Success Story

From a ‘budget’ to a high profile CAM package

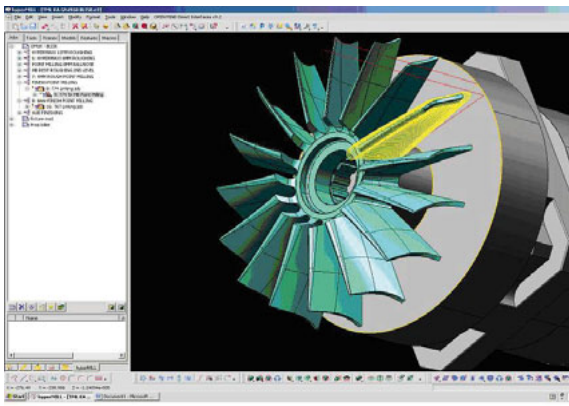
Diversifying into new markets is never easy, particularly ones as demanding as aerospace and defence. However, over the course of the past 2-3 years, Norfolk-based Tml Precision Engineering Ltd has taken its first steps in this high profile...

...industry and hasn’t looked back. Already fully accredited, the company has since landed a number of high profile, long term contracts for leading aerospace customers, including becoming an approved Tier 1 machinist to one of the world’s fastest growing aircraft manufacturers. Central to the company’s early success and pivotal to its ongoing growth and investment plans, is the award winning *hyper*MILL® CAM package from OPEN MIND Technologies.

Neil Dyer, Tml’s Managing Director, is something of an entrepreneur. He acquired the business in 2003 when it was run from a barn with two people and three ageing CNC machines. At this time, 80% of revenue was generated by the motorsport sector.

Not content with owning just a run-of-the-mill Formula one and motorsport-orientated engineering company, Mr Dyer was keen to expand and diversify into high end, high precision commercial and military aerospace work. Immediately, he relocated the company to its existing facility adjacent to the emerging technology hotspot of Hethel – home to Group Lotus and the Hethel Engineering Centre – five miles southeast of Norwich. Since then, he has acquired a further six engineering businesses, amalgamating them all into Tml. What’s more, the company achieved AS9100 accreditation in 2009 and has since been re-certified by BSI to the latest AS9100 Rev C aerospace quality management standard, and headhunted Technical Sales Director, Andrew Yates, a man with the credentials and experience to spearhead Tml’s penetration into aerospace markets. Today, the company employs 17 people and is still recruiting.

Reverse engineering from an old, rusty impeller to generate a CAD model which to import into *hyper*CAD®. From here, optimised *hyper*MILL® toolpaths were produced before machining on the Matsuura.



About Tml

At Tml they are passionate about quality precision engineering. They are consistently investing in the very best available state-of-the-art plant and computer aided engineering equipment and they strive to only employ the very best talented and enthusiastic engineers, in a time where short lead times and quality products are essential.
Combining this, with a down to earth partner approach with our customers to meeting and exceeding their expectations has positioned Tml as a consistently top performer in the precision engineering field.
Tml can deliver straight to your door machined parts from single prototypes to high volume production in your choice of materials ranging from soft plastics like PTFE and acetyl onto aluminium through to the most exotic stainless steels and titanium’s.

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Neil Dyer, Tml's Managing Director

A suitable CAM package

Tml's investment in the latest machine tools such as a high specification Matsuura MAM72-35V (image above) simultaneous five-axis machining centre is supported by multi-tasking machining centres among a comprehensive array of 15 CNC machines in total. Providing the all-important link between the CAD models and optimised toolpaths for machining, the company set about sourcing a suitable CAM package.

"We were running a 'budget' CAM system but in all honesty by 2011 we had reached the limit of what it could achieve and made the decision to change," explains Mr Dyer. "A few years ago we undertook a two-month trial of both *hyper*MILL® and one other high profile CAM package. We preferred *hyper*MILL®, particularly for its ease-of-use and superior support, but at the time had to concentrate our investment efforts on machine tools."

Spitfire impeller being machined on Matsuura

The situation came to a head in 2011 when Tml secured a new customer making aerospace cooling components. Mr Dyer and his team had to react fast – they were introduced to the project late after the customer's existing supplier began struggling.

"We contacted OPEN MIND and asked if they could help," he says. "We had no commitment to buy the software at this stage, so in effect it was a trial, albeit on real parts. However, both the *hyper*MILL® 5AXIS software and the OPEN MIND Applications Department were excellent and we managed to complete a whole family of parts in double-quick time. Our performance helped secure a long term agreement for machined parts used on the next generation of fuel efficient short haul passenger aircraft. Needless to say, we invested in *hyper*MILL®."

Sourcing a replacement impeller

Another interesting aerospace project at Tml arrived via Kennett Aviation, the heritage aviation experts based at North Weald Airfield near Epping, Essex. The unfortunate wheels-up landing of a Spitfire in France had destroyed the supercharger impeller of this legendary aircraft. Powered by a Rolls-Royce Griffon engine, rather than the more common Merlin, it is one of only two such aircraft (Seafire variant) in the world still flying. With this in mind, sourcing a replacement impeller wasn't going to be easy. After all, the blades on the original impeller were machined straight before being shaped by hand using rudimentary blacksmith style methods and heat. However, Tml stepped up to the plate.

"We were offered the original Rolls-Royce drawings from the 1940s, but to be honest very little was legible," says Mr Dyer. "As a result we had to reverse engineer an old, rusty impeller and with the cooperation of Hethel design consultancy Active Technologies Ltd, who helped generate a CAD model which we were able to import into *hyper*CAD®. From here, optimised *hyper*MILL® toolpaths were produced before machining on the Matsuura. Within no time we supplied the Spitfire rebuild team at Kennett Aviation with two replacement impellers made from heat resistant stainless steel S154 to help get the Seafire Spitfire in the air once more."

In addition to his entrepreneurial prowess, Mr Dyer has a true passion for engineering. His father made parts for the first prototype Concorde on a Capstan lathe, and some of this pioneering spirit clearly rubbed off.

"I enjoy projects such as the Spitfire impeller," he says. "This part presented a real challenge, but to be honest, *hyper*MILL® made light work of it. The cutter paths were the biggest issue we faced, and without OPEN MIND's Multiblade package, getting a

sensible cycle time would have been a struggle. As it goes, we cut the original cycle time of 24 hours by three-quarters using Multiblade, while at the same time improving the quality of the finish-machined components. Now it looks like we might get additional work relating to the Spitfire at North Weald, such as replacement wheels and brake drums."

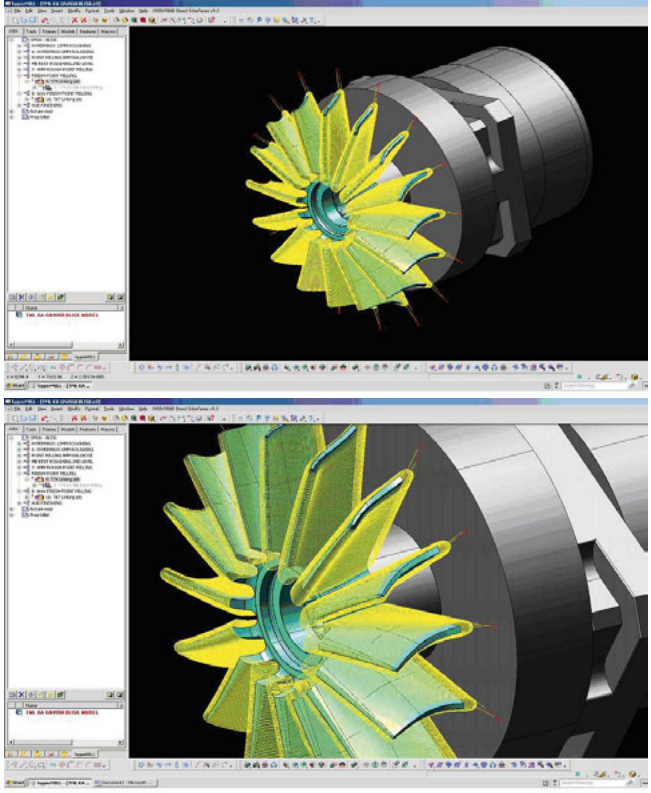
Specialising in simultaneous five-axis prismatic milling

Using the Multiblade package within *hyper*MILL® 5AXIS, impellers and blisks can be programmed without any special knowledge. Integrated, automated functions reduce the number of input-parameters to a bare minimum, while proven collision checking guarantees high process reliability. Among the operations made easy include roughing, plunge roughing and hub finishing, along with the milling of points, flanks, edges and fillets.

Today Tml sees itself as a fully fledged aerospace subcontract CNC machine shop specialising in simultaneous five-axis prismatic milling and up to nine-axis mill-turn operations: one-hit machining in super quick time. This progressive manufacturer accommodates all aerospace materials, including tough heat resistant super alloys (HRSAs) and titanium alloys, while typical batch sizes are in the realm of 10-100 off. The company already exports 33% of revenue to countries such as Singapore, the Netherlands and Portugal.

"We are a relatively new aerospace company with a young workforce and this appears to be working in our favour," says Mr Dyer. "Too many other aerospace subcontractors have ageing management who aren't prepared to invest. We are different – we have extensive investment and growth plans. I am trying to build a world class business with a turnover in excess of £10 million. The workshop here already houses the best machine tools and software money can buy."

Tml is currently busy devising the next phase of its development. Planning permission has recently been granted for a new 32,000sq ft facility near to the company's existing plant. Construction is due to start shortly, and with the new site on stream, Tml's existing £2 million plant list is expected to double within four years, helping facilitate further diversification into large aerostructure machining.



Another interesting aerospace project at Tml: The unfortunate wheels-up landing of a Spitfire in France had destroyed the supercharger impeller of this legendary aircraft. Sourcing a replacement impeller wasn't going to be easy.

"Success is about having the right facility, the right staff, the right machines and the right software," concludes Mr Dyer. "It's possible to have a £500,000 machine tool and a good customer, but without the right CAM software for the type of parts in question, you might as well give up." ■

About OPEN MIND Technologies AG

OPEN MIND is one of the world's most sought-after developers of powerful CAM solutions for machine and controller-independent programming.

OPEN MIND designs optimized CAM solutions that include a high number of innovative features not available elsewhere to deliver significantly higher performance in both programming and machining. Strategies such as 2D, 3D as well as 5axis milling/mill turning, and machining operations like HSC and HPC are efficiently built into the *hyper*MILL® CAM system. *hyper*MILL® provides the maximum possible benefits to customers thanks to its full compatibility with all current CAD solutions and extensive programming automation.

OPEN MIND strives to be the best and most innovative CAM/CAD manufacturer in the world, helping it become one of the top five in the CAM/CAD industry according to the NC Market Analysis Report 2015 compiled by CIMdata. The CAM/CAD solutions of OPEN MIND fulfil the highest demands in the automotive, tool and mould manufacturing, production machining, medical, job shops, energy and aerospace industries. OPEN MIND is represented in all key markets in Asia, Europe and America, and is a Mensch und Maschine company.