METAL CUTTING AND DE-BURRING CELL

This project was part of a £1.0M investment in manufacturing facilities and equipment with the following overall objectives:

- Reduce manufacturing costs.
- Significantly increase production capacity.
- Improve operating flexibility.
- Replace old and obsolete technology.

For details of the other parts of the investment, please click on **£1.0M Investment in Metal Manufacturing** or **Pre-treatment & Powder Coating Plant** or **Robotic Welding Cell** as required.

The company in question manufactured products using wood composite panels, plastic mouldings and metal components. A significant proportion of the metal components were welded assemblies fabricated in-house from lengths of hollow section mild steel. These lengths of steel were cut from stock purchased in 6.1 metres lengths.

An analysis of the market place for these products had shown a significant change in recent years, moving from high volume orders with low variety, to low volume orders with high variety. The company had an existing in-house cutting capability but the process was slow due to:

- The set up time required.
- Machines had to be loaded and unloaded manually.
- Cut components had to be de-burred on separate machines resulting in double handling.

All the above factors meant that there was insufficient in-house capacity to meet current, or future, business requirements. To overcome this situation the company was buying a significant proportion of its steel in cut lengths directly from its steel suppliers. This strategy resulted in increased material costs, in-process inventory levels and space requirements due to:

- The charge per cut levied by the supplier.
- The need to hold significantly more stock due to the variety of lengths required.
- Increased lead-time from the supplier.

An audit of in-process inventory showed that there could be up to 150 stillages containing cut lengths of steel on the shop floor at any one time.

An analysis of the total annual requirement for cut lengths of hollow steel section revealed that:

- 80% used just four different sections (size and/or shape).

In addition, an analysis of the cutting requirement showed that:

- 90% were right angle cuts.
- 10% were oblique angular cuts.

From the results of the process evaluation it was obvious that the existing in-house cutting facility would need to be upgraded to meet both current, and future, business requirements. This would be justified by reduced manufacturing costs based on:

- A reduction in the level of in-process inventory.
- Elimination of supplier cutting charges.
- A reduction in space requirements.

This last consideration was also a key factor in achieving a requirement to consolidate all manufacturing operations in a single location.

The results of the process evaluation also identified that the new in-house cutting facility would need to provide two distinct capabilities:

- A high speed automatic saw for volume cutting of right angle cuts.
- A semi-automatic mitre saw for producing oblique angular cuts.

It is worth making the point here that you can buy dual purpose machines which will volume cut both right angle and angular cuts. However, the above strategy provided the better solution because:

- The respective volumes leant themselves to splitting the duty between two machines.
- One machine operator could use the mitre cut saw while the automatic saw was batch cutting.
- Dual purpose machines are very expensive and they are inevitably a compromise.

On the last point, few multi-purpose machines of any type are capable of excelling at everything they are designed to do. In view of this they should be avoided, unless the work profile is such that the cost of buying individual machines would be prohibitive.

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In order to address the constraints of the existing process the following key requirements were identified for the high speed automatic saw:

- Bulk loading of steel stock.
- Rapid setting time (auto/manual length stops).
- Length accuracy & repeatability (0.25mm).
- Quality of finished (de-burred) cut.
- In-line de-burring.
- Bulk collection of finished components.

Like many areas of the machine tool industry the supply of metal cutting equipment is hugely competitive, with a bewildering choice of machines from several suppliers. Details of the projected annual cutting requirement (volumes and types of material) were made available to three potential suppliers who each recommended a suitable package based on the above key operating requirements. These packages were then subjected to an initial evaluation on paper which reduced the choice to one of two suppliers.

These two options were then subjected to a rigorous evaluation consisting of:

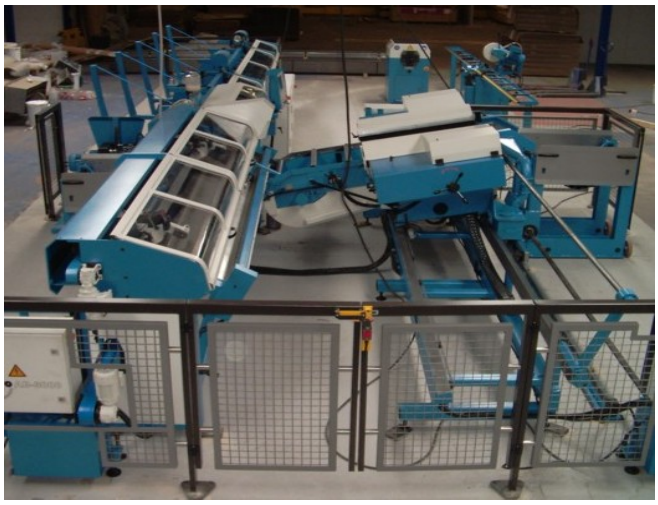
- Cutting trials using supplied material.
- A visit to the supplier's manufacturing facility.
- Visits to existing customers who had bought similar equipment.

All the above activities included the involvement of the people who would eventually operate and maintain the equipment. In this particular case existing customers were selected who made a living using the equipment providing a sub-contract cutting service.

Final selection was based on the results of the above activities, plus additional criteria including:

- Ease of use/setting.
- Noise levels during the cutting cycle.
- Cost of ownership.
- Supplier spares & service capability.

In the end all the equipment was sourced from one supplier as a package which helped to secure a competitive deal, and simplified both installation and ongoing spares and service requirements. Following an Acceptance Trial at the supplier's premises, again using our own material, both installation and initial operator training were completed in five working days.



1 – General view of the cell installation

A general view of the installation which shows the automatic saw consisting of: 7 metre automatic bundle loader (rear left), cutting head and clamping system (centre left) and 3 metre output with front and rear discharge (front). Also shown is the semi-automatic saw and stand-alone de-burrer for mitre cutting (rear right).

2 – In-line de-burrer & belt collector

The front discharge system consisting of the in-line de-burrer (centre), which is set automatically from the automatic length stop on the saw, and the belt collection system (front) which stacks the finished components and automatically stops the saw when it is full.

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The rear discharge only has a belt collector which means that these components need to be de-burred This is achieved by passing them through the in-line de-burrer on the front of the machine, or using a separate machine offline. The belt collectors were specified to:

- Minimise material handling.
- Reduce in-process damage.
- Eliminate noise resulting from components dropping into metal stillages.

The final part of the cell consists of an overhead crane which is used to unload deliveries of steel, and load the automatic saw. This crane was relocated from another site within the company. During relocation, the opportunity was taken to refurbish the crane and upgrade the power distribution and control systems.

This work was carried out by the UK agent for the crane manufacturer, who also carried out operator training and certification for the new installation. A coat of paint completed the transformation. The completed installation can be seen in the photograph below.

This project was completely successful in overcoming the constraints of the existing in-house metal cutting process by providing increased capacity and flexibility to meet both current, and future, business needs.

In addition to achieving a substantial reduction in manufacturing costs through elimination of supplier cutting charges, the project was also key to the success of an overall plan to consolidate manufacturing activities by achieving a dramatic reduction in the space required for in-process inventory.

3 – The Finished Cell