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## PTC Product Focus

### Design Animation Option (DAO)

An important aspect of the product development cycle is the ability to clearly communicate ideas with colleagues, management, partners, and customers. Animation sequences provide an eye-catching and effective means of depicting products in action. These virtual simulations can be leveraged throughout the product's lifecycle to ensure that functional, aesthetic, and support requirements are achieved. In particular, design animations enable enhanced communication for:

- Validating and sharing design ideas from Engineering
- Internal / External design reviews
- Sales and Marketing materials
- Training materials
- Assembly sequences and operational method sheets
- Disassembly sequences and maintenance procedures

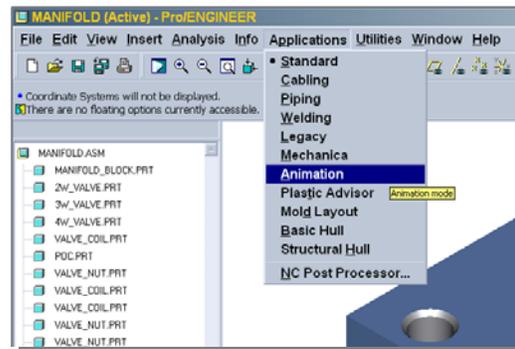
This capability is available within Pro/ENGINEER® via the **Design Animation Option**, which was introduced with 2000i. It is currently bundled with the Foundation Advantage, Flexible Engineering II, and Flex3C packages as a locked module. It is also available as a floating option that can dynamically extend the capabilities of other Pro/ENGINEER configurations.

This powerful functionality is simple to learn and use since it leverages familiar concepts and information already captured in the Pro/E design. Information such as: assembly configurations, Mechanism Design™ (MDX) connections, named views, component display states, 3D notes, and photorender settings. DAO basics presented in this article can be learned and applied in minutes.

## Accessing Design Animation

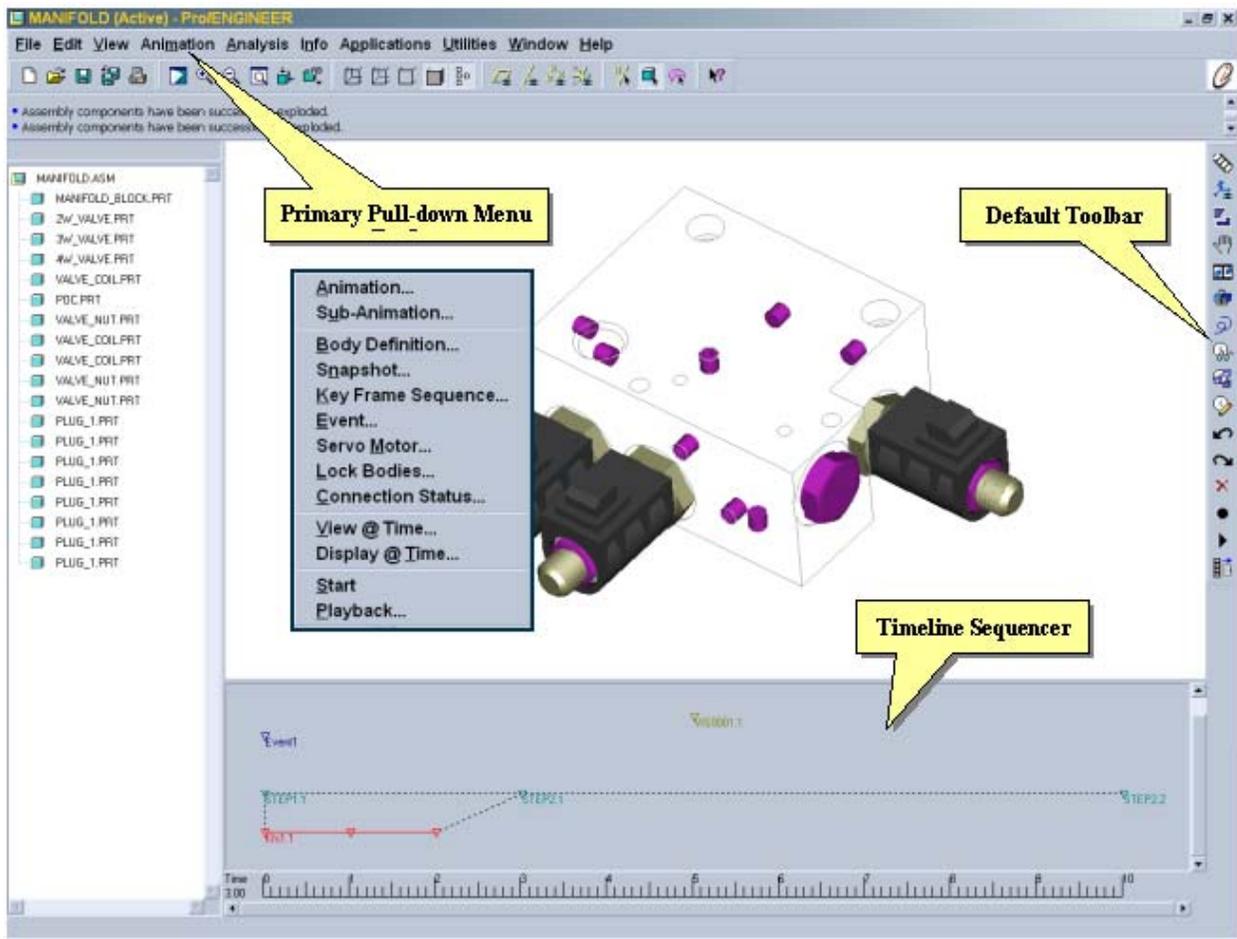
The Design Animation functionality can be accessed during any assembly design session.

1. If necessary, first acquire a license using **Utilities > Floating Modules**
2. Select **Applications > Animation**

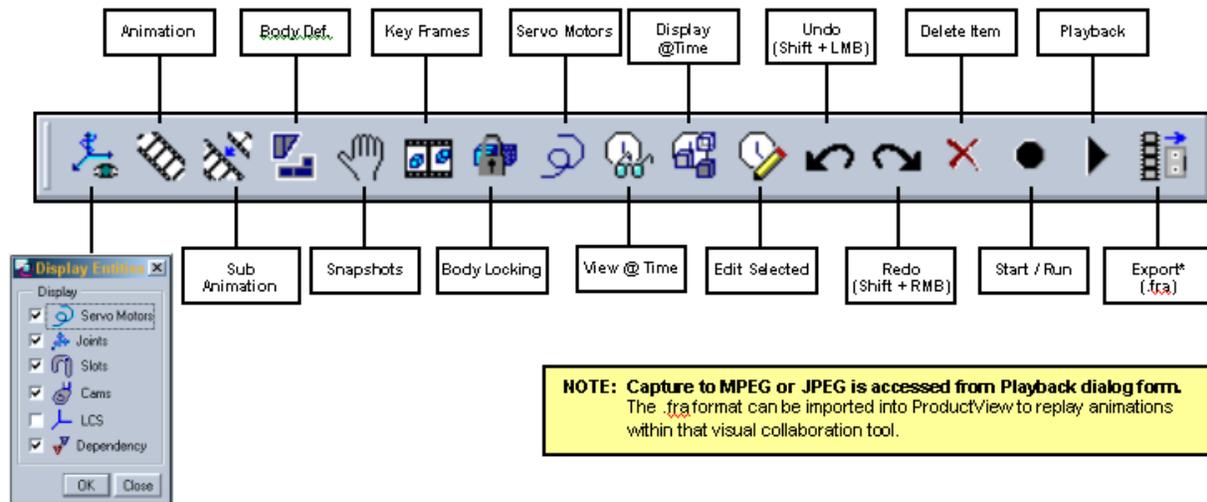


## Animation Command Structure

The User Interface is very simple to navigate, with the most commonly used functions available on the customizable **Toolbar**. Right Mouse Button (RMB) shortcuts provide access to commands in the context of the **Timeline Sequencer**. Additional commands are available within the **Pull-down Menus**. Refer to the figure below for a sample User Interface layout.



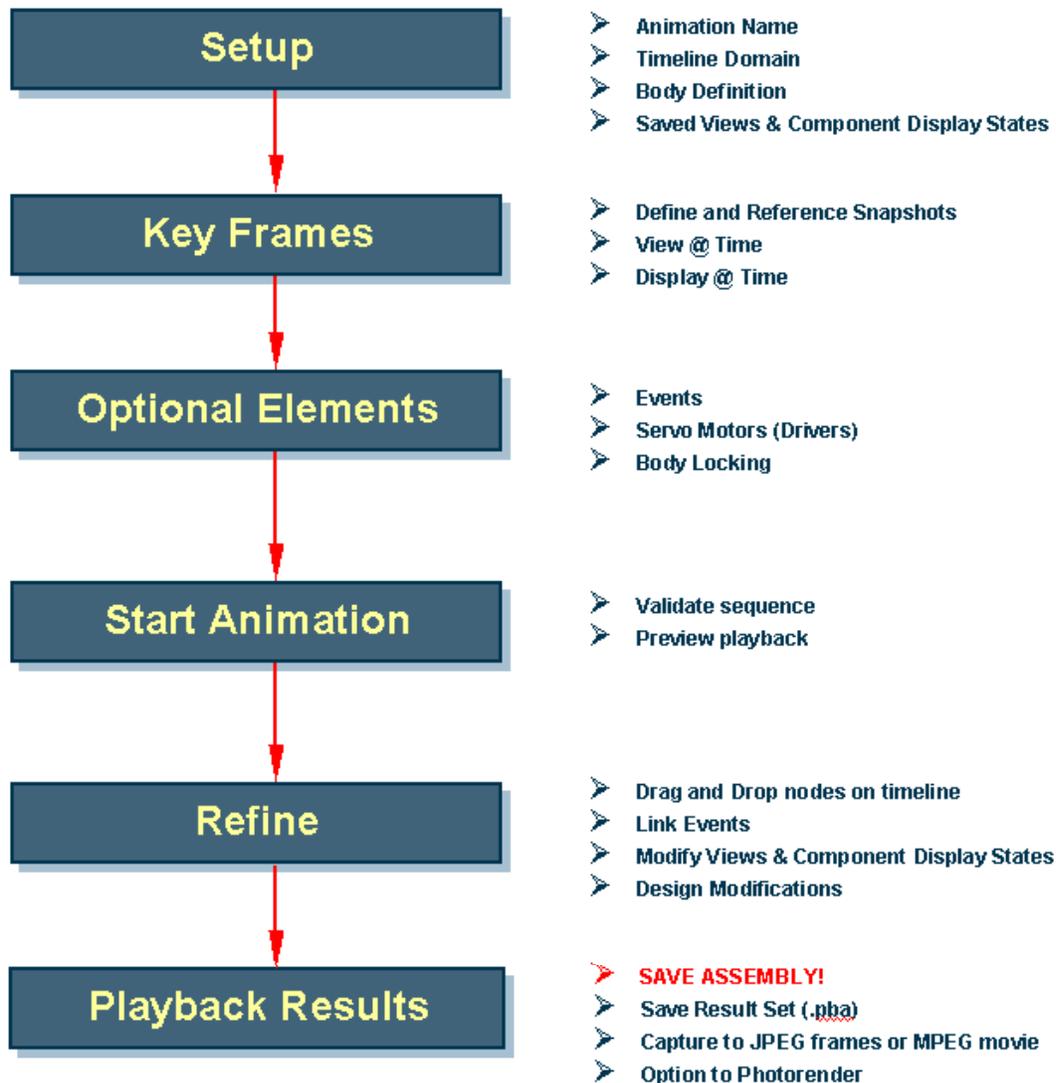
The default toolbar icons follow a natural flow, and map to the commands indicated:



## Animation Workflow

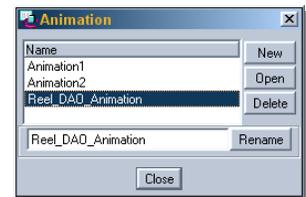
The process to develop an animation is iterative and centers upon intuitive toolbar commands and the timeline sequencer. A series of simple steps are combined to configure a complex animation over time. This animation can depict any combination of viewpoint positions, relative component positions, as well as functional operation. Animations defined in sub-assemblies can be reused in higher-level assemblies.

Typically, the development follows this basic flow:



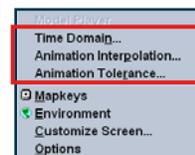
## Setup

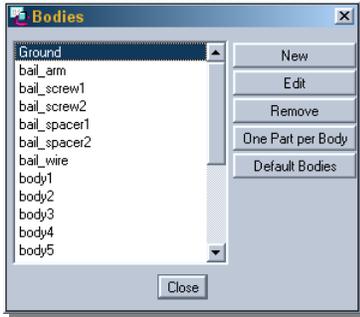
The animation definition is named and stored associatively as part of the assembly. Each assembly may contain more than one animation sequence. The Animation dialog is used to name and manage these sets.



The **Utilities** menu contains various animation specific environment settings:

- **Time Domain** - control length of animation by specifying combination of Start Time, End Time, Frame Count, or Rate (shortcut: double-click on timeline at bottom of sequencer)
- **Animation Interpolation** – global setting to determine if translation and rotations are interpolated using linear or smooth algorithms
- **Animation Tolerance** – options to control assembly and mechanism tolerances; useful option to increase performance by disabling graphical display during playback





Objects that need to move together are defined through the concept of **Bodies**. This grouping can be completely independent from assembly structure and constraints. By default, all objects with conventional placement constraints are included in the Ground [reference] body. Since MDX uses the same body methodology, bodies defined from connections are inherited by DAO. The body definition dialog is used to regroup components into named, user-defined body sets. Note that each part can only exist in a single body definition.

- If a body is removed, all its members will revert to Ground
- If a part is added to a body, it will be removed from Ground or other bodies
- **Default Bodies** will revert back to initial state based upon assembly constraints
- **One Part per Body** will create a body for every component in the assembly  
– only use this for small and simple designs

## Key Frames

It is time to get things moving! **Snapshots** are essentially exploded view states created using a drag & drop approach to position and orient bodies. These snapshots are referenced at specified times during the definition of **Key Frame Sequences**. Design Animation interpolates between these frames to produce a smooth animation. Nodes within the sequence can easily be redefined or re-sequenced. Notice that as with all new tools in Pro/E, Undo / Redo is implemented!

**Step 1:** Expand Drag Options Panel  
Select Bodies and reposition using body coord sys, or packaging approach

**Step 2:** Capture Snapshot

**Step 3:** Enter meaningful name for Snapshot

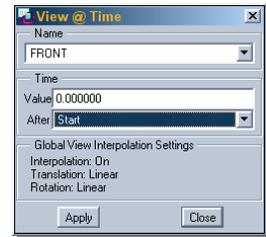
Define Snapshots on-the-fly

**Step 4:** Name key frame sequence

**Step 5:** Select Snapshot from list  
Enter Time  
Select "+" to add to timeline

**NOTE:** The view orientation is not relevant for Snapshots. Only the relative position of bodies is significant.

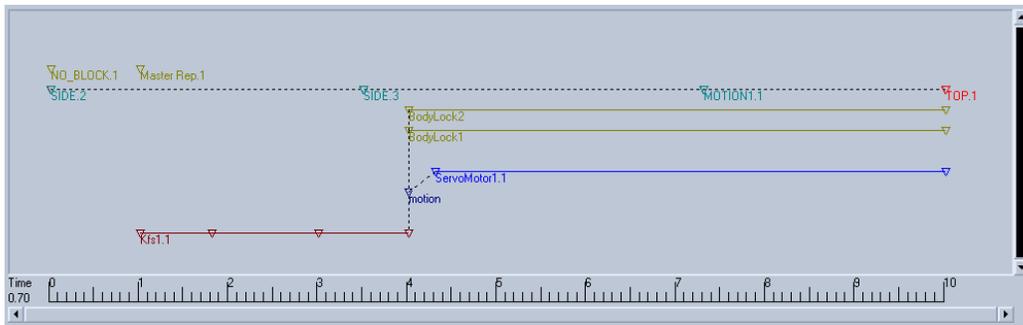
Any Views or Component Display States that were previously defined can be leveraged within DAO. Additional ones may be defined as needed while Animation mode is active. If views or display states are redefined, the animation will update accordingly. These are referenced at specified times using the **View @Time** and **Display @Time** commands. The transition can be linear, smooth, or none.



In order to have a view position remain fixed over time, simply specify the same named view at different time locations.



The **Timeline Sequencer** is a powerful tool to manage the animation and combined effects of defined elements. Selected nodes can be repositioned using a drag & drop approach. Once an element is selected, the most commonly used operations are available on the RMB context menu.



**Shortcuts:**

- |                          |                                  |
|--------------------------|----------------------------------|
| → Single select          | click node or instance with LMB  |
| → Multiple select        | CTRL + click with LMB            |
| → Edit Component Time    | double-click LMB; or drag & drop |
| → Edit vertical position | MMB + drag                       |
| → Undo                   | shift + LMB                      |
| → Redo                   | shift + MMB                      |
| → Context menu           | RMB                              |
| → Edit Time Domain       | double-click timeline            |
| → Expand sub-animation   | select circle node at start/end  |

**Optional Elements**

**Events** can be added as associative nodes at specific times. This command is not on the default toolbar, but can be added or accessed from **Animation > Event**. If an event is moved, any linked items will automatically be repositioned.

**Lock Bodies** provides a method to temporarily cause bodies to follow a leader. In the snapshot dialog form, there is a Bodies tab which allows the user to specify how a body should behave if conflicting motion is requested.

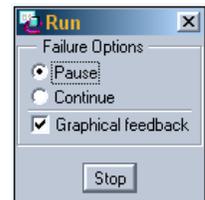
**Servo Motors** can be added as drivers to define functional operation of bodies. The approach is identical to that used in MDX. Any Servo Motors defined in MDX will be inherited, thereby supporting design intent re-use. They may be selectively activated or de-activated at any stage in

the animation sequence. The various driver profiles each have their own input requirements. Further description is beyond the scope of this article, but each is fully explained in the documentation.

**3D Notes** attached to components will appear during animation run in Pro/E, but are not displayed during playback or capture in Release 2001.

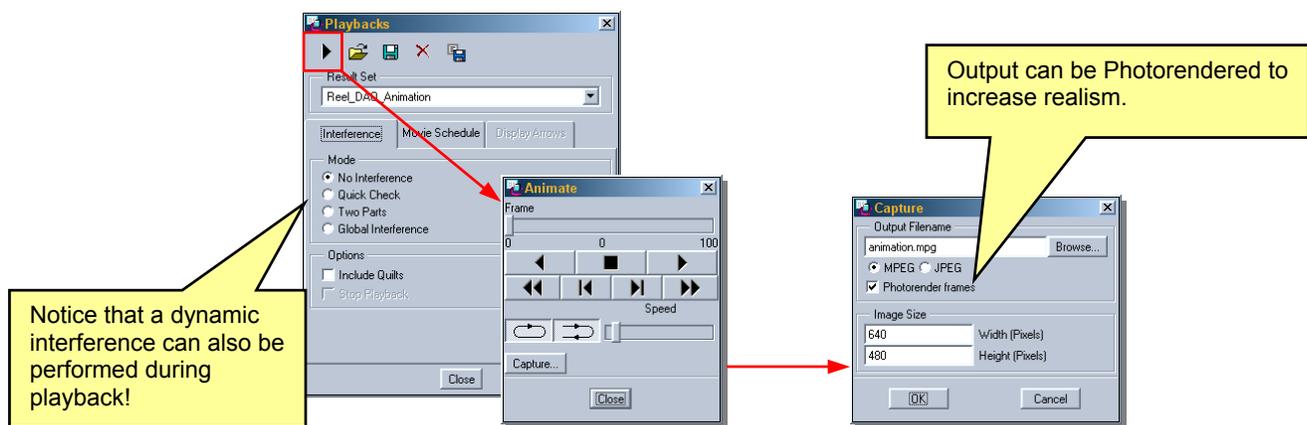
## Start Animation

The **Animation > Start** command is used to validate the animation while generating each frame for the movie. The result set is stored in session for subsequent playback. While only one result set can be in session at a time, the playback dialog described below enables saving multiple sets. Re-run the Start command after making design modifications or refinements to the animation.



## Playback Results and Export

Now, the moment you have been waiting for – deliverable generation! After the animation is run, use the **Animation > Playback** command to review, save, or export the result set information. The playback button on the toolbar is only a shortcut to the Animate dialog box. The Animate dialog is a VCR-like control to play the animation and export output.



Output quality is very sensitive to Image Size versus Pro/E graphics window size, as well as Photorender settings. The Tip section in this edition provides guidance to improve movie quality. The MPEG export generates a single file in an industry standard format that can be replayed by Windows Media Player, Real Player, QuickTime, etc. The JPEG export will generate a single file for each frame. Third party tools can then be used to retouch images, combine frames into other movie formats, and/or dub audio.

## Conclusion

**Design Animation** is a tightly coupled module that extends the range of problems that designers can address, while leveraging the fundamental benefits of Pro/E. It bypasses the typical process problems accompanying data translation. This solution supports the business needs to increase innovation and quality, while reducing design cycle times and costs. Non-Pro/E users requiring a similar capability should consider [ProductView](#) with the Realizer option.

## Additional Information

Full documentation is provided on the Pro/E Documentation CD, and can be accessed by browsing to “Using Additional Modules” under Contents tab. In addition, a PDF version (des\_anim.pdf) is provided on the same CDROM under Topic Collections.

- Online Datasheet - <http://www.ptc.com/products/proe/dao/index.htm>
- Sample Animations -  
[http://www.ptc.com/products/proe/dao/saw\\_anim.htm](http://www.ptc.com/products/proe/dao/saw_anim.htm)  
[http://www.ptc.com/products/proe/dao/foot\\_anim.htm](http://www.ptc.com/products/proe/dao/foot_anim.htm)
- Technical Support Tutorial - [http://www.ptc.com/cs/cs\\_23/howto/pas3220/pas3220.htm](http://www.ptc.com/cs/cs_23/howto/pas3220/pas3220.htm)

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## PTC Product Focus

**Windchill DynamicDesignLink – Design-to-Order**

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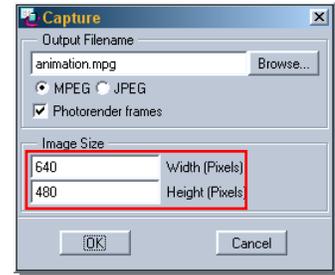
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## Tips of the Week

### Improving Animation Quality

As indicated in this month's Product Focus, the quality of the movies generated by DAO is very sensitive to the graphics window aspect ratio and optional photorender settings. This section is a collection of tips to assist with maximizing image and movie quality plus realism.

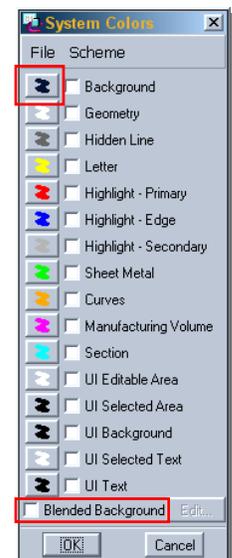
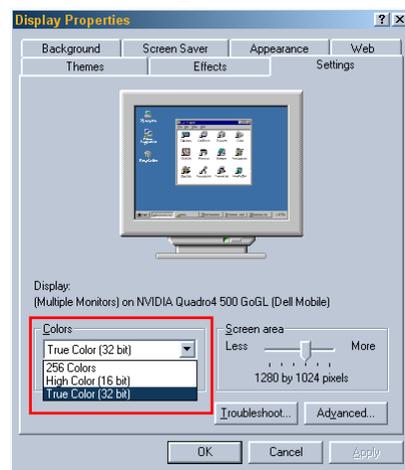
Since the introduction of DAO with 2000i, an effort has been made to improve the default quality of captured movies. In order to make sure that the movie is not distorted, the size entered in the capture dialog box for Width x Height should match the size of the graphics-only portion of the Pro/E window. Square regions like 500x500 with an aspect ratio of 1:1 work best. Unfortunately, there is no means within the application to set or determine the size of this window.



These utilities can help in sizing the window:

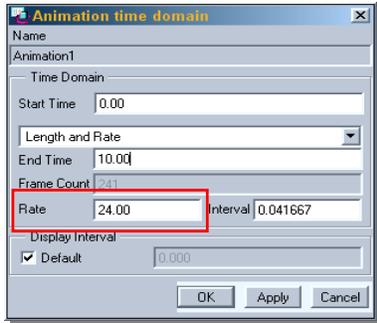
- **SnagIt** - <http://www.techsmith.com/products/snagit/default.asp>  
General purpose, commercial screen capture utility with support for fixed regions. When setting the properties for capture, the region size is displayed as a crude means to measure window size.
- **Sizer** - <http://www.brianapps.net/sizer.html>  
Freeware utility to resize windows to specific sizes. Open a temporary browser window and set to specific size, then overlay Pro/E graphics area to approximate size.

Make sure that **Display Properties > Settings** have the color depth set to **True Color (24 or 32 bit)** to prevent blurring as the result of dithering.



It is not recommended to use gradient backgrounds since they do not capture well.

Another benefit of a fixed background color is a more compressible and therefore smaller movie file. The background can be set to a fixed color using **View > Display Settings > System Colors**. Uncheck Blended Background. Next select the Background swatch to set color. Photorendered images will optionally use wall textures from Room Setup. These can be set to a solid color if desired.



In order to prevent players from skipping frames, a frame rate of 24 to 30 fps is recommended. When setting up the Time Domain, use the **Length and Rate**, or **Rate and Frame Count** options.

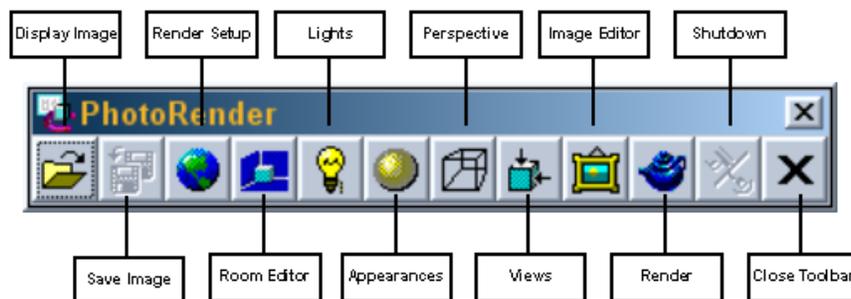
The Display Interval is the graduation that is used on the Timeline.

During capture, do not try to interact with the Pro/E windows. It is also important that no other application windows are opened that will overlap with the Pro/E graphics window.

Photorendering can significantly increase the amount of time and resources required to generate a movie, but is the most effective way to increase realism. Depending on the target audience and intended application, it may not be desired or required.

Applying Pro/PHOTORENDER™ will dramatically increase the realism of the product animation and scene. While very simple to setup and use, it does require trial and error to stage the environment with realistic appearances, textures, and lighting. Once established, these can be re-used with future projects. The render settings will be used when capturing movies with the Photorender option enabled. Photorender functionality is available while in Animation mode and can be accessed from **View > Model Setup > Photorender**.

The default toolbar is shown here, and cannot be docked or customized.



If the photo rendered image appears washed out, the gamma needs to be adjusted. Many video adapters provide an option in the Display Properties control panel to set this. There is also a config.pro option available. Set *window\_gamma* to a value between 0.5 and 2.0; larger numbers result in darker renderings.

**Appearances** can be improved by turning up the color intensity and ambient values up to 100%. Washout can be eliminated by increasing basic color values to 100%. 100% black with a Mirror value of 80% will result in the elusive chrome finish.

**Lights** are one of the most important influencers to a high quality scene. Toggle off the default ambient light. Next, add two lights - a point light and a spotlight with shadows enabled.

There are two excellent tutorials for Pro/PHOTORENDER available here:

1. [http://ptc-mss.com/Tutorial/photo\\_tut.zip](http://ptc-mss.com/Tutorial/photo_tut.zip)

<http://ptc-mss.com/Tutorial/PhotoRender.zip>

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## Tips of the Week

### Preparing a Pro/ENGINEER Assembly for DynamicDesignLink

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## Announcements

### Special Hardware offers for customers updating to Pro/ENGINEER Wildfire

[http://www.ptc.com/partners/hardware/current/wildfire\\_tlo.htm](http://www.ptc.com/partners/hardware/current/wildfire_tlo.htm)

<http://www.3dlabs.com/PTC/>

### Customer PTC E-Newsletter Survey

For the past 2 years I've been sending you our Customer PTC E-Newsletter such as this one.

In an attempt to deliver the highest quality and create the most value we would like to use this survey to further our "Learning" Relationship with you, our Customers. Even if you are a first time recipient of the newsletter, please feel free to share your comments on this one you're reading.

It will not take longer than a few minutes to fill out this quick survey as your input is invaluable and we greatly appreciate your input. Please click on the following link to begin:

[To Enter Survey, Please Click](#)

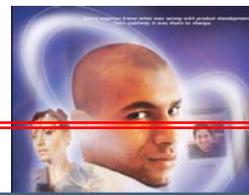
Please note it may be impossible to "Customize" the newsletter to meet every individual request however we will attempt to integrate as many ideas as possible.

Thank-you very much for your time and feedback as we try to improve this value-added service.

### PTC Sponsored Events

Click below to see PTC sponsored events:

<http://www.ptc.com/company/news/events/index.htm>



Click on the poster to gain access to the Product First Virtual Event resource center!! See the software and pick up a screen-saver or two.

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### **E-PROFILES IS HERE!!**

We have been eagerly anticipating the debut of the new electronic version of Profiles Magazine and now it is here! This new web site will supplement the print edition of the magazine and will provide new useful features not feasible with paper media. e-Profiles will provide you with 24x7, worldwide access to key information previously available exclusively in the print version. "Tips & Tricks," a popular feature pioneered by Pro/USER, has also moved to the web and will be expanded as the site matures. Future plans include several foreign-language editions of Profiles for our many international readers. Currently, Profiles is printed in English and Japanese.

Please take a few minutes to check out this new web site. We don't think you will be disappointed.

<http://profilesmagazine.com/>

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## Upcoming Events & Training Class Schedules

Upcoming, 2003      Your local Pro/Engineer User Groups  
<http://www.prouser.org/rugs/>

Upcoming, 2003      Pro/USER International Conference  
<http://www.prouser.org/>

Please visit the [PTC Education Services](#) website for the latest training information including course descriptions, schedules, locations, and pricing.

- Attend a course at any PTC Center and receive a **free** copy of Pro/E 2001 Student Edition!

<http://www.ptc.com/services/edserv/index.htm>

PTC

Note: This PTC E-Newsletter will continue to be used for the following:

- 1) Inform you on events related to PTC products (user groups, conferences, training schedules, etc.)
- 2) Educate you on products that are available at PTC
- 3) Tips & Techniques using PTC Products

Note: These messages are compiled in the local PTC office and will be distributed via e-mail.

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