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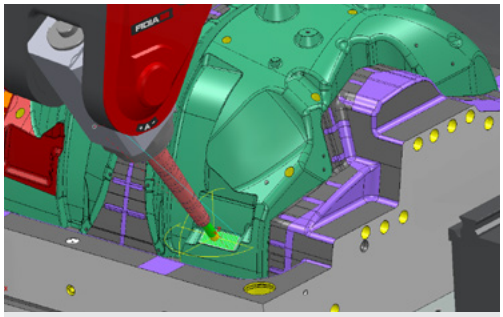
Delcam
Complete CADCAM Solutions

ISSUE 3 2015

Advanced Simulation & Verification webinar

The recent webinar on the Advanced Simulation & Verification module in PowerMILL is now available for download from **www.delcam.com/asv-webinar**

Simulate | Optimise | Verify



The Advanced Simulation & Verification module in PowerMILL provides comprehensive checks on machine-tool projects

The webinar demonstrates how PowerMILL provides complete verification 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 shown, including how to ensure that the machine tool is capable of running the proposed strategy, as well as methods for checking for both machine-tool collisions and tooling collisions, during cutting moves and all leads and links, including machine-tool movements as tool changes are executed.

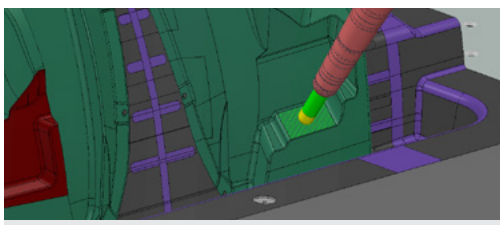
PowerMILL generates a detailed list of any problems found for the complete project so that these can be fixed on a case-by-case basis.

As well as highlighting potential collisions, warnings can also be flagged for near misses. The user can specify a clearance value and, when any machine tool component comes within this value, it will turn yellow to highlight a near miss. The clearance distance is shown in the display so that a decision can be made on whether to keep or change the toolpath.

Also demonstrated are a new PowerMILL dialogue that can be used to track and adjust the position of the machine tool, and the special toolbar to simulate and adjust the configuration and tool axis of a 3+2 machine or any equipment with incremental rotary axes.

The dialogue presents data on the position of the machine tool, together with the limits set for each axis. It includes a slider to jog the machine components into position during the simulation and displays a warning if any axis limit is exceeded.

The toolbar can be used to edit the tool axis and the orientation of the machine tool. This allows quick and easy updates to existing toolpaths with the new parameters. Warnings appear automatically in the event of machine-tool collisions or axis-limit violations. In addition, a new workplane that is aligned to the new axis and orientation can be created for subsequent programming operations.



A new toolbar can be used to edit the tool axis and the machine-tool orientation

The webinar also shows how another new plug-in for PowerMILL can provide a graph of the linear and rotary axes of the machine during the simulation. Analysis of this graph allows users to locate any potential problems, such as sudden changes in direction or axis reversals that can adversely affect the surface finish on the part. Adjusting the position of the part on the machine and running another simulation will often identify a solution to these problems.

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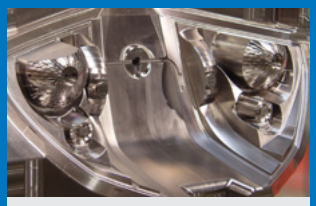
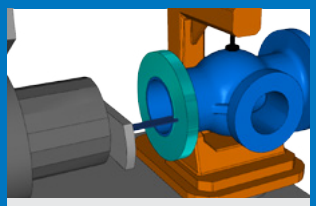
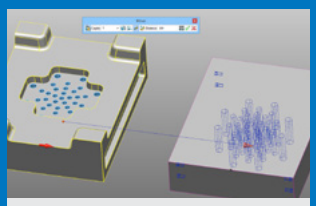






Making special effects extra special

A combination of Autodesk's Maya design software, the PowerMILL Robot programming system and a KUKA robot allows special effects company, Artem, to bring amazing projects to life.

A video showing the process at www.delcam.tv/artem

Artem provides special effects of all types from giant puppets to small film props from its base in West London. "We get involved in all sorts of technology, the most recent being robot machining and 3D printing," explained Artem CEO, Mike Kelt. "Much more is done on a computer now than has ever been done in the past when it used to be very much an industry based on hand skills."

"One of the challenges is dealing with clients who aren't entirely sure what they want," added Mr. Kelt, "so you have to tell them what you think they want and get them to approve things. If you can do the design on a computer with Maya and send them an image that's rendered, then they can go "yeah that's it", and we can carry on with the design and manufacturing process."

"We are able to use the software to see how the robot is going to cut the material and to see the finish we are going to get, while the software also lets us see how the robot will react in the cell and make sure that it is not going to do something silly."

The team at Artem explained how the process develops, starting with modelmaker, Jim Bones. "My main job is to pose the figure," he said. "I sit down with the sculptor and we'll tweak everything to get it all in the right positions. Importing a RIG model on Maya is a massive advantage as it comes with all these handles. I can just grab them and pose every little bit of the model. It's all very easy to use."

Using a KUKA robot programmed with PowerMILL Robot allows Artem to machine large, complex pieces

"We often start with the photograph and position the Maya RIG model to look like the photograph," continued Andrew Freeman, Digital Sculpture and CNC Supervisor: "Then we can export the model from Maya into another software, a sculpting package, that's going to allow us to fine tune the model, add on the clothing, change the muscles to give the look that the client wants. Once the design has been approved, we can start chopping the pieces up and putting them into the Delcam software to prepare them for cutting on the robot."

"We are going to try and extend the software to the other machines now. For me, PowerMILL is very easy to use and it's very good at what it does."

The programs for the robot are developed by Design Engineer, Ken White. "We import the part designs into PowerMILL Robot as a series of STL files," he stated. "For each element, we create roughing and finishing passes which we then simulate to see how they machine. Once I am happy, the toolpaths are output as G-code to the KUKA robot for machining."

"Because we are using STL files, creating boundaries is very important to be able to get to certain areas of the model," he added. "The robot allows us to machine very large pieces so keeping the number of parts to as few as possible. We are able to use the software to see how the robot is going to cut the material and to see the finish we are going to get, while the software also lets us see how the robot will react in the cell and make sure that it is not going to do something silly."

"I see a really bright future for Delcam with this company – we're delighted with the robot and the software," concluded Mr. Freeman. "We are going to try and extend the software to the other machines now. For me, PowerMILL is very easy to use and it's very good at what it does."

Cavalier Tool was an early user of Delcam Electrode

Cavalier Tool wins Leadtime Leader Award

Delcam is pleased to congratulate its customer Cavalier Tool & Manufacturing on being awarded MoldMaking Technology's annual Leadtime Leader Award for 2015. The Award, which recognises the outstanding efforts and growth of North America's top mould manufacturers, was presented at an awards ceremony on 17th June, during the 2015 Amerimold expo in Rosemont, Illinois.

The Honorable Mention Award went to a second Delcam customer, Wisconsin toolmaker Dynamic Tool and Design.

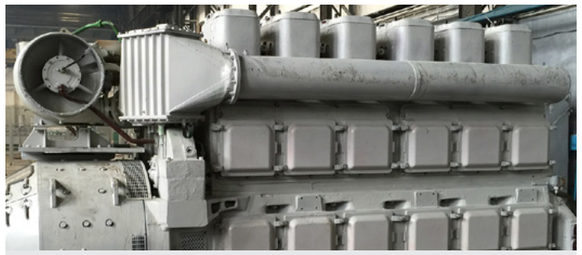
Each year, MoldMaking Technology searches for companies that have successfully set a higher standard for overall innovation, efficiency, quality and commitment in mould manufacturing. "Cavalier Tool was chosen for the 2015 Award in recognition of the way the company has transformed its business by implementing a standardised, flexible process, advanced technology and a people-centric philosophy. Cavalier Tool attributes that have contributed to this win include: an appetite for technology, precise customer profiling, a solid social media campaign, a new EDM cell, unattended operations, a focus on more value-added activities, co-development of new electrode software, automated machine monitoring, offsite educational training and much more," said Christina Fuges, Editorial Director of MoldMaking Technology.

Cavalier Tool was one of the first users of the Delcam Electrode software for the design, manufacture and inspection of electrodes, with the company's feedback providing important guidance in the development of the system. Subsequently, the company, which creates 200 or more moulds each year, has gone from outsourcing about $600,000 a year on EDM to pulling all that work back in-house with a single OPS Ingersol machine and Delcam's software.

A video showing Delcam Electrode in use at Cavalier Tool can be seen at www.delcam.tv/cavalier

Five-axis blisk machining

In order to improve its competitiveness, the Penza Diesel Plant in Russia uses the latest high-technology production methods. These include programming the company's advanced machine tools with PowerMILL.



The Penza site has the ability to produce all the components of its diesel plant

The Penza plant, which is located between Moscow and Samara, was founded in 1949. The complete complex includes areas for casting, forging and pressing, machining, welding, assembly and maintenance, giving the plant the ability to produce all the elements of its products completely independently.

In 2005, the factory acquired a Nakamura-Tome Super NTX high-performance turning and milling machining centre, for the production of the blisks for its turbochargers. A further five-axis machine, an OKK VP-600 5AX vertical machining centre, was added in 2010. This is used for blisk manufacture and also for the production of moulds for precision casting of turbine blades and other components. Both machines are programmed exclusively with PowerMILL.

"We compared this figure with the productivity of our colleagues in related businesses using other CADCAM systems and found that they were taking several times longer."

"We chose PowerMILL after we completed a number of pilot projects in cooperation with experts from the Centre of Computer Design within Penza State University," remembered Andrey Sverchkov, the Deputy Technical Director at Penza Diesel Plant. "As a technologist by training and after having many years of experience using various CAM systems, it took me about a month of working with PowerMILL to gain an in-depth understanding of the program."

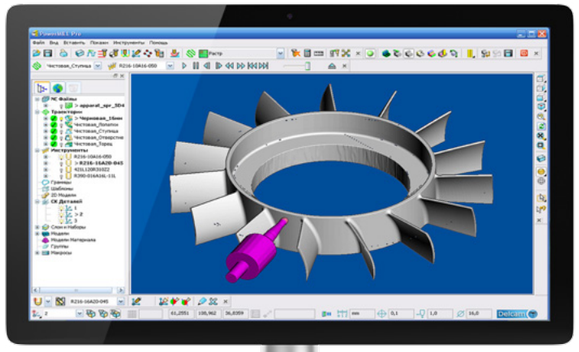
Mr. Sverchkov is still personally engaged in the development of many of the CNC programs in PowerMILL. "The main benefits are the speed with which I can generate even complex programs and the many opportunities to edit toolpaths manually to get exactly the results I need," he claimed.

"We also use the supporting CAD system, PowerMILL Modelling, which offers a variety of surface modelling techniques," he added. "As a rule, we get CAD models of the finished products from designers in the Parasolid format. We undertake refinement of these designs to create an 'operational' 3D model that represents the shape of the casting. As well as using these models to develop the tooling designs to manufacture the parts, we also use them as stock models for all subsequent milling operations on the castings."

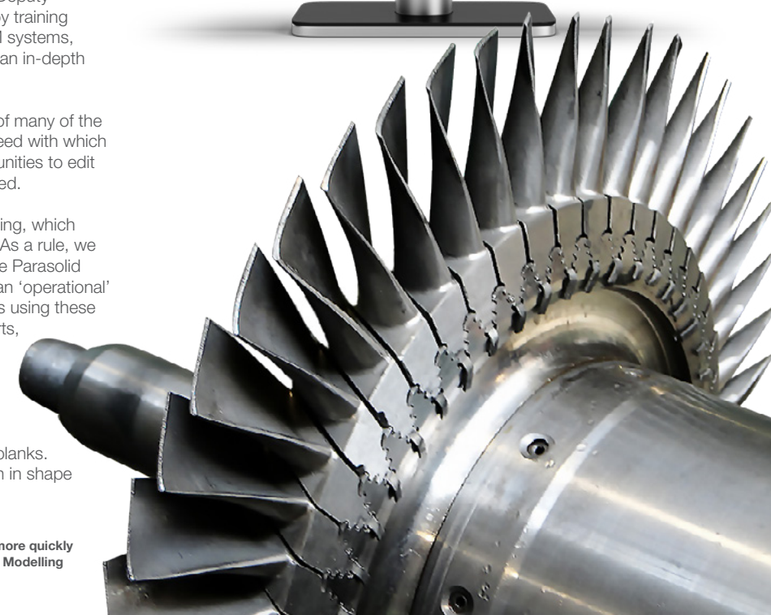
"The development of programs for machining of each new blisk requires about two days, taking into account the time spent on the construction of 3D models of the parts and the blanks. However, the various types of blisk may vary significantly, both in shape and size, and in the number of blades. Similarly, developing the models and programs for machining of our moulds usually takes no more than two days," claimed Mr. Sverchkov. "We compared this figure with the productivity of our colleagues in related businesses using other CADCAM systems and found that they were taking several times longer."

More recently, in addition to traditional metal moulds for precision casting of large parts, the Penza plant has begun using the Delcam software for the production of master models in either plastic or wood for the manufacture of composite components. Again, the tooling design is first developed in PowerMILL Modelling and the models then milled with PowerMILL. This approach was used in the production of the exhaust system for a new generation of diesel engine.

"After many years of working with PowerMILL, we have never encountered any problems in our machining due to issues with our CAM system, so it has become really trusted," concluded Mr. Sverchkov. "This is thanks to the specialists at Delcam Samara, who have developed high-quality post-processors for our machines."



All machining at Penza is programmed with PowerMILL



Penza is able to produce blisks more quickly with PowerMILL and PowerMILL Modelling

Mirroring machining projects

The 2016 version of PowerMILL has the ability to mirror complete machining projects in one operation and to maintain automatically the machining characteristics, for example to choose automatically whether climb or conventional milling should be used in each section of the toolpath. Previously, only individual toolpaths could be mirrored.

2016 LEARNING ZONE

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

www.delcam.tv/pm2016

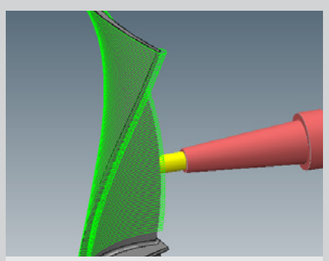
Automatic mirroring saves considerable time whenever right- and left-hand versions are needed of a part or tool. It will also be faster to program the machining of symmetrical objects since it will be possible to program one half and then mirror the toolpaths to complete the program.

To ensure that the mirroring has performed as expected, the new option can be used with the ability, introduced in PowerMILL 2015 R2, to undertake complete verification of a project for machine-tool issues such as collisions. Comprehensive verification can be performed, including ensuring that the machine tool is capable of running the mirrored toolpaths, as well as checking for both machine-tool collisions and tooling collisions.

PowerMILL 2015 R2 also saw the introduction of the ability to simulate machine-tool movements as tool changes are executed. The capability has been enhanced in the 2016 release by allowing more complex tool changes to be simulated, in particular those involving a carousel mechanism.

Other improvements to simulation in PowerMILL 2016 include a new form to print out the position of the cutting-tool tip during simulation, an auto-translucency option that will allow viewing of the table attach point at all times, and the ability to draw translucently the safe areas for rapid moves.

Development work has continued on the optional modules for PowerMILL as well as to the main program. In particular, a new, more efficient strategy to machine single blades has been developed for the



A new, more efficient strategy has been added for blade machining

Blades, Blisks & Impellors module, and a constant-Z machining option has been added to the module for programming the machining of ribs into tooling.

OMV provides “an invaluable tool”

PowerINSPECT On-Machine Verification provides “an invaluable tool” according to Process Application Engineer, Stewart Seedhouse, from the Makino-NCMT Grinding Division. The technology saves both Makino-NCMT and its customers considerable amounts of time and money.

Complex shapes are easy to measure with PowerINSPECT

PowerINSPECT OMV uses probing equipment on the machine tool to allow initial checking of parts to be carried out in situ on the machine rather than having to transfer them to coordinate-measuring machines for inspection.

NCMT has represented the complete Makino range of machining centres in the UK for many years. In 2006, in recognition of the company’s leadership in the application of VIPER grinding, the Makino-NCMT Grinding Division was set up in Coventry to market the technology throughout Europe.

VIPER grinding employs small, vitrified aluminium oxide wheels in creep-feed grinding mode on Makino machining centres, in place of conventional, plated cubic boron nitride wheels. It is mainly used in the production of components from nickel-based alloys, principally in the aerospace and power generation industries but also in the motorsport and medical sectors.

The technology is not only up to eight times faster than the conventional process but also reduces the cost of consumable significantly. Furthermore, the Makino range is the first to combine creep-feed grinding with milling, drilling and turning in a multi-processing environment, reducing the number of separate operations and, therefore, the set-up times.

Even so, the process remains extremely challenging due to the use of difficult-to-machine materials, such as Inconel, the complexity of the shapes that need to be produced and the high levels of accuracy that are required. In addition, many of the components are produced from forgings or castings, which can be both expensive and in very limited supply.

“In a typical project, our customer might be required to produce at least 30 conforming parts from 32 high-value castings,” explained Mr. Seedhouse. “Anything that can make the process more reliable and more accurate is hugely valuable.”

The first stage of most projects uses the PowerINSPECT software to check the machine kinematics by taking measurements from a standard sphere in a known position on the machine. This takes one to two hours but is essential to ensure that the accuracy of future measurements can be trusted.

The next stage is to inspect the datum locations of all the fixtures to be use in the process and, in some cases, their clearances. This is necessary, said Mr. Seedhouse, because “although we expect to receive the fixtures in the correct state, being able to ensure they are correct to what we expect at this stage can save a whole lot of time and effort trying to find a problem later on.”

Following these checks, the first part is loaded and OMV is used to measure the amount of stock to be removed. If necessary, the position of the part can be adjusted or a modification made to the datum being used in the machine-tool control to give a more even distribution of stock around the required final shape. The complex shapes found in many of the components would be difficult to check with physical measurement but are easy to measure with PowerINSPECT OMV.

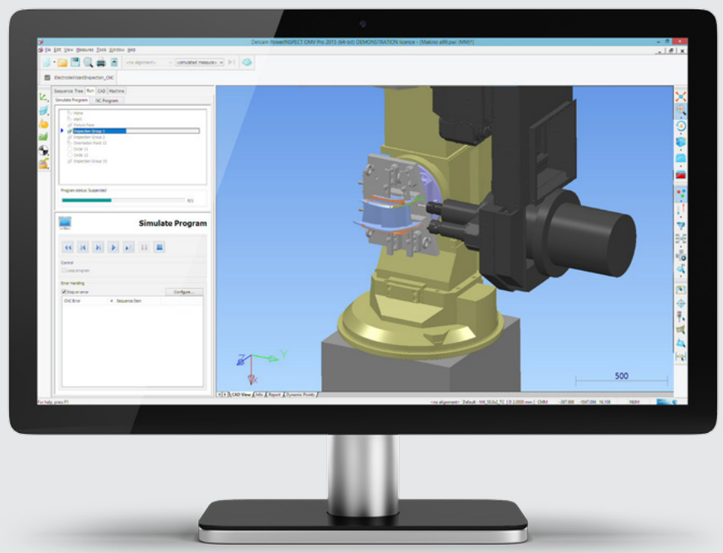
“With new parts and possibly multiple casting suppliers, we often check the amount of stock on the component prior to machining,” explained Mr. Seedhouse. “Too much stock on the component can lead to metallurgical problems such as cracking and burning, or wheel breakdown leading to geometrical problems, and, in extreme cases, even damage to the machine. Once you know that there is more stock than expected, it is easy to add in an extra cut to remove this excess material safely.”

Another potential problem is that residual stress within a forging or casting can be released during machining and change the shape of the part. “If we think this might happen, we carry out an initial cut with extra material left on to release the stress,” said Mr. Seedhouse. “We can then check if any movement within the part has occurred with OMV and so allow the finish machining to be performed accurately.”

OMV is also used to check fixture and part positions after any heavy cuts that might have moved the part or if any problems have occurred during machining.

“PowerINSPECT OMV is an invaluable tool when making any new component or installing a new machine,” claimed Mr. Seedhouse. “It gives you a high degree of confidence almost immediately because it is very, very quick to provide basic measurements on the key points of the part.”

“It can save weeks of time that might be spent waiting for a CMM to be available and for a metrologist to analyse the results,” he added. “OMV even gives us the confidence to ask the customer to check the CMM if the measurements show any errors. In my experience, if the part gives the correct results with OMV, there is not going to be much wrong with it.” This faster commissioning benefits customers because initial test batches can be produced more quickly with high confidence that the parts will be to the required standard.



Simulations in PowerINSPECT give a high degree of confidence

Closing the skills gap

Finding enough skilled employees is regularly highlighted as one of the key challenges for manufacturing companies. The skills gap affects companies around the world, from emerging economies that need to develop more skilled people to continue their growth to developed countries in North America and Europe that need to train new staff as their current employees move closer to retirement.

Delcam staff helped local primary schools with their entries in the Jaguar Primary School Challenge

Delcam recognises that its responsibilities extend beyond supplying the best software that it can. Customers must also be supported in their efforts to develop the skills of their workforces. Of course, this starts with providing good quality training for new users. Delcam offices around the world also organise regular user meetings to demonstrate the latest advances in the software so that users can maximise their productivity with their programs.

At a more fundamental level, Delcam's offices work closely with universities and technical colleges to train the users of the future. Both software and training for tutors are provided to all educational establishments at heavily discounted rates.

Even well trained and experienced staff still need help from time to time on their most challenging projects. Every Delcam office is able to provide telephone support from experienced engineers to help customers with any problems they might experience when using their software and on related topics, such as the best choice of machining strategy or tooling. This support is provided as part of the standard maintenance contract, in addition to the regular updates to the software.

More recently, Delcam has introduced a number of extra web-based services to help customers to develop their skills.

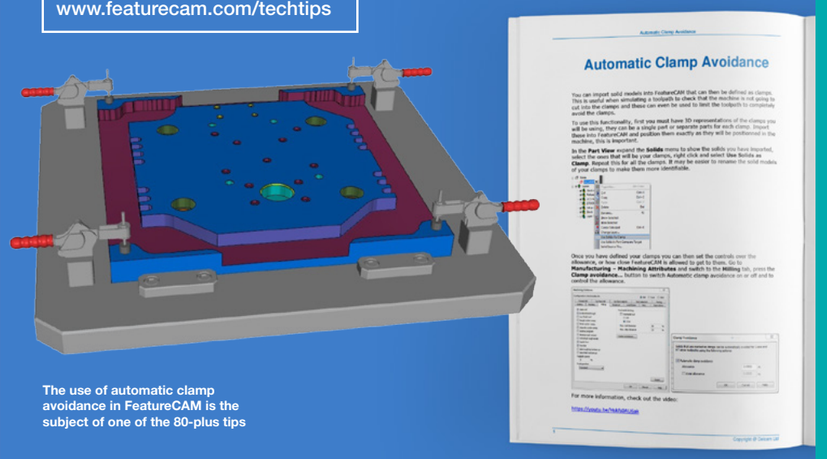
FeatureCAM technical tips

A section for technical tips has been created on the FeatureCAM website.

The tips aim to help users with all aspects of programming with FeatureCAM, including milling, drilling, turning, creating geometry, simulation and generating NC code. Each tip is saved as a pdf file that can be read online or downloaded for future use.

The tips complement the videos that are produced for the FeatureCAM Learning Zone, which demonstrate extra functionality that has been added to each new release of the program.

More than 80 tips are listed in the new section, located at www.featurecam.com/techtips



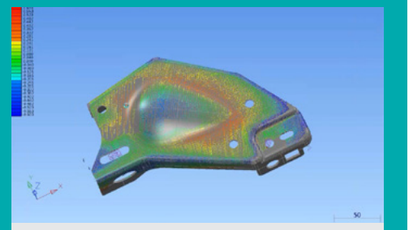
The use of automatic clamp avoidance in FeatureCAM is the subject of one of the 80-plus tips

New webinars on PowerINSPECT

A recent series of webinars on inspection technology has been made available for online viewing or download. The webinars include a general introductory video explaining why measurement is critical to manufacturing efficiency, together with more specific videos on laser scanning, retrofitting and shop-floor inspection.

To watch or download the webinars, please go to www.delcam.com/webinar

The introductory webinar, which was presented in partnership with Coventry University's Metrology Department, explains why measurement matters to the future of manufacturing. It looks at sources of uncertainty in making measurements, including equipment, people and environment, and then considers how to minimise these problems to achieve better throughput.



Analysis of laser-scanned data with PowerINSPECT is covered in one of the webinars

The webinar on laser scanning shows how to use the PowerINSPECT inspection software on a range of hardware devices, including FARO and ROMER portable CMMs, and how to extract geometric features from the resulting point-cloud data. Advice is given on how to choose and use the best approach, either laser scanning or probing, to measure different types of geometry.

Delcam partnered with Pantec Metrology to present the webinar on retrofitting. This presentation focuses on how retrofitting can make CMMs more efficient and the other benefits that can be realised. The presentation includes a case study showing how upgrading from manual to CNC operation could improve throughput and quality, plus a demonstration of the CNC version of PowerINSPECT.

The webinar on shop-floor inspection offers a variety of tips and tricks for people using PowerINSPECT with portable measuring devices. It includes two demonstrations, one showing the inspection of a machined casting and the second giving an example of dual-device inspection with PowerINSPECT.

The new Learning Zone App contains videos demonstrating the latest developments in Delcam's software

LEARNINGZONE

Delcam has made the Learning Zones for its full range of CADCAM software available as a free App for iPads.

The App can be downloaded through www.delcam.com/apps

The Delcam Learning Zone App comprises tutorials for the latest releases of all Delcam software. A selection of case study videos from the Delcam.tv website is also included, in which a number of customers talk about their relationship with Delcam and the benefits they get from using the software.

Users with suitable internet connections can stream the videos using the Learning Zone App. Alternatively, the videos can be downloaded and then viewed offline at any time.

The videos can be filtered by product and/or by industry category to help viewers find the content that is relevant to them. In addition, any of the videos can be made a 'favourite' so that it is easy for users to go back to their preferred material.

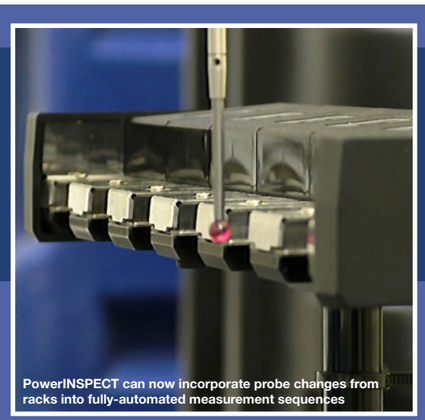
While the Learning Zone App is intended mainly for existing customers, it will also help companies interested in adding Delcam software to see the latest developments in the programs.

New tutorials for new product releases will be added to the Learning Zone App as they are developed to help users make the most of each new version of their Delcam software.

The current version of the Learning Zone App can only be used on iPads but an Android version is also being prepared that will be released shortly.

Download on the App Store

Faster and easier inspection

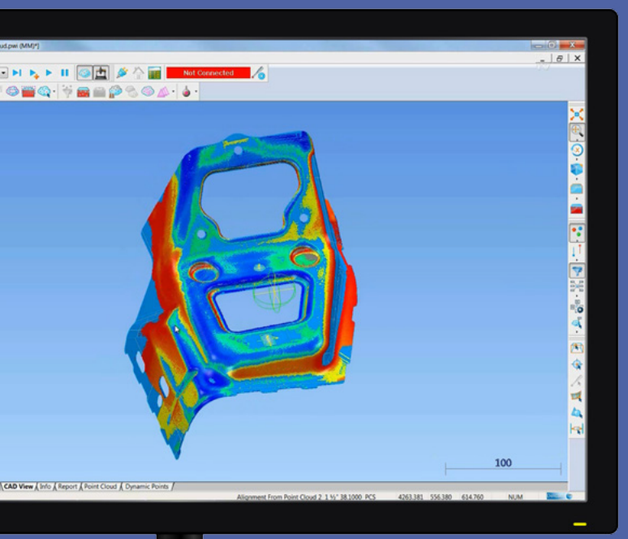


PowerINSPECT can now incorporate probe changes from racks into fully-automated measurement sequences

The 2015 R2 release of PowerINSPECT makes it easier to complete fast and accurate inspection of complex assemblies. The new version includes more options for automation of inspection sequences, including automated probe changes, automatic feature extraction for point cloud batch inspection, and greater control over collision checking.

For full details, including video demonstrations of the new options, please go to www.delcam.tv/pi2015

The main improvement for users of CNC CMMs is the addition of support for MCR20 and FCR25 probe change racks. PowerINSPECT can now incorporate probe changes into fully-automated measurement sequences. Enhancements to the probe database allow the user to define probe tools in terms of 'sub-assemblies' which can be docked in the rack ports. A typical example of a sub-assembly is the combination of a probe module and a stylus.



Users now have better control over RPS alignments

Once created, the sub-assemblies are allocated to specific ports in the probe change rack, and the user defines the physical location of the rack on the CMM by measurement. PowerINSPECT carries out probe changes as required by the measurement sequence and keeps track of the sub-assemblies as they move between the probe head and probe rack.

A new 'zoom-to-fit' option is available that shows, in the CAD view, groups or individual items that have been selected in the sequence tree. This option will save considerable time, especially when locating specific features in large, complex CAD models or long measurement sequences.

It is also easier to navigate between the graphical display of the CAD model and the CAD file manager history tree. Selecting a CAD level or individual surface in the graphical CAD display highlights the corresponding item in the CAD file manager history tree. Similarly, selecting an item in the history tree highlights the corresponding surfaces in the graphical CAD display.

PowerINSPECT 2015 R2 includes a new way of evaluating features from point-cloud data that makes batch inspection much easier. Geometric point-cloud features can now be evaluated from suitable scan data that exists anywhere in the PowerINSPECT document. The features are created in the usual way, either from the geometric toolbar or by using the wireframe checker. The entire sequence can be created in advance and then PowerINSPECT will evaluate the results automatically as soon as the scan data is available. Operators measuring subsequent, similar parts just have to perform the scan and the sequence of features is evaluated automatically. Once the scan is complete, all specified features are calculated and the report is updated automatically.

With PowerINSPECT 2015 R2, users have better control over RPS alignments thanks to a new option to define which features are used for any best-fit calculations, rather than calculating the best fit across all of the features selected for the alignment. It is also now possible to apply an offset to an RPS alignment, if required.

Improvements to the graphical display have made programming of CNC edge points much easier and more intuitive. When creating edge points, PowerINSPECT displays a live preview of the edge point based on the current cursor position. When editing edge points, the point pairs and probe paths update simultaneously as the point is dragged along the edge.

Finally, a new option has been added to measure waviness or small fluctuations in surface smoothness that can result from cutting tool wear or worn machine components causing vibrations during machining. Waviness defines the allowable variation within a localised region. This allows simultaneous control of very tight tolerances inside small localised regions and looser tolerances over larger areas. For surface inspection and point cloud inspection PowerINSPECT can now produce a waviness evaluation based on the differences between a point and its neighbours. Each point passes the waviness test if its variation relative to neighbours in the specified zone is within the tolerance limit. An overall value for the part is expressed as a ratio of the number of points passing the test to the total number of points measured.

Improved simulations in FeatureCAM

The 2015 R3 release of FeatureCAM includes a range of enhancements to give high-quality results on all types of machine tool, including complex mill-turn equipment and five-axis machining centres, while retaining the rapid programming times for which the software is renowned.

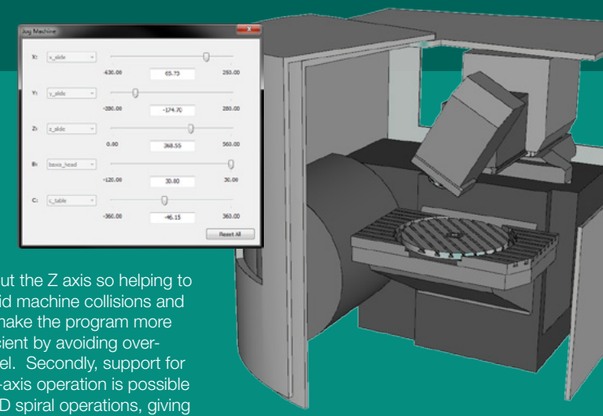
Full details on the new release, including video demonstrations of the main enhancements, are on the Learning Zone – www.delcam.tv/fc2015

The most significant new option is the ability to duplicate the physical constraints of the machine tool in simulations in FeatureCAM. Machine-tool limits can be added to the models to be used in the simulation for three-, four- and five-axis milling machines, for turning equipment, and for mill-turn machines, including those with multiple turrets and/or multiple spindles. It is then possible to check that the chosen machine tool is capable of completing the proposed program for all types of equipment, from the simplest lathe to the most complex multi-tasking machine.

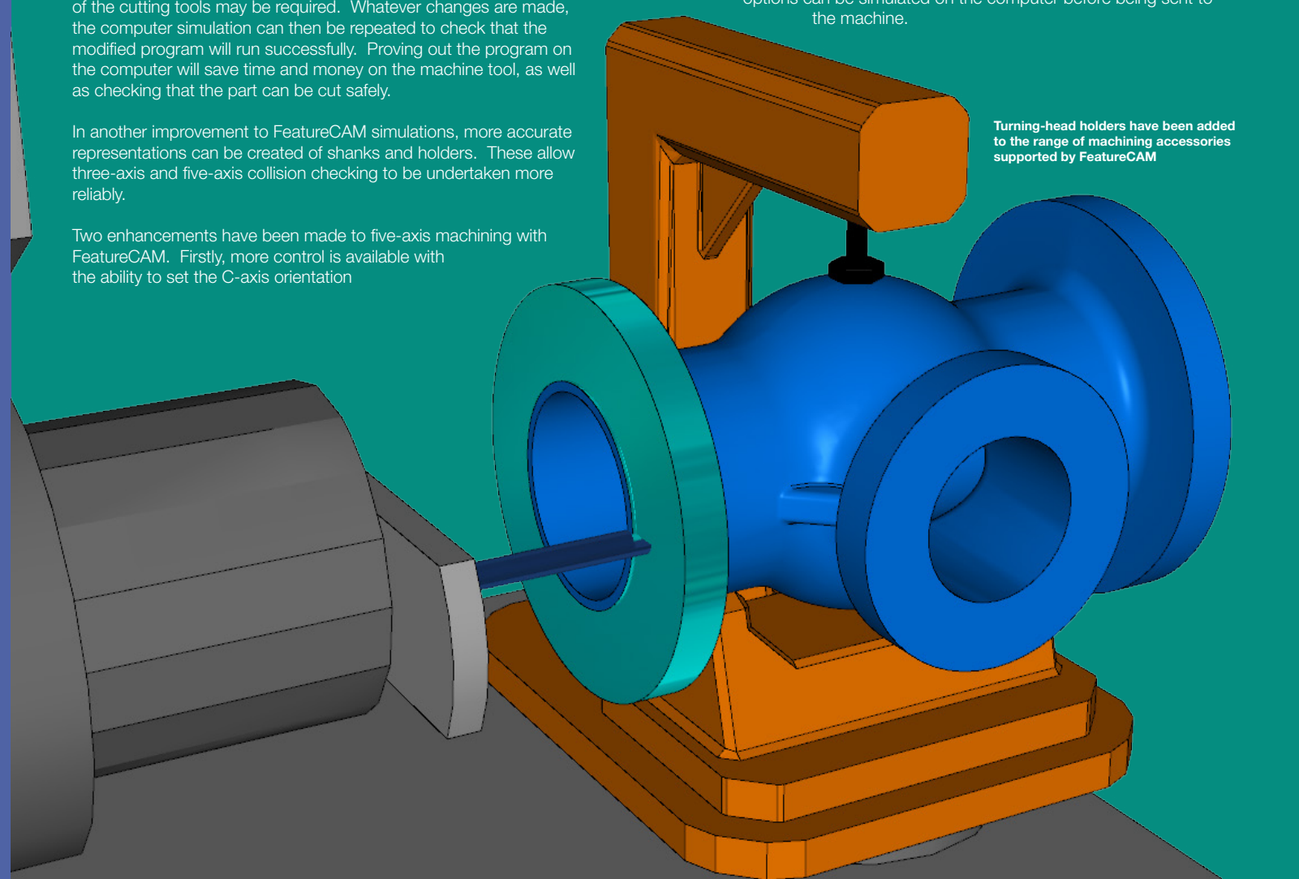
The simulation will pause whenever the program attempts to move the machine beyond the specified limits. In many cases, simply changing the position of the part on the machine bed will allow the whole operation to be completed. Alternatively, modifications to the fixturing or to the length of the cutting tools may be required. Whatever changes are made, the computer simulation can then be repeated to check that the modified program will run successfully. Proving out the program on the computer will save time and money on the machine tool, as well as checking that the part can be cut safely.

In another improvement to FeatureCAM simulations, more accurate representations can be created of shanks and holders. These allow three-axis and five-axis collision checking to be undertaken more reliably.

Two enhancements have been made to five-axis machining with FeatureCAM. Firstly, more control is available with the ability to set the C-axis orientation about the Z axis so helping to avoid machine collisions and to make the program more efficient by avoiding over-travel. Secondly, support for five-axis operation is possible in 2D spiral operations, giving better control of the tool axis. This can ensure uniform depth of cut and cross-section when engraving onto complex surfaces, including parts with undercuts.



Additional accessories that are supported in the new release include turning-head holders and mini turrets. Turning-head holders allow turning to be undertaken on a milling machine, while mini turrets allow more flexible positioning of the tooling and faster tool changes. In both cases, the new options can be simulated on the computer before being sent to the machine.



Turning-head holders have been added to the range of machining accessories supported by FeatureCAM

PartMaker Mobile App

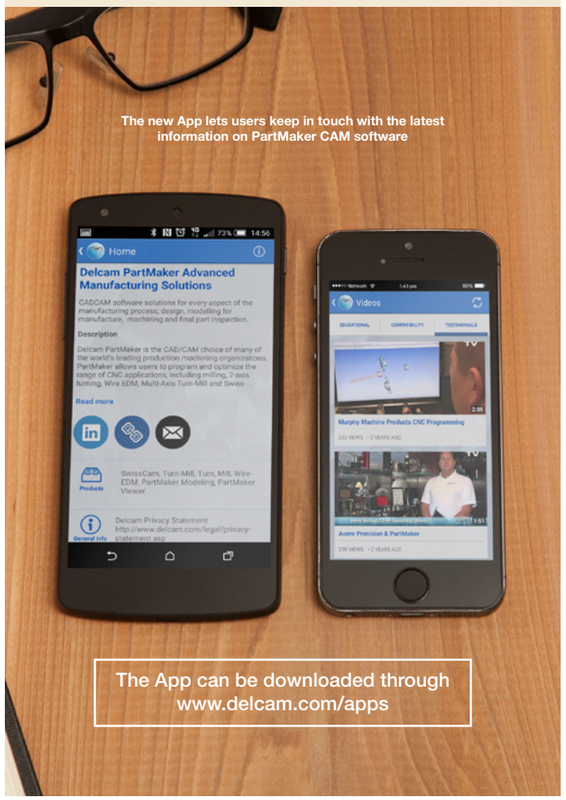
A new PartMaker Mobile App has been launched for smartphones and tablets to keep users in touch with the latest information on PartMaker CAM software while on the go.

The PartMaker Mobile App is available free of charge from the iTunes App Store or Google Play. It can be found easily by just searching for the key word "PartMaker" in the search area.

The PartMaker Mobile App is a great resource for PartMaker users. It allows them to quickly see when the next training class in their local area or other event of interest is being held. Users can check when and where PartMaker will be on display at trade shows and machine tool open houses, where they can directly interact with PartMaker product specialists.

The PartMaker Mobile App also features a link to educational videos hosted on PartMaker's YouTube channel. Users can also see an up-to-date schedule of educational webinars being hosted. Additionally, users can correspond with the PartMaker support team directly from the App, allowing them to get answers to their technical questions.

Download on the App Store | ANDROID APP ON Google play



The new App lets users keep in touch with the latest information on PartMaker CAM software

The App can be downloaded through www.delcam.com/apps

The composites challenge

After retiring from the rail industry, Stephen Ollier and his wife invested in their composites engineering company, Pentaxia. Today, with the support of PowerMILL the company is going from strength-to-strength.

Stephen Ollier established Pentaxia in 2008 when he was asked to help some former colleagues who had started a precision engineering business. He recalls: "They rented a five-axis machine tool and set up a business, but they had not had much experience in running a business, so they asked me if I wanted to join. I admit I found retirement a bit boring so I joined."

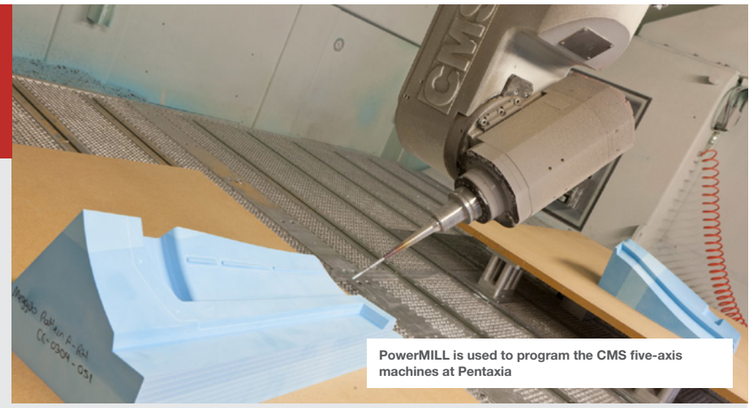
Originally located in a rented building with no running water or toilets, after six months the decision was taken to look for new premises. "In the beginning our customers were small composite companies," he said. "We supplied them with patterns and always focused on providing a reliable service. This was appreciated and we started to progress strongly."

By the second year, the company had two machines and decided to start looking at composite moulds and tooling for the aerospace industry. The business was also steered towards investing in composite component manufacturing and it now runs a full-service composite facility.

Today, the company employs 57 staff and has one of the largest five-axis facilities in the UK, with five five-axis and two three-axis machine tools installed in a 7,000 sq ft workshop. The site also has two autoclaves, a new Langzauner composite press, four clean rooms, a full inspection facility and new paint/lacquering booths. The ISO 9001 approved company also has AS9100 aerospace accreditation, and works with many of the leading Formula One teams, luxury automotive brands and aerospace companies.

"As Managing Director, I see my job as always providing the right equipment, the right machines to the right people," Stephen Ollier explained. "We have never been afraid of investing in the business and a key part of the investment is software; we started with Delcam and today we have three seats of PowerMILL, supported by VERICUT CNC simulation software."

Every machine tool is programmed off-line using PowerMILL and the post-processed NC code is then taken straight into VERICUT. "Using both software systems provides us with accurate run times. Although not perfect as they cannot predict everything, it is within five or ten per cent. This is important to our production planning as we have run uninterrupted jobs for up to sixteen hours," Mr. Ollier states.



PowerMILL is used to program the CMS five-axis machines at Pentaxia

Pentaxia's Production Services Manager, John Bates, and Production Manager Machining, Daniel De Cecco, selected PowerMILL. "Back in 2008, as the company started on its steep growth curve, we evaluated a number of the leading CAM systems available," recalled Mr. Bates. "We had some limited experience of Delcam from previous employers and, on testing, it offered us all of the capabilities we required with a simple, user-friendly interface."

"The PowerMILL interface seems to be much easier to navigate"

"Some of our employees have undertaken the Delcam 3-axis and 5-axis training courses, which provided a very good introduction to the system," added Mr. De Cecco. "Subsequently, we have then tailored our own training relevant to the type of work that we do. However, on the occasions where we have required support with a new strategy or any problems we have encountered, Delcam has been very helpful and quick to respond. These are important considerations when you are up against delivery deadlines and you need to get a job programmed and on the machine."

"We often produce complete suites of tools and we are very competitive on the machining side," he added. "For the majority of the components we produce in the composite business there will also be an element of machining required, such as trimming and drilling. We are unusual in that we offer a single source solution for the composite components industry, from design to prototype tooling and components right through to finished part supply."

Many of the jobs produced by Pentaxia are unique, and a majority of the files are received as solid models with the occasional 2D drawing. As a 'batch of one' there is a high degree of variation and also complexity for most of the work. Here, the ongoing development of Delcam's software comes to the fore. As John Bates comments: "We only use a small percentage of strategies that are available in PowerMILL; the development of just those strategies over the years has really helped us to speed up our programming time, allowing more jobs to be put through our machine shop."

The software's comprehensive range of high speed machining and multi-axis toolpath strategies allows users to tackle the most difficult and challenging parts while achieving faster machining times, reduced tool loads and producing smoother surface finishes.

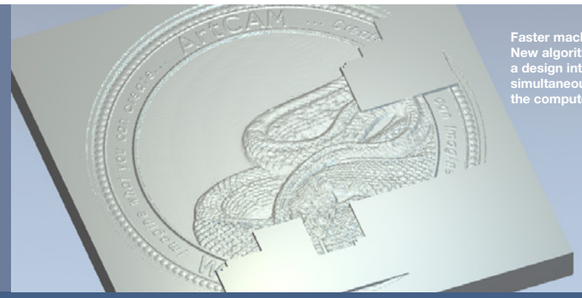
"Delcam is a great investment, particularly for any company starting out with CAM software due to its user friendliness and the good support," said Mr. De Cecco. "In comparison to a lot of the other CAM software systems I have experienced, PowerMILL seems to be much easier to navigate through the menus, and the way the process of creating programs is set out follows a straightforward, logical process."

"Using Delcam has helped us to grow and to be able to run efficiently," added Mr. Ollier. "Anyone looking to take their business forward needs to be using every available tool and I see PowerMILL as an essential part of our future."

High-speed machining strategies allow Pentaxia to achieve faster machining times

"One of the key things for us to do is move composites into the more cost-conscious markets," he concluded. "The challenge is to get production costs down and volumes up. We are always looking at ways to be more competitive and cost-effective. Delcam is providing us with the ability to run our sophisticated machine tools to the best of their ability to help achieve this goal."

ArtCAM range enhanced



Faster machining simulation: New algorithm divides a design into blocks for simultaneous simulation by the computer's GPU/CPU.

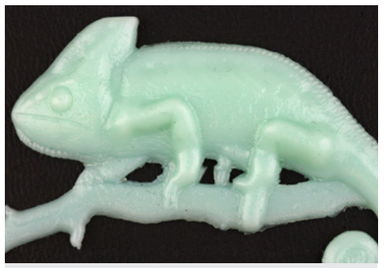
The 2015 R2 versions of the ArtCAM artistic CADCAM range of software include improvements in design and machining.

Full details on the new versions and the opportunity to download an evaluation version are on the website – www.artcam.com

ArtCAM Express/Insignia

The entry-level ArtCAM Express and ArtCAM Insignia introductory package for 3D modelling and machining have seen improvements in designing with vectors and reliefs, plus faster machining simulations.

Two options have been added in both programs to help users to design with vectors. Firstly, snap hints now appear to help in spotting hard-to-find snap points within vectors when creating designs. Secondly, the thickness of vectors can be changed, in either the 2D or 3D view, making it easier to visualise the design.



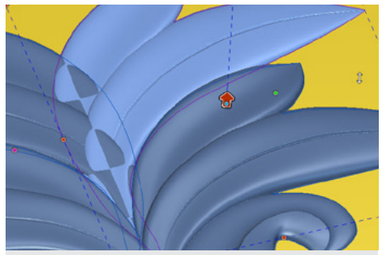
3D Print reliefs: Export 3D artwork to an Ember Printer as a .tar.gz file or as a .stl file for other 3D Printers

Accuracy will also be helped by the addition of rulers in the 3D view to make it easier to create precise artwork and to position elements of the piece.

The ability to overlap and intersect reliefs has been enhanced with a new option to interactively blend the reliefs. This allows relief clipart to be pulled up or pushed down in the Z axis to give a better blend with another 3D design.

The main machining enhancement for both Express and Insignia is significantly faster machining simulations thanks to a new algorithm that uses the specialist processor in modern graphics cards to calculate multiple operations simultaneously. This gives major benefits over standard multi-threading.

Another area of improvement is corner machining, where fillets can be added to vectors to allow more accurate machining of slots. In a related development, loops can be added for creating corners with knife cutting.



Interactively blend relief clipart: Pull or push down the height (Z axis) of selected Relief Clipart to blend with another relief or piece of Relief Clipart

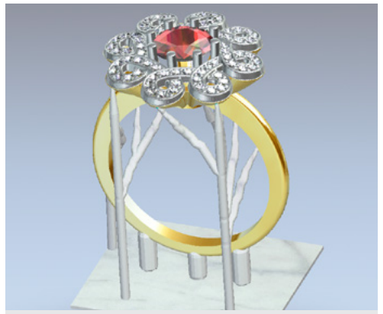
A further change to ArtCAM Express is the ability to 3D Print reliefs as well as to machine them. Previously, this was only possible with the other members of the ArtCAM range.

In addition, the optional Vector Tools module for ArtCAM Express has been enhanced with better layer management. Firstly, multi-coloured vectors can be imported from DXF files as a single vector layer or as separate layers. Similarly, several layers can be exported simultaneously. Secondly, working on complex models with multiple layers can be simplified by merging any layers not being used and placing them in the project tree.

Two extra new options have been added to ArtCAM Insignia but not Express. Firstly, the 3D weave tool now operates in real time, allowing designers to see their changes as they happen. Secondly, relief slicing can now output the slices as DXF files, making laser cutting of tall items easier.

ArtCAM Pro/JewelSmith

In addition to the new options outlined above, the main enhancement for both ArtCAM Pro and ArtCAM JewelSmith is the ability to create support structures for 3D Printing. Users can generate intelligent support structures, either manually or automatically, and can also add a tray for the printing of multiple items.



Enhanced 3D Printing: Choose to manually or automatically create intelligent supports for 3D Printing and add to a tray for batch printing

3D Printing offers jewellers an alternative route to machining for the production of highly complex models for sacrificial casting and for direct 3D Printing in gold.

The tools for assembly modelling have been improved making it easier and quicker to drag or rotate elements of the assembly into position. It has also been made simpler to undo any changes.

The creation of complex designs by grouping relief layers together has been made easier. For example, it is easier to combine the front and back of a miniature or a sculpture.

The number of modelling tools that operate in real time has been extended to include the ability to create smooth domed shapes or domes with a centreline ridge, as well as the option to make intricate weaves added to Insignia.

On the machining side, two new options are available in the 3D offset strategy. Firstly, it is now possible to spiral from the outside in or from the centre outwards. The strategy can reduce tool wear and give better surface finish. Secondly, on-surface links can be used. This reduces the number of plunge and retract moves and so saves machining time.

Complete complex designs more quickly

A series of enhancements to PowerSHAPE Pro for both modelling and reverse engineering will help users to complete complex designs more quickly and more easily. In addition, a combination of new, more efficient, code, together with the extension of multi-threaded calculations to many commonly-used tasks, will make the software significantly faster than any previous version.

For full details, including video demonstrations of the new options, please go to www.delcam.tv/pi2015

Full details, including video demonstrations, are on the Learning Zone – www.delcam.tv/ps2016

The first enhancement in the 2016 release allows groups of features to be copied between two solids in a single operation. While the features do not need to be of the same type, the most common application is expected to be in copying patterns of holes with a single click from one solid to another, for example from one mould plate to any other plate in the mould stack.

Another new option that should save modelling time is the ability to edit the axis direction of any number of surface or solid primitives simultaneously. Similarly, the axis direction of a group of primitives that are not aligned can be brought into alignment in one operation. PowerSHAPE Pro already had the ability to edit simultaneously the dimensions of groups of primitives.

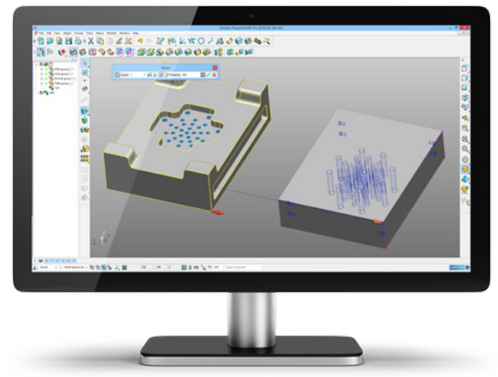
For customers using PowerSHAPE Pro to capture data for reverse engineering, the software can connect directly to most scanning hardware to capture and display scan data in real time. In the 2016 release, it has been made easier to switch between measuring modes when using devices that have both laser-scanning and point-probing capabilities.

Reverse engineering has been made easier for prismatic parts, with the new ability to identify planes, cylinders, cones and other primitives, or to create wireframe arcs and lines, directly from probed points. This approach can often be more accurate than using scan data to create prismatic areas of a model.

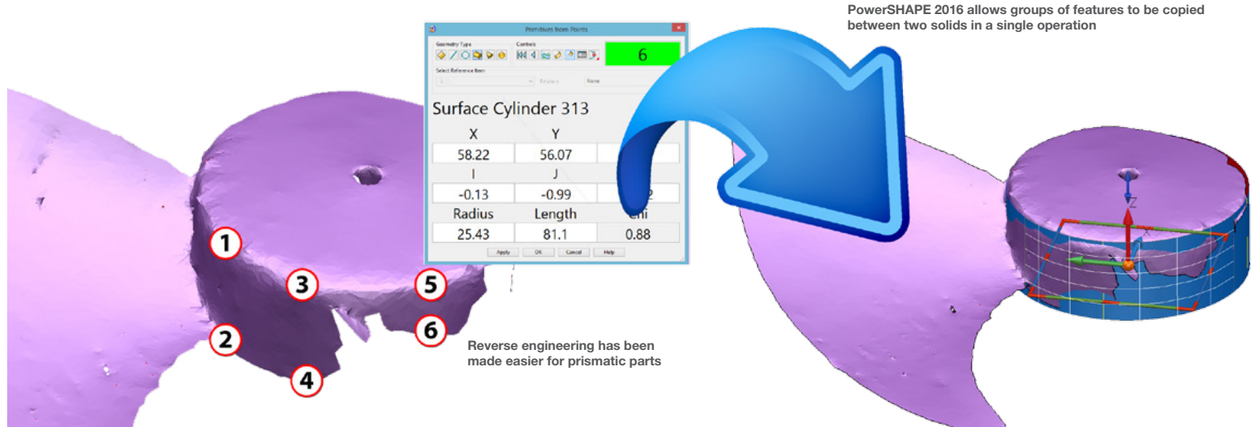
The ability to replace regions of complex, free-form geometry with a single, shrink-wrap surface was introduced in PowerSHAPE Pro 2014 R2. In the new release, it has been made easier to re-orient such surfaces interactively and so place them in the most appropriate surface alignment.

In addition to these new options, a wide range of speed improvements has been made to the core modelling functions. Specific items affected include opening and displaying models in both wireframe and shaded views, displaying any single layer that had previously been drawn, projecting curves onto multiple surfaces, replaying complex solid history trees, selecting solid features, either graphically or using the history tree, and selecting multiple faces of a solid.

The degree of improvement varies according to the size and complexity of the model but can be as much as 40% faster with larger models.



PowerSHAPE 2016 allows groups of features to be copied between two solids in a single operation



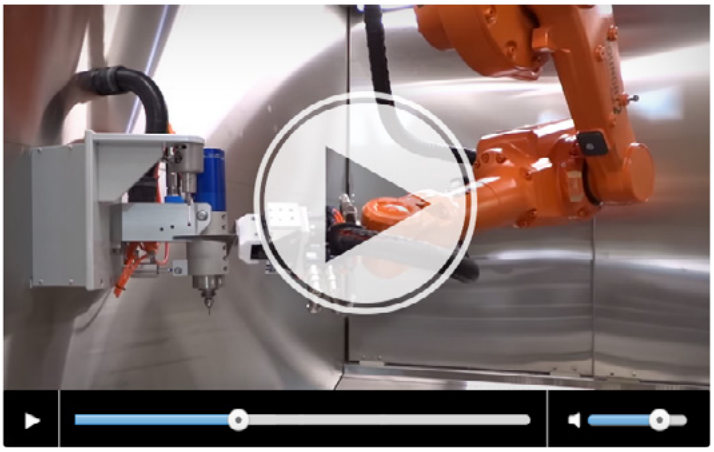
Reverse engineering has been made easier for prismatic parts

Blade polishing by robot

Delcam's stand at the Paris Air Show included a demonstration system for the polishing of turbine blades by robot. The system, which has been developed by Delcam Professional Services in association with Finland-based JOT Automation, uses an ABB robot driven by a combination of Delcam software including PowerMILL Robot and PowerINSPECT.

During the development of the process, simulations were undertaken in PowerMILL Robot to ensure that the robot could complete the progress of the blades around the cell without any collisions or singularities resulting in erratic movements.

To see a video of the demonstration, please go to www.delcam-services.com/robotics-programming



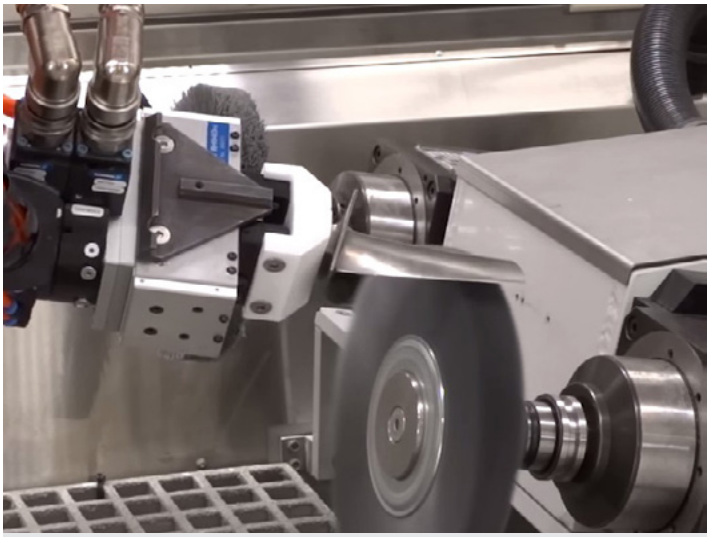
As well as showing how the use of a robot could replace manual operations, the cell provides an example of Delcam's adaptive machining technology. As with other adaptive processes, the polishing operation is altered for each blade individually on the basis of inspection data collected at various stages in the process.

Each blade is transferred into the cell on a conveyor and picked up by the robot. The robot completes an initial pattern of measurements on the blade surface by lifting the blade towards a fixed probe. These measurements are passed into PowerINSPECT to determine the amount of stock material remaining on the blade. The information is used to produce the polishing paths in PowerMILL Robot.

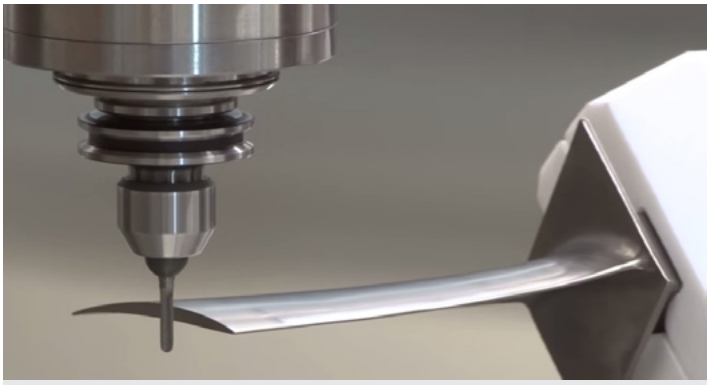
For the polishing operation, the blade is moved against a disk within the cell. Once the routine is complete, a further series of probing measurements are taken to check that the required amount of material has been removed and that the blade is within the specified tolerances. If it isn't, further polishing can be undertaken until the blade conforms to the standard.

A similar sequence is followed to machine the tip of the blade. Probing measurements are made along the tip and any excess material machined away by moving the blade against a milling cutter.

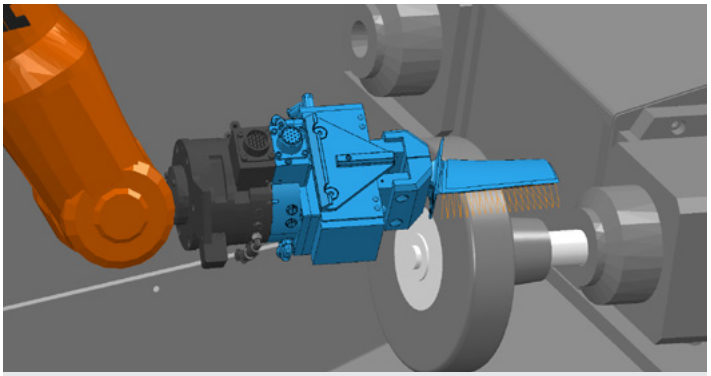
Typically, one or two passes across the grinding wheel and the milling cutter are sufficient to bring the blade into tolerance, although the loop can continue through more cycles until compliance is reached. The polished blade is then returned to the conveyor for removal from the cell.



The blade is first polished by holding it against a disc with the robot



After polishing, the blade tip is machined by moving it against the cutter



The complete operation is simulated in PowerMILL Robot to check for potential collisions and similar problems

Delcam
Complete CADCAM Solutions

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 | Web: www.delcam.com