

Sutton Tools Automation Program

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As the key player, Australian owned tooling developers, Sutton Tools, require no introduction. From their onset in 1917 they have proven to be great pioneers, adopting and developing new technologies to improve the efficiency of cutting tools and their manufacture, including the latest coating technologies. As part of this ongoing development, Sutton Tools has invested heavily in the use of robotics.

From an automation perspective, cutting tools are principally long cylindrical components, regardless of whether they end up as drills, taps or milling cutters. As such they can be handled in much the same way as any process proven to benefit from being automated – for example, you wouldn't imagine tins of beans to be labelled by hand nowadays.

This thinking along with growing competition from outside Australia prompted Sutton Tools to re-evaluate all its key processes and determine which would benefit most from being further automated. As the production bottleneck was manual loading and unloading, this was the first to be addressed. Batch sizes range from 1 to 5000, with the average being in the order of 500 - 1000, so there was much to be gained by freeing up operators to focus on programming rather than loading and unloading.

The company have four manufacturing locations, three in Victoria and one in New Zealand. At Thomastown, Victoria, the focus is on HSS tooling such as high performance drills, taps and milling cutters. There is also a small carbide division but most of the carbide tooling is produced at the other plants. The highest volume plants are in Maryborough, Victoria and Kaiapoi, New Zealand, where between them manufactures up to 120,000 standard drill bits per day. It's these plants that employ the vast majority of special-purpose automated machinery most of which has been either developed in-house or commissioned as a special, optimised for tooling manufacture.

“What we needed, and set out to achieve over the past six years, was to develop an automated system capable of transporting components from one machine to another using a palletised system” said Phillip Xuereb, Chief Engineering Executive. “As we saw it, the best way to do that was to make use of a robot system, so we embarked on installing a Fanuc robot, supplied by John Hart. This was adapted to work with an in-house developed palletising system (basically an aluminium plate with a large number of holes corresponding to the diameter of the tool shank), but sat alongside the machine rather than being fully integrated.”

“Our first applications were the manually loaded machines followed by replacing simple automation already existing on the machines with a robot system. This gave us the ability to move components from one machine to the other via the pallets. It's an ongoing process where we are looking to replace all manually intensive tasks with automation. When we design a machine, we decide use a palletising system and a Robot as an integral part of the machine.

“Our aim was to do three things: 1. to eliminate repetitive manual loading 2. to have a common process which makes the components transportable from one machine to the other and 3. a process which is quick setting and easy to use integrated with the machine so that it becomes operator friendly.”

“The first exercise we undertook comprised a thread grinding machine and Fanuc robot. We found that the productivity of that machine based on the same hours was 40% greater than our previous manual setup. The reason for this was that it ran more continuously, there was no waste of time between the loading processes. Also, the operator didn't have to drop another task to attend to the machine,” says Xuereb. Based on that improvement, it wasn't too difficult to convince the management to continue investment along these lines and retrofit robots to other machines by virtue of productivity. Regarding training, I asked whether operators required special courses to bring them up to speed. The answer was yes, but Phil was quick to point out that Sutton Tools employed highly trained operators. “We needed to have specialists in

robotics positioning and programming and so forth so we sent a number of our people to external training courses.” Therefore, Sutton Tools had to put a fair bit of investment up front but the return was good.

Sutton Tools needed to compete with low cost imported products, yet also needed to have the flexibility; therefore they went about using as many of the same type of robots as possible throughout the plant. By adopting this approach, they could move operators and jobs around with relative ease.

Today, Sutton Tools have achieved its objective. Productivity has certainly increased, and one robot has now become twenty five. The company has an on-going programme to automate processes. Any new machinery built for them includes an integrated Fanuc robot situated within the working envelope. For example, if a new machines is commissioned, it will include a Fanuc robot as standard. A number of ‘special purpose’ CNC machines have also been built in-house with an integrated robot. These are their own designs for specialist tooling, as such they are not for sale.

“Basically we have standardised on the 6-axis Fanuc 200 IC systems because we have found them to be very reliable and offer us the flexibility we need,” says Xuereb. The robot control programs are integral with the machine’s CNC controller and programmed by the machine operator as part of the job. They principally work to pick and place each tool using a now standardised Sutton designed palletising system and specially developed gripper systems which are also made in-house. The robot systematically picks a tool blank from the pallet and places it in the grinding machine’s chuck ready for the grinding cycle. It then retrieves the finished ground tool and places it in a second pallet ready for further operations. The robot is typically programmed to pick components for inspection at set intervals and place them in a separate tray.

“The pay back is that we have a happier workforce – we haven’t gone about applying robots to reduce workforce, what we have done is reduce the manual handling. The staff appreciates this as they don’t have to do monotonous jobs like manual loading anymore, leaving them to focus on programming and getting the next job underway. Our people are very good at understanding that we needed to make efficiency changes in order to stay ahead of competition. We practice lean manufacturing principles, therefore this was an extension of this philosophy. Part of our brief was to have a quick set up that was operator friendly. So having those in place we’ve had a high acceptance level. Elsewhere, I have seen where processes have been put in a manufacturing operation and not accepted by the workforce so they’ve never got used to their potential.”

Regarding the future, Sutton Tools are in discussion with John Hart, to look at the possibility of using a vision system to select components from a basket and load up the initial pallets with the right tooling blanks. At present this is done manually and is very labour intensive.

“Robots are making huge leaps in terms of their technology. They are becoming easier to use and more reliable and are now being augmented with vision systems for selecting grippers etc. Gone are the days where people are thinking, ‘I don’t want to use a robot, they crash all the time! Today’s robots won’t crash.....mind you it is critical to consider the safety aspects,” said Xuereb.

So in summary the reason for the robot is for efficiency gains, production gains and a happy workforce.

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