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## Programming a new growth plan

By Rob Colman

**T**he mark of a successful job shop is the ability to meet and exceed client needs, whatever the project on the floor. KDM Oilfield Manufacturing of Nisku, Alberta, went a step above and beyond that when it invested in a new 5-axis machine to help a client get out of a bind. To speed the success of that contract, the company invested in GibbsCAM software (GibbsCAM.com), which helped them get up and running on the new machine in short order.

KDM has been serving oil and gas drilling contractors for a little more

than four years. The company's 15 employees, four CNC lathes and 10,000 square foot facility has primarily serviced equipment and built sub-components for those drilling contractors, working in 4145 alloy steel.

"Much of the work we've done has been threading related," says KDM's President, David Donnelly. "We repair threads on pipes and build sub-components like crossovers. It has mostly been tubular work."

Work has been steady for the company, but Donnelly and his team knew

that without diversifying that wouldn't necessarily last.

"The products that we make can likely be built cheaper elsewhere," says Donnelly. "Like many manufacturers, we feel the cost pressures of the market."

### A friend in need

The opportunity to expand the company's reach came while working with a client on the design of a thread. "It was a purpose-built application, so we helped design it and built it," notes Donnelly.

**On the cover: A drill bit being machined on the Mazak Variaxis 730-5X II.**  
**Inset: A screen capture of the part in GibbsCAM.**

Through discussions with the client, Donnelly discovered that they were interested in finding a new source for drill bits — a company that could respond quickly to supply requests. The customer was finding it difficult to source a shop with the required skill set.

“So I put my hand up and said, ‘if we said we wanted to do that work, would you give it to us?’ They said yes, so that’s how it started,” Donnelly recalls.

That was in March 2010. Since then, the company has made about 100 drill bits, which includes about 20 different designs and sizes. The bits KDM has been building run anywhere from about three inches in diameter up to 8.75 inches.

“I knew that to build these was going to be very challenging and exciting,” Donnelly recalls. “Other companies our client had tried to engage from other provinces really struggled with this. Part of this may have been that they didn’t really understand what they were making. The other part is that they realized they weren’t really set up for it. That was where the CAM software really came into play. Some of these shops were trying to get the job but didn’t have the technology at their disposal, and weren’t willing to invest to upgrade.”

KDM did make the investment. They purchased a Mazak Variaxis 730 with a pallet changer and then went looking for someone with the expertise to do the programming work.

### Choosing a partner

“When we started to look for someone we could hire to do the programming, we couldn’t find anyone who had experience doing this kind of job,” says Donnelly. “The drill bits have many different sides and lots of pockets. All the people who had experience doing this type

of work were already employed by other companies to do it. That’s when I decided to get the training to do it myself.”

One of the reasons Donnelly chose GibbsCAM was that he had seen other companies that were doing similar work using it. And people that used it said it was the easiest CAM system to adapt to.

The second reason he chose GibbsCAM was that the sales representatives weren’t prepared to see Donnelly fail.

“Our GibbsCAM representatives were willing to stand up and say, ‘you will be able to make these parts and we will make sure we give you all the help you need to make them,’” Donnelly recalls.

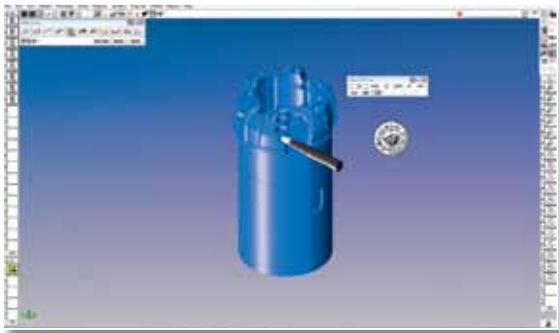
Donnelly ended up taking a three-day introductory course with his local GibbsCAM representative to get his feet wet. He then paid to have their applications engineer on-site for one day. “He showed me some of the more advanced techniques that we needed to know to do our first part,” Donnelly notes.

Thirty days later, KDM had produced their first drill bit. There were a lot of hours involved, but KDM was able to prove itself to its client.

“We had to get the first one out of the way so that everyone felt comfortable that we could do this,” says Donnelly. “In the first year, the client said that we would build 60 bits, so that is what we budgeted for. It hasn’t been a full year and we’ve already made about 100. With the number of different designs, there has been a lot of programming time. Most of the time has been spent with GibbsCAM, not the machine.”

### Ramping up skills

To build the part, KDM first receives a model from the client created in SolidWorks. Generally, Donnelly asks to be sent models of about five different stages of the design so that he has a



Illustrations show the application of a 5-axis toolpath in GibbsCAM.



good sense of the steps involved in the process.

“I might have the designer give me a blank where there are no cutter pockets in it or where the nozzle ports are missing so that I can look at it the same way I would build it,” says Donnelly. “That is what we import into GibbsCAM and we create a tool path based on those models.”

At this point, Donnelly is much more comfortable with the software. “The first bit we did took 4-5 hours to machine, and it wasn’t nearly as complicated as some of the designs we’ve done since. Now, that bit would take about 2.5 hours to machine. We’ve really improved through trial and error.”

Donnelly finds that he is using the more advanced tools, such as advanced 3D machining functions and 5-axis tool path details, much more often.

“For instance, roughing the part. In the beginning, there was a lot of wasted machining taking place during that process,” he explains. “It was very easy to click on a surface and say, ‘machine this surface.’ And it did that, but it didn’t do it optimally. Now I understand the more advanced options in the system — things like how to approach the part and much more — I am able to use the machine to its fullest value through high speed machining and using a number of high-feed cutters. We do use a lot of advanced coordinate systems, so we are using a lot of very advanced aspects of GibbsCAM.”

Donnelly is quick to say that this doesn’t mean KDM is yet using its new 5-axis machine in the best way that it can, but he knows the company is making quality parts.



Above: KDM Oilfield Manufacturing’s new Mazak Variaxis 730-5X II, and two of the drill bits the company has produced on it, with the assistance of GibbsCAM software.

### New horizons

Having this initial client has helped KDM cover the cost of their investment, and the client is getting exactly what they want. “They can give us a SolidWorks model, and within two to three days, they have a finished part,” says Donnelly. This same client is now offering KDM more work for their 5-axis, which is helping them expand their expertise.

“While there are different shapes and contours for the drill bits, we did not use a 5-axis tool path to make them,” Donnelly notes. “There is a lot of 5-axis positioning, but no 5-axis tool path. We have recently started doing other parts that require more complex tool paths, so

we’re really starting to use the machine to its full capacity.”

Even with this work, however, KDM is finding that they have capacity to take on more work from other customers. “No one else in our area is offering 5-axis machining,” Donnelly contends, “so we can see ourselves building this business gradually.”

And Donnelly gives GibbsCAM a lot of credit for helping to make this happen. “The people who developed it clearly weren’t just computer programmers, they were people who understood manufacturing. Everything I was told I’d be able to do, I’ve done with it.”

And this is clearly just the beginning. ■

## GibbsCAM CNC Programming Solutions

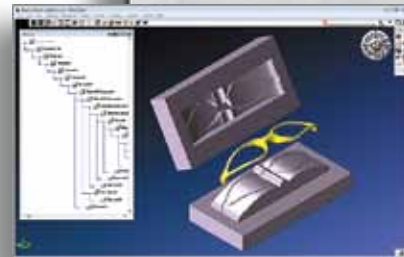
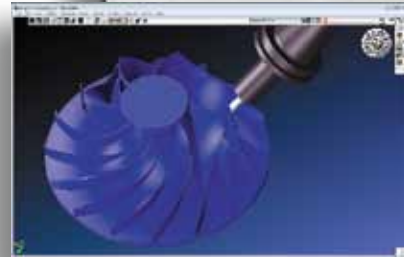
For over twenty-five years, Gibbs and Associates has been a leader in providing cutting edge CAD/CAM technology, while maintaining its signature ease-of-use and productivity. **Powerfully Simple, Simply Powerful** is the guiding philosophy at Gibbs. Gibbs believes in empowering the NC programmer, machinist and manufacturing engineer, not eliminating them. Gibbs' goal is to introduce manufacturers to new technologies and new ways of working that makes their machining easier and their businesses more profitable. To achieve this goal, Gibbs creates tools that are naturally intuitive, graphically interactive, extremely visual, associative and just plain enjoyable to use. Gibbs provides a total quality solution with the service and support successful customers require.

## GibbsCAM Capabilities and Benefits

- Short learning curve makes the GibbsCAM system easy to learn and remember
- Intuitive graphical user interface, specifically designed for manufacturing, is easy to use
- Powerful macro programming capability allows users to create their own extensions to the system
- Integrated manufacturing CAD capabilities provide accurate geometry creation and modification
- Exchange data with CAD systems using ACIS®-SAT®, DXF®, DWG®, IGES, STEP AP203/AP214, VDA-FS, Parasolid®, CATIA® V4/V5, STL, UGX/NX and Creo Elements/Pro® (formerly known as Pro/ENGINEER) formats and all of the files from the systems mentioned below
- Directly transfer models files and assemblies from within Autodesk Inventor®, Rhinoceros®, Solid Edge®, SolidWorks®, KeyCreator and CimatronE to GibbsCAM for machining
- Wizards interface technology streamlines common tasks:
  - Hole Wizard guides compound hole creation
  - Stock Wizard guides stock definition
- Interactive Feature Recognition provides an easy-to-use way to identify feature geometry to machine
- Automated Feature Recognition identifies hole features and their corresponding parameters
- Hole Manager organizes hole programming process
- Knowledge-based machining stores your company's manufacturing expertise for re-use
- Advanced toolpath generation creates fast and accurate gouge-free machining
- Full associativity automatically allows processes to be quickly and easily updated based on part model changes
- Reporter function easily generates comprehensive process documentation for the shop floor
- 3D Cut Part Rendering reveals any errors before material and machining time are wasted
- Machine Simulation allows program to be checked for potential part, tool and machine interferences
- Over 10,000 error-free post processors ensure what-you-see is-what-you-machine output with over 800 posts for MTM machine tools

## CAD System Certification

GibbsCAM is certified under the Autodesk Inventor Certified Applications Program, is a Siemens Solution Partner Program-PLM for Solid Edge Product and is a SolidWorks Certified CAM Partner Product.



## Ease of Use

GibbsCAM's graphical user interface has been specifically designed for the types of operations performed by manufacturing professionals making for an intuitive interface that is easy to learn and use.

## Breadth of Capability

Programming capabilities support production milling and turning, solid modeling, 2- through 5-axis milling, wire-EDM and advanced machining requirements including mill/turning, rotary milling, high speed machining, multi-task machining, Swiss, tombstone machining and 3-axis multi-surface machining.

## Manufacturing CAD

GibbsCAM provides integrated CAD functionality for geometry, wireframe, surface, and solid model creation and modification necessary to support the special needs of manufacturing. Use it to program from blueprint, design fixtures and molds or repair the imported data.

## 3D Simulation

Integrated 3D visualization capability allows the process to be simulated and verified at any time, preventing costly errors before material and machine time are wasted. The user controls the animation speed, tool display and the ability to highlight specific operations. Process and full machine simulation are supported.

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