Manufacturing software

Carbon-fibre production company improves visibility and control on the shopfloor — and minimises paperwork

Colchester-based Reverie Ltd designs and manufactures carbon-fibre composite products. Founded in 2000, the company initially relied on a series of Excel spreadsheets alongside Quickbooks accounts to help run the operation, but this approach presented several problems.

For a start, parts could not be labelled or tracked easily, plus the company had limited visibility and control on the forward planning of orders; and because data was fragmented, its reporting capabilities were poor. Reverie was also running its Web site through a separate content-management system, which was limited in functionality and had to be updated separately.

Simon Farren, Reverie's managing director, had originally seen the 123insight software from Southampton-based 123 Insight Ltd (Tel: 01489 860851 — www.123insight.co.uk) at the *CIM* show in 2003; and although he recalled being impressed with the commercial offering, at the time the company was not ready to move forward to a more-integrated solution. The business continued to grow rapidly, and Mr Farren decided the following year that, in order to win larger contracts, a better system had to be put in place.

"In 2004 we were bidding for a superbike contract that required us to demonstrate traceability. I contacted 123 Insight Ltd, attended an Evaluation Workshop and decided to take two licences. The prospective customer was happy with the procedures that we were planning to put in place, and this was a key reason for them selecting us. Using the 123insight system, we were able to work under our customer's ISO 9000 umbrella. I also feel that the Evaluation Workshop was essential to understanding what 123insight could offer us. It was our first chance to use the product and ask questions. By 'walking' through all of the screens, we started to appreciate the power of the system."

Data 'migration'

As the company's legacy data was already in Excel spreadsheets, it took just two weeks to 'migrate' it and go live. Mr Farren says: "We initially pulled the data into a test database to run some 'queries' and check that the data had gone across correctly; we were very satisfied with how that went. Indeed, the whole process was much smoother than I thought it would be."

Although Reverie started with two licences — one for the office and one for shopfloor data capture — the number was increased to five during the super-bike project, to cover more shopfloor data capture units. After going live, the company immediately noticed improvements across the board. Previously, stock levels were inaccurate, with staff having to check all items during a stock take. Now, items are classified according to the frequency of stock movements, and stock levels have been reduced by 10% — along with the number of errors. Moreover, as visibility on stock and orders improved, lead times dropped by an average of 20%.

Reverie quickly found that the 123insight software system provided a framework of procedures to follow on a daily basis. Mr Farren says the work-flow generated by purchase and works orders is particularly beneficial. "With

Simon Farren says 123insight simplifies visibility and control of the shopfloor

our previous accounts system, we were not booking goods in. We now have a system that enables us to check how well suppliers are performing and that quantities are correct; we can also track partial deliveries and items that have to be returned. Works orders also provide us with similar benefits, detailing key operations, bills of materials, time to perform functions — and even images of parts."

Less paperwork

The paperwork generated has been reduced by 20%, but Mr Farren believes this could drop even further in the future. "We currently print works orders out, but the truth is that we could rely completely on the on-screen data, and we have plans to go paperless within a year. Another feature that came in a free update was the ability to set reminders. I like the fact that we can display a text message pop-up box reminder when performing specific tasks such as creating a sales order. Previously, little things that are important to customers — such as using a specific carrier — could easily be forgotten.

"Support has rarely been used, with less than seven calls per year logged, but when it has been required, it has been fantastic. On a couple of occasions, they connected to us remotely to point us in the right direction. The system is so reliable — and structured in a way that makes you disciplined to use it correctly."

In 2007, Reverie talked to authorised 123insight partner Solweb about the Web Portal e-commerce solution, which ties in seamlessly with 123insight, allowing Reverie's customers to place orders via the company's Web site (www.reverie.ltd.uk) and for these to be passed automatically between systems. Product information and images are automatically taken from 123insight's database.

In 2009, Reverie 'migrated' to Access Dimensions accounts. Mr Farren says: "The key driver was to use an integrated accounts package where we could batch process invoices from within 123insight. Due to the integration between the two products, we can view customer files and immediately see current and future orders, as well as account information from both systems.

"What was really attractive was that the same SQL — pronounced *sequel* and standing for Structured Query Language — structure is used. Also, after talking to 123 Insight Ltd, we know that there will be further integration in the next version."

Having moved to new premises in January 2010, Reverie plans to double its turnover within three years, and 123insight is key to delivering this growth. "To achieve our aims, we will need to make even better use of 123insight. It's already brought us so many benefits and makes the overall visibility and control of the shopfloor so much easier."

Combination drilling of carbon-fibre-reinforced materials

The growing demand for producing holes in carbon-fibre-reinforced (CFR) materials 'in a single hit' — rather than in two or three stages using drills, reamers and countersink tools — has been addressed by the Plastics and Composites Division within LMT Tool Systems by developing a service for 'One-Shot' combination tools designed for specific applications. These tools are available in the UK from Meriden-based LMT UK Ltd (Tel: 01676 523440 — www.lmt-tools.de).

The drilling of CFR materials in laminated or 'stacked' composite panels has been increasingly challenging to machinists, because the cutting tool has to contend with the highly abrasive nature of the material, as well as unfavourable vibration and resonance that can adversely affect surface finish. Furthermore, the cutting process can be very sensitive to local overheating around the drilled hole, due to the low melting point of any resins used in the material preparation.

Also, because the material has very low thermal conductivity, any chips produced will carry away very little heat, and quality is at risk because fibres can be pulled from the matrix of the material, particularly as the tool dulls and begins to deform the hole at the exit point of the drill. This can result in rough edges, and any excessive force under cut can introduce 'peeling' that will lead to delamination separating the individual material layers from each other. Key to the cutting process is shearing the carbon fibres, which can not be cut by conventional methods, as these will result in shattering of the hard carbon material.

LMT's Martin Danielczick says: "The rapid development of CFR technology has led to the production of heterogeneous stacks incorporating layers of different materials such as aluminium and titanium. These can be between 4 and 10mm thick and are totally integrated into the panel construction. However, when machining these 'combination' materials, application parameters and tooling are critical if problems are to be avoided — especially with aluminium, where residues can be 'smeared' into the layer boundary or the interior of the CFR surface. Titanium also presents problems, as any swarf or chips can act as additional individual cutting edges in the hole, where they continue to 'machine' the material or damage the surface."

He says poly-crystalline diamond (PCD) is by far the best cutting tool material when drilling. 'Fabricated' at a pressure of some 6,000 bar and a temperature of around 1,500°C, the individual diamond particles combine with the carbide substrate and are 'affiliated' to each other in the sintering process. As a result, the cobalt of the carbide product is bound to the individual PCD diamond particles.

An LMT 'One-Shot' tool can combine, for instance, three separate stages of operation, using multi-step geometry. The tool geometry, point angles, helix angles and clearances are tailored to the thickness and make-up of the material stack, while the matrix formation, fibre types — plus their respective properties and proportions — and the forming techniques being used are important elements in ensuring the performance of the tool.