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Drive Your Pro/ENGINEER® Model with a Spreadsheet
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When you create a complex Pro/ENGINEER model, it may become difficult to keep track of all the driving parameters and important dimensions. In addition, the Pro/ENGINEER interface is not as user-friendly as it could be.

You can make the model easier to use by introducing an interface that will

- Prompt the user for important values (type of product, dimensional information, interface details)
- Perform necessary calculations (maximum/minimum allowable values and related sizes)
- Present values in an easy-to-read format (display inputs and outputs clearly)
- Provide feedback (alert the user if invalid or incompatible values are entered)

Here's how you can use Excel spreadsheets to collect and organize information for export to Pro/ENGINEER. In this example I used Microsoft Excel 97, but the method will work with most spreadsheet programs.

1. Set up a user interface. Create a new workbook to act as your interface. Add titles and input areas for the parameters and dimensions involved in your model. You can add as much detail as you want. For instance,

- a simple interface may be appropriate for people who know the product well;
- checks and limits may be necessary to ensure design relationships are maintained; and
- feedback may be added for others less familiar with the product.

The following example controls the dimensions of a cylinder and hole. The part is created in Pro/ENGINEER from a solid cylinder with a cylindrical cut. Figure 1 shows the part and the spreadsheet interface, containing input areas for cylinder diameter and height, and hole diameter and depth. In this example I've added a couple of spinners to control the diameter and height values. Create these using the Excel Forms toolbar (you could also use buttons, lists, etc). The spinners have built-in properties like maximum, minimum, and incremental values that can be set with right-click, Format Control.

Figure 1 - Spreadsheet interface and Pro/E part

The hole dimension ranges are derived from the cylinder sizes. The cells are constrained using **Data, Validation** in Excel. This enables you to specify the range of allowable values and other information, e.g., a range of 30-40mm hole diameter.

If you have time to develop a user interface or if less experienced users will be accessing the sheet, you can add other checks and feedback messages. This will help guide people as they choose inputs.

2. Link values through data sheet. On a fresh sheet, enter variable names (with no spaces) in the first column to be used in Pro/ENGINEER. Add a second column with an equal sign for each row. In the third column type a formula to point to each value on the interface sheet. Figure 2 shows a sample data sheet. The formula for the diameter cell C1 would be something like:

```
=interface!C4
```

where interface is the worksheet name and C4 is the cell name.

Note: Don't include any extra text on this data page because it will be exported to the file that Pro/ENGINEER reads.

Figure 2 - Data sheet with Export button

3. Export a text file. To use this data in Pro/ENGINEER, you need to export as a text file. Use **File, Save As** and pick the file type Text (tab delimited). Be sure to re-save the file in spreadsheet format before making any changes.

A spreadsheet macro can help automate the export process. The following macro checks for and removes any existing data text file, exports the active sheet to text file (c:\files\data.txt), and checks for and removes the spreadsheet file before saving it again.

```
Sub Export_text()
```

```
txt = "c:\files\data.txt"
xls = "c:\files\data.xls"

If Dir(txt) <> "" Then
   Kill (txt)
End If

ActiveWorkbook.SaveAs FileName:=txt,
FileFormat:=xlTextPrinter, _

CreateBackup:=False

If Dir(xls) <> "" Then
   Kill (xls)
End If

ActiveWorkbook.SaveAs FileName:=xls, FileFormat:=xlNormal, _

Password:="", WriteResPassword:="",
ReadOnlyRecommended:=False, _

CreateBackup:=False

End Sub
```

Now **Create** a new push button on the sheet using the Forms toolbar, and **Assign** your macro to the button. Next time you press the button, you will export a new text file with the contents of the data sheet.

4. Configure a Pro/ENGINEER model to use the data. The next step is to allow the model to accept the data created by the spreadsheet, using program inputs.

When you set up a Pro/ENGINEER model, you can either drive the dimensions directly or use parameters to pass the values. In this case, we'll drive the dimensions directly. First, though, you have to rename the dimensions to appropriate variable names. (Use **Info, Switch Dimensions** to display the dimension names.)

Figure 3 shows the model with its dimensions renamed Open the part program (**Program, Edit Design**). Then add lines for each variable, stating the variable name and type:

```
INPUT
diameter number
height number
hole_dia number
hole_dp number
END INPUT
```

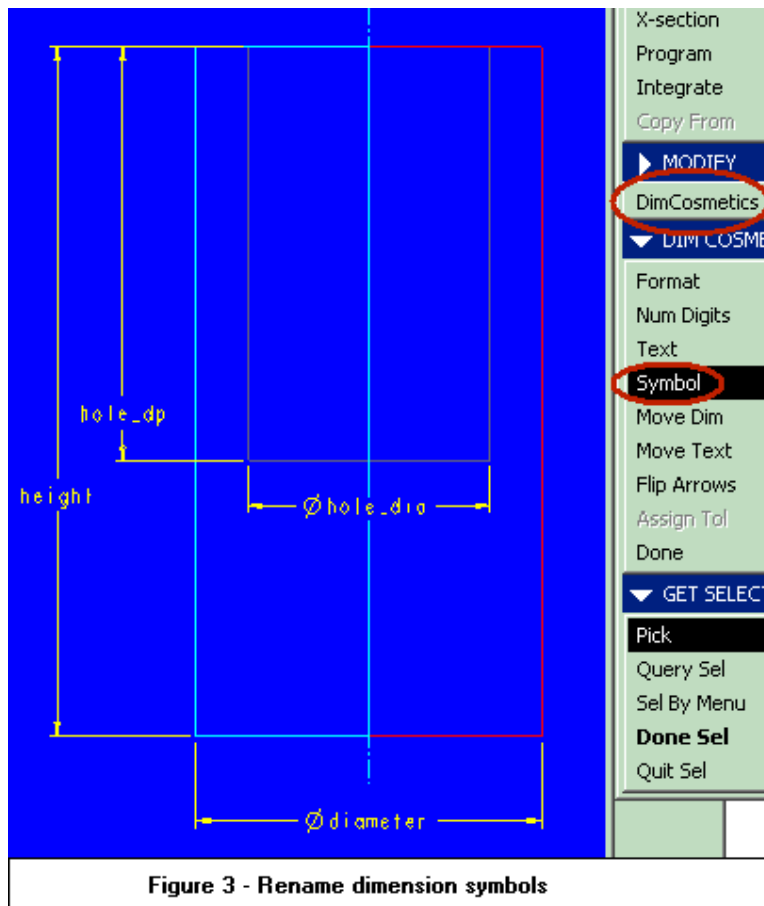This allows the model to accept inputs to drive geometry.

Figure 3 - Rename dimension symbols

The final piece of the puzzle is to read the text file into Pro/ENGINEER. Select **Regenerate, Read File** and enter the location and filename of the text file, e.g., c:\files\data.txt. Create a mapkey to automate this process:

```
mapkey input #REGENERATE;#MODEL;#READ FILE;c:\files\data.txt;
```

You may assign this mapkey to a toolbar button to make regeneration easier.

You now have a quick method to update your Pro/ENGINEER model using an Excel spreadsheet. You can also use this same method with other spreadsheets by creating a link between input and output, and ensuring the output format is compatible with Pro/ENGINEER. ♦

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