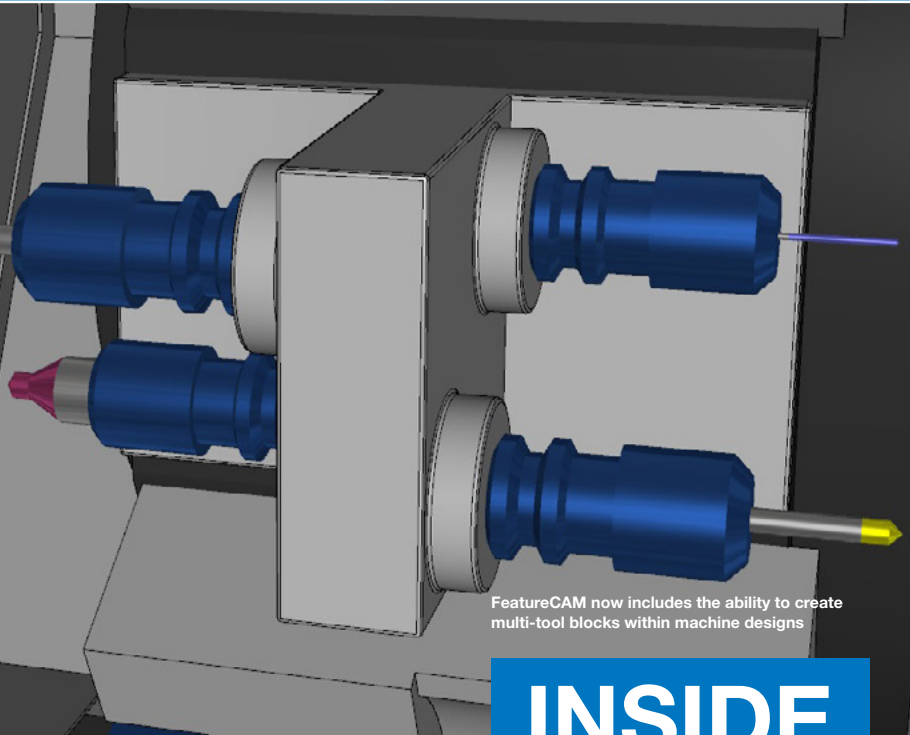


## Vortex Milling Calculator

The 2015 R2 release of FeatureCAM incorporates a milling calculator to help users obtain the maximum benefit from the Vortex high-efficiency area-clearance strategy. Other enhancements, among the 280 customer-requested improvements since the initial 2015 release last September, include the ability to create multi-tool blocks within machine designs, better control over toolpath output and more efficient automatic selection of tools.



FeatureCAM now includes the ability to create multi-tool blocks within machine designs



Full details on the new release, including video demonstrations of the main enhancements, are on the FeatureCAM Learning Zone

[www.delcam.tv/fc2015](http://www.delcam.tv/fc2015)

The Vortex area-clearance strategy in FeatureCAM produces safe toolpaths with a much deeper cut by using a controlled engagement angle that maintains the optimum cutting conditions for the whole toolpath. As a result, higher feed rates and material-removal rates are possible, making the cutting time shorter by as much as 70%. In addition, cutting is undertaken at a more consistent volume-removal rate and at a near constant feed rate, so extending tool life and protecting the machine.



The Vortex milling calculator helps users obtain the maximum benefit from the high-efficiency area-clearance strategy

The radical nature of Vortex can make it difficult for users to set the optimum parameters when they first apply the strategy. To overcome this problem, Delcam has added a calculator to FeatureCAM that provides an easy way to maximise productivity and efficiency with

Vortex. The calculator uses control of the maximum chip thickness to calculate the appropriate feeds and speeds that will minimise the cutting time while maintaining a consistent load on the cutter.

A new development in the Vortex strategy itself will make it more efficient when machining flat areas or

open pockets. In both cases, Vortex now allows the cutter to approach from outside the stock rather than having to make a helical entry move into the stock.

Both Vortex and other two-axis toolpaths have new output options. These give control over point filtering and arc fitting, both of which can contribute to smoother machine motion and, therefore, to better surface finish.

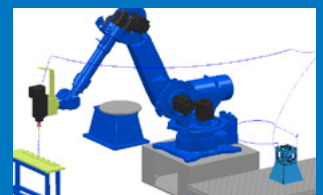
In a related development, toolpath points can now be displayed by using the dialog for output options. This allows the user to view the toolpath points and check that their distribution is compatible with the machine-tool control.

As machines have become more sophisticated, accurate simulation has become increasingly important before toolpaths are passed to the machine. In FeatureCAM 2015 R2, multi-tool blocks can be developed with a list of tool locations and then the attributes can be specified describing the type of tool to be held in each location. The blocks can then be used in the simulation of the movement of the part being machined towards the various tools.

The programming time for drilling has been reduced significantly in the new release. Specific pecking depths can now be allocated to drills on a tool by tool basis. This change means that there is no longer any need to update the global pecking defaults after the creation of features needing to be drilled.

In addition, the exposed length of all tools is now checked as part of automatic tool selection. The check allows tools to be verified against the depth of the feature or the set-up depth so that potential collisions can be avoided.

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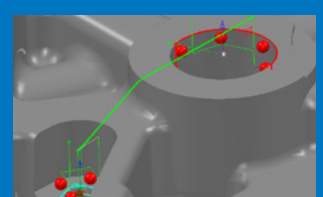
### Page 5 POWERMILL ROBOT 2015

Manual and CNC programming combined for increased flexibility



### Pages 8-9 POWERSHAPE PRO 2015 R2

More tools for reverse engineering and modelling for manufacture



### Page 15 POWERINSPECT 2015

Automatic collision avoidance, plus many other enhancements



# Top marks for robot milling

Five students in mechanical engineering from Aalborg University's Department of Mechanical and Manufacturing Engineering (AAU M-TECH) have received top marks for their BSc project. The students developed a prototype of a robot-based milling solution, built on PowerMILL Robot, for concrete company BC Industry from the nearby town of Løkken.

The specific goal was to develop an automated solution to mill mould tools for production of concrete windowsills at BC Industry. PowerMILL Robot was used to generate toolpaths for an ABB robot fitted with a milling head. The software was also used to simulate the robot's movements to prove out the program.

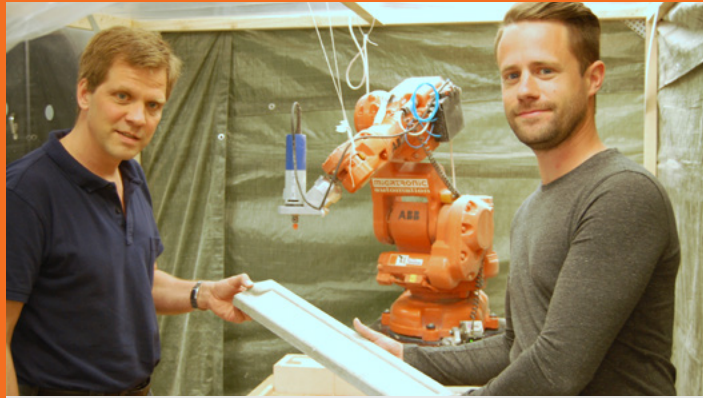
Professor Ole Madsen and Assistant Professor Simon Bøgh from AAU M-TECH were the supervisors of the project. Professor Madsen stated that the top marks were given principally because the students had managed to develop from scratch a solution that was almost industry-ready.

"The students had no prior experience with robots or with CAM software for milling with robots. Even so, they managed to develop a solution that could work in practice," explained Professor Madsen. "It was a complex project and I was impressed with the way they managed to understand the technologies so quickly. This project has made us more interested in future research into robot-based milling solutions."

One of the major advantages of machining with robots for tasks such as making moulds for concrete is that is much cheaper than having to invest in a complex and expensive machining centre. In addition, a solution would only be possible with a fairly sophisticated machining centre, while the flexibility in the movement of the robot makes it able to handle very complex geometric shapes at a relatively low cost.

"It has been an exciting project that has proved to us that it is possible to make moulds using robots provided that they are combined with appropriate CAM software. Although the moulds from the project were not completely ready for production, I believe that, in the long term, it will be possible to gain great benefits from adopting this approach," predicted BC Industry CEO, Søren Jørgensen.

Rasmus Larsen was one of the students who participated in the project. He explained that the CAM software had been easy to use, saying, "It is hard to find any software that can generate the control program for a robot based on a CAD model and then simulate the machining. However, that was the case with PowerMILL Robot and we found that the software worked well."



Project supervisors, Professor Ole Madsen (left) and Assistant Professor Simon Bøgh, with one of the moulds made by the students

His fellow student SørenValentin-Pedersen was also very satisfied with the CAM software.

**"We had enough time to discover that PowerMILL Robot contained a number of really cool features and that it was easy to use. We did not find any other commercial software that could do the same things."**

Søren Friis, CEO of Delcam Denmark, supported the students during the project and was pleased with results of the cooperation with Aalborg University. "I see great potential in this kind of machining solution," he commented. "Through their project, the students have proved that it is quite possible to manufacture larger moulds using a robot."

# Free CAD/CAM automation software

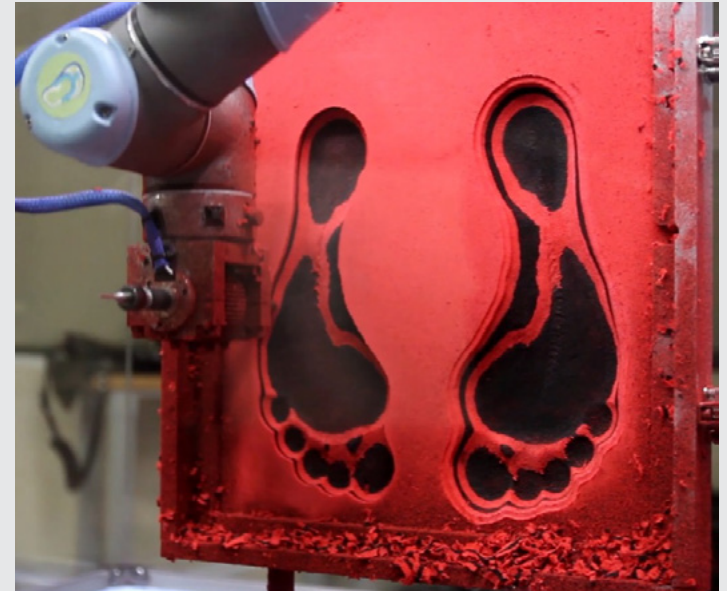
**Delcam Professional Services is offering free Custom Software Core software to speed up and simplify the automation of repetitive operations in PowerSHAPE and PowerMILL. The software can be downloaded from [www.delcam-services.com/custom-software-core](http://www.delcam-services.com/custom-software-core)**

Even though both PowerSHAPE and PowerMILL incorporate automatic routines as part of the software, many experienced users like to customise the software to automate further standard, repetitive operations specific to their application or product range. Typically, this is done by recording a sequence of operations as a macro that can be replayed when a similar calculation, or series of calculations, is required. For more complex operations, this can be a time-consuming process and can produce an intricate string of commands that is difficult for other users to understand or to edit.

The Custom Software Core is a library of middleware that allows users to develop code more intuitively than using macros when interfacing .NET applications to PowerSHAPE and/or PowerMILL. The use of an Object Oriented design, together with IntelliSense in Microsoft Visual Studio, means that the software engineer can discover the functionality available when interfacing with PowerSHAPE and/or PowerMILL more easily than recording a macro and pasting together a series of commands.

An additional benefit is that the number of lines of code in the customised application will be reduced, typically by at least 50% compared to using macro commands. Rather than using lengthy blocks of macro commands that are hard for other users to read and understand, the new application comprises easy-to-read function calls, each of which can encapsulate many lines of macro commands.

Using the Custom Software Core also makes it easier to upgrade any custom application from one version of PowerSHAPE or PowerMILL to a newer version. Any changes between software releases to the macro command for a particular operation can be handled by downloading a new



The Custom Software Core was used to develop an automated manufacturing process for Yooshu's custom-made sandals

version of the Custom Software Core. This new version will ensure that the application will continue to function as before, without any need to recreate macros.

The Custom Software Team within Delcam Professional Services used the Custom Software Core to develop an automated production method for Yooshu, a manufacturer of custom-made sandals. The Team, which combines software development and mechanical engineering skills, was able to develop a system that interfaces with a third-party foot scanner to obtain scan data from the customer's feet. That data is then passed to PowerSHAPE to design the sandal, and then to PowerMILL to create and post-process the toolpaths used by a robot to cut the custom shape.

**A video showing the Yooshu process is at <https://vimeo.com/112876637>**

# New ShoeMaker Pro

The latest release of Delcam CRISPIN's ShoeMaker Pro CAD software for the design of all types of footwear includes special editing tools to adapt an existing sole to a new upper design. Using an existing sole design can shorten the overall development process, while the new alignment tools make 3D modelling of the shoe quicker and easier.

The 2015 R2 version also incorporates more efficient tools for upper design, such as edge gimping, stitch-down simulation and a new jewellery library, plus improvements to the KeyShot rendering and the ability to export models in Apple's iBook Widget format for viewing on iPads and iPhones.

**For further details on the new release, please go to <http://lz.delcam-crispin.com>**

Two new tools allow the shape of the sole to be edited, either by using the bending tool to match a flat sole to the profile of the upper or by using the box morphing tool to reshape the sole to match the last.

Another new option allows stitch-down construction to be modelled. As with the other stitching options in ShoeMaker, various types of stitching can be trialled, with different stitch sizes and spacing.

The main enhancement to the KeyShot rendering in ShoeMaker is the ability to produce a render of a pair of shoes by mirroring the design automatically to generate the second shoe in the image. Once they have been created, the pair exist as separate models within KeyShot so their positions and colouring can be altered independently. The new version also recognises any duplicated features in the model, such as a set of eyelets around the lace holes, and treats them as 'instances' of the same geometry. This gives a 'lighter' model that can be imported into KeyShot, and then moved within it, more quickly.

The improved rendering in ShoeMaker Pro allows images of pairs of shoes to be created automatically from a single design





# Ember and ArtCAM

Delcam has demonstrated the potential to use the new Ember™ 3D printer from Autodesk with a development version of ArtCAM JewelSmith with support for 3D printing.

Autodesk developed the Ember printer as a reference device for its open Spark 3D printing platform. By using digital-light stereolithography to cure liquid resins, Ember creates complex, high-resolution objects, which is desirable for the casting of jewellery.



Autodesk's Ember 3D printer can create up to twenty ring models in less than 90 minutes

The Ember printer also offers a rapid build speed, having the capability to produce up to ten model rings in an hour or up to twenty model rings in less than 90 minutes.

ArtCAM JewelSmith has been developed specifically to allow jewellery manufacturers to increase productivity, improve quality and deliver new designs more quickly, by combining their craft skills and creativity with the power and precision of computer-aided manufacturing. The software includes a gem library, which can be added to by the user, and the KeyShot rendering system, which creates extremely accurate and lifelike images for either customers or retailers to view, or for the production of catalogues and other marketing materials.

Functionality currently under development at Delcam will allow future releases of ArtCAM JewelSmith to support 3D printing with Ember and other 3D printers.



# Sales Partners welcome new Vice President

More than 450 Delcam staff and representatives of the company's international Sales Partners network packed the Cineworld cinema in Solihull on 9th February to welcome Pete Baxter as Delcam's new Vice President and to hear about his plans for the future of the company.



More than 450 Delcam staff and Sales Partners packed the Cineworld cinema in Solihull

Pete has joined Delcam from its parent company, Autodesk, Inc, where he was a Vice President of Sales and served as the country manager for Autodesk in the United Kingdom.

"I'm thrilled to announce the appointment of Pete Baxter as Vice President, Delcam Ltd.," said Buzz Kross, Autodesk Senior Vice President, Design, Lifecycle and Simulation. "In his new role, Pete will be responsible for managing the global Delcam business, and for leading the company in the next stage of its growth. Pete brings to Delcam extensive leadership experience and knowledge that will be critical in helping Delcam develop

closer connections to Autodesk, to the benefit of both organizations and our customers."

"I am delighted to be joining Delcam, and helping create the next generation of manufacturing software," added Pete. "The company has an unrivalled reputation for the support and industry-leading products it offers to manufacturing companies around the world."

**"I look forward to working with Delcam's staff and reseller channel to accelerate the growth of the business and to deliver an even better manufacturing experience to our customers."**



Pete joined Autodesk in 2004, most recently serving as a Vice President in the Autodesk Worldwide Sales organization. Prior to that, he held a number of other sales and management roles, including head of sales for Northern Europe, where he was responsible for sales across the Manufacturing, AEC, Media and Entertainment industries. Previously, Pete held management positions at companies including Revit Technology Corporation, Bentley Systems and PTC.

Other speakers during the morning included two Delcam customers, Tim Geurtjens from MX3D, who presented some of his company's latest developments in 3D printing, and Wing Commander Andy Green, from the Bloodhound SuperSonic Car project, who updated the delegates on the project's progress towards setting a new land-speed record of over 1,000 miles per hour.

# Combining manual and CNC robot programming

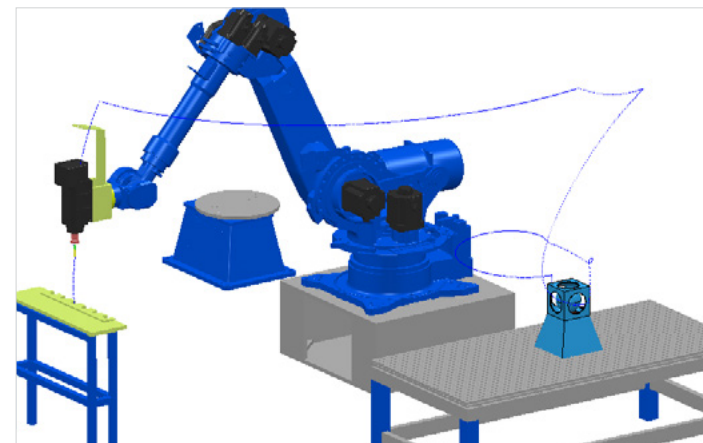
The 2015 release of the PowerMILL Robot software for the programming of robots for multi-axis machining operations enables manual and CNC programming to be combined in a single program so providing the maximum flexibility. Other enhancements include improved collision checking, automatic avoidance of wrist singularities and the ability to generate robot programs from tape files produced in other CAM software.

For full details, please go to [www.delcam-robotics.com](http://www.delcam-robotics.com)

PowerMILL Robot also benefits from the many enhancements made in recent releases of PowerMILL, in particular the Vortex strategy for high-efficiency area clearance. In addition, the range of robots supported by the system has been increased so that it now includes KUKA, ABB, Fanuc, Yaskawa Motoman, Stäubli, Hyundai, Comau, Kawasaki Robot, Nachi and Universal Robots equipment, in all cases eliminating any need for third-party translation software.

The new functionality in the 2015 release allows users to duplicate in the virtual environment teach-and-learn programming of the robot for linking moves. The model robot on the computer can be 'jogged' between positions where machining is to take place, in a similar way to the movement of the arm in the real environment. The programmed linking moves can then be integrated with the cutting moves to give the complete sequence of operations.

This approach will be necessary in any cases where there are additional objects in the real world that are not included in the CAD model of the part to be machined, such as the clamps or fixture being used to hold the item. In other cases, the user might prefer to move up and over the part, rather than moving around it, even if that is shorter.

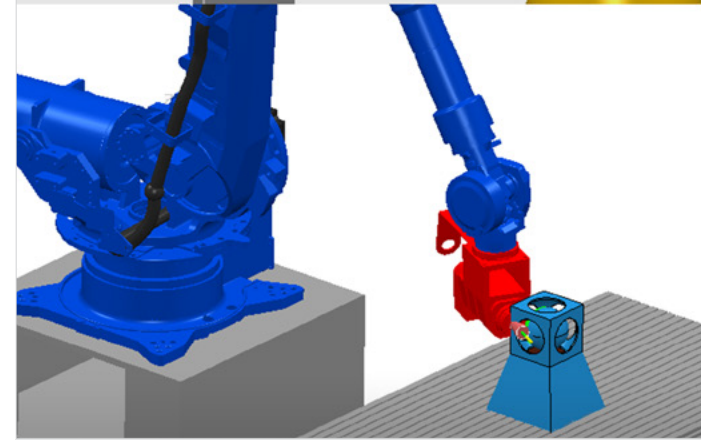
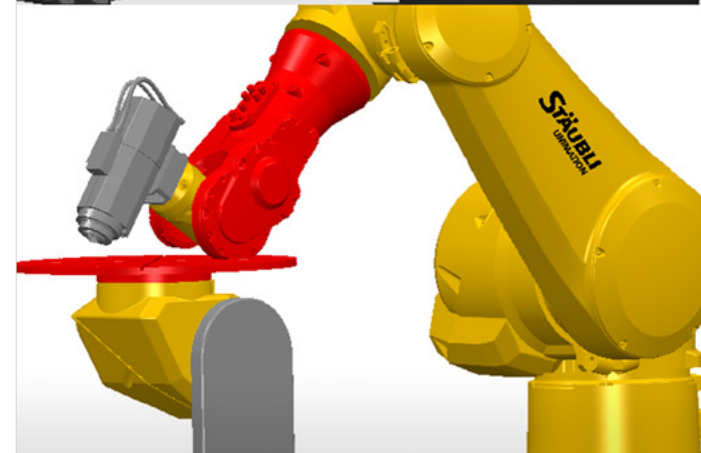
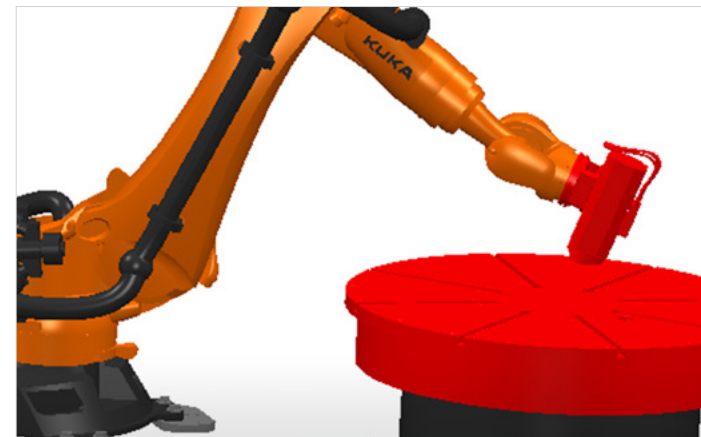


Manual and CNC programming can now be combined in a single program

A singularity in robot operation occurs when collinear alignment of two or more axes results in unpredictable robot motion. Singularities must, therefore, be eliminated to maintain smooth, predictable machining. The new release avoids automatically wrist singularities, the most common example of this type of problem.

The improved collision checking in the 2015 release allows the complete NC program to be simulated in one operation so saving considerable time when compared to the previous method of checking each toolpath individually.

Finally, the ability has been added to import existing tape files from other CAM systems. Once imported, the toolpaths can be simulated and post-processed in PowerMILL Robot in the same way as toolpaths from PowerMILL.

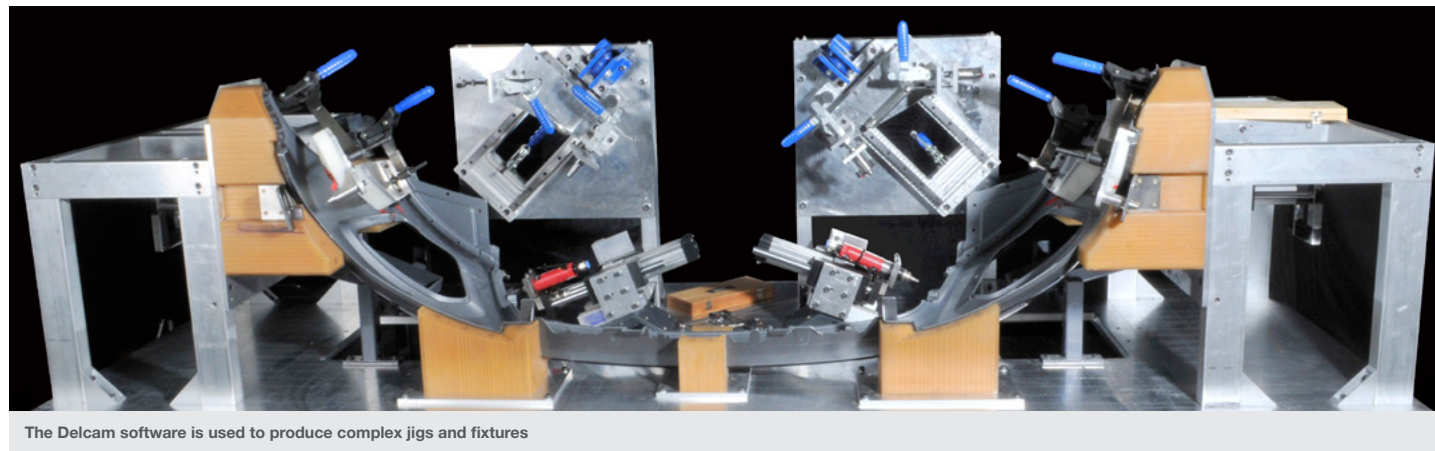


The new PowerMILL Robot software incorporates improved collision checking



# Elkington Brothers 25-year partnership with Delcam

Elkington Brothers has completed twenty-five years as a customer for Delcam's CAD/CAM software. The Birmingham toolmaker installed its first system in 1989, having used traditional methods for fifty years since being founded in 1939.



The Delcam software is used to produce complex jigs and fixtures

"It was a big decision to move to computerised methods as the software alone cost tens of thousands of pounds and the computers and CNC machines were also much more expensive than they are now," remembered Elkington Brothers' Managing Director, James Kelly. "Subsequent years have proved it was the right decision. I'm certain that, if we hadn't invested in CAD/CAM, we wouldn't be here now."

"There were far fewer systems to consider in those days but we still did a thorough evaluation. Delcam seemed to have a different focus, with its emphasis on tooling design and machining, while other systems were more appropriate for component design. The location in Birmingham was also an important factor as we knew we would need a lot of support in the early days."



Elkington Brothers uses PowerMILL for all its machining

Of course, Delcam's software has undergone huge developments since those days, with much of the improvement prompted by feedback from early customers like Elkington Brothers. "We have always had a strong

partnership with Delcam," commented Mr. Kelly. "We used to ask 'Why can't we do this?' or 'Wouldn't it be better if we could do that?' and then see the changes appear in the software."

Elkington Brothers now has seven staff working on the software; three doing design with PowerSHAPE, two programming with PowerMILL and two switching between the two programs. Two of the group also use PowerINSPECT for inspection on a Stiefelmayer CMM, with a third about to be trained.

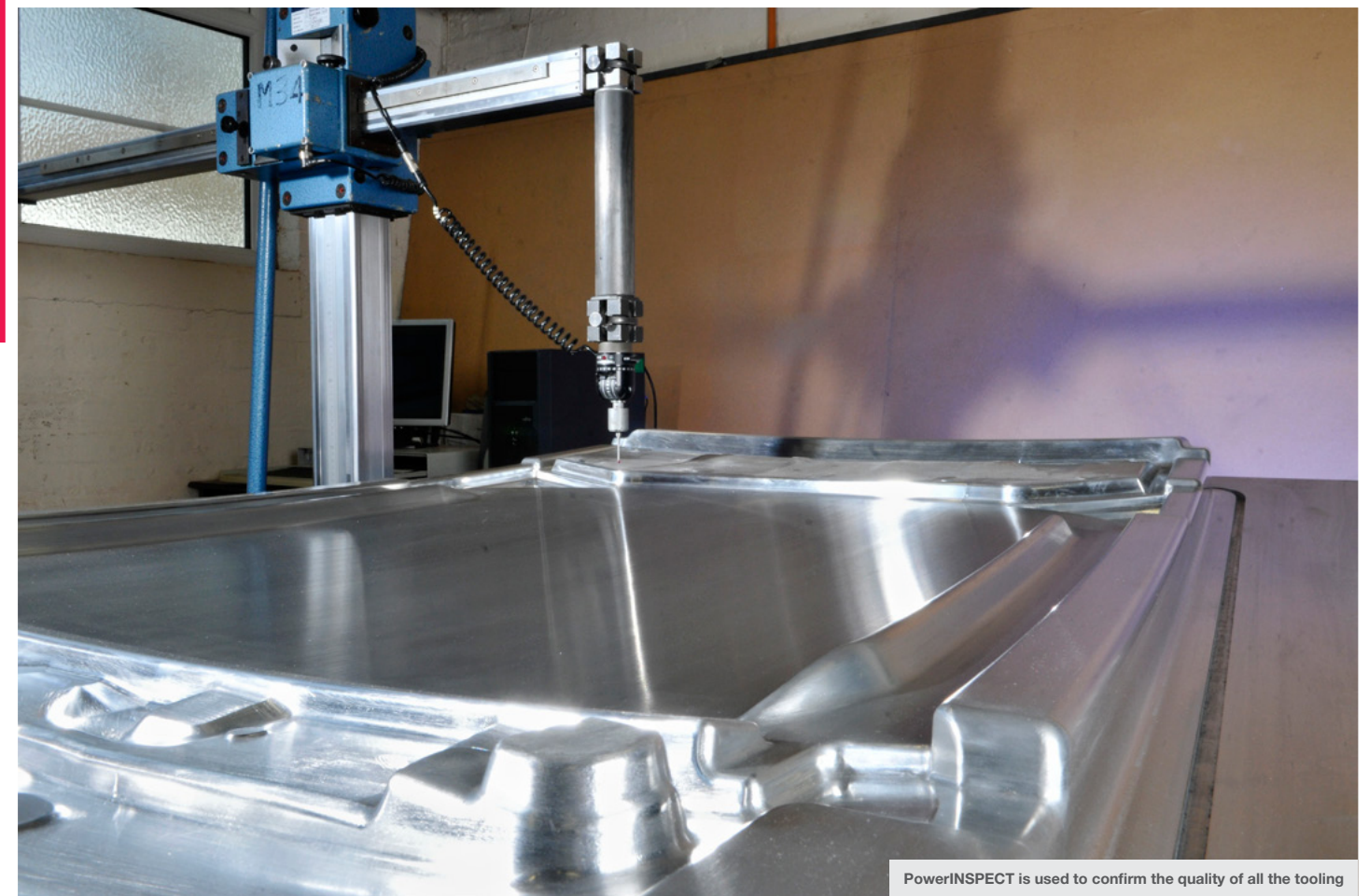
The Delcam programs are used for the company's complete range of projects, including making many types of tooling, producing models and patterns, and building jigs and fixtures. While almost 90% of the work is for the automotive industry, including a lot of RIM tooling to produce sills, bumpers and spoilers, Elkington Brothers also has customers in the aerospace, agricultural and rail businesses.

**"The software has gone from strength to strength over the time we have been a customer"**

"We started out using a lot of typed commands, whereas now everything is done through the user interface. In addition, the developments in both software and hardware mean that calculation times are a fraction of what they used to be."

The faster calculation times have contributed to substantial time savings. A project like a tool for a headliner used to take twenty-four weeks but this is now down to six weeks if everything goes to plan. The time savings enable Elkington Brothers to be competitive when quoting for work. The faster delivery also benefits the company's tooling customers because they can start making parts that much sooner.

The accuracy that is possible with the Delcam software is also much better. "Of course, we would never have sent out tooling that wasn't up to our standards," explained Mr. Kelly.



PowerINSPECT is used to confirm the quality of all the tooling

**"The software means we can reach the required quality much more quickly with very little hand finishing."**

One thing that hasn't changed is the number of tools that are modified, either before any parts are produced or after initial samples have been made. "PowerSHAPE makes it very easy to compare models so that we can see what needs to be done or, if substantial changes are required, whether we need to start the project from scratch," claimed Mr. Kelly. "This means we can prepare a quote for the extra work very quickly and be confident that the price we are asking is realistic."

Even though Mr. Kelly says that "the software is much easier to pick up now", he still insists that his staff attend update courses at Delcam on a regular basis. "We still use the helpline quite a bit," he said. "Many of the staff that we contact now are the same people that were there when we first bought the software. With all that experience, their knowledge is very impressive. It means that the support is second to none."

After a difficult time during the latest downturn, Elkington Brothers is now back on a strong growth path. The company has added two extra Hurco machines in the last eighteen months, both offering higher machining speeds and better surface finish. Mr. Kelly is now looking at acquiring the company's first continuous five-axis machine, after many years of operating 3+2 equipment.

While he is grateful for the work that has resulted from the large investments made by Jaguar Land Rover in the region, Mr. Kelly is looking to broaden his customer base, in particular by trying to bring in more work from the aerospace industry.

Mr. Kelly is also increasing the numbers of staff. He has recruited two apprentices recently and is looking to add one or two more later in the year. The new recruits are keen to learn to use the Delcam software but Mr. Kelly is insisting that they develop their manual skills first, saying "Despite all the

benefits we have gained from our CAD/CAM systems, I still believe that our strong traditional skills remain essential to the success of the company."



Tooling is produced up to 25 tons in weight



# More reverse engineering tools in PowerSHAPE Pro

Delcam has added a number of new options for reverse engineering to its PowerSHAPE Pro software for the design of products and tooling. The 2015 R2 release of the software also includes improvements to speed up and simplify the editing of product designs to make them more suitable for manufacture.

By offering a combination of solid, surface and direct modelling, together with reverse engineering, PowerSHAPE Pro provides the most comprehensive range of design techniques available in a single CAD program. Having all the different technologies in the same package reduces the need to transfer data between multiple programs and so streamlines any product-development process that requires both reverse-engineering and CAD functionality.

PowerSHAPE Pro can connect directly to most scanning hardware to capture and display scan data in real time. The 2015 R2 version includes a new split-screen alignment option that makes it quicker and easier to combine multiple scans, taken, for example, from the opposite sides of a part. The new method also allows more accurate snapping of alignment points, giving greater accuracy in the resulting single CAD model.

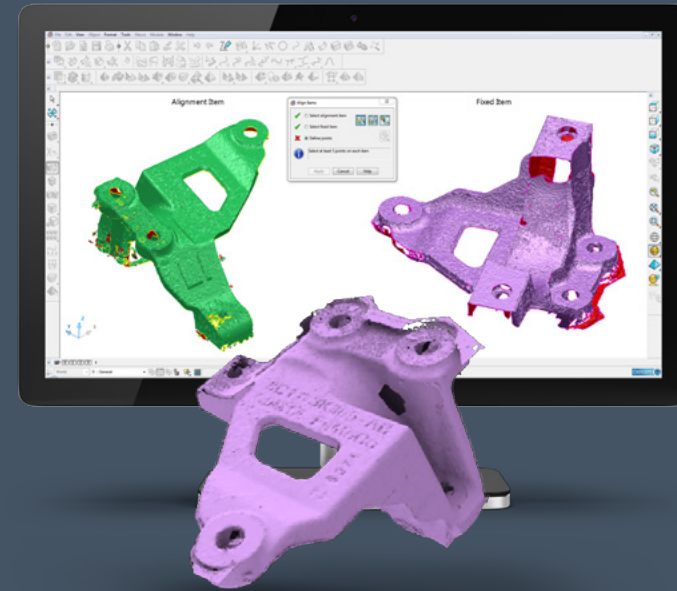
PowerSHAPE Pro can be used to take cross-sections through the scan data to generate wireframe for the development of surface models. The wireframe can be simplified automatically into lines and arcs, reducing the number of points needed to describe the item and giving more precise geometry for the re-engineering of the model.

Another new option is the ability to morph a complete solid or surface model to a mesh. This can be used to compensate for spring-back when pressed parts are released from their tooling. Morphing can be used to update a nominal CAD model to match the part as it is made in reality or to modify the surfaces of the tool so that the part can be produced in the desired shape represented by the CAD model.

On the modelling side, analysis of models has been made easier as the Smart Feature Selector now displays the type and parameters of each feature interactively as the cursor is moved around the model.

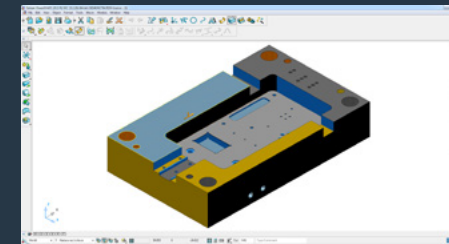
In addition, the ability of the Smart Feature Selector to find, select and edit multiple similar features has been extended. Now, any number of items of the same type, not just similar features, can be edited in a single operation. For example, all the arcs within a model could be set to the same diameter or all the holes could be made the same depth.

Two enhancements have been made to the tools for the creation and editing of curves. Firstly, the Composite Curve tool has been more efficient so that it needs fewer clicks to create the curve, even when following

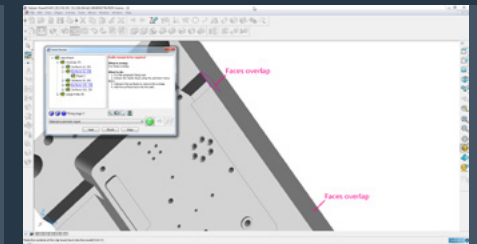


fragmented edges. Secondly, the Re-point dialog now displays the deviation between the original curve and the new one, and it is also possible to re-point a curve to a known tolerance. This makes it even easier to create high-quality, smooth surfaces when re-engineering scan data or when remodelling an existing design to allow it to be manufactured.

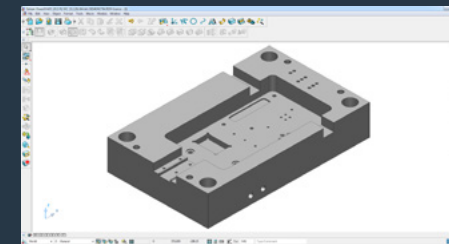
## Modelling for Manufacture Workflow



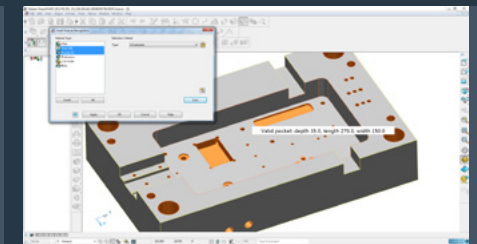
1. CAD data is imported into PowerSHAPE as a set of surfaces, for example from an IGES file



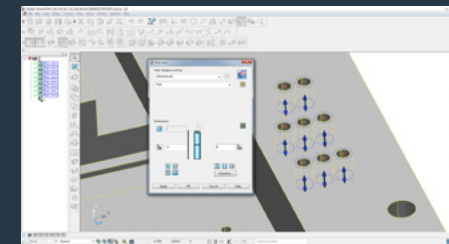
2. PowerSHAPE's Solid Doctor identifies any problems in converting the surfaces into a single solid and recommends the appropriate repair methods



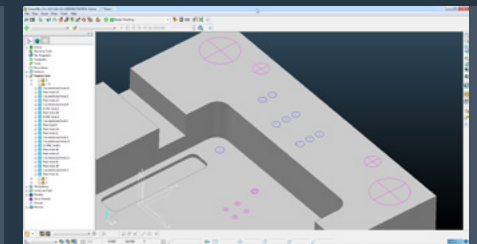
3. The repaired solid



4. PowerSHAPE's Smart Feature Recognition identifies features, such as pockets, holes and bosses, and allocates similar items into groups to simplify the history tree



5. Each group of items, such as a set of holes, can be edited simultaneously



6. The feature sets are exported directly into PowerMILL to simplify the creation of drilling routines for groups of holes

## Multi-part and family electrodes

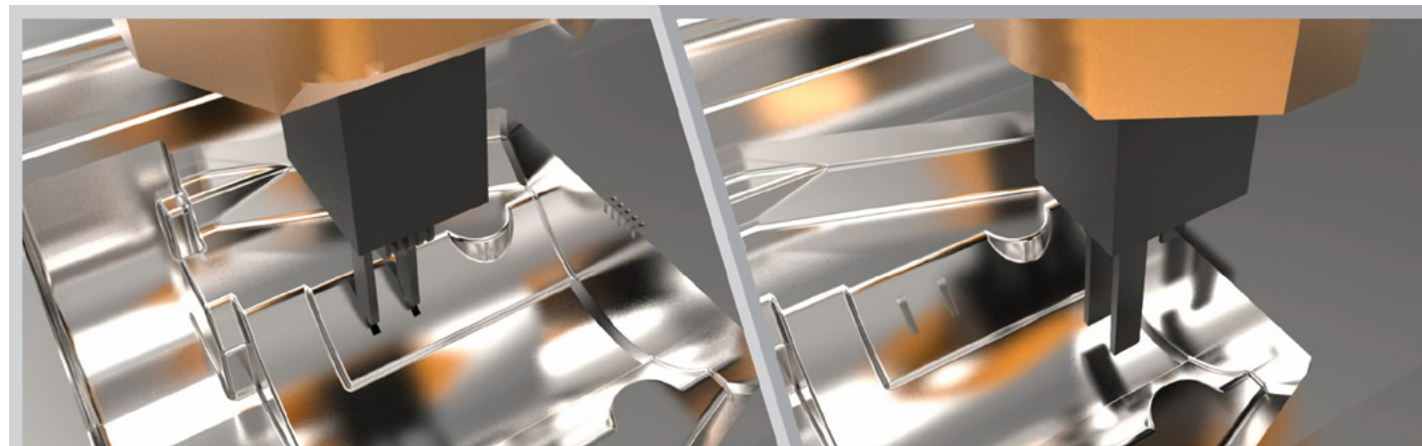
The Delcam Electrode integrated solution for the design, machining and inspection of electrodes can now produce multi-part electrodes or family electrodes. In addition, electrodes can now be displayed in the history tree of the tool on which they will be used, so simplifying the management of projects. Also, all electrode drawings will update automatically if the design is changed.

For full details, please visit [www.delcam-electrode.com](http://www.delcam-electrode.com)

Multi-part electrodes can reduce the time needed for both machining and EDM compared to using several individual electrodes. In addition, machining multiple electrodes from a single blank can save materials and single holder can be used for the combined electrode.

The design of multi-part electrodes uses the same wizard-based process as is used for conventional electrodes. The wizard helps users to define the region where the electrode will be used quickly and easily, extract the shape needed to produce the required feature in the part, and then edit the design to provide clearance from the main surface of the tool and to blend it into the blank size needed to fix the electrode into its holder. Once the electrode for the first area has been defined, the user then re-runs the wizard for other burn areas to be included in the multi-part electrode.

The same process can be used if particularly hard materials are to be burnt or if the same electrode design is required in several areas of the tool. In these cases, a single electrode might not be sufficient. A second electrode can be created within the blank, again by re-running the wizard, so that, once the first electrode has worn

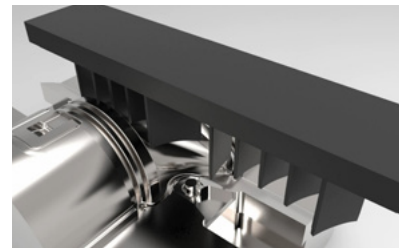


Multi-part electrodes can reduce the time needed for both machining and EDM

out, the electrode assembly can be rotated to use the second one.

In family electrodes, the roughing and finishing electrodes for a single area are combined in the assembly. Once again, the second part of the assembly is created by re-running the wizard. However, in these cases, the different machining offsets required for the rougher and finisher are applied when creating the various parts of the assembly.

All of these compound electrodes require more complex movement around the tool as they are used in comparison to standard electrodes. To ensure that collisions don't occur, collision prevention technology from the PowerMILL CAM system has been added into the simulation algorithms used by Delcam Electrode.



Delcam Electrode can now be used to produce a family of electrodes from a single blank



# A productive partnership

A partnership between Delcam, DMG MORI Ellison and other suppliers developed a turnkey solution that reduced the machining time for an aerospace component by more than half.



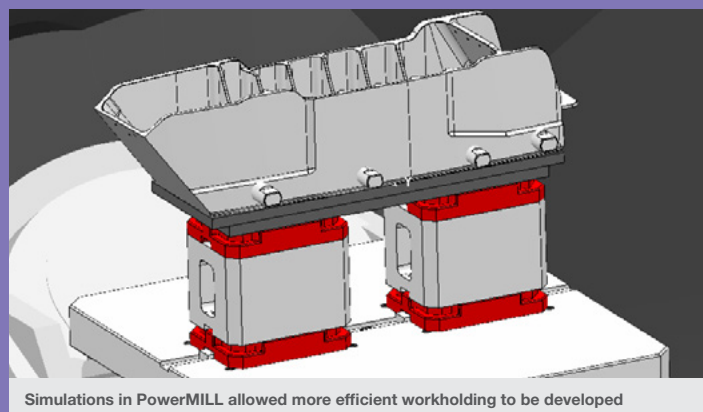
From Left:- Mark Sully (Delcam), Mitch Hamilton (Seco Tools), Nicholas Piccione (DMG MORI SEIKI Ellison) & Robert Sochaj (Cyclone Manufacturing)

The customer was Cyclone Manufacturing, a manufacturer of aerospace parts with four plants in Mississauga, Ontario, that is growing its turnover by 20% each year. By the end of this year, the company expects to top \$65 million in sales.

Nicholas Piccione, area sales manager for DMG MORI Ellison, approached Cyclone in 2013 with a turnkey solution to help improve productivity at the company's new plant. "I thought of an aluminium winglet component for a major aerospace OEM because we were machining about 100 parts per month and it was taking us about seven hours per part using the capacity of one and a half machines," recalls Robert Sochaj, who runs the company with his father Andrew.

The winglet component is a classic aluminium aerospace part: a complex geometry that requires a high volume of metal removal, many tight-tolerance holes and multiple cutting processes, such as milling, reaming and drilling.

Mr. Piccione knew DMG MORI's DMU eVo linear machine was a good choice but he also knew the machine alone wouldn't improve the cycle times. The complexity of the part would require CAM software that could handle the programming, plus tooling and workholding that could support the higher machining speeds and meet the tight tolerances for the part.



Simulations in PowerMILL allowed more efficient workholding to be developed

Mr. Piccione's turnkey solution was to bring in Delcam for PowerMILL, and Seco, for its EPB toolholders, Jabro end mills and Aeromaster roughing tools. The turnkey solution also included Lang workholding fixtures supplied by Machine Tool Solutions.

The installation took place in February of last year and since then the machine has been running smoothly. "We were on the same page when it came to the turnkey concept," said Mark Sully, Delcam's account manager for Central Ontario. "The customer's process is only as good as its weakest link, so a high-end machine with a weak tool or poor software won't perform well."

Cyclone's target for its aerospace component was simple: improve productivity and reduce costs. The turnkey solution did just that. Not only did Cyclone reduce its machining cycle times by more than half from seven hours down to two and a half hours, it rationalized the number of cutting tools required from approximately thirty down to eleven simply by redesigning the workholding fixtures and reconfiguring the cutting-tool approach.

Cyclone was also able to eliminate a polishing step because of the high-quality finish and incorporate operations, such as chamfering, into the machining process on the DMG MORI machine.

PowerMILL was key to achieving the savings. As well as enabling faster programming and providing more efficient toolpaths, the software's simulation capabilities helped to reconfigure how the part was held in the machine. They showed that, with the new Lang workholding, it would be possible to secure the part more efficiently and hold it rigid during high-speed machining.

Having seen the benefits of PowerMILL in this project and receiving recommendations from other users that he respected, Mr. Sochaj purchased the Delcam software for other programming tasks at Cyclone.

# Future of research in Europe



**FOCUS**  
www.focusonfof.eu

Delcam has joined with a group of the leading research centres across Europe in a new European Commission CSA (Coordination and Support Action) project that will have a "direct impact on the future of research in Europe." The Kick-Off Meeting for representatives from all the consortium partners in the FOCUS project took place in Brussels at the end of February.

Odd Myklebust from Project Coordinator, NTNU (Norwegian University of Science and Technology), opened the meeting. He explained that "the FOCUS project will be giving recommendations and guidance on the organisation of projects under the EC Factories of the Future programme (FoF). It will have a direct impact on the future of research in Europe."

The FOCUS project aims to support improved exploitation of FoF project results from each of its five participating clusters – Zero Defect Manufacturing, Clean Factory, Robotics, High Precision Manufacturing and Maintenance & Support.

The project will review the current state of the art in project management and exploitation, and formulate future FoF priorities. In particular, it will deliver a model and associated methodology for effective cluster creation, execution and monitoring; and a model and associated methodology for industrial exploitation for future FoF PPP projects.

Delcam will lead the part of the project looking into the provision of pro-active support to disseminate the tangible outcomes of future projects and the encouragement of industrial exploitation, both within and outside the clusters undertaking the work.



Representatives of the organisations undertaking the FOCUS project met for a Kick-Off Meeting in Brussels

# Hybrid 3D print/leather shoes

**Delcam CRISPIN demonstrated the potential of its ShoeMaker design software in the mass customisation of footwear by displaying hybrid shoes at the SIMAC exhibition in Milan. The hybrid shoes feature a leather upper, with the sole and heel produced by 3D printing, bringing together traditional and new methods of shoemaking in their creation.**

The complete shoe model was developed in ShoeMaker, the only footwear design system that integrates fully 3D designs of lasts, uppers and soles, so allowing the complete CAD model of the shoe to be developed and visualised in a single system. This comprehensive functionality makes ShoeMaker the perfect solution for projects like Delcam's hybrid shoe.

The soles and heels for the hybrid shoes were produced by Stratasys, which also supplied the materials. The upper for the shoe was created and fitted to the soles by Cool Gray in Portugal, with support from Norcam, Delcam's joint venture in the country.

The new materials and increased design freedom offered by 3D printing are expanding the creative opportunities for footwear designers. Unhindered by the restrictions of conventional manufacturing, designers can let loose their creativity, paving the way for more projects in mass customisation and in meeting the most unusual and individual bespoke requests.

Delcam CRISPIN has always invested its development resources into providing a flexible design solution for its customers and is committed to providing software able to support the more extreme shapes that have been made possible by 3D printing. At the same time, the company recognises that more traditional methods will still provide the most appropriate manufacturing route for the majority of footwear projects.



A combination of traditional methods and 3D printing was used to create the Delcam CRISPIN hybrid shoes



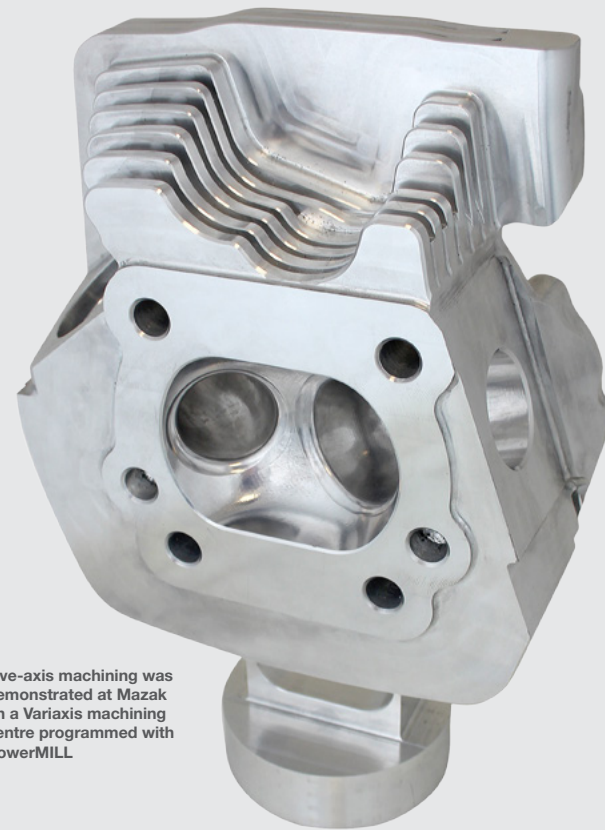


# Make tomorrow better

A new video has been added to Delcam.TV showing how Delcam supported the 2014 Yamazaki Mazak Open House held at the company's European Technology Centre and manufacturing plant in Worcester, UK, in November last year. The theme for the event was Make Tomorrow Better.

To see the video, please go to [www.delcam.tv/delcammazak](http://www.delcam.tv/delcammazak)

Three of the machining demonstrations run at the Open House were programmed with Delcam software. Five-axis machining was shown on a Variaxis machining centre programmed with PowerMILL, while mill-turn technology was demonstrated on a Hyper Quadrex machine with three turrets and two spindles programmed with FeatureCAM. A combination of FeatureCAM and manual programming with the Mazatrol control was used for one of the new machines on display, the Integrex i-100S, the latest variant of Mazak's flagship Integrex range.



Five-axis machining was demonstrated at Mazak on a Variaxis machining centre programmed with PowerMILL

# New OrthoMODEL release

## OrthoMODEL

Custom Orthotic Insole CAD/CAM

The 2015 version of the OrthoMODEL software for the design of custom orthotic insoles includes the ability to design three-quarter-length rigid orthotics and an extended range of corrections for rigid orthotics, plus other enhancements. For further details, please go to [lz.orthotics-cadcam.com](http://lz.orthotics-cadcam.com)

OrthoMODEL offers 'real-time design' of both accommodative orthotics, ideal for patients with diabetes and for those requiring comfort insoles, and corrective orthotics, to address problems with the patient's foot orientation and gait cycle.

The software has a direct interface to Delcam's iQube range of scanners, all of which are able to scan the patient's foot, foam boxes or casts. As an open system, OrthoMODEL can also import scan data from most other systems as well as create NC code for orthotics generated in other CAD systems.

The main addition to the 2015 release is the new option to create three-quarter-length rigid orthotics. The new style can be selected from the existing menu of orthotic types, with the same options to specify the size and width required for the patient.

The range of corrections that can be made to rigid devices has been extended in OrthoMODEL. Options available to be added now include



OrthoMODEL can now create three-quarter-length rigid orthotics

extrinsic and intrinsic forefoot and rearfoot posts, as well as heel lifts and raises.

In addition, all rigid orthotics can now be designed with constant thickness across their width, even in areas with steep walls, thereby maintaining rigidity.

Other enhancements in OrthoMODEL 2015 include support for orthotics with flat heels, dynamic reporting of the pad height as a pad is adjusted, and an easier method to set up a new library of orthotics with improved error reporting if details are entered incorrectly.

# Delcam and Fidia demonstrate Collision-Free Machining

**FIDIA**

Delcam partnered with Fidia to hold an open house event during February at Paragon D&E in Grand Rapids, Michigan. The event, with the theme 'Tomorrow's Manufacturing Today', saw the debut of the Fidia GTFM gantry CNC machine, the first machine from Fidia to be built in the USA by Paragon, and demonstrations of PowerMILL and its new interface with Fidia's ViMill anti-collision technology.

To see the video, please go to [www.delcam.tv/fidia](http://www.delcam.tv/fidia)

The relationship between Delcam and Paragon started when the team at Paragon realized that they needed to reduce the number of CAM packages they were using in order to be more efficient on the shop floor. The decision to go with Delcam wasn't only about the strength of the software but, according to President and CEO, David Muir, was also based on Delcam's "willingness to listen to what our company needed and to provide what our users needed."

Through what Paragon learned from Delcam on the CAD/CAM side, a new partnership was developed with Fidia to produce a CNC machine specific to Paragon's needs. The drive for a better, more efficient workflow lead to the creation of the Fidia GTFM gantry. The machine uses innovative technology to integrate the programming process to the machining floor. The Fidia ViMill control interfaces with PowerMILL to create a real-time virtual collision checker. ViMill uses all the information produced in PowerMILL as the part is programmed to run in look-ahead mode in virtual 3D, and so to detect and avoid any machine collisions.



The Fidia GTFM gantry CNC machine is built in the USA by Paragon

This approach overcomes the problem that, without real-time checking, the multitude of possible CNC parameter settings can produce unexpected machine movements, even when the part program has been verified with off-line simulation.

Other problems can occur because of the shortage of skilled labour. Every customer wants 100% protection and utilization of their multi-million dollar investment no matter who is running the machine. Managers want to rely on a certain skill set that comes with a lot of experience when it comes to programming and running a multi-million dollar CNC machine tool. However, due to the labour shortage, shops may need to implement a fail-safe system for newer employees with less experience, or even for apprentices, so they can run any machine with confidence. In addition, companies need reliable CAM software that is powerful enough to run efficiently but easy enough to use so that beginners can become productive as quickly as possible.

The ViMill interface provides a link between PowerMILL and the Fidia machine tool. It simulates machining based on the CAM programs generated, and detects and avoids possible collisions or unexpected movements between the part, the tool head or machine. It looks ahead of the machine's motion to provide virtual milling in real time as the job progresses.

This development emphasises Delcam's key philosophy that, in order to improve workflow and throughput for their customers, solutions providers must work together to provide solutions for tomorrow's manufacturing today.



Fidia's ViMill interface uses data from PowerMILL to provide real-time simulation of machining



# Free Multi-Channel Viewer

Delcam's PartMaker Division has launched a new, free PC-based app called the PartMaker Multi-Channel Viewer that allows users of multi-tasking turn-mill centres and Swiss-type lathes to view and align multi-channel CNC programs automatically.

## PartMaker Multi-Channel Viewer

**The PartMaker Multi-Channel Viewer is available for download free of cost from <http://www.partmaker.com/multichannelviewer>.**

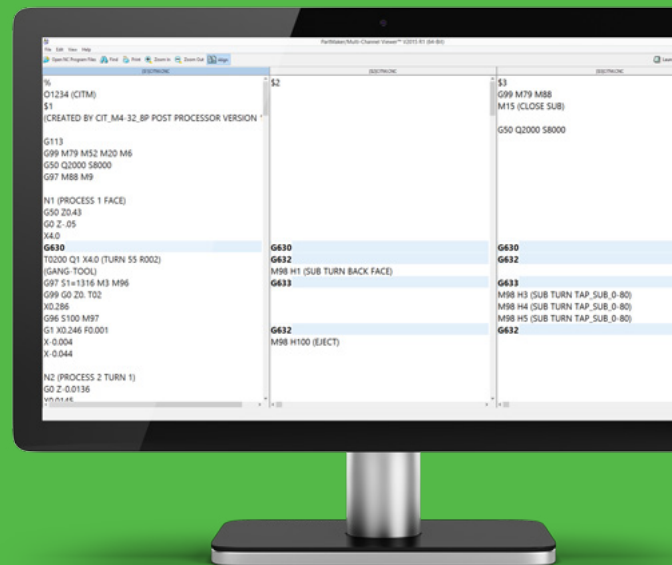
The downloaded program is activated for each shop by a PartMaker product specialist. He will provide the user with a customized machine configuration for the machines in that shop. The software also works for any standard, single-path NC machine as well. Both the application and the custom configuration files are provided free of cost.

The PartMaker Multi-Channel Viewer allows users of turn-mill centres and Swiss-type lathes that require multi-channel CNC programs to view such programs side by side and automatically align "sync" or "wait" codes. This unique application supports virtually any multi-channel machine/control combination from every machine builder on the market. It is highly intelligent,

using proprietary technology to automatically recognize the CNC syntax required by specific machine tools.

Once installed and configured, the PartMaker Multi-Channel Viewer lets users view a multi-channel CNC program on one screen with just a few clicks of a button. It automatically displays synchronized processes across multiple channels for any multi-axis machine/control combination. The software allows users to search their multi-channel NC program quickly and easily.

While the PartMaker Multi-Channel Viewer is not a CNC editor, it can connect to the user's chosen CNC editor to allow changes or corrections to be made to multi-channel NC programs.



The PartMaker Multi-Channel Viewer lets users view multi-channel CNC programs side by side

# Student CAM competition

**Kuei Tong Huang, from National Chin-Yi University of Technology in Taiwan, was the winner of Delcam's 2015 international student CAM competition, which was held at the company's Birmingham headquarters earlier this year. Runner up in the competition was Zhao Zhiyang from China, while Lee Hyun Jun from South Korea came third.**

The other finalists came from Germany, Russia, Malaysia and the Ukraine. Each of the contestants had previously won the CAM competition in their region to qualify for the final in Birmingham.

The Delcam CAM competition was again sponsored by cutting-tool supplier, Seco, which provided the tooling for the student's machining projects.

After announcing the winner and presenting certificates to the winning contestants, Mark Forth, Product Manager for Advanced Manufacturing Solutions at Delcam, said "Once again, we were impressed by the standard reached by all the students in the competition. While this was possibly to be expected given that each of the finalists had already won competitions in their home countries, it is still very pleasing to see the high standard achieved by all the participants. It demonstrates the success of Delcam's collaborations with universities around the world, in helping to train the next generation of engineers for our growing international customer base."

"We were very appreciative of Seco for the support given by the company for the competition," added Mr. Forth.

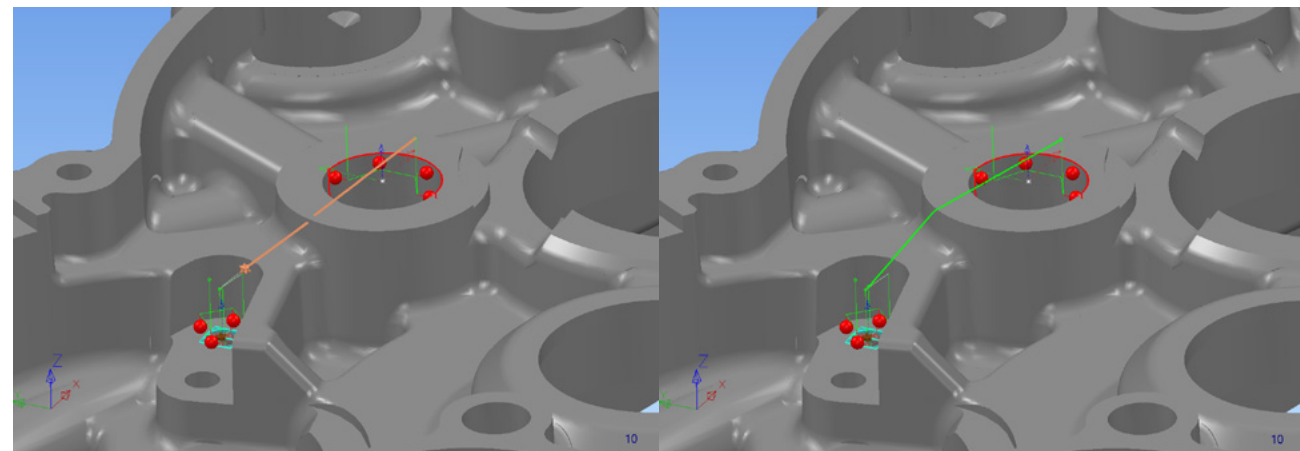


Delcam's Mark Forth with Kuei Tong Huang, winner of Delcam's international CAM competition

**"It demonstrates the success of Delcam's collaborations with universities around the world, in helping to train the next generation of engineers for our growing international customer base."**

# Automatic collision avoidance in PowerINSPECT

The 2015 version of PowerINSPECT, the world's leading hardware-independent metrology software, includes automatic collision avoidance, faster import of large CAD files, quicker preparation of longer inspection reports, and improved display of results from point-cloud data, plus many other customer-requested enhancements.



Previous versions of PowerINSPECT would simply highlight collisions (left) but the 2015 release avoids the collision automatically (right)

**For full details, including video demonstrations of the new options, please go to [www.delcam.tv/pi2015](http://www.delcam.tv/pi2015)**

PowerINSPECT has included collision detection for many years to warn the user when there was a possibility of any collision between the probe and the item being inspected. Until now, the user then had to make the required changes to the probe path to avoid the collision.

With PowerINSPECT 2015, the software adjusts the probe path automatically if a direct move between inspection features could produce a collision. The software will calculate a new motion path that avoids the obstacle, typically by moving up and over the obstruction or around it.

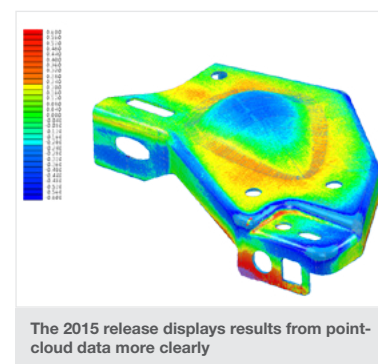
Collision avoidance is carried out when the initial probe path is generated, when the sequence of measurements is re-ordered, and when features are added or removed. As well as preventing collisions, automatic collision checking will save significant programming time, especially when inspecting more complex items.

The user still has the option to override the path produced by the software. This might be required if any accessories not modelled in the CAD data are present, for example, any clamps or fixtures being used to hold the part.

A number of improvements to PowerINSPECT 2015 have made both data import and report generation much faster. The differences will be particularly apparent when reading large CAD models, such as a complete car body, and when producing longer reports with more graphical images.

Another improvement in reporting gives users much greater control over the contents of any report. For example, it is easier to produce a summary of the complete set of results as a management report. Similarly, a more concise report can be produced when greater detail is not needed, for example, when all the results are well within the expected tolerances.

The 2015 release also offers improved display of results from point-cloud data, including a better shaded display of the 'colour map', complete with the coloured scale of the tolerances. As well as making the results simpler



The 2015 release displays results from point-cloud data more clearly

to understand, the new format is more consistent with the reports produced by PowerINSPECT from data from other types of measurements. This makes it easier to compare the results from different devices or measurement methods.

A number of other usability enhancements have been included. The representation of changes to the probe or to the probing parameters is now clearer and easier to

understand. These improvements will be especially useful when creating longer inspection sequences for CNC coordinate-measuring machines and for on-machine verification. They will also make it easier for CMM operators to follow measurement sequences developed by another user, for example, when the inspection routine is created by the company's metrology expert but then carried out by less experienced users.

Another usability enhancement is the addition of scale-model inspection. In this mode, the measurements from a scale model, such as a half-scale car, are displayed as though they were the results from the full-size item. This makes the reports easier to understand at first view and makes it quicker to exchange digital measurements with the CAD system as there is no need to compensate for the scaling in the model.

It has also been made easier to handle more complex CAD data structures, with data split over a series of levels. In particular, it is easier to match the CAD view to an item contained within a history tree.

Finally, a new intersection item has been added to the range of geometry that can be measured with PowerINSPECT; the intersection between a sphere and either a cone or a cylinder. This option will be useful when measuring ducting and pipework.



# Global Footwear Design Competition



The winning design in the footwear design competition

Delcam CRISPIN – in partnership with [www.3DSHOES.com](http://www.3DSHOES.com) – ran its first Global Footwear Design Competition earlier this year. Ekaterina Gapeeva, a shoe designer from Minsk in Belarus, was chosen as the overall winner from the many entries, based on her design's creative flair, commercial potential and impressive use of ShoeMaker software, the package used to create all of the entries.

The winning entries can be seen on the Delcam CRISPIN website at [www.delcam-crispin.com/competitions/](http://www.delcam-crispin.com/competitions/)

Ekaterina joined the Delcam CRISPIN staff at the SIMAC exhibition held in Milan during February, where a 3D printed version of her design was showcased on the Delcam CRISPIN stand.

**"My design was inspired by collections of Giuseppe Zanotti, Valentino, Stella Jean, Gucci and Chanel."**

Ekaterina was delighted to win the competition, saying "I tried to express the natural beauty and loftiness of birds, with a combination of a feather's thin quill and broad vane. It reminds me of a peacock or firebird. I only started to use the Delcam CRISPIN software four months ago and found

the design process in full 3D very exciting. I believe that it will change not only Belarusian but the whole world's shoe industry."

Natacha Alpert, a consultant from MIRAS 3D, was on the judging panel. She said: "This design has very interesting attention to detail in the upper design that makes it unique," while fellow judge and independent footwear design expert, Rob Major added: "Ekaterina's design is superb."

Other judges on the panel included Katrien Herdewyn, from 3DSHOES.com; Bryan Oknyansky, Founder and Designer at Shoes By Bryan; Bill Decker, a Director of the 3D Printing Channel; Lucy Beard, CEO & Founder, of Feetz.Co; Michele Badia, 3D Print Product Designer at My Mini Factory; and Winde Rienstra, Owner of Winde Rienstra.



Ekaterina Gapeeva shows off her winning design

**Delcam**   
Complete CAD/CAM Solutions

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