Abrasive Engineering Grows to $8.5 Million through Collaboration with A*STAR

Abrasive Engineering (AE) has successfully designed and fabricated blasting and shot-peening machines in Singapore since 1990. Adapting AE's tools to a rapidly expanding digital manufacturing marketplace was imminent, so its Managing Director Tan Ser Hean looked to A*STAR to develop new technologies.

While Abrasive Engineering's (AE) blasting and shot-peening machines have sold successfully for nearly three decades, the company needed to adapt to Industry 4.0 to stay competitive well into the future.

AE's Managing Director Tan Ser Hean said, "Factories everywhere, including those of my customers, are embarking on Industry 4.0. I want my machines to be ready for that – to be machines of the future."

To develop AE's technologies, Tan knew he needed a partner like A*STAR to guide him through what could be a challenging journey.

Tan chose to partner with A*STAR's Advanced Remanufacturing and Technology Centre (ARTC). In partnership with Nanyang Technological University (NTU), ARTC functions as a testbed to develop advanced manufacturing technologies. The Centre functions as a conduit between research and industry applications – a bridge that helps transforms research know-how into practical solutions that businesses can use.

Along with AE, heavyweights like Microsoft and Rolls Royce have joined the ARTC since its inception in 2015.

"AE is one of the earliest members at ARTC. As a small company, we knew that there would be a lot to gain from working with ARTC. Our profits have also grown over a short period of time since we began conducting R&D," added Tan.

Specialising in blasting and shot-peening machines that strengthen metal components, AE needed to upgrade its technology to better service MNCs already in the thick of advanced manufacturing technologies. This was especially true for those in high-value industries like aerospace, automotive, and oil and gas.

To stay ahead of the competition, AE joined A*STAR's Model Factory initiative. One of the first things AE tested at ARTC was a new type of digital process to monitor machine health. Earlier there was no system in place to collect and analyse data machine health. Engineers needed to make site visits to troubleshoot machinery. This lack of data made it very difficult for the company to advise customers on the condition of the equipment. As a result, the company was struggling to manage manpower productivity as well as maintain customer satisfaction levels.
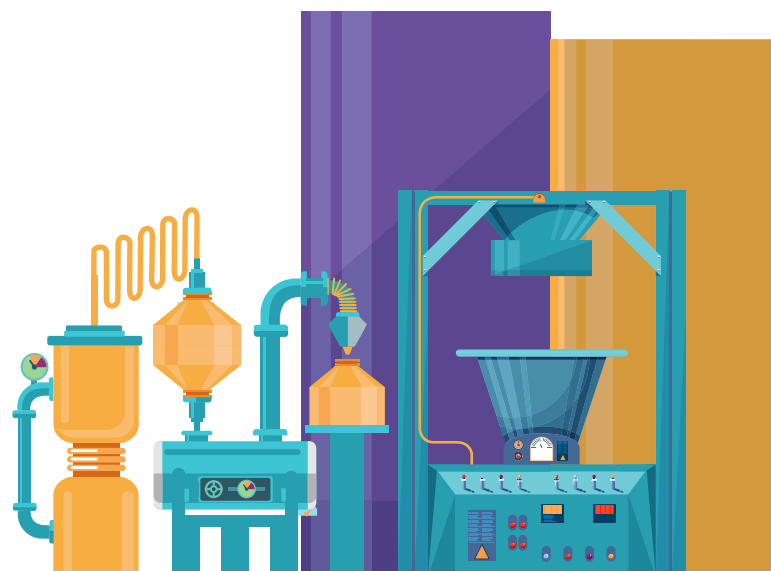
"Our machines have evolved from manual to semi-automatic, fully automatic, and now robotic," Tan said. "The next step is digitalisation, which will improve preventive maintenance on our machines and reduce costs for our clients."

AE and ARTC are working together to equip the machines with sensors so that the company can tap on the benefits of the Industrial Internet of Things (IIoT) connectivity. With IIoT, customers can use data analytics to track the activity of AE's machines.

This allows them to optimise maintenance cycles, reduce machine downtime, and in turn, minimise disruptions on the factory floor.

A second advancement made was the incorporation of advanced image analytics and an online quality check system. With these hi-tech images, customers of AE's shot-peening machines can inspect the quality of their machined metal components. Such analytics provide quality assurance to customers and help reduce overall manpower.

AE is currently in its final stages of developing a manufacturing intelligence control room (MICR) that would grow the company's machine analytics and connectivity. The company also plans to develop technology in online quality systems.

To date, AE has invested about half a million dollars on its project with ARTC – a relatively substantial investment by a company with an annual turnover of about S$7 million. The company's projected revenue for 2018 is around S$8.5 million.

Tan envisions the company growing, and plans to continue its close partnership with the ARTC. "After three years, we have a close relationship with ARTC. They understand what we want. **We're aiming to develop a machine for the future, and we want to develop it together with ARTC**," said Tan.

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>
> - Tan Ser Hean,
>   Managing Director, Abrasive Engineering

Model Factory at ARTC

The A*STAR Model Factory provides senior management, managers and operators with overall visibility of the manufacturing floor. The digitisation of the entire workflow allows for data to be visualised and organised in a manufacturing intelligence control room (MICR) so that the end-user can make quick decisions to ensure productivity is kept at an optimal level.

With the MICR, businesses such as AE can develop advanced robotics, decentralise decision-making tools, and build tools for sustainable manufacturing.

ABRASIVE ENGINEERING PTE LTD

CHALLENGES

* ★ Need to ensure sustainable growth
* ★ Adapt the company's shot-peening and blasting machines to include advanced technologies
* ★ Remain competitive in the advanced manufacturing supply chain by providing products equipped for Industry 4.0

SOLUTIONS

* ★ Partnered ARTC to upgrade its existing machines by incorporating technologies such as image analytics, online quality check systems, sensors, and tapping on the use of IIoT
* ★ Worked with A★STAR to co-develop new products available for adoption under A★STAR's Model Factory initiative
    * – For instance, the Manufacturing Intelligence Control Room (MICR) – a data visualisation dashboard that allows end-users to make quick operational decisions

RESULTS

* ★ Revenue jumped to about S$8.5 million in 2018 from over S$7 million in 2017
* ★ Continued growth – AE projects higher revenue growth beyond 2018
* ★ Widespread impact – AE's machines are used in multiple industries including aerospace, automotive, medical, oil and gas and electronics
* ★ Developed research plans for 2019, which include training and technology road-mapping sessions, secondment of researcher under A★STAR's T-Up scheme

Model Factory

The Model Factory Initiative is introduced by A★STAR in 2015. It is a live manufacturing production environment, coupled with a virtual environment, where companies can learn, collaborate on and develop Industry 4.0 technologies. It provides a safe environment where companies can learn and test newer Industry 4.0 technologies within a collaborative ecosystem of partners. For more information, visit bit.ly/astar_mf