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## PTC Product Focus

### Smart Assemblies

Is your company looking to achieve any of the following?

- **Standardization of CAD modeling (assemblies, parts, features)**
- **Common shared components across multiple divisions**
- **Focus on design and process**
- **Ease of use**
- **Intelligent/Robust features & models**
- **Knowledge Base Engineering Capture**
- **Design thru Mfg**
- **Design Variations and Options**

If the above are some objectives your company is trying to achieve then continue reading.

First some background on programming languages. The following list is a set of tools many companies use to enhance their use of Pro/Engineer:

#### Programming Level

- Java
- Web Link
- Toolkit

#### User Level

- Pro/Program
- Smart Assemblies
- Family Tables
- UDF's
- Mapkeys

We have classified the tools into two categories; programming level and user level. The difference between the two is that programming level tools typically requires a background in a higher level programming language such as C++, java, ... The tool we will be focusing on in this article is called Smart Assemblies.

This tool is listed in the user level since any user of Pro/Engineer that has used Pro/Program, UDF's, or Family Tables can use the tool. The typical training class is only a single day.

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## **PTC Product Focus**

### **Arbortext Digital Media Publisher**

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### How to Use Smart Assemblies

#### How to Use the Tool:

First we will describe the programs. Programs are simple text files that are created in an editor such as word, notepad, wordpad, Crimson Editor or your choice. Crimson Editor is mentioned here since it is a shareware program and can be set to color code words when they are typed correctly to avoid syntax mistakes. The following is a simple program structure:

```
BEGIN_GUI_DESCR  
  
END_GUI_DESCR  
  
BEGIN_ASM_DESCR  
    CONFIG_ELEM  
  
END_ASM_DESCR
```

There are two main parts of the program: the GUI section (Graphical User Input) – this is the user interface that pops up after the program is selected. The main program is indicated by BEGIN\_ASM\_DESCR and ending with END\_ASM\_DESCR.

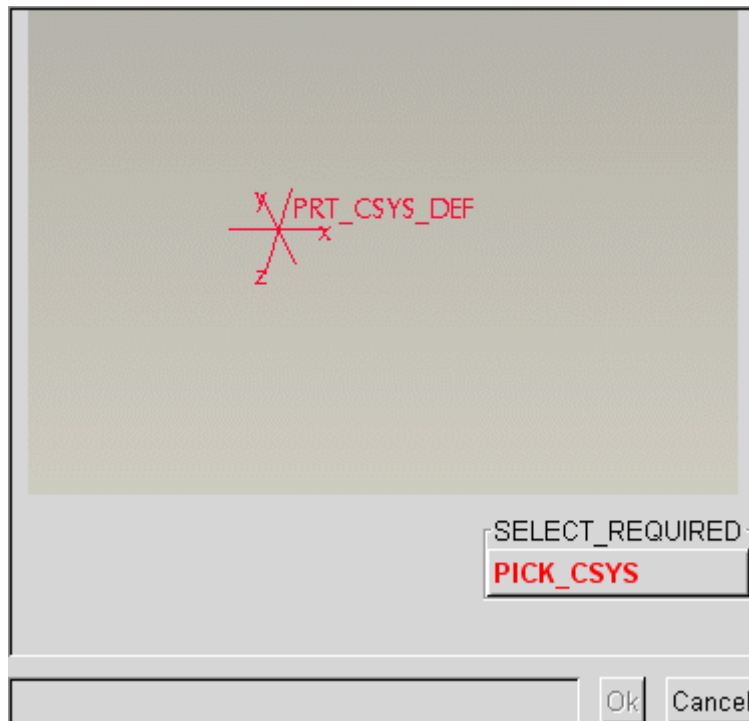
The GUI section is also optional; meaning sometimes we don't need it. An example of this is extracting a BOM and outputting it to an Excel spreadsheet or bulk processing Pro/Engineer objects such as parts, assemblies, or drawings.

Let's add a few lines to the GUI section and show the results:

```
BEGIN_GUI_DESCR  
  
GLOBAL_PICTURE <name of a gif object here; create any gif image>  
  
USER_SELECT CSYS PICK_CSYS  
  
END_GUI_DESCR
```

Here are the results that would show up in Pro/Engineer after selecting this program:

The gif image is simply a snapshot of the Pro/Engineer screen.



Notice that there is no compiling required; simply edit the text file and run it.

When the user selects the 'PICK\_CSYS' button above; the smart filter selection in Pro/Engineer switched to Coordinate System since this is the type of reference the program is asking for.

There are many other types of references we can look for such as point, axes, plane, surface, curves... any type of geometry type Pro/Engineer supports.

Let's add a few more lines to the GUI section:

```
BEGIN_GUI_DESCR
```

```
GLOBAL_PICTURE newsletter
```

```
USER_SELECT CSYS PICK_CSYS
```

```
USER_SELECT AXIS PICK_AXIS
```

```
USER_INPUT_PARAM DOUBLE ENTER_DOUBLE_NUMBER
```

```
CHECKBOX_PARAM INTEGER ROTATE
```

```
RADIOBUTTON_PARAM INTEGER SELECT_ONE A B C
```

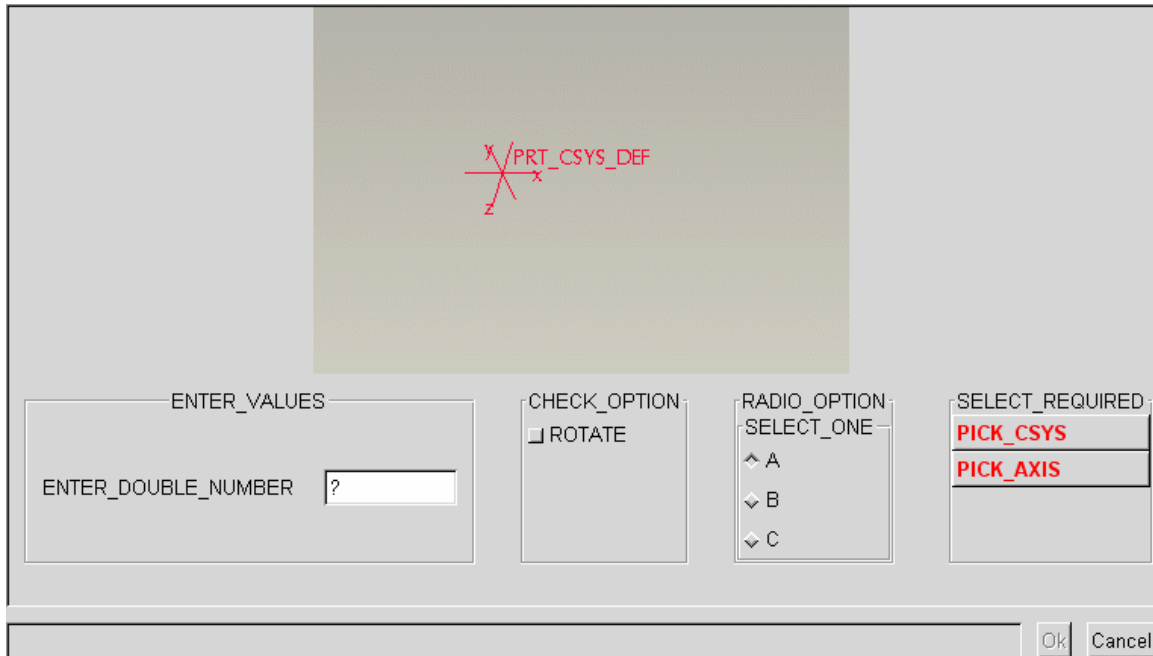
```
END_GUI_DESCR
```

```
BEGIN_ASM_DESCR
```

CONFIG\_ELEM

END\_ASM\_DESCR

Here is what this GUI will look like after selecting the program again:



Notice the program takes care of organizing the GUI automatically. We now are asking the user to select a choice of 'A', 'B', or 'C'. Turn on the 'ROTATE' option and also enter a value for 'ENTER\_DOUBLE\_NUMBER'.

Next we will focus attention on the BEGIN\_ASM\_DESCR, END\_ASM\_DESCR section. This is where features are created, parts, sub-assemblies get assembled, parameters created, etc... Think about all the things we can do inside of part, assembly, or drawing. In this tutorial we will show how to assemble a part and create a udf.

First assemble a part:

This means we must be in assembly mode to do this. It is not possible to assemble a part in part mode or drawing mode.

Here is an example of assembling a part or sub-assembly into an active assembly.

BEGIN\_ASM\_DESCR

CONFIG\_ELEM

```
SEARCH_MDL_REF THIS CSYS PRT_CSYS_DEF MTG_PART_CSYS
```

```
ASSEMBLE THIS PICK_SUB_ASM

CSYS REF_CSYS MTG_PART_CSYS

END_ASSEMBLE
```

```
END_ASM_DESCR
```

In the above example we are assembling a component using a typical coordinate system to coordinate system constraint. All types of assembly constraints are supported.

The keyword 'ASSEMBLE' means to start the assembly instructions. The keyword 'THIS' refers to the object the user is assembling. It can be a part, copy of a part, assembly, or a copy of an assembly. Some examples are family table instance of a bolt, bushing, gusset, clamp assembly, or a start assembly that gets copied and renamed automatically. The next keyword 'PICK\_SUB\_ASM' means that the component will automatically get assembled inside of this assembly. So we can assemble parts inside another sub-assembly while working at the top level assembly. This keyword is also optional and not required without it the component gets assembled to the active assembly. Next line is the assembly constraints. The 'REF\_CSYS' is an assembly reference from the assembly; typically this is selected thru the GUI from the 'USER\_SELECT' command as described in the GUI section. The next reference 'MTG\_PART\_CSYS' is from the component. We use the command SEARCH\_MDL\_REF to automatically find this coordinate system from the part to be used.

For example: SEARCH\_MDL\_REF THIS CSYS PRT\_CSYS\_DEF MTG\_PART\_CSYS  
Here we look for a coordinate system called "PRT\_CSYS\_DEF" and store it in the variable 'MTG\_PART\_CSYS' that we can use it for assembly purposes.

Next we will go over applying features to models.

The following is a call to a udf (user defined feature). Udf's are collections of Pro/Engineer features. They can include a single feature or unlimited number of features. To create udf's simply select Tools; Udf Library..., Create and following the prompts. The result of this is storing a \*.gph file. We then call this \*.gph file and pass it the required references.

Example:

```
CREATE_UDF <name of *.gph file w/o extension> PICK_MODEL

UDF_REF CSYS REF_CSYS

END_CREATE_UDF
```

We will now explain this:

CREATE\_UDF – starts a call to the udf  
<name of \*.gph file w/o extension> - this is the name of the \*.gph file the user wants to apply  
PICK\_MODEL – is a reference from the object that is to receive the udf  
UDF\_REF – is the command to pass a reference to the udf.

CSYS – is the prompt the user typed in when storing the udf – it is important here to remember this prompt!

REF\_CSYS – is the reference we are passing to the udf; typically comes from a user select or we can automatically find it using a search mdl ref command.

END\_CREATE\_UDF – stops the call to the udf

We can create as many udf's as you like in a program and also apply these to several models from an assembly. For example a user can assemble a bolt then create the c'bore feature in one part, a clearance hole in another part, and finally a drill and tap feature in a third part all in the same program. Couple that with a FOR, or WHILE loop and we can apply a program many times over in a matter of seconds.

Here we wanted to simply introduce the software and talk about how easy it is to get started. Typically we can create programs in a matter of a few hours to show the potential of this tool.

For more information on obtaining the software and getting started email: Todd Stecker  
tstecker@ptc.com

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## **Tips of the Month**

### **Arbortext Editor – Limiting the List of Available New Templates**

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## Announcements

### Educational Resource Library

Learn things you always wanted to do - but didn't know you could.

This one stop educational resource library will help you learn more about PTC Solutions and provide you with technical materials developed by the product experts to help you become more productive.

Get tutorials, how-to videos and expert advice for:

- Pro/ENGINEER
  - Conceptual and Industrial Design
  - Detailed Design
  - Simulation/Analysis
  - Production
  - Design Collaboration
- Windchill PDMLink
- Windchill ProjectLink
- Pro/INTRALINK
- PTC Online Tools

Check out the [Educational Resource Library](#) today.

### PTC Tips & Techniques Newsletter Archives

Miss an issue! Can't find that awesome technique you read about? Fear not, you can click on the link below and go through our Customer PTC E-Newsletter archives.

[Click Here To Access](#)

It's better than finding the Ark of the Covenant!

### PTC Tips & Techniques Webcasts: Work Smarter. Not Harder.

Click below to see regularly scheduled Tips & Techniques technical Webcasts that are designed to provide you with the most popular time-saving tricks that Pro/ENGINEER users of all skill levels will find useful. Get more out of your maintenance dollars!

[Tips & Techniques: Work Smarter Not Harder!](#)

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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.

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, 2008                      Your local Pro/Engineer User Groups  
<http://www.ptcuser.org/rugs/>

June 1 – 4, 2008                      Long Beach, CA USA  
PTC/USER World Event  
<http://www.ptcuser.org/>

### Events

Our seminars and conferences seek to provide you with relevant information regarding product development trends in your industry as well as innovative software learning experiences. Think of them as a constructive day off where you can share experiences and swap ideas with your peers.

If you can't manage to get away, we'll bring it to you. Check back often for regularly scheduled live webcast events.

[You're Invited to Attend...](#)

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/ENGINEER Wildfire Student Edition!

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

### Live Instructor-Lead Virtual PTC Training Courses

Virtual Classrooms provide interactive learning with a trained PTC instructor in convenient and manageable sessions that last approximately 4 hours over a series of days. It's easy to join a class right from your desk using a phone or voice-over IP technology.

Sessions are performed just like a traditional ILT (including interactive exercises where you and the instructor can work on lab exercises together) and feature some of our most popular ILT courses. These sessions cover the exact same material as the traditional ILT in-center courses. Also look for some of our most frequently requested mini-topics delivered in the same format that are only an hour - two hours in duration.

If you have any questions about these sessions or would like to see getting other courses, not on this list, on the schedule please feel free to contact me for more details. They are a great way to bring training to you without you having to worry about location or being out from work for long stretches.

You can register for these sessions just as you would for any normal ILT class either by:

1. calling order admin at <http://www.ptc.com/services/edserv/training/registra.htm> or
2. you can go to PTC University directly at <http://www.ptc.com/learning> and submit a registration request directly. All you have to do is search the catalog by typing in “virtual” in the search field and you will see a listing.

## 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 solutions 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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