

Cost per part fabrication solutions

At Machine Tools Africa during May, global laser and bending specialist, Bystronic, represented in South Africa by First Cut, presented its holistic approach for fabricators. *African Fusion* talks to Philipp Burgener, the company's MD, and Andrew Poole, MD of First Cut.



Although Bystronic is renowned as a laser-cutting specialist, "Fabrication starts with design," begins Burgener in introducing the company's approach. "From the design, the material required goes for cutting, then for rolling or bending of individual components, before the welding, joining and product assembly begins.

"Our 'total solutions' approach is striving to help fabricators to do every stage of the process better – more cost-effectively, at higher quality levels and much faster – so that the cost of every part is minimised with production costs dropping for each process involved. The end goal is to achieve the best margins possible for fabricators, enabling them to either reinvest for growth or generate better profits for shareholders," he explains.

"So we are no longer simply selling capital equipment such as laser cutting systems, we are now offering fabrication solutions," he adds.

This 'total solutions' approach starts with the design of the individual parts. "By deliberately designing parts in a modular way to suit each of the downstream fabrication processes, by the time the welder gets to see the job, the fit up is easier, the amount of welding is reduced – by up to 30% in many cases – and a high quality end-result can be routinely achieved," Burgener points out.

"Incorporating more complicated shapes at the cutting stage – chamfered ends instead of straight cuts, built-in bending relief, cut-outs to reduce weight or welding requirements, or interlocks to assist with fit up – does not add significantly to the cutting costs or time. By

incorporating these principles, however, significant amounts of time can be saved when welding, better accuracy can be achieved and reject rates can be drastically reduced," he continues.

"Adding a tiny nose to ensure perfect alignment, for example, might add one second to the cutting time, but it could save hours downstream through reduced jigging and error avoidance," he adds.

He shows an example of a simple part that requires bending and then welding. By incorporating slots along the weld path, the net welding seam length is significantly reduced, while the fit up is made easier via the slots. By incorporating easy to teach, design-for-fabrication techniques when developing the laser cutting program, less bending force will be required and the overall weld length can be reduced. We can typically reduce the total production costs of parts by 30% using cutting methodologies such as these," he tells *African Fusion*.

"When designing for fabrication, this is the way we need to start thinking," he argues. "We deliberately seek to simplify the way the joints work, even if it means incorporating more complex cutting paths."

BySoft 7 software

Developed to make it easy for designers to include design-for-fabrication principles, Bystronic now incorporates its Boft 7 software at the starting point. The software runs on the Solid Works platform and shares the same interface, so designers need not learn something completely new.

"BySoft 7 supports part construction within the Solid Works 3D-CAD environment and provides the tools needed to enable 3D models of parts to be prepared for cost-effective fabrication," Burgener explains. "If a part is created for manufacture by bending, for example, the software will automatically cut the relief edges to enable the part to be accurately bent. This is a significant time saver for the designer."

Following finalisation of the part's 3D model, cutting plans and programs

can be developed, followed by CNC bending sequences, both of which can be downloaded to their respective production machines. In addition, planning and monitoring routines are also available to track production progress. "This functionality is a built-in MES (manufacturing execution system). BySoft 7 automatically plans, initiates and monitors part production and offers immediate access to all relevant production and machine data, which guarantees maximum traceability," he says.

Adds Poole: "Bystronic fibre lasers now come with BySoft software and no additional Solid Works licenses are required. All upgrades and training is also done directly by Bystronic. So the purchase of a fibre laser now comes with its own design office package," he says.

The ByStar fibre laser

"Power-wise, we are foremost in the laser cutting market with our unique 10 kW ByStar fibre laser," continues Burgener.

Explaining, he says: "10 kW of power via a fibre laser enables us to cut up to 12 mm carbon steel sheet using nitrogen gas. When using oxygen, combustion of the metal along the cut line occurs. This tends to overheat the metal plate, which limits the maximum power that can be used.

"With nitrogen, the process involves only melting, with gas pressure being used to blow material away from the cut line. So by using 10 kW and nitrogen, we are able to cut four times faster than with oxygen."

Compared to CO₂ lasers, the ByStar also offers significant advantages. "A CO₂ laser using nitrogen is limited to a cut depth of around 3,0 mm. This is due to its wider beam angle, which means that more metal has to be melted to penetrate the thickness, so more energy is required. Fibre lasers have a sharper beam focus, so they produce a narrower and deeper kerf," Burgener says.

"Of every ten lasers we now sell, nine of them are fibre lasers," adds Poole. "Not only do they use less energy but they are at least two to three times faster; and they are also more cost-effective



Bystronic press brakes sense the pressure required by each component and adjust to ensure that the angle required is achieved.

to run in terms of direct input costs."

"To pierce a hole in 15 mm stainless steel, for example, a fibre laser can do it in less than 1.5 sec, while a CO₂ laser might take 10 sec to do the same job," he says.

In addition to the significant speed advantages, the use of nitrogen has a direct advantage for welding. When cutting with oxygen, cleaning is required before welding to remove the oxides, while with nitrogen, no post-cut cleaning is required. "We call this a mill finish. This makes fibre lasers ideal for cutting weld preparations, because no additional processes are required to clean the joint," notes Burgener.

Summarising the advantages of the ByStar fibre, he says: "The cut is clean and oxidation-free and, using the 10 kW machine with nitrogen, we can cut carbon steel of up to 12 mm; stainless steel up to 30 mm; and aluminium, also up to 30 mm thicknesses.

"Even if paying more for a full-feature ByStar fibre laser, three times better productivity along with all of the downstream fabrication advantages make the machine highly cost-competitive," he assures.

Bystronic press brakes

Once cut, fabrication often moves to the press brake to bend the parts.



Bystronic's 10 kW ByStar fibre laser offers three times better productivity along with downstream fabrication advantages.

"Traditionally, designers knew not to bend across parts with holes or cavities. But today, bending across holes is very common.

"If bending across a complete length of material, then the press brake might require 30 t of pressure. But if 80% of the material has been removed, for light-weighting or for weld joint design purposes, then only 6.0 t of pressure might be required to make the same bend. If the two components are bent using the same total bending brake pressure, then the component with less material will be over-bent," Burgener explains.

Bystronic press brakes employ a system that automatically compensates regardless of the true length of material being bent. "Our machines sense the pressure required by each component and adjust to ensure that the angle required is achieved, regardless of the true bend length," he explains, adding: "This is of significant benefit when it comes to welding, since all of the fit up angles will be perfect."

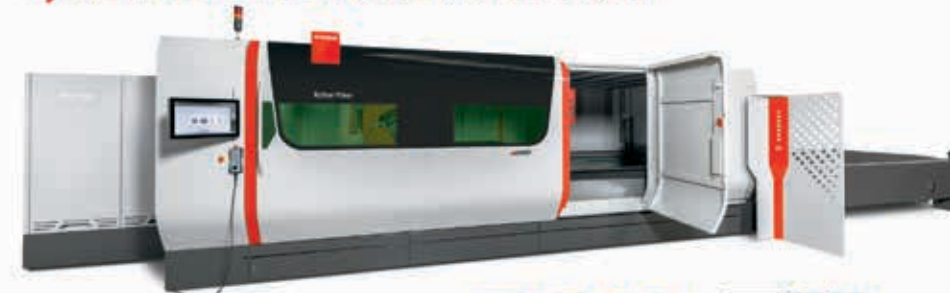
The process, known as dynamic

crowning, relies on pressure feedback to continuously monitor and compensating for spring back. "If the quality or the thickness of the steel varies, spring back will be different and over or under-bending inevitable, so a machine that compensates for these issues is ideal for use here in South Africa," adds Poole.

As the exclusive agent for Bystronic in South Africa, "First Cut's challenge is to keep pace with the speed of technology developments, but we are determined to support these new products. We are running on a treadmill. You can neither run too fast nor too slowly. We are keeping pace with the speed of the advancements while focusing on keeping our customers up to speed at the same time.

By adopting automation through systems such as these, high standards of fabrication can be achieved, even if the actual welding is still being done manually. The machines take quality to an international level, because overseas companies are using the identical systems," Poole concludes. ■

All that you know about laser cutting has changed.
Bystronic can now do it TWICE as fast!



Bystronic

Best choice.

FIRST
TOTAL CUTTING SOLUTIONS

CUT
(PTY) LTD

JHB: +27 11 614 1112, DBN: +27 701 3960
C.T.: +27 21 531 3126, P.E.: +27 41 453 3826
WEBSITE: www.firstcut.co.za EMAIL: info@firstcut.co.za