

EVEN as larger construction firms are finding increasingly sophisticated ways to improve their productivity, smaller firms are also making productivity strides through the adoption of machinery and training of their workers. Sterling Engineering, a local subcontractor which provides structural steel engineering and prefabrication solutions to Singapore's construction sector, is one such example.

Marc Sim, business development manager and productivity champion at Sterling Engineering, jokes that in the five years that he has been with the family business, he has purchased four separate pieces of equipment, making him quite productive as well.

The four pieces of equipment – an automatic hydraulic shearing machine, a CNC plasma cutting machine, a gantry crane and an automatic profile cutter – are not in themselves large investments (the equipment range from S\$20,000 to S\$40,000, except for the automatic profile cutters which cost the company S\$18,000 for two sets) but they have transformed the way that Sterling Engineering works.

“The CNC plasma cutter is the best machine so far, it's reaped the best productivity gain across the machines,” says Mr Sim. “The workers told me that if we were to remove the CNC plasma cutting machine now, it would be like taking their handphones from them. It's that bad – or that good!”

Using the CNC plasma cutting machine has greatly improved the process of cutting odd-sized plates. With the machine, drawings of odd-sized plates are easily created using computer-aided design (CAD) software; the drawings are then transferred to the control panel of the CNC cutting machine via USB.

For the cutting process, the entire steel plate is placed onto the machine's cutting table and the machine cuts the desired shape and quantity accordingly. A single piece takes approximately three to seven minutes to execute.

Using the conventional method, workers would have had to cut the steel plate to the nearest dimension, and because the finishing is very crude, grind down the edges. One worker would have been involved in performing hot works and another worker on standby with a fire extinguisher for safety. One odd-sized plate would take about 20 minutes to produce.

The benefits are manifold – only one man is required to operate the machine; less preparation work is required; and human error and material wastage are minimised.

LEVERAGING GOVERNMENT FUNDING

More companies are leveraging the Construction Productivity and Capability Fund (CPCF) to improve their productivity. To help companies, especially small and medium-sized enterprises (SMEs), make the switch to higher productivity, the Building and Construction Authority (BCA) has been offering assistance through the fund to defray the costs of technology adoption and workforce development.

“Over the years, the take up rate for the CPCF has improved at an increasing rate,” notes BCA chief executive John Keung. So far, more than S\$230 million of the CPCF has been committed, benefiting more than 5,200 firms, of which over 80 per cent are small firms. In October, the government announced it will pump in an additional S\$55 million, bringing the total funding to S\$335 million.

In addition, 76 sessions of the Productivity Clinic



WORK DIFFERENT ▶

In the five years that Mr Sim has been with Sterling Engineering, he has purchased four separate pieces of equipment that have transformed how the subcontractor works

PHOTO: YEN MENG JIN

RISE OF THE MACHINES

MECHANISATION HAS ALLOWED WORKERS IN THE CONSTRUCTION INDUSTRY TO COMPLETE THEIR TASKS EFFICIENTLY. IT GOES HAND IN HAND WITH SKILLS UPGRADING TO ENSURE THAT THEY CAN USE SUCH TECHNOLOGIES EFFECTIVELY.

(these are personalised one-on-one consultations on construction productivity related issues) have also been conducted, reaching out to over 300 firms.

Of the various schemes under the CPCF, a higher percentage of small firms are applying for the Mechanisation Credit (MechC) and Workforce Training and Upgrading (WTU) schemes, adds Dr Keung.

Some of the popular technologies adopted by small builders under the MechC include work platforms such as scissor lifts, lifting equipment such as telescopic handlers and builder's hoists as well as small tools such as spray painting machines. Some of the popular courses include those related to Building Information Modelling (BIM) and construction productivity.

“We are seeing the industry respond and make effort to improve productivity. As a result, site productivity which is measured as the total floor area constructed per man-day has improved at about 1.2 per cent per annum from 2010 to 2013. The adoption rates for productive construction technologies such as drywall and system formwork have also increased,” says Dr Keung.

While these are commendable statistics, more needs to be done. “Moving forward, we will be focusing on training professional and technical personnel (building

“FOR SUB-CONTRACTORS AND SMALL BUILDERS, ADOPTING MACHINERY AND TRAINING WORKERS IN SPECIFIC SKILLSETS CAN HELP IMPROVE THEIR PRODUCTIVITY WHEN PERFORMING VARIOUS TRADES. FOR BIGGER BUILDERS, THEY WILL ALSO NEED TO LOOK FOR WAYS TO IMPROVE SITE MANAGEMENT AND COORDINATION AT THE PROJECT LEVEL BY RESTRUCTURING THEIR WORK PROCESSES.”

– BCA chief executive John Keung



capabilities) to support the technological advancements and productivity drive in the built environment sector, improving the integration along the construction value chain and pushing for the adoption of Design for Manufacturing and Assembly (DfMA) and game-changing technologies,” says Dr Keung.

MOVING TOWARDS DfMA

DfMA, where manufacturing and assembly of building components are done off-site for installation on-site, is the next step to accelerate productivity growth in the construction sector.

“This means pushing for the adoption of integrated volumetric building solutions such as Prefabricated Prefinished Volumetric Construction (PPVC) whereby whole room- or apartment-sized units complete with internal fixtures are produced and manufactured off-site, and installed on-site in a Lego-like manner,” says Dr Keung. “The productivity improvement is higher, potentially achieving up to 50 per cent in terms of manpower and time savings, depending on the complexity of the projects.”

DfMA also brings about other intangible benefits to the public such as less noise and dust in the construction vicinity, as well as better quality homes and safer workplaces.

THE IMPORTANCE OF TRAINING

Training is an equally important driver. “Technology adoption and skills upgrading are equally important in helping companies improve productivity. Through mechanisation, workers are able to complete their tasks more efficiently. On the other hand, skills upgrading is needed to ensure they have adequate knowledge and skills to effectively deploy such technologies at work,” says Dr Keung.

At Sterling Engineering, all the workers – except for two who are recent hires – are CoreTrade (Construction Registration of Tradesmen) certified.

Administered by BCA, the CoreTrade scheme was introduced to help the construction industry build up its core group of competent and experienced workers in key construction trades. CoreTrade personnel may qualify as “higher skilled” under the Ministry of Manpower's foreign worker levy scheme.

“Our case was special because I know my guys are skilled. A lot of them have been with us for more than five years . . . so I know they are skilled but they don't have something formal to prove that,” says Sterling Engineering's Mr Sim.

One of the benefits of sending his staff for training was to affirm them. “At one point, they felt that their jobs were at stake (after we bought the machines),” says Mr Sim. Sending them for training however reassured them of their position at the company, and they were subsequently more open to embracing the machinery and automation journey.

Mr Sim already has his eye on his fifth investment. He says: “When I assumed this role, I learnt a few things. Productivity is like safety. It's not a management concept. It's not a framework. It's a mindset. You have to want to be productive.

“At any company, whether it is restructuring or not, you're supposed to look at ways to make your process more productive. Whether there's incentive or not, whether there's a penalty or not, if you own any business process, you should try to look at it and make it improve in a more efficient and productive way. So that's what I sought to do.”

CONSTRUCTION PRODUCTIVITY AWARDS

Sterling Engineering was one of the nine firms lauded for their innovative productivity initiatives under the Construction Productivity Award (CPA) - Advocates category this year, compared with six firms last year.

One of the other winners was Antara Koh who advocated the use of Real Time Kinematic (RTK) Global Positioning System (GPS) for marine pile positioning. The technology can reduce the number of people needed for carrying out surveying work to three people from six. It also allows piling work to be carried out at night and under all weather conditions. The technology also helped to improve the productivity of pile installation by more than 100 per cent.

Another winner is Samwoh Corporation, a leading integrated civil and infrastructure construction company with a strong focus on research and technological innovation, many of which are the first of its kind to be implemented in Singapore. These include an automated laser crack measurement system which uses 3D laser and image recognition technology to collect road condition data for road maintenance. This method enables faster reporting of pavement surface condition with at least 34 per cent improvement in productivity.

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