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## **SGS S-CARB APR can cut roughing times in half**

**Thanks to S-CARB APR high performance roughing tools from SGS Carbide Tool (UK), Manufax Engineering has dramatically reduced the machining cycle time for the tailfin shear plate the company has produced for the Bloodhound SSC. A complex, freeform aluminium component, the shear plate will form the interface between the tailfin structure and the body of the world land speed record attempting vehicle.**

Based in Stockport, Manufax is a major supplier to the commercial, civil and defence aerospace, automotive, nuclear and agricultural industries, as well as supporting general precision engineering businesses. With several decades of experience, the company provides specialist tooling design and manufacture across all disciplines, including airframe assembly jigs and fixtures, airframe detail tooling, mould tooling, automotive tooling and components for the nuclear power generation sector.

A dedicated and multi-disciplined workforce has been trained to adapt to the unique and challenging projects they work on at Manufax. Both these criteria can certainly be applied to the Bloodhound SSC (SuperSonic Car), a jet and rocket powered car designed to go at 1,000 mph. It has a slender body approximately 14m length, with two front wheels within the body and two rear wheels mounted externally within wheel fairings. It weighs over 7,000 kg and the engines produce more than 135,000 horsepower. The car is a mix of automotive and aerospace technology, with the front half being a carbon fibre monocoque like a racing car and the back half being a metallic framework, with panels like an aircraft.

Manufax is no stranger to the Bloodhound SSC project, having produced the mounting frame for the HTP (High Test Peroxide) fuel tank, and an assembly jig that is being used to assemble and align the lower chassis, side rails and upper chassis. Project sponsor, SGS Carbide Tool (UK) Ltd, is supporting the company's commitment to producing the complex shear plate that has been designed to securely mount the rear tailfin onto the body of the car. North West Area Manager, Tony Theaker, visited Manufax to assess all the production parameters.

Manufacturing is Manufax's core business and the company has an excellent reputation for supplying the customer with a quality precision engineering service. So the Correa FP50 5-axis gantry-type machining centre, selected to product the aircraft grade aluminium component, was more than up to the task. CAD/CAM Projects Engineer, Mark Brittain, used the company's Delcam software to produce the NC program to machine the shear plate. Initially, he had programmed the machine to perform the roughing operation using a 50 mm diameter cutter with indexable inserts, followed by a second roughing operation using a smaller diameter cutter to access the material that the larger cutter could not get to.

Tony Theaker suggested Manufax use a 20 mm diameter SGS S-CARB APR three-flute roughing end mill in a single roughing operation. He says the tool is ideally suited to machining aircraft grade aluminium, as well as non-ferrous and non-metallic materials. "The S-CARB APR range of end mills have been designed and developed with all the necessary high performance machining process parameters for these materials in mind."

Although Manufax use external flood cooling, the S-CARB APR roughing tool features three feed holes for spiral through tool coolant supply. It can provide high pressure coolant supply (50 to 70 bar) to aid chip evacuation at the elevated material removal rates achieved. Swarf evacuation is a key factor given the volumetric expansion of machined aluminium.

For most applications, an S-CARB APR tool will halve existing roughing cycle times, and a 25 mm diameter SGS cutter can match or exceed the material removal rates of a 50 mm diameter indexable router at 5,000 cc/min. Mark Brittain applied the new cutting parameters to the Delcam program and it resulted in significant cycle time savings of over 40 per cent.

He recalls: "We were a little sceptical at first, as the cutting data being suggested for the S-CARB APR cutting tool was providing phenomenal results on the CAD/CAM system. We set up

a trial cut with a sample of the same grade aluminium on the machining centre, and applied the speeds, feeds and depths of cut suggested by SGS.”

As a complex, freeform component the shear plate contains very demanding geometric forms produced from a single billet of aluminium. “We could not afford to scrap the raw material, using a test piece allowed us to prove that the S-CARB APR would perform as predicted. The tool performed remarkably well, and the cutting action also reduced any deflection of the thin walls of the rough machined part.”

Tony Theaker concludes: “It is not uncommon for precision machining companies to be unsure of the performance levels offered by the S-CARB APR cutting tool range. However, the machining sample set up by Manufax was cut so smoothly that the operator and the engineers were immediately convinced.”

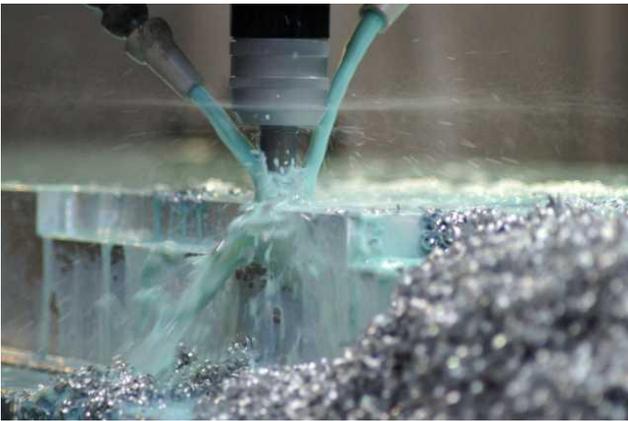
**Images:**



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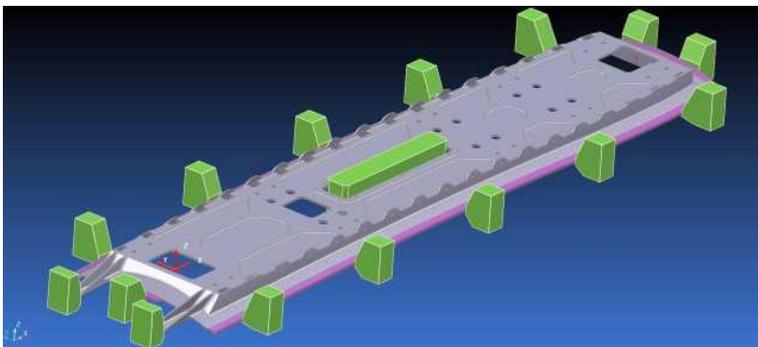
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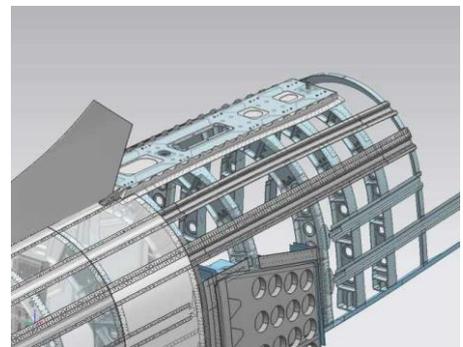
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