EdgeCAM in Action

Oil & Gas

EdgeCAM Relieves the Pressure on Specialist Valve Manufacturing

LB Bentley Limited saves time and money and significantly increases machine tool utilisation using EdgeCAM Solid Machinist

Wish you were here!

Remember those lazy, hazy, days of summer? You may well have been on holiday, very possibly relaxing on the beach with sun blazing down and surf crashing in. However, on the seabed, conditions would not have been quite that pleasant. For at a depth of 3,000 metres, the pressure is almost 300 bar (4,300 lb-in^{-2}): hardly the friendliest of environments. Yet this is where you will find valves designed and manufactured by LB Bentley Limited. Reliable performance is vital at such depths: the cost of replacing faulty items can be measured in millions. However, thanks to their innovative all-metal seal design, the company's valves are capable of operating for 30 years or more in such conditions, without any intervention.

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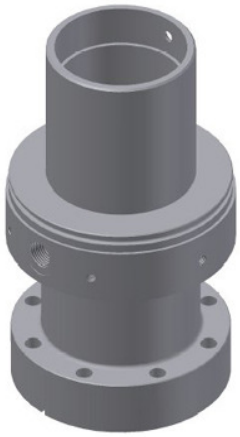
Bernard Bentley,
Joint Managing Director,
LB Bentley Limited

This is just one example of how the company specialises in solving a whole range of problems posed by high pressure operating conditions either internal or external. In addition to sub-sea valves for upstream oil and gas subsea production applications, LB Bentley Limited (Bentley) makes air filtration equipment for use in a wide range of applications. The Stroud-based company employs 66 people and turnover in the last full year was £3.3 million, with further significant growth already recorded for the current year. Bernard Bentley, Joint Managing Director with his brother John, attributes the company's success to, "…our skills in innovation and our determination to make use of rapidly-advancing technology in machines, tools and IT. We don't just try to manufacture the same things faster and cheaper than the competition. We engineer better products." As an example of this, the company has implemented EdgeCAM Solid Machinist along with Probe Ops, Bentley's own EdgeCAM PDI application programme to speed up the creation of CNC programmes.

Completing the design to manufacturing chain

Bentley is a specialist manufacturer: everything is made-to-order and there is no expensive-to-finance finished product stockholding. Production batch sizes are quite small and the number of variations on a theme is high. Quality is exceptional. The company's inventory of machine tools now includes Haas VF 2 and Haas VF3 VMCs, a Daewoo Mynx 540 VMC, a Daewoo Puma lathe with live tooling and a Colchester Tornado lathe. There are three seats of Autodesk® Inventor® in use and to complete the picture, the company has installed two seats of EdgeCAM Solid Machinist. According to Bernard Bentley, "Over the years, we have been gradually building up our skills as our investment in CNC machines has increased. However, it was only with the implementation of Autodesk Inventor and EdgeCAM Solid Machinist that we were able to complete the design to manufacturing chain."



Over 1000 programmes created

What has the experience been like? Lee Allen, Production Engineer says, "We have created over 1000 CNC programmes using EdgeCAM Solid Machinist and we are much more efficient now. We take our Inventor solid models directly into EdgeCAM Solid Machinist. Then, by using EdgeCAM Solid Machinist's feature finder, work that used to take us an hour now only takes ten minutes." He continues, "Creating programmes for helix milling using the fourth axis now takes around half an hour, when previously it used to take a day." He sums up, "For me, the benefit is not just in the increased speed of programme creation. It's in the simulation and the checking too. I no longer need to stand at the machine with my finger hovering over the stop button when I run a programme for the first time."

Tremendous return-on-investment

Another Bentley production engineer, Derek Wood, comments, "I've been using EdgeCAM Solid Machinist for 12 months. Whereas previously I would have to stop the machine whilst I created a new programme, I can now create the programme in EdgeCAM Solid Machinist before running it live on the machine." Derek finds, "Programming times are reduced from typically two hours or more to between 30 and 45 minutes. We don't

suffer anywhere near as much production downtime because proving time is dramatically reduced." Derek finds there are other benefits. He says, "Because we can test our programmes before transferring them to the machine tool, we can detect potential problems before they happen. As a result, we have reduced tool breakage and scrap. With material costs of up to £1,000 for just one valve body, you can see how important this is." In addition, Derek calculates, "The additional production time released in this way is worth £780 per week to the company, a tremendous return-on-investment."

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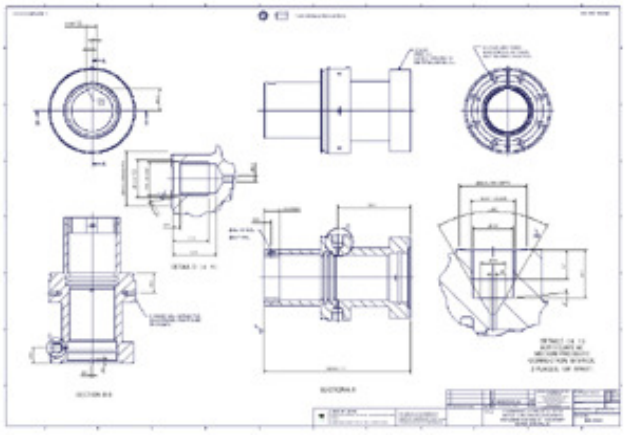
Derek Wood, Production Engineer, LB Bentley Limited

Probing for more time savings

Bentley has now adopted Renishaw probing technology. Bernard Bentley points out, "We must get maximum production time out of our very expensive machine tools. To do that, probing is essential. We use it not only for setting-up but for in-cycle checking too. It reduces jig and tool time and costs, reduces inspection times and cuts waste caused by unrecognised tool wear and breakage." He continues, "Probing is particularly important to us because we are machining very tough materials such as 22% and 25% chrome duplex stainless steel and 625 and 718 nickel alloys that cause a very high tool wear rate. Probing enables us to run our machines unattended." Instead of the usual lengthy and complex setting-up process using dial test indicators, the technique uses sensitive probes mounted in the machine's tool holders. As Lee Allen points out, "It used to take us an hour or more to set up a complex component. It now takes only ten minutes using probing. We get better component quality too, because we can afford to build more checks into the machining cycle. This avoids the need to take the job off the machine, inspect it and set it up again. We can easily add tool breakage checks on fragile tools like small drills."



Probe Ops makes an appearance
Initially, probing operations were added manually to the EdgeCAM Solid Machinist programme after post-processing. To maximise production time, however, the team needed to speed up the process and Probe Ops, Bentley's probe operations programmer, was designed specifically for this purpose. A proof-of-concept version was written in which probing operation insertion points are added to the EdgeCAM Solid Machinist programme at the required locations. After post processing, Probe Ops is then executed, pre-set Renishaw probing operations are specified at those insertion points and the prompted variables are inserted. According to Lee Allen, "Probe Ops saves between ten and sixty minutes a day depending on how much programming and how many probing operations are involved."

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Probe Ops now commercially available
Bentley is now moving ahead with full commercialisation of Probe Ops. A version is now available that uses PDI, Pathtrace's software tool kit for the integration of application programmes into EdgeCAM. This means that Probe Ops can now operate seamlessly within EdgeCAM, appearing as a menu item or toolbar icon on the user interface. Now, probing operations and other specialist operations can be inserted into EdgeCAM Solid Machinist as the CNC programme is developed, rather than as a separate task after post processing. Lee Allen points out, "It is simple. When inserting probing operations, you click on the Probe Ops icon, pick the operation and add the requested parameters. That is it: right first time and right every time." He concludes, "Probing saves you masses of time compared with traditional setting. If you are investing upwards of £2000 on a probe, then the modest extra investment in Probe Ops can really make the difference to the return-on-investment."

A winning combination
Where next for Bentley? The company is understandably pleased with the results of its investments. According to Bernard Bentley, "We are particularly pleased that we chose EdgeCAM Solid Machinist as our CAM package because the PDI / PCI capabilities have allowed us to customize it for our needs and enabled us to fully integrate Probe Ops" He adds, "The whole idea of EdgeCAM Solid Machinist is to make the job easier for the engineer, to reduce errors, to reduce scrap and to increase machine availability. It certainly does all three." He concludes, "The next machines we buy will be aimed at increasing our level of unattended operation. To do this we will need to detect and replace faulty and worn tools. We will only be able to do this effectively using probing. If you too are considering probing, then EdgeCAM Solid Machinist and Probe Ops is a winning combination."

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