



Advanced Innovative Engineering

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For the production machining market Edgecam solutions combine the power of sophisticated toolpath generation with seamless CAD integration. Used globally within a multitude of industries, Edgecam consistently produces high quality toolpaths to ultimately improve productivity.

Advanced Innovative Engineering

Edgecam Makes 5-Axis Machining Simple For Rotary Specialists

It was a big step for Advanced Innovative Engineering to invest in their first-ever CNC machine in Spring 2015. And they went straight in with a 5-axis Mazak, driven by the powerful, but simple to use, Edgecam CAD/CAM software.

Edgecam made it much easier than they imagined to produce complex, high precision components on a top end machine, just weeks after installing the technology for the first time.

Managing Director Nathan Bailey says: "We had no 5-axis machining experience, but felt the rewards would outweigh the risks. And it has considerably enhanced our in-house capabilities."

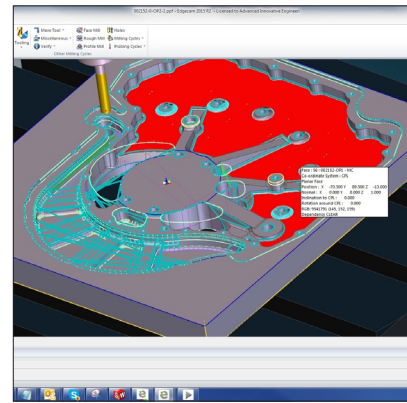
The Staffordshire company develop wankel rotary engines with a number of their patented technologies built into the cooling and exhaust systems; and their exhaust expander technology improves efficiency. AIE have a worldwide customer base for their unique engines, particularly amongst defence companies and military research organisations. While core markets are aerospace, especially for Unmanned Aerial Vehicles – or drones – the automotive sector is becoming increasingly important as manufacturers of electric vehicles seek to develop range-extender products. And wankel rotary engines are gaining popularity for hybrid outboard motors on boats.

AIE's patented technology addresses the historic Achilles heel of rotary engines – keeping the rotor bearing cool. "Our closed loop gas cooled system uses the density of the combustion gas to absorb heat from the rotor and circulate it through a heat exchanger, prolonging the engine's life."

Once Nathan Bailey and his team of 15 employees complete the development and prototyping of each component and product at their 6,500 square foot premises, the bulk manufacture is carried out by The Proving Factory in Rotherham, in conjunction with Tata Steel.

Before purchasing their simultaneous 5-axis Mazak Variaxis i-500 they also sub-contracted the prototype machining work out to a number of other companies, but found the slow turnaround frustrating and uneconomical. "We were waiting too long for essential components that we needed to test and develop our products, so decided to bring that machining operation in house."

The components are quite small, mostly within a 500 mm manufacturing area, and are extremely detailed and complex. "This means they would require a considerable number of set-ups using traditional 3-axis machining, so we went for a 5-axis centre to overcome that issue. And we knew we'd need simultaneous 5-axis machining to achieve some of the complex shapes when we're porting the engine."



About The Company:

Name:
Advanced Innovative Engineering

Business:
Precision Engineering

Web:
<http://www.aieuk.com>

Benefits Achieved:

- Gives the ability to see if there are simpler ways of producing each component.
- Gives total control of all aspects of prototype design and manufacture and turn vital components around in a few days

Comments:

"Almost every surface on a rotor interfaces with another, and it is difficult to manufacture them with regard to set-ups and keeping within tolerances – it's all about co-ordinating all the dimensions. This is why Edgecam's 5-axis capability is extremely important."

Nathan Bailey
Managing Director

They also realised they needed CAM software that they could use immediately to produce highly complex components, while having the capability of progressing to manufacture parts such as the rotor housing ports, which are castings at the moment. "We're now looking at experimenting with machining those, so we can optimise our engines even further."

After investigating five CAM systems they shortlisted three for detailed demonstrations. "Edgecam was definitely ahead regarding usability and configurability, which was extremely important to us as a company exploring this technology for the first time."

Most of the engine is aluminium, but the core running components are steel. "Almost every surface on a rotor interfaces with another, and it is difficult to manufacture them with regard to set-ups and keeping within tolerances – it's all about co-ordinating all the dimensions. This is why Edgecam's 5-axis capability is extremely important."

"Edgecam has also given us the ability to see if there are simpler ways of producing each component. For example, if it has five radiuses we need five tools...can we standardise the radius which will reduce costs and time?"

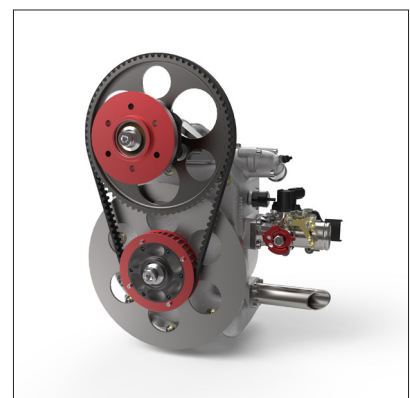
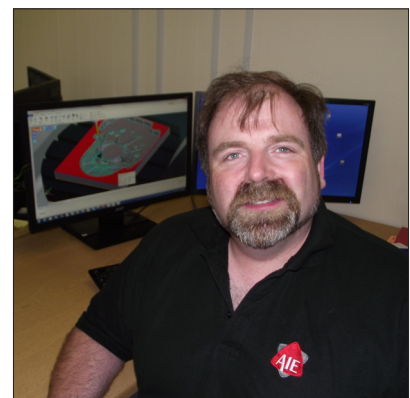
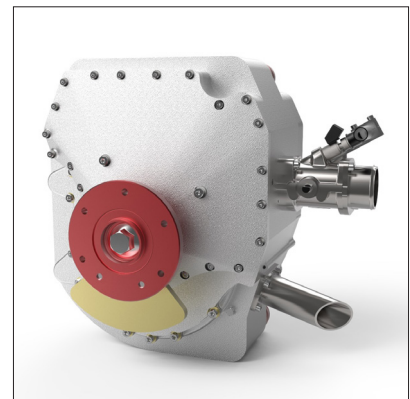
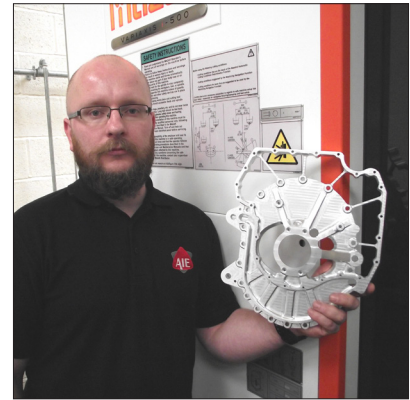
The process begins with their Product Data Management System for concept design and model development, which integrates both with Edgecam and their SolidWorks CAD software.

Once Design Engineer Nazeel Panthakkalakath reaches a certain level with that, it goes into Edgecam for tool sizes, tool changes and toolpaths, and modifying the design. When the concept model is complete, he runs it through Edgecam's simulator to see how long the job will take and how many tool changes are needed. A full design release is then created, and the finished model put back into Edgecam to develop the CNC program. "I can't believe some of the things I've made so soon after learning how to use Edgecam," he says.

Machine operator Wiktor Krolik runs the post processed output on the Mazak and produces the prototype. Nathan Bailey says the program is generally only used once as, even if the prototype has to be modified, it effectively becomes a different component, requiring a new program.

"We're now in total control of all aspects of prototype design and manufacture and turn vital components around in a few days, which is invaluable – especially if something doesn't work properly. We can amend it and make the new prototype component immediately; no waiting weeks for them to come back from sub contractors."

He concludes: "The ease with which we've moved into the world of manufacturing complex, high precision prototype components, has really surprised us. It's been a real revelation what we, as 'inexperienced' 5-axis machinists, have been able to achieve with Edgecam."



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Nazeel Panthakkalakath ,
Design Engineer

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after learning how to use Edgecam.”**