

The production philosophy at Caparo Tube Components Ltd, UK is based on dedicated automatic cells supplied by the BLM GROUP

Each project has its own “cell”

produce a varied range of bespoke assemblies, fabrications and components.

In its role as a first and second tier supplier CTC offers customers what Simon Baxter, Sales Manager, describes as “full support throughout the product design and development cycles and on to the delivery of the finished component”. To achieve its stringent quality and traceability objectives, the ISO 9001/ISO 14001 accredited company has put in place a manufacturing sequence that extends from the supply of steel strip and steel tube production in the adjacent Caparo Precision Tubes, to tube bending, forming, laser profiling, welding, press work, machining, finishing and assembly within CTC. In this way full traceability can be assured, and accreditation to the TS 16949 automotive industry standard means that components can be delivered straight to line.

Each cell is a dedicated cell

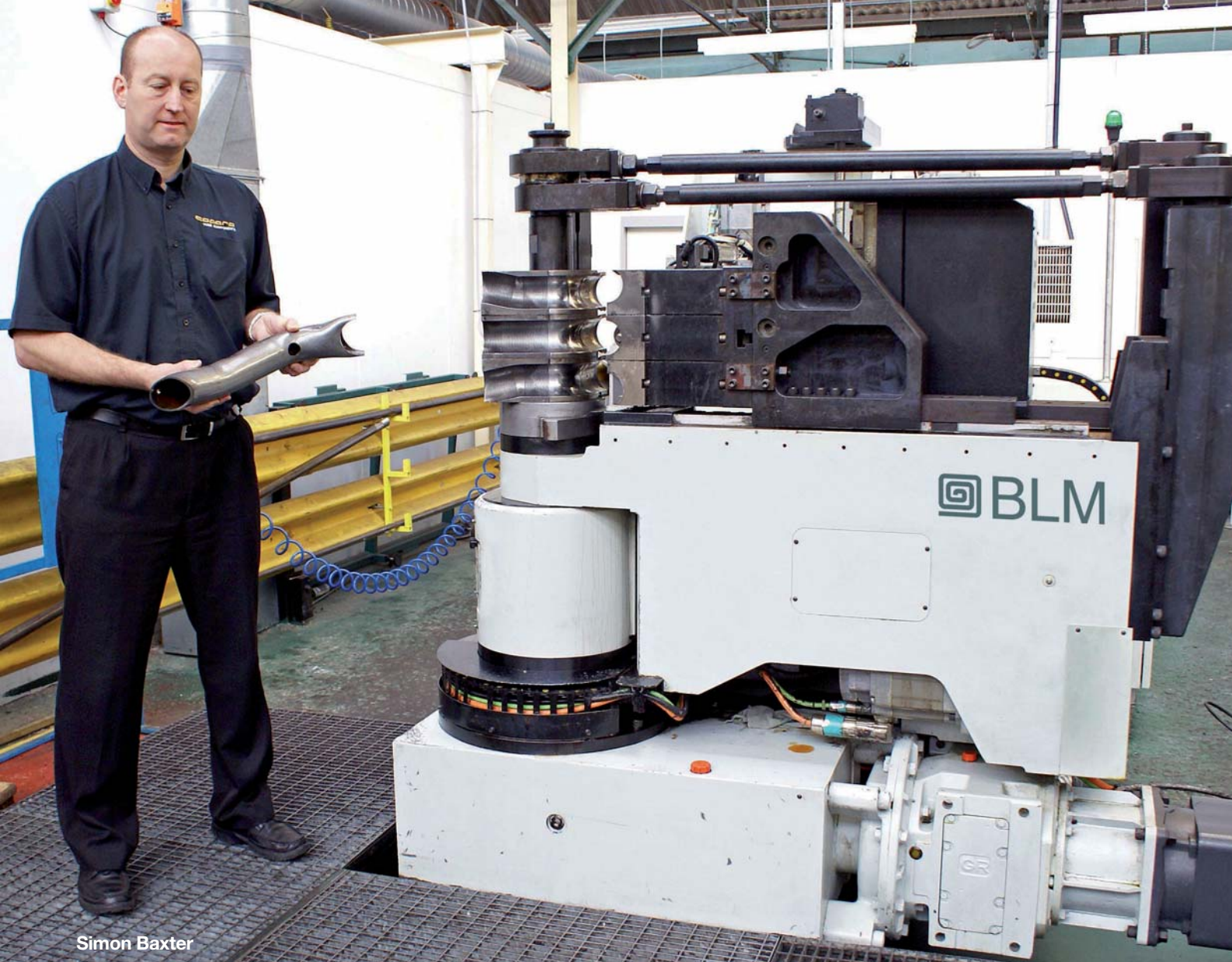
The majority of CTC's output is delivered through manufacturing cells dedicated to specific customer projects. One example is fuel filler pipe assemblies. The main pipe cell comprises of a BLM E-TURN 40 all-electric left- and right-hand CNC tube bending machine and two BLM AST100NC CNC tube end forming machines. The 35 mm diameter main fuel filler pipe is given a double bead form (hose connection) on the first AST100 and then bent to shape on the E-TURN 40 tube bender. The other end of the tube, which will become the main filler neck, is expanded on the second AST100 using three punches and rotary trimmed, using a unique ‘swarfless’ capability and/or rotary facing tool to remove the required 10 to 15 mm trim length, before the tube end is curled over to form the cap lip.

The use of multi-station end formers minimises, or in this case eliminates, changeover times and allows the use of more than one punch to produce high quality, highly accurate end forms. This single set-up approach has the added benefit of eliminating the compounded errors that inevitably result from the traditional multi-machine approach.

A second manufacturing cell comprising of a BLM AST25N multi-station tube end forming machine and a BLM Dynamo MR100E five-axis tube bending machine, produces the 15 mm diameter breather pipe, with the first operation again producing a double bead form on one

According to Caparo Tube Components Ltd's Managing Director, Phil Begley, two major orders were secured during 2007 because BLM GROUP UK Ltd undertook to supply the necessary production equipment within extremely acute delivery targets. The total investment amounted to £1.4 million, with 90% of the equipment and tooling being ordered from BLM. “I was confident that Paul Lake and his team would deliver and install to plan,” says Phil Begley. “Both the CTC and BLM engineering teams worked extremely hard to deliver numerous projects/parts within a timescale of weeks, which was an amazing achievement and why we have continued to work with BLM.”

Caparo Tube Components Ltd (CTC), part of the £1 billion turnover Caparo Group, manufactures a range of tubular components and assemblies, predominantly for the European automotive sector. Although the West Midlands site's history extends back to 1927, it houses a manufacturing facility that uses 21st century technology to



Simon Baxter

end of the tube prior to bending. End forming tools for other diameters and forms of breather pipe can be pre-mounted if required, thereby eliminating non-productive changeover time, while the mounting of different diameter tooling on the Dynamo tube bender also eliminates downtime when changing from one size of tube to another. With a cycle time typically of 1.5 seconds per bend, CTC is confident that it has now achieved the highest possible output while maintaining optimum repeatability.

Right first time

Dean Newey, CTC's Operations and Engineering Manager, believes that the all-electric drive technology featured in BLM's E-TURN and E-BEND CNC tube benders has revolutionised the tube bending process. "The accuracy and repeatability that we can achieve using BLM's technology in our tubular components is far superior to anything else we have seen before and changeovers take just a few minutes. As such, we are confident that we are offering our customers the best possible quality products on top of considerable production efficiencies", he says. "Our bends are 'right first time' and the process of tube bending is no longer a 'black art'."

As an example, he instances a high volume order placed with CTC because a competitor had experienced seri-

ous quality and supply issues. The downside was that the deadline to begin production seemed impossible to meet. "Following on from our initial contact with BLM, we had off-tool samples within four weeks and the new E-BEND 90 installed and working at full rate within six weeks. From day one we produced what we knew was going to be a demanding job within a tolerance of ± 0.5 mm with no problems whatsoever and running the machine 24/7. The component involved was a 70 mm diameter by 3 mm wall thickness steel tube component with three tight radius bends. Even more remarkable was that we never had to change the bending parameters, even though the material specification varied slightly from batch to batch."

The choice of the E-BEND 90 was made because of the requirement to produce left- and right-hand suspension cross member components. As it is a multi-stack machine, left- and right-hand tooling can be mounted in a single set-up. As well as eliminating costly tool changeovers, CTC was able to bend left-hand and right-hand parts in sequence, which improved the process flow and provided better control of subsequent manufacturing operations.

The bending cycle time was also an important consideration. This was kept to the absolute minimum as the E-

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BEND 90's VGP 3D software could simultaneously move and control each of the machine's 13 axes individually. For example, the clamp position on a traditional hydraulic bending machine is either open or closed, and the distance between these two positions can be as much as 150 mm. This means that after each bend the clamp has to retract and, in some cases, the bend arm cannot return to zero until the clamp has reached its open position.

This can take up to 1.5 seconds, which does not seem much, but on volumes of, say, 150,000 components this wasted time soon adds up.

However, on the all-electric E-BEND 90, and any other of BLM's all-electric tube benders, the clamp movement on or off can be controlled infinitely. This means that a 'clamp off' distance of 150 mm does not need to be made on every bend. Instead, it may be as little as 5 or 10 mm, thus contributing significant cycle time savings.

Targeted investments

Typical tube products manufactured by CTC for automotive applications include fuel filler pipes, steering rack tubes, car seat frames, suspension components, car cross beams, oil and water pipes, chassis components, and side impact door beams. The preferred tube manipulation route, according to Simon Baxter, is to set up a new stand-alone cell that is either specific to a product

(as with the suspension arm cell) or to a family of products (as with the fuel filler pipe cells). This, he says, provides an ideal opportunity to evaluate current methods and, when appropriate, to invest in new technology. "We installed the fuel filler main pipe cell because, although we could do the work on existing equipment, the projected volumes meant working a three-shift system and excessive overtime as well as leaving no room for customer's schedule variations. The new cell has also given CTC the additional capability needed to attract similar work from other customers."

This has proved to be perceptive as the automotive industry is currently reducing its output. However, the decline has been countered by an increase in aerospace work and orders gained from other industry sectors. Investment continues because many automotive and aerospace projects have long lead times and CTC quotes for new business on the premise that, according to Simon Baxter, "if we don't have the capacity now, we will make sure that it is in place before the project is ready to run". He says that the choice of machine tool is influenced by price but points out that CTC also takes account of the performance of existing machines and the service and support provided to keep them running. "We cannot afford for a machine to be down, not least because there may be penalty clauses involved," he says. "It is better to have some overcapacity, although we don't want machines standing idle for long periods of time."



"As a supplier, BLM GROUP ticks all the boxes," says Dean Newey. "What really appeals is the flexibility and reliability of these machines, which is a 'must have' given the demanding and fast changing nature of the automotive business. With thousands of machine installations world-wide BLM has shown that it can provide a total solution, whether it is for tube bending, end forming, sawing or laser tube cutting, and as individual machines, dedicated cells or integrated manufacturing solutions."

CTC has a total of 17 BLM machine tools, 12 of which have been installed in the last two years, including a BLM LT 712D CNC tube laser installed in 2007. This is a significant indication of Caparo's commitment to investment in modern day, high technology equipment to provide customers with high quality products at the lowest possible price per part. One job, a rectangular hollow section radiator support beam, would previously have required tube to be cut to length on a production saw, deburred, manipulated on a tube bender, the holes drilled or punched, each end trimmed to 45 degrees, and a final deburring operation.

This component is now completely laser profiled - all the holes cut and both ends mitred - in a single hit on a fully automatic basis before being completed by the final bending operation. In addition to cycle time savings, several operations have been taken out of the process and this has eliminated the re-

quirement for dedicated hard tooling and fixturing. "As there is no tooling involved with the laser it is very quick and inexpensive to make changes to any component and to produce prototypes," says Simon Baxter. "The laser can also etch a component, whether for identification purposes or to act as a positioning guide for a subsequent bending operation or to provide a guide to correct assembly."

Caparo Tube Components Ltd shares its Oldbury site with Caparo Accles & Pollock Ltd, which manufactures high integrity, thin wall, stainless steel and titanium tubular assemblies for the aerospace, medical, automotive and power generation sectors. Caparo Accles & Pollock is now planning to expand its advanced bending, welding and forming capability and, says Phil Begley, "BLM is the obvious choice to supply the two additional tube bending machines that will be needed in 2009".