	0.0	n.a.	-6.7	-15.0	-31.0	-40.5
1679 HK	Risecomm Group Holdings Ltd	1.83	189	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	3.3	n.a.	4.1	n.a.	3.0	n.a.	0.0	n.a.	0.0	-8.5	-38.4	-50.5
1385 HK	Shanghai Fudan Microelect-H	8.98	756	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	3.1	n.a.	14.9	n.a.	9.6	n.a.	0.0	n.a.	8.2	8.6	20.7	30.1
981 HK	Semiconductor Manufacturing	7.27	4,674	48.8	58.0	29.0	8.3	7.4	6.1	0.8	0.9	3.8	1.6	1.3	0.6	0.0	0.0	-13.6	-20.9	-27.2	-46.2
3355 HK	Advanced Semiconductor Man-H	1.37	268	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	1.7	n.a.	5.7	n.a.	4.9	n.a.	0.0	n.a.	75.6	65.1	55.7	44.2
1347 HK	Hua Hong Semiconductor Ltd	16.20	2,152	13.3	12.3	11.2	6.6	5.6	4.4	1.2	1.0	9.1	8.9	7.1	7.1	1.9	2.1	-2.6	-41.5	-7.2	-2.3
600584 CH	Jiangsu Changjiang Electro-A	10.82	2,517	35.9	20.4	14.8	6.2	5.5	5.3	1.3	1.4	4.9	3.6	0.6	2.2	n.a.	0.3	-16.8	-33.7	-47.4	-49.3
002185 CH	Tianshui Huatian Technolog-A	4.08	1,262	15.1	11.5	9.5	7.5	6.1	4.9	1.5	1.5	9.7	9.4	4.4	5.3	n.a.	0.9	-19.8	-23.9	-42.1	-52.1
002156 CH	Tongfu Microelectronic Co-A	7.74	1,296	24.5	21.4	16.7	7.6	6.5	5.8	1.4	1.5	2.5	4.3	1.3	2.0	n.a.	0.3	-12.5	-24.1	-35.5	-41.5
603005 CH	China Wafer Level Csp Co -A	15.89	540	36.1	24.1	18.9	19.8	18.4	15.0	2.0	2.0	5.5	4.7	2.9	4.4	n.a.	0.2	-7.1	-24.6	-46.2	-55.0
300053 CH	Zhuhai Orbita Aerospace Sc-A	9.08	925	34.9	26.3	20.6	n.a.	n.a.	n.a.	2.0	2.8	6.0	7.9	3.8	5.5	n.a.	n.a.	-12.0	-16.2	-39.2	-36.3
300661 CH	Sg Micro Corp-A	77.86	897	51.2	40.7	32.3	43.0	34.0	25.2	8.1	7.0	18.3	13.5	14.1	11.3	0.5	0.2	-17.9	-31.1	-12.2	7.5
300672 CH	Goke Microelectronics Co-A	42.25	685	32.5	26.4	n.a.	n.a.	n.a.	n.a.	4.9	n.a.	6.3	n.a.	5.4	n.a.	0.4	n.a.	-10.1	-17.1	-29.5	-34.9
300493 CH	Shanghai Fortune Techgroup-A	10.18	470	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	4.3	n.a.	11.2	n.a.	4.3	n.a.	0.0	n.a.	0.9	-6.9	-25.9	-27.7
Average				**45.7**	**28.6**	**23.6**	**31.2**	**18.0**	**13.6**	**4.5**	**4.6**	**8.8**	**13.0**	**4.4**	**8.4**	**0.6**	**0.8**	**-7.0**	**-14.5**	**-25.7**	**-25.1**
MPI MK	Malaysian Pacific Industries	10.98	524	14.4	12.5	11.5	4.4	4.1	4.0	1.8	1.7	16.9	12.0	8.6	9.7	n.a.	2.8	-11.0	-0.2	42.6	-13.0
UNI MK	Unisem (M) Berhad	3.00	523	22.7	17.3	16.0	7.0	6.3	6.0	1.5	1.5	11.1	6.9	6.1	5.7	0.8	3.2	-3.8	15.8	68.5	-17.8
GTB MK	Globetronics Technology Bhd	2.20	353	19.3	15.6	13.8	11.6	9.7	8.8	5.0	4.4	18.8	27.2	17.3	20.3	n.a.	4.4	-12.7	-14.4	21.9	-20.9
INRI MK	Inari Amertron Bhd	1.91	1,451	19.7	15.8	13.2	13.3	10.9	9.2	5.6	5.2	29.2	28.0	19.7	22.9	3.4	3.9	-19.7	-20.9	5.7	-15.6
ELSR MK	Elsoft Research Bhd	3.10	206	21.4	19.4	19.4	20.0	18.0	18.4	7.9	7.0	29.0	31.8	30.3	28.5	2.6	3.3	-8.6	14.4	25.0	14.8
MMSV MK	Mms Ventures Bhd	1.07	52	12.4	7.6	8.9	13.6	8.4	7.8	3.7	n.a.	42.3	21.9	20.2	18.5	0.0	2.0	-9.0	-7.1	-3.1	-22.3
VITRO MK	Vitrox Corp Bhd	7.61	859	34.3	24.7	19.9	30.4	21.9	17.9	9.7	8.8	28.0	27.3	19.1	21.5	n.a.	0.7	-5.5	18.9	47.8	22.5
MI MK	Mi Equipment Holdings Bhd	2.57	308	23.4	17.1	12.5	18.2	13.1	9.4	4.0	3.8	61.2	22.8	n.a.	28.7	n.a.	1.2	-18.4	23.0	n.a.	n.a.
PENT MK	Pentamaster Corp Bhd	3.37	256	17.7	14.0	13.5	8.1	6.4	6.0	3.3	3.1	24.9	20.5	9.3	16.1	0.0	0.6	-11.1	17.8	76.4	11.2
KLAC US	Kla-Tencor Corp	94.92	14,530	10.7	10.4	9.6	8.0	7.9	7.5	9.3	8.5	91.9	77.4	16.2	23.1	2.8	3.1	-6.0	-19.9	-7.1	-9.7
TER US	Teradyne Inc	36.19	6,747	16.3	15.0	11.9	9.5	9.0	7.8	4.0	4.5	13.6	23.2	6.8	13.2	0.9	1.0	-2.0	-16.9	5.4	-13.6
ORBK US	Orbotech Ltd	56.85	2,758	16.1	14.7	n.a.	10.5	8.9	n.a.	2.8	2.6	15.9	14.0	12.7	10.3	0.0	n.a.	-4.7	-12.0	-3.3	13.2
098460 KS	Koh Young Technology Inc	95100.00	1,166	28.8	24.8	19.7	22.3	18.0	14.5	6.1	5.6	16.8	23.6	14.6	18.4	n.a.	0.8	-11.7	-12.7	-4.7	15.3
6857 JP	Advantest Corp	2403.00	4,247	13.2	13.5	12.8	7.5	7.8	7.3	2.6	2.8	14.0	25.4	16.7	14.4	n.a.	2.4	-0.3	-10.4	-11.0	14.9
7729 JP	Tokyo Seimitsu Co Ltd	2864.00	1,055	9.2	9.2	9.0	3.8	3.8	3.6	1.2	1.1	11.9	12.3	10.0	8.8	n.a.	3.9	-3.2	-24.5	-31.5	-35.6
Average				**18.6**	**15.4**	**13.7**	**12.5**	**10.3**	**9.2**	**4.6**	**4.3**	**28.4**	**24.9**	**14.8**	**17.3**	**1.3**	**2.4**	**-8.5**	**-3.3**	**16.6**	**-4.0**

Source: Bloomberg, Company Data, CGIS Research estimates for covered stocks

Major risk factors

(i) Pentamaster's success is dependent on the continuous efforts of its key personnel and its ability to retain and recruit competent personnel.

(ii) Pentamaster's technology is subject to obsolescence risk.

(iii) Pentamaster relies on major customers who have no long-term commitment to it.

(iv) PentaMaster's may have difficulty securing a stable and adequate supply of materials on commercially acceptable terms of satisfactory quality and in a timely manner.

(v) Pentamaster's land titles are subject to certain conditions, whose non-fulfilment may lead to its existing production plant being liable to forfeiture.

(vi) Pentamaster faces currency risk. Its operations are exposed to USD, its financial statements are presented in MYR, and its stock price is valued in HKD, so unfavorable exchange rate movement could materially impact its results. Appreciation of the MYR against the USD would likely translate into a potential loss of income for an export-oriented technology manufacturer such as Pentamaster in Malaysia. However, the magnitude of the impact may be gradual and hence manageable as higher economies of scale and hedging by locking into currency futures will minimise the net impact of foreign exchange volatility on Pentamaster's headline numbers. We didn't see any material impact from recent exchange rate movement on the Company's results in Jan-Sep 2018.

Company History

1995: Establishment of the Company with the incorporation of Pentamaster Technology, marking the commencement of Pentamaster's automated systems and equipment business.

2003: PCB, the parent company of Pentamaster, was listed on the second board of Bursa Malaysia. Establishment of Pentamaster Instrumentation, marking the expansion of its automated equipment business to include ATE and test and measurement systems for end products.

2004: PCB's listing was transferred to the Main Market of Bursa Malaysia.

2006: Establishment of Pentamaster Equipment, marking the commencement of Pentamaster's high precision manufacturing equipment business.

2007: Establishment of its first representative office in Shanghai, China, to provide customer liaison support to Pentamaster's customers in China.

2013: The Company received grants from the Domestic Investment Strategic Fund of MIDA in relation to (i) R&D activity; (ii) modernisation and upgrading of facilities and tools for manufacturing activities and solutions; and (iii) international certification and standards.

2015: Pentamaster Equipment developed i-ARMS to address manufacturing needs under Industry 4.0 and was subsequently granted Pioneer Status in 2016 for a period of 10 years.

2018: Listing of the Company on the Main Board of the Stock Exchange of Hong Kong Limited, and incorporation of a sales and technical support office in California, USA.

Figure 30: Pentamaster's Awards

1999&2000	Pentamaster Group was awarded International Supplier of the Year by Dell Inc. for excellence in worldwide process technology.
2003&2007	Pentamaster Group was awarded Industry Excellence Award by MITI in quality management category.
2008	Pentamaster Instrumentation was granted the Pioneer Status for development and production of test and measurement system for the E&E industry.
2016	Pentamaster Technology was granted the Pioneer Status for smart device test solution for IoT industry and related modules for a period of 10 years.
2017	Pentamaster Group was awarded the 2017 Alliance Partner of the Year (APAC) – by the National Instruments Corporation (NATI.US).
2017	Pentamaster Group was awarded Knowles 10bn SISONIC MEMS Microphones by Knowles Electronic (Suzhou) Co., Ltd.
2017&2018	PCB was named as one of the "200 Asia-Pacific public companies with less than US$1.0bn" in revenue and consistent top- and bottom-line growth on Forbe's list of Asia's Best Under A billion 2017.

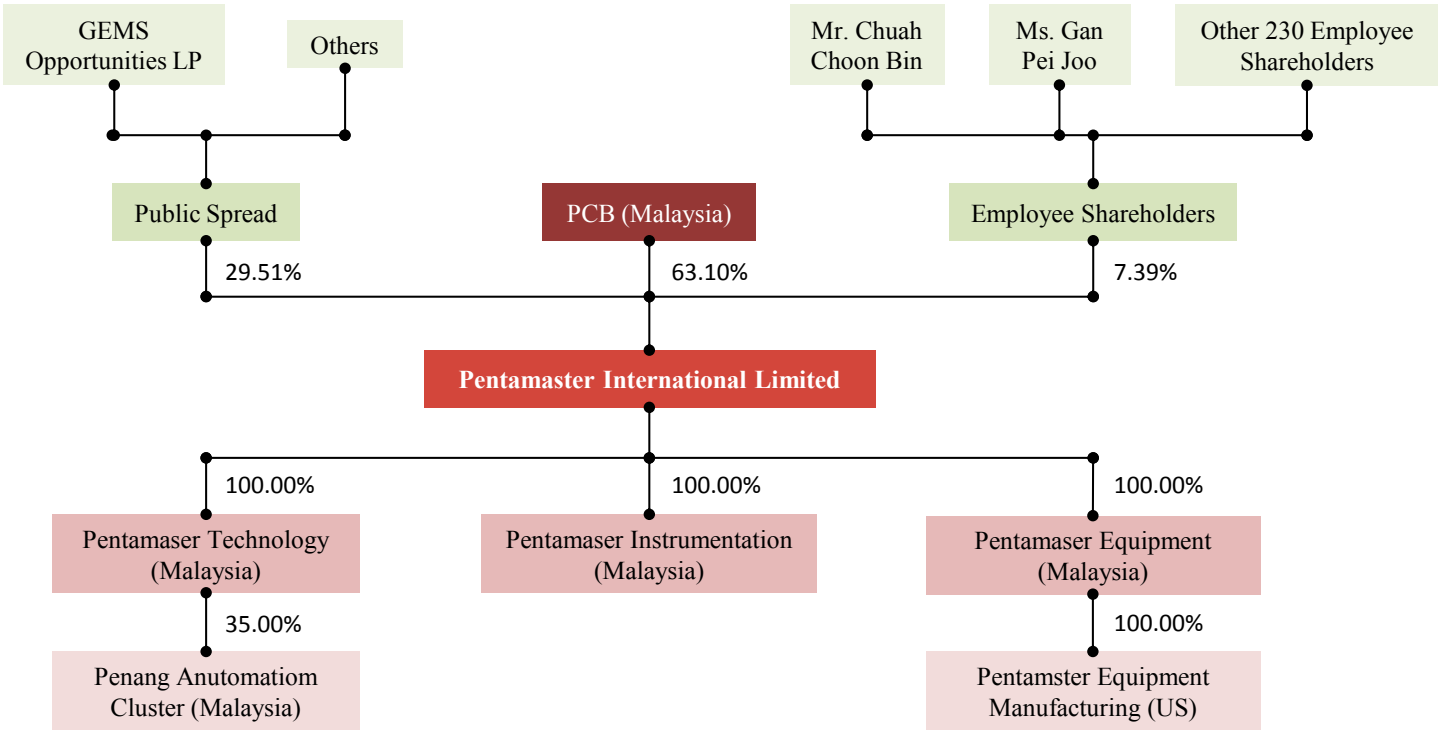
Source: Company data, CGIS Research

Figure 31: Pentamaster's use of proceeds from IPO

Use of proceeds	Total Funds		Used as at 30 June 2018 (MYR m)	Balance (MYR m)	Utilization
	(HK$ m)	(MYR m)			
Capital investment and costs in relation to the New Production Plant and the expansion of the Existing Production Plant	84.8	45.8	9.6	36.2	21.0%
Business expansion into the Greater China region	38.1	20.6	0	20.6	0.0%
Establishment of an office in California, U.S.	28.2	15.3	0.5	14.8	3.3%
Marketing, branding and promotional activities	3.1	1.7	0.2	1.5	11.8%
Working capital	17.1	9.2	9.2	0	0.0%
Total	171.3	92.6	19.5	73.1	N/A

Source: Company Data, CGIS Research

Figure 32: Pentamaster's Corporate Structure



Source: Company Data, CGIS Research

Selected Members of the Management Team

Mr. Chuah Choon Bin, Executive Director and Chairman. Mr. Chuah, was appointed Director on 12 June 2017 and was re-designated Executive Director on 5 September 2017. Mr Chuah has more than 30 years of experience in the automation solutions industry and has developed the Company to its present level of success.

Ms. Gan Pei Joo, Executive Director and Chief Financial Officer. Ms. Gan, was appointed Director on 12 June 2017 and was re-designated Executive Director on 5 September 2017. Ms. Gan joined Pentamaster Group as group accountant in April 2003 and held various positions prior to her promotion as group financial controller of PCB in November 2009.

Mr. Leng Kean Yong, Non-executive Director. Mr. Leng, was appointed Director on 7 August 2017 and was re-designated a Non-executive Director on 5 September 2017. Mr. Leng has over 21 years of experience in the finance and marketing industry.

Dr. Chuah Jin Chong, Independent Non-executive Director. He is also chairman of the nomination committee and a member of the remuneration committee. Dr. Chuah has over 28 years of professional experience in the medical industry since he was registered as a medical practitioner in Queensland, Australia and New Zealand in 1989.

Mr. Sim Seng Loong @ Tai Seng, Independent Non-executive Director. He is also chairman of the audit committee and the remuneration committee and a member of the nomination committee. He is primarily responsible for supervising and providing independent judgment to the Board.

Ms. Chan May May, Non-executive Director. She is also a member of the audit committee and the nomination committee. She is primarily responsible for supervising and providing independent judgment to the Board. She has over 20 years of experience in the legal field.

Mr. Teh Eng Chuan, the chief operating officer of Pentamaster Technology since January 2015, has over 20 years of experience in machine vision, design and control.

Mr. Ng Chin Keng, the chief operating officer of Pentamaster Equipment since January 2015, joined the Group as an automation software programmer of Pentamaster Technology in January 2000.

Mr. Teoh Siow Khiang, the senior general manager of Pentamaster Instrumentation since January 2017, joined the Group in January 2006 as the general manager of Pentamaster Instrumentation.

Mr. Hon Tuck Weng, the operation director of Pentamaster Technology since May 2007, has more than 24 years of experience in the automation solutions industry.

Ms. Ng Yen Mei, the corporate procurement logistic manager of the Group, has approximately 20 years of experience in procurement and accounting.

Mr. You Chin Teik, the vice president of new business development, is primarily responsible for overseeing the R&D of the Group, and joined the Group as a vision engineer of Pentamaster Technology in January 1998.

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