

# NC program simulation and verification



Vericut is the only machining simulation software approved by the Joint Strike Fighter programme

## Software helps avoid costly spindle crashes for a fraction of a machine's purchase price

**F**or the past two years, GPV Teknik in Glostrup, Denmark, has used Vericut's virtual simulation software program as part of its manufacturing processes, and this has made a real difference to the company.

GPV Teknik is part of the GPV Group, which was established in 1961 as a mechanical engineering workshop in Copenhagen. Through a combination of strategic acquisition and organic growth, GPV Teknik has expanded rapidly. The group now has three distinct and complementary divisions — mechanics, electronics and printed circuit boards — and its aim is to be the preferred First Tier out-sourcing partner within these key sectors. The group undertakes a range of activities, from one-off prototypes right through to large, complex projects. Its turnover is around £150 million, and it has 1,600 employees.

Employing around 155 skilled staff, GPV Teknik is the location of the group's range of highly specialised processes for precision machining. These include CNC high-speed milling, five-axis CNC milling, 12-axis CNC Swiss-type turning, and CNC drilling. The latest investments include three large Makino MAG3 CNC machining centres with 30,000rev/min spindles.

Products for the ISO 9002- and AS9100-accredited company range from small high-tech precision-machined parts (and even micro-parts) to large, complex and heavy parts for various industry sectors. The factory also produces wing structures for the aerospace industry.

When working on aerospace and defence

contracts, quality is a priority, which is why GPV Teknik decided to use the CNC machine simulation program Vericut — available in the UK from Hove-based CG Tech Ltd (Tel: 01273 773538) — before undertaking any material removal.

GPV Teknik's technical manager, Frank Dühring, says: "The difference between Vericut and every other program on the market is that it does not simulate the CAD model data, like all other CAD simulation programs do. Instead, Vericut uses the post-processed data and works directly in G codes, just like the CNC machine tool does. This means that, if there is a fault in our CNC program we have time to correct it before it is used on the machine.

"It goes without saying that, if you want to avoid a costly spindle crash on a modern CNC machine that costs several million Danish kroner, then it is worthwhile investing in preventative software costing a fraction of the machine's purchase price. Vericut provides the answer to this problem. There aren't many software systems on the market offering a virtual test of this quality, and Vericut is the only machining simulation program that has been approved by the American Joint Strike Fighter programme. This is, of course, an important factor for those of us who actually work with it.

"More and more machining centres run high-speed spindles, which are particularly susceptible to damage when collisions occur. A collision can result in irreparable damage, but with Vericut it is possible to avoid this. I would say that we have saved, on average, one and a half spindles a year by using this simulation, which means that we are achieving a much higher operational efficiency, because the machines remain available for production."

GPV Teknik has seen enormous differences, following the introduction of machining simula-

tion. "With our virtual tool simulation, we check whether our tool-paths are correct within our own machine environment. With the traditional CAM simulation, you simply check your own tool-paths, which is, of course, not the same thing, because in the machine environment everything is included," adds Mr Dühring. "If the tool-holder touches the surface of the workpiece in the machine for a fraction of a second, you probably wouldn't notice it in a real test. With a Vericut simulation you notice it straightaway. It is a really clear example of what the software does so well."

### Software details

Vericut allows users to develop detailed software models of all types of CNC machines, and to create a virtual machining environment. Users then run their CNC programs through Vericut before attempting to machine components; errors such as axis over-travel, collisions between tooling and work-holding devices, rapid moves in material, and tool-change collisions are detected and written to an error log.

The software supports all types of machine tool, including five-axis milling machines and machining centres, as well as combination mill-turn centres. Vericut also includes program optimisation, which can reduce machining times by up to 50% by adjusting feed rates and tool motions based on the material removal rate. Other benefits of optimised CNC programs include improved surface finish, greater tool life, and less wear and tear on the machine tool.