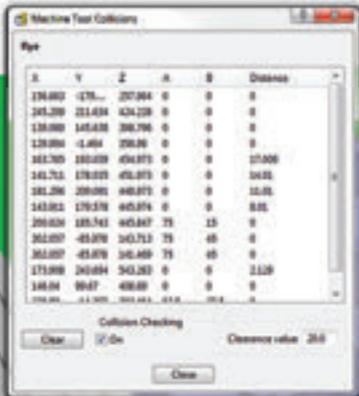


Collision detection in PowerMILL
2015 will also show near misses



“For full details on the new options in PowerMILL 2015, visit the Learning Zone at lz.powermill.com”

PowerMILL made even more efficient

The 2015 version of Delcam's PowerMILL CAM system for high-speed and five-axis machining includes improvements to the Vortex high-efficiency area-clearance strategy, more flexible collision checking to also cover near misses, and more efficient raster finishing.

Vortex 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.

Two enhancements in PowerMILL 2015 will give even greater reductions in machining time with Vortex compared to conventional roughing. The first change allows toolpaths to approach the part from outside the stock at the cutting height for open pockets or in areas where earlier cuts have made this possible. Previously, all entry moves had to be made by plunging onto the surface or by ramping into the material.

The second change allows an increased feed rate to be set for non-cutting moves. The default

“Two enhancements in PowerMILL 2015 will give even greater reductions in machining time with Vortex compared to conventional roughing.”

value is set at double the rate for the cutting moves but this can be altered as required for each machine tool. The extra time that can be saved depends on the shape of the part but an additional saving of around 20% should be expected above the earlier releases of Vortex.

Another problem in previous versions of PowerMILL was that unnecessary lifts could be added to area-clearance toolpaths when the cutter moved outside the stock or close to its

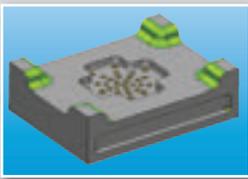
edge. Changes to the roughing algorithm have now reduced the number of lifts per toolpath slice to the minimum needed and so made area clearance much more efficient.

Companies using PowerMILL for either positional or continuous five-axis machining will benefit from improvements to the collision checking within the software. Firstly, collision checking has been changed so that warnings can also be flagged for near misses. The user can now specify a clearance value and, when the machine tool comes within this value, it will turn yellow in colour to highlight a near miss. Collisions will still be shown by a change of colour to red.

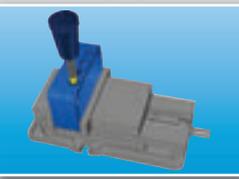
Secondly, the display showing the list of collisions, and now near misses as well, has been updated to be easier to read, making it simpler to extrapolate the coordinates at these points. For near misses, the clearance distance is shown in the display, with the distance shown as zero for collisions.

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INSIDE...



P3
PowerSHAPE 2015 launched
Improvements to direct modelling, surface modelling and reverse engineering

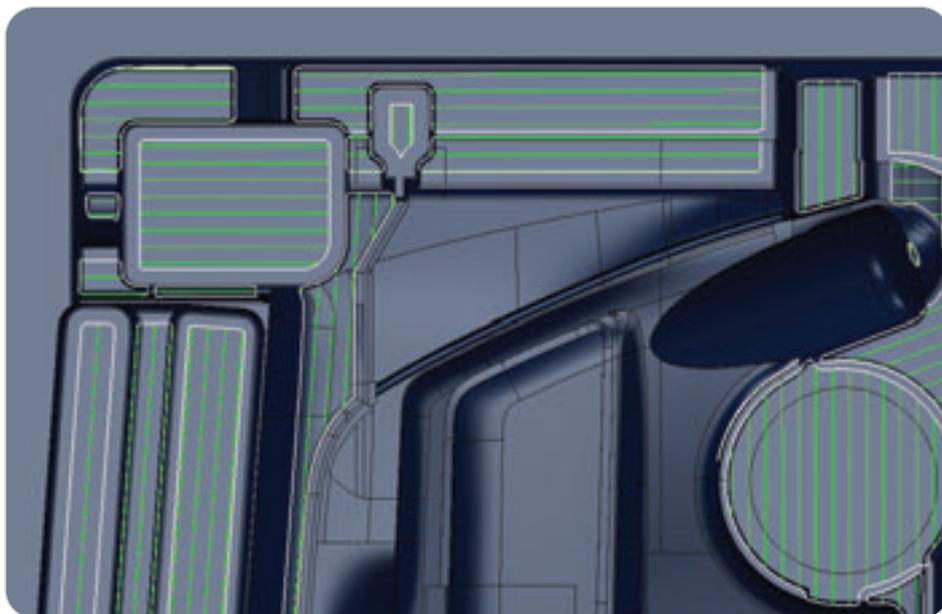


P6/7
FeatureCAM made even easier
New options for drilling, milling, turning, turn-mill and wire EDM



P8/9
Cut machining times with Vortex
Three case studies show savings possible with Vortex area clearance

PowerMILL made even more efficient continued



The most appropriate raster machining angle for each region is now selected automatically

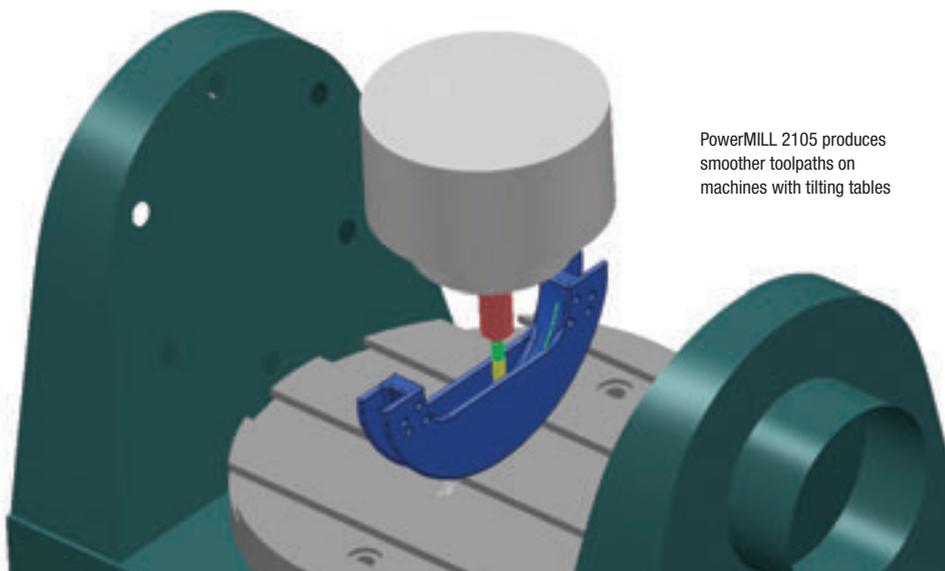
Another improvement will help companies using four- or five-axis machines with trunnions or similar tilting tables. Previous PowerMILL toolpaths could exhibit unwanted changes of azimuth as the cutting tool approached a position vertical to the part. This would slow down the machine, often to the extent that a witness mark would be left on the surface. New options are now available to specify the information used by PowerMILL to distribute the toolpath points so that the machine's gimbal-lock position is avoided and a smoother motion results.

Raster finishing has also been improved in PowerMILL 2015, with the software now able to set automatically the most appropriate angle for each region of the part. In previous versions, the user had to select each area and specify the angle manually. The new option, which provides the same functionality that already existed for steep-and-shallow finishing and face milling, is most beneficial when finishing a series of pockets aligned in different directions.

A clearer form for strategy selection makes navigation easier when choosing which strategy to use. It is also easier to create folders of strategies and to add and remove strategies.

A number of improvements have been made to the PowerMILL interface. Most important is a clearer form for the strategy selector that makes navigation easier when choosing which strategy to use. It has also been made easier to create folders of strategies, for example, those most suitable for a particular machine tool, material or type of part, and to add and remove strategies from those folders.

Finally, three new curve-creation options have been added to the curve editor – ellipse, spiral and helix. These options can be used to create patterns or boundaries when generating toolpaths.



PowerMILL 2015 produces smoother toolpaths on machines with tilting tables

Steven Arnold (centre left) and Martin Phelps (centre right) of Impcross with Alan Gardner (left) and Steve Creron on the Delcam stand at MACH



Impcross standardises on Delcam

UK precision engineering specialist, Impcross, has standardised on Delcam software for its future design and programming needs. The order for multiple seats of PowerSHAPE, PowerMILL and FeatureCAM was confirmed during the recent MACH exhibition.

Impcross, which is based in Stroud in Gloucestershire, has grown into a world-class centre of precision engineering over more than twenty years. It makes high-precision components in an array of materials for the aerospace, automotive, autosport, military and petro-chemical industries. The company has built up a wide range of equipment, including eleven three- and five-axis Matsuura mills, two DMG DMU five-axis machining centres, and turning and turn-mill equipment from Hitachi-Seiki, Mori-Seiki, MHP and Romi, plus high-precision grinding and jig-boring machines.

"At Impcross, we focus on providing our customers with a winning blend of accuracy and excellence," claimed Operations Manager, Steven Arnold. "We offer quality, speed and competitive pricing to all our customers, whether they are ordering a one-off prototype or a large run of components."

"Despite our status as one of the UK's leading centres for precision engineering, we know that we cannot afford to be complacent and so put a big emphasis on our continuous improvement philosophy," added Mr. Arnold. "With our new Delcam software, our production engineering and programming departments are fully equipped to produce even the most complex parts on our five-axis and turn-mill equipment."

"In all the sectors we supply, the pressure for cost reduction is ever present but we also need to maintain our exacting standards and quick lead times without compromise. We believe that Delcam offers the best CAD/CAM software on the market and look forward to continuing the growth of our business with Delcam by our side."

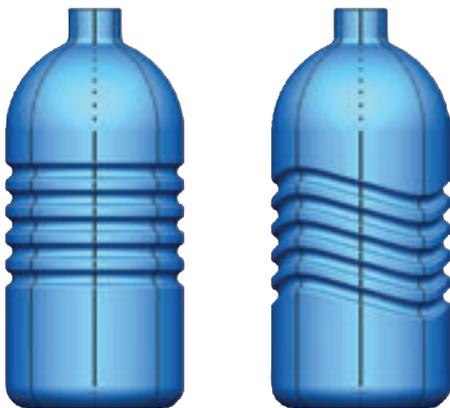
Modelling and reverse engineering enhanced

The 2015 version of PowerSHAPE Pro includes improvements in direct modelling, surface modelling and reverse engineering, plus support for data from Creaform HandySCAN handheld scanners. Full details are on www.powershape.com

The improvements in direct modelling build on the introduction of the Smart Feature Manager and the Smart Feature Selector in recent releases. The Smart Feature Manager allows users to identify all the features, such as fillets, slots, bosses etc, within a solid in a single operation and so makes the analysis of the imported data easier and faster. The Smart Feature Selector then allows multiple similar features to be found and selected using either a specific value or a range of values.

Once the particular group has been selected, all the features within it can be edited simultaneously. For example, all holes having a diameter of 5mm can have their diameter increased to 10mm in one operation.

This new functionality will speed the preparation of models for manufacturing significantly. For example, one common problem in product designs that are to be moulded or cast is that fillet sizes are set so small that they restrict the flow of material. The Smart Feature Selector can be used to identify any fillets below the required radius and then all the fillets found can be increased to the desired minimum size simultaneously.



Points selected from multiple curves can be selected and moved with real-time updates

Another potential application is in tidying up models created by reverse engineering, where features that are intended to be identical, such as a series of holes, will often show small variations. In such cases, all the items within a specified tolerance band can be selected and then all adjusted together to the same precise size.

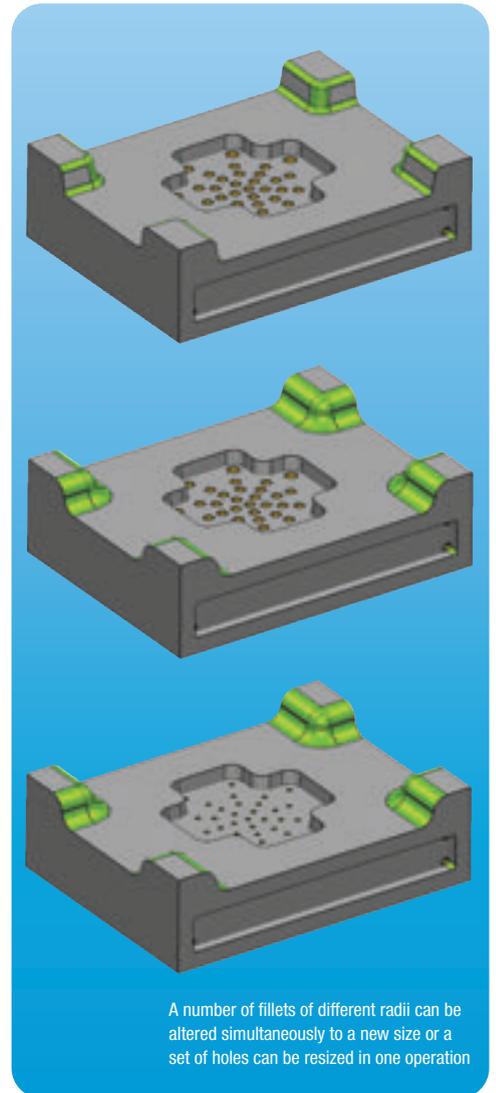
One of PowerSHAPE Pro's great strengths has always been its surface modelling capabilities, giving the user the ability to create any shape they can imagine. These capabilities have been further improved with new dynamic point editing. Multiple points, either along a single curve or picked from multiple curves, can now be selected and moved, with real-time updating of the model. This makes styling of free-form shapes easier and quicker, and also speeds up modelling-for-manufacture tasks like removing undercuts from tooling designs.

“Once the particular group has been selected, all the features within it can be edited simultaneously. For example, all holes having a diameter of 5mm can have their diameter increased to 10mm in one operation.”

Another strong area for PowerSHAPE Pro that has also been made faster and easier is the ability to morph a complete model into a new shape. One key application for this option is in compensating for springback in press tools or warpage in moulded products. The user can alter CAD directly based on scan data from a sample part collected as a point cloud or as a triangle mesh, with a choice between either updating the CAD model of the part to match the as-produced item or adjusting the tooling design so that it can produce parts matching the original CAD data.

Another important application of morphing is in updating parts that need to be repaired but that have changed their shape during use. A typical example is turbine blades that have been distorted by heat so that their shape no longer matches the CAD data used for their manufacture. Again, the original CAD data can be adjusted to match scan data captured from the actual part.

The main enhancement to PowerSHAPE Pro's reverse engineering functionality is a more automated method for capturing cross-sections through a mesh. The software now fits lines and fillets to the cross-section where it can, with the user able to control the tolerance used. This method uses the mesh as a guide instead of



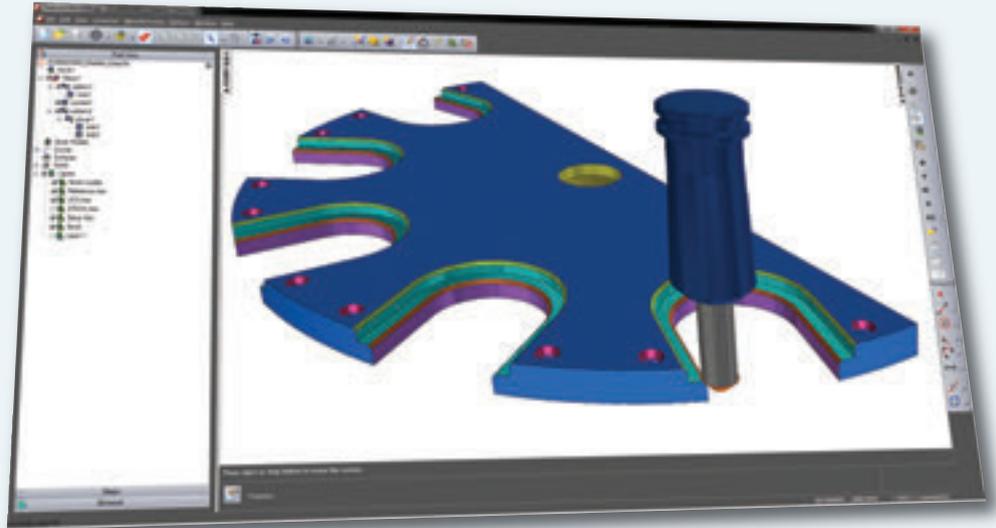
A number of fillets of different radii can be altered simultaneously to a new size or a set of holes can be resized in one operation

treating it as exact geometry, with the priority of capturing the design intent rather than ensuring a precise fit to the scan data.

“Multiple points, either along a single curve or picked from multiple curves, can now be selected and moved, with real-time updating of the model. This makes styling of free-form shapes easier and quicker, and also speeds up modelling-for-manufacture tasks like removing undercuts from tooling designs.”

FeatureCAM certified for Autodesk Inventor 2015

Delcam's FeatureCAM range of feature-based CAM software products has been certified by the Autodesk Inventor Certified Application Program for Autodesk Inventor 2015 mechanical design and engineering software. Since Autodesk's acquisition of Delcam in February, the two companies have been working together to more closely integrate their technology, and this certification is the first step in this process.



The latest release of Delcam's FeatureCAM CAM system has been certified for use with Autodesk Inventor 2015

This program certifies that FeatureCAM

software applications have been tested by Autodesk engineers to ensure that they meet the highest standards set for strength, quality and interoperability with the latest version of Inventor, the industry's leading Digital Prototyping software that enables engineers to design, visualise and simulate products before they are built.

"Increased interoperability offers huge benefits to our customers who use Autodesk Inventor

as they can open Inventor parts seamlessly in FeatureCAM, with no loss of data or concerns about translation errors," said Tom McCollough, Vice President of Development for FeatureCAM. "The certification program gives our customers the added confidence of knowing that FeatureCAM has been rigorously tested by Autodesk and found to perform to the highest standards."

"Delcam has prioritised interoperability with Inventor and worked with the certification program for many years," added Carl White, senior director, manufacturing engineering at Autodesk. "Our ongoing work with Delcam to more closely integrate our portfolios moving forward will be highly beneficial to our manufacturing customers looking to machine Inventor models with Delcam's range of programming software."

MWP Best CAD/CAM Award

Delcam's Vortex high-efficiency area-clearance strategy was the winner in the Best CAD/CAM or Control System category at the MWP Advanced Manufacturing Awards presented at the Awards Dinner at the Hilton Birmingham Metropole on Tuesday 8th April.

In selecting Vortex for the Award, the

judges commented, "The winner has developed a method of controlling the tool's angle of engagement, which optimises the tool speed, extends tool life and produces a faster overall cycle time."

Winning the Award was the highlight of an extremely successful week at the MACH exhibition for Delcam. As well as taking many orders at the exhibition, Delcam engineers carried out demonstrations to more than 250 companies that were looking to invest in more powerful CAD/CAM software.

A video from the exhibition has been added to Delcam.TV, showing Delcam software driving equipment from machine-tool manufacturers CMS Industries, Roeders, and XYZ Machine Tools, together with interviews with company representatives on their partnerships with Delcam. [To view the video, please go to www.delcam.tv/MACH2014](http://www.delcam.tv/MACH2014)



Steve Finn, Managing Director of DMG Mori UK (left), presents the Award to Steve Creron, General Manager of Delcam UK (centre left), and Delcam Marketing Manager, Peter Dickin (centre right), watched by compère Marcus Brigstocke

ArtCAM is being used by the workshops at St. Petersburg's Mariinsky Theatre to produce spectacular scenery for operas and other productions.

The world-famous Mariinsky Theatre was built in 1860.

Since then, it has become an integral part of Russian culture that has given debuts to many of the great opera singers, as well as being one of the main architectural attractions in St. Petersburg.

"All of our scenery has always been complex and uniquely detailed so the cost of its production was quite high," remembered Head of Department at the Theatre, Inessa V. Almazova. "The Theatre's management set us the task of developing modern and efficient manufacturing techniques that would greatly reduce the financial cost of the scenery."



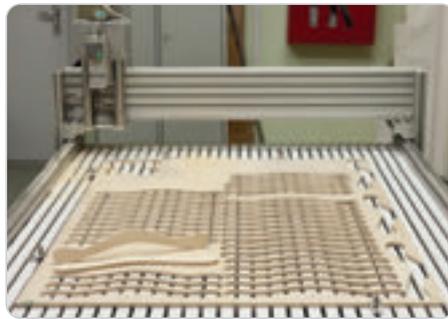
The opera Boris Godunov was one of many productions at the Mariinsky Theatre to feature scenery made with ArtCAM

ArtCAM in the Mariinsky Theatre

"A few years ago, the supplier of our large-format printers showed us equipment to cut sheet-metal parts on a milling machine. We acquired a three-axis milling machine, designed for cutting soft sheet material: wood, plywood, plastic, foams, etc."

"The same supplier advised us to use ArtCAM for the programming. We were soon able to develop programs for the milling machine and, later, for laser cutting. In August 2013, we purchased a new three-axis milling machine with an indexable 4th axis to expand our manufacturing capabilities. Again, we used ArtCAM for the programming."

Despite the fact that the Theatre has mastered digital technology, the role of the designers has remained central to the process of creating each new set of scenery. Before staging a new opera, artists and modellers use AutoCAD to create from paper sketches detailed models at a 1:20 scale of each scene in the production and all of its scenery.



The CNC router and ArtCAM have reduced the cost of scenery significantly

Production of these models is a very complex and time-consuming task as they must contain all the fine details that will appear in the final full-scale designs. In addition, the designer must take into account not only the aesthetic aspects but also the technical requirements to allow a change of scenery during the production, and to provide a sequence of assembly and disassembly for transport and storage.

The results of the work of designers and technologists are two-dimensional vector drawings, with an accompanying description of each part. The data is then transmitted digitally to ArtCAM so the programmer can develop an efficient layout of the various elements in the block of material and create the programs for the CNC router.

Once the director of the production has approved the scenery designs, they are produced at full scale. This is one of the main advantages of the digital approach since the 1:20 CAD model can be resized quickly to the size to be used in the Theatre. Similarly, ArtCAM makes it easy to duplicate parts of the design or to create their mirror copies.

These techniques mean the new scenery can be produced much more quickly. Even more importantly, the CNC router and ArtCAM have reduced significantly the financial costs of creating scenery and so allowed the Mariinsky Theatre to recoup the cost of purchasing the equipment many times over.

Additive manufacturing project

Delcam is part of a consortium of UK companies being led by GKN Aerospace in a 3½ year, £13.4 million research and development programme called Horizon (AM) that builds on GKN Aerospace's extensive and fast-developing capability in additive manufacturing.

The Horizon (AM) team includes GKN

Aerospace, Renishaw, Delcam, and the Universities of Sheffield and Warwick. The programme is backed by the UK's Aerospace Technology Institute (ATI) and funded jointly by industry and the UK Government's Technology Strategy Board (TSB).

The project is part of a major investment of £154 million in research projects to keep the UK as a world leader in aerospace innovation that was announced by the Deputy Prime Minister, Nick Clegg, during his visit to the 2014 Farnborough International Air Show.

Horizon (AM) will take a number of promising additive manufacturing (AM) techniques from research and development through to viable production processes, able to create



Horizon was one of a number of projects announced by the UK Deputy Prime Minister, Nick Clegg, during his visit to the 2014 Farnborough International Air Show

components that could be as much as 50 per cent lighter than their conventional counterparts, with complex geometries that cannot be manufactured cost-effectively today. These new processes will unlock innovations in low-drag, high-performance wing designs and in lighter, even more efficient engine systems – and lead to dramatic reductions in aircraft fuel consumption and emissions.

The programme will focus initially on using AM techniques to create near-net shape parts which require minimal subsequent machining. This will dramatically improve the 'buy-to-fly' ratio of the parts by reducing the considerable cost in time and material wastage associated with the conventional machining of metal forgings or billets. With material wastage as high as 90 per cent for some parts, a significant reduction here will also provide major environmental benefits.

Within the project, Delcam will work with GKN Aerospace on an integrated solution to combine additive and subtractive technologies seamlessly. This approach will allow companies to benefit from both the geometrical freedom offered by AM and the surface finish and accuracy that is possible with subtractive manufacturing.

More powerful and easier to use

Two new versions of FeatureCAM have been released in recent months. Both the 2014 R3 and the 2015 releases focus on making the software even more powerful and even easier to use, so allowing customers to produce programs for all types of machine tool more quickly and, therefore, to deliver high-quality parts in shorter lead times.

General enhancements

One new command that will boost FeatureCAM's productivity allows entire parts or projects to be mirrored more easily than before. The option supports parts to be milled with multiple set-ups, including 2.5D, 3D and 3+2-axis configurations. Both 'Move' and 'Copy' options are available to reflect all the features within the part or project relative to a choice of a particular plane, line or axis in which to mirror.



Entire parts or projects can be mirrored more easily than before

Continuous enhancements have been made to the FeatureCAM user interface to improve ease of use. One simple improvement in the new release makes tool windows respond to the machine choice. Tools now appear in the window in an orientation that matches how the tool will be used on the machine, eliminating any mental disconnect when selecting the desired tools for particular operations.

Another change allows the picking of the bottom radius of solid faces through curvature analysis. This greatly improves interactive feature recognition by removing the need to take measurements of the part to identify the bottom radius.

Continuous enhancements have been made to the FeatureCAM user interface to improve ease of use.

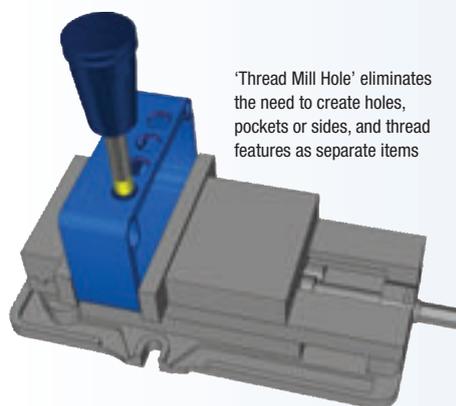
The latest FeatureCAM also allows easier programming of families of parts. Working with the part library, the software matches the names of features within the part library with user-created curves relating to those features. This makes the programming of subsequent parts in the family much easier and faster.

Programming of complex parts has been made easier and more reliable with the addition of automatic collision checking of the tool shank and holder for both three-axis roughing and finishing toolpaths.

The availability of a wide range of post-processors has always been a key benefit of FeatureCAM, together with the ability for users to customise their posts. In the latest releases, post variables can be assigned user-defined names. This allows users to see quickly exactly which post variables are configured for use with a particular post-processor and to understand their intended use. This change will be particularly valuable when programmers need to understand customisations in posts that have been made by other users.

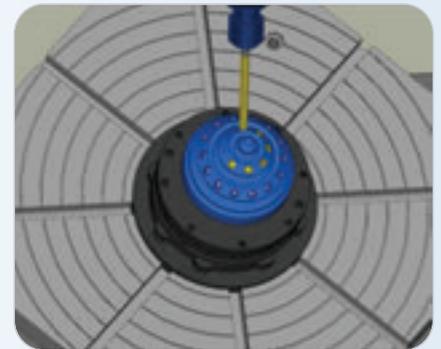
Drilling

FeatureCAM now includes a new hole type, 'Thread Mill Hole', which eliminates the need to create holes, pockets or sides, and thread features as separate items. It can be used either with holes created with the 'Hole' feature or those that have been identified with 'Feature Recognition'. A range of preset threads for standard depths of drilling and thread depths can be applied or users can customise their own thread combinations.



'Thread Mill Hole' eliminates the need to create holes, pockets or sides, and thread features as separate items

Five-axis programming of multiple holes has also been made easier in FeatureCAM 2015. It is now possible to create patterns of holes of a similar size with regular positioning. Any subsequent

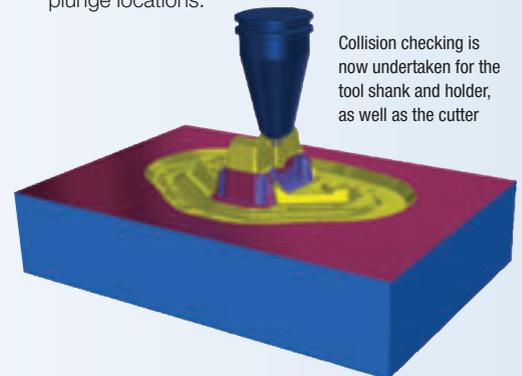


Five-axis drilling of patterns of holes has been made quicker and easier

changes to the program can then be made for all the holes in the pattern in one operation, rather than having to edit the toolpaths separately for each individual hole.

Three-axis milling

More control is available when creating z-level roughing toolpaths, with a new option to establish pre-drill locations for the toolpath. This can be done through the use of single-point positions or curve-point positions to define the plunge locations.



Collision checking is now undertaken for the tool shank and holder, as well as the cutter

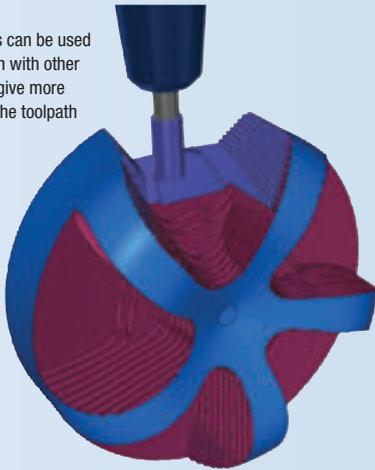
Programming of complex parts has been made easier and more reliable with the addition of automatic collision checking of the tool shank and holder, as well as the cutter, for both three-axis roughing and finishing toolpaths. If a gouge is detected, the toolpath can then be recalculated with any segments that will cause a gouge clipped away.

Removing these segments of the toolpath will leave an area of unmachined stock that will need to be removed with a longer tool. This extra toolpath can be calculated using a stock model of material remaining after the shorter tool has been used to ensure there is no re-machining of stock that has already been removed.

As part of this development, an additional function, called 'maximum machine stock', has been added that removes direct moves where clipping has occurred. These direct moves can leave witness marks on the part so their removal improves surface finish.

Another improvement in three-axis machining allows stock models to be used in conjunction with other geometry, such as the part surface dimensions, solid models, the stock dimensions and boundary curves. This addition gives better control over the area to be machined by each toolpath and so gives more efficient machining by allowing the user to confine toolpaths to specific regions and to minimise air-cutting by referencing the stock model.

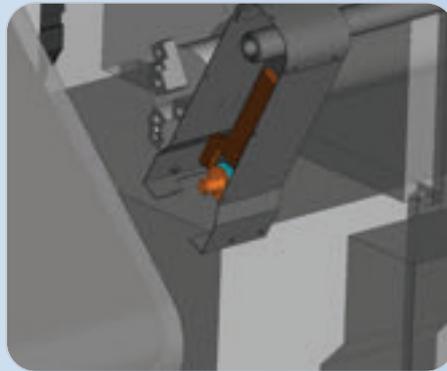
Stock models can be used in conjunction with other geometry to give more control over the toolpath



Turning and turn-mill

A series of improvements have been introduced to make turning with FeatureCAM more efficient. The software now produces toolpaths that rapid up and over previously machined diameters, rather than feeding along them. This reduces the overall cycle time and avoids dragging of the tool.

'Pinch and follow' turning can now be chosen when machining components using the 'face' or 'back-face' cycles. Using this method gives better results since having the tools cut in opposing directions to each other means that the cutting forces are better balanced.



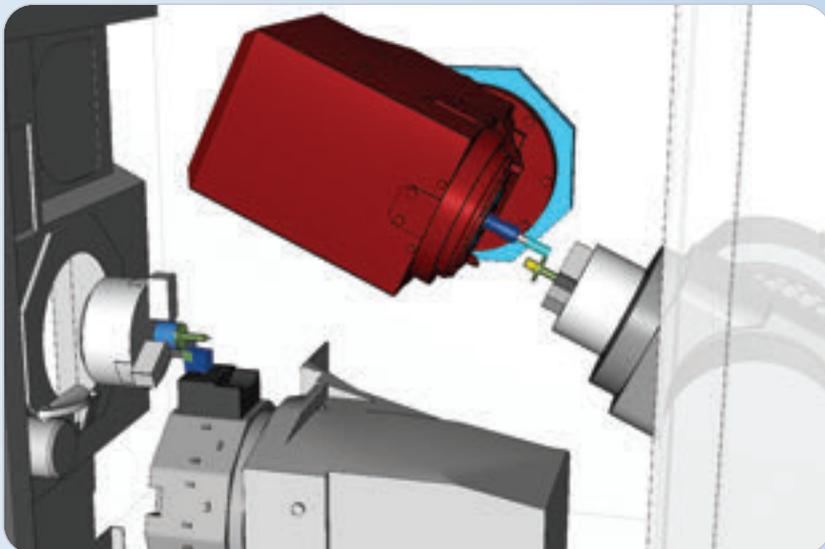
FeatureCAM now has the ability to manage multiple part-catchers on turn-mill equipment

Two additions have been made that allow FeatureCAM to provide programs for a wider range of turning and turn-mill machine tools. Firstly, support has been added for the use of travelling steady rests to give increased flexibility when turning very long parts. Secondly, FeatureCAM now has the ability to manage multiple part-catchers on turn-mill equipment. Machines with multiple part-catchers include the Nakamura WT-150, NTJX and NTMX, all of which have part-catchers for the main spindle and a separate part-gripper for the sub-spindle.

FeatureCAM also provides full-machine simulation and post-processing for the rotating sub-spindle on the Mori Seiki NTX1000 turn-mill equipment. The user has full control over the angle of the sub-spindle, with the software inserting automatically an operation on each channel so that the lower turret is positioned correctly prior to the movement of the sub-spindle.

Wire EDM

For users of wire EDM, FeatureCAM now provides an expanded wire-cut database to support multiple machines with varying formats and methods of operation, with the ability to specify nozzle type and fluid type as well as material type and thickness, wire type and diameter, and EDM machine. This gives more flexibility by providing the option to store and apply a greater variety of different parameters.



FeatureCAM provides full-machine simulation and post-processing for the rotating sub-spindle on the Mori Seiki NTX1000 turn-mill equipment

Clay-milling video



A video has been added to Delcam.TV demonstrating Delcam's software for clay milling with CMMs

A video has been added to the Delcam.tv online video channel demonstrating software for clay milling of styling models with coordinate measuring machines.

The video, which is located at

www.delcam.tv/claydesignprocess, covers the complete clay design and manufacturing process using Autodesk's Alias software for styling, followed by machining and inspection on a Stiefelmayer CMM programmed with Delcam software.

The combination of a CMM and machining software is intended primarily for use in automotive styling but could also have applications in other sectors that use clay models for design reviews, such as the marine industry. When operated with PowerINSPECT and the clay-milling software, CMMs can be used as multi-purpose tools for measurement, digitising, marking out and milling.

Depending on the size of the CMM, designers can machine a complete car body or sections of the design. If required, the design can be re-machined following design reviews using digitised curves or scan data.

The software has been developed specifically for the production of styling models and comprises a number of templates for the machining techniques that are needed in these applications, such as raster machining, Z-level area clearance and rest finishing. The full range of PowerMILL strategies is available in the background so additional templates can be created if required, either by an expert user in the company or by Delcam's support team.

The clay-milling software can be used together with PowerINSPECT's marking-out option for refining or completing clay models. This utility enables curves created within PowerINSPECT to be used to guide a marking-out tool on a measuring device or layout machine. Time-saving features make it easy for users to display the details of digitised curves, to switch between curves, and to select, edit and mark out points within the curves.

Bloodhound part production at AMRC

PowerMILL is being used by the AMRC (University of Sheffield Advanced Manufacturing Research Centre with Boeing) to produce a series of components for the Bloodhound SuperSonic Car project. To see the full story, go to www.delcam.tv/bloodhound-amrc

The AMRC used the Vortex high-efficiency area-clearance strategy to machine components for the Bloodhound SSC

Bloodhound SSC aims to set a new world land speed record of 1,000mph in South Africa in 2016. Delcam is both an SME Sponsor, supporting the project with its manufacturing software and expertise, and a Product Sponsor, producing components for the record-breaking vehicle in its Advanced Manufacturing Facility. The AMRC is one of several Delcam customers and technical partners that are using the company's CAD/CAM software to manufacture parts for the ultimate jet- and rocket-powered racing car.

One particularly challenging part machined at the AMRC was for the front suspension sub-assembly of the Bloodhound SSC. On first looking at the model, it appeared that the part would be extremely difficult and complex to machine because it included deep pockets with small internal corners. However, these problems were overcome easily by using the Vortex high-efficiency area-clearance strategy in PowerMILL to rough out the pockets. As a result, the AMRC was able to produce the finished part within the tight time constraints demanded by the project.

The work for the Bloodhound SSC continued a long relationship between Delcam and the AMRC. "We've dealt with Delcam for seven or eight years now," commented Matt Farnsworth, the Aero Structures Platform Group Leader. "Delcam offers us a lot of functionality in terms of the programming capability within the software. In addition, we like its ability to give us rapid programming, so reducing the time it takes to

give us the cutter paths we require. Delcam allows us to be on the machine cutting a lot quicker than the alternative software solutions because we're able to reduce our programming times."

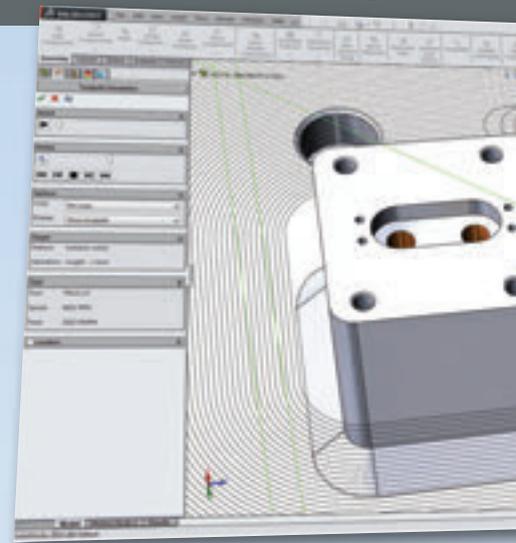
"We also use On-Machine Verification with PowerINSPECT so, when we are getting near to finishing a part, we can probe the surfaces and machine adaptively, if required, to ensure that we get good geometrical tolerance."

"We're focused constantly on reducing costs, mainly through looking at cycle time reductions," continued Mr. Farnsworth. "We need to understand the limitations of any process in order to challenge traditional production methods and then apply new technical developments in machining strategies, as well as in tooling and machine tools."

The machining for the Bloodhound SSC is a change from the usual work at the AMRC, where 95% of the projects are involved with the aerospace industry.

"AMRC has always been a strong advocate of the Bloodhound project, not only because it is an exciting engineering challenge to go at 1,000 miles an hour but also because it is an opportunity to bring young engineers through by getting children interested in engineering," said Mr. Farnsworth. "We've recently opened our training centre with 250 apprentices coming through that each year. The Bloodhound project has a lovely synergy with that initiative."

Machining time



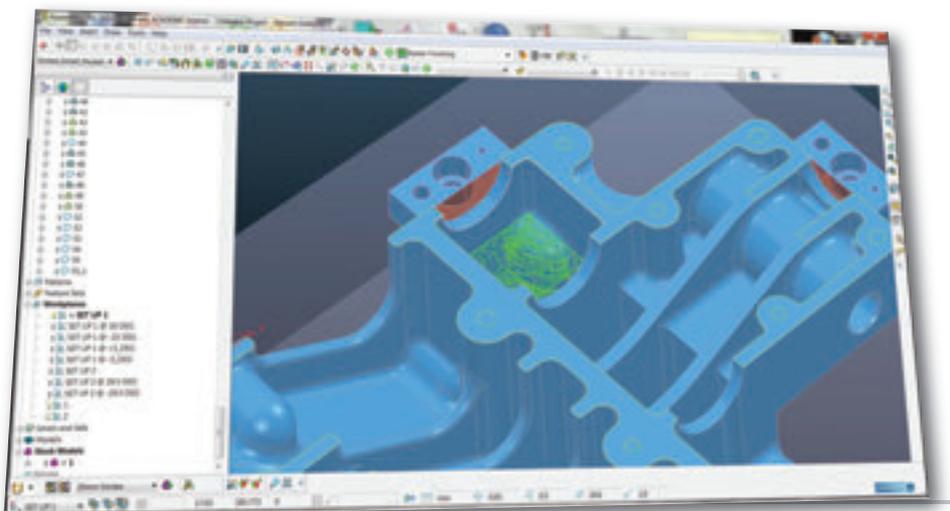
Delcam's Vortex high-efficiency area-clearance strategy produced a saving of 90% in the time needed to machine the core plate for an injection mould at Dutch company, Promolding BV.

Promolding (www.promolding.nl) is an innovative company that transforms high-performance polymer technology into industrial applications. It offers its customers a complete service from product design, via material and process development, to manufacturing, including automation. The company is very active in the use of new and high-tech materials, such as biodegradable materials and technical plastics with extra properties including electrical conductivity and heat conductivity, as well as new technologies for mould production.

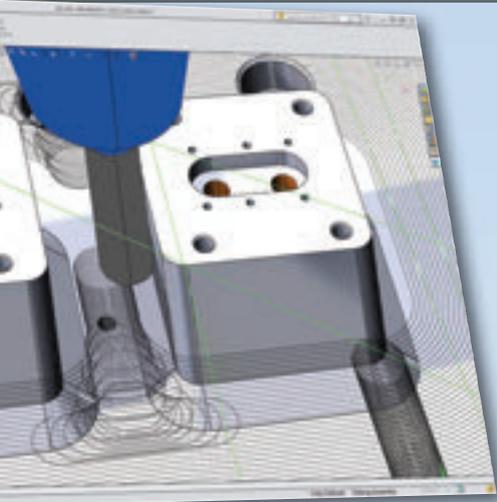
The plate was roughed in 45 minutes, whereas conventional area clearance would have taken close to nine hours, a saving in the machining time of 90%.

Promolding is a partner in the EU-funded project FaBiMed (Fabrication and Functionalization of BioMedical Microdevices) to improve and develop new manufacturing techniques, based on micro-moulding, specifically for biomedical micro-devices. The project aims to reduce the cost of mass production of diagnosis and therapeutic micro-devices which have common problems of small batch sizes, frequent demands for customisation, and micron-scale geometric features.

The FaBiMed project has received funding from the European Union's Seventh Framework Programme for research, technological development and demonstration under grant agreement No 608901. For more information about the FaBiMed project, please visit <http://www.fabimed.eu>.



Time cut by 90%



Promolding is a work-package leader, responsible for mould design and manufacturing as well as for the injection moulding of the micro-devices. One of its tasks within the project is to manufacture several experimental test moulds. Promolding manufactures its moulds in-house using a five-axis DMG DMU 60 monoBLOCK machine and has used Delcam for SolidWorks to program the machine for several years.

CNC machinist at Promolding, Arjan Markus, felt that the core plate of one injection mould would be a perfect test for the new roughing strategy. The mould plate was to be machined from tool steel and featured two cores, each 48mm high.

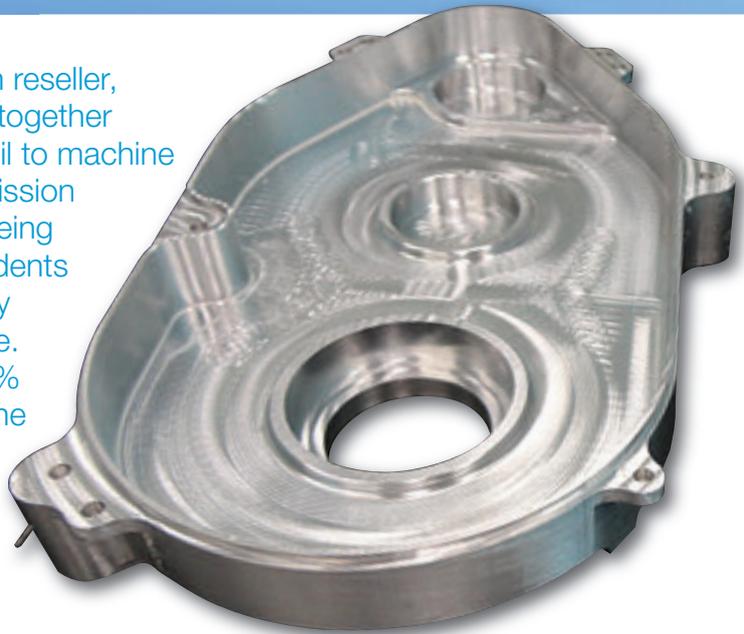
Mr. Markus was able to program the part without difficulty using the knowledge of Vortex he had gained at a recent Dutch Delcam user meeting hosted at Seco/Jabro. The 48mm height was machined in two layers, although Mr. Markus felt confident that it could have been machined in one go if the cutting length of the tool had been long enough.

The plate was roughed in 45 minutes, whereas conventional area clearance would have taken close to nine hours, a saving in the machining time of 90%. The same afternoon, Mr. Markus reported his experience back to Delcam: "Today, I machined about 2,750 sq cm of tool steel in 45 min using Vortex in DFS. In one word: unbelievable! I am definitely going to use this method again! The cutting sounded beautiful, the swarf was perfectly consistent and the tool looked unused." Subsequently, he machined the core and several other components of the mould using the same technique.



Using Vortex in Delcam for SolidWorks cut the machining time for this mould base by 90%

Delcam's Brazilian reseller, Seacam, worked together with Sandvik Brasil to machine aluminium transmission covers for a car being developed by students from the University of São Paulo State. A reduction of 73% was achieved in the machining time by using Vortex.



Reduced machining time

The students regularly participate in competitions organised by SAE (Society of Automotive Engineers) between Institutions of Higher Education. The target of each team is to design and build a prototype, off-road, single-seat car, for marketing to enthusiastic amateurs rather than professional drivers. The competitions let engineering students participate in real examples of project development, with all the activities involved, to provide a practical application of the theoretical knowledge they have acquired in the classroom.

With Vortex, it is possible to use a much deeper cut and so remove a larger quantity of material with each pass. There is also a significant reduction in the wear seen on the tool.

Since being founded in 2001, the USP team has improved its results year by year, winning more than thirty awards in various categories including the national championship in 2009 and 2012, and 9th overall in the finals in South Carolina, USA, in 2010.

Left- and right-hand versions of the transmission cover were produced on machines at Sandvik Brasil. Using the Vortex strategy enabled both parts to be machined in three and a half hours. Similar parts had already been machined in December 2012, also using PowerMILL, the same cutters and the same machines, when the machining took thirteen hours. This meant that Vortex achieved a reduction of 73% in machining time.

"With conventional roughing, it is necessary to limit the depth of cut and step-over of the tool to approximately 70% of its diameter," explained

Alexandre Magdalon from Seacam. "With Vortex, it is possible to use a much deeper cut and so remove a larger quantity of material with each pass. There is also a significant reduction in the wear seen on the tool."

"We were very grateful to Sandvik for the help given to us during the tests," he continued. "A technical partner like Sandvik was essential to complete this project so successfully because the staff are specialists in cutting tools, with vast experience in all kinds of machining, as well as having a productivity centre with high-quality machining centres."

According Mr. Luis Angelo Veloso, a CAM Applications Specialist at SEACAM, "The use of Vortex strategy is very simple and intuitive; the only challenge is to set the optimum cutting parameters for safe machining. For this, I relied on the long experience of the technicians of Sandvik. Together, we were able to achieve this incredible result."



A 73% reduction in machining time for transmission cover was achieved by using Vortex

MTA Challenge victory

ArtCAM was used by Charlie Smith of Sedbergh School to create his innovative 'SOLA' water-heating stove for outdoor expeditions, the winning entry in the Manufacturing Technology Association's annual Technology, Design and Innovation (TDI) Challenge in the competition for the 17-19 age group.

Charlie's victory is the latest result of Delcam's close partnership with the Sedbergh School, an independent co-educational school based in Cumbria. Delcam sponsored the installation of a state-of-the-art Roland MDX540 at the school, with the company's David Stokes helping students with a variety of projects, including Charlie's successful entry.

Open to all Technology and Design students, the nationwide MTA TDI competition is split into two age groups: 14-16 years old and 17-19 years old. The 12 finalists, who all impressed the judges with their engineering talent, were chosen by the MTA's Education and Training committee. The final judging and the award ceremony took place on 9th July at the Yamazaki Mazak European Headquarters in Worcester.



Charlie Smith with his 'SOLA' water-heating stove that won the MTA Technology, Design and Innovation Challenge for 17-19 year-olds



Graham Brown of Seco (centre) with the latest group of Delcam staff to be trained on the Seco Technical Education Programme

Development staff trained at Seco

Delcam is putting members of its development team through the Seco Technical Education Programme (STEP) to update their understanding of the latest developments in cutting-tool technology. The knowledge gained should ensure that the CAM software they produce reflects these developments and so gives the maximum benefit to Delcam's customers.

"The potential problem in all CAM software development is that the toolpaths produced by the system may be mathematically correct but may not consider other practical limitations," explained Charles Jones, the Delcam Application Engineer who is coordinating the training with Seco. "We need to ensure that our developers have an understanding of real-world machining, as well as their programming skills, so that they can produce software that performs on the machine tool just as well as it does on the computer."

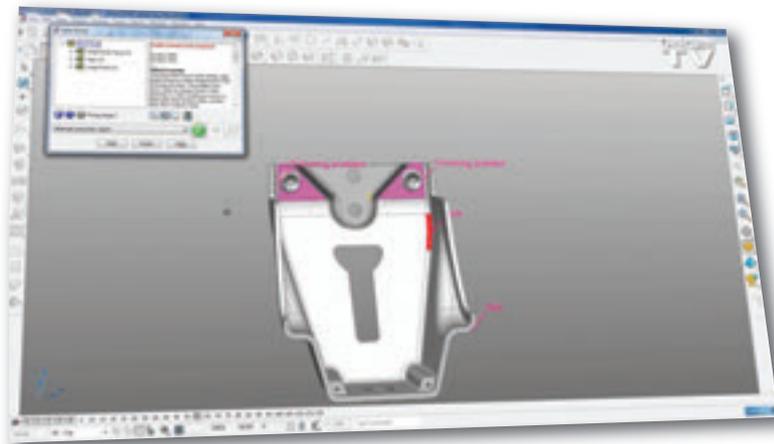
"Delcam may have the largest development team in the CAM industry but we also need to ensure that the programs they produce will allow our customers to take full advantage of the much faster machining that is possible with the latest cutting-tool technology," added Mr. Jones. "Having our on-site machining facility plays an important part in giving our developers a real appreciation of the challenges faced by our customers; the training provided by Seco will add significantly to their knowledge of the concepts that underpin the process of creating machined components."

STEP is offered as a series of modules to familiarise Seco's customers with the latest

"We need to ensure that our developers have an understanding of real-world machining, as well as their programming skills, so that they can produce software that performs on the machine tool just as well as it does on the computer."

tooling systems and metal-cutting techniques and so achieve maximum machining productivity. Without this in-depth understanding of the new technologies in the market, many customers find the decision-making process more and more difficult as the range of tooling systems expands. Courses can be designed to cover customer-specific requirements, so that machine operators, manufacturing engineers, programmers, and company owners can begin to understand the simplest way to choose the correct tooling and machining strategy.

Design and machining video tips



The PowerSHAPE videos include one demonstrating how the Solid Doctor can be used to repair CAD data

A series of videos have been added to Delcam's YouTube channel showing tips for users of PowerSHAPE, PowerMILL and FeatureCAM. These latest additions bring the total number of videos to over 1,200 on Delcam's Advanced Manufacturing Solutions channel on YouTube.

The PowerSHAPE playlist of tips comprises five videos. These cover the use of the Solid Doctor and PowerSHAPE's trim-region editing tools for data repair, an introduction to the use of the Smart Surfer for surface creation, plus examples of creating a blend between three surfaces and of separating the internal and external surfaces in a solid model.

To see the playlist, go to www.youtube.com/playlist?list=PLDuUAqDYm_rbfjnW9FNPayXvymkaOniJ5

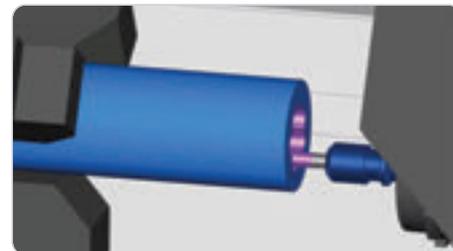
The playlist for PowerMILL includes five videos demonstrating a variety of machining methods for items including cavities, open pockets, side walls and upstands. A sixth video shows how to apply parameters from one toolpath to other toolpaths.

The PowerMILL playlist is at www.youtube.com/playlist?list=PLDuUAqDYm_rYBlqkFnyEhpVgg7hAYfK1o

10 videos make up the FeatureCAM playlist. These include two examples of the use of Delcam's award-winning area-clearance strategy, Vortex, one in a milling example and one in a turn-mill project. Other demonstrations show how to use stock models in 2.5D machining, a comparison of automatic and interactive feature recognition, selection of features by colour or type, parametric surface machining and programming from 2D DXF data.

The full playlist for FeatureCAM is at www.youtube.com/playlist?list=PLDuUAqDYm_rZ1vLjFFnGmb_XS0AKzMHXW

Delcam's Marketing Manager, Peter Dickin, explained that the demonstrations were originally part of the material presented at the company's UK Technical Update Days, which are held each year at locations around the country. "We thought that the videos would be helpful both to our UK customers who were unable to attend the meetings and to our international customers," he said. "If they prove popular, we will look into adding more material after this year's series of events in October."



The FeatureCAM playlist includes a video showing how to use Delcam's Vortex high-efficiency area-clearance strategy on mill-turn equipment

Mold Builder of the Year

Delcam is pleased to congratulate customer Don Snow, Operations Manager at CS Tool Engineering, Inc., on being named the 2014 Mold Builder of the Year by the American Mold Builders Association (AMBA). CS Tool Engineering, based in Cedar Springs, Michigan, has used PowerSHAPE, PowerMILL and PowerINSPECT for more than ten years.

Mr. Snow received his award during the AMBA's Annual Conference, which was held in Milwaukee, WI, from 14th to 16th May. He was recognised for his long-term commitment to the industry, to the AMBA and to the development of an in-house apprenticeship programme, in which he takes an active part in conducting training sessions. Working with Ferris State University, the Kent Career Technical Center, Grand Rapids Community College and the Whitehall Township Tooling Coalition, Mr. Snow

continues to promote the industry and keep the training facilities aware of the need for skilled workers. He also has worked extensively with the Michigan Economic Development Committee to create more advertising for the tool and die trade on the state's own website.

Founded in 1967, CS Tool Engineering has always been a company that promotes quality and customer service in everything it designs and manufactures. CS Tool Engineering

specialises in building injection mould tools primarily for the automotive industry and has a high experience level with automotive interior and exterior trim components. The company, which also designs and builds large compression forming moulds for headliners and package trays, offers full project management from start of concept through textured sample parts, as well as mould flow analysis with Autodesk's Moldflow software.



CS Tool Engineering designs and builds injection and compression moulds

New release of DentMILL

The 2014 R2 release of Delcam's DentMILL software for the milling of dental implant restorations provides a new mechanism for receiving parts from Delcam's OrderManager system, more control when using multi-holder fixtures and new options for non-uniform scaling of items. Smaller enhancements include improved library management and easier set-up for 3+2 machining.



DentMILL now gives users more control when using multi-holder fixtures

DentMILL is now linked to Delcam's

OrderManager workflow management software so that the new part library is updated automatically once a new order is received. OrderManager then manages the whole process from the initial order through to manufacturing and final dispatch. At all stages users can maintain a 'real-time' view of the centre's total order status. The improvements in the 2014 R2 release provide a quicker, slicker and more intelligent mechanism for transferring new restorations into DentMILL from OrderManager, thus making the whole process more efficient and saving time.

Multi-holder fixtures allow individual restorations to be machined from discrete blocks of material, rather than machining multiple items from a

single block. DentMILL 2014 R2 gives users more control when using this type of fixture. For example, if similar types of restoration are being produced in all the positions, the same set of strategies can be applied to the complete group. Alternatively, individual machining approaches can be used to calculate the toolpaths if each item is of a different type.

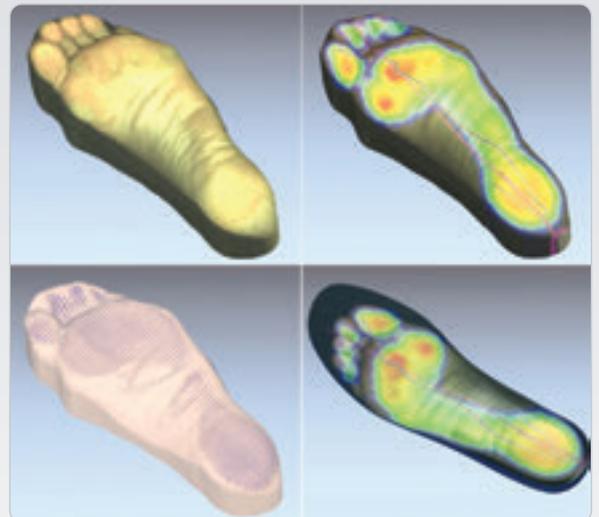
In addition, the machining sequence can be set up so that all operations with a particular tool across the various items can be completed in sequence before moving to the next cutter, so reducing tooling changes. If preferred, each restoration can be machined completely before moving to the next item.

DentMILL has always offered an option to scale models to compensate for shrinkage of materials during the sintering process. This option has been made more powerful with the ability to undertake non-uniform 3D scaling, allowing more accurate scaling to give better-fitting restorations.

Data import has also been enhanced to improve the import of models from many different open and closed systems, an important area for an open system like DentMILL. In particular, more variants of 3Shape parts can now be read into the software.

OrthoMODEL upgraded

The 2014 R3 version of Delcam's OrthoMODEL software for the design of custom orthotic insoles includes the ability to display multiple 2D images and a 3D model simultaneously, and a range of improvements to the user interface to simplify workflow and reduce design times. For further details, please go to lz.orthotics-cadcam.com



OrthoMODEL now has the ability to display multiple 2D images on the 3D model of the orthotic

The new version represents a big leap

forward in bringing together 2D image data and 3D scan data. When both types of data are presented together, users are better able to decide upon the features required in the orthotic.

OrthoMODEL enables multiple 2D images to be imported and overlaid onto the 3D scan data. This ability creates a dynamic environment where users can interpret the information represented by the 2D images in situ over the 3D model.

The extra dimension that OrthoMODEL offers is in allowing multiple images to be displayed at the same time. For example, the user can overlay

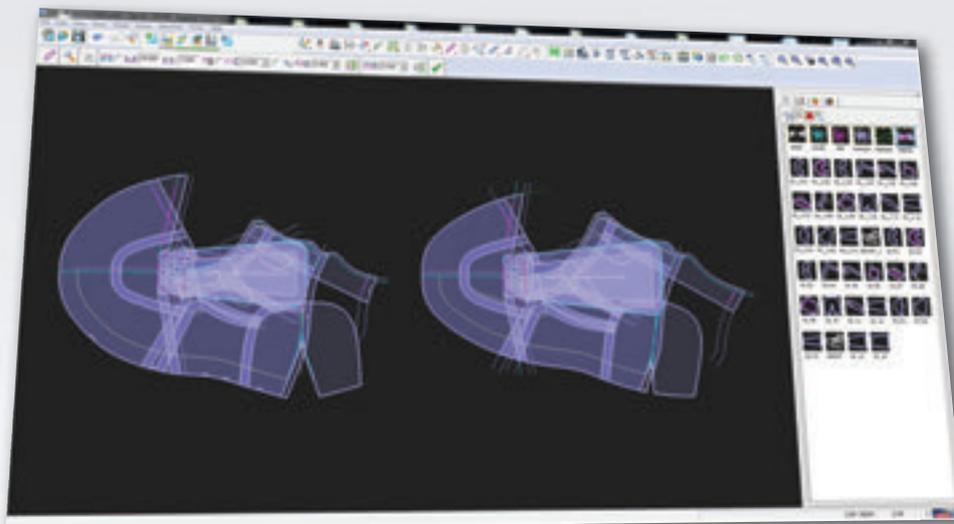
the photographic image of the plantar surface and an image from a pressure system, and be able to see the data from both whilst overlaid on the 3D scan. The ability to vary the transparency of the scan, images and orthotic allows a full appreciation of how the various elements work together to influence the overall design. As a result, more informed decisions can be made as to the prescriptive requirements and on where any additions may need to be located, such as a depression to relieve a skin lesion or region of high pressure.

Also new to this version is a dramatically updated user interface. A new image page to

capture, import and present multiple images, plus extra display utilities on the alignment and design pages, make for a better user experience and enable decisions on the orthotic design to be made quickly and accurately.

The system has also been updated to allow users who purchase a Delcam iQube scanner to send orders that contain either scan data or the finished design through to a range of on-line labs that can fulfil the manufacture. This allows users to embrace the digital design world without the need for a CNC mill or router.

CRISPIN Ortho for orthopaedic footwear



Delcam CRISPIN has launched a new version of its Engineer Pro software specifically for the manufacture of orthopaedic footwear. Engineer Ortho includes all the options for 2D pattern development from Engineer Pro and so allows bespoke footwear designs to be created in the shortest possible time.

Engineer Ortho allows existing pattern designs to be transferred directly onto any individual last developed to match the patient's foot

One key tool in Engineer Ortho is the multi-point transformation function that makes it easy to transform the style lines of an existing pattern to match a new last. This allows existing shoe designs to be transferred directly onto any individual last developed to match the patient's foot.

If parts have been developed as well as the style lines, then the same operation will adapt their shapes to the new last as well. While the pieces are unlikely to be produced exactly as required for manufacture, the adjustments necessary will

take, at most, one tenth of the time needed to develop the equivalent parts from scratch.

The time savings will be especially beneficial when the patient is suffering from a non-static condition, for example, progressive deterioration resulting from diabetes. In these cases, new footwear will be needed on a regular basis, with each pair needing to be redesigned based on new lasts.

If a completely new design is required, Engineer Ortho offers the full range of pattern development tools available in Engineer Pro,

including all the time-saving enhancements in the recently released 2014 version. For example, simple parts can be created with a single click in a closed area and adjoining regions can then be added to the piece with a click in the neighbouring area. In addition, if a part has a mirrored boundary, the features will be mirrored automatically.

Once the piece area has been finalised, edge details can be added around the part simply by dragging and dropping designs from the library of edge templates.

Additive Manufacturing of 3D orthotic insoles

Delcam is embracing the new era of mass customisation by applying Additive Manufacturing (AM) to the design and manufacture of custom orthotic soles.

A combination of OrthoMODEL and ArtCAM can produce orthotics designs suitable for Additive Manufacturing

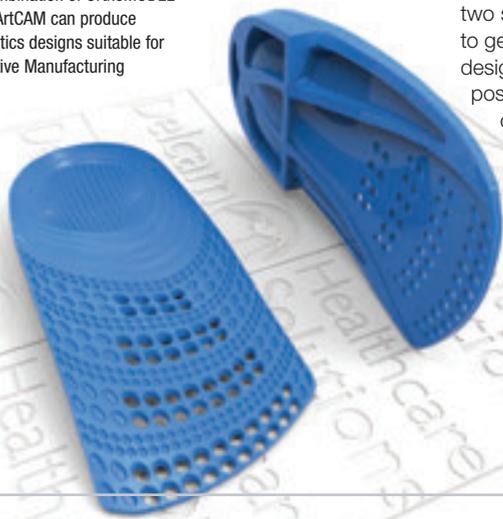
Delcam first looked at AM for the orthotics and prosthetics industry back in 2010, working with Adrian Bowyer of Bath University using a RepRap device to print custom PLA insoles. More recently, the Healthcare team has been able to transfer surface data from Delcam's orthotics solution software, OrthoMODEL, into ArtCAM. By combining the functionality of these two software packages, Delcam has been able to generate and print a series of concept designs which demonstrate some of the possibilities for AM in the production of orthotics.

The process started by creating the orthotic designs within OrthoMODEL and then importing them into ArtCAM where additional product features were added. These included structural ribs for strength, high-resolution 3D reliefs for aesthetics, and textures and aeration holes for potential clinical benefits.

Delcam is aware of a wide range of potential customers who are embracing the advances in the AM sector. The new materials and increased design freedom offered by AM are expanding the creative opportunities of designers, allowing mass customisation to be offered together with bespoke requests. Delcam is investing its resources into providing a flexible design solution for its customers.

AM does not replace the faster and more economical subtractive milling but it does open some new and interesting doors. For example, by 3D printing an orthotic, the practitioner is able to design the ideal custom insole unhindered by the restrictions of conventional manufacturing.

Chris Lawrie, Healthcare Business Development Manager at Delcam, believes, "In a world where waste reduction is increasingly on people's agendas, AM certainly offers potential to be the 'greener' choice in the future. We are aware that machine prices are coming down, but the real change will come first from faster printing technologies and then from an increase in the choice of functional materials."



FeatureCAM at Pier 9



The most complex machine at Pier 9 is a Mori-Seiki mill-turn

Autodesk has added FeatureCAM for its Autodesk Workshop at Pier 9 in San Francisco. FeatureCAM will be used to program all the CNC equipment at the facility, including a DMS five-axis router and a Mori Seiki mill-turn machine.

To see more about how Autodesk is using FeatureCAM, please go to www.delcam.tv/pier9

Autodesk opened its Pier 9 facility in

September 2013 to support the company's vision of helping everyone to imagine, design and create a better world. The 27,000 square foot site is located a short walk from the company's San Francisco headquarters.



FeatureCAM will be used to program all the machines at Pier 9, including this DMS five-axis router

“Having access to FeatureCAM is really beneficial because it is able to read files from any of our design software and is able to output toolpaths ready to cut parts on any of our machining equipment.”

“Pier 9 is a very interesting facility because it has traditional Autodesk software alongside an incredible workshop,” explained Gonzalo Martinez, Director of Strategic Research at Autodesk. “It has a whole floor for additive manufacturing, plus we have a metal shop and a wood shop on the site. The best part of the whole concept is that it lets people experiment here. They have access to the tools that we provide – both the software and the hardware – to see what they can do.”

Jeremy Malan, Applications Engineer at Delcam, was responsible for installing FeatureCAM at Pier 9. “It’s not every day that you can come out to a machine shop overlooking the bay, especially such a great facility,” he remembered.

“Pier 9 does have a lot of people that are learning machining for the first time so it’s really helpful that FeatureCAM is one of the easiest-to-learn software programs out there,” he added.

“With FeatureCAM, even new users are able to identify very quickly the kind of feature that they are trying to make and how they are going to do that on the machine.”

“I love what FeatureCAM does because, at Autodesk, we’ve always been very good with design tools, and visualisation and simulation tools, but we were not really connected to what I’d call fabrication,” said Mr. Martinez. “Having access to FeatureCAM is really beneficial because it is able to read files from any of our design software and is able to output toolpaths ready to cut parts on any of our machining equipment.”

“I really looked forward to testing FeatureCAM on our Mori-Seiki machine, which is our most complex being a mill-turn with two turrets and five-axis capabilities,” he continued. “There are always multiple axes moving around but, with FeatureCAM, I can make sure that nothing is colliding and that the machine is working correctly.”

“The support that I have received from the Delcam team has been an A+ from day one. I’m so pleased that we have Delcam; not only the technology, but the people as well. The people are so extremely knowledgeable about the industry that it makes this journey beautiful.”

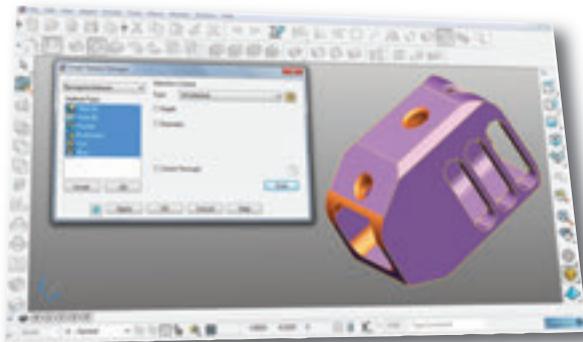
PartMaker Modeling

The 2014 version of PartMaker Modeling features a host of exciting new enhancements, including the Radial Cut Wizard for creating cylindrically-wrapped part features as well as improved direct-modelling and feature-recognition functionality using PowerSHAPE's Smart Feature Manager.

The new and unique Radial Cut Wizard allows very quick and intuitive creation of solid cut features on cylindrical surfaces. This functionality is particularly helpful for creating "wrapped" features on cylinders that typically require cylindrical interpolation programming when they are machined.

Additionally, PartMaker Modeling now includes automated functionality for snapping both geometry and solid features to existing faces. This makes creating both milled and drilled features, such as hexes, flats and holes of any orientation, much faster than previous versions.

A number of enhancements have been made to the software's direct-modelling functionality for altering "dumb" solid models or 3D models with no feature history that have been created in other solid-modelling systems. One particularly helpful new direct-modelling option is



PartMaker Modeling 2014 includes the Smart Feature Manager, giving improved feature recognition

the Merge Faces command. This allows a number of coincident but separate faces to be merged into a single face automatically, which makes altering or removing features attached to these faces much faster and more automated.

PartMaker Modeling 2014 also has significantly improved functionality for extruding multiple regions with hollow shapes automatically.

Tackling the skills gap

Delcam's PartMaker Division is supporting an initiative by one of its customers, Precision Plus from Elkhorn, Wisconsin, to tackle the skills gap in North American manufacturing.

Precision Plus is an ISO 9001:2008

registered contract manufacturer of precision turned components. The company specialises in Swiss-type turning and uses PartMaker to program more than twenty Tsugami machines to produce complex parts for electrical, aerospace, medical, dental and hydraulic/pneumatic applications. To see how Precision Plus uses PartMaker, visit www.partmaker.com/video/precisionplus

President and owner, Mike Reader, has built up a team of skilled manufacturing men and women with many years of experience. His team has the knowledge and expertise to see a product from concept to reality, working closely with the customers' engineering and production teams to produce high-quality, cost-effective components.

Like many other company presidents, Mr. Reader is a strong believer in continuous education of his staff to ensure that his company can continue to flourish in the new global economy. However, he has gone further than most by hiring a former school principal, Barry



The new classroom at Precision Plus will be used for training staff and students in PartMaker CAM software

Butters, to run his education and apprenticeship programme.

As well as training current Precision Plus staff, Mr. Reader is aggressively attacking the skills gap in manufacturing by opening the classroom on his company's site to a group of apprentices made up of highly motivated students from local high schools. They will be trained to use Inventor software donated by Autodesk as well as the PartMaker CAM program supplied by Delcam.

Both Autodesk and PartMaker supported the recent opening ceremony for the new training facilities. "Together with our software partners, Autodesk and Delcam/Partmaker, we are rolling out training programmes to develop the next generation of elite manufacturing and application engineers," explained Mr. Reader. "We will use the new classroom as the focus of our efforts to work with local school districts to close the skills gap and to enlighten young people about what manufacturing is today and the career opportunities it offers."

Jaguar School Challenge

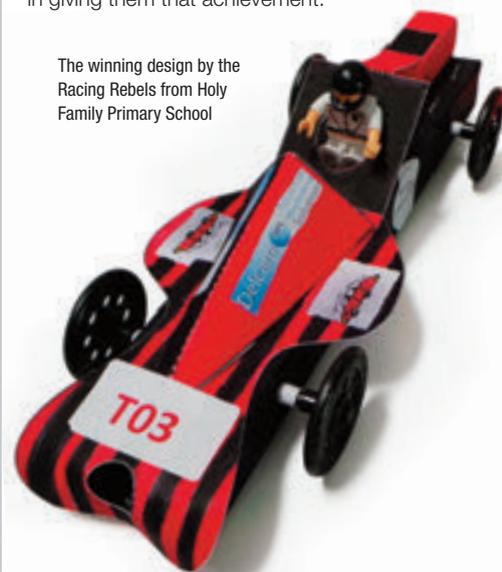
Two staff from Delcam's Birmingham headquarters, Andrew Whitten and Richard Pedley, have been helping nearby Holy Family Primary School with the Jaguar Primary School Challenge. The two teams entered by Holy Family Primary and mentored by Andrew and Richard won 1st and 2nd place in the Birmingham regional finals.

The Jaguar Primary School Challenge is

part of the UK F1 in Schools programme, which is sponsored by Delcam's parent company, Autodesk. It is open to students aged 5-11 years old and involves designing and manufacturing the fastest car possible, emulating the design and engineering processes employed by real engineering companies, such as Jaguar Cars. The children also have to produce a display to promote their team, create merchandising and give a five-minute presentation on their car.

Alison Lloyd, one of the teachers at the school, said, "We certainly wouldn't have entered without the help we received from Andrew and Richard. The children said it was one of the happiest days of their lives, so we played a part in giving them that achievement."

The winning design by the Racing Rebels from Holy Family Primary School



Electrode solution enhanced

For more news, go to
www.delcam.com
www.delcam.tv

A range of enhancements has been added to the Delcam Electrode integrated solution for the design, machining and inspection of electrodes, and the range of EDM equipment supported by the software has been extended. For full details, please visit www.delcam-electrode.com

Delcam Electrode integrates the design, machining and inspection of electrodes

Delcam Electrode combines PowerSHAPE, PowerMILL and PowerINSPECT to give a completely integrated solution for the design, machining and inspection of electrodes. At the heart of the Delcam solution is a novel file format – the .Trode file. This contains all the information for each electrode project, including not only the electrode design but also the machining and inspection information, plus the set-up sheets for its manufacture and use.

In the 2014 version, the .Trode file is compatible with Windows Explorer. This new option allows electrode geometry, set-up sheets and script files to be viewed directly from the .Trode file using Windows Explorer with a single click on the desired item.

Data management has also been simplified with the option to output an electrode schedule from the software. The data can be output in HTML, Excel or CSV format as a table describing each electrode required and its key data, such as blank size, undersize value, material etc. This option will, of course, be of most value when large numbers of electrodes are required in a project, for example, for a complex mould tool.

The system has also benefitted from a number of new options introduced into the PowerSHAPE design software which provides the CAD element of the overall solution; in particular, the new option to merge fragmented faces into a single, continuous surface and so produce cleaner, simpler electrode geometry. This simplification makes subsequent operations, such as adding draft to complex regions of the model, much easier and also improves the operation of many of the direct-modelling tools in the software.

Delcam Electrode can now provide scripts for Exeron and JDMA EPX equipment as well as the previously supported AgieCharmilles (Agievision and CT Millennium controls), Makino EDM, Mitsubishi Electric, ONA EDM, OPS-Ingersoll, Sodick and Zimmer & Kreim.

Scripts are the EDM equivalent of CAM programs for machine tools. They provide an automated process for the programming of the machine, instead of users having to program manually from a set-up sheet. The automated process is much easier and quicker, especially when a number of electrodes are being used on

“Delcam Electrode can now provide scripts for Exeron and JDMA EPX equipment as well as the previously supported AgieCharmilles (Agievision and CT Millennium controls), Makino EDM, Mitsubishi Electric, ONA EDM, OPS-Ingersoll, Sodick and Zimmer & Kreim.”

the same component. Furthermore, the direct link removes the human error that could always be possible with manual programming.

In the 2014 version, the script files are updated automatically based on information gathered during the inspection with PowerINSPECT. The new script file can then provide accurate process information to the EDM machine, avoiding the need for manual updates.

In addition, data from Delcam Electrode can now be output to the CERTA shop-floor management software.