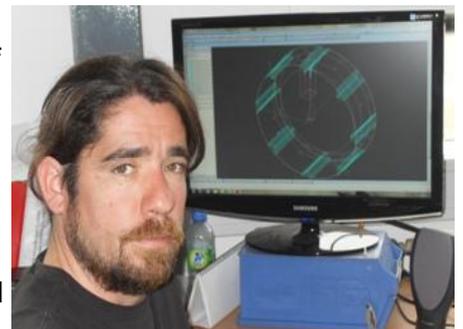


Precision at 6,000 Metres Under the Sea

Absolute precision is required for components on underwater craft, some operating at 6,000 metres beneath the sea. Market-leading Alphacam CAD/CAM software is equally at home designing them and driving the manufacturing machines that produce them for the National Oceanography Centre.

The National Oceanography Centre is a joint venture between the National Environmental Research Council and the University of Southampton. Design Engineer Nick Rundle (pictured right) is one of a four-strong team which is part of the Underwater Systems Laboratory, designing and manufacturing components and equipment for underwater science project vessels. "We work on anything from small pieces of onboard lab equipment to full ocean scientific platforms, including Remote Operated Vehicles and an Auto Sub, which are deployed at various depths in the ocean down to 6,000 metres below the surface, collecting a range of sensory data," he says.



Benefits Achieved :

- manufacture of intricate parts from Inventor models
- solid simulation highlights problems before they happen

Comments :

"a lot of what we do is intricate, and being able to undertake a solid simulation of the machining is a big advantage."

Nick Rundle
Design Engineer

Having used Alphacam for four years he knows the Centre wouldn't be able to manufacture some of the more complex items required for the undersea craft, without it. "Alphacam is used mainly for making intricate parts that we'd otherwise have to contract out at a far greater cost."

An example of this is a filter assembly that they are currently working on for filtering water in an Antarctic lake. "We couldn't make this in-house without Alphacam, so it is saving us a considerable amount of money."

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Alphacam has also been instrumental in producing prototype wings and fins for wind tunnels, a variety of components for the mini sub, and mountings for sensors, including a mounting plate securing a sonar device on the TOBI 2 Side Scan Sonar Towed Vehicle (pictured right) which is towed around 5,000 metres underwater, carrying out sea floor mapping.



Prototyping using Alphacam is an important part of the design team's work, which is carried out on a Hardinge three axis milling machine with a rotary dividing head. Nick Rundle says: "Although we are occasionally supplied with a CAD drawing, we generally produce a 3D model on Inventor which is imported directly into Alphacam. Then we manipulate it, put the various tools on and generate the CNC codes." He carries out the programming on his own workstation, then uses a network portadisk to transfer the code to the Hardinge, which is also linked to the network.

He says Alphacam is often asked to perform complex operations, and it always rises to the occasion. "We don't make large quantities – it's rare that we'll need more than half a dozen of any components or parts, but a lot of what we do is intricate, and being able to undertake a solid simulation of the machining is a big advantage.



"There've been several times when I've been using a solid simulation and had to go back to the drawing board because Alphacam has highlighted a number of problems which we wouldn't have known about otherwise. For example, I was making a camera holder for a system of taking photographs of waves. It was a convoluted shape for holding various components that operated the camera, and it wasn't until it came onto the simulation and I put the planer on and started the machining simulation, that I saw there were a few points where the tool wasn't going to work. There may even have been a collision, leading to some expensive scrap metal and a broken bed. Alphacam prevented that from happening."

Because of the ease with which toolpaths can be generated on the 3D model he is keen to keep the full manufacturing skills base in-house, and is looking for his colleagues to expand their knowledge of Alphacam, which he is also intending to run on a number of micromills shortly.

As well as the components and parts which take to the oceans of the world, Alphacam has also produced toys for the Centre's open days, including a model penguin and a key ring in the form of an engraved Earth. Alphacam is never at sea when it comes to providing a completely integrated CAD/CAM solution.



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