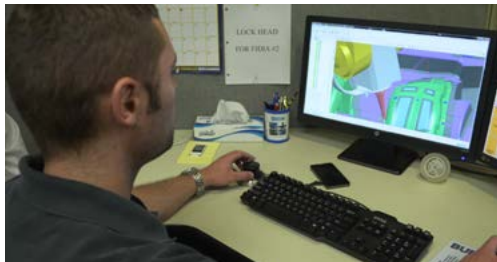


## THE POWER TO CHANGE

Standardising on PowerMILL for all of its machining has proved a key component of the 'Power to Change' philosophy at Paragon D&E. "We are seeing jobs coming in days ahead of schedule," claimed Manufacturing Engineer, Brian Kerkstra. "We're seeing jobs that would traditionally have taken us ten weeks being completed in eight or nine weeks."

"Our 'Power to Change' philosophy is about our team working together to develop methods to do things more efficiently. It's about getting people involved and really trusting in their decisions," explained Paragon President, David Muir. "We're actually envisioning what Paragon could look like in a year from now."



Before we had PowerMILL, this was a five-year plan for Paragon – we are accelerating our plans by using the relationship we have with Delcam."

Paragon, which is based in Grand Rapids, Michigan, is best known for producing very large and very accurate tooling and components. The company serves a variety of industries, including automotive, heavy truck, oil and gas, aerospace, defence, marine and nuclear.

This diversity has been an important part of the company's success. "A big advantage that Paragon has is that we're really able to cross-pollinate ideas from different projects," claimed Mr. Muir. "What we learn in one industry, like aerospace, we're able to apply in injection moulding or vice versa, or even in compression tooling or even now in hydro-form tooling."

In contrast, a diverse range of programming software used to be a major problem. "We had too many software programs on the machine floor," remembered Mr. Muir. "That problem was driving a lot of inefficiencies with our training and with the ability for our staff to move from one station to another. We

explored the idea of looking for only one software program across the whole shop. We looked through all the software that was available in the world today and we decided on Delcam."

The decision wasn't only about the strength of the software. "Delcam brought us a willingness to listen to what our company needed and what our users needed," stated Mr. Muir. "Most of the competitors told us "This is how it's going to be" but Delcam said "What can we do to make your business more profitable?" We needed more customised input and, instead of being the traditional software vendor that pushed back and tried to shoe-horn us into its product, Delcam gave us direct access to the development team."

"Our customers have been telling us that, because of the way we can move now, we are doing things that no one else on earth can do for them," he continued. "We've got some great 'mad scientists' who can think up these incredible things. PowerMILL has helped us to take their focus off the day-to-day issues and to begin to look forward. The type of equipment that we build is among the largest of its kind but that's simply a stepping stone towards being able to build more custom solutions for specific customer needs. Delcam allows us to take care of our customers and to make money at the same time."

**"Delcam isn't just another software provider, We've been given regular training onsite. We were able to move from zero knowledge to a better cost performance in less than six months and that's amazing!"**

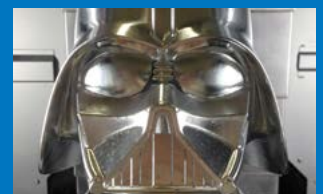
## INSIDE THIS ISSUE



Page 3

### MOVING TO 5-AXIS

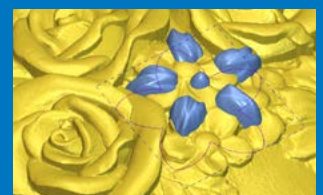
A new five-axis FPT Dino machining centre programmed with PowerMILL



Pages 8-9

### MACHINE-TOOL PARTNERSHIPS

The latest developments in PowerMILL demonstrated



Pages 12-13

### ARTCAM 2015

The complete range of ArtCAM artistic CAD/CAM software has been upgraded



# THE POWER TO CHANGE continued

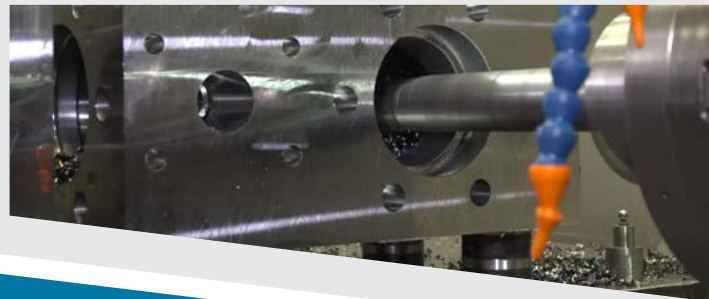
One area where Paragon needed extra support was dynamic machining control for the company's large five-axis machines. Paragon staff worked with Delcam developers to create the integrated mechanism for optimising five-axis positioning in the 2014 R2 release of PowerMILL.

Another of the main drivers for the change in technology at Paragon was the availability of skilled labour. "There is a shortage of labour out there right now, especially of skilled machinists," explained Mr. Muir. "That shortage means that we need to find technology that takes the labour that we have and applies it across more machining time."

To tackle the problem, in 2013, Paragon decided to start a training programme within the company called Paragon Technical University. Dean

of PTU, Larry Oppenhuizen, explained, "This programme allows us to put our apprentices on the right path for the right career choice. We have twenty-six of them currently and they are all learning PowerMILL."

"Now that we are using the same software throughout the plant, an apprentice that is learning PowerMILL in, for example, the small machine department can go over to another department more quickly as he already has Delcam knowledge. It makes it easy for us to give our apprentices a good rounded education because they only need to learn one set of software."



## Project on titanium alloy aircraft parts



Members of the RAWFEED team meet at Delcam to discuss progress in the project

Delcam is partnering with Cranfield University, Airbus Group and the University of Bath in a major project looking at the use of Additive Layer Manufacturing (ALM, more commonly known as 3-D printing) to revolutionise the production of titanium alloy aircraft components.

The £995,000 project, which began at the Cranfield University Welding Engineering and Laser Processing Centre in January 2014, is looking at the industrial potential of RAWFEED, Rolling Assisted Wire Feed Direct Deposition for Production of High Value Aerospace Components. The ALM process would reduce waste in the manufacture of titanium components from the current 80-90% to 30-35%, and increase production speed fifty-fold compared to components manufactured using conventional methods.

The RAWFEED process uses a welding torch to deposit a continuous bead of material on a titanium baseplate, creating the first layer of the component. The layer is allowed to cool and is then rolled to enhance the material's properties. This process is repeated until the required 3D shape is completed.

Managed by Airbus and supported by £630,000 support from the UK Technology Strategy Board, the research is looking to validate a cost model and define the machine architecture and specification to exploit the industrial potential of this emerging technology.

Adrian Addison, a Senior Research Fellow, who is managing Cranfield University's RAWFEED project said: "As a leader in the field of Wire Deposition, we are using a large friction-stir-welding machine

from a previous TSB funded project as the test bed for RAWFEED. This large gantry machine is capable of providing the forces and motion control required for the cold rolling requirements of the process."

Delcam is providing the high quality control software for the project over a wide range of machine tool and robotic platforms. The University of Bath's Laboratory for Integrated Metrology Applications (LIMA) will develop a measuring system that will help control and quality assure the process.

Curtis Carson, Head of Systems Integration – Manufacturing Engineering at Airbus Group commented: "Airbus currently procures £250m of these components every year, so the savings in terms of lean and efficient UK industry of the future. We are proud to be associated with this cutting edge technology project, which is a continuation of the work to date on additive layer manufacturing, and confirms its potential for industrial scale application. RAWFEED could dramatically transform the way high-value aerospace components are manufactured, as part of lean and efficient UK industry of the future. We, and our partners, are very grateful for the support of the Technology Strategy Board, which is continuing to join us in investing in innovation in the UK aerospace industry."

# Moving to five-axis machining

A new five-axis FPT Dino machining centre programmed with PowerMILL means that Aarestrup Vaerktojs- og Maskinfabrik (AA-VM) is now able to machine large parts with very complex geometry both quickly and accurately. The company, which is located in the Northern Jutland town of Stoevring, was previously only able to perform three- and four-axis machining.

Large parts with highly complex geometry can be produced quickly to very high precision



Kenneth Andersen (right) and Bjørn Krogh with the new Dino five-axis machine

Aage Andersen founded AA-VM in 1983 in the village of Aarestrup as a tool factory for cutting and punching. Ten years later, part of the company moved to Stoevring. A year after that, the company expanded the new location and shut down the branch in Aarestrup. In 2004, the current owner, Kenneth Andersen, took over as new CEO of the company.

Today, the company's fifteen employees develop, manufacture and optimise tools for punching and forming, and moulds for injection moulding and blow moulding. In addition, AA-VM develops and manufactures spare parts, specialised parts in small series and prototypes as well as special machines developed in close collaboration with its customers. The company's CNC machinery now includes six milling machines and one lathe, as well as two wire and two sinker EDM machines.

"We invested in the five-axis machine combined with PowerMILL mainly because we have a number of customers in the food industry that need large and extremely complex new parts and spare parts made to a very high quality," explained Mr. Andersen.

The machining centre is such a huge size that AA-VM had to acquire a neighbouring property to make room for it. The machine can process parts

with a length, width and height of up to 3,000 x 1,600 x 800 mm. It uses five-axis simultaneous machining which allows for faster processing of complex geometry at extremely high precision.

With the introduction of the new machine, it became necessary for AA-VM to upgrade its CAM software since the existing program could not handle the really complex parts required by a number of customers or take advantage of the new machine's capabilities, according to Mr Andersen. "We examined a number of CAM programs and chose PowerMILL because we rated it as the best solution," he stated. "We are really happy with the software. We particularly like having Delcam Denmark available to provide professional support and service locally and we are very pleased with that relationship."

Another big advantage for us is that, if it becomes necessary, the local Delcam office can provide us with access to the experts at Delcam's headquarters."

**"PowerMILL is very sophisticated software which can handle virtually any task we can imagine. Our three CAM operators are now learning how to use templates and macros in PowerMILL to further optimise the programming process for our toolpaths."**

It has taken AA-VM some time to become familiar with all the advanced possibilities offered by the FPT machining centre but, after less than a year, it is running five to six days a week for the production of newly developed parts. It has proved particularly beneficial for large moulds where the use of five-axis machining has cut the number of machine set-ups in half, reducing the overall machining time considerably.

The vast majority of the designs for new parts are received from customers as 3D files generated in their different CAD systems. "It is a major advantage for us that, in most cases, we are able to manufacture using the customer's 3D files directly without further need for editing," explained Mr. Krogh. "In a few cases, it has been necessary to use PowerSHAPE to generate extra geometry such as clamping surfaces."



# Integrated CAM for SolidWorks

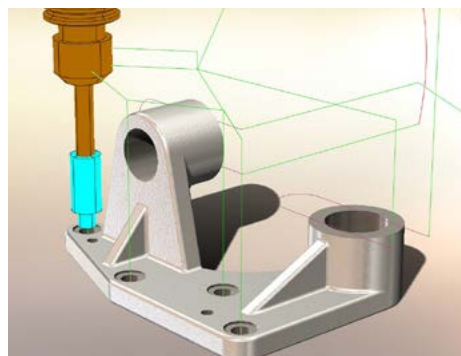
The 2015 version of the Delcam for SolidWorks integrated CAM system includes a range of enhancements in three-axis milling, drilling, turning and wire EDM to make the software even more valuable to SolidWorks users that need to manufacture their designs. Full details are on the Learning Zone at <http://www.delcam.tv/dfs2015/lz>

Programming of three-axis toolpaths for complex parts has been made easier and more reliable in Delcam for SolidWorks 2015 with the addition of automatic collision checking of the tool shank and holder, as well as the cutter, for both roughing and finishing operations. If a gouge is detected the toolpath can be recalculated with any segments that will cause a gouge clipped away.

Deleting these segments of the toolpath leaves an area of unmachined stock that will need to be removed with a longer tool. This extra toolpath is able to 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.

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 eliminate air-cutting by referencing the stock model.



It has been made easier to program and edit drilling of a series of similar holes

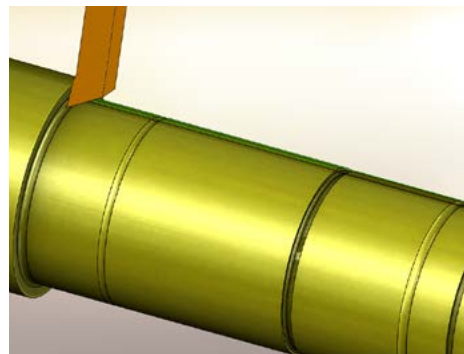
Drilling with Delcam for SolidWorks has been made easier in the new release with the introduction of a new hole type, 'Thread Mill Hole', which eliminates the need to create holes, pockets or sides, and thread features as separate items. It can be used either with holes created with the 'Hole' feature or those that have been identified with 'Feature Recognition'.

Another improvement to drilling is the new 'Find Feature' command that gives the ability to combine similar holes into groups on indexed parts. With previous releases, users had to have

a separate feature for each hole but, in Delcam for SolidWorks 2015, holes that are similar can be recognised and then grouped together. This makes them much easier to manage and edit.

A series of improvements have been introduced to make turning with Delcam for SolidWorks more efficient. The software is now able to produce 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.

For users of wire EDM, Delcam for SolidWorks 2015 provides an expanded wire-cut database to support multiple machines having 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.



A number of enhancements have made turning more efficient

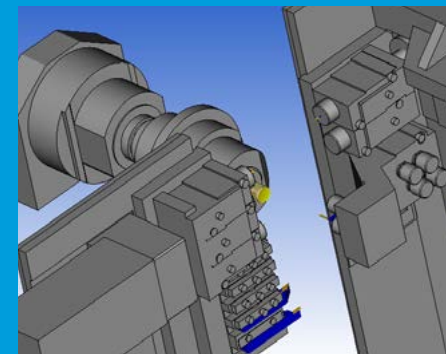
Wire EDM assemblies with multiple set-ups are now able to be output in a single program separated by Program Stops, with NC code required for a safe Program Stop formatted in a special section of the post processor. This increases programming flexibility greatly for Wire EDM users, allowing them to manage their parts on the machine more safely.

A key benefit of Delcam for SolidWorks has always been the availability of a wide range of post-processors, together with the ability for users to customise their posts. In the 2015 version, post variables are able to 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 is particularly valuable when programmers need to understand customisations in posts that have been made by other users.

# Bringing machining in-house

TiNi Aerospace, a specialist manufacturer of aerospace components based in Northern California, has moved into Swiss machining successfully with a Tornos ST-26 machine and PartMaker software.

Located in California's Silicon Valley, TiNi Aerospace specialises in the manufacture of mechanical-release devices for the aerospace industry, based on the company's specialist Shape Memory Alloy technology. Its products have been used on scientific missions flown by NASA, ESA and JAXA. Underwater applications of the devices include ballast release, buoy detachment, payload separation, instrument recovery and disentanglement manoeuvres on vehicles such as Alvin, the first manned submersible capable of travelling to the deepest regions of the ocean floor.



With PartMaker, Tornos customers can produce realistic simulations of parts cutting on the machine

Historically, TiNi outsourced much of its machining work to shops in the Bay Area. The company recently decided to bring some of its parts in-house. It started with components appropriate for Swiss applications, such as titanium bolts, so that it could turn around small batch sizes for its internal R&D and testing efforts. TiNi made its first Swiss machine a Tornos ST-26, based on the combination of functionality to price that it offered against other machines on the market. To better harness the power of the Tornos ST-26, TiNi chose PartMaker SwissCAM for its programming.

"The challenge we have is achieving tight tolerances at short volumes. We don't have a long production run to optimise our processes, plus everything is slightly different to the previous job," said TiNi Operations Manager, David Bokaie. "PartMaker has worked amazingly well in helping us manufacture our designs on the Tornos ST26. Particularly with being new to Swiss machining, PartMaker really helps us tap into what the Tornos machine can do."

As the Tornos ST-26 was TiNi's first Swiss-type lathe, it was imperative that the company chose software suited to the task of programming the machine productively and intuitively. "PartMaker is really easy to use; the learning curve has been awesome," said Richard Cosman, TiNi's CNC programmer responsible for the new machine.

With introduction of the Tornos ST-26 and PartMaker into its manufacturing process, TiNi has been able to program quickly and achieve better cycle times. "PartMaker helps us produce a good part the first time, which means a lot faster turnaround. Parts that we previously would have had to do in two set-ups, we are pushing out in half the time," claimed Mr. Cosman.

**"PartMaker is really easy to use; the learning curve has been awesome"**

## Vortex

### Webinars & Video

A series of webinars is being presented on the Vortex high-efficiency roughing strategy, which has been shown to achieve savings of up to 90% in the time needed for area clearance. The webinars, which are being run under the headline New Tools, New Rules, cover the use of Vortex in each of Delcam's CAM products.

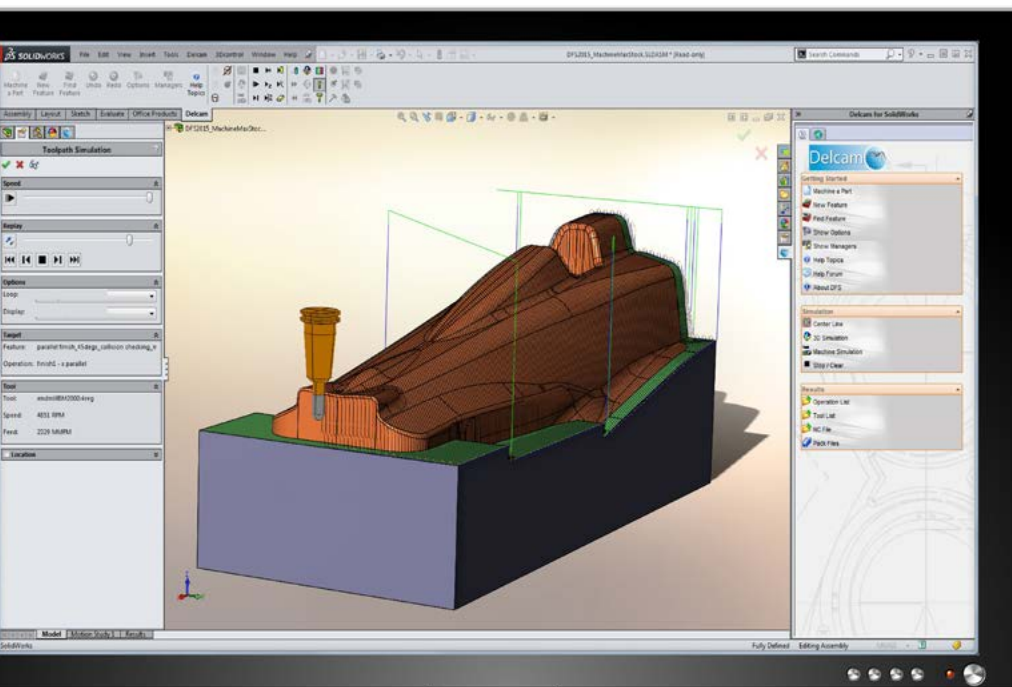
For full details and to register, please go to [www.vortexmachining.com/events](http://www.vortexmachining.com/events)



The latest Vortex video shows Iscar tooling cutting on a Mazak Variaxis machine programmed with PowerMILL

A new video showing the speed of area clearance possible with Vortex has been added to Delcam.TV at [www.delcam.tv/vortex-iscar](http://www.delcam.tv/vortex-iscar). The video shows machining of 4340 alloy steel using an Iscar Finishred 12mm cutter on a Mazak Variaxis 750 programmed with PowerMILL.

The Vortex strategy gives the fastest safe metal removal from solid carbide tooling, in particular designs that give deeper cuts by using the full flute length as the cutting surface. It produces toolpaths with a controlled engagement angle and so maintains the optimum cutting conditions for the toolpath that would normally be possible only for the straight-line moves. As a result, higher feed rates are possible, making the cutting time is shorter. In addition, cutting is undertaken at a more consistent volume-removal rate and at a constant feedrate, so protecting the machine.



Programming of three-axis toolpaths for complex parts has been made easier and more reliable



# 32 recruits in Birmingham

Delcam added a total of 32 graduates and undergraduates to the staff at its Birmingham headquarters during 2014, a record number of recruits for the company's annual summer intake. The extra staff are being added across the company's various departments, including software development, engineering support and marketing.

The recruits include new graduates in permanent positions and students gaining employment experience during their courses that have been given fixed-term placements. Their addition brings the total staff in Birmingham to over 300 employees.

This latest round of new staff exceeded the 2013 intake when Delcam added 30 recruits at its Birmingham headquarters. The increasing scale of the company's recruitment parallels the growth in its global sales, both in its established manufacturing area and in the newer healthcare markets.

"As usual, we have offered some of this year's new permanent positions to students that have previously completed placements at Delcam," commented Software Development Manager, Richard Barratt. "Our scheme has become more established in recent years, with Delcam being ranked in the 'Top 100 Companies for Graduates to work for' in the latest list produced by the Job Crowd website," added Mr Barratt. "The Job Crowd rankings are based entirely on the views of new graduate employees and their positive comments are helping us to attract more applications. More recently, we reached number six on RateMyPlacement's 2014/2015 Top 25 Medium-sized Undergraduate Schemes."

**"Delcam's global presence gives me the opportunity to travel around the world representing the company, showcasing the variety of software products that Delcam develop."**

Sanjay Thakore, Applications Engineer



Some of the 32 new recruits added to the staff at Delcam's Birmingham headquarters



The Delcam booth attracted many visitors during the Grand Opening of the new DMG Mori Seiki showroom in Jakarta

## DMG Mori Seiki Grand Opening

Delcam was the only CAD/CAM company invited to exhibit at the Grand Opening of the new DMG Mori Seiki showroom in Jakarta during November. Staff from Delcam's Birmingham headquarters and from the Delcam Indonesia subsidiary attended the event.

The Delcam Indonesia booth featured demonstrations of the Delcam family of CAM software and also included live machining on the new DMC650V vertical machining centre with toolpaths generated with PowerMILL.

During the event, James Slater from Delcam's headquarters gave three presentations

highlighting PowerMILL's five-axis capabilities, particularly the simulation, optimisation and verification of five-axis machining. The presentations also covered recent examples of PowerMILL being used on DMG machine tools, including development work for the Vortex high-efficiency area-clearance strategy on the DMU160P in Delcam's Advanced Manufacturing Facility and a recent case study at Cyclone Manufacturing in North America where a combination of a new DMG DMU eVo machine and PowerMILL reduced the cycle time for an aerospace part from seven hours to two and a half hours.

# VIP visits to India

Delcam directors took part in two high-profile visits to India last year. President, Clive Martell, was chosen to be an industry delegate on the official visit by UK Deputy Prime Minister, Nick Clegg, in August, while Commercial Director, Bart Simpson, took part in a week-long visit by UK Business Secretary, Dr. Vince Cable, during October.

For the first trip, Mr. Martell was part of the delegation focused on the aerospace sector. "I was extremely honoured to be chosen to take part in this important visit," he commented. "It provided a huge boost to Delcam's profile in India, especially among the larger companies we visited, including Airbus India, HAL and UTAS, and the government officials we met."

Mr. Simpson's visit began with the Federation of Indian Chambers of Commerce and Industry Conference in Delhi, where Dr Cable said, "Britain and India have long enjoyed a strong, collaborative business relationship –

demonstrated by the fact that we are their largest investor in the G20 accounting for around 30% of their annual investment."

Delcam has made its contribution to that investment in the form of new, purpose-built headquarters in Pune that cost around \$1 million when they were constructed in 2006. The company has also contributed to the increased trade between the UK and India over recent years.

Delcam's business in the country has expanded significantly since the establishment of its wholly-owned subsidiary, Delcam India, in the country in 2000. Since then, Delcam India has grown from its initial staff of three to more than 100 employees. In addition to the Pune headquarters, Delcam India operates 14 regional offices spread across the country, to support its growing customer base. The visits followed shortly after Delcam reached 2,500 customers in India.



UK Deputy Prime Minister, Nick Clegg, with Vineet Seth, Managing Director of Delcam India

## New rib-machining module

**A new rib-machining module for PowerMILL has been introduced to speed up and simplify the machining into tooling of cavities to form ribs.**

Reinforcing ribs are required in many types of plastic mouldings, from electrical housings to containers to furniture. They are typically much deeper than they are wide, which poses special challenges when machining the cavities needed

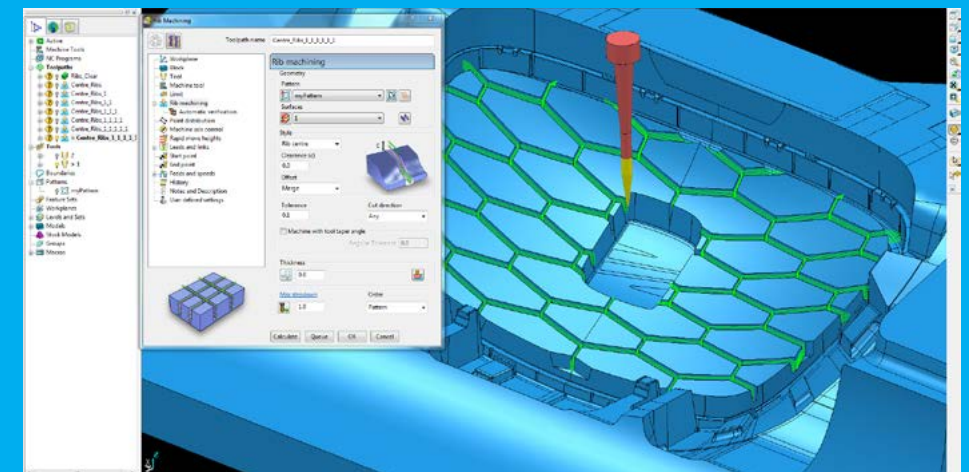
to form them. In many cases, these challenges prompt companies to use EDM to form the features rather than machining.

The new PowerMILL module makes it much easier and safer to program the machining of cavities for narrow ribs, even when the cutter's length is much greater than its diameter. Using the dedicated rib-machining strategy gives a better surface finish than using a standard finish machining option and also improves efficiency by limiting the number of air moves.

The first stage of the process is to create a pattern for a single rib, by sketching a line along its length. PowerMILL uses this line to identify

automatically all the surfaces needed to form the rib. The machining sequence is then calculated. Usually, the machining will either be undertaken by cutting progressively deeper along the centreline of the cavity using a form tool matching the rib profile or by profiling along either side of the rib with a standard tool.

In many cases, most, if not all, of the ribs in a part will have similar depth and width profiles. Thus, once the user is happy with the sequence developed for the first rib, the same machining strategies with the same tooling can be applied across the complete network of ribs so minimising programming times.





# Machine-tool partnerships

**Delcam's close relationships with manufacturers of machine tools and cutting tools are an essential part of the company's service to its customers. Every year, Delcam staff reinforce those relationships at a variety of seminars and open houses.**

The importance of working closely with machine-tool companies can be seen whenever they release new machine designs. Delcam cooperates with all the major manufacturers to ensure that suitable post-processing software can be developed for any new machines so that customers can see their investment in new equipment producing parts as quickly as possible.

Recent developments in cutting-tool technology mean that cutters can operate at speeds and feeds that would have been unthinkable only a few years ago. Delcam's partnerships with the tooling suppliers have been essential in the development of many of our high-speed machining strategies, especially the Vortex strategy for high-efficiency area clearance.

## Inspiration at Seco

Delcam demonstrated the huge time savings that can be made with Vortex at Seco's 'Inspiration through Innovation' manufacturing best-practice event that was held at the company's UK premises in Alcester, Warwickshire, during September.

## New EMEC showroom

A demonstration of Vortex was one of the highlights of a two-day Grand Opening Open House hosted during November by the Montreal division of EMEC Machine Tools at the company's new, expanded showroom.

The demonstration was carried out on an Okuma GENOS vertical machining centre using the Vortex strategy in PowerMILL.

## Innovating with DMG Mori

An Innovation Week held by DMG Mori at its UK Technical Centre in October gave visitors a chance to see the recent enhancements in PowerMILL, alongside the latest machining and control technology from the hosts. Live machining demonstrations were presented in the DMG Mori showroom throughout the four days.

Delcam worked with cutting-tool supplier, Sandvik, and DMG Mori to develop a new demonstration for the event, showing high-efficiency area clearance with Vortex and five-axis machining.

**Delcam, DMG Mori and Sandvik developed this demonstration for the Innovation Week**

## Hurco Open House



**A Darth Vader head was machined using PowerMILL 2015 at the Hurco Open House**

The latest developments in PowerMILL were demonstrated at the Hurco Open House in December at the Hurco UK head office in High Wycombe. 'New Opportunities' was the main theme for the event, which Delcam supported by showing the latest opportunities to reduce machining times and improve surface quality in the PowerMILL 2015 release.

The highlight of the event was machining of a Darth Vader head on a five-axis Hurco machine programmed with PowerMILL. This demonstration was prepared originally by engineers from Delcam France working with Hurco staff. It proved equally popular with the English audience.

## Think: Production with Matsuura



**This component was used to demonstrate the Vortex strategy in PowerMILL at the Matsuura seminar**

The latest developments for high-speed and five-axis machining in PowerMILL were presented at a half-day seminar at Matsuura's European headquarters in Coalville, Leicestershire, during October. The seminar, which also featured a presentation from Matsuura on how to choose a five-axis machine and one from SGS on tooling for high-speed machining, was part of the Think: Production event held at Matsuura in association with Delcam, Tornos, Fanuc and Nikken.

After the seminar, delegates were able to see live demonstrations of five-axis machining on a range of Matsuura machines programmed with PowerMILL.

## SGS, DMG Mori and Delcam combine



**One of two parts used to demonstrate Vortex at the SGS UK headquarters**

Delcam combined with cutting tool manufacturer SGS and machine tool supplier DMG Mori to present two joint seminars on high-efficiency machining at SGS's UK headquarters in Wokingham, near Reading, during July. Morning and afternoon sessions were presented during which the three companies described their latest developments to increase machine-tool productivity.

Each set of presentations was followed by two live demonstrations of the Vortex strategy on DMG Mori machine tools using SGS cutters. The first was a stainless steel part with a number of deep pockets, while the second component was produced in titanium.

## Fidia 40th anniversary

Delcam Italia took part in the Fidia Open House held in May at the company's manufacturing plant in Forlì, Italy, to celebrate its 40th anniversary. The demonstration focussed on the Vortex high-efficiency area-clearance strategy. It showed the cutting of an aluminium aerostructure component on a Fidia GTF3212/LC machine, using solid carbide tooling from German manufacturer, Jongen.

**The aluminium part machined during Fidia's 40th anniversary celebrations**





# DentMILL 2015

## Dental CAD/CAM Suite

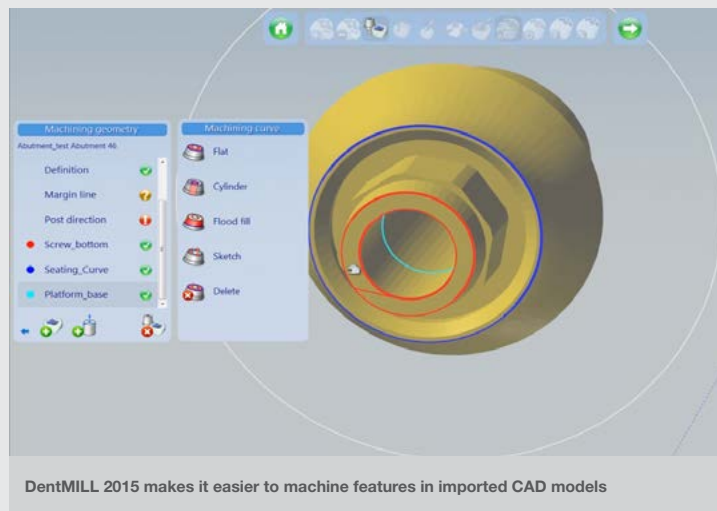
The 2015 release of the DentMILL software for the milling of dental implant restorations includes a series of enhancements to save time and reduce the chance of programming errors. This latest version provides a new mechanism for identifying and creating machining features from imported CAD data, an improved interface for the library manager, and the ability to provide 3D previews of imported parts. It also benefits from the latest enhancements in Delcam's PowerMILL CAM system on which it is based.

DentMILL is an open dental CAM solution, which can mill all types of restoration, including crowns, bridges and implants, from all major dental CAD systems. It includes advanced strategies to mill restorations in any material from PMMA to titanium both quickly and accurately. The system uses dental imagery and terminology, making it easy for dental technicians to use even if they have limited experience of machining.

Milling templates are supplied with the software covering a wide range of materials, including titanium, cobalt-chrome and glass ceramics. These allow highly-tailored automated generation of toolpaths. Of course, users can also develop their own templates for any additional materials that they machine.

The new method for identifying features within imported CAD models will speed up the programming of implant interfaces, bar attachments or any other special geometry on a restoration or dental bar. It has been made easier to position workplanes to fix the orientation of the restoration, to identify prismatic geometry within the implant, such as cylinders or cones, and then to generate milling or drilling routines from the appropriate template.

The library manager within DentMILL is used to develop and edit libraries of material stock, fixtures and NC machines. These libraries form part of the stock-management system that allows the user to only select sizes of material block that are currently in stock and that are suitable for the specified machine fixture, so saving time and eliminating possible errors. The new interface makes it easier to add extra items, such as a partly-used block of material or a new piece of equipment, to the library.



DentMILL 2015 makes it easier to machine features in imported CAD models

# Supersonic programming

**PowerMILL was used by Manufax Engineering to create a highly efficient NC program to machine the tail-fin shear plate for the Bloodhound SuperSonic Car (SSC). A complex, freeform aluminium component, the shear plate will form the interface between the tail-fin structure and the body of the vehicle for its attempt at the world land-speed record.**

Based in Stockport, UK, Manufax is a major supplier to the aerospace, automotive, nuclear and agricultural industries, as well as supporting general precision engineering businesses. With several decades of experience, the company provides specialist tooling design and manufacture across all disciplines, including jigs and fixtures for airframe assembly, mould tools, automotive tooling and components for nuclear power generation. Manufacturing is Manufax's core business and the company has an excellent reputation for supplying its customers with a quality precision-engineering service.

A dedicated and multi-disciplined workforce has been trained to adapt to the unique and challenging projects undertaken at Manufax. Both these criteria can certainly be applied to Bloodhound SSC, a jet- and rocket-powered car designed to go at 1,000 mph. Manufax is no stranger to the Bloodhound SSC project, having produced the mounting frame for the HTP (High Test Peroxide) fuel tank, and an assembly jig that is being used to assemble and align the lower chassis, side rails and upper chassis.

The company's Correa FP50 five-axis gantry-type machining centre was selected to produce the component in aircraft-grade aluminium. CAD/CAM Projects Engineer, Mark Brittain, used PowerMILL to produce the five-axis NC program to machine the shear plate, with its very demanding geometric forms, from a single billet of aluminium.

At the suggestion of Tony Theaker, Area Manager for SGS Carbide Tool (UK), Mr. Brittain used the Vortex area-clearance strategy and an SGS S-CARB APR three-flute roughing end-mill to rough the part in one operation. Like Delcam, SGS is a partner in the Bloodhound project.

The combination of the Vortex strategy and the SGS tooling resulted in significant cycle time savings of over 40 per cent. "We were a little sceptical at first, as the cutting data being suggested for the S-CARB APR cutting tool was providing phenomenal results within PowerMILL," Mr Brittain recalled. "We could not afford to scrap the raw material so we set up a trial cut with a sample of the same grade of aluminium on the machining centre, and applied the speeds, feeds and depths of cut suggested by SGS."

"The trial proved our trust in PowerMILL's NC code and the cutting tool was well founded," continued Mark Brittain. "They performed remarkably well together. As well as giving the predicted time savings, the toolpath and the cutting action reduced any deflection of the thin walls of the rough machined part."

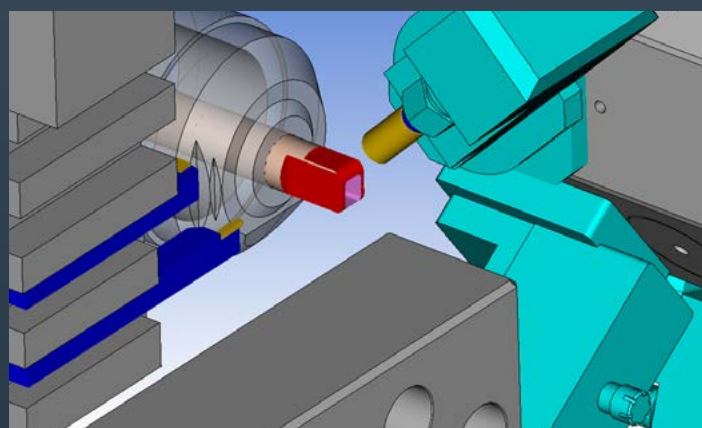


# More support for multi-tasking machines

**Delcam has released PartMaker 2015 which provides improved support for today's latest breed of multi-tasking machine tools, such as vertical mill-turns.**

Other highlights of the new release include more powerful milling and turning functionality, and a unique approach to post processing for multi-axis turn-mill centres and Swiss-type lathes, among other productivity enhancements. Comprehensive details on all the new features and functionality in PartMaker 2015 can be found in the learning zone at [www.delcam.tv/pmk2015/lz/](http://www.delcam.tv/pmk2015/lz/).

"The innovations in PartMaker 2015 include a unique blend of productivity enhancements that both new and existing users of the software are going to love, along with a host of utterly unique and innovative technology that can't be found anywhere else," claimed PartMaker Inc. President, Hanan Fishman. "PartMaker 2015 extends support of the product's patented approach to programming multi-tasking machine tools to include today's latest breed of multi-function machines, allowing our customers to stay on the leading edge of multi-task machining."



# PartMaker 2015

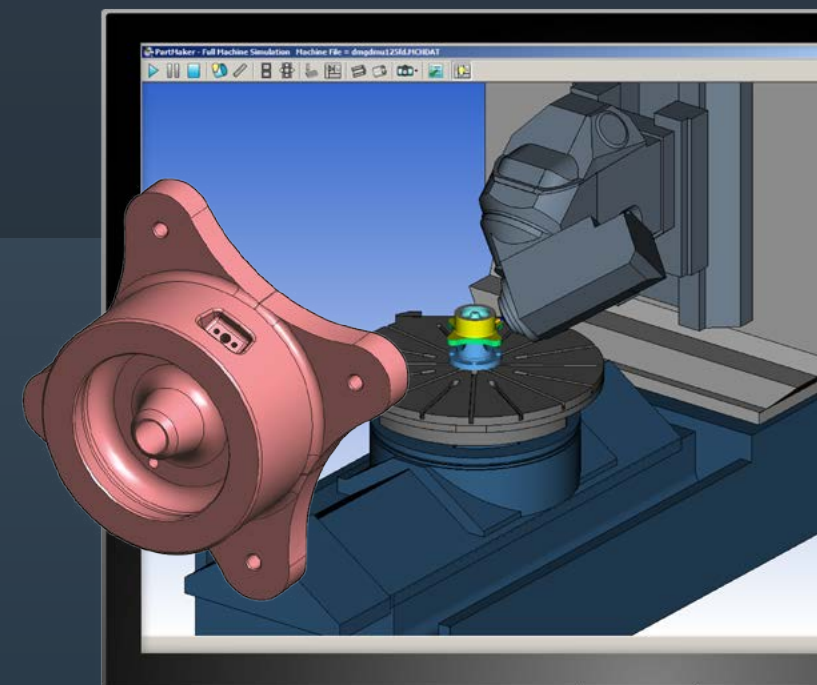
World-leading CAM software for production machining

[www.partmaker.com](http://www.partmaker.com)

PartMaker 2015 includes specialist support for a new breed of machine tools that has been growing steadily in popularity in recent years called vertical mill-turns. These machine tools provide the turning functionality typically found on a vertical-turret lathe with the milling capabilities of a five-axis vertical machining centre.

PartMaker 2015 also offers support for turret-based Swiss lathes with programmable B-axis live-tooling attachments, as well as more intuitive handling of angled live-tooling attachments.

Also headlining in PartMaker 2015 is a unique approach to post-processing for multi-tasking machine tools. This new approach includes a variety of improvements to the software's post-processing technology, together with new software functionality to help guide users on how to take best advantage of the unique capabilities of their specific multi-tasking machine tools.



PartMaker 2015 provides enhanced support for the latest breed of multi-function machine tools





The weave option is now included in ArtCAM Insignia

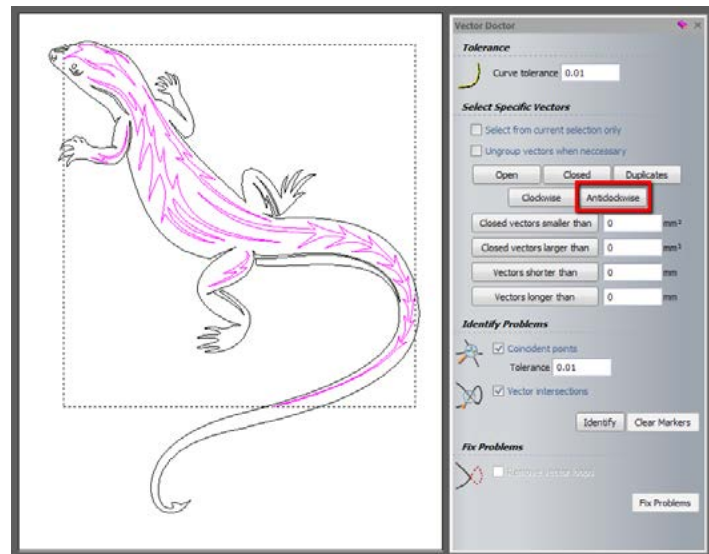
# ArtCAM update

The complete range of ArtCAM artistic CAD/CAM software has been upgraded with more options to create complex 2D and 3D designs. In addition, new modules have been introduced to further extend the capabilities of ArtCAM Express.

## ArtCAM Express

ArtCAM Express is the entry-level version in the range, offering 2D drawing, over 600 free pieces of relief clipart, and 2D and standard 3D machining functions. A range of modules are available to add extra functionality.

The 2015 release includes new tools to speed up the editing of vectors. Firstly, selection of vectors has been made easier and quicker. Dragging the mouse across any area of a model now selects all the vectors either completely or partially within that area. Selection can also be made of a set of nodes, either from a single vector or from a group of vectors. Once selected, the group of vectors or the set of nodes can be edited simultaneously in either the 2D or the 3D view.



Troublesome vectors, such as clockwise and anticlockwise vectors can easily be identified

Movement of relief clipart and vectors has been made simpler and more accurate with the ability to specify the exact distance to be moved.

The ability to create and edit text has been extended so that now all users can write text in the 3D view. This includes writing text on a curve as well as rotating, scaling and angling text after creation.



More complex designs can be created by overlapping reliefs using the combine/replace mode

CNC machining is often easier if all the vectors are in either the clockwise or anticlockwise direction. ArtCAM Express can now identify all vectors created in one direction automatically, rather than having to check each vector in turn.

Users that create 3D designs by importing 3D models or using ArtCAM's free clipart reliefs will appreciate the new combine/replace mode. This allows reliefs to be overlapped and intersected to give more complex designs.

Four new add-on modules are now available for ArtCAM Express. The toolpath-panelling module allows larger jobs to be divided into sections for machining and reassembly once cut. With the bevel-carving module, a hand-carved look with bevelled edges can be added to frames, moulds or signs. Multiple items with different text on the same underlying design

can be created with the multi-plate module using data from text or CSV files. Finally, the new fluting module allows ramping moves in and out of the material to create grooves or textured surfaces. This uses the vectors together with the geometry and motion of the cutting tool.

The existing modules for advanced 2D machining and nesting have been enhanced to allow bridges associated with a group of vectors to be amended simultaneously, while the vector-tools module has a new option whereby vector layers can be preserved when a selection of vectors are copied and pasted.

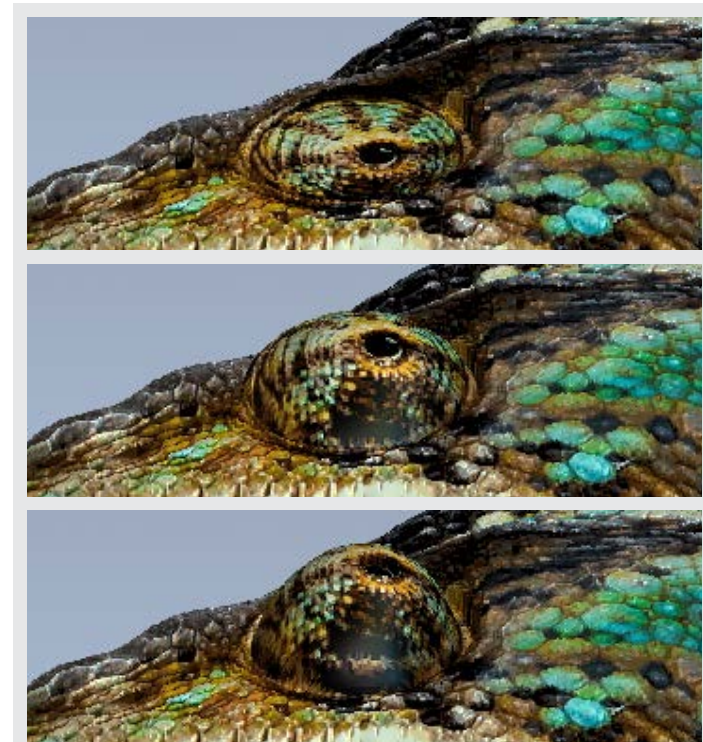


Bridges can be updated simultaneously with the advanced 2D machining and nesting modules

## ArtCAM Insignia

ArtCAM Insignia combines all the functionality in Express with additional 3D modelling and machining tools, making it suitable for volume production of artistic items in 2D or 3D by signmakers, woodworkers and engravers, amongst others.

A significant enhancement in the 2015 version is the ability to create and edit 3D shapes with the shape editor and two-rail-sweep tools in real time, allowing the user to see changes instantly. Previously, this live update was only available when distorting vector artwork. In addition the extrude, spin and turn modelling tools previously available only in ArtCAM Pro give more methods to create freeform 3D shapes and now also operate in real time.



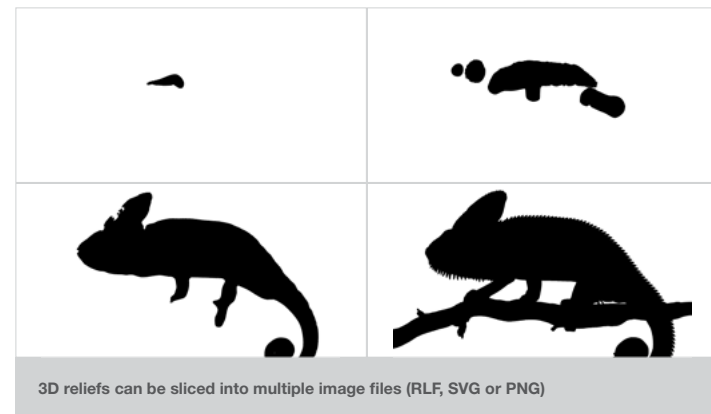
See 3D shapes take form instantly with the interactive 3D shape creation tools

Rotary models can be developed as the basis for designs, with the ability to wrap reliefs around them.



Specify the rotary model's dimensions, orientation and resolution, and then add the relief

On the machining side, custom tools can be created using an open vector to represent the tools' profile, while relief slicing is available to divide high reliefs for CNC machining, laser engraving or 3D printing as a series of files. A number of machining options previously available in ArtCAM Pro have been moved into ArtCAM Insignia. The weave option can turn vectors into 3D weaves to provide complex decorations, while the ability to use offset machining can give a superior finish in many applications.

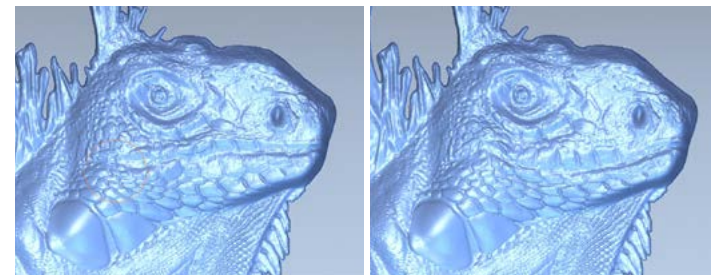


3D reliefs can be sliced into multiple image files (RLF, SVG or PNG)

## ArtCAM Pro

ArtCAM Pro incorporates a wider range of 3D modelling and machining options for skilled artisans wishing to design and manufacture complex 3D designs and sculpted reliefs.

A key development for 2015 is the new putty tool for modelling. This allows models to be edited by picking an area to be moved, swirled, pinched or puckered. As with the upgraded 3D editing tools also in Insignia, these extra operations operate in real time. They will be especially valuable when creating a series of variants on a repeating element in a design, such as a number of flowers making up a bouquet or subtly changing the details of a design such as facial expressions. Together with the existing 3D tools in ArtCAM Pro, they will help the most ambitious designers create any shape they can imagine.



The new putty tool allows subtle changes in the details of the design

Also new is the ability to select multiple relief elements from a model's project tree and then add them to the clipart library.



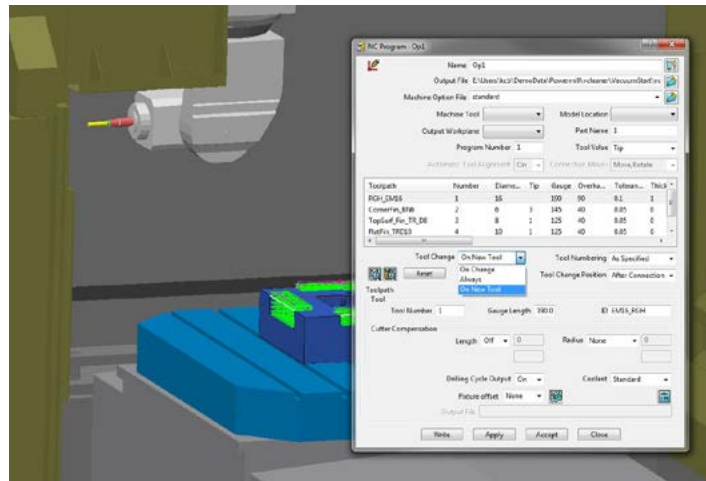
# New PowerMILL released

## PowerMILL 2015 R2

The 2015 R2 version of PowerMILL has been released with improvements in toolpath simulation and verification, area clearance and drilling, plus more options for user customisation.

In the new release, complete verification can be undertaken of a project for machine-tool issues such as collisions, rather than having to undertake verification of each individual toolpath in turn. Comprehensive verification is performed, including checking that the machine tool is capable of running the proposed strategy, and of both machine-tool collisions and tooling collisions. A detailed list is generated of any problems found so that these can be fixed on a case by case basis.

In related improvement, automatic collision checking of area-clearance toolpaths now takes into account any remaining stock on a model, both when checking the cutter and the tool-holder. In addition, all tool-holder collision checking for area clearance takes place during toolpath calculation,



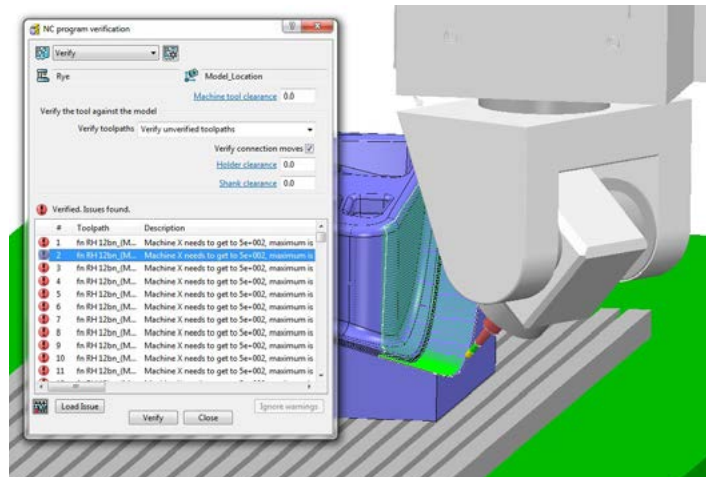
Machine tool movements during tooling changes can be simulated

ensuring that these toolpaths will now be completely free of tool-holder collisions.

Simulation has also been improved with the addition of the ability to simulate machine-tool movements as tool changes are executed. Again, a list of any problems found is produced so they can be corrected.

Two enhancements have been made to the drilling options in PowerMILL. Firstly, drilling calculations can now reference a stock model instead of the block, with toolpaths created from the point when the tool touches the stock. This reduces the time spent air cutting. Secondly, drills larger than the milling tool can be used when drilling is being used to create an entry point for area clearance. Alternatively, a larger entry hole can be created by helical ramping of the tool.

The options for user customisation have been increased steadily over the last few releases of PowerMILL. These now include the ability to create keyboard shortcuts for menu items, toolbar items, custom commands or macros, allowing frequently-used commands to be accessed more quickly. Another new option allows expression fields to be added to custom toolbars.



Complete projects can now be verified in one operation

# World's biggest CAM meeting

Delcam's South Korean joint venture, Hankook Delcam, held its 25th User Group Conference at the Hyundai Hotel in Kyeong-Ju on 26th and 27th September. The theme for the meeting was 'Big Jump Up', a reference to the large increases in productivity being seen by companies adopting software and services from Hankook Delcam. Over 1,300 attendees set a new record number for the event, reinforcing its position as the world's largest meeting for CAM users.

The meeting was the first major event to be held for Korean users since the acquisition of Delcam by Autodesk in February. The audience was, therefore, especially interested in the presentations from Delcam President, Clive Martell, and Buzz Kross, senior vice president for Design, Lifecycle and Simulation products at Autodesk.



Hankook Delcam President, Chan Oong Jeong, and his staff welcome the 1,300 delegates to the company's 25th User Group Conference

# More flexible footwear design

## ShoeMaker 2015

3D Concept Design & Visualisation

Delcam CRISPIN has launched the 2015 release of its ShoeMaker Pro CAD software for the design of all types of footwear. The new version incorporates improved import of last designs, the introduction of style-line templates to speed up the creation of classic shoe designs, more flexible design of heels, and the ability to create a flattening-parameter file based on existing lasts and patterns.

For further details on the new release, please go to [lz.delcam-crispin.com](http://lz.delcam-crispin.com)

ShoeMaker Pro is the only CAD program for footwear that integrates fully the 3D design of lasts, uppers and soles, so allowing the complete shoe to be developed and visualised in a single system. This integrated approach benefits all footwear designers, but is particularly advantageous for companies making sports shoes and other designs that include complex soles.

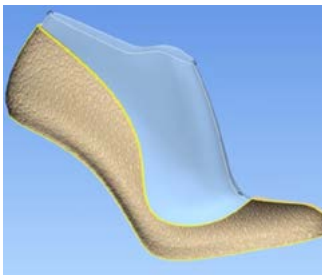
In ShoeMaker Pro 2015, the last import wizard has been improved to give more efficient import of last designs. Once the design has been imported, key points on the last can be identified, such as the heel-top point, the heel-bottom point and the toe point. Nodes on the top curve, feather curve, centre curve and heel curve can be edited, if required.

For companies using lasts from their existing ranges, the last filter makes it quicker and easier to select the required last from the last library. Upper and lower values required for different properties can be added into a filter dialog to find lasts that meet the desired criteria.

Another new tool in the 2015 release allows ShoeMaker Pro to analyse flattenings that have been created outside ShoeMaker and then use the findings to create a flattening parameter file. To create the file, a series of lasts and patterns need to be imported into ShoeMaker Pro, with each linked set given the same name. A degree of difference can be specified to control how close to the existing flattening the results from the new flattening parameter file need to be. Once created, the new file can be used for any future flattening operations.

The addition of style-line templates to ShoeMaker Pro will speed up the generation of classic designs. Style lines from templates representing six different popular styles can be added to either or both the inside or outside of the last. Once added, the lines can be edited to create the new design or used directly to produce panels.

In a related development, three new options have been added for the creation of style lines based on standard geometric shapes. Circles, rectangles and polygons can be placed directly onto the 3D surface of the last, making it easier to create panels from these shapes.



Textures can be added to materials more easily

ShoeMaker Pro designs can be made more realistic with the new ability to add 'bump mapping' effects to materials. A range of alternative textures are supplied with the software that can be dragged and dropped onto the material.

Two improvements have been made to the punching ability in ShoeMaker Pro. Firstly, it is now possible to fill an area with a grid of punches using the new pattern-of-punches tool. Secondly, a series of punches of varying sizes can be created along a line by specifying scale increments. A series of accessories of different sizes can be produced along a line in a similar way. In addition, it has been made easier to create custom accessories and add them to the library that is supplied with the software.

Finally, heel design has been made more flexible with a new option allowing one of various top-piece shapes to be chosen. Once the basic shape has been selected it can be edited using either a series of sliding bars or by inputting exact dimensions to give the required heel shape.



# Latest CAM developments presented

Delcam's Illinois office presented the latest developments in PowerMILL and FeatureCAM at its annual update meeting during November. The meeting was held at Ingersoll Cutting Tools in Rockford and included live cutting demonstrations on Ingersoll's Mori Seiki MV-65 and Toyoda UX570 CAT 40 machines.

Both demonstrations showed the machining of a metal replica football, one programmed with PowerMILL and one with FeatureCAM. Recognizing the divided loyalties of the region's Delcam customers, one was produced with a Chicago Bears theme while the other featured the Green Bay Packers. Part of the engraving process can be seen here - [www.delcam.tv/american-football](http://www.delcam.tv/american-football)



The Illinois user meeting included live machining demonstrations cutting metal replica footballs



# Mazak helmet demo on video



Delcam has added a video showing the machining of a complex cycle helmet on a Mazak Variaxis to its Delcam TV online TV channel at [www.delcam.tv/rudyhelmet](http://www.delcam.tv/rudyhelmet). The demonstration, which was programmed with PowerMILL, was first shown to large crowds on the Mazak stand at last year's BIMU exhibition held in Milan.

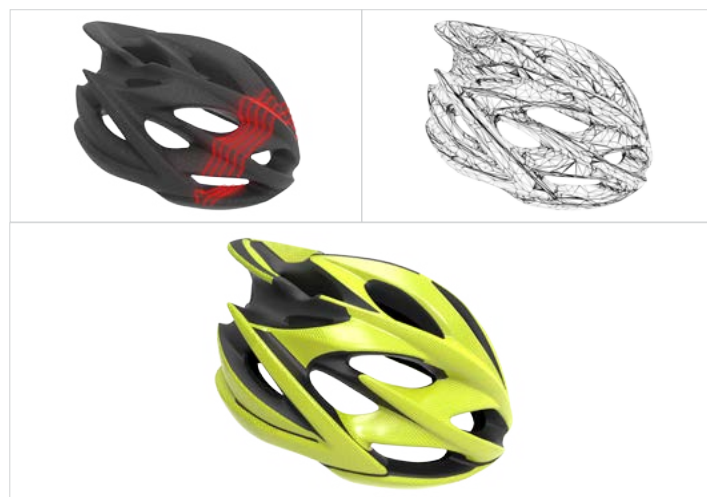
The same design was also machined during BIMU by CMS Industries and Isper. BIMU visitors were also able to see reverse engineering of the CAD model of the helmet from the Rudy Project original and machining with a robot from CIA Automazione on the Delcam stand.

A second video showing the complete project – reverse engineering with PowerSHAPE Pro, machining with PowerMILL and inspection with PowerINSPECT – is available at [www.delcam.tv/rudyhelmet-re](http://www.delcam.tv/rudyhelmet-re)

Franco Calloni, General Manager of Delcam Italia, chose the helmet for the demonstrations at BIMU after seeing it used by a cycling team that is sponsored by his company. "I was looking for a single object to demonstrate the complete Delcam solution," he explained. "I needed something that would be recognised instantly by visitors and that would show how easily Delcam's software can model and machine complex shapes."

The project began by using PowerSHAPE Pro to convert a sample helmet into a CAD model. The machining demonstration then shows how the five-axis capabilities of PowerMILL allow even a part as challenging as the helmet to be machined quickly and efficiently in a single set-up.

Finally, the machined helmet was measured with PowerINSPECT, to confirm that the shape of the original helmet had been reproduced successfully.



The cycle helmet was reverse engineered with PowerSHAPE Pro



News.Delcam is written and produced by Delcam.

Small Heath Business Park, Birmingham B10 0HJ, UK.

Tel: +44 (0)121 766 5544 | Fax: +44 (0)121 766 5511

Email: [marketing@delcam.com](mailto:marketing@delcam.com) | Web: [www.delcam.com](http://www.delcam.com)

© Copyright Delcam Ltd 2015. All trademarks are the property of their respective owners.