

## Pro/E Wildfire 5.0

» **Al Dean** takes a look at the legendary modelling application that started 3D parametric CAD and asks, with its twenty-year history, can PTC keep Pro/Engineer fresh and up to date with its competition?

» **Product:** Pro/Engineer Wildfire 5.0  
 » **Supplier:** PTC  
**Price from** £4,500  
[www.ptc.com](http://www.ptc.com)

**P**ro/Engineer was the system that introduced parametric 3D modelling to the market and turned it mainstream. Since the early days it has always had a reputation for being difficult to use. The complex user interface (UI) interaction model was never the easiest to use, and the process of building parametric models of any complexity was never much fun. During the twenty years that the system has been around, the world has changed and parametric modelling has become a whole lot easier or, more accurately, less strict in its requirements.

Since the initial release of Pro/Engineer Wildfire back in 2001, PTC has been working on modernising the software and presenting a less restrictive way of working. The introduction of the dashboard-driven command control made life much easier and presented the command options in a logical manner directly on screen. In the subsequent releases this has been extended deeper and deeper into the application, so now the vast majority of modules and areas within the system are now using the same user interaction methods. During this transition period some commands were still controlled by the menu manager, which seemingly popped up at random.

For the Wildfire 5.0 release, this transition continues, but the real bulk of UI work is in other areas. For example, the software now uses ProductView technology to give 3D previews that users can interact with and inspect, prior to opening the data in full. There are pervasive fuzzy search tools for quickly

locating parts and, depending on the type of data management method deployed (file system, ProductPoint or Windchill Intranlink) it searches not only file or part name, but a larger range of metadata and part attributes. This makes finding data much easier.

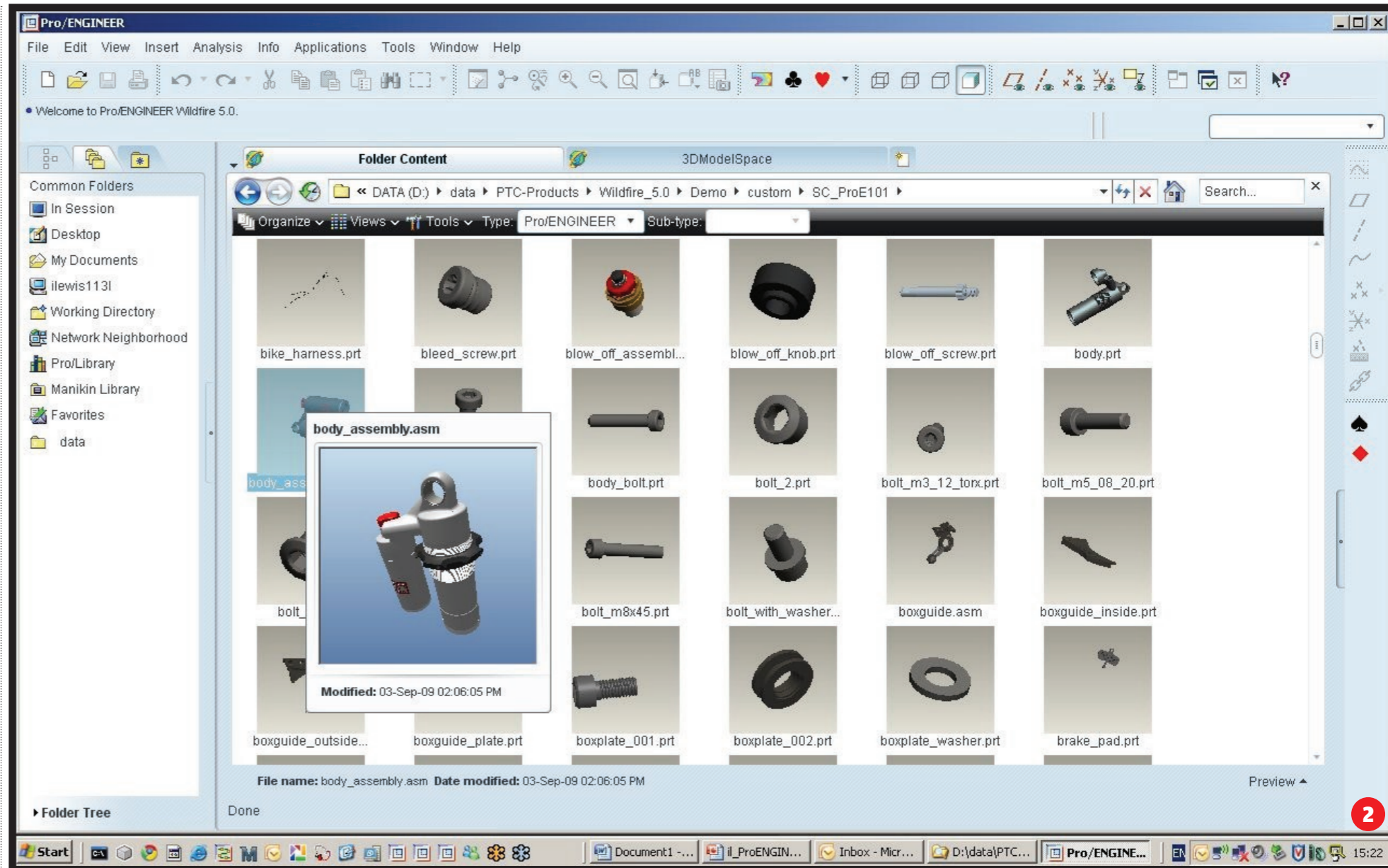
In terms of user experience the big news for this release is Dynamic Feature Editing. This dramatically reduces the time taken to edit feature-based models by removing much of the recalculation time. It should be made clear that this is an acceleration of the time taken to recalculate a model's history tree, and not a history-less approach that is being introduced into other systems. This, we have been told, is coming in Wildfire 6.0.

In use, Dynamic Feature Editing enables users to grab the feature entity either from the right mouse button menu or the model tree. The sketch can then be edited and as it is dragged it into its new position, the system recalculates the history that follows on from it in real-time. Using the phrase 'real-time' may be a little misleading because no matter how quick the workstation is, editing an early stage feature in a typical complex part always means a lag. However, it should only take a matter of seconds, rather than the minutes typically required for standard model regeneration.

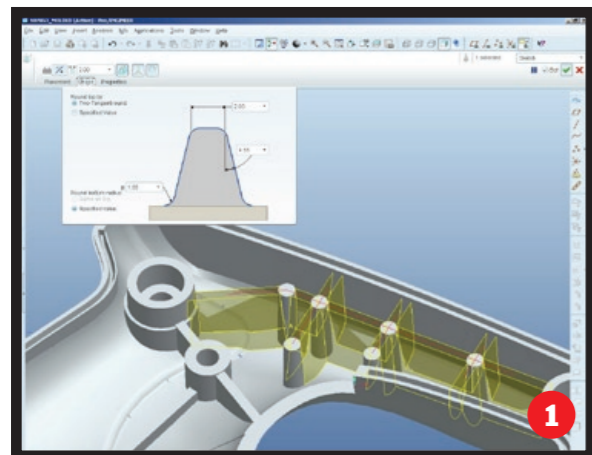
When using Dynamic Feature Editing, because the system maintains the history, there's the distinct possibility that the parameters and inter feature links that add the intelligence to the part may be broken. This is where another key new capability comes in. It's now possible to break the history within a part, flag up the 'broken' features and defer the updates, rather than having to deal with them there and then. This should make life much easier when making dramatic changes to the structure of both parts and inter-linked assemblies.

Another update is the change made to the reuse of User Defined Features (UDF). While the definition stage hasn't changed, the placement of UDFs has. When starting to place new standardised features, a wireframe preview is shown on screen. This means the initial placement can be seen and all of the placement requirements and inputs are clearly shown as the user locates the feature and adapts it to the new use case.

The system also takes advantage of the



1 **Trajectory Rib** allows users to define rib features within plastic parts using a basic sketch, with the system constructing the feature, and adding draft and fillets where needed



new co-ordinate system on surface tools that allows users to place a co-ordinate system onto any surface and then constrain it using drag handles. When used in the context of UDFs, it's very powerful as the user simply matches up co-ordinate systems. Now, let's move onto the fun stuff, that of the new modelling tools.

### MODELLING TOOLS

Pro/Engineer pretty much has everything you could ever need in terms of modelling features and this is one benefit of a system that's been around for two decades. If it can be modelled, it's probably possible in Pro/E, whether using feature-based solid modelling or more freeform surfacing. That said, there is still room for improvement and making the system 'more usable' rather than 'more functional'.

The first example of this is the new Trajectory Rib feature. This is not a unique feature in the wider CAD world, but its addition to Pro/Engineer Wildfire will make life easier for those developing injection-moulded parts, or zinc castings, where

structural support is required. In short, the user sketches out the rib structure in its basic form, using points, lines and arcs, and the system extends those sketch entities and builds the rib around them, all to user defined widths and with fillets/rounds and draft. The clever bit is that it'll extend the sketch entities so that each rib extends to the boundaries around it.

The second example is Sketch Point Pattern. Unlike structural array tools, this allows users to sketch a series of points and have a feature inserted at each point. While it does nothing new, it means multiple features can be placed at less structured positions as required. The pattern can then be referenced by other features or parts.

### ASSEMBLY MODELLING

The updates made to assembly modelling have the core purpose of making life easier, particularly when handling large and complex assemblies. Large assemblies can be loaded as a simplified representation, which means the product structure can be loaded and previewed

2 **New pervasive fuzzy search which uses ProductView-based dynamic thumbnails to help make finding data much easier. This is then backed up with tools to make loading large datasets more efficient**

without loading the actual parts into memory. Then, as and when required for purposes of editing or referencing, the parts will be loaded into memory.

Also relating to assembly modelling is the ability to restructure an assembly draft traditionally been the case. Sub-assemblies can be created, then parts either dragged and dropped or multiples selected and a right mouse button menu shortcut will create one on the fly. There has also been work done to remove some of the restrictions from previous releases, such as the requirement to retain the first default part at the root level, greater

support for simplified representations and the ability to reorganise parts with complex (such as assembly features) or external references.

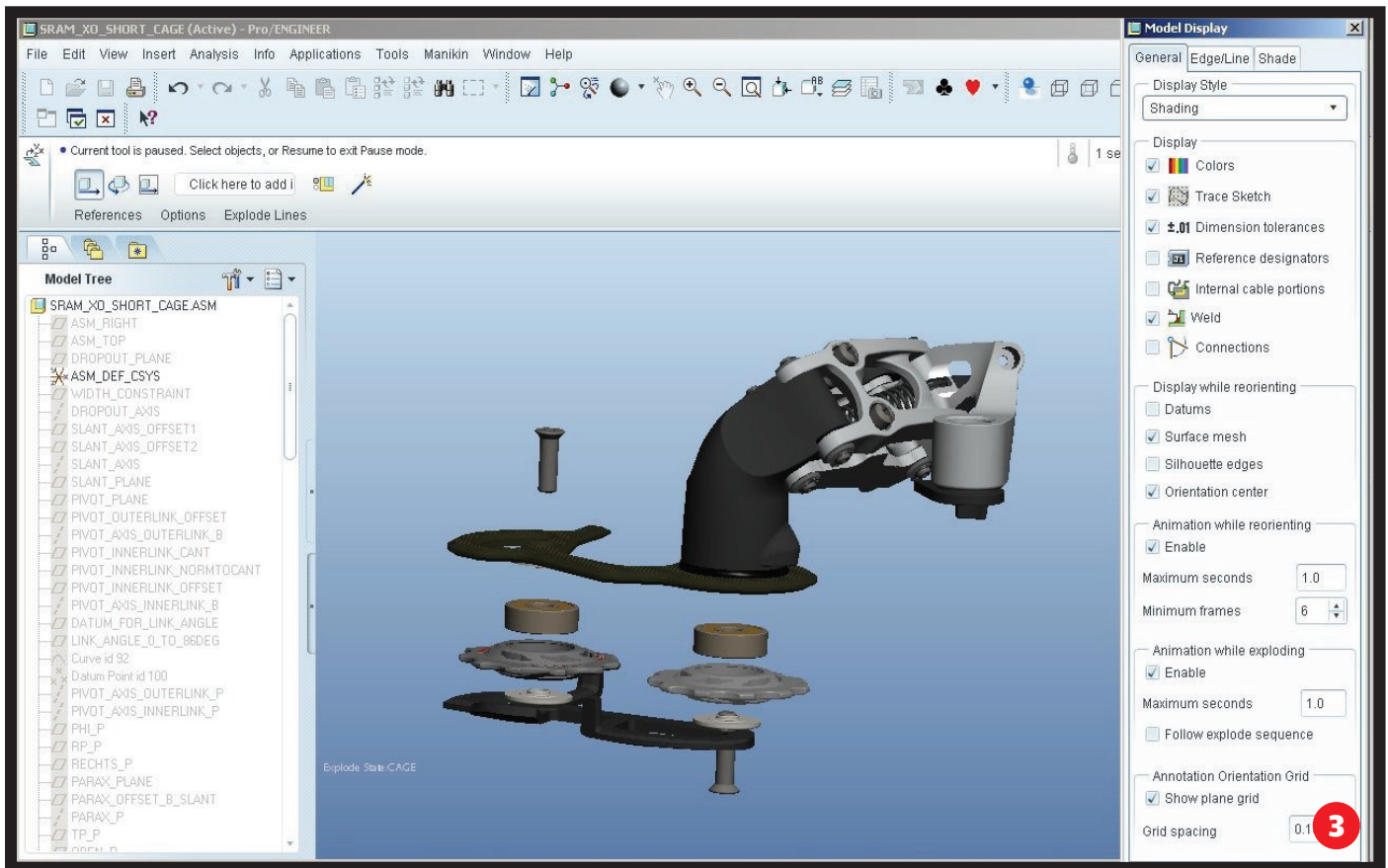
The workflow when placing parts has also been revamped for this release, providing users with an 'accessory window' that previews the part that's being positioned and ensures it remains persistent, without hijacking the windows of other Pro/E sessions.

The final major assembly modelling update for Wildfire 5.0 is a complete rework of the Explode tools, where users create exploded views of components for assembly drawings and manufacturing instructions. This is now driven entirely from the dashboard and is much more interactive. Parts, or multiple selections, can be dragged and dropped into position, rotated and animated with ease, making the whole process much more slick and efficient.

### DETAILING & DRAUGHTING

The draughting and detailing environment has arguably received the biggest revision out of all those in Pro/Engineer. When

“ **The big news for this release is Dynamic Feature Editing which dramatically reduces the time taken to edit feature-based models by removing much of the recalculation time** ”



opening it for the first time, existing users might be a little surprised by what they see - a Microsoft ribbon-based interface. All commands are logically segregated into task-based groups and panels, from Layout (handling sheet creation, drawing view placement and display control), Table (for placing and editing BOMs), Annotate (Dimensions and GD and T), Sketching (for those looking to manually add details), Review (includes inspection and view / mark-up tools as well as drawing comparison functions) and Publish (print and export tools as well as a new precise print preview option).

There is also a 'tree-based' explorer for the drawing sheets and views, and below this is a separate area for viewing the assembly tree. This should make selections and filtering much easier.

### SHEET METAL & WELDMENTS

While we've covered most of the generally applicable updates, there are a number of areas in Wildfire 5.0 that are more specific to workflows and industry tasks. The first we're going to look at is Sheet Metal and Weldments.

In Wildfire 4 there was a lot of work done on sheet metal, and this release builds on that. There are now new tools to assist with the creation of more intelligent models where design intent is stored and maintained. For example, the new Form Tool follows the work done with UDFs and part placement, and offers a full preview and more intelligent placement of forms within sheet metal components (such as auto rounding of edges). Wall (or Flange) features can now be mirrored and

patterned where needed as well.

The weld design tools have been redesigned, using the dashboard to create a logical workflow through which users can work to create welded connections between parts. All of the major weld types are covered (including fillet, groove, plug/slot and spot). Annotation is automatically added and the user can extract all manner of information from the weld definitions such as the process used and consumables).

### MACHINE DESIGN

Moving into machine design, there are a few key updates for this release relating to the design and simulation of mechanisms driven by both belts/pulleys and gears. Belt design is now intelligent, allowing users to define a belt-driven mechanism using anything from the most basic of sketches for layout, to fully featured pulley designs. Factors such as belt tension and

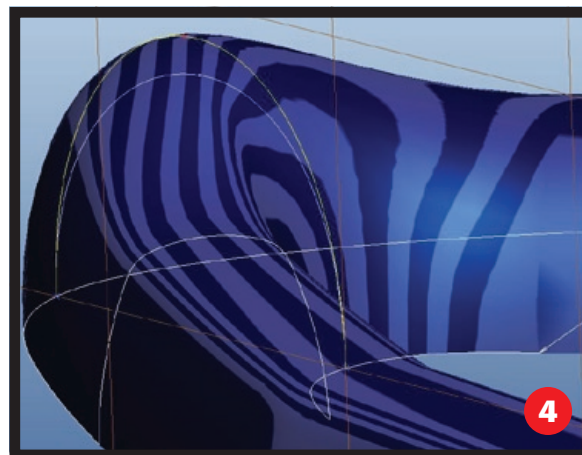
**“Pro/Engineer Wildfire 5.0 is a Godzilla amongst 3D design systems and like the legendary Japanese beast, has the ability to floor its competition with a single swipe”**

slip can be integrated into the process, so mechanisms can be developed on the basis of functional requirements and limitations. Elsewhere, the gear design tools now allow users to calculate reaction forces based on the teeth angles, rather than basic calculations, so simulation work is much more accurate as a result.

The support of gear types has been expanded, so users can now define pretty much any relationship between components (using the generic gear entity) and have the system drive/simulate them. Finally, Slot Motors can now be created, which will drive a component around a specified slot.

### HUMAN FACTORS

Human Factors and Ergonomics rarely get discussed in the context 3D digital design, which is odd considering one of the key things products need to do is interact well with the user. The reason for this is that the technology that enables



**3 The creation of exploded assembly views is now more intelligent**

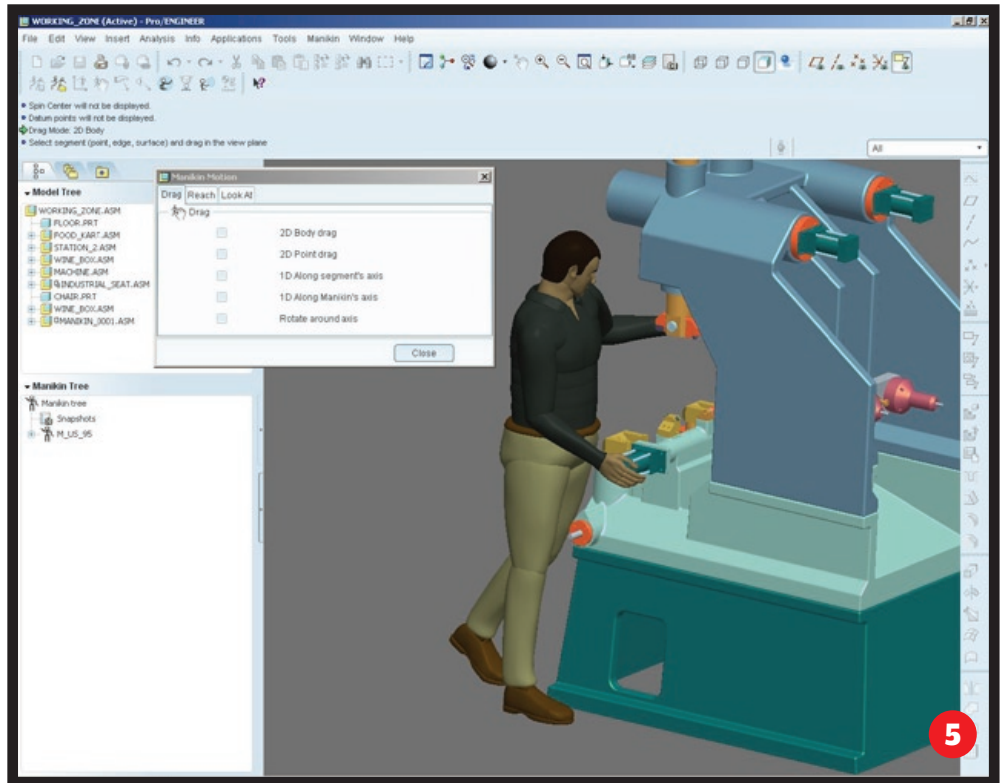
**4 The curve manipulation tools allow users to fine tune the fundamental elements of surfaces**

the digital validation of a product design against human requirements is still quite niche. The majority of tools in this area are restricted to the world of digital factory and task simulation.

PTC has changed this with the introduction of the Manikin tools. While there's a full-blown human factors assessment module for in-depth studies, Manikin Lite will fulfil the requirements of most users and this is now part of Pro/Engineer Wildfire 5.0. It allows users to place a human form into a product model, then position and manipulate it within or around that model. While the tools are quite rudimentary, providing only a basic western male that can be dragged into position and a number of postures, for a free tool it's useful indeed. To get into the realms of reach envelopes, vision cones, and geography-specific anthropometrics, an upgrade to the Manikin Analysis Extension module will be required.

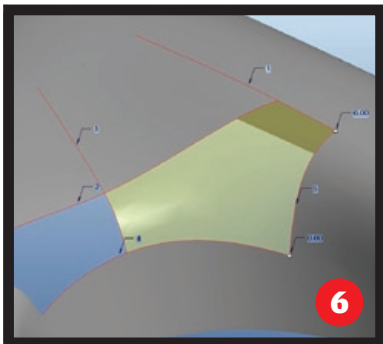
**CONCLUSION**

Pro/Engineer is a Godzilla amongst 3D design systems and like the legendary Japanese beast, has the ability to floor its competition with a single swipe. Sure, it's



5 Manikin Lite brings human factor-based design to the masses, with more specialised tools available as a cost option

6 The new n-sided patch tool is adept at closing out complex surface joins



known for being a bit slow, but its power and capability can't really be argued with. In the last few releases, while this power has been maintained and enhanced, its speed has also been increased. It's becoming Godzilla, with a jet-pack - truly a scary thought.

The perfect example of this is the work done in Wildfire 5.0 to alleviate some of the major headaches associated

with history-based modelling - namely, recalculation times, which now happens in a matter of seconds and how the system handles history and feature failure. These two updates alone should make the upgrade a worthwhile investment for existing users. Of course, if you're looking at Pro/Engineer with a fresh set of eyes, then that's how it should be, so the impact will be much less.

One thing that still confuses me is the introduction of the Ribbon-based UI to the draughting environment. PTC has made a lot of effort to move a lot of code to the dashboard-driven UI style and that work is getting towards the point of completion with this release. It then seems rather perverse that the developers would choose to introduce another UI scheme into the mix in the drawing tools. PTC's response to this is that it is planning to move towards the Ribbon-based UI

in forthcoming releases, but retain the Dashboard for command operations.

UI changes aside, Wildfire 5.0 is an impressive release. PTC is addressing many of the core, fundamental issues that many users face, all across the board, from the headline grabbing real-time regeneration, through to seemingly small details such as the curve tweaking tools and greater weldment control. It all works together to help make the system more efficient and the user more productive. Alongside this, there's a smattering of new tools, such as Manikin Lite, which bring new functionality to the system.

Wildfire 5.0 is a solid release and one that the extensive Pro/Engineer community is going to get many productivity benefits from. And for those looking to move from 2D or another 3D system, Pro/Engineer continues to be one of the most powerful systems available.

**WILDFIRE 5.0 FOR SURFACING AND VISUALISATION?**

For some time now, Pro/Engineer has had a rich set of surface modelling tools built directly into the system. While the majority of 3D design tools have some form of surface modelling, Pro/E is one of a handful that has truly first class tools for creating complex shapes.

This release introduces a number of tools that provide an enhanced level

of control over how surfaces are built. As ever, surface quality and control starts with curve creation and this sees major work for the Wildfire 5.0 release. To fine tune curves where needed, the new 'relax' tangency in curves allows the system to adjust tangency to maintain curvature along a curve, and to 'nudge' curve points with the arrow keys to a user

defined value. This, combined with the increased recalculation speed, can be very powerful. Wildfire 5.0 also features new tools to provide greater control over how draft is created from surface forms. Finally for curve tools, the new limit curves tool allows the quick creation of curves to limit previously defined surfaces. This can be incredibly useful if you have a parametric model where forms can change by larger degrees.

Moving onto surface creation, the new n-sided surface

operation is going to come in handy for those times when a nice neat four-sided surface can't be maintained to close out a network. The system overbuilds a surface to fit the boundary curves. The overbuilding, which extends geometry beyond the boundary, gives a better result, particularly when looking to maintain tangency or draft. There's also a new curvature continuous round option, which will give a much more aesthetically pleasing fillet.

In general, there's a move to offering

much more control over how surfaces are built, allowing users to re-parameterise a surface on the fly, and to maintain tangency to not only planes, but also to surfaces, and to match control points between transitional surfaces.

Alongside these, the visualisation tools within Pro/E have been given a boost with the existing rendering engine (LightWorks) being replaced with Mental Ray. This provides a much more realistic environment in which to create visualisation assets, and includes better support

for more advanced rendering technologies such as caustics and global illumination. This has been backed up with a much-improved workflow for both defining materials and assigning them and the standard library has also been

expanded. The working process for defining room, lights and effects has also been reworked and consolidated, and these are now defined from a single dialog which has a positive effect on the quality of the image.

