Enabling the Digital World
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ATS grew from manufacturing gold wire bonders to include automold machines, etched leadframes and flexible-in-line system. It also contributed to the development of fast wirebonding technology to a higher bonding capability. In September that year, ATS received the esteemed Semiconductor International Editors’ Choice Best Product Award for its leading technology to meet new packaging challenges.

In 1998, our product AB339 gold wire bonder was honored as Best Product of the Year by Semiconductor International magazine. Our product AB339 was a high-speed gold wire bonder which was the first to use on-board microprocessor control and computer. The new fast wirebonding technology offered a significant advantage over previous wirebonding equipment. ATS was the first company with such high-speed technology to win the prestigious award.

Since 2004, ASMPT had been credited as one of the best economic enterprises in Hong Kong and was recognized as a Best Performer in the Foxconn Supplier Report. The technology advancement award 2008 was given to the best company for its innovative research and development. In 2008, ATS achieved the Manufacturing Headquarters (MHI) certification in November 2008. The MHI certification is a quality management system that ensures the highest level of quality and productivity. In 2008, ATS was also awarded the Best Employers’ Award for its commitment to its employees.

Amicra joined our ranks, allowing us to expand our product and technology. Under our parent company, we are also one of the Top 10 global leaders in the Silicon Photonics Market. In 2010, we were officially named as one of the Top 10 global leaders in the Silicon Photonics Market.

By 2013, we had been recognized as one of the Top 10 global leaders in the Silicon Photonics Market. In 2015, we maintained our position as one of the Top 10 global leaders in the Silicon Photonics Market. In 2016, we continued to expand our product and technology. In 2017, we celebrated our 20th anniversary. In 2018, we maintained our position as one of the Top 10 global leaders in the Silicon Photonics Market.
Under the leadership of Mr. Lee Wai Kwong, Group CEO, ASMPT transforms from a manufacturing based factory to a high technology business solution provider. Mr. Lee has been awarded the Director of the Year Award 2018 by the Hong Kong Institute of Directors (HKIoD), demonstrating the award theme “Leadership in Times of Change”.

Mr Henry Lai, Chairman of the Council of HKIoD, said, “Leaders of changes need to have extraordinary vision, openness and courage when exploring new paths in new circumstances. These qualities are found in all the winning directors this year. They dare to venture into new realms and lead their companies in facing rapid changes in the business environment.”
Innovation has always been at the heart of ASMPT. Enabling Technologies, our research and development (R&D) arm, has allowed the Group to broaden our product portfolio to serve diverse markets and offer customers a total solution approach that encompasses the entire chain of assembly process of semiconductor device and surface mount technology. We have been consistently investing up to 10% of our annual equipment turnover in Enabling Technologies to strengthen our competence and continue to be the leader in the technology front. This investment commitment has resulted in 10 Enabling Technologies centres worldwide, with fields of expertise in but not limited to material science, motion control systems, vision technologies, optics, precision engineering, real-time software and vibration control. In 2018, ASMPT was awarded as one of Top 100 Global Technology Leaders by Thomson Reuters.

In 2018, ASMPT R&D spending was US$205 million, adopting the longstanding policy of investing up to 10% of our annual Backend Equipment revenue in R&D irrespective of our short-term sales fluctuation. In line with ASMPT, ATS’ spending on Enabling Technologies is about US$33 million annually, which is approximately 10% of ATS Revenue. The strength of ATS Enabling Technologies are in the area of linear motor, control systems and computer visions which enables our equipment to achieve state-of-the-art performance at affordable cost and acts as the competitive edge to support the growth of ASMPT. Enabling Technologies partners with sister companies to leverage the technologies of assembly, packaging and surface mount to enhance ASMPT’s competitiveness and drive digital lifestyle forward.

Great People Around the World Inspired to Deliver Innovative Solutions!


Die Bonder & CIS Equipment Design Centre

SMT placement Equipment Design Centre

Multi-beam laser dicing and grooving

Mechanical module & Optical Measuring Equipment Design

R&D focus on technology of leading products & solutions

SMT Printing Equipment Design Centre

Manufacturing Execution System for Industry 4.0

Ultra high precision Die Attach Equipment (submicron placement Accuracy)

Deposition System for advanced Packaging. (Electrochemical Deposition (ECD) & Physical Vapor Deposition (PVD)

ASMPT Enabling Technologies R&D Centres
ASMPT Awards and Accolades

2018
- Thomson Reuters Top 100 Global Technology Leaders
- Director of the Year Award 2018 in the Listed Companies Executive Directors category by The Hong Kong Institute of Directors
- ATS achieved SQC Certification by Enterprise Singapore
- Rank first in VLSI Research the Best Supplier for Assembly Equipment

2017
- 10 Best Large Semiconductor Equipment Suppliers in the VLSI Customer Satisfaction Survey
- Grand Award in Technological Achievement by Hong Kong Awards for Industries
- Directors of the Year Award in Corporate Governance by the Hong Kong Institute of Directors
- Hong Kong Outstanding Enterprise by Economics Digest
- Best Investor Relations Company by Corporate Governance Asia
- Asia’s Best CEO (Investor Relations) by Corporate Governance Asia
- Ranked 1st in Assembly, 10 Best Chip Making Suppliers and the best Assembly and Test Suppliers from VLSI Customers Satisfaction Survey 2017

2016
- Top 10 of Best Managed HK Companies in 2016 by Finance Asia
- Top 10 of Best at Investor Relations in 2016 by Finance Asia
- Top 5 of the 10 Best Chip Making Equipment Suppliers in 2016 by VLSI Customer Satisfaction Survey
- Top 3 of Assembly Equipment in 2016 by VLSI Customer Satisfaction Survey
- Top 4 of Test Equipment in 2016 by VLSI Customer Satisfaction Survey
- Corporate Governance Asia – Best Investor Relations Company

2015
- Technology Achievement Grand Award from Hong Kong Awards for Industries

1999
- The Technology Achievement Award 1999 from the National Science and Technology Board (currently known as A*STAR) for outstanding R&D achievements with significant contribution to Singapore’s economy

1998
- Semiconductor International Editors’ Choice Best Product Award for our product AB339 Gold Wire Bonder for its leading edge technology in the then 50 micron pad pitch bonding capability
Enabling the Digital World

Together - We have the POWER and agility to drive changes.

We deliver the highest value and innovative solutions to our customers through products and solutions with advanced technologies and excellent quality. We aspire to make ASMPT a great work place, a great business partner and a great company built to last.

VISION: ENABLING THE DIGITAL WORLD

PASSION  OWNERSHIP  WE  EXCELLENCE  RESPECT

MISSION

Together - We have the POWER and agility to drive changes.

We deliver the highest value and innovative solutions to our customers through products and solutions with advanced technologies and excellent quality. We aspire to make ASMPT a great work place, a great business partner and a great company built to last.

Passion to be the #1 Go-to-Partner
Ownership of actions and behaviours
Win with our customers
Excellence in all that we do
Respect for one and all
“Enabling the Digital World” is ASMPT’s vision for a world where its solutions help connect people and processes through digital technologies to share information and knowledge, to exchange ideas and opinions, creating a world of new opportunities.

Founded in 1975, ASMPT is the world leader in leading edge solutions, equipment, surface mount technology and materials for the semiconductor assembly and packaging industries. Its surface mount technology solutions are deployed in a wide range of end-user markets including electronics, mobile communications, automotive, industrial and LED.

Today, the Group has grown into a global technology and market leader with a presence in over 30 countries and a workforce of more than 16,000 who share a set of core values which are expressed through “POWER”: Passion to be the #1 “Go to Partner”; Ownership of actions and behaviours; Win with its customers, Excellence in all it does and Respect for one and all.

In 2018, the Group achieved record revenue growth, building on the momentum and achievements of the past two years. Group revenue grew 11.6% year-on-year, tripling its revenue over the past ten years, to a new record high of US$2.49 billion. All its three business segments achieved new revenue records in both 2017 and 2018.

A key reason for the Company’s continued success has been its steadfast focus on driving innovations, annually investing up to 10% of its annual equipment turnover in R&D to develop enabling technologies, to broaden its product portfolio to serve diverse markets and to offer customers a total solution approach.

ASMPT’s operations around the world are focused on constantly improving operating efficiency and resource stewardship so as to build a sustainable future that will create long-lasting value for its business, stakeholders, community and the environment.

Back in 2016, the company launched the Group Business Excellence Programme to drive the standardization in processes and sharing best practices across its global operations and business segments. The drive for business excellence and efforts on systematic and structural improvements will make the Group stronger and better equipped for the challenges ahead. The improvement programmes initiated by the Business Excellence Programme led to good results in 2018:-

- The Singapore operations (Backend Equipment and Materials) was awarded the Singapore Quality Class by Enterprise Singapore.
- Its SMT business won the Factory of the Year/Global Excellence in Operations Award in the Excellent Production Network category, given by Produktion Magazine and global management consultancy firm, AT Kearney.

As the industry leader, ASMPT places strong emphasis on customers, collaborating with them to create world-class products and services that deliver real business value and excellence.

All of these are crucial for substantial performance improvement to tie in with the ASMPT Group’s development in Smart Manufacturing, Artificial Intelligence, Data Analysis and Industry 4.0 as well as the economic challenges in coming years.

Besides revenue growth, ASMPT has gone through many significant organizational and structural changes. We moved from pure organic growth to profitable growth with strategic acquisitions. We diversified our product portfolio, customer mix and geographical footprint. We updated our supply chain with balanced internal and external manufacturing. We focused on customer satisfaction and continued to offer total solutions. With the diversity of ASMPT, a common platform to move forward together towards our future visions and goals is required. It is timely for our organization to introduce a new set of Vision, Mission and Values (VMV). The new VMV provides a common platform and lingo for the organization to share best practices across our global operations, set ground rules for inter-cultural and interdisciplinary corporations, and standardize processes. Nevertheless, it is not totally new. The new VMV came from the development of our existing values and strategies and has been verified through inputs from various parts of organization.

Describe how the organisation:

1.1a Develops the organisation’s mission, vision and values, and communicates them to key stakeholders
The Vision is “Enabling the Digital World”. It beautifully captures the impact of our products and provides a purpose-driven direction to the entire organization. It is also timely as our organization moves from a manufacturing based factory to a high technology business solution provider. The metaphor of the vision is a North Star which shines in the night sky and points us in the right direction.

The Mission statement is “Together, We have the POWER and agility to drive change. We deliver the highest value and innovative solutions to our customers through products and solutions with advanced technologies and excellent quality. We aspire to make ASMPT a great work place, a great business partner and a great company built to last”. These few sentences describe pathways for employees to move the organization towards these common goals in our respective positions. The metaphor of the mission is a map, more precisely, a treasure map. The Values are summarized in the acronym POWER, which stands for "Passion to be the #1 Go-to-Partner, Ownership of actions and behaviours, Win with our customers, Excellence in all that we do and Respect for one and all". Values are explicit or implicit beliefs and principles that underlie the organization’s culture and guide our decisions and behaviour. This set of values is like a compass, always handy and reliable, supporting our daily journey.

ASMPT leaders conduct a review of the Vision, Mission, and Values to ensure that they continue to be both effective and relevant in an ever-evolving operating environment. These reviews also incorporate feedback from key stakeholders.

<table>
<thead>
<tr>
<th>Past Adopting ASMPT’s Mission &amp; Vision</th>
<th>Present Review of VMV</th>
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<tbody>
<tr>
<td>Development Process</td>
<td></td>
</tr>
<tr>
<td>• Validated and found to be relevant</td>
<td>• ATS has undergone significant organisation and structural changes</td>
</tr>
<tr>
<td></td>
<td>• Greater emphasis was placed on customer satisfaction</td>
</tr>
<tr>
<td></td>
<td>• Development via Annual Executive Meeting 2015 as well as Senior Management and VMV Core Team discussions with reference from previous values and strategies</td>
</tr>
<tr>
<td></td>
<td>• Formulation of new vision</td>
</tr>
<tr>
<td>Engagement &amp; Communication Efforts</td>
<td>• Change was graced by our Managing Director, Mr. WK Lee in Annual Dinner.</td>
</tr>
<tr>
<td>• Mission and Values were communicated to employees via training sessions and performance management exercise</td>
<td>• 3 levels of communication to engage internal and external stakeholders 1) Cascading 2) Engaging 3) Instilling</td>
</tr>
</tbody>
</table>

Figure 1.1a.1: Displays the key milestone developments since ATS was formed in 1990
1.1b Engages key stakeholders to drive the organisation’s performance

ATS leaders believe in communicating and engaging with both internal and external stakeholders in driving the organisation’s performance: actively engage the organisation’s diverse stakeholders via multiple platforms throughout the year (Figure 1.1b.1).

### CASCADING

<table>
<thead>
<tr>
<th>Phase</th>
<th>Key Platforms</th>
<th>Implementation</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>VMV Equipping Workshops</td>
<td>Include internalisation learning activities, discussions and presentations</td>
<td>Annually</td>
</tr>
<tr>
<td></td>
<td>VMV Communication Sessions</td>
<td>Communication and feedback sessions</td>
<td>Quarterly</td>
</tr>
<tr>
<td></td>
<td>New Hire Orientation Program</td>
<td>Include internalisation learning activities</td>
<td>Ongoing</td>
</tr>
<tr>
<td></td>
<td>Media</td>
<td>Revamped the corporate website and career portals</td>
<td>Ongoing</td>
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### ENGAGING

<table>
<thead>
<tr>
<th>Phase</th>
<th>Key Platforms</th>
<th>Implementation</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Corporate Events (such as Annual Dinner and Family Day)</td>
<td>Memorabilia were imprinted with VMV</td>
<td>Twice Annually</td>
</tr>
<tr>
<td></td>
<td>Industrial Events (such as Career Fairs and Experimental Outreach)</td>
<td>Redesigned company brochures, pop-up structure and pull-up banner</td>
<td>Periodically</td>
</tr>
<tr>
<td></td>
<td>Community Events (such as Race Against Cancer)</td>
<td>Donning wearables imprinted with VMV</td>
<td>Periodically</td>
</tr>
<tr>
<td></td>
<td>Media (Corporate Website)</td>
<td>Ease of VMV information</td>
<td>Ongoing</td>
</tr>
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</table>

### INSTALLING

<table>
<thead>
<tr>
<th>Phase</th>
<th>Key Platforms</th>
<th>Implementation</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Publications and Promotional Materials</td>
<td>Share and update employees on VMV promotional activities with Connection @ ASM (newsletter); Visible VMV structures and collaterals are publicized around the entire company building. (such as RESPECT posters and Vision wall)</td>
<td>Ongoing</td>
</tr>
<tr>
<td></td>
<td>4 Disciplines of Execution (4DX)</td>
<td>Implement 4DX excellent methodology “Act on the Lead Measures” to execute identified wildly important goal (WIG) to achieve organization goals</td>
<td>Ongoing</td>
</tr>
<tr>
<td></td>
<td>Performance Appraisal</td>
<td>Translate VMV into competencies for performance appraisal</td>
<td>Twice Annually</td>
</tr>
</tbody>
</table>

1.1c Acts as role models and grooms future leaders

Grooming of future leaders is part of ATS efforts to ensure succession and successful transfer of knowledge. ATS senior leadership places strong emphasis on identifying future leaders and mentoring them through experience sharing, coaching and mentoring, developing of competencies and leadership exposure.

For example, our future leaders across various departments are nominated to the Working Committee to analyse the survey results, following our first ever ATS Workplace Culture Survey participation in 2016. With guidance from Top Management in the Steering Committee, these leaders were tasked to study and analyse the results from the assigned dimensions, identify strengths and areas for improvement, recommend affirmative or corrective actions and formulate engagement and communication strategy to employees on follow-up actions, among many others. We exercise leadership role modelling by scheduling our future leaders to conduct presentations to the Steering Committee at designated milestones and senior leaders to guide them through various plan execution after approval of their recommendations (Figure 1.1c.1).

**Figure 1.1c.1: Illustration on how future leaders are identified in ATS**
1.2 Organisational Culture

Describe how the organisation:

1.2a Develops a culture that supports the organisation’s mission, vision and values to drive growth

Through the years, ATS has developed a culture which exhibits the power and agility to drive change to deliver the highest value and innovative solutions to our customers through products and solutions with advanced technologies and excellent quality (Figure 1.2a.1).

- SOLICIT FEEDBACKS FROM VARIOUS CHANNELS
  - Structured
  - Unstructured

- GAPS IDENTIFIED

- SUPPORT TEAM - ANALYSE GAPS
  - Committee (such as Great Place to Work Team 1 & 2, EMPOWER)
  - Department (such as Human Resources, Management Information System)

- DEVELOP AND IMPLEMENT MEASURES

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<th>W</th>
<th>E</th>
<th>R</th>
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<tbody>
<tr>
<td>Lunch Time Talk Initiative</td>
<td>Flexi-ben Scheme</td>
<td>Patent Award Ceremony</td>
<td>Executive Education</td>
<td>Teambuilding Activities</td>
</tr>
<tr>
<td>POWER Buddy Program</td>
<td>Get Together Fund Initiative</td>
<td>Customer in China</td>
<td>Skillsets upgrading</td>
<td>Showcase role models and sharing of promotional materials and testimonials</td>
</tr>
<tr>
<td>Quality Mindset Program</td>
<td>Creation of iSpace</td>
<td>Release technical papers within the global R&amp;D community (i.e. IEEE, IMAPS)</td>
<td>Driving production excellence through 4 Discipline of Execution (4DX) and Process Centric System (PCS).</td>
<td></td>
</tr>
<tr>
<td>Work Improvement Suggestion Scheme</td>
<td></td>
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</table>

- Figure 1.2a.1: Developing ATS culture to drive growth

1.2b Translates values into desired employee behaviours to enable innovation, learning and achieve the organisation’s goals

Our POWER values of passion, ownership, win, excellence and respect guide fellow employees in their work and are inculcated in them via various platforms, programmes and practices. These values also translate into a set of desired behaviours and foster a culture of achieving goals, learning, innovation and service. The core of what VMV particularly POWER described was already in practiced in various parts of ATS (see Figure 1.1b.1).
### 1.2c Embraces organisational change for sustainability

Current business needs or gaps are identified and addressed in the 4 domains, strategic, structural, technological and people so that the company can adapt quickly to changes (Figure 1.2c.1).

In terms of the digital economy, ASMPT is always on the lookout for new technologies to develop in-house or acquire. Our investment for the future philosophy has seen ASMPT grown from strength to strength throughout the years with internal R&D as well as strategic acquisitions.

<table>
<thead>
<tr>
<th>Opportunities</th>
<th>Improvements</th>
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</thead>
<tbody>
<tr>
<td>Organisation Diversity</td>
<td>Addressing current organisation needs through the formation and development of new VMV to all employees.</td>
</tr>
<tr>
<td>Wildly Important Goals (WIGs)</td>
<td>Better alignment of goals and information sharing from workshops and check-in sessions. (ie. HR4HR, QA)</td>
</tr>
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</table>

<table>
<thead>
<tr>
<th>Opportunities</th>
<th>Improvements</th>
</tr>
</thead>
<tbody>
<tr>
<td>Workforce Structure</td>
<td>Ensuring manpower flexibility through manpower design and redesigning. (ie. New roles and capabilities)</td>
</tr>
<tr>
<td>Corporate Governance</td>
<td>Committing to the highest ethical standards through an established governance system. (ie. Code of Business Conduct)</td>
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<table>
<thead>
<tr>
<th>Opportunities</th>
<th>Improvements</th>
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</thead>
<tbody>
<tr>
<td>Employee Engagement</td>
<td>Engage employees with the development of HAPPY Framework – Happy Work, Happy You.</td>
</tr>
<tr>
<td>Competency</td>
<td>Groom employees to meet current and future needs through formulated L&amp;D plans and opportunities.</td>
</tr>
<tr>
<td>Customer Satisfaction</td>
<td>Improve customer satisfaction through designing a Customer Experience Framework. (ie. Customer touchpoints)</td>
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<table>
<thead>
<tr>
<th>Opportunities</th>
<th>Improvements</th>
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</thead>
<tbody>
<tr>
<td>Procedures</td>
<td>Streamline work processes through development of systems to provide better support. (ie. Fire Drill App, eHRDocs)</td>
</tr>
<tr>
<td>Operational Excellence</td>
<td>Enhance productivity though pursuing robots and smart manufacturing. (ie. Auto Guided Vehicle, AGV)</td>
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</table>

* Figure 1.2c.1: The 4 domains guiding change and sustainability
1.3 Corporate Governance and Social Responsibility

Describe how the organisation:

1.3a Establishes a governance system to ensure accountability and transparency

The Board of Directors are responsible for bringing about good corporate governance as well as to develop and review the Group’s policies and practices on corporate governance including the Group’s risk management.

Supporting and reporting to the Board of Directors are the Executive Committee which comprises nine members (Figure 1.3a.1).

ASMPT adopted the Three Lines of Defence Model, endorsed by The Institute of Internal Auditors and Institute of Directors, for a strong overall governance and control environment.

The Institute of Directors is a business organization for company directors, senior business leaders and entrepreneurs

The Three Lines of Defence Model enhances the understanding of risk management and control with clear roles and responsibilities, that identify, analyze, define, address and mitigate risks for an effective internal control. This Model clarifies the difference and relationship between the assurance and other monitoring activities, with oversight and direction from the Executive Committee and the board of directors.

With endorsements from the Institute of Auditors and the Institute of Directors, The Three Lines of Defence enables ASMPT to strive towards our objectives that involve embracing opportunities, pursuing growth, taking risks and managing these risks to advance the Group.

One of the Corporate Services, provided by ATS as the headquarters of ASMPT, is Internal Audit which forms the third line of defence. The head of Internal Audit is based in ATS, supported by the internal auditors from ATS and the Hong Kong related company (Figure 1.3a.2).
Internal Audit team comprises experienced and qualified accountants with strong technical knowledge who are able to communicate effectively to the Executive Committee and the Board. To protect their objectivity and independence, the Internal Audit team does not perform management functions in order to carry out internal audit responsibilities with integrity in an unbiased manner.

Internal audit reviews largely comprises of:

- **Control Assessment & Monitoring Systems (CAMS)**
  CAMS is adopted from and aligns closely to the Sarbanes Oxley Audit Requirements of a Sarbanes Oxley compliance audit of internal controls.

- **Financial & Operational Audit (FOA)**
  FOA evaluates the financial reports and the financial reporting processes and provides evaluations of operational efficiencies.

- **Information Technology General Control (ITGC)**
  ITGC examines information technology controls including the information technology infrastructure, policies and operations.

Internal Audit provides management with an unbiased assessment of these areas for an effective risk management, control and governance process. There is a direct line of reporting to the Board, and does so every quarter, in addition to reporting to the Executive Committee. Internal Audit plays a valuable role in providing assurance and confidence to the Board and adds value to the business.

ASMPT is committed to the principles of good governance that assure shareholders’ interests are represented in a thoughtful and independent manner. We believe that good governance supports long-term value creation.

Compliance function is one of the Corporate Services that ATS provides to global ASMPT. The head of compliance is based in ATS and reports to the Chief Financial Officer (Figure 1.3a.3).

### Compliance Statement: A trusted company committed to the highest ethical standards.

<table>
<thead>
<tr>
<th>Phase</th>
<th>Description</th>
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<tbody>
<tr>
<td>Identify, Assess, Review</td>
<td>Identify, assess, and review existing policies, procedures and controls</td>
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<tr>
<td></td>
<td>- Code of Business Conduct</td>
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<td></td>
<td>- Supplier Code of Conduct</td>
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<tr>
<td></td>
<td>- Whistleblower Program</td>
</tr>
<tr>
<td>Alignment and Enhancement</td>
<td>Establish and enhance to align required controls and the guiding compliance</td>
</tr>
<tr>
<td></td>
<td>principles (Responsible Business Alliance, US Foreign Corrupt Practices</td>
</tr>
<tr>
<td></td>
<td>Act, UK Bribery Act, OECD Convention on Combating Bribery of Foreign</td>
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<tr>
<td></td>
<td>Public Officials in International Business Transactions, Personal Data</td>
</tr>
<tr>
<td></td>
<td>Protection Act)</td>
</tr>
<tr>
<td>Deployment and Implementation</td>
<td>Communication and dissemination of guiding compliance principles</td>
</tr>
<tr>
<td></td>
<td>- Ensure transparency with the Tone From The Top, and the availability of</td>
</tr>
<tr>
<td></td>
<td>the Code of Business Conduct in our corporate website, and compliance</td>
</tr>
<tr>
<td></td>
<td>messages in the offices</td>
</tr>
<tr>
<td>Monitoring and Communication</td>
<td>Ongoing communications to instill values to become business-as-usual</td>
</tr>
<tr>
<td></td>
<td>- Code of Conduct Communication Sessions were conducted by the Compliance</td>
</tr>
<tr>
<td></td>
<td>Director</td>
</tr>
<tr>
<td></td>
<td>- Quarterly Whistleblower report submitted to Audit Committee</td>
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*Figure 1.3a.3: Compliance framework*
The Code of Business Conduct, Supplier Code of Conduct and the Whistleblower Programme are published on the corporate website as well as intranet. The sustained, continual communications and dissemination of these compliance guidance with Tone from the Top enhances accountability and transparency as well as encourages a culture of decision-making based on ethics and integrity.

ASMPT aligns its compliance guidance to local and other applicable international laws in all countries where we do business, including these leading enforcement codes and guidance:
- Foreign Corrupt Practices Act USA
- Bribery Act UK
- OECD Convention on Combating Bribery of Foreign Public Officials in International Business Transactions
- Modern Slavery Act 2015 UK
- Responsible Business Alliance, which is the world’s largest industry coalition dedicated to electronics supply chain responsibility

ASMPT has put in place a Whistleblower Programme as part of its Group Compliance Programme. The Whistleblower Programme is in line with international guidelines and practices, not least of which the Sarbanes-Oxley Act of 2002, Responsible Business Alliance and Personal Data Protection Act. This allows not just employees but also third party business partners to report on suspected or actual fraudulent activities or financial irregularities, as clearly set out in the corporate website.

The Whistleblower Programme and reporting channel is through the Compliance Officer who, being in the third line of defence is independent and has a direct reporting line to the board. This ensures the ethics function takes a balanced approach to foster a “speak-up” culture. The Board has oversight and management of ASMPT ethics and compliance programme and receives quarterly update of Whistleblower reporting from the Compliance Officer.

ASMPT was awarded the “Directors of the Year Awards 2017” by The Hong Kong Institute of Directors (HKIoD) and co-organized by The Financial Services and The Treasury Bureau; Securities and Futures Commission and the Hong Kong Exchanges and Clearing Limited, for achievements in demonstrating exemplary high standards in corporate governance.

Receiving the Award for ASMPT is Mr. Eric Tang, Member, Board of Director (Left) and Ms Orasa Livasiri, Chairman, Board of Directors (Centre).

In 2018, The Hong Kong Institute of Directors (HKIoD) awarded Mr Lee Wai Kwong, CEO of ASMPT, with Director of the Year 2018. This award recognises directors for outstanding director practices and corporate governance, to publicise the significance of good corporate governance and to promote awareness of good corporate governance and director professionalism.

Mr Henry Lai, Chairman of the Council of HKIoD, said, “Having a good governance system can allow a company to develop healthily and sustainably. However, to cope with the ever-changing operating environment, conventional ways of doing things have to change also. Leaders of changes need to have extraordinary vision, openness and courage when exploring new paths in new circumstances. These qualities are found in all the winning directors and boards this year. They dare to venture into new realms and lead their companies in facing rapid changes in the business environment. We hope their success stories can serve as examples and provide the benchmark for enhancing corporate governance to different industries in Hong Kong.”
1.3b Implements policies and involves stakeholders to contribute to the community and the environment

ASMPT sustainability framework is based on our four pillars:

**SUPPORTING OUR COMMUNITIES**
We practise good corporate citizenship and contribute to the social well-being of the communities where we operate.

**MANAGING ENVIRONMENTAL IMPACT**
We commit to environmental sustainability, ensuring that our operations are carried out in a responsible manner.

**CREATING VALUES THROUGH INNOVATION**
We create values, focusing on R&D to deliver new cutting-edge technology and product innovations to enable the digital world. At the same time, we strive to embed sustainability in our innovations through the efficient use of resources, recycling measures and re-engineering of manufacturing processes.

**NURTURING OUR EMPLOYEES**
We believe employees are our best assets and we are committed to building a future-ready workforce in an environment that allows them to grow and excel.

Moving forward, we shall continue to implement and sustain programmes and measures to improve the economic, environmental and social well-being of the communities in which we operate.

- Figure 1.3b.1: Ms Orasa Livasiri, Chairman, Board of Directors

ASMPT has published our Sustainability Report since 2016, and as part of our continued commitment to environmental sustainability, this report is published in electronic form only, on our corporate website.

The sustainability drive is spearheaded by a dedicated Environment Social Governance Committee to review and monitor the Group’s environmental, social and governance policies and practices, ensuring compliance with legal and regulatory requirements as well as to matters relating to sustainability risks, sustainability management performances as well as recommendations and follow-up measures.

Supporting the Environment Social Governance Committee are two ATS WHS Committees, which drives sustainability efforts that align with Group strategy and directions. Within ATS, there are two certified FSM for each of our two offices (Figure 1.3b.2).

We facilitate employee’s attitude and behavior beyond organizational commitment through corporate social responsibility activities. Our employees are encouraged to leave social imprints as they continue to give back to the society. Involvements of Non-Governmental Organisations (NGO) are closely tied to our programmes as we integrate CSR efforts into the organization. Per Figure 1.3b.3, we offer token of appreciation prepared by the beneficiaries from MINDS to our employees during festive celebration periodically, that is, during Christmas. During annual dinner 2018, we donated a token sum of $15,140 for every nomination received during staff’s registration. The initiative raised awareness for our support to our regular partners as well as staff engagement.

The Group encourages active contribution to the communities in which we operate in. We endeavor to create impact through means of collaboration, employee volunteerism and charity giving. Our community initiatives focus on community well-being, empowering youths through our structured internship initiatives and encouraging eco-friendly initiatives. In 2017, the Group contributed 125 activities and 18,000 hours of volunteer service in the communities we operate, including annual stalwart activities such as the Oxfam Trailwalker programme where global employees participated to aid the efforts and the Race Against Cancer (RAC) to help raise funds for cancer treatment and rehabilitation, among others. We support local Institute of Higher Learning (IHLs) through internship programmes totaling 93,000 hours and scholarship opportunities, benefiting more than 40 deserving recipients.

ATS contributes regularly and effectively to the development of the Skills Framework (SFw) for Training and Adult Education (TAE), lending expertise, resources and validation efforts to support and forward the national agenda.

In May 2012, ATS piloted ‘Green Office’ concept in its building. It implemented double-glazed glass, double roof Rockwool heat insulation and low energy LED light as well as upgraded the chiller plant to be more energy efficient. Such measures resulted in a low ETTV (Envelope Thermal Transfer Value) of less than 50W/m².
CONTRIBUTION TO COMMUNITY

1. Industry Discussions & Validation
   - Representation for Precision Engineering WSQ Technical Working Committee
   - Representation for Precision Engineering Sectoral Manpower Strategy 2020 focus groups
   - Representation for Precision Engineering Development of Skills Framework focus groups
   - Representation for Institute for Human Resource Professionals (IHRP) focus groups and field tests

2. Council Member
   - Council Member: Patrick Lim for PECOI – Precision Engineering Centre of Innovation (collaboration with SIMTech)
   - Management Board: Ong Beng Thiam – Bartley Community Care Service (charity with IPC status)

3. Corporate Social Responsibility
   - Race Against Cancer (collaboration with SingTel-Singapore Cancer Society)
   - Blood Donation (collaboration with Singapore Red Cross Society)
   - Festive Giveaways (collaboration with non-profit organizations such as MINDS)

ENVIRO

NMENT

1. Environmental Charter
   - ATS is committed to environmental care, pollution prevention and continuous improvements of the environmental performance in all our activities, products and services.

2. Reduce, Reuse, Recycle Projects
   - Captured natural light to office by solar tube for roof office, 100% replace artificial light at pantry area on sunny days
   - Installation of motion and light sensors in infrequently used areas
   - Installed wastewater treatment facilities to recycle processed water from our lead frame operations

3. Awards & Certification
   - Certified ISO 14001 Environmental Management System since 2000
   - BCA Green Mark for new building (TPB2)
   - Energy Efficiency National Partnership (EENP) Awards 2016 – Outstanding Energy Manager of the Year

Reduce more than 1,000,000 kg carbon footprint per year

Energy cost savings to more than $283,000 per year

CORPORATE SOCIAL RESPONSIBILITY

<table>
<thead>
<tr>
<th>Organisation</th>
<th>Frequency</th>
<th>Activities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Singapore Cancer Society</td>
<td>Yearly</td>
<td>Race Against cancer</td>
</tr>
<tr>
<td>Singapore Red Cross</td>
<td>Yearly</td>
<td>Blood Donation Drive</td>
</tr>
<tr>
<td>Red Shield Industry</td>
<td>Yearly</td>
<td>Donation Drive</td>
</tr>
<tr>
<td>Oxfam</td>
<td>Yearly</td>
<td>100km Oxfam Trail Walker (Hong Kong)</td>
</tr>
<tr>
<td>MINDS</td>
<td>Periodic</td>
<td>Merchant purchase for Management Giveaway</td>
</tr>
<tr>
<td>Singapore Visually Handicapped</td>
<td>Periodic</td>
<td>Massage</td>
</tr>
<tr>
<td>Land Transport Authority</td>
<td>-</td>
<td>Safe Riding Programme</td>
</tr>
</tbody>
</table>

Figure 1.3b.2: ATS leaders supporting various forms of CSR initiatives

Figure 1.3b.3: Our CSR involvement and activities
Facilities management department continued the efforts to maintain energy efficiency and incorporated into Tech-Park Building 2 (TPB2). Completed in 2016, TPB2 has achieved Gold certification in BCA Green Mark Scheme. Our manufacturing processes are certified to the ISO 14001 Environmental Management System since year 2000.

Goodies purchased from MINDS for the purpose of Management giveaway during festive celebration

Participants going through the table-top exercise during the Safe Riding Program

Colleagues participating in Boy’s Brigade activities as part of joint CSR and Teambuilding

Contribution to MINDS and Singapore Cancer Society is one of the key elements of Annual Dinner 2018

Annual affair promoting cancer awareness and raising funds for cancer treatment and rehabilitation efforts

Employees engaged in massage service provided by Singapore Association of the Visually Handicapped

Colleagues participating in Hong Kong Oxfam 100km Trail Walker

Contribution to the SFw for TAE under SkillsFuture, a national agenda
Grand Opening of Tech-Park Building 2
**Customer Relationship Framework**

5 channels to **CAPTURE** “Customer Requirement”

- Gather feedback and review with customers
- Manage Sales / Service / Customer Relationship Management (CRM)
- Senior Management provide strategic direction
- Conduct market research and analysis
- R & D / Innovation Center for product defect and quality management, technology analysis and product requirement.

4 means to **CREATE** “Customer Experience”

- Customer Touch Point (such as sales / service engineer and overseas sales / service centers)
- Marketing activities (such as exhibition / tradeshow, seminar, in-house show)
- Collaboration on technology and product development
- Customer Engagement (such as Technology Day and Supplier Day)

3 ways to **COLLECT** “Customer Satisfaction Feedback”

- Satisfaction survey / feedback
- Product appraisal survey / feedback
- Post marketing activities survey / feedback
ASM Pacific Technology (ASMPT), being the market leader that offers best-in-class equipment and materials for all major steps in the electronics manufacturing process, serves global customers and engages them in various collaboration and development projects. Our Backend Equipment Business offers a diverse range from bonding to molding and trim & form to the integration of these activities into complete in-line systems for the microelectronics, semiconductor, photonics, and optoelectronics industries. Our Materials Business provides a variety of leadframes such as etched and stamped as well as advanced packaging materials. Our SMT Solutions, which is not in scope for this assessment and hence will not be explained in detail, develops and sells printers and placement solutions for the surface mount technology, semiconductor and solar markets.

**Backend Equipment Business**

The markets are segmented by Integrated Circuit (IC)/Discrete and Optoelectronics (Opto)/Light-Emitting Diode (LED) due to different market needs.

ASMPT offers a full range of equipment for
- IC/Discrete business which require fast speed, high accuracy and smart features;
- Opto/LED business which require fast speed and low Cost of Ownership (COO).

As the whole semiconductor industry is moving toward Industry 4.0, the future requirements of Backend Equipment are in the direction of smart features and automation. Features such as auto loop height measurement, real time monitoring and predictive maintenance are to ensure equipment is always running in tip top condition. Automation such as auto magazine changing and auto capillary changing are to promote high machine utilization.

Backend Equipment revenue contribution is made up of IC/Discrete and Opto/LED with 64% and 36% respectively in year 2018 with the major contribution from the China market.

**Materials Business**

Materials Business focuses on the design and manufacturing of stamped and etched leadframes. In ASMPT, we offer one-stop design and manufacturing of etched leadframes with patented process technologies.

ASMPT is the market leader for Moisture Sensitivity Level 1 (MSL 1) enhancement solution and also the market leader in the high density leadframes with frame size of 100mm x 300mm.

Our core technologies include high speed stamping, precision etching, thin metal plating, metal forming, design and process automation.

Markets are segmented by Quad Flat No-leads package (QFN) and standard leadframes. ASMPT has invested heavily on processes that are capable to produce Ultra Large High Density and Patented MSL 1 Solutions for both QFN and standard leadframes, which distinguishes ASMPT from our competitors.

ASMPT has extensive technical knowledge and process capability to support new package development with our ASM Build up Interconnect Technology (ABiT) leadframe package and LED Leadframe Red Ink package (Dye Penetration Test Solution).

Our advanced technologies in this area, coupled with vast product portfolio with leading edge product technologies, enable our global sales and post-sales services personnel to provide value-added products and services to meet customers’ demands and requirements.

ASMPT Materials Business’ top 10 customers contributed almost 55% to the 2018 revenue, located in these three countries: China (five), Thailand (three) and Malaysia (two).

To meet the strong market demand and business growth, as well as a demand for shorter lead-time, we have increased the number of etching lines. For products with stringent adhesion properties, zero delamination and higher density requirements, we have various processes to fulfil customer expectations, such as:

1. RSA is to promote Copper (Cu)/ Epoxy Mould Compound (EMC) adhesion; high positional accuracy and high degree of freedom in coverage design.

2. Moisture Sensitive Level (MSL) Solutions - Brown Oxide Treatment (BOT) is ASMPT patented special chemical
process to form a well-controlled oxide layer on top of the leadframe copper surface with unique morphology and structure (Figure 2.1a.1) to promote chemical and mechanical adhesion, contamination free on Ag surface and wire bondability is guaranteed to customers at proven level (MSL 1). This BOT process only applies to silver (Ag) plated products.

**Brown Oxide Treatment (BOT)**

3. Micro-etching roughness (ME2) is similar to BOT but cater for different plating type which is applied before plating process (Figure 2.1a.2). ASMPT patented ME2 process is applicable to both PPF and Cu/Ag leadframe. The ME2 also promotes mechanical inter locking and enhances adhesion. The ME2 has a zero delamination advantage which is able to satisfy customers’ stringent requirements.

**Micro-etching (ME-2)**

4. QFN ONE block design, Figure 2.1a.3, is offering customer a higher density unit outline by increased material utilization level as compared to conventional 4 blocks QFN layout. With this design, customers can achieve higher productivity gains and cost savings. This ONE BLOCK design can be applied to both RSA and PPF leadframes.

**In understanding customers’ requirements and building business relationship with customers for both Backend Equipment and Materials, we adopt a Customer Relationship Framework (Figure 2.1a.4). The framework consists of:**

- **5 channels to capture customer requirements**
- **4 means to create customer experience**
- **3 ways to collect customer satisfaction and feedback**

**Our Frontline Sales teams visit our customers regularly to obtain direct feedback on our equipment and materials performances and requirements and customers’ upcoming projects. Such interaction with customers, as well as during trade shows, allows our Backend Equipment frontline sales teams to understand the**
latest potential equipment demands of the customers, which are recorded to the CRM (Customer Relationship Management) system. Materials Frontline Sales teams conduct Customer Quarterly Business Review and Quality Management Review with customers to track materials quality performance and customer experience.

Our Senior Management frequently interacts with our customers both formally in meetings and informally in social events to gain insights on the latest trends of applications in the digital world, upcoming business opportunities and expansion plans of the customers.

In order to understand our market position, Backend Equipment conducts regular analysis on our bookings and lost orders so that we can serve our customers better by continuously improving our product range, pricing and equipment features that could exceed customers’ expectations. Similarly, Materials Business analyses market share, sales bookings trends, business opportunities and threats from competitors in order to gain more market share.

Market researches and surveys conducted by independent organizations such as SEMI, Business Wire and VLSI are valuable inputs to validate our leading position in the industry. For two consecutive years in 2017 and 2018, ASMPT is one of the 10 best suppliers and we were awarded the Triple Crown by VLSI (Figure 2.1a.5).

2.1b Incorporates market and customer requirements into strategic plans

After knowing the market and customers’ requirements through the 5 channels, Senior Management will map out the short, mid and long term strategic plans accordingly (Figure 2.1b.1).

Our overall strategy is to grow together with customers and to meet their requirements. Our local Sales arrange meetings with customers on a weekly basis to update the customers on our technical developments. We organize technical team visits for technology exchange, capability update and sharing our knowledge with customers, which forms a platform to gather customers’ feedback for improvement plans to support our valued customers.

Market and customers’ requirements are being actively referenced in our yearly Product Roadmap meetings in which long term plans of our product development is derived for Backend Equipment and Materials.

For market or customers’ mid-term needs, new products are designed based on customers’ requirements such as low cost of ownership or new packages.

For short-term requirements to meet shorter lead-time, the Factory Planner (FP) software was introduced into our Materials Business for manufacturing efficiency. The software enables us to provide accurate capacity planning and fast commitment to customers with better visibility to reschedule production priorities for customers.
2.2 Customer Experience

Describe how the organisation:

2.2a  Incorporates customer expectations in designing touch points, products, processes and services

2.2c  Provides ease of access for customers to seek assistance and information to enhance the customer experience

Based on the ATS Customer Relationship Framework, there are 4 means to create customer experience (Figure 2.2a.1).

![Figure 2.2a.1: 4 means to create Customer Experience](image)

**Backend Equipment**

For ease of access to customers’ touch points, ASMPT has overseas offices near to our customers’ bases. Sales and Field Service Engineers visit customers on a regular basis and support customers’ daily issues and improvement projects. Besides these regular visits, our Sales and Service Engineers are contactable through their mobile phone to provide immediate technical support.

Customers can seek assistance during our regular visits or contact us via phone calls, emails or through our website. While the Service team installs or maintains the equipment on-site, they also work with customers in process study for improvement and development. All the work and activities of the Service team at customer plants are recorded in CRM Service module for analysis.

We have dedicated Corporate Account Managers (CAM) to serve our corporate customers, such as Nexperia, Texas Instrument, Infineon and ON Semi. CAM is to provide customized sales and service support and is the main contact window to these corporate customers. CAM has direct access to Top Management to seek additional resources or support. The main responsibility of CAM is to enhance customer satisfaction and promote customer experience.

Our latest products are showcased during our marketing activities, exhibitions and trade shows. We gather direct feedback from customers and improvements and channel them to our R&D team. Technical seminars on the hottest topics of the digital world are held in conjunction with the trade shows to introduce and showcase our latest technologies.

We listen to our customers, which may result in co-creation of product with our customers, achieving a win-win situation.

**Materials**

To enhance customer experience in doing business with ASMPT, we provide them with easy access to our engineering or technical support, sales support for order, pre-alert for material reservation, expediting delivery and other customer queries.

Our touch points are the Frontline Sales personnel and Sales Administration Officers (SAO) who provide quotation, order processing, delivery lead-time and shipment plan support. Overseas Sales provide on-site support when there is need such as quality complaint or new product drawing first review discussion. Quarterly business reviews are carried out with our customers to review our overall performance in meeting customers’ requirements and expectations.

Customer factory audits and visits are also areas where customers assess the factory processes to meet their requirements. Feedback during the audits are addressed and actions taken to correct the findings that were raised by our customers.

Customers can raise enquiries via email 24/7. This email helpline is set up to target new/future customers. Sales and Marketing will follow up to assist customers and to enhance the customer experience in doing business with ASMPT.

Our Leadframe Pre-Production Engineering (PPE) department handles new design enquiries and work
ASMPT has both commercial and product quality related feedback from customers in the form of compliments or complaints. Customer feedback on product quality, price, delivery and service support are received via different touch points and are reviewed. We respond to customers via our Frontline Sales or Service personnel.

Complaints received from customers are important to ASMPT as they reflect customers’ satisfaction levels and perception on our products and services. Each complaint case is handled with extreme care and urgency to minimize risks of ASMPT products impacting customers’ production output or their business needs.

A cross-functional team is formed to investigate and take appropriate actions using 8-Discipline (8D) methodology. A formalized report in the form of an 8D corrective action report will be generated with details of the root cause and countermeasures. Investigations are carried out by a multi-disciplinary team where root cause and countermeasure are established to address the complaint.

### 2.2b Ensures customer feedback is addressed and analysed

ASMPT has both commercial and product quality related feedback from customers in the form of compliments or complaints.

Customer feedback on product quality, price, delivery and service support are received via different touch points and are reviewed. We respond to customers via our Frontline Sales or Service personnel.

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### 2.2c Sets performance standards at customer touch points to ensure consistent service delivery

**Backend Equipment**

CRM Service module records every service visit to customer’s plant and measures our response time to customer’s request for service.

In order to have fast release of the wirebonder into mass production run, we track the Backend Equipment installation time closely in order to identify the areas for improvement. One significant improvement we made was reducing the wire clamp calibration time from 50 minutes to 2 minutes. This was achieved through the innovative design on wire clamp whereby the calibration jig is no longer needed and the wire clamp gap and force are determined by build-in high precision piezo sensor. With this innovative design, the calibration at customer’s site is no longer dependent on skilled operators.

**Materials**

We have established performance standards at the various touch points. These include product quality, response time, delivery lead-time and on time delivery.

An example is the delivery lead-time improvement from 10 weeks to 6 weeks by installing additional etching line capacity to meet the customers’ requirements for shorter lead-time.
Understanding customer satisfaction can help us stay ahead of competition in an effective way. Hence, for both Backend Equipment and Materials, we have Quarterly Business Review (QBR), Customer Relationship Management (CRM), e-mail communications, phone calls and weekly or monthly meetings with customers.

We have 3 ways to collect customer satisfaction on product performance and services (Figure 2.3a.1), either via customer satisfaction survey or customer scorecards or from product appraisal survey and survey on our marketing activities.

For post marketing activity, both Backend Equipment and Materials hold seminars with our customers. After-event customer satisfaction survey is conducted to determine customer satisfaction on the topics delivered and the various aspects of the event management. The survey covers customer expectation, presentation topics and contents, future seminars topic etc. in Figure 2.3a.2.

**Backend Equipment**

Quality Assurance team works with Marketing to conduct survey once every half year on worldwide customer satisfaction of our products and services. The survey covers the following criteria:

- Cost of Ownership (COO)
  - Price, cost of ownership

- Equipment Performance
  - Uptime, throughput, build quality & Software Quality

- Customer Service
  - Response time, professionalism of service and trainer

As a result of our listening to our customers and surveys conducted, we observe faster market acceptance of our new wirebonder compared to previous wirebonder models (Figure 2.3a.3). Areas of improvement to win together with customers include smart innovative features such as X Power, AeroEYE, ECP and etc. (Figure 2.3a.4).

**Figure 2.3a.1:** 3 ways of collecting customer satisfaction feedback

**Figure 2.3a.2:** Extract of customer survey after seminar

**Figure 2.3a.3:** Data table showing faster acceptance rate of Aero Bonder compared to previous models

**Figure 2.3a.4:** Graph showing machine sales quantity and fast market acceptance.
Customers share quarterly or yearly supplier scorecards which indicate their overall satisfaction level on our delivered services in the areas of:

- Quality Excellence
- Cost Excellence
- Operational Excellence
- Service Excellence
- Technology Excellence

We internalize the scores and make improvements to better serve customers and enhance customer experience in doing business with us.

Our participation in an independent third party survey conducted by VLSI provides insights on customer perception of ASMPT as compared to our competitors. The survey covers major aspects such as technical leadership, supplier’s commitment to support customer needs, process support, partnering, field engineering support, and spare/replacement support. ASMPT is awarded Best Supplier in the area of field engineering support and after-sales support in Year 2018.

**Materials**

Customers measure our performance based on quality, delivery, price, and service. Some customers also include technology and environment compliance as part of the measurement.

### 2.3b Determines current and future drivers of customer satisfaction

For Backend Equipment, we gather inputs on current and future drivers of customer satisfaction from Frontline Sales and Service teams. Analysis on market share to track our new equipment also provides a good indicator of whether we are going in the right direction to create drivers to satisfy customers. The key drivers for Backend Equipment are fast speed, low cost of ownership and good quality.

Aero wirebonder has improved the Mean Time Between Assist (MTBA) by up to 50% and Unit Per Hour (UPH) by up to 30% as compared to previous wirebonder model (Figure 2.3b.1). Customers have gained more output with fewer operators and this has improved their cost of ownership (COO). Currently, we are moving forwards in our smart and automation features to achieve market driven Industry 4.0.

For Materials, we focus on quick responsiveness of design as an important differentiator to retain existing customers and to capture new business. Customers are expecting shorter lead-time. As such, our Frontline Sales team conduct competitors’ lead-time survey/understand our competitors’ lead-time and together with Production, benchmark our lead-time accordingly. In terms of product range, we target high density leadframes to meet customers’ expectations for high performance products. We win and delight customers with our quick turnaround and range of products available.
2.3c Incorporates customer insights and feedback into the strategic improvement plans

Customers feedback received through the various channels are incorporated into our quarterly business reviews, product roadmap, operation reviews and executive meetings. We listen to our customers, and incorporate their insights and ideas to our strategic improvement plans and product development, to set ourselves apart from our competitors and embrace our VMV of winning with our customers.

Based on the customer feedback, Backend Equipment and Materials determine that regular introduction of our technology advancement to customers is an important strategy. We organize product roadmap meetings, technical seminars and customer visits to our dynamic Innovation Centre located in ATS which showcase our latest product development and range of advanced and inventive offerings.

Backend Equipment

Besides speed, technology evolution is also required by customers to handle their challenging packages. As a result, ASMPT wirebonder has an ultrasonic power technology, an innovative feature that responds to customers’ requests.

ASMPT developed the first transducer in the world with ultrasonic power excite on both X and Y directions. This innovation not only brought significant breakthrough in the wirebonding technology, it addresses many of our customers’ process issues (Figure 2.3c.1).

Besides technology evolution, ASMPT has focused smart features including AeroEye with machine auto heat check and automated features such as automated capillary changing, auto wire spool changing and wire thread, which reduce human intervention and promote higher yield assurance through artificial intelligent (AI) process for future market needs.

Materials

ASMPT Ultra-Large High Density leadframes is a proven winning product and a new business strategy to capture more market share. This leadframe can support high and increased unit packing, almost 100% leadframe utilization, high productivity jump and it can fit packages of various body size. ASMPT has started producing first article sample for customer qualification.

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**Figure 2.3c.1: Technology Innovation - X power**

- Better Al Splash Control
- Much Better MTBA
- High UPH
- Better Pad Crack Control
- Better Stitch Formation
- Wider Process Window
- Better Inter-Metallic Coverage
- More Robust Bonding

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Semiconductor **Market Drivers**

- **Data - The New Oil**
- **5G**
- **AR/VR**
- **Mobility**
- **Camera**
- **Power Modules**
- **Industrial / Power Energy**
- **Car-to-Car**
- **Mobile devices**
- **Drones**
- **LED Display**
- **Smart City**
- **Smart Home**
- **Autonomous Vehicle**
- **Smart Cleaner**
- **Smart Office**
ASMPT recognizes the importance of effective strategy development as a contributor to our on-going business success. ASMPT strategy is built based on the Group’s Vision, Mission and Values that guides the organization and aligns the organization towards a unified goal. The Group Strategy is defined for 10 years horizon to reach the Vision and Mission. Business Segment Strategies are to support the Group Strategy. Supply Chain Management, Enabling Technology Group, Quality Management (QM), Information and Communication Technology (ICT), Human Resource, Finance and Merger and Acquisition (M&A) strategies are designed to support both the Business Segments and Group Strategies. Values are the fundamentals for ASMPT’s Business proceedings.

The Group Strategy (Figure 3.1.1) focuses on 5 main core areas:

- **Company Success** in achieving Group revenue exceeding US$4 billion and EBIT exceeding 20% by 2025

- **Market and Customer** to achieve the undisputed number 1 position in Assembly, Packaging and SMT; to be the Preferred Go-To-Partner for Smart Factory Solutions and the leading player in new businesses

- **People and Technological Enablers** which promotes ASMPT as a Great Place to Work where people are inspired to deliver outstanding results. Besides that, ASMPT also carries a culture that promotes innovation and attracts the right talents to develop key technologies in Enabling the Digital World

- **Value Add** to produce World Class Quality Equipment; to maintain Operational Excellence by leveraging on agile supply chain network and build ASMPT Smart Factories

- **Differentiation** to strive for outstanding customer value through High-Speed Innovation, produce a premium brand recognition and best in class integrated solutions

ASMPT has strategic Business Segments (BU) that operates independently with the responsibility for a particular range of products. Their focus is on profitability, market share, product differentiation, innovation and people development. These strategic business units are responsible for their own profit or loss but are answerable to the Top Management. The Group Strategy guides the Business Segments Strategy.
Describe how the organisation:

3.1a Determines organisational challenges and anticipates external changes and risks

In the monthly EXCO meeting, the Business Segment CEOs will review and evaluate the external market factors, such as US and China trade war, semiconductor market forecast, wafer fabrication houses forecast, country specific consumer market demand and PMI/GDP growth. Segment CEOs also review in depth of the market drivers to ensure that the Business Segment Strategy is still valid. If there are any change in the industry forecast, economical changes or customer behaviour, the situation will be brought up to the table in the EXCO meeting for discussion and make immediate changes to the WIGs.

ASMPT’s Board of Directors is responsible for the risk management and for reviewing its effectiveness to ensure that the Group establishes and maintains appropriate and effective risk management system.

With managing risk in mind, the Strategic Risk Review Committee (SRRC) was formed in 2016 to report directly to the Executive Committee.

SRRC comprises of management from different Business Segments who are responsible for various key functions within ASMPT so as to bring experience, knowledge and a balanced approach to pro-actively evaluate the internal and external risks facing the Group. The SRRC members are re-elected every two to three years bringing in fresh and new perspectives in evaluating risk management.

ASMPT adopts the Three Lines of Defense Model assigning clear roles and responsibilities that increase the effective management of risk and control.

With the Strategic Risk Review Committee and the Three Lines of Defense Model, ASMPT has a strong overall governance and control environment, enabling the Group to pursue its objectives that involves embracing opportunities, pursuing growth, taking risks and managing these risks.

3.1b Develops long- and short-term strategies to achieve organisational goals

Every year, the organization conducts an Annual Executive Meeting, which maps out the strategic plans with participation from “Executive Committee” (EXCO) Members and Senior Management of respective business segments and global sites.

- 5 Years Plan – using SWOT analysis, Porter’s 5 Forces Model and PEST analysis
- 2 - 3 Years Plan – develop strategic directions and cascade down to site-level
- Annual WIGs to support the strategic directions and measure departmental level KPIs assigned to sections and staff

3.1c Engages key stakeholders in the strategy development process

ATS utilizes several engagement strategies for key stakeholders to increase their participation and commitment to strategic planning processes. Key stakeholders are engaged in the strategy development through the following channels (Figure 3.1c.1):

<table>
<thead>
<tr>
<th>Strategic Events / Meetings</th>
<th>Stakeholders / Objectives</th>
</tr>
</thead>
<tbody>
<tr>
<td>Annual Vision and Strategy Formulation</td>
<td>Executive Management</td>
</tr>
<tr>
<td></td>
<td>To share goals and projections for the next 5 years and to discuss short-term initiatives to meet KPIs</td>
</tr>
<tr>
<td>Annual Sales and Product Roadmap</td>
<td>Senior Management &amp; Department Management</td>
</tr>
<tr>
<td></td>
<td>To share strategic directions for the next 2 to 3 years and to discuss short-term target</td>
</tr>
<tr>
<td>Annual Manufacturing Review Meeting</td>
<td>Senior Management &amp; Department Management</td>
</tr>
<tr>
<td></td>
<td>To brainstorm on strategies and key issues based on the sales and product roadmap</td>
</tr>
</tbody>
</table>

* Figure 3.1c.1: Engagement of Key Stakeholders in Strategy Development Process
3.2 Strategy Implementation

3.2b Manages organisational risks associated with plans

ASMPT manages global risks in a structured risk management process. Figure 3.2b.1 shows the flow of the strategic risk review process. Strategic Risk Review Committee (SRRC) is now into the second wave of members, with the first wave serving from 2016 to Q3-2018, and the second wave serving from Q2-2018 for a period of 2 years.

ATS has four representations, including the Secretary who has continued from the first wave to ensure consistent adoption of review methodology, in the SRRC that comprises a total of 11 members.

SRRC consulted The Committee of Sponsoring Organizations of the Treadway Commission (COSO) Enterprise Risk Management – Integrated Framework to implement a structured process to identify potential threats to ASMPT, to manage risk to be within our risk appetite and to provide reasonable assurance regarding the achievement of our Group objectives.

COSO is a joint initiative of five private sector organizations, including the Institute of Internal Auditors, dedicated to providing thought leadership through the development of frameworks and guidance on enterprise risk management, internal control and fraud deterrence.

SRRC has put in place a unique ASMPT Risk Identification Framework (Figure 3.2b.2) which is a comprehensive organizing framework for defining and understanding potential business risks both external and internal that may affect the achievement of ASMPT’s objectives.

External factors have an impact in achieving Group objectives. Recent trade disputes affecting global economy, customers’ mergers and acquisitions that result in higher bargaining leverage, or competitors’ mergers and acquisitions that may negate ASMPT’s unique value proposition in total solutions, are some of the risks that SRRC will assess and evaluate. Figure 3.2b.3 provides the guiding factors in considering external risks facing the Group.

ASMPT to also look into internal factors (Figure 3.2b.4) to ensure we are at the forefront in terms of technology, costs and value to customers. How the Group addresses and responds to business and markets’ changing needs, our product strategy, quality and innovation, manufacturing capabilities, as well as our social and environmental responsibilities are considered.

After identifying the potential and possible risks, Risk Assessment Scores derived from the COSO Impact Scale and Likelihood Scale that is tailored to suit ASMPT risk management, evaluates the potential impact of the risks (Figure 3.2b.5).

To ensure that ASMPT identifies the current thriving business requirements whilst still dramatically reinventing ourselves when defining risks facing the Group, SRRC adopts the 3 Box Solution by Vijay Govindarajan (Figure 3.2b.6), a New York Times bestselling author who pioneered the strategy for leading innovation.

In assigning the risks identified through the 3 Box Solution, SRRC ensures that ASMPT:

1. Manages the present by managing the core business at peak profitability
2. Selectively forgets the past where ideas, practices and attitudes that could inhibit innovation are abandoned
3. Create the future to convert breakthrough ideas into new products and businesses

The overall ASMPT Risk Identification Framework allows the Group to systematically identify risks that poses strategic and organizational challenges which allows the Group to constantly redefine the strategies in the face of dynamic forces of technology and shifting customer preferences and positions ASMPT to execute breakthrough strategies.

SRRC regularly reviews the progress of the risk mitigation strategies, considers and evaluates the effectiveness of these implementations and assesses whether threats have been sufficiently reduced to ASMPT’s acceptable levels (Figure 3.2b.7).
Figure 3.2b.2: Risk Identification Framework

- External
  - Political
  - Economic
  - Social
  - Technological
  - Natural Environment

- Internal
  - Business
  - Financial
  - R & D (Technology)
  - Products
  - Manufacturing
  - HR
  - IT

- External Factors:
  - Governmental changes
  - Legislation
  - Public policy
  - Regulation

  - Capital availability
  - Credit issuance, default
  - Concentration
  - Liquidity
  - Financial markets
  - Unemployment
  - Competition
  - Mergers/Acquisitions

- Internal Factors:
  - Market needs
  - Business model/strategy
  - Service
  - Competition
  - Customer satisfaction
  - Pricing
  - Down turn
  - Diversification
  - Authority
  - Reputation, Image & PR
  - Partnership

  - Currency
  - Liquidity & Credit
  - Cash flow
  - Profitability
  - Cost
  - Results/growth
  - Internal audit
  - M&A

  - IP
  - Time to market
  - Differentiation
  - Innovation
  - Resources allocations
  - Innovation
  - Competences

  - Strategy
  - Capability
  - Health & Safety
  - Competitive advantages
  - Entry barriers
  - Innovation
  - Cost
  - Failure on site
  - Life cycle

  - Generation Y
  - Succession planning
  - Knowledge & competences
  - Culture
  - Leadership
  - Global alignment
  - Communications

  - Code of conducts
  - Compliance
  - Management Fraud
  - Legal, employees' integrity

  - Environment
  - Society awareness

- Figure 3.2b.3: External Risk Factors

- Figure 3.2b.4: Internal Risk Factors
### Risk Assessment Score - Final

<table>
<thead>
<tr>
<th>Impact</th>
<th>Probability</th>
<th>Final</th>
<th>(A x B)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Critical</td>
<td>Medium (12)</td>
<td>Extensive management crucial (36)</td>
<td></td>
</tr>
<tr>
<td>Moderate</td>
<td>Low (2)</td>
<td>Management effort required (4)</td>
<td></td>
</tr>
<tr>
<td>Minor</td>
<td>Low (2)</td>
<td>Monitor and manage risks (8)</td>
<td></td>
</tr>
</tbody>
</table>

### Probability (B)

- **Low** (2)
- **Medium** (4)
- **High** (6)

### Risk Assessment Score - Impact

<table>
<thead>
<tr>
<th>Impact</th>
<th>Definition</th>
<th>Score (A)</th>
</tr>
</thead>
</table>
| Critical | • Sustained loss of market potential/position/reputation  
• Significant impact in long term competitive edge  
• ≥ 10% decrease in sales revenue  
• ≥ 20% decline in profit margin | 6 |
| Moderate | • Some impact on market potential/position/reputation  
• Some impact in long term competitive edge  
• 5-10% decrease in sales revenue  
• 5-10% decline in profit margin | 4 |
| Minor | • No or minimal impact on market potential/position/reputation  
• No or minimal impact in long term competitive edge  
• ≤ 5% decrease in sales revenue  
• ≤ 5% decline in profit margin | 2 |

### Risk Assessment Score - Probability

<table>
<thead>
<tr>
<th>Probability</th>
<th>Definition</th>
<th>Score (B)</th>
</tr>
</thead>
<tbody>
<tr>
<td>High</td>
<td>≥ 80% of occurrence</td>
<td>6</td>
</tr>
<tr>
<td>Medium</td>
<td>30% - 70% chance of occurrence</td>
<td>4</td>
</tr>
<tr>
<td>Low</td>
<td>≤ 20% chance of occurrence</td>
<td>2</td>
</tr>
</tbody>
</table>

*Figure 3.2b.5: Risk Assessment Scores*
The 3 Box Solution*

<table>
<thead>
<tr>
<th>Box Number</th>
<th>Risk Type</th>
<th>Description</th>
<th>Target</th>
</tr>
</thead>
<tbody>
<tr>
<td>Box 1</td>
<td>Manage the present</td>
<td>Those intended to improve today’s business performance</td>
<td>For companies to endure, they must get the forces of Preservation (box 1), Destruction (box 2), and Creation (box 3) in the right balance</td>
</tr>
<tr>
<td>Box 2</td>
<td>Selectively abandon the past</td>
<td>This is about pruning lines of business that are underperforming and/or activities that no longer fits the company’s strategy. E.g products, services and people, obsolete policies and practices, outdated assumptions and mind-sets</td>
<td></td>
</tr>
<tr>
<td>Box 3</td>
<td>Create the future</td>
<td>Those that prepare your organization for the long term, winning companies typically allocate 20-30% of their resources to Box 3</td>
<td></td>
</tr>
</tbody>
</table>

* Pioneered by Prof. Vijay Govindarajan (known as VG), who is the Coxe Distinguished Professor at Dartmouth’s Tuck School of Business, a Marvin Bower Fellow at Harvard Business School, and widely regarded as one of the world’s leading experts on strategy and innovation.

---

Total Number of Risks Identified From Each Zone

<table>
<thead>
<tr>
<th>Zone</th>
<th>Impact-Probability</th>
<th>Probability (%)</th>
<th>Risk Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>Critical-High</td>
<td>A</td>
<td>Low</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Medium</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td></td>
<td>High</td>
<td>7</td>
</tr>
<tr>
<td>Moderate-High</td>
<td>B</td>
<td>Low</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Medium</td>
<td>19</td>
</tr>
<tr>
<td></td>
<td></td>
<td>High</td>
<td>12</td>
</tr>
<tr>
<td>Moderate-Medium</td>
<td>C</td>
<td>Low</td>
<td>19</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Medium</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td></td>
<td>High</td>
<td>0</td>
</tr>
</tbody>
</table>

Total number of risks identified: **61**

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Figure 3.2b.6: The 3 Box Solution

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**Risk Assessment Sanity Check**

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Figure 3.2b.7: Risks Identification Review for First Wave 2016 to Q3 2018
3.2c  Allocates resources in a timely manner to achieve strategic goals

Annual WIGs is synchronized with finance, capital investment and manpower allocation. All departments and Business Units are required to submit their budget to Budget Office as part of their work plan submission according to the budget timeline.

Budget Office is part of the Corporate Services with team members sitting in Singapore, reporting to the Chief Financial Officer. Budget Office’s role is to set-up annual budget and long-term business plan for the Group and Business Segments. The annual budget and long-term business plan are discussed in the yearly Annual Strategic Meeting, participated by ASMPT Board of Directors and the EXCO Members. Annual Budget approved by the Board of Directors will then be cascaded down to the Business Segment levels and tracked on their performance progress every month. If the actual performance is deviating against budget, action plans will be discussed and implemented to remediate the situation. Actual financial performance results against budget will be reported to Board of Directors on a quarterly basis through the quarterly Board meeting.

3.2d  Engages key stakeholders in the strategy implementation process

Regular platforms are available to engage key stakeholders in the strategy implementation process which also serves to obtain feedback on the strategies.

Key stakeholders are engaged in the strategy implementation through the following channels (Figure 3.2d.1):

<table>
<thead>
<tr>
<th>Strategic Events / Meetings</th>
<th>Stakeholders / Objectives</th>
</tr>
</thead>
</table>
| Quarterly Financial Results                 | Present preliminary results to EXCO Members  
- To review quarterly financial results  
- To review actual results against budget |
| Monthly Financial Review Meeting            | EXCO Members and Representatives from Business units and Departments  
- To review financial results against budget |
| Monthly Singapore Management Meeting        | EXCO Members and Executives  
Platform for managers to present and feedback on departmental strategies / initiatives |
| Monthly Operational Review Meeting          | Senior Management and Representatives from Business units and Departments  
- To review business and departments performance against budget allocated and KPIs.  
- To review market trends and formulate strategy to address them |

3.2e  Measures performance against plans and targets

Key performance indicators are tracked, monitored and reviewed through various platforms such as Booking, Billing and Backlog which provide real-time information by products, customers, market applications and geographic distributions. Budget Office and Business Unit track the booking and billing against budget on a weekly basis. Tracking of actual results and budget are reviewed and action plans discussed in the monthly Operational Review Meeting.
4.1 Human Resource Planning

Describe how the organisation:

4.1a Anticipates HR needs and develops HR plans and policies which are aligned to strategic goals and organisational values

We advocate a tripartite approach in playing the roles of governance, business enabler and employee champion in our HR process of identifying current and future HR needs leveraging on our six HR functions (Figure 4.1a.1) as conduits to help us secure the right people for the right jobs, build a supportive and great place to work as well as develop our capabilities and capacity to ensure our organization’s success.

For example, we scanned the external environment to anticipate needs in a changing workforce market and adapt our human capital aligned appropriately to the organization’s strategic goals and operational priorities. Through progressive people practices embedded within our recruitment practices, grievance handling, flexible work arrangements and focus on providing a supportive work environment, among others, it enables our workforce to thrive and achieve organizational goals amid a volatile, uncertain, complex and ambiguous environment.

In February 2019, we have been acknowledged as the seventeenth (17th) company in Singapore and the first (1st) in Semiconductor, Precision Engineering industry, to demonstrate exemplary support for our HR team to be IHRP-certified with the Institute for Human Resources Professionals (IHRP) Corporate Partner Program, an exclusive corporate-led initiative. It is part of our continual commitment to build a world-class HR community in Singapore, maximize human capital and contribute to business growth.

This IHRP competency framework has been mapped directly into our HR charter which is aligned with ASMPT strategic goals and operational priorities. Our HR charter translates into desired mindset and behavior, enable our functional roles with the necessary competencies and achieve HR thrusts and outcomes through foundational and technical competencies.
We leverage on the Agile Project Management (APM) (Figure 4.1a.2) approach, an iterative approach to planning and guiding project processes. The APM approach is implemented in the 2 key thrusts: Operational Excellence and HR digitalization involving both internal and external stakeholders. We apply APM across several projects, including our new employee medical claim system, effective from 2019. Given the iterative development and early and incremental feature delivery, we had successfully planned for and released a functional ‘ready to market’ product and reap the following benefits.

**Contribution to Industrial and Government Agencies**

We also contribute to our industry by playing an active role in the Human Resource Management Congress (HRMC), comprising close to 40 companies of the high-technology electronics industry (ourselves included) and accounting for over 68,000 employees within Singapore.

In March 2018, we hosted a meeting for 60 HR leaders and shared on how we leverage technological tools (i.e. Qualtrics) to further internal HR capabilities and better engage our stakeholders.

We leverage on market leading platforms and solutions such as LinkedIn and SAP Success Factors modules, Recruiting Marketing (RMK) and Recruiting Management (RCM) to reach out to both active and passive job seekers. These effective recruiting algorithms reduce our turn-around time, maintain a database of potential talent audiences and match the right candidates to our job requirements. Successful candidates are welcome to the family with a comprehensive onboarding program which includes culture and connection experience with Senior Management.

**4.1b Establishes a recruitment and selection process to meet organisational needs**

As business partners, we build trusting partnership with the business units through the talent acquisition process and manage business outcomes and hiring needs. We keep pace with flexible hiring needs and evolve our recruitment schemes to engage our workforce effectively. (Figure 4.1b.1)

We take on key leadership position within the HRMC Central Committee and meet monthly with other companies to discuss strategic HR topics and legislation. We anticipate HR needs through gaining first-hand information from the meetings and devise appropriate timely plans to address them. We serve to represent members’ interests and provide a credible industry voice when engaging government and non-government agencies in policies affecting the industry.

We maintain good relationships with organizations such as Singapore National Employer Federation (SNEF) for industry engagement and partner Singapore Semiconductor Industry Association (SSIA) for best practices sharing. We also subscribe to and benchmark against the Tripartite Standards to reinforce our adoption of Fair and Progressive Employment Practices (TAFEP).

We work closely with both industrial and government agencies to support and develop national agendas. As part of our L&D contribution, we received a letter of appreciation from SkillsFuture Singapore towards the development of the Skills Framework (SFw) for Training and Adult Education (TAE) in November 2018.
### TALENT ACQUISITION

**Planning**
- Headcount Planning & Budgeting
  - Conduct annual budgeting exercise and review approved headcount in staff requisition system

**Attraction**
- Recruitment Schemes
  - Identify and adopt reactive and proactive schemes which include, temp, contract, intern, outsource

**Outreach**
- Talent Pipeline
  - Enhance employer branding through collaboration with Institute of higher Learning

**Selection**
- Interview
  - Use of Competency-Based Interview Evaluation Form, aligned to the company POWER values

**Onboarding**
- Orientation
  - Includes welcome package, first day induction and New hire orientation programme

**Recruitment Needs**
- Provision for long-term and short-term organisation needs

**Sourcing & Advertising Strategy**
- Tap on to external and internal recruitment platforms

**Candidate Relationship Management**
- Use of social media to seek out passive candidates

**Probation**
- New hire’s performance review with reporting supervisors

---

**Figure 4.1b.1: Business partnership infused into the talent acquisition process**

**4.1c  Identifies and grooms employees for high performance**

<table>
<thead>
<tr>
<th>Identifying &amp; Grooming Process</th>
<th>ATS Application</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Aligning with Organisational Goals</strong></td>
<td>Refer to Category 3 Strategy</td>
</tr>
<tr>
<td><strong>Identify Key Roles and Define Leadership Capabilities</strong></td>
<td>Exposed to new functions, Redefined work boundaries, Involvement in new working committees</td>
</tr>
<tr>
<td><strong>Identify Employee’s Performance and Emerging Leaders</strong></td>
<td>Performance Management System, Organisation appointment</td>
</tr>
<tr>
<td><strong>Develop and Groom Employee</strong></td>
<td>Vertical progression – Promotion, Lateral progression - Job enlargement, Horizontal progression - Job rotation</td>
</tr>
<tr>
<td><strong>Transition to New Role</strong></td>
<td>Learning &amp; Development interventions (Sponsorship, Leadership development, Flagship programme, Functional/Technical development)</td>
</tr>
<tr>
<td><strong>Track and Review Performance</strong></td>
<td>Performance appraisal (twice yearly), Reward and recognition interventions</td>
</tr>
</tbody>
</table>

---

**Figure 4.1c.1: Process of Identifying & Grooming Employees**
Employee Learning and Development

4.2a Engages employees to identify current and new competencies required to achieve organisational goals

We embrace the spirit of the learning organisation philosophy that “We have the POWER to learn”.

In line with our strategic thrusts and WIGs, we endeavour to shape a learning organisation culture and build a high quality and responsive ecosystem to support the future of work and provide learning and development opportunities to employees to achieve organisational and personal growth. Our L&D planning process and three domains of L&D (Figure 4.2a.1) encompass the agile mindset and approach of lifelong learning.

Career Development Pathway
The Precision Engineering (PE) framework is an integral component of the PE Industry Manpower Plan and aims to enable skills mastery in the PE industry. Our career development pathway subscribes to the Skills Framework (SFw) for Semiconductor, PE which is jointly developed by SkillsFuture Singapore (SSG), Workforce Singapore (WSG), the Economic Development Board (EDB) and Enterprise Singapore (Figures 4.2a.2 and 3).

Learning Roadmap
We identify and map the competency for all employee types into three broad categories: (i) Technical & Personal development, (ii) Flagship programs and (iii) Sponsorship for higher education.

Training Needs Identification/Analysis
Our annual training needs identification/analysis exercise adopts a systematic PDCA cycle (Figure 4.2a.4) to identify current and future competencies and requirements for continuous improvement in our learning process management.

Evaluation
Our course evaluation is built upon the Kirkpatrick Model for analysing and evaluating the results of training courses and flagship programmes. We had successfully implemented digital processes such as interactivity tools i.e. Kahoot and e-course evaluation for participants, that is, Mentimeter for further productivity gains.

Operational Review
Our annual operational review exercise adopts an E2 (effective-efficient) approach to increase the value of learning by identifying and prioritizing opportunities for financial and operational improvements to stay on the competitive edge. We have been progressively digitising our operational processes. For example, all our training and administrative tasks and processes may be executed directly from our internal Training Management System (TMS).
Training Administration
A set of effective administration procedures to underpin the learning & development function.

Courseware Development
A continuous design and development process that leads to an enhancement of facilitating and learning experience.

Facilitation
A role and process to create an environment which encourages and effectively enable our employees to flow ideas and solutions.

Non-Managerial Employee Career Development Pathway

Managerial Employee Career Development Pathway

Present analysis to develop more effective and contextualised learning experience.

Prepare TNJ/ TNA based on the agreed approach and objectives.

Analyse quantitative and qualitative data from focus group discussion/ management review, performance appraisal platform and employee engagement programmes.

Consolidate Organisation, Industrial, Legal and Learner’s (OILL) needs.
4.2b Provides learning and development opportunities to employees to achieve organisational and personal growth

We provide a blended suite of learning and development opportunities to help facilitate and catalyze our employees to achieve organisational and personal growth (Figure 4.2b.1).

Flagship Programmes

We conceptualize, develop and implement flagship programmes in collaboration with business leaders to address specific business needs and performance gaps (Figures 4.2b.2, 3 and 4).

E-Learning

We identify the required competencies and incorporate ICT tools and made them available to all employees to enhance learning. With Udemy for Business e-learning platform, employees are able to meet their learning needs online and on-demand. The e-learning modules are packaged into a series of thematic learning interventions for targeted participant pools.

Product Training and Overseas Attachment

We provide diverse opportunities to build enthusiasm, courage and confidence in our employees as our ambassadors of our house products (Figure 4.2b.5).

Nanyang Technological University (NTU) Co-facilitation Workshops

As an industry leader, we want to set our footprint for our future talents. We partnered with NTU Career and Attachment Office for the Insider Series: Exclusive co-facilitated workshops to empower students to gain insights on the industry, spur meaningful discussions and innovative ideas (Figure 4.2b.6).

<table>
<thead>
<tr>
<th>SUITE OF L&amp;D OPPORTUNITIES</th>
</tr>
</thead>
<tbody>
<tr>
<td>INTERNAL TRAINING</td>
</tr>
<tr>
<td>Core Training</td>
</tr>
<tr>
<td>Functional/ Technical Skills</td>
</tr>
<tr>
<td>Personal Development</td>
</tr>
<tr>
<td>Other Courses</td>
</tr>
<tr>
<td>Flagship Programmes</td>
</tr>
</tbody>
</table>

- Figure 4.2b.1: The L&D suite of opportunities
- Figure 4.2b.2: Management Induction (M3) Programme
- Figure 4.2b.3: Supervisory Excellence for Employee Development (SEED) Program is curated to enhance supervisors’ performance and productivity to effectively manage their team in a represented environment
- Figure 4.2b.4: Service Engineer Accelerated Learning programme is curated to prepare Field Service Engineers with the knowledge and skills to align and be assimilated into the organization
- Figure 4.2b.5: Basic and Advanced Laser 1205 product training at ALSI Beuningen in August 2017
- Figure 4.2b.6: Ms. Angy Ang, Senior L&D Officer, facilitated the Emotional Intelligence at the Workplace in NTU on September 2018. Participating NTU students rated the course 4 out of 5!
We foster a positive work environment which yields commendable results in supporting individual and team participation to achieve our organization goals and employee’s participation (Figure 4.3a.1). For example, our ASMPT Quality Award (AQA), now in its 11th year, a company-wide initiative that nurtures an innovative climate and encourages diverse and inclusive teams to conceptualize and develop ideas. Another example, will be the recently concluded ASMPT Global Technology Conference in November 2018, where more than 200 of our R&D employees gathered together to share knowledges, embrace new ideas and drive innovation.

**4.3a Supports individual and team participation to achieve organisational goals**

Describe how the organisation:

### Employee Engagement and Well-Being

<table>
<thead>
<tr>
<th>Domains</th>
<th>Category</th>
<th>Employee Engagement Programs / Schemes</th>
</tr>
</thead>
</table>
| **Growth**                          | Product & Innovation            | ▪ ASMPT Quality Award  
▪ Global Technology Conference  
▪ 4 Disciplines of Execution (4DX) |
| **Learning & Development**          |                                 | ▪ Suit of L&D opportunities (refer to 4.2b)  
▪ Lunch workshops                    |
| **Welfare**                         | Workplace Safety & Health       | ▪ Workplace Safety & Health (WSH) Promotion                                      |
|                                     | Healthy Workforce               | ▪ Interest Groups (Yoga, Zumba, etc)  
▪ Fruits Week  
▪ Bazaars & Roadshows               |
|                                     | Employee Benefits               | ▪ Festive Giveaways  
▪ Interest group funding scheme  
▪ Teambuilding funding scheme  
▪ Get-together funding scheme        |
|                                     | Facilities                      | ▪ Club House (Skyloft) and Staff Cafeteria  
▪ Maternity and First Aid Room  
▪ Pantries (i-Space, M-Café and others) |
| **Management Interaction**          |                                 | ▪ Lunch with Executive/ CEO  
▪ Town-hall Meetings  
▪ Teambuilding                   |
| **Corporate/ Functional Events**    |                                 | ▪ Annual Dinner/ Family Day  
▪ Opening of TPB2 and Engagement Programmes  
▪ Plant Tours and Experiential Outreach |
| **Corporate Social Responsibility** |                                 | ▪ Blood Donation  
▪ Race Against Cancer               |
| **Learning & Development**          |                                 | ▪ New Hire Orientation Programme                                                   |
| **Policies**                        |                                 | ▪ Flexi work arrangement                                                           |

*Figure 4.3a.1: Examples of individual and team participations and schemes to support and achieve organisational goals*
4.3b  **Develops a work environment that enhances employee health and wellbeing**

In continuing our aspiration to be a great place to work, our Happy Framework enable us to develop a happy and healthy workplace which yields high levels of engagement which goes directly to performance and productivity, innovation plus creativity, team work and collaboration - #HappyWorkHappyYou (Figure 4.3b.1).

We promote organic growth through committee formation. Our talents underpin the development of a supportive work environment under the guidance of our Management representatives. This partnership facilitates both professional and personal development and creates accountability and ownership for our talents.

![Happy Framework](image)

4.3c  **Measures employee satisfaction, engagement and well-being**

In October 2016, we partnered with an independent party, Great Place to Work® Institute (GptW), for our ATS Workplace Culture Survey to obtain employee feedback and input on how we can further enhance employee engagement, inclusion, welfare, belonging and accelerate growth.

In 2018, our ATS Workplace Culture Survey participation rate increased significantly since the previous assessment in 2016. This is attributed to better employee engagement on the ground and improved willingness and participation from our employees as well as actioned feedback to provide paper alternatives for our employees since the last survey. Our trust index, the key indicator registered an inspiring increase of 6% across all 5 dimensions in just a short span of two years! This is testimony to our strong Management support and intent to provide and facilitate resources for a great place to work.

Two new committees with representatives from various departments were subsequently formed to review and address the consolidated feedback. Many initiatives such as the enhanced Flexi Benefits, introduction of “Get Together Fund”, curation of “Supervisory Excellence for Employee Development” (SEED) programme and the formation of the Canteen Committee, amongst others, were then implemented.
Employee Performance and Recognition

Describe how the organisation:

4.4a Supports high performance, productive and innovative behaviours to achieve organisational goals

4.4b Reinforces desired behaviours and organisational value

- Figure 4.4a.1: The execution of each step within the Performance and Recognition Framework is closely linked to POWER values
- Figure 4.4b.1: Types of pay-out and pay-out periods
- Figure 4.4b.2: Performance Criteria Mapping

<table>
<thead>
<tr>
<th>ORG. VALUES</th>
<th>MANAGERIAL</th>
<th>EXEMPT</th>
<th>NON-EXEMPT</th>
</tr>
</thead>
<tbody>
<tr>
<td>PASSION</td>
<td>• Focus on Customers</td>
<td>• Adaptability &amp; Flexibility</td>
<td>• Adaptability &amp; Flexibility</td>
</tr>
<tr>
<td></td>
<td>• Decision Making</td>
<td>• Commitment &amp; Purpose</td>
<td>• Quantity of Work</td>
</tr>
<tr>
<td></td>
<td>• Role Model</td>
<td>• Job Attitude &amp; Commitment</td>
<td>• Meeting Schedule &amp; Targets</td>
</tr>
<tr>
<td>OWNERSHIP</td>
<td>• Strategy</td>
<td>• Adaptability &amp; Flexibility</td>
<td>• Initiative &amp; Independent</td>
</tr>
<tr>
<td></td>
<td>• Innovative Entrepreneurship</td>
<td>• Customers’ Responsiveness</td>
<td>• Adaptability &amp; Flexibility</td>
</tr>
<tr>
<td></td>
<td>• Executive Excellence</td>
<td>• Innovation</td>
<td>• Quality of Work</td>
</tr>
<tr>
<td>WIN</td>
<td>• Coaching</td>
<td>• Quality of Work</td>
<td>• Interpersonal &amp; Communication Skills</td>
</tr>
<tr>
<td>EXCELLENCE</td>
<td>• Promotion of Teamwork &amp; Alignment</td>
<td>• Job Attitude</td>
<td>• Initiative &amp; Independent</td>
</tr>
<tr>
<td>RESPECT</td>
<td>• Teamwork</td>
<td>• Analytical Skills</td>
<td>• Technical Skills</td>
</tr>
</tbody>
</table>

- Figure 4.4b.1: Performance Criteria Mapping
4.4c **Rewards and recognises employees to achieve organisational goals**

Rewards and recognitions are essential to an outstanding workplace as we value, respect and recognise the contributions of our employees. We administer a myriad of monetary and non-monetary reward mechanisms to motivate our employees for higher performance. Besides improvements in employee engagement and overall work productivity, it also induces desired work behaviours in other employees as well (Figure 4.4c.1).

<table>
<thead>
<tr>
<th>ORG. VALUES</th>
<th>OBJECTIVES</th>
<th>MONETARY</th>
<th>NON-MONETARY</th>
<th>EXAMPLES</th>
</tr>
</thead>
</table>
| **PASSION** | • To highlight notable employee achievements  
• To inspire and instil passion in others to excel in their respective functions | Fixed Bonus  
• Annual Wage Supplement (AWS) | Awards Ceremony/ Token of Appreciation  
• ASMPT Quality Award (AQA)  
• Patent Award  
• Long Service Award | • ASMPT Quality Award (AQA) – Awarded to winning teams with innovative proposals to enhance quality standards in areas of production and quality control |
| **OWNERSHIP** | • To empower employees to assume greater job responsibilities beyond their existing job function  
• To build the employee’s capacity and efficacy through equipping them with adequate resources to perform their work | Incentives  
• Production Incentives  
Allowances  
• Transport Allowance | Award Ceremony/ Token of Appreciation  
• Committee Award  
• Lead Auditor & Internal Auditor Award  
Job Scope  
• Appointment in Committee | • Skyloz Committee – A self-organised team of high-performing employees from various job functions, including IT, Marketing, R&D and HR, managing staff recreational facilities and activities in Skyloz |
| **WIN** | • To rejoice in and celebrate the organisation’s successes alongside our employees who form the contributing members and make the achievements possible | Variable Bonus  
• Special Bonus  
• Performance Bonus | Appreciation Luncheon  
• Product Unit Achievement  
• Celebrations  
Corporate Events  
• Annual Dinner  
• Family Day | • Annual Dinner – Invitation is also extended to employee’s spouse to be part of the special occasion |
| **EXCELLENCE** | • To retain and motivate employees for high performance  
• To foster employee identification with organisation’s success and reward performance based on specific goals and objectives | Increment  
• Merit Increment  
• Promotion Increment  
Incentive Schemes  
• Performance Gratuity Scheme (PGS)  
• Performance Sharing Scheme (PSS) | Job Scope  
• Succession Planning | • PSS – Targeted long-term incentive scheme with payouts in cash and ASMPT shares awarded to eligible Senior employees by merit |
| **RESPECT** | • To promote respect and camaraderie spirit among employees and create a harmonious work environment for all | Employee Funds & Schemes  
• Teambuilding Fund  
• Get Together Fund  
• Flexi-Benefit Scheme | Communication  
• Official Memorandum of Recognition  
• Organisation-wide Collaterals | • Flexi-Benefit Scheme: One-time top up of S$500 for all employees in 2018 in recognition of their contribution |

— Figure 4.4c.1: Rewards and Recognition Mechanisms and the linkage to POWER values

People

C4-38
5.1 Innovation Capabilities

Describe how the organisation:

5.1a Develops and implements innovative ideas to create value

The accelerated growth of Virtual/Augmented Reality (*VR/ AR), 5th Generation data network (5G), Artificial Intelligence (AI), Internet of Things (IoT) and autonomous driving translates into higher demand in memory, processor, logic and power chips to cater for services and products such as cloud computing servers, blockchain, smart devices, wearables and advanced mobile appliances. Furthermore, to fuel the Era of Big Data, the upcoming 5G network mobile communication is creating more opportunity to device makers and service providers as well as security concern.

As embracer and enabler of these exciting digital technologies, innovation is paramount element and essential for maintaining our leadership position by innovating equipment and materials. These opportunities generated intense global competition to meet customer expectations in term of product quality, cost effectiveness and advanced capabilities.

We have made innovation one of our sustainable core competencies to achieve one of our Missions - We deliver the Highest Value and Innovative Solutions to our Customers through Products and Solutions with Advanced Technologies and Excellent Quality.

To accomplish this mission, we have established an innovation framework to support and nurture our competitiveness.

ATS Innovation Framework

We understand the importance of staff engagement in applying innovative mindset in their work (Figure 5.1a.1).

In year 2017, we offered our customers our “Smart Factory” digital solution for light-off operations with our automation capability, robotic know-how and advanced software with data analytics for remote controls. Since the inception, we had put in more focus to create best-in-class equipment with intelligent factory management system. The top down approach is effective to steer us to create higher value for semiconductor industry.

Our annual product roadmap meeting is instrumental to strategize in developing new products. This global event involves executives and key personnel from Sales/Marketing, Finance, Product Engineering, Enabling Technology Group and Manufacturing. It serves as the most important platform for us to value-add our products with advanced technology and unique value proposition. With careful planning and execution, crucial support and greater awareness are instilled.

Directives: We engage our staff continuously and consciously to grow our repertoire of technology offering to provide a state-of-the-art technology and competitive products.

Resources: Competent staff is critical to our growth and sustaining competitiveness. We have around 78% or more than 800 staff having tertiary qualifications (Diploma and above), around 21% or more than 200 staff with Master or PhD qualifications.

In 2018, we collaborated with SIMTECH-SSG and Skills Future SG (WSQ) to enhance staff competency in data mining technologies and data analytics. In one example, we had achieved remarkable success by building a model based on fuzzy neural network to “predict tail length and Free Air Ball in wire bonding process” and implemented in Aero wirebonder. This wire bonder achieved 95% accuracy in prediction, reduced 50% process development time and 75% manpower reduction. This training program was awarded the “Best WSQ Industry Partner 2018” on 16th August 2018 as testament of our commitment to our innovation and applied data analytics.

Annually, we spent about 10% of our Backend equipment revenue to fund R&D projects. We view Intellectual Property (IP) as an important element for innovation and encourage our staff to patent our state-of-art inventions for both designs and processes. To date, we have a total of 1412 US patents granted. The Annual Patent Award Ceremony held during our Annual Dinners to honour the inventors.
Environment: We engage our staff in this innovative journey by exposing them to the latest technology and knowledge via various platforms such as technical seminars, technical publications, trade exhibitions and international conferences. We have our Annual Innovation Summit to recognize innovative projects and promote our ASMPT Quality Award (AQA) to spur innovations and continually celebrating innovation to ensure everyone shares the same commitment that innovation is our key to success.

In November 2018, we invited over 200 R&D engineers and university professors from Asia & Europe to our “Enabling Smart Factory” Global Technology Conference held in Hong Kong R&D Centre. They shared successful innovations and learned about Advanced Engineering Materials, Mobile Device Application, Machine Prognostic & Health management for predictive maintenance, AI applications and Industrial Internet of Things (IIoT) for equipment and factory level.

We held discussions at Innovation Corner regularly. The Corner was designed with a relaxing ambient, equipped with large TV screen and writing board to facilitate brainstorming and creation of ideas.

The innovation framework described above is designed to support our mission. To sum-up what we had done to stay true to our mission statement, we shall once again glance at our drive for “Smart Factory” solution. The aim is to help semiconductor industry to achieve:
- Higher productivity, reduce manual work
- Higher quality, Zero-Defect and reduce waste
- Best-in-class equipment and processes

To achieve those targets, we deliver products and services in four key innovation areas (Figure 5.1a.2):
- Advanced Production Capabilities
- Automation
- Process Integration
- Material Logistics

### Advanced Production Capabilities
- Best-in-class Equipment
- Real time process performance monitoring
- Auto-ID and recipe control
- Augmented Guidance Operator advisor
  - Smart diagnostic
- Predictive maintenance
  - Smart Sensors
- Remote monitoring and recovery

### Automation
- Towards unmanned operation at line
- Self-calibration
- Auto device setup
- Auto conversion
- Auto consumable replacement
  - Wire spool, capillary, collet, epoxy, ejector

### Material Logistic
- Uninterrupted material supply to equipment
- Mobile Robot
- Material Tower
- Material Manager Software
- Inventory Traceability
- Automated Storage and Retrieval System
- Smart Traffic Control
- Automated Guided Vehicle
- Smart planning System

### Process Integration
- Process Expert System & Data Analytics
- Optimized Performance & Zero defect
- Line Planning
- Yield and Performance Monitoring
- Predictive Maintenance

*Figure 5.1a.2: Innovations Identified for Smart Factory*
We believe in seeking creative ways for problem solving, making it easier for a person who is burdened with it. Our employees, business partners, suppliers and customers are stakeholders in this journey. In fact, to maintain healthy and win-win collaboration with stakeholders, we are guided by ASMPT core values “POWER” to make sure ATS is always a great partner and great place to work. ATS has a wide range of innovation initiatives to encourage our customers, partners and employees to carry out research and development plus innovations and tests. This includes the Innovation Summit to promote R&D, test-bedding, product development and technology adoption as well as patents, improvement projects, joint developments of modules with partner.

Let us look at the conventional semiconductor wire bonding process, where there had been no major breakthrough in the transducer technology since 1960. This old technology delivered ultrasonic energy only in Y-direction that could cause effect of “uneven-bonded ball size quality in X-Y directions”; it was the wish-list from our wire bonder customers to overcome this effect. It compels ATS engineers and suppliers from Design and Process Development team to study the solutions. Finally, in 2016, ATS launched a patented (reference US 9,640,512 B2) and production ready design called the “Aeroducer with X-Power” in ATS latest Wire Bonder equipment. It is for the first time a dual-directional (X-Y) capillary oscillation technology is introduced in wire-bonding process.

Our patented transducer improves the ball size quality in X-Y directions and intermetallic coverage and further gain in term of productivity. This achievement is particularly crucial for difficult and challenging IC devices that require stringent bonding requirements. Our breakthrough design delighted many of our customers and they recognized its effectiveness to improve quality and stability of wire-bonding process. The Aeroducer technology has shortened bonding time up to 70% and increased productivity by more than 20%. It creates a new dimension in wire bonding industry (Figure 5.1b.1).

Simple Innovation ideas and improvements are harvested through various approaches, including gathering inputs and suggestions from employees from the ground, bottom-up suggestions from the Grass Root teams; we call it Great Team from the Roots (GTR). Empowerment, engagement and involvement from the ground to drive for quality improvement with innovative ideas are keys in improving our processes and product quality. There were various good innovative ideas suggested by the GTR teams, which were implemented in the production processes.

We have also organised GTR sharing sessions to promote and instil Ownership of POWER with “I care” quality culture. The GTR teams share the suggestions and implemented ideas during the Town Hall meeting or Get Together sessions.

One example of innovation project with our partner (ATC) is “material transfer by automated guided vehicle”, which helps ATS to reduce workshop machine manning-hours and reduce waiting material transfer time.

ATS Etched Leadframe Production “iFactory connectivity” project planned and executed with partners in ATC. It is an example of modernized factory process flow. Production machines are connected to ATS network for online monitoring, data logging and real-time feedback. During machine setup, after an operator has scanned the job-card, system will read parameters from server and carry out setting automatically. This prevents human mistakes. In case machine breakdowns for long time, the system is able to trigger alert to related parties to take action.

Other innovations include predicting pump failure by analyzing pressure and frequency.

Innovation projects in Leadframe production roadmap were established and it is fanned out to our partners in ATM and AMC.

Our ICT department has developed and implemented innovative ideas to create values such as introducing VR/AR technology to reduce development cost, speed up product design, facilitate process reviews, ergonomic review, production work instructions and product service trainings.

Figure 5.1b.1: Patented Aeroducer with X-Power
5.2 Process Management

Describe how the organisation:

5.2a Manages key and support processes to meet customer and operational requirements

We manage our key and support processes to meet customer and operational requirements according to our Overall Process Management Framework as shown in Figure 5.2a.1.

The key processes are Corporate Services (consisting of Corporate Operations, Resources Control & Compliance and Enabling Technologies), Customer Relationship Management (CRM), Product Life Cycle Management (PLM) and Supply Chain Management (SCM). Each key process is measured by KPIs and aligned to our Vision, Mission and Values.

The support processes work in the background, providing effective support for our key processes to achieve targets, which ultimately contribute to the organisational goals and objectives.

Procurement

Within Procurement, we operate at three levels namely Site Procurement, Commodities Procurement and Business Process and Data Analytics.

Our various sites have responsibilities for different products to meet with the wide spectrum of applications such as Opto wirebonding and IC wirebonding. Site procurement is responsible to focus at each site for the assigned products to fulfil customers’ demands in meeting with their shipment dates and quantities for on time delivery (OTD).

With all the various sites purchases, Commodity Procurement team will consolidate our purchases and evaluate suppliers’ performance for Quality, Cost, Delivery and Service & Technology. The team will select and allocate the business volume according to each performance. This team will drive cost saving projects to keep ASMPT’s competitive edge.
With ASMPT Merger & Acquisitions, Focus Groups are set up to drive Integrated Procurement Synergy (IPS) to facilitate the various companies in its integration process by carrying out cost reviews and to identify opportunities of cost savings to help improve on our cost structure and gain better competitiveness in the market. For example, collaboration between ATS Commodity team with SMT and AMICRA. The respective teams have monthly and quarterly meetings to report the status and progress of the synergy projects to Management.

To lead the Procurement and EM team on the journey to digital procurement/Big data analytics, we set up this dedicated group to embark on projects to review our procurement business processes. We will review to utilize available data to structure and identify digital twins that can be used to predict possible outcomes such as forecasting, over/under stock situations and etc.

**External Manufacturing**

Within External Manufacturing (EM), we operate with the China EM Team and the EM Rest of Asia (ROA) Team.

For 43 years, ASMPT has been very vertically integrated and in the last 4 years, there was a strategic directional change. The decision to start EM in China was in response to our company’s high growth rate. One of the criteria was to have these EM vendors near to where we carry out machine final assemblies and we were successful in the last 4 years.

With the global currency instability, Chinese Yuan (RMB) appreciation and Malaysia Ringgit (MYR) depreciation, our Management made a further decision to build a core manufacturing, base in Malaysia, to cushion the risks. With this, we have ATS EM ROA team to build a network of EM vendors in Rest of Asia. EM ROA works with the manufacturing management team to identify the core technology areas to keep within ASMPT. Our outsourcing activities include manufacturing of chassis, fabrication parts, module assemblies, PCBAs and cable assemblies.

Similar to Procurement, the site EM team takes care of issuance of purchase orders and order fulfilment from the EM vendors.

The commodity EM team sets the strategic direction for its different commodities for outsourcing. We also collaborate with the ALSI, AMICRA and NEXX teams for cost savings projects in China and Asia.

**Facilities**

Facilities operate under three different branches, namely, Service, Management and Property. For Services, Facilities team is responsible for the maintenance and upkeep of mechanical and electrical systems in the buildings, landscaping, provision and management of utilities supply, security of all personnel, as well as other supporting services such as cleaning services, pest control and waste disposal. To Management, Facilities team is responsible for compliance to all related legislations and codes of practises involving environmental, health and safety, building codes, mechanical and electrical installations standards, indoor air/environment quality standards, as well as all IT systems related to the operations and maintenance of facilities systems and building. As for Property, Facilities team is responsible for the evaluation and execution of capital projects and renovation projects for buildings and systems.

**Quality Assurance**

QA focuses on three key processes involving Product Quality, Process Quality and People Quality.

One of quality initiatives, ASMPT Quality Award (AQA) was introduced in May 2008; beginning with a clear direction from the Group CEO Mr. WK Lee “We need participation from everybody..... We need to develop a culture of “I care”, a culture of if I will not accept it, I will not pass it to the customers”.

The AQA framework consists of Five Aspects to cover all key results areas and Four Pillars of execution. **Five Aspects** are Internal/ External Customer Focus, Product Quality Assurance, In Process/ Stages Control, Continuous Improvement and Application of Quality Tools & Knowledge. **Four pillars** refer to Quality Innovation, Quality Management System, Quality Sustainability and Quality Culture.

A total of 66 manufacturing units from Singapore, Malaysia, Hong Kong and China plant had successfully completed the first AQA in 2008. This had created a very competitive environment for all sites to achieve top honour in quality and recognition by Senior Management. Over the years, the AQA has expanded in participation and assessment criteria (Figure 5.2a.3).

Corporate Communications is responsible for communications and branding for the Group. A brand is a set of mental associations and emotions, held by the customers, added to the perceived value of a product or service. Brands have financial value because they have created assets in the minds and hearts of customers/ consumers, distributors, prescribers and opinion leaders.

In October 2018, Corporate Communications did a Group Brand Survey to evaluate and obtain feedback on the current brand perception. The survey covered more than 200 participants, which includes ASMPT customers, partners, media and employees. The results showed very positive perception of ASMPT image and branding by both external and internal stakeholders.

An extract of the result is illustrated in the Figure 5.2a.4.
Perceived Brand Values I

How do you perceive the company brand ASMPT? (Please rate on the polarity scale – just on your initial thoughts/gut feeling)

<table>
<thead>
<tr>
<th>Personable</th>
<th>Software</th>
<th>Smart</th>
<th>Old</th>
<th>Progressive</th>
<th>Rational</th>
<th>Efficient</th>
<th>Weak</th>
<th>Machines</th>
<th>Local</th>
<th>Arrogant</th>
<th>Fast</th>
<th>Static</th>
<th>Unreliable</th>
<th>Inexperienced</th>
<th>Profitable</th>
<th>Backward-looking</th>
<th>Lively</th>
<th>Affordable</th>
<th>Future</th>
<th>Monochrome</th>
<th>Academic</th>
</tr>
</thead>
<tbody>
<tr>
<td>Distant</td>
<td>Hardware</td>
<td>Cumbersome</td>
<td>Young</td>
<td>Traditional</td>
<td>Emotional</td>
<td>Inefficient</td>
<td>Strong</td>
<td>Solutions</td>
<td>Global</td>
<td>Humble</td>
<td>Slow</td>
<td>Flexible</td>
<td>Reliable</td>
<td>Experienced</td>
<td>Unprofitable</td>
<td>Forward-looking</td>
<td>Boring</td>
<td>Expensive</td>
<td>Past</td>
<td>Colourful</td>
<td>Pragmatic</td>
</tr>
</tbody>
</table>

ASMPT brand values perceived by internal and external stakeholders are: strong, global, reliable, experienced, forward-looking and future

**Product Life Cycle Management (PLM)**

The Product Life Cycle Management (PLM) is geared towards our Company’s Vision, Enabling the Digital World. In our annual product road map meetings, ATS Management uses inputs from Sales, Service, Marketing and R&D team to set strategic direction and plan the development of future advanced Backend Equipment and Materials. Product features will also be fine-tuned after understanding, benchmarking and receiving feedback on customers’ experience with our products.

**Supply Chain Management (SCM)**

Supply Chain Management (SCM) is one of the key pillars in alignment to meet our Company’s Mission and Values under ATS Overall Process Management Framework. ATS provides manufacturing services for Backend Equipment business and Materials business. The SCM processes include:
• Plan - Processes that balance aggregate demand and supply to develop a course of action which best meets sourcing, production, and delivery requirements
• Source - Processes that procure goods and services to meet planned or actual demand
• Make - Processes that transform product to a finished state to meet planned or actual demand
• Deliver - Processes that provide finished goods and services to meet planned or actual demand, typically including order management, transportation management and distribution management

The figure below shows the key requirements and measurements of the key processes (Figure 5.2a.5).

<table>
<thead>
<tr>
<th>SCM</th>
<th>Key Process</th>
<th>Key Requirements</th>
<th>Control Measures</th>
<th>Measurements</th>
</tr>
</thead>
<tbody>
<tr>
<td>Plan</td>
<td>Demand and Product Planning</td>
<td>OTD</td>
<td>MPS, MMP</td>
<td>OTD and Quality KPI</td>
</tr>
<tr>
<td>Source</td>
<td>Source Procurement</td>
<td>SP/ECC/PR</td>
<td>OTD</td>
<td>OTD and Quality KPI</td>
</tr>
<tr>
<td>HVM</td>
<td>Module Assembly</td>
<td>• XY Table&lt;br&gt;• Bond Head&lt;br&gt;• Optics&lt;br&gt;• Wire Clamp&lt;br&gt;• Transducer</td>
<td>• Modular Progressive Copy Exact&lt;br&gt;• Spectrum Test&lt;br&gt;• Optic Dynamic Functioning Test&lt;br&gt;• Transducer Sine Sweep&lt;br&gt;• Frequency Bandwidth Analyzing Test</td>
<td>• Copy Exact Spectrum&lt;br&gt;• Boundary compliance&lt;br&gt;• Dynamic Function Test Result&lt;br&gt;• Frequency Bandwidth&lt;br&gt;• Boundary compliance</td>
</tr>
<tr>
<td></td>
<td>Module Integration</td>
<td>• XYZ Module Installation&lt;br&gt;• Cabling &amp; Tubing Layout Electrical &amp; Functional Testing</td>
<td>• HIPOF Test&lt;br&gt;• Module Installation&lt;br&gt;• Full Chassis Grounding Verification Test</td>
<td>• Compliance to HIPOF Test&lt;br&gt;• Module Installation Guide and Grounding Verification Test Requirement</td>
</tr>
<tr>
<td></td>
<td>Setup and Calibration</td>
<td>• Mechanical Alignment&lt;br&gt;• Calibration &amp; Verification&lt;br&gt;• Performance Testing&lt;br&gt;• Machine Dry Run</td>
<td>• Bond Force Calibration&lt;br&gt;• Work Holder Elevator Alignment&lt;br&gt;• Table Mapping Calibration&lt;br&gt;• Transducer Vibration Calibration</td>
<td>• Compliance to Calibration and Alignment Result as per Setup checklist</td>
</tr>
<tr>
<td></td>
<td>In-House Qualification</td>
<td>• Auto-Portability Calibration&lt;br&gt;• In-house device bonding for QA submission</td>
<td>• Ball Size&lt;br&gt;• Ball Shear&lt;br&gt;• Ball Thickness&lt;br&gt;• Loop Height&lt;br&gt;• Wire Pull&lt;br&gt;• Placement&lt;br&gt;• SEM</td>
<td>• First Past Yield for In-house bonding sample submission to QA</td>
</tr>
<tr>
<td></td>
<td>Final Test / Shipment</td>
<td>• Customer Device Setup&lt;br&gt;• Customer Buy-Off&lt;br&gt;• Shipment Preparation&lt;br&gt;• Outgoing QA Audit&lt;br&gt;• Machine Packaging</td>
<td>• Ball Size&lt;br&gt;• Ball Shear&lt;br&gt;• Ball Thickness&lt;br&gt;• Loop Height&lt;br&gt;• Wire Pull&lt;br&gt;• Placement&lt;br&gt;• SEM&lt;br&gt;• Inter Metallic Check</td>
<td>• Compliance to Customer Buyoff&lt;br&gt;Acceptance with customer devices bonding performance/ parameters</td>
</tr>
</tbody>
</table>

| ACM   | Auto cycle testing           | 3G System + MOLD + PRF Cycle Testing                                               | Dry cycle test, auto-cycle test,                            | Incorporated in the PRP Execution Risk Assessment (ERA) and documented per SOP in the IDM 3G PRF Configuration plus incoming checklist |
|       | Process inspection           | Molded Final Product Testing                                                       | Process related PRF and mold tests,                        | Incorporated in the PRP Execution Risk Assessment (ERA) and documented per SOP in the IDM 3G PRF Cycle Test Report |
|       | Final QA buy-off             | Final Inspection before shipment                                                   | MTBA test, auto run,                                       | Measurement by QA Assembly first pass trend chart |

<table>
<thead>
<tr>
<th>SCM</th>
<th>Key Process</th>
<th>Key Requirements</th>
<th>Control Measures</th>
<th>Measurements</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-clean</td>
<td>Remove oil and oxidation on raw coil for dry film lamination by chemical degreasing and acid</td>
<td>Sensor/ Gauges feedback to machine, alarm if out of setting range</td>
<td>1. Conveyor speed&lt;br&gt;2. Chemical Temperature&lt;br&gt;3. Chemical concentration&lt;br&gt;4. Spray pressure</td>
<td></td>
</tr>
<tr>
<td>Lamination</td>
<td>Attach dry film photore sist onto both sides of copper with good adhesion</td>
<td>Sensor/ Gauges feedback to machine, alarm if out of setting range</td>
<td>1. Roller temperature&lt;br&gt;2. Roller pressure&lt;br&gt;3. Speed</td>
<td></td>
</tr>
<tr>
<td>UV</td>
<td>Transfer photo mask pattern onto dry film photore sist</td>
<td>Sensor/ Gauges feedback to machine, alarm if out of setting range</td>
<td>1. Exposure energy&lt;br&gt;2. UV lamp uniformity&lt;br&gt;3. Resolution</td>
<td></td>
</tr>
</tbody>
</table>

• Figure 5.2a.5: Key Processes Requirements and Measurements for HVM, ACM & Materials
5.2b Drives process improvement to enhance productivity and achieve organisational performance

Productivity improvement is championed by Group Chief Operating Officer (COO) and the Manufacturing Executives and Directors. We strongly believe that We have the POWER and Agility to Drive Change and the productivity improvements are one of the essentials for our sustainable business growth through platform such as Annual Manufacturing Review. ATS improves her processes by actively leverages on the latest technology, such as Additive Manufacturing, System Integration and Autonomous Robots as well as Lights-off manufacturing.

Below are a list of examples of process improvement initiatives that ATS has put in place that have improved productivity and efficiency (Figure 5.2b.1).

<table>
<thead>
<tr>
<th>Methods</th>
<th>Example of Improvement</th>
<th>Before</th>
<th>After</th>
</tr>
</thead>
<tbody>
<tr>
<td>Automation</td>
<td>Electrode offline setup by CMM (Supplier)</td>
<td>Electrode was measured on EDM machine by pin, average 10min/electrode</td>
<td>Offline measurement by CMM, eliminate internal setup time and is the pre-requisite for EDM automation project</td>
</tr>
<tr>
<td></td>
<td>EDM AGV robot automation line for 23x machine (Partners)</td>
<td>Manual tool change, machine idles if no operator is in place</td>
<td>Auto tool change, machine is able to run even when no operator is in place</td>
</tr>
<tr>
<td></td>
<td>Grinding automation (Supplier/Customer)</td>
<td>Manual dressing and grinding, not capable of controlling grinding distance</td>
<td>Auto dressing and compensation, automated grinding by G code program, capable of controlling grinding distance</td>
</tr>
<tr>
<td></td>
<td>CNC electrode automation (Partner/Supplier)</td>
<td>Manual load and unload of electrode, maximum 4x electrode can be cut in one setup, cutter wear cannot be detected</td>
<td>Auto loading and unloading by robot arm, offline setup without disturbing the auto run, cutter wear measurement and compensation by laser system</td>
</tr>
<tr>
<td>Bench Marking</td>
<td>e-Workshop Resource Planning system (Partner)</td>
<td>Part status was tracked manually, no electrode priority for CNC machinists</td>
<td>Part status is tracked by barcode scanning, enable pre-order of electrode, setup 3x TV to display machine status and electrode priority list</td>
</tr>
</tbody>
</table>

*Figure 5.2b.1: Examples of Continuous Process Improvement on productivity and efficiency*

Besides developing and selling machines to our customers, ATS also provides advanced production capabilities. For example, our best-in class inspection equipment and High-Precision-Vision-Inspection-Machine (HPVIM) (Figure 5.2b.2). These enable us to:

- Optimize Fabrication Process by Big Data
- Process Analysis & In-line Monitoring
- Improve machining CpK and etc

**Make Change**

- Optimize Fabrication Process by Big Data
- Process Analysis and In-line Monitoring
- Improve CpK

*Figure 5.2b.2: High-Precision-Vision-Inspection-Machine (HPVIM)*
Materials

ATS Materials team continues to drive project improvements. For example, to use automatic measurement/inspection to replace human inspector. This improves accuracy and minimizes down time.

Some examples of continuous improvements are:
Panel etching requires one operator to peel mylar and load to machine, one operator to offload and put interleaf papers on each leadframe. Human handling also creates scratches and deformation to leadframe. Reel to reel etching is a continuous process and no human is involved in loading and offloading. Other benefits of reel-to-reel etching include higher productivity and lower copper usage (Figure 5.2b.3).

5.2c Sustains key processes in times of emergencies to ensure business continuity

Business Continuity Planning – BCP

BCP is the process to deal with potential threats. It ensures business continuity in ATS and continuity to serve our customers. It outlines a range of disaster scenarios, alternative production sites and the steps the business will take in any particular scenario to provide short-term delivery and/or services support as well as action plan for returning to regular operations.

The Business Continuity Management (BCM) Steering Committee, headed by ASMPT Management, provides policy guidance to the Co-ordination & Entity Level Committee.

In essence, the Emergency Response Committee (ERC) will assume the executive command that sets out the overall objective of the emergency operations whereas the Disaster Recovery Committee (DRC) will identify potential risks and implement responses needed (Figure 5.2c.1 and 2).

Based on Business Impact Analysis (BIA) done yearly, we identified three main risks, namely Fire, IT and Haze. ATS has conducted fire drills and IT drills on an annual basis. All drill records met the set KPI. Procedure for business continuity due to haze is also put in place. ATS continues to drive for improvements. We had implemented ATS mobile application to facilitate fire evacuation since 2017.
5.3 Supplier and Partner Management

Describe how the organisation:

5.3a Identifies and manages key suppliers and partners to achieve organisational goals

Our collaboration with our Suppliers, External Manufacturing (EM) Vendors and Partners play an important role in the achievement of our strategic goals. It challenges us to excel in the dynamic semiconductor market conditions with short and sharp cycles of up and down. Prompt delivery of goods and services, technological services and advancement ensure smooth operations to support our customers’ order fulfilment.
ATS buys components and assemblies from suppliers that can be direct manufacturers, distributors and agents that are market players in their field of specialties. External Manufacturing (EM) vendors as the name implies are vendors that we qualified externally to be our extended manufacturing capacity and capability to meet our customers’ demand. Partners are ATS sister companies, serving each other needs in manufacturing.

Suppliers and EM Vendors are evaluated on five criteria in the areas of Quality, Costing, Delivery, Service and Technology. Performance requirements are communicated to Suppliers and EM Vendors during the quarterly reviews. These Suppliers and EM Vendors can view their performance in ATS grading and feedback on our "ASMPT Procurement – Suppliers (APS)".

**Suppliers and External Manufacturing (EM) Vendors**

We select and categorize our Suppliers and EM Vendors into Certified Strategic Suppliers (CSS), Certified Preferred Suppliers (CPS), and Approved Firefighter Suppliers (AFS). CSS are those that supply critical items and perform well on Technological Capabilities, Vendor Managed Inventory (VMI), On Time Delivery (OTD) and other support such as fast responses. We cultivate close relationship at both their top levels as well as operational levels to ensure priority for capacity and supplies including sudden demand-delivery situation that requires exception actions for compressed deliveries.

CPS are those with lead-time between one to three months and from historical performance, they can respond well to fulfill our market demands with good VMI, OTD and Quality performances.

We qualify a pool of AFS which have proven their resourcefulness to source and deliver certain items with short lead-time, however typically at a premium. AFS serves us well typically during market ramp up beyond 35% capacity and challenges the regular supplies.

To enable agility in our supply chain, we collaborate closely with our Suppliers and EM Vendors through the in-house developed portal "ASMPT Procurement – Suppliers (APS)" portal for Electronic Request for Quotation (eRFQ), Vendor Managed Inventory (VMI) and OTD.

VMI or buffer stock keeping at suppliers’ site serves to shorten lead time from the suppliers to ATS. We share our material plan/ forecast for the next 3-6 months in the portal. The suppliers use this visibility to plan and keep a buffer inventory of at least one month reserve for ATS’ consumption. This stock keeping is mutually agreed as their commitment to serve ATS better and, at the same time, we commit to consume the VMI stock.

We adopt the Plan-Do-Check-Act (PDCA) to identify monthly performance lapses and follow up with suppliers for corrective actions to improve. This is done to manage the OTD and VMI performance with the vendors.

### 5.3b Engages key suppliers and partners to co-create products and services

**Suppliers**

ATS collaborates and co-creates with our suppliers to incorporate new products and latest technology on our machines for cost savings purposes.

One good example is the personal computer (PC) box outsourced to our CSS. In the past, our Partners have been very vertically integrated and have been able to carry out assemblies of motherboard, RAM and other computer accessories in ATH. Currently, we have successfully implemented a turnkey PC box with our CSS with substantial cost savings achieved and production efficiency increased.

Another example would be co-creation of encoders, with another of our CSS, which are to be used in our machines. We managed to phase in RSF series of low cost encoders on the XY table of AB383 successfully. Regular meetings are held with the suppliers for review and to ensure that ATS is kept up to date with the latest technology available and smooth supply chain and customer experience.

**EM Vendors**

ATS collaborates with our EM vendors to modernize their manufacturing. One such vendor is for machine frames/ chassis/ sheet metal works using one stop full line automation combining robots, crane, Big CNC and human efforts to build wirebonder chassis. A full automation Powder Coating line with degreasing system has also been built to ensure supply of consistent quality products to ATS (Figure 5.3b.1 and 2).

ATS continues to work with our EMs on various projects in driving for cost reduction, increase product quality stability through means of automation and industry 4.0 approaches.
Partners

One of the key projects being identified with ATM is the Magnet Assembly Robot Project. Traditional gluing of magnets with different polarity to the magnet plate is replaced by Collaborative Robot.

The positioning of magnet to the location can be achieved precisely by using COBOT which is not subjected to work fatigue. Glue dispensing accuracy had been further improved by implementing volumetric glue dispensing apparatus. Currently, this COBOT Magnet Assembly Automation is capable of achieving unmanned operation (24/7), which improved both quality and productivity aspect (Figure 5.3b.3).

With the successful application of COBOT for magnet assembly, the team explores and fans out COBOT automation and implements it to assemble precision cross roller way onto X-Plate of the XY Table.

The COBOT is capable to perform precision tightening task to well position the precision cross roller way onto X-Plate, in sequential torque process. Servo feedback control precision screwdriver to provide real time close loop feedback of torque to controller (Figure 5.3b.4).

In CNC Machining Center, Automated Guided Vehicle (AGV) was implemented to automate the work piece dispatch, installation on CNC, collection from stocking centre to CNC machining center and vice versa.

Material preparation was done offline in batches at Stocking Center. AGV dispatches the work piece prepared for CNC based on auto scheduling programme, according to production status of each CNC machine. CNC machining utilization and output were increased.

This transforms the traditional practice in CNC machining centre which was highly dependent on setup by machinists (Figure 5.3b.5).
Mr. Lee Wai Kwong,
CEO of ASMPT
What are my expectations for this Technology Conference?
ATS has established a Knowledge Management (KM) Framework to enable consistent performance and steer decision-making. The KM framework has structured information management into KM Content, KM Process, KM Technology and KM Culture.

As a global high-tech organization, we receive huge volume of data daily, from our core operations and corporate services systems. In order for us to manage and make good use of this big data, ATS has developed a comprehensive Knowledge Management Framework to collect, classify and achieve our Wildly Important Goals (WIGs). This framework captures the tacit and explicit knowledge, disseminates and utilizes it for various processes and harnessing experience.

Information is accessible to all ASMPT Global employees, through Product Life Cycle Management (PLM), Enterprise Resource Planning (ERP) and Customer Relationship Management (CRM), so as to support them in achieving their essential learning objectives. For example: (1) During customer visits, our Sales and Service engineers are able to obtain up-to-date customer information from our Customer Relationship Management (CRM) system while on the move through their mobile devices. (2) Design Manager (DM) system provides self-guided templates to guide our budding Product Development teams to walk through their product development cycle systematically and minimize time-to-market. (3) The customized ERP Vendor Managed Inventory (VMI) system facilitates effective management of inventory for our manufacturing teams thereby reducing their storage and downtime costs.

Our KM Platform has been developed to have the capability to support daily operations, responsiveness, accessibility, analytics plus predictive capability and thus enabling the digital world.

SAP, the best-in-class Enterprise Application Platform, is the most established ERP system which we have to support our business operations from Sales, Finance and Manufacturing Process to Supply Chain. It ensures data integrity along business functions and data accuracy in workflow design. SAP CRM is also deployed to manage market opportunities and sales analysis. For product development, we are currently in the process of migrating to Teamcenter Application for PLM which supports global product development collaboration.

In addition to core applications, ATS also develops Virtual Reality (VR) / Augmented Reality (AR) and Artificial Intelligence (AI) for product and business process applications. Design review can be conducted in VR mode which speeds up the design iterations and reduces prototype cost. With networking capabilities built into the VR/AR platform, partners and customers are able to join reviews and discussions in VR world.

ATS is leveraging AR for production and service training, to provide immersive step-by-step instructions for technicians, leading to time saving through improved performance and cost reduction through the use of fewer resources. User obtains information in an intuitive manner instead of reading hardcopy documents. Product quality inspection is being gradually replaced by AI technology. KM technology evolves along digitalization technology in ATS.

Knowledge sharing forms an important part of our knowledge management process. We structurally consolidate knowledge in our web portal to share best design practices in the industry and best design concepts within our organization.

ATS Sales and R&D teams attend trade shows and exhibitions periodically to gather information on competitors and upcoming cutting-edge technologies. This information is consolidated to build product roadmaps and develop sales strategies.

Business Units (BU) meet monthly to review customers’ feedback and fine-tune production plan according to market information. The results are applied to our core operations to achieve better cost control and modulate product development plans. Generated information is analyzed to facilitate further data analytics for improvement. Together with organized ‘knowledge sharing events’, benchmarking activities and ‘innovation sharing platforms’, knowledge is transferred to people and processes for continuous improvement.

Knowledge Sharing, Learning and Transfer

This comprises of established knowledge transfer through organized activities. Figure 6.1a.1 shows ATS Web Learning Platform for effective learning of design technologies used. This allows easy administration of large amounts of information in a user friendly, web based environment.
Figure 6.1a.2 showcases ATS’ participation in ASMPT Global Technology Conference that took place in November 2018. The internal conference achieved several of its objectives, resulting in successful sharing of best technologies across different business units and identification of available innovative technologies with highest value proposition for customers.

One of the greatest advantages of learning technology is that it removes communication barriers and increases the ease and efficiency of information transfer. Our training team conducts training for customers and new staff.

6.1b Ensures the accuracy, accessibility and security of information

IT applications are designed together with business process owners to support operation and business goals. Roles are defined for information creation, review and approval.

With clear information, information ownership, ‘review and announcement mechanism’ and IT technology, information accuracy, reliability, timeliness and accessibility are inbuilt into the processes.

All processes and information are role-based-control to ensure right information access and format is assigned to the right job.

For Information Protection, Server Hardware/Software Protection, Anti-virus and Firewall are in place. Critical product information is synchronized to alternate server in ASM Hong Kong.

Since ATS is a high-tech organization, additional systems are add-on. Network is designed to isolate different functional areas. In case there is a virus attack, the risk is confined to one area. Unauthorized hardware is rejected by network protection. Mobile users can access defined applications from the internet with data loss protection software installed to prevent data loss. High security information transfer is encrypted; only designated receivers are allowed to access it.
6.2 Analytics for Performance Management

6.2a Leverages knowledge and information to create new value

ATS adopts First-Class Industrial Analytical Framework and Platform to continuously drive performance.

**Statistical Analytics**
Statistical Analytics reports are widely used among all operations to report what has happened. In addition, it compares performances to targets to ensure operations are in control.

Report portal is built for operations group to review their performances. Report portal consolidates essential information for supporting decision-making and triggering action.

**Diagnostic Analytics**
In addition to standard reports, users build their own reports that are drill-down to very detailed operations. Diagnostic analysis correlates this information to find the source of the problem.

**Business Intelligent and Analytic Services**
In a large operation, data volume consists of hundreds of millions of records. ATS has established a Database Analytic Service (Figure 6.2a.1) to allow users to dynamically construct and drill in information in real time.

**Trend line and Correlation Analytics**
Trend line analytics summarizes data in timeline and correlate performances among different operations.

- **Figure 6.2a.1: ATS Database Analytic Service**
- **Figure 6.2a.2: Predictive Analytics Tools**
- **Figure 6.2a.3: Computer Aided Engineering**
- **Figure 6.2a.4: Motion and process simulation**
VR Technology as Predictive Tool

Virtual Reality / Augmented Reality (VR/AR) technology enables digital twin concept. Activities such as design, training and validation can now be done in VR instead of building physical prototypes. This reduces development cost drastically and enables fast iteration and validation process.

ATS has developed its own VR technology that not only enables physical handling of parts like in the real world; it also completes machine motion simulation. Our VR network capability also allows multiple parties to join a VR session from different parts of the world to join product discussion and interact with the machine. VR is also a knowledge sharing platform for training in manufacturing processes such as assembly procedure. It also supports monitoring for Industry 4.0 Smart Factory.

Scan the QR code (Figure 6.2a.4) to experience ATS VR technology which includes VR Assembly and Service Training, Design Ergonomic Review, Interactive Cable Layout in VR and Product Show Case. In addition, there are AR applications for work instruction and spare part support.

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AI Technology Converts Data to Inspection Tool

Artificial Intelligence (AI) techniques are currently applied to Vision technology for Product Quality Analysis. Figure 6.2a.5 shows detection of solar panel quality.

- **Challenges**
  - Separate microcrack and saw mark
  - Separate microcrack and crystal grating
  - Separate microcrack and black dot (FM, inclusion)

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![Figure 6.2a.3: Part of Project system Guideline for Deliverables workflow diagram](image)

![Figure 6.2a.4: ATS VR/AR Technology](image)

![Figure 6.2a.5: Product Quality Inspection by AI](image)
AI technology is first applied to product development. Machine learning and AI will be further extended to data analytic areas.

ATS collaborated with SIMTech on Data Analytics, with SIMTech sharing their technical expertise and case studies with our employees. This partnership had won us the Best WSQ Industry Partner Award, as a testament to our collaboration and mutual gains realized in smart product development and manufacturing. (Figure 6.2a.6)

6.2b Uses comparative and benchmarking knowledge to improve performance

Benchmarking activities are planned throughout various processes:
- a. Product benchmarking
- b. Technology benchmarking
- c. Process benchmarking

Product Benchmarking

Benchmarking (Figure 6.2b.1) has allowed us to (1) Gain an independent perspective on our performance in comparison to competitors and other companies, (2) Drill down performance gaps to identify areas for improvement, and (3) Develop a standardized set of processes and metrics.

Besides product benchmarking, we also carry out technology and process benchmarking against our competitors as well as existing models to ensure our competitiveness.

Enabling Smart Factory into ATS Products and Processes

Organizations worldwide are integrating the internet of things (IoT) closely into how they conduct their businesses. The IoT is at the heart of changes being implemented in many industries, and it is closely associated with what is being hailed as the fourth industrial revolution or Industry 4.0, the current trend in manufacturing, the Smart Factory.

The Smart Factory describes an environment where machinery and equipment are able to improve processes through automation and self-optimization. The innovative drivers of smart factories are (1) Advanced Production Capabilities such as Real Time Process Monitoring (2) Equipment Automation with Unmanned Operation (3) Smart Process Control with self-learning inline expert system and (4) Automated Materials Supply.

In 2018, ATS partnered with a lead customer, a world leader in providing semiconductor solutions, to develop an i4.0 Lights-off Smart Factory (Figure 6.2b.2).

This project sets out the strategic environment, priorities and plans for ATS. It is intended to ready ATS for the fourth industrial revolution and allows ATS to better realize our Mission and Vision.
ASMPT Recognized as TOP 100 Global Tech Leaders

ONLY Back-end Equipment Supplier Being Recognized

"The Top 100 Global Technology Leaders are the organizations poised to propel the future of technology.”
Brian Scanlon, Chief Strategy Officer
Thomson Reuters, 2018

R&D Commitment Makes Us a Preferred Partner of Choice

USD1.423 million invested in R&D

2018 R&D expenditure
- US$ 205 million
- 9.3% of equipment sales

Package Interconnection Optics precision engineering Vibration control Laser dicing & grooving SMT
7.1 Customer Results

Describe how the organisation:

7.1a Customer satisfaction and experience

We have several ways to measure and monitor our customer satisfaction and retention through 3rd Party Survey by VLSI Research, survey software such as Qualtrics as well as customers’ awards and periodically customer scorecards which allow us to further improve our products and services and continue to delight our valued customers.

Continuously, we are being awarded several great achievements from VLSI Research which conducts survey of worldwide participants on equipment suppliers based on fifteen categories focusing on three key factors: supplier performance, customer service, and product performance as shown on Figure 7.1a.1. In Year 2018, we were awarded triple-crown for the 2nd time for The 10 BEST, The BEST and RANKED 1st Awards with highlight on our Field Engineering Support and Support After Sales.

In addition, we also received several awards from customers as part of appreciation due to ASMPT’s efforts over the years. In 2017, our Group CEO received the Best Partner Supplier Award from one of the China Big 4 Companies (Figure 7.1a.2).

![Figure 7.1a.1: VLSI Awards on Best Supplier](image1)

![Figure 7.1a.2: Best Partner Supplier Award](image2)

In 2018, our Group CEO received the Best Partner Supplier Award from one of the China Big 4 Companies.
We also review customer scorecard received to drive further improvement as shown on Figure 7.1a.4.

Scorecard:

<table>
<thead>
<tr>
<th>Rating Area Type</th>
<th>Weightage</th>
<th>Max Score</th>
<th>H1-2017</th>
<th>H2-2017</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quality Excellence (Criteria Weightage as 30%)</td>
<td>30%</td>
<td>22.40%</td>
<td>20%</td>
<td></td>
</tr>
<tr>
<td>Social Responsibility</td>
<td>5%</td>
<td>10</td>
<td>10</td>
<td>0</td>
</tr>
<tr>
<td>Uptime</td>
<td>25%</td>
<td>10</td>
<td>6</td>
<td>4.86</td>
</tr>
<tr>
<td>Supplier Quality System</td>
<td>15%</td>
<td>10</td>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td>MTBF</td>
<td>25%</td>
<td>10</td>
<td>6.57</td>
<td>6.67</td>
</tr>
<tr>
<td>Quality Complaints</td>
<td>25%</td>
<td>10</td>
<td>7.75</td>
<td>8.29</td>
</tr>
</tbody>
</table>

**Key Achievements:**
- ISO 9001, ISO 14001 and OHSAS 18001

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### 7.1b Product and service performance

In order to provide excellent services to our customers, we track on the Backend Equipment performance through the Field Installation Report (FIR) (Figure 7.1b.1) and Field Part Return (FPR) (Figure 7.1b.2) by our competent Customer Support Engineering teams.

The results from Year 2013 to Year 2018 had been improving and it is a good indicator of customer satisfaction on both our Materials and Backend Equipment businesses.
7.2a  Financial performance, including financial results and economic value

ASMPT delivered excellent financial performances and generated impressive shareholder values. Since its inception in 1975, ASMPT manages to achieve profitability every year. In fact, ASMPT has entered into high growth period.

For financial year ending 31 December 2018, both Group Bookings and Billings attained new records (Figures 7.2a.1 and 2). Group revenue grew 11.6% year-on-year to US$2.49 billion, of which Backend Equipment and Materials recorded total revenue of US$1.47 billion. Group revenue has, in fact, consecutively set new records over the past three years. All three Business Segments (including SMT) attained two years running records in revenue (Figure 7.2a.3). Group revenue has grown close to four times over the past ten years.

Figure 7.2a.1: ASMPT has entered into high growth period

Figure 7.2a.2: ASMPT achieved 2 years running Bookings record
7.2b Marketplace performance, including growth and market share, position and acceptance

As the market leader, ASMPT Backend Equipment traditionally outpaces the PAE (“Packaging Assembly and Equipment”) industry growth rate. In 2018, VLSI Assembly and Packaging Equipment forecasted a year-on-year growth of 3% but ASMPT Backend Equipment outpaced the industry and reported a year-on-year growth of 7% (Figure 7.2b.1).

ASMPT Backend Equipment continues to retain the No. 1 position in the global market, a position we first attained in 2002. In fact, over the past 17 years (68 quarters), the Group had maintained the No. 1 position, except for only once in Q1 2012. We further widen the revenue gap with our closest rival. In 2018, we also beat our closest rival in terms of profitability.

ASMPT Backend Equipment continues to chase after the wallet of our customers. Over the past five years, we continue to gain market share, growing from 22.5% in 2014 to 25% in 2018 (Figure 7.2b.2).

Geographically, China (inclusive of Hong Kong), Europe, Malaysia, the Americas and Taiwan were the top 5 markets for the Group in 2018. We have strong presence in China and are the preferred partner for customers. We continue to widen our gap with our rivals in China.

Our introduction of new leadframe products gained market traction significantly. For ATS Leadframe Selective Ag (RSA), the sales grew significantly from US$3 million in 2013 to US$19.3 million in 2018 with a compound annual growth rate (CAGR) at 44% for the last 6 years which reflects the market well acceptance of the product from our customers.

The Group also saw good progress from business that it had acquired over the past few years as the SMT Solutions Segment and ALSI continued to deliver outstanding results. The SMT Solutions Segment saw its revenue exceeded US$1 billion in 2018, with a record profit of HK$1.27 billion. ALSI, the laser business in the Backend Equipment Segment, was acquired in 2014, achieved a new record in revenue in 2018 that was around fivefold that of 2014.
7.3 People Results

7.3a Human Resource Planning

Figure 7.3a.1 shows that our outreach engagement with various Institutes of Higher Learning (IHLs) and candidate pool has increased tremendously. In 2018, the number of outreach events has increased more than 11 times as compared to 2013. This is attributed to our engagement efforts in building and sustaining stakeholder ownership by involving our internal stakeholders, such as hiring managers, regularly. The increase in outreach events has helped to grow our candidate pool by more than 22,000 within a short span of 2 years. This indicates that we have built up a growing pipeline of potential candidates to help support and meet our organisational needs.

7.3b Employee learning and development

Encompassing the agile mind-set and approach of lifelong learning, our L&D planning process involves the consolidation of current and future interventions from stakeholders’ inputs (Figure 7.3b.1) as well as providing timely L&D interventions and deliverables. Figure 7.3b.1 shows that the identified interventions in 2019 are 5 times more since 2013. The positive trend is attributed to the increasing business focus on upskilling and reskilling our employees and the need for new employee capabilities. Through our annual training needs identification/analysis exercise, we review and develop our interventions regularly to ensure that they remain current and relevant to the business needs and emerging L&D trends. Examples of future intervention in 2018 are Emotional Intelligence and Data Analytics.
7.3c Employee engagement and well-being

We work on and sustain various employee engagement platforms and execute well-being strategies for a great workplace for our employees. We are supported by our Happy Framework and relevant policy levers.

Figure 7.3c.1: Supportive environment - Skyloft facilities usage

Figure 7.3c.2: Cumulative number of employees who participated in interest groups

Figure 7.3c.3: Achieving 100% minimum take up rate for every interest group introduced

Figure 7.3c.4: Corporate Individual Scheme offered to employees

Employee Benefits
CORPORATE INDIVIDUAL SCHEME

Health Benefits
Mount Alvernia Hospital
Khoo Teck Puat Hospital

Technology
Apple
Starhub
Singtel

Personal Well-being
UOB Bank
Standard Chartered

Provide affordable healthcare benefits to employees.
Provide technological products and services, i.e. mobile subscription plan to employees at discount rate
Provide financial advisories to employees through our corporate partner

Figure 7.3c.5: Teambuilding fund utilisation rate

Figure 7.3c.6: Get together fund utilisation rate
From the workplace culture survey conducted, we observed a significant improvement in the participation rate for the survey conducted across 2016 and 2018.

<table>
<thead>
<tr>
<th></th>
<th>2016</th>
<th>2018</th>
<th>Delta</th>
</tr>
</thead>
<tbody>
<tr>
<td>Participation Rate</td>
<td>56%</td>
<td>80%</td>
<td>↑ 24% more participation</td>
</tr>
<tr>
<td>Total Response</td>
<td>592/1056</td>
<td>837/1051</td>
<td>↑ 245 staff</td>
</tr>
<tr>
<td>Survey Period</td>
<td>19 days</td>
<td>15 days</td>
<td>↓ 4 days</td>
</tr>
</tbody>
</table>

![ATS Workplace Culture Survey Results (2016 vs. 2018 Participation) - By Dimensions](image)

### 7.3d Employee performance and recognition

We invest in our human capital and reward our employees using different mechanisms to recognise their effort and contributions to the organisation.

**Variable Bonus**

The Annual Wage Supplement (AWS) and Special Bonus are some examples of variable bonuses in place for our employees.

We have been administering AWS as a fixed payment to all employees throughout the years and on top of their total annual wages, despite it being a discretionary wage component.

Staff Retention

We have a well-proportioned workforce of employees who form the various service year categories illustrated in Figure 7.3d.1. In most of the years, except in 2014 (28%), at least 30% of our workforce has been serving the organisation for 10 years or more. This healthy balance between the experienced and inexperienced allows for knowledge and skills transfer from more experienced employees to the next generation workforce to ensure a steady organisation growth and succession planning to take place.

![Figure 7.3d.1: Spread of employees by their service years category in ATS over the years](image)
7.4 Operational Results

7.4a Process performance

With our high investment and focus in R&D and innovation drive, ATS continuously file and attain for patents over years as shown on figure 7.4a.1.

Our productivity for product has increased by 34% over a period of five years with various improvement programmes such as application of lean manufacturing, process centric approach in assembly and functional testing, automation, Design for Manufacturability (DFM) and so on (Figure 7.4a.2).

![Figure 7.4a.1: Cumulative number of patents granted](image1)

![Figure 7.4a.2: High Volume Manufacturing (HVM) Average Labour hours per Machine](image2)

7.4b Suppliers and partners performance

Suppliers

Figure 7.4b.1 shows the yearly cost savings achieved based on our annual spend of US$80 million with an annual cost saving target of 5%. The above shows that we have maintained a robust level of cost savings of about 5% to 6% yearly from 2014 to 2018. This was driven by direct negotiation and alternative sourcing based on procurement strategy from each commodity, namely electrical, mechanical and electronics respectively.

![Figure 7.4b.1: Cost savings achievement](image3)

7.4c Governance system and contribution to the community, society and the environment

Governance system

The internal audit programme for ATS centered around the Control Assessment & Monitoring System (CAMS), which is aligned to Sarbanes-Oxley Act of 2002 (SOX). After considering the risks facing the entity, CAMS test plans are drawn up and audit review will be carried out annually. Group Internal Audit will recommend process and control enhancements to ensure the effectiveness of these key controls. The most recently completed SOX review for ATS was 2018.

A new review, Information Technology General control (ITGC), was introduced in 2017. This review applies to all systems, components, processes and data for the information technology environment, which includes review of system and data backup and recovery controls. ITGC is important as companies rely on systems and such ITGC review ensures the integrity of the data and processes that our systems support. An ITGC review of ATS was conducted in 2017.
Every quarter, the Audit Committee will review the quarterly report on internal audit from Group Internal Auditor. This quarterly Audit Committee meeting also involves the external auditor Deloitte Touche Tohmatsu, who will similarly receive and review the internal audit reports.

Moving from a paper to a digital environment, all the internal audit documentation from 2016 has migrated from the hardcopy version to be available on the internal audit shared intranet.

In area of Corporate Social Responsibility (CSR), several activities had been launched and Figure 7.4c.1 are examples on contribution to community and society.

Facilities teams across the 9 plants have implemented various energy savings projects. As shown in Figure 7.4c.2, although our energy consumption remained fairly constant since 2012 to 2017, the total revenue generated has been increasing. This shows significant energy efficiency with a reduction of the energy intensity index by 37% since 2012.

The Energy Efficiency National Partnership (EENP) award is organized by the National Environment Agency, Energy Market Authority and the Economic Development Board. The EENP Awards aims to foster a culture of sustained energy efficiency improvement in industry and public sector agencies. The EENP Awards also aims to encourage companies/organizations/individuals to adopt a proactive approach towards energy management by identifying and sharing best practices for all to emulate. Our Facilities Management had received this prestigious award for the efforts in promoting and driving energy efficiency improvement within our organization.

At the same time, in recognition of ASMPT’s initiative to shape a more environmentally friendly and sustainable environment, we were awarded the GOLD standard by BCA Green Mark (Figure 7.4c.3) for our new Tech-Park Building 2.
<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>8D</td>
<td>8 disciplines or the 8 critical steps for solving problems</td>
</tr>
<tr>
<td>ABIT</td>
<td>Universal Abit (formerly ABIT Computer Corporation) was a computer components manufacturer, based in Taiwan</td>
</tr>
<tr>
<td>ACM</td>
<td>Advanced Customized Manufacturing</td>
</tr>
<tr>
<td>AFS</td>
<td>Approved Firefighter Suppliers</td>
</tr>
<tr>
<td>AGF</td>
<td>Automated Guided Forklift</td>
</tr>
<tr>
<td>AGV</td>
<td>Automated Guided Vehicle</td>
</tr>
<tr>
<td>AP</td>
<td>Advanced Packaging</td>
</tr>
<tr>
<td>APM</td>
<td>Agile Project Management</td>
</tr>
<tr>
<td>AQA</td>
<td>ASMPT Quality Award</td>
</tr>
<tr>
<td>ASMPT</td>
<td>ASM Pacific Technology</td>
</tr>
<tr>
<td>ASRS</td>
<td>Automated storage and retrieval Systems</td>
</tr>
<tr>
<td>ATS</td>
<td>ASM Technology Singapore Pte Ltd</td>
</tr>
<tr>
<td>BCA</td>
<td>Building and Construction Authority</td>
</tr>
<tr>
<td>BGA</td>
<td>Ball Grid Array</td>
</tr>
<tr>
<td>BOT</td>
<td>Brown Oxide Treatment (to increase the adherence of shiny copper surface to resin) --&gt; Increase mold adhesion by increase copper surface roughness</td>
</tr>
<tr>
<td>BU</td>
<td>Business Unit</td>
</tr>
<tr>
<td>CAE</td>
<td>Computer Aided Engineering</td>
</tr>
<tr>
<td>CAMS</td>
<td>Control Assessment &amp; Monitoring Systems</td>
</tr>
<tr>
<td>CAR</td>
<td>Corrective Action Report</td>
</tr>
<tr>
<td>CCM</td>
<td>CMOS Camera module</td>
</tr>
<tr>
<td>CFD</td>
<td>Computational Fluid Dynamics</td>
</tr>
<tr>
<td>CIP</td>
<td>Continuous Improvement Plans</td>
</tr>
<tr>
<td>CIS</td>
<td>CMOS Imaging Sensor</td>
</tr>
<tr>
<td>CLAM</td>
<td>Closed Loop Automatic co-Planarity</td>
</tr>
<tr>
<td>COO</td>
<td>Cost of Ownership</td>
</tr>
<tr>
<td>CPS</td>
<td>Certified Preferred Suppliers</td>
</tr>
<tr>
<td>CRM</td>
<td>Customer Relationship Management</td>
</tr>
<tr>
<td>CSR</td>
<td>Corporate Social Responsibility</td>
</tr>
<tr>
<td>CSS</td>
<td>Certified Strategic Suppliers</td>
</tr>
<tr>
<td>DFA</td>
<td>Design for Assembly</td>
</tr>
<tr>
<td>DFM</td>
<td>Design for Manufacturability</td>
</tr>
<tr>
<td>DRC</td>
<td>Disaster Recovery Committee</td>
</tr>
<tr>
<td>EBIT</td>
<td>Earnings Before Interest and Taxes</td>
</tr>
<tr>
<td>ECM</td>
<td>Engineering Change Management</td>
</tr>
<tr>
<td>EDB</td>
<td>Economic Development Board</td>
</tr>
<tr>
<td>EDI</td>
<td>Electronic Data Processing</td>
</tr>
<tr>
<td>EEPS</td>
<td>Enhanced Electronic Pull System</td>
</tr>
<tr>
<td>EFIR</td>
<td>Electronic Field Installation Report</td>
</tr>
<tr>
<td>EM</td>
<td>External Manufacturing</td>
</tr>
<tr>
<td>EP</td>
<td>Expandable Press</td>
</tr>
<tr>
<td>EQT</td>
<td>Equipment</td>
</tr>
<tr>
<td>ERC</td>
<td>Emergency Response Committee</td>
</tr>
<tr>
<td>ERP</td>
<td>Enterprise Resource Planning</td>
</tr>
<tr>
<td>ESG</td>
<td>Encapsulation Solutions Group</td>
</tr>
<tr>
<td>ESI</td>
<td>Earlier Supplier Involvement</td>
</tr>
<tr>
<td>ESS</td>
<td>Encapsulation Solutions and System</td>
</tr>
<tr>
<td>ETTV</td>
<td>Envelope Thermal Transfer Value --&gt; A useful indicator for the thermal performance of a building envelope</td>
</tr>
<tr>
<td>FAMless</td>
<td>Film Assist Molding</td>
</tr>
<tr>
<td>FEA</td>
<td>Finite Element Analysis</td>
</tr>
<tr>
<td>FOA</td>
<td>Financial &amp; Operational Audit</td>
</tr>
<tr>
<td>FSM</td>
<td>Fire Safety Manager</td>
</tr>
<tr>
<td>GDP</td>
<td>Gross Domestic Product</td>
</tr>
<tr>
<td>GTR</td>
<td>Great Team from Roots (Bottom up Improvement teams) --&gt; To build an engaging team that drive towards World Class Quality</td>
</tr>
<tr>
<td>HPVIM</td>
<td>High-Precision-Vision-Inspection-Machine</td>
</tr>
<tr>
<td>HRIS</td>
<td>Human Resource Information System</td>
</tr>
<tr>
<td>HVM</td>
<td>High Volume Manufacturing</td>
</tr>
<tr>
<td>i4.0</td>
<td>Industry 4.0</td>
</tr>
<tr>
<td>IC</td>
<td>integrated circuit</td>
</tr>
<tr>
<td>ICT</td>
<td>Information Communication and Technology</td>
</tr>
<tr>
<td>IDM</td>
<td>Integrated Device Manufacturer</td>
</tr>
<tr>
<td>IHQ</td>
<td>In House Qualification</td>
</tr>
<tr>
<td>IHRP</td>
<td>Institute for Human Resource Professionals</td>
</tr>
<tr>
<td>IIoT</td>
<td>Industrial internet of things</td>
</tr>
<tr>
<td>IoT</td>
<td>Internet of things</td>
</tr>
<tr>
<td>IP</td>
<td>Intellectual property</td>
</tr>
<tr>
<td>ITGC</td>
<td>Information Technology General Control --&gt; Use windows user account as unified access control for most of the applications</td>
</tr>
<tr>
<td>KPI</td>
<td>Key Performance Index</td>
</tr>
<tr>
<td>LED</td>
<td>Light-Emitting Diode</td>
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<tr>
<td>MBD</td>
<td>Multibody Dynamics --&gt; A multibody dynamic (MBD) system is one that consists of solid bodies, or links, that are connected to each other by joints that restrict their relative motion. The study of MBD is the analysis of how mechanism systems move under the influence of forces, also known as forward dynamics.</td>
</tr>
<tr>
<td>Abbreviation</td>
<td>Description</td>
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<tr>
<td>ME</td>
<td>Micro-etching roughness → Roughness of copper surface after micro-etching treatment</td>
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<tr>
<td>MI</td>
<td>Module Integration</td>
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<tr>
<td>MIS</td>
<td>Management Information System</td>
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<tr>
<td>MMP</td>
<td>Master Manufacturing Plan</td>
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<tr>
<td>MPC</td>
<td>Material Planning and Control</td>
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<tr>
<td>MPS</td>
<td>Master Production Schedule</td>
</tr>
<tr>
<td>MTBA</td>
<td><em>Mean Time Between Assists</em> → MTBA is the average number of hours the equipment is running until an assist is required. Assists are not failures but are essentially interruptions that require a reset and do not require spare parts; often this is as simple as rebooting the computer.</td>
</tr>
<tr>
<td>NPI</td>
<td>New Product Introduction</td>
</tr>
<tr>
<td>OECD</td>
<td>Organization for Economic Co-Operation and Development</td>
</tr>
<tr>
<td>OR</td>
<td>Operational Review</td>
</tr>
<tr>
<td>OSAT</td>
<td>Outsourced Assembly and Test</td>
</tr>
<tr>
<td>PA</td>
<td>Performance Appraisal</td>
</tr>
<tr>
<td>Pd</td>
<td>Palladium</td>
</tr>
<tr>
<td>PDCA</td>
<td>Plan-Do-Check-Act</td>
</tr>
<tr>
<td>PE</td>
<td>Production Engineer</td>
</tr>
<tr>
<td>PEST</td>
<td>PEST analysis (political, economic, socio-cultural and technological)</td>
</tr>
<tr>
<td>PGS</td>
<td>Performance Gratuity Scheme</td>
</tr>
<tr>
<td>PLM</td>
<td>Product Life Cycle Management</td>
</tr>
<tr>
<td>POWER</td>
<td>Passion-Ownership-Win-Excellence-Respect</td>
</tr>
<tr>
<td>PPF</td>
<td>Pre-Plated leadframe</td>
</tr>
<tr>
<td>PPM</td>
<td>Parts Per Million</td>
</tr>
<tr>
<td>QBR</td>
<td>Quarterly Business Review</td>
</tr>
<tr>
<td>QFN</td>
<td>Quad Flat No-Leads → QFN package (type of surface mount package)</td>
</tr>
<tr>
<td>R&amp;D</td>
<td>Research &amp; Development</td>
</tr>
<tr>
<td>RBA</td>
<td>Responsible Business Alliance</td>
</tr>
<tr>
<td>RCM</td>
<td>Recruitment Management</td>
</tr>
<tr>
<td>RDLS</td>
<td>Redistribution Layers → A redistribution layer (RDL) is an extra metal layer on a chip that makes the IO pads of an integrated circuit available in other locations</td>
</tr>
<tr>
<td>RMK</td>
<td>Recruiting Marketing</td>
</tr>
<tr>
<td>RSA</td>
<td>Reel Selective Silver → Photomask Silver plating in roll form</td>
</tr>
<tr>
<td>SAO</td>
<td>Sales Administration Officers</td>
</tr>
<tr>
<td>SAP</td>
<td>System Administration Product - Enterprise resource planning (ERP) System</td>
</tr>
<tr>
<td>SCM</td>
<td>Supply Chain Management</td>
</tr>
<tr>
<td>SEMI</td>
<td>A global industry association for electronics serving the manufacturing supply chain for electronics industry</td>
</tr>
<tr>
<td>SFw</td>
<td>Skills Framework</td>
</tr>
<tr>
<td>SIF</td>
<td>System-In-Package</td>
</tr>
<tr>
<td>SLIM</td>
<td>Smart Lean Integrated Manufacturing</td>
</tr>
<tr>
<td>SMT</td>
<td>Surface Mount Technology</td>
</tr>
<tr>
<td>SNC</td>
<td>Setup and Calibration</td>
</tr>
<tr>
<td>SNEF</td>
<td>Singapore National Employer Federation</td>
</tr>
<tr>
<td>SRRC</td>
<td>Strategic Risk Review Committee</td>
</tr>
<tr>
<td>SSG</td>
<td>SkillsFuture Singapore</td>
</tr>
<tr>
<td>SWOT</td>
<td>Strengths, Weakness, Opportunities, Threats</td>
</tr>
<tr>
<td>TAE</td>
<td>Training and Adult Education</td>
</tr>
<tr>
<td>TAFE</td>
<td>Tripartite Guidelines released by Tripartite Alliance for Fair and Progressive Employment Practices</td>
</tr>
<tr>
<td>TNA</td>
<td>Training Needs Analysis</td>
</tr>
<tr>
<td>TNI</td>
<td>Training Needs Identification</td>
</tr>
<tr>
<td>TPB2</td>
<td>Tech-Park Building 2</td>
</tr>
<tr>
<td>UPH</td>
<td>Units Per Hour</td>
</tr>
<tr>
<td>USPs</td>
<td>Unique Selling Points</td>
</tr>
<tr>
<td>UV</td>
<td>Ultra-Violet</td>
</tr>
<tr>
<td>VLSI</td>
<td>Very Large Scale Integration</td>
</tr>
<tr>
<td>VLSI Research</td>
<td>→ VLSI Research is VLSI Research, Inc. VLSI research is an award-winning provider of market research and economic analysis on the technical, business, and economic aspects of the semiconductor supply chain</td>
</tr>
<tr>
<td>VMI</td>
<td>Vendor Managed Inventory</td>
</tr>
<tr>
<td>VMV</td>
<td>Vision, Mission and Values</td>
</tr>
<tr>
<td>WB</td>
<td>Wire Bonders</td>
</tr>
<tr>
<td>WHS</td>
<td>Workplace Health and Safety</td>
</tr>
<tr>
<td>WIP</td>
<td>Work-In-Progress</td>
</tr>
<tr>
<td>WIGs</td>
<td>Wildly Important Goals</td>
</tr>
<tr>
<td>WLP</td>
<td>Wafer-Level Packaging</td>
</tr>
<tr>
<td>WSG</td>
<td>Workforce Singapore</td>
</tr>
<tr>
<td>WSH</td>
<td>Workplace Safety &amp; Health</td>
</tr>
<tr>
<td>WSTS</td>
<td>World Semiconductor Trade Statistics</td>
</tr>
</tbody>
</table>