

## Without the IT systems the company could not exist!

Despite the commonly held view that integrated manufacturing IT systems are not for SMEs here is a company that is proving the opposite through IT systems that make them very, very lean!

## Award Winning IT that underpins the business

“Without the IT systems the business couldn’t exist”

Yan Tiefenbrun - Director

In 2010 Castle Precision Engineering won the titles of Best SME and overall ‘Manufacturer of the Year’ in The Manufacturer magazine’s Manufacturer of the Year Awards. It was also a finalist in the award for best use of IT in manufacturing, a fantastic achievement for an SME. Quite simply, IT is core to the business’ success.

“Without the IT systems the business couldn’t exist” was the response of Director Yan Tiefenbrun when we asked the question of how the IT systems supported the strategy.

Castle’s strategy revolves around it being able to deliver the most demanding machining operations at a profitable cost. During its history, this has meant that the industrial sectors of its most demanding customers have changed as the cycles of their industries have ebbed and flowed. At times its customers have been in the oil business, at times nuclear, sometimes electronics and at present aerospace. Castle’s resilience is based on adapting its business to excel in both the technical and assurance aspects of its customers’ demands. Throughout its history it has been an early adopter, being amongst the first to adopt BS5750, CNC machines and be awarded the AS/EN 9100:Rev B



### Background of a family firm

Castle Precision Engineering is a Glasgow based SME that machines extremely high precision components mainly for blue-chip clients from the aerospace, automotive, electronics, defence and energy sectors. Founded in 1951, the business employs 150 staff operating over 70 major CNC machine tools in an area approaching 90,000 sq ft. and has a turnover of



around £15m. Castle is a family firm, with the current MD Marcus Tiefenbrun being the second generation in charge. Several other family members are also engaged by the business.



“We watched as Marcus reviewed the current value of his work-in-progress. It took seven seconds. A few minutes later it had increased as the system accounted for value added during those minutes. This is a real-time system” Prof Umit Bititci, Univ of Strathclyde

Aerospace quality standard. It has also been an early adopter of IT systems.

The requirements for quality control and quality assurance from its customers are an enormous challenge for the business, and also a major element of its competitive strength. Yan pointed out that without the systems, they would need an army of people measuring and collecting data, and this overhead would drive up their costs to a point where they would not be able to survive. The systems are so effective that the company employs only one person in finance, an amazing ratio for a company of its size. Indeed the business managed to grow its turnover by 327% and a 60% increase in direct staff, yet employ only one extra member of administrative staff.

The systems are also crucial in supporting engineering processes. As Castle makes low volumes of product the ability to machine right first time is essential. A scrapped casting can potentially cost thousands of pounds, not to mention the impact on the business’ reputation and delivery performance. The IT system captures massive amounts of data about the machining process, including setup times, actual processing times and product quality. There is an underlying philosophy of capturing the data once and accurately and then using it to the maximum. The captured data allows the engineer to refine the manufacturing process and increase both the quality and profit margin of the job. Also, the quality department are able to identify the least capable processes on any product being

manufactured within seconds, thereby allowing them to prioritise continuous improvement activities. They are able to trace the history of any product or order for several years with an incredible level of detail allowing them to quickly support their customers’ quality assurance requirements. The data allows the management team to look at the cost and profitability of any order and allows accurate cost projections to be used when developing quotations.

Marcus showed us how he could instantly find out his levels of work-in-progress (which took seven seconds). He repeated the task a few minutes later and the value



had changed to reflect the extra labour and machine time that had been spent machining components. Quite simply this is a rare thing - a real time management information system that works.



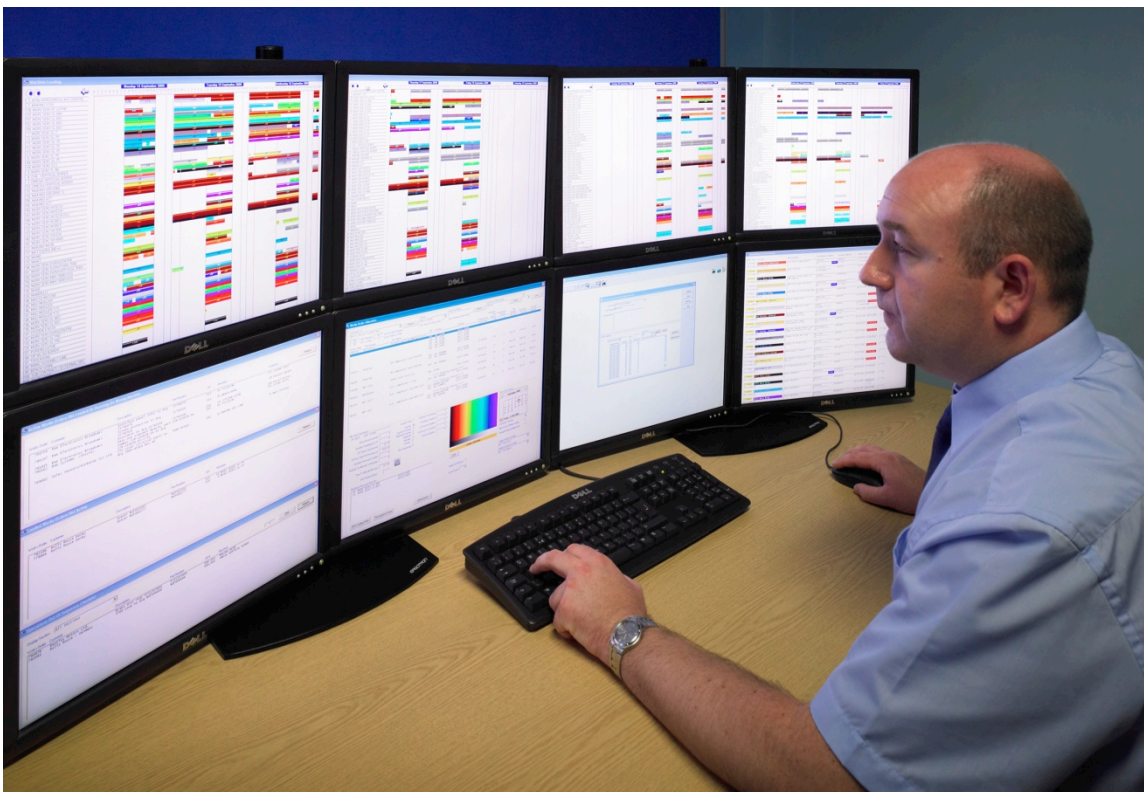
## “Nobody agreed with me, so either I did it or it wasn't going to happen” Marcus Tiefenbrun, MD

Whilst IT is central to the business now, it was not always so. The current system dates from 1999 and was the vision of Marcus who had a long track record of systems development. He describes how for the first five years or so, few in the business could see the potential benefits. In most businesses, this would have meant the end of development. A big advantage of Castle being a family business is that it is able and prefers to take a long-term view and this led to success. Marcus describes how one of the key tenets of Castle's philosophy is consistency. He sees this in terms of strategy, in terms of workforce, in terms of the choice of equipment and in terms of operational systems including IT. This manifests itself in a number of ways.

Castle's commitment to developing and retaining its employees leads to the building of deep competence and trust. Many businesses put in IT systems to control the workforce and force them to do things in a particular way. Castle's philosophy is to put everything the machinist or engineer needs to do their job to a high standard within reach - the emphasis remains on the person being responsible. Each CNC machine has a two

screen terminal attached to it for the operator to use to view drawings, 3D models and cutting simulations, see data on current and historical performance and capture new information. The attention to detail is amazing, for example each machine has a camera installed. A machinist can monitor several machines simultaneously from any terminal on any machine. Marcus describes this as 'Doing the job through the computer' as the IT system is an integral part of the work process. This is even more noticeable in production planning, where the systems facilitate the planning of the plant, which is done by a single planner on an eight screen computer. Marcus describes how they rejected an MRP II style planning system because of the damaging effect it would have on schedule stability.

Castle is very proud of its commitment to its employees, with many having decades of service with the company. The level of trust with employees, combined with a philosophy of measuring the process, not the person, also means that the machinist is willing to capture data. Marcus describes how the systems are designed to capture data once and with the least possible effort.



When you computerise a system you don't want to computerise complexity, so the first thing is:  
**Keep it Simple Stupid**  
Marcus Tiefenbrun MD

In some cases the machine is directly interfaced to the system. In other areas touch screens are used. You log on using a fingerprint reader and barcode readers are used extensively, this all saves time and makes the job simpler. One recent innovation is the tooling system. All tools are identified with a 2D barcode. Cameras in the tool stores and on each CNC machine are used to track the location of each tool. This means that a manufacturing engineer can quickly pull together a tool pack for a new job, instead of spending hours walking around the plant looking for each tool. Overall data accuracy is very high, creating a virtuous circle of using and benefiting from that data.

Castle uses simulation and 3D modelling to the maximum to reduce machining risks. A team of engineers, all promoted from the shop-floor take drawings and models from the customer and write cutting programmes for the machine tools. These are then tested on simulation software with a high degree of rigour. The drawings, models and simulations are then made available to the machine operator at the machine. One area of consistency is in the machine controllers, which are the same across the factory. Operators can easily download the cutting programme to the machine and IT only needs to maintain one interface.

## In order to simplify, you have to have consistency.

Castle's implementation approach is unusual for a small business. In the early days of the system, Marcus realised that he could not buy what was required off-the-shelf from a software vendor. He chose to employ a software developer and has worked with him since. Marcus led systems design and the IT Manager developed the software. It is amazing that such a complex system has been written by a single developer, giving power to Marcus' view that there are major productivity issues with teams of developers. Marcus estimates that investment in the system has been around £1million over a ten year period.

As the scope of the system has expanded the system increasingly integrates off-the-shelf packages such as those for CAD or inspection. When such a need is identified, the decision will be taken on whether to buy and integrate a package, or develop a system in-house. In either case, all systems are fully integrated. At the commencement of systems development, Marcus chose a Microsoft platform because they had achieved a position as the industry standard and because their commitment to continuous refinement was likely to keep them in

Castle employs a single developer and has done so consistently for the last 12 years. It's amazing what consistency of focus can achieve.

that position. That platform is still in place, albeit with newer databases and hardware behind it. From a user perspective, the interface design has remained consistent for the life of the system, easing acceptance and reducing error. The system has evolved, with features being gradually added, as they became required by the business. One of the advantages of in-house development is that the system can be easily enhanced to meet emerging needs at a pace that suits the business, not those of a third-party software developer. This is especially important as nowadays; suggested system improvements are as likely to come from the shop-floor as they are from Marcus.



## Key Messages:

- Design the systems around the users so they can do their job *through* the computer
- Consistency of purpose is key to successful systems development
- Standardisation of hardware and software, both in IT and CNC controller choice, helps keep things simple
- Capture data once with the least pain, and use it fully
- A strong culture of trust is vital in having the operators capture data - measure the process, not the person

## About FutureSME

FutureSME is an €8 million project funded by the EU's Framework 7 programme. Led by The University of Strathclyde, the consortium of 26 partners includes 13 manufacturing SMEs, research and development organisations as well as SME support agencies. The consortium represents a collaborative effort amongst eight European countries: Czech Republic, Ireland, Italy, Poland, Turkey, Slovakia, Sweden and the UK.

If you would like to find out more about the FutureSME project, please visit <http://www.futuresme.eu> or contact [info@futuresme.eu](mailto:info@futuresme.eu)

If you would like to find out more about Castle Precision, please visit their website at <http://www.castleprecision.com>

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*Igniting a  
movement  
amongst  
European SMEs  
towards  
creating a  
sustainable and  
globally  
competitive  
manufacturing  
community*

