Pro/ENGINEER® Reverse Engineering Extension

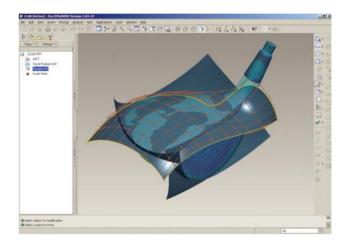## QUICKLY CONVERT EXISTING PRODUCTS INTO 3D CAD MODELS

Do you have prototypes, current products, or finished tooling, but no related drawings or CAD data? Are you dreading having to create the CAD model from scratch? Perhaps you design highly customizable products such as medical devices that require a perfect fit with the human body. Are you wondering how you'll get the parts to fit? Relax.

With Pro/ENGINEER Reverse Engineering Extension (REX), you can easily create – or recreate the electronic 3D CAD model of your physical product, without spending an enormous amount of time, effort or money. Pro/ENGINEER Reverse Engineering allows engineers to work with 'point cloud' data obtained by scanning physical prototypes.

With the cutting edge tools in Pro/ENGINEER Reverse Engineering, you can refine the point cloud and polygonal data, reducing noise and/or the total number of points. In this way you can speed up processing time, without sacrificing the level of detail, while preserving design intent. From there, you can quickly create an acceptable facet model, the next step in the re-engineering process. Next, surfaces can be projected to fit facet data or boundary surfaces created from curves sketched on the facet model. Or, take advantage of the geometric surface options such as planar, cylindrical, extruded or revolved surfaces.

Once a surface is created, you can use the full set of Pro/ENGINEER analysis tools for surface analysis, and to check for any deviation between the surface and point cloud. Pro/ENGINEER Reverse Engineering captures physical characteristics such as surface tangency, ensuring that the design intent is preserved 100%.

From the moment the information is imported, you are on your way to a product. You can recreate the CAD data for a product for mass-production, or re-use the information for highly customizable products. Pro/ENGINEER Reverse Engineering gives you the flexibility to design new, more innovative products that will win in today's competitive environment. Whether you are reverse engineering from a complex sculpted clay model, or from a scanned engineered mounting plate, Pro/ENGINEER Reverse Engineering will enable you to get it right the first time.

Curve and surface definition can also be generated manually with full control over the surface control mesh if desired.

Key Benefits

- Reduce costs and shorten development time by automating the process of reverse engineering a physical prototype

- Simplify the workflow, and minimize the learning curve, by using the same CAD program you use to design your products to also reverse engineer a product

- Reduce noise in point cloud data for more accurate product designs

- Maintain design integrity by accurately capturing the design intent of the original product

- Automate the manual process of transforming scan data into manufacturable surfaces

- Easily update old designs without their original digital data to meet new market requirements

- Analyze the differences between the completed model and the original point cloud data to verify accuracy

Pro/ENGINEER Reverse Engineering Extension

Features and Specifications

Point Cloud Refinement
- Point cropping
- Noise reduction
- Automatic deletion of outlying points
- Point sampling (random, uniform and curvature sampling)
- Fill holes in the scanned data

Dynamic Facet Modeling
- Automatic removal of webbing
- Removal of facets as singles, groups or user-defined cropping
- Hole-filling operations
- Cleaning operations to redistribute the facets for a cleaner representation
- Decimating and refining operations to reduce or increase the number of facets
- Relax facets to generate a smoother representation
- "Make manifold" operation to remove erroneous facets, ensuring a single contiguous set of facets
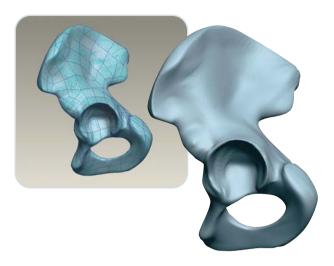
Flexible Curve Creation
- Construct curves on a facet, a surface, from a surface boundary, and through points
- Create a curve from the results of an analysis feature such as along the fringe of a colored analysis plot

Flexible Surface Creation
- Develop analytical surfaces such as planes, cylinders, cones, revolutions and extrusions
- Create a surface from a box or boundary
- Enable lofting through multiple curves
- Create tangent and normal boundary conditions

Verification
- Analyze the deviation between individual surfaces and the facets
- Fit new point cloud data to an existing model to implement design changes
- Analyze the deviation between the completed model and the original point cloud

With Pro/ENGINEER Reverse Engineering, you are able to capture valuable data without having the original CAD files. The above image shows the resulting facet model from a scanned point cloud of a hip bone. Verification tools ensure that the resulting CAD model accurately represents the scanned data. Finally, we have our complete model.

Language Support
- English, German, French, Italian, Spanish, Japanese, Chinese (Simplified and Traditional) and Korean

Platform Requirements
- Microsoft Windows (XP, 2000)
- UNIX platforms (Solaris, HP-UX, Linux)

For specific operating system levels, visit:
www.ptc.com/partners/hardware/current/support.htm

The Pro/ENGINEER Advantage
With Pro/ENGINEER, you can rest assured that no matter where you make a change in your design, your changes are propagated instantly throughout all downstream deliverables. Pro/ENGINEER modules are seamlessly integrated, which means you can focus on design and analysis of your product—not on wasting your time and energy recreating the model for use in different CAD applications. The value of this integration is realized in Pro/ENGINEER Reverse Engineering, because you can eliminate the pain of having to recreate a model due to the loss of data. Lastly, the integration of all Pro/ENGINEER tools eliminates errors that can be incurred when models are translated or recreated for another program.

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