Pro/ENGINEER®
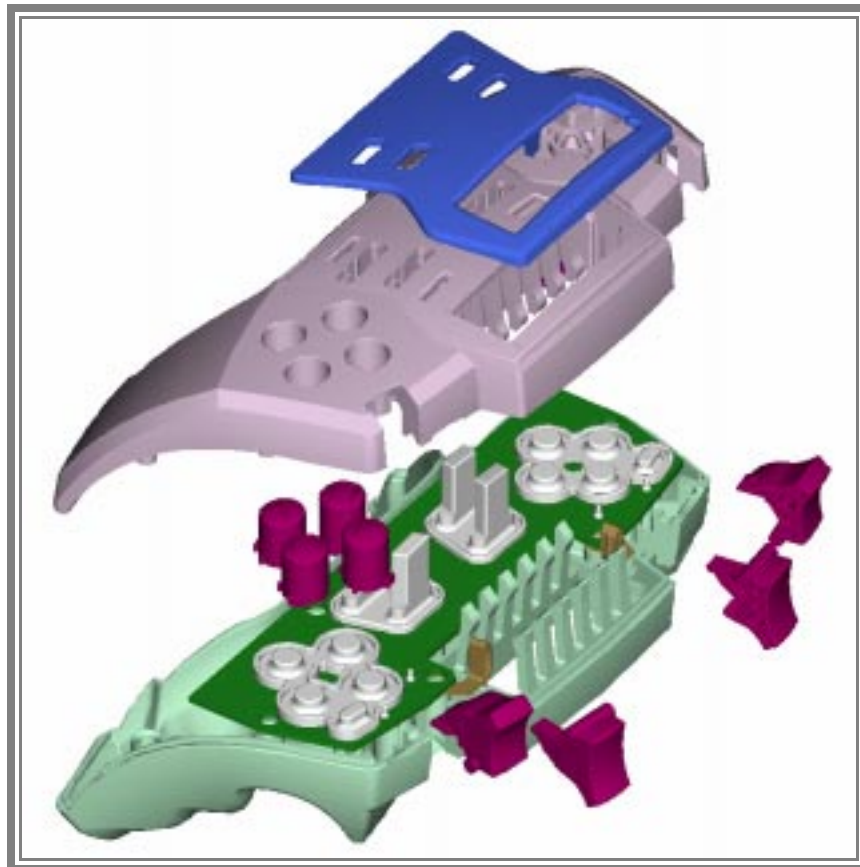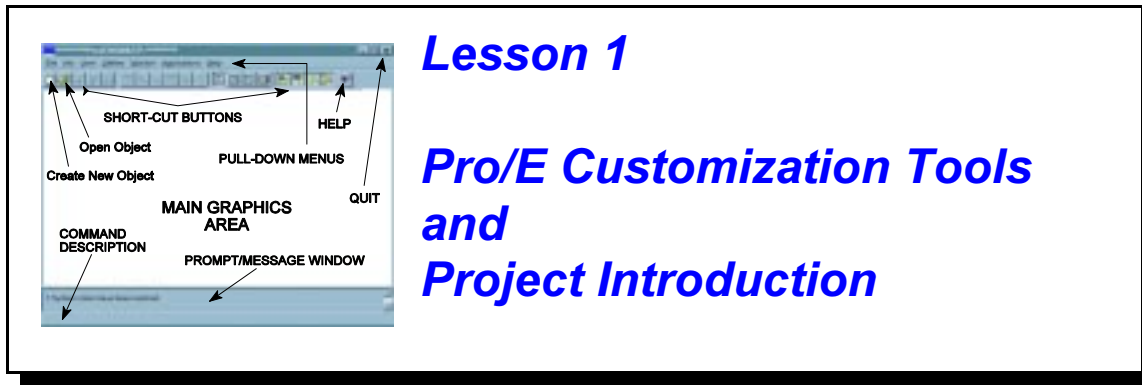# *Advanced Tutorial*
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Lesson 1

Pro/E Customization Tools and Project Introduction

Synopsis:

Configuration settings; customizing the screen toolbars and menus; mapkeys; part templates; introduction to the project

Overview

This lesson will introduce tools for customizing your Pro/E configuration and working environment and show you how to create some useful shortcuts for accessing Pro/E commands. The major customization tool is the use of one or more configuration files (default file: *config.pro*). The lesson also includes managing and creating your own custom toolbars and mapkeys. We'll also see how you can create your own part templates.

The major project used in this tutorial is introduced and the first four parts are presented.

Configuration Files (*config.pro*)

By now, you should be familiar with the commands for environment settings that are available in

> *Utilities > Environment*

These aspects of the Pro/Engineer working environment (and much more!) can also be controlled using settings stored in configuration files (*config* files for short). Pro/E has several hundred individual configuration settings. All settings have default values that will be used if not specifically set in a *config* file.

The most important *config* file is a special file called *config.pro* that is automatically read when Pro/E starts up a new session. You can also read in (and/or change) additional configuration settings at any time during a session. For example, you may want to have one group of settings for one project you are working on, and another group for a different project that you switch to during a single session. In this tutorial, we will deal only with the use of the single configuration file, *config.pro*, loaded at start-up.

Several copies of *config.pro* might exist on your system, and they are read in the following order when Pro/E is launched:

♦   *config.sup* - this is a protected system file which is read by all users but is not available for modification by users. Your system administrator has control of this file.
♦   Pro/E loadpoint - this is read by all users and would usually contain common settings determined by the system administrator such as search paths, formats, libraries, and so on. This file cannot normally be altered by individual users.
♦   user home directory - unique for each user (Unix)
♦   startup directory - the current or working directory when Pro/E starts up. To find where this directory is, select *File > Open* and observe the directory name in the top box[1]

Settings made in the first copy (*config.sup*) cannot be overridden by users. This is handy for making configuration settings to be applied universally across all users at a Pro/E installation (search paths for part libraries, for instance). An individual user can modify entries in the last two copies of *config.pro* to suit their own requirements. If the same entry appears more than once, the last entry encountered in the start-up sequence is the one the system will use. After start-up, additional configuration settings can be read in at any time. These might be used to create a configuration unique to a special project, or perhaps a special type of modeling. Be aware that when a new configuration file is read in, some options may not take effect until Pro/E is restarted. This is discussed more a bit later.

Settings in *config.pro* are composed of two entries in the following form:

config_option_name   **config_option_value**

Option values can be composed either of text, single numbers, or series of numbers. A complete listing and description of all *config* options is contained in the on-line help. With the Help page visible in your browser, select

Contents > Pro/ENGINEER Foundation > Using Configuration File Options

This gives a (very long) list of all the options, with a short description of each. Note that the default value is indicated in italics. You will have a hard time remembering the meaning of all these options, let alone their names! Fortunately, the dialog window for working with configuration files contains a one line description of any selected option. There is also a new search capability for finding option names. Although this makes finding the options much easier, you are encouraged to explore the on-line help - you might find just the setting you need to make your life easier!

Your system may have a standard configuration file available for you to use as a basis for your own work. Look for the *config.pro* file in the **pro_stds** ("standards") directory in the Pro/E installation.

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[1] In Windows, right click on the Pro/E icon on the desktop (if it exists), select **Properties > ShortCut** and examine the **Start In** text entry field.

Before we proceed, if you have access to this file, copy it to your start-up directory, along with the file *config.win* (this is a file containing customized screen layout settings which are discussed later). Now launch Pro/E, or if it is already up erase everything currently in session and set your working directory to your normal start-up directory.
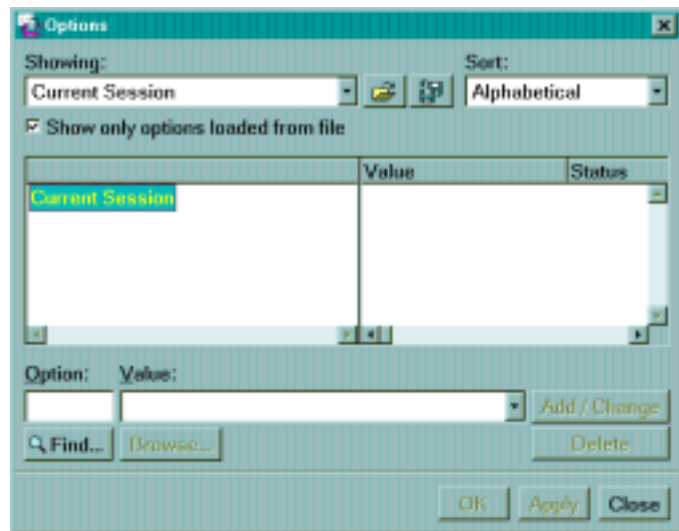
The Configuration File Editor

You can access your current configuration file using

> *Utilities > Options*

This brings up the **Options** window. If your system has options set already, these will appear in the window. If not, the central area of the window will be blank, as in Figure 1. We'll discuss the operation of this dialog window from the top down.

The **Showing** pull-down list at the top will let you choose from a number of configuration groups (Current Session, your start-up config.pro, or elsewhere)

Deselect the check box just below the **Showing** pull-down box. After a couple of seconds, a complete list of all the Pro/E configuration options will appear. The first column shows its name, and the second column shows its current value. An entry with an asterisk indicates a default value.

Figure 1 The Options window for setting and editing configuration files

Browse down through the list. There are a lot of options here! Note that the options are arranged alphabetically. This is because of the setting in the **Sort** pull-down menu in the top-right corner. Change this to *By Category*. This rearranges the list of options to group them by function. For example, check out the settings available in the **Environment** and **Sketcher** groups. Fortunately, there are a couple of tools to help you find the option name you're looking for. Let's see how they work.

Check the box beside "Show only options loaded from file" and select *Sort(Alphabetical)*. Note that the options listed here are only those that are different from the default settings.

Adding Settings to *config.pro*

Assuming you have a blank *config.pro*, let's create a couple of useful settings. At the bottom of the **Preferences** window are two text boxes for entering option names and values. If you know the name of the option, you can just type it in to the first box. One of the most common settings

is to turn off the (annoying!) beep that Pro/E emits from time to time. In the text box below **Option**, enter the option name *bell*. In the pull-down list under **Value**, select *No*. Note that the option name is not case sensitive and the default value is indicated by an asterisk in the pull-down list. Now select the *Add/Change* button on the right. The entry now appears in the data area. A bright green star in the **Status** column indicates that the option has been defined but has not yet taken effect.

Now enter a display option. The default part display mode in the graphics window is **Shaded**. Many people prefer to work in hidden line mode - let's make it the default on start-up. Once again, we will enter the configuration option name. As you type this in, notice that Pro/E anticipates the rest of the text box based on the letters you have typed in. After typing the "dis" characters, the rest of the option will appear; just hit the Enter key. The option name and value we want are

        display   **hiddenvis**

Now select *Add/Change* as before (or just hit the Enter key after typing the "h").

Another common setting is the location of the Pro/E trail file. As you recall, the trail file contains a record of every command and mouse click during a Pro/E session. The default location for this is the start-up directory. Theoretically, trail files can be used to recover from disastrous crashes of Pro/E, but this is a tricky operation. Most people just delete them. It is handy, therefore, to collect trail files for each session in a single directory, where they can be easily removed later. There is an option for setting the location of this directory. Suppose we don't know its specific name. Here is where a search function will come in handy.

At the bottom of the **Preferences** window, click the *Find* button. This brings up the **Find Option** window (Figure 2). Type in the keyword *trail* and select

        All Categories > Find Now

Figure 2 Finding a configuration file option

Several possibilities come up. The option we want is listed as **trail_dir**. Select this option and *Browse* to a suitable location on your system for the value. Perhaps something like *c:\temp*. Then select *Add/Change*. The new entry appears in the Preferences window. In the Find Option window, select *Close*.

For some options, the value is numeric (eg setting a default tolerance, number of digits, or the color of entities on the screen). In these cases, you can enter the relevant number (or numbers separated by either spaces or commas). For example, under **Option**, enter the name **system_hidden_color**. Then under **Value**, enter the numbers **60 60 60** (separated by spaces). These give the values of red, green, and blue (out of 100). Equal values yield gray; this setting will brighten the hidden lines a bit from the default value. Select *Add/Change*.

We have now specified four options. To have them take effect, select the *Apply* button at the bottom. The green stars change to small green circles in the Status column.

Note that you can resize the column widths by dragging on the short vertical column separator bars at the top of the display area. At the far right is a long (scrollable) one-line description of the option.

For practice, enter the options shown in Figure 3. The order that the configuration options are declared does not matter (the exception is mapkeys, discussed below). Check the on-line help for a description of these configuration settings and feel free to add new settings to your file. Investigate settings for search paths, libraries, default editors, default decimal places, import/export settings, and so on.

Figure 3 Settings in *config.pro*

Notice the icons in the first column beside the option names. These mean the following:

      ⚡ (lightning) - option takes effect immediately

      ✳ (wand) - option will take effect for the next object created

      🖳 (screen) - option will take effect the next time Pro/E is started

If you are using a *config* file from a previous version of Pro/E you may see a "stop sign" (actually a red circle with a line through it), which means that the option is no longer used.

Try to add an illegal option name. For example, in Release 2000i there was an option **sketcher_readme_alert**. Type that in to the **Option** field. When you try to set a value for this, it will not be accepted (the *Add/Change* button stays gray). Pro/E only recognizes valid option names! Thus, if you mistype or enter an invalid name, this is indicated by not being able to enter a value for it.

We will be making more changes to this *config.pro* a bit later in this lesson when we discuss mapkeys.

Saving Your *config.pro* Settings

To store the settings we have just created, select the ***Save As*** button ▣ at the top of the **Options** window. At the bottom of the new window, type in the desired name for the file - in this case ***config.pro*** and select ***OK***.

Deleting Configuration Options

With the configuration file name visible in the Showing field at the top, highlight one of the options and select ***Delete***. Selecting ***Apply*** automatically saves the new settings. ***Close*** the window.

Loading a Configuration File

To load a new configuration file, select the ***Open File*** button beside the **Showing** list. Select the desired file and then ***Open***. Note that these settings will be read in but not activated immediately (note the green star). Select the ***Apply*** button and observe the green star.

Now select ***Close*** in the **Options** window.

Checking Your Configuration Options

Because some settings will not activate until Pro/E is restarted, many users will exit Pro/E after making changes to their *config.pro* file and then restart, just to make sure the settings are doing what they are supposed to. Do that now. This is not quite so critical since the window shows you with the lightning/wand/screen icons whether an option is active. However be aware of where Pro/E will look for the *config.pro* file on start-up, as discussed above. If you have saved *config.pro* in another working directory than the one you normally start in, then move it before starting Pro/E. On the other hand, if you have settings that you only want active when you are in a certain directory, keep a copy of *config.pro* there and load it once Pro/E has started up and you have changed to the desired directory. To keep things simple, and until you have plenty of experience with changing the configuration settings, it is usually better to have only one copy of *config.pro* in your startup directory.

Note that it is probably easier to make some changes to the environment for a single session using ***Utilities > Environment***. Also, as is often the case when learning to use new computer tools, don't try anything too adventurous with *config.pro* in the middle of a part or assembly creation session - you never know when an unanticipated effect might clobber your work!

Customizing the Interface

In addition to the environment settings, there are several ways of customizing the Pro/E interface: using *config.pro*, toolbars, menus, and mapkeys. An example of a customized interface is shown in the figure at the right. When you modify the interface layout, your changes will be saved in a *config.win* file in a directory of your choice (usually the current working directory). It is possible and permissible to have several different *config.win* files in different directories, each with a different customization of the screen to suit the work you may be doing on files in that directory.
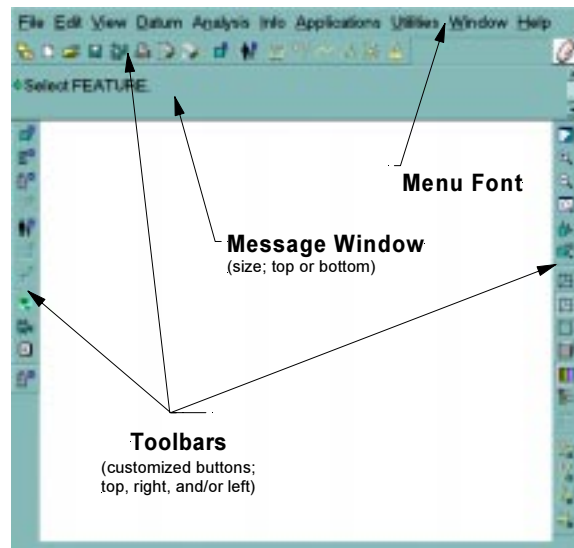
In this section, we will introduce methods to customize the toolbars and menus.

Figure 4 A customized screen layout

Toolbars

With the cursor on the top toolbar, hold down the right mouse button. This brings up the menu shown in Figure 5. This shows the toolbar groups currently displayed (see check marks); the groups can be toggled to include/exclude them from the display. Each group contains a set of functionally-related shortcut buttons.
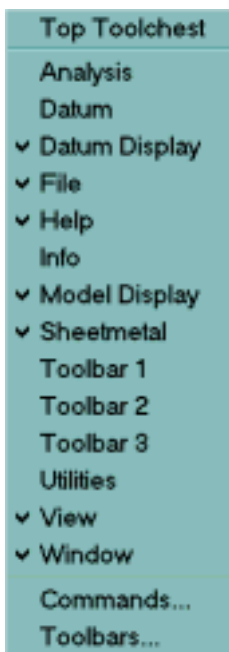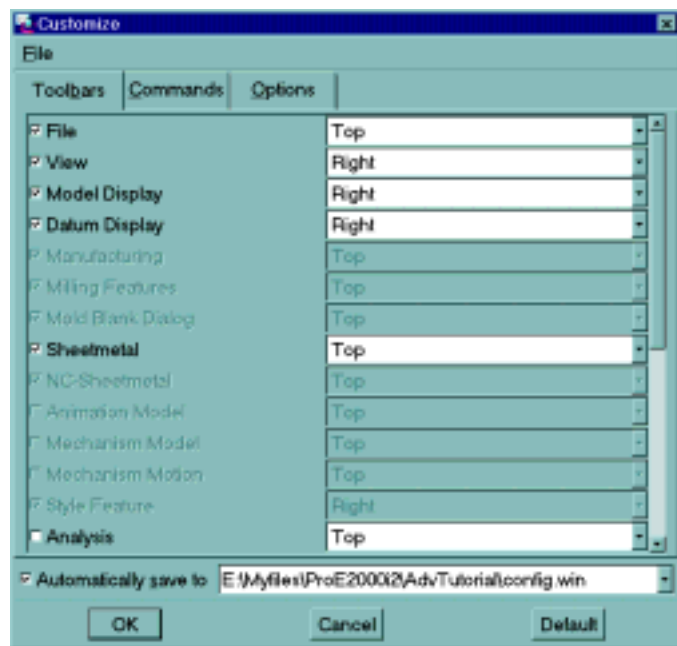
Figure 5 *Toolbar* toggle menu

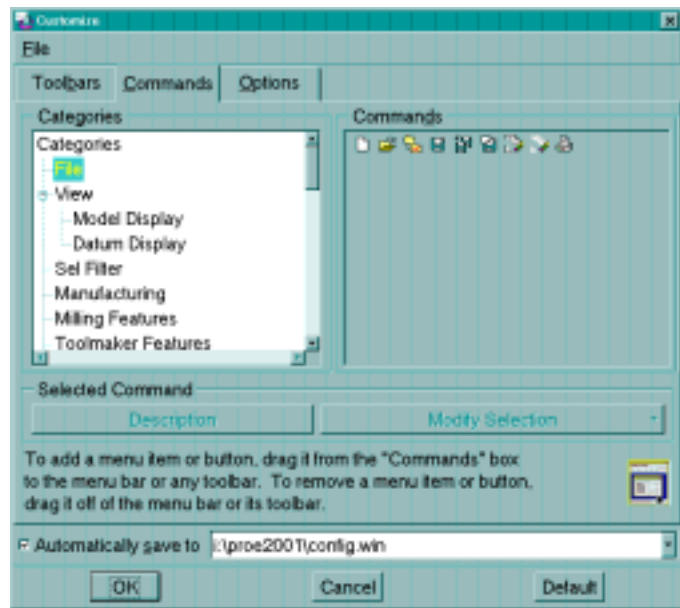**Figure 6** The *Toolbars* tab in the **Customize** window

At the bottom of this pop-up menu, select ***Toolbars***. This brings up the **Customize** menu which contains a list of all available toolbars, and their location (see Figure 6). At the bottom of this window you can specify whether or not, and where, to automatically save the current layout settings. The default is *config.win* in the current working directory. As mentioned above, you can create multiple *config.win* files, and use ***File > Save Settings*** and ***File > Open Settings*** in the **Customize** window to store and recall previous files. Note that in addition to the eleven standard toolbar groups there are three initially empty groups (Toolbars 1 through 3), which you can populate with short-cut buttons using methods described below. The pull-down lists at the right allow you to place the selected toolbars at different places on the screen (left, right, top of graphics window).

Changing Toolbar Buttons

In the **Customize** window, select the ***Commands*** tab. (This is also available by selecting ***Commands...*** in the menu shown in Figure 5 or using ***Utilities > Customize Screen*** in the pull-down menu.) The window shown in Figure 7 will open. Groups of toolbar commands are listed in a tree structure in the **Categories** area on the left. Click on any of the group names and the available short-cut buttons will appear in the **Commands** area on the right. As you move the mouse over these buttons, a tool tip will display.

To add a button to a toolbar, just drag and drop it onto an existing toolbar at the top, right, or left. The button will be added wherever you drop it on the toolbar. To remove it, drag it off the toolbar and drop it somewhere else (on the graphics window, for example). Note that it is possible to mix and match the short-cut buttons: any button can be placed on any toolbar. For example, a button listed under the **File** category can also be added to the **View** toolbar. Buttons can also be present on more than one toolbar. The possibilities are endless!

Figure 7 Choosing short-cut buttons for toolbars

While we are here, notice that at the bottom of the **Categories** list is **Mapkeys**. We will be discussing mapkeys a bit later. You can add a button representing any of your defined mapkeys to any of the toolbars. It is helpful to keep your mapkey descriptive names short for this.

At the bottom of the **Categories** list is **New Menu**. You can drag this up to the menu area at the top of the screen to create your own pull-down menus.

If you turn on one of the user toolbars (select Toolbar 1, 2, or 3 under the ***Toolbars*** tab), an initially empty button will appear in the designated location (top, left, or right). You can use the

Commands selector to drag any button to define your own toolbar.

Notice that the final tab in the **Customize** window is *Options*. This lets you set the position of the Command/Message window (above or below the graphics area) and some other settings.

When you leave the **Customize** dialog box, your new settings can be written to the file designated in the bottom text entry box. Each new *config.win* file is numbered sequentially (*config.win.2*, *config.win.3*, and so on).

Helpful Hint
It is tempting, especially if you are blessed with a lot of screen space, to over-populate the toolbars by trying to arrange every commonly used command on the screen at once. This is reminiscent of many other Windows-based CAD programs. Before you do that, you should work with Pro/E for a while. You will find that Pro/E will generally bring up the appropriate toolbars for your current program status automatically. For example, if you are in Sketcher, the Sketcher short-cut buttons will appear. Furthermore, many commands are readily available in the right-mouse pop-up menus. Thus, adding these buttons permanently to any toolbar is unnecessary and the buttons will be grayed out when you are not in Sketcher anyway - you are introducing screen clutter with no benefit.

Keyboard Shortcuts - Mapkeys

A mapkey is a short sequence of keyboard key strokes or a function key that will launch one or a series of Pro/E commands. Mapkeys are very similar to macros that can be defined in other software packages. Mapkey definitions are contained/included in your *config.pro* file, so they are loaded at start-up.

The mapkey key stroke sequence can be as long as you want; most users restrict mapkeys to only 2, or sometimes 3, characters. This gives several hundred possible mapkey sequences - more than you can probably remember effectively. Pro/E constantly monitors the keyboard for input and will immediately execute a defined command sequence when its mapkey is detected. Single character mapkeys should be avoided due to the way that Pro/E processes keyboard input. If you have two mapkeys "v" and "vd", for example, the second mapkey would never execute since Pro/E will trap and execute the first one as soon as the "v" is pressed. For the same reason, a 3-character mapkey can never have the same two first letters as a 2-character mapkey.

Ideally, you would like to have mapkey sequences that are very easy to remember, like "vd" (view default), or "rg" (regenerate). Because it is common to only use two characters, it will take some planning to decide how you want to set up your definitions to use only a couple of easy-to-remember key strokes! The mapkey should be mnemonic, but can't collide with other definitions. You don't want to have to remember that "qy" means "repaint the screen."

A practical limit on usable mapkeys is perhaps in the range of 20 to 30, although some "power users" can use over a hundred.

For this exercise, clear your session and load any single simple part file. We will not be modifying the part.

Listing Current Mapkeys

To see a list of your current mapkeys (some are defined in the *config.pro* contained in the pro_stds directory) select

Utilities > Mapkeys

This dialog window (Figure 8) allows you to define and record, modify, delete, run, and save mapkeys. Note that each mapkey has a short Name and Description. The Name will be used on any short-cut button (described below), and the Description will appear at the bottom of the main graphics window. Mapkeys that start with a "$" are function keys.

Note that mapkeys created using a previous release may differ in command syntax and it is likely that some mapkey definitions from previous releases will not function properly. However, mapkeys are easy enough to record. Before you do that, you might try to get hold of the *config.pro* file in the **pro_stds** directory mentioned above. A list of these mapkeys is in the file usually stored in
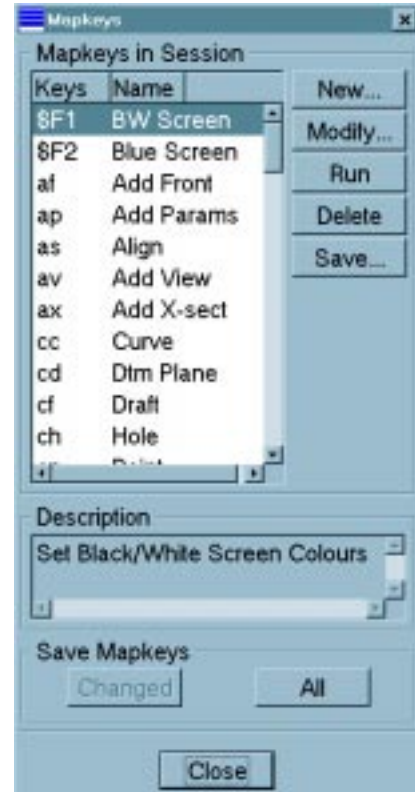
/ptc/pro_stds/mapkeys.htm

Figure 8 Accessing Mapkeys currently in session

In the following, it is assumed that you have no mapkeys defined as yet. If any of these tutorial mapkeys collide with existing mapkeys shown in the mapkeys list (Figure 8), you can modify the keyboard sequence (for example, use "dv" instead of "vd") for the new mapkey.

Creating Mapkeys

New mapkeys are created as follows. We will create a mapkey sequence "vd" that will reorient the view to the default orientation. To set this up, you will have to bring in one of your previously created parts. We will not be modifying the part.

Select the *New* button in the menu of Figure 8. The **Record Mapkey** dialog box shown in Figure 9 will open. Enter the data shown in the figure: key sequence, name, description. Now we record the command sequence:

> ***Record***
> ***View > Default Orientation*** (in the top pull-down menus)
> ***Stop > OK***

It's that easy! Spin the model with CTRL-middle. In the Mapkeys window, highlight the new mapkey "vd" and select the ***Run*** button. It's a good idea to check your mapkey definitions now when it is easy to modify them.

As mentioned above, mapkey definitions are saved in a configuration file (as in *config.pro*). New mapkey definitions are appended to the end of the file. If you redefine a mapkey (or use a duplicate keystroke sequence), the definition closest to the bottom of the *config* file is the one that will be used. When saving a mapkey you can choose either *config.pro* or *current_session.pro*. There are three ways to save the mapkeys using the buttons in the **Mapkeys** window:

> ***Save*** - saves only the highlighted mapkey
> ***Changed*** - saves any mapkeys changed this session
> ***All*** - saves all mapkeys defined for session

Remember that if you save the mapkey in the *current_session.pro* or elsewhere, it will not be loaded automatically the next time you start Pro/E. To do that, you must explicitly save the mapkey definitions into the *config.pro* file.
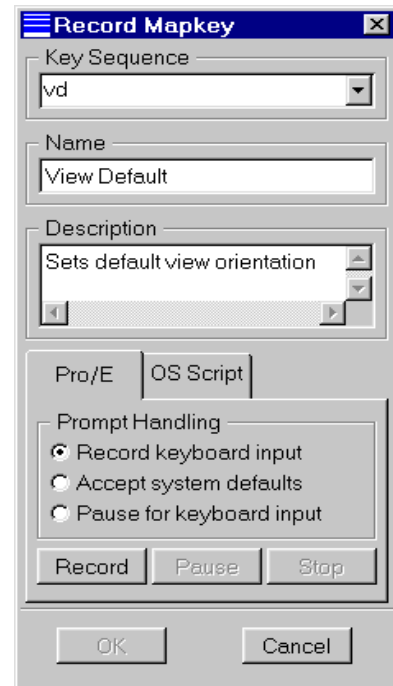
Close the **Mapkeys** window.

Figure 9 Creating a mapkey

Minimize Pro/E and open *config.pro* using your system text editor. Scroll down to the bottom of the file to see the new line(s) that describe the mapkey. Obviously, these lines should never be separated since they are a continuation of the same sequence. It is possible, but probably not advisable, to try to edit the mapkey definitions manually - leave that to the power users! Exit your text editor and restore the Pro/E window.

Some final points about mapkeys: it is possible to set up the mapkey so that execution will pause to allow user input during the command sequence, either by picking on the screen or through the keyboard. Mapkeys can also call other mapkeys. You might like to experiment with these ideas on your own. The possibilities for customization are almost limitless!

As mentioned above, the *config.pro* file provided in the **pro_stds** directory contains several dozen mapkeys. Some of these are listed in Table 1-1 on the next page.

We will return to mapkeys after the next section.

Table 1-1 Some commonly used mapkeys

General Mapkeys		Feature Creation Mapkeys	
wc	Window Close	ct	Create Cut
wa	Window Activate	cp	Create Protrusion
rg	Regenerate	ch	Create Hole
dd	Done	cr	Create Round
qq	Quit	cc	Create datum Curve
View Mapkeys		cd	Create Datum plane
rr	Repaint	Utility Mapkeys	
sd	Shade	fr	Feature Redefine
vd	View Default	fs	Feature Suppress
vr	View Refit	fd	Feature Delete
vf	View Front	fe	Feature Resume
vb	View Back	fm	Feature Modify
vt	View Top	fi	Feature Information
vl	View Left		
vg	View Right		

Working with Part Templates

Most part files that you create contain many common elements such as datums, defined views, coordinate systems, parameters, and so on. Creating these from scratch for every new part that you start is tedious and inefficient. Prior to Release 2000i^2 a very handy model creation tool used the notion of a "start part" which contain these common elements. Users would then create a mapkey that would bring the part into session and then rename it. This made the creation of new parts very quick and efficient, with the added bonus that standard part setups could be employed.

This "start part" functionality has been built into the program using part templates. Several part templates are included with a standard Pro/E installation for solid and sheet metal parts in different systems of units. You may have a reason at some point to create your own template, which we will do here. We'll also define a mapkey to quickly bring it in session and allow you to change its name. Then you can immediately get on with the job of creating features. We will

create the part template from scratch, although you could use any of the existing templates as a basis for this.

Select *File > New*. Make sure the **Part** and **Solid** radio buttons are selected. Deselect the **Use Default Template** box, and enter a name *mytemplate*. Select *OK* and in the next window, select the **Empty** template and *OK*.

Create the default datums and use *Part > Set Up > Name* to rename the datums *SIDE* (DTM1), *TOP* (DTM2), and *FRONT* (DTM3). Now set up some named views.

>*View > Orientation*

and create the following three named views:

View Name	Reference 1		Reference 2	
	Direction	Pick Datum	Direction	Pick Datum
FRONT	Front	FRONT	Top	TOP
TOP	Front	TOP	Right	SIDE
RIGHT	Front	SIDE	Top	TOP

The completed list of saved views should appear as shown in Figure 10. Feel free to add additional standard views (Left, Back, Bottom, Iso_Right, ...). Select *OK* to leave the **Orientation** dialog.

Check out our previously defined mapkey for setting the default view ("vd").
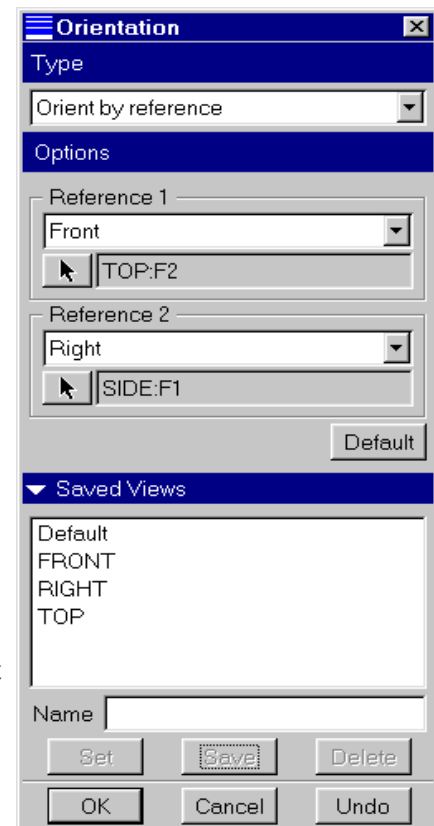
Set the part units using

>*Set Up > Units*

and picking "millimeter-Newton-Second", then

>*Set > OK > Close*

We are finished with creating the start part, so save it with the name **mytemplate.prt**. If you have write access, move the part file to the Pro/E installation directory, something like

>**\ptc\proe2001\templates**

This is the default directory where Pro/E will look for part templates. If you do not have write access to this directory,

Figure 10 Saved views in mytemplate.prt

leave the part file in your working directory. You can rename the file to remove the version number if you want, so that it appears as as **mytemplate.prt** rather than **mytemplate.prt.1**.

Creating More Mapkeys

Before we leave this new part template, let's create some more mapkeys to go directly to the named views. Select

> *Utilities > Mapkeys > New*

Use the key sequence "vt" and enter a short name like "View Top" and description "Orientation Top View". Now record the mapkey using

> *Record*
> *Saved View List* (a toolbar button) *> TOP*
> *Stop > OK*

Spin the datum planes, and select **Run** to try out the mapkey. Similarly, create and test two more mapkeys to go to the front view ("vf") and the right side view ("vg")[2]. Don't forget to save all the changed/new mapkeys in your *config.pro* file. Open up your *config.pro* to confirm that they are there.

Using the New Part Template

Erase the current part from the session[3]. Select

> *File > New*

Deselect the **Use Default Template** box, enter a name (like **test**), and select **OK**. In the **New File Options** window, scroll to and highlight the template **mytemplate**. This is the copy in the default templates directory. If you weren't able to put your file there, use the Browse button to find it in the working directory. Once the template is located, select **OK**. A copy of the template is now brought into session and given the name you specified.

Setting the Default Part Template

We can tell Pro/E to use our new template as the default by setting an option in *config.pro*.

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[2] The mapkey "vr", which is more logical for the right view, is usually used for "View Refit"

[3] If you have stored your template part in the templates directory you must close Pro/E and restart it.

Select

>   *Utilities > Options*

and enter the Option **template_solidpart**. Set the value for the option by browsing to the template directory (or use the current working directory, wherever you have saved the template file) and selecting the part file **mytemplate.prt** we created above. Select Add/Change and then *Apply* the new setting (remember that this automatically saves the *config* file).

Creating a Mapkey to Start a New Part

Erase the current part from the session. Select

>   *Utilities > Mapkeys > New*

Enter the key sequence "cp" ("create part"), name "Create Part", and description "Create a New Part and Rename". Now select

>   *Record*
>   *File > New*

Choose *Part | Solid | OK*. Leave the default part name as **prt0001**, and the check beside Use Default Template. Now select

>   *File > Rename*

This is where we want the mapkey to stop, so select *STOP > OK* in the **Record Mapkey** dialog. In the **Rename** window, enter a new name for the part, like **test**, then select *OK* twice. We have a new mapkey called "cp", so highlight this in the **Mapkeys** dialog and save it. Close the **Mapkeys** dialog window. Open the *config.pro* file to see the listing added for this new mapkey.

To try out the mapkey, erase the new file with *File > Erase > Current*. Type "cp". Several windows will quickly open and close, and you will be left with the dialog box for renaming the part. You can now enter the desired name for a new part, which will contain the default datums, units, and named views set up above to work with the view mapkeys we created earlier. Pretty slick!
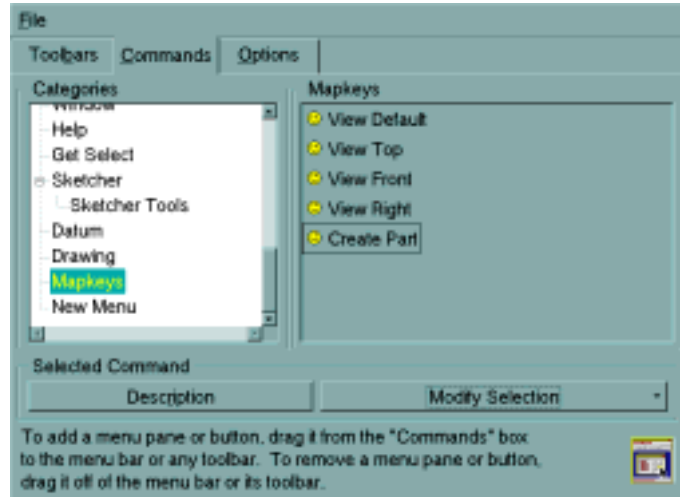
We have created a very simple part template here. You can make this as elaborate as you like with parameters, units, materials, layers, datum features and so on - even solid features. For example, if you often create parts whose base feature is a cylindrical solid, consider including this in a special template, perhaps called *cylinder.prt*. You can include as many features as you want in a template and, of course, use any of the provided part templates as a starting point for any new ones.

Adding Mapkeys to Menus and Toolbars

Mapkeys can be added to any of the existing toolbars and pull-down menus. You might like to do this for mapkeys that you do not use frequently, and are likely to forget.

To see how this is done, select the **Commands** tab in the **Customize** window (see Figure 11). At the bottom of the **Categories** list, you will find an entry called **Mapkeys**. Select this. This shows the tree structure of the pull-down menus on the left, and your currently defined mapkeys on the right. In the Mapkeys pane on the right, select the mapkey **Create Part**. The two buttons *Description* and *Modify Selection* are now active. Selecting the former shows you the description you entered when defining the mapkey. Selecting the latter allows you to modify the mapkey button image (currently a "happy face") and display. You might like to get rid of the "happy face", since all mapkeys use this same icon. You can select from a large collection of Pro/E icons, or design your own.
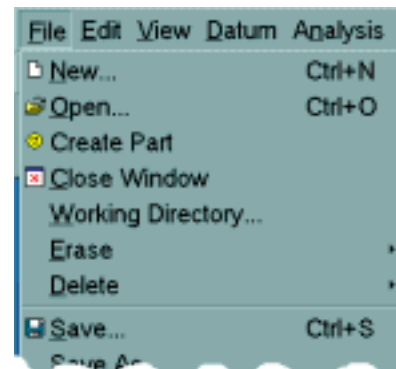
Figure 11 Adding mapkeys to menus and toolbars

Drag the Create Part mapkey in the right pane up to the *File* pull-down menu and drop it in a convenient location, as in Figure 12. Selecting this will launch the mapkey.

Another way to utilize mapkeys is to create shortcut buttons on the toolbars. Again select the Create Part mapkey in the right pane and drag it to a toolbar.

We now have three different ways to launch the Create Part mapkey:

   ♦   from the keyboard, with "cp"
   ♦   from the pull-down *File* menu
   ♦   from the toolbar

Figure 12 Create Part mapkey added to a pull-down menu

Experiment with these to find out which one is most suitable for you. Again, remember the cautionary note about cluttering up your screen.
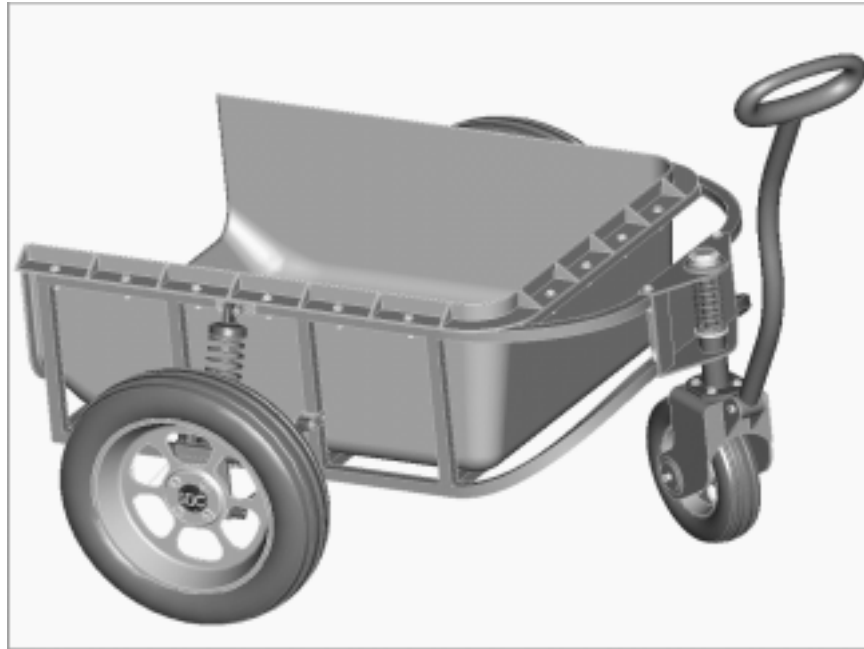
Introduction to the Project

The assembly project to be completed in this tutorial involves the modeling and assembly of the three-wheeled utility cart shown in Figure 12. The cart contains 26 or so parts, many of which

are repeated in the assembly. The total assembly has about 75 parts (mostly bolts!). We will use the techniques introduced in the lessons to model various parts of the cart as exercises at the end of each lesson. We will average about 4 parts per lesson, so you should get lots of practice! In the final lesson, we will assemble the cart, using a number of advanced functions for dealing with assemblies. Try not to "jump the gun" on this assembly task, since the functions to be covered in the last lesson can really speed up your job of putting the cart together.

Figure 13 The assembly project - a three-wheeled utility cart

For your modeling exercises, the parts shown at the end of each lesson will illustrate the critical dimensions. A figure will also be provided to show where the parts fit into the overall assembly. **Not all dimensions are shown on each part - you can use your judgement and creativity to determine the remaining dimensions.** In this regard, please take note of the following:

♦   ALL UNITS ARE IN MILLIMETERS! You might set up your default part template with this setting.
♦   Dimensions are usually multiples of 5mm. For instance, all the plate material and the wall of the cargo box are 5mm thick. The tubing is 25mm square.
♦   All holes and cylinders, unless otherwise dimensioned, are $\varphi 10$. This applies to bolt holes, pins, rods, and so on.
♦   All holes, unless otherwise dimensioned, are coaxial with cylindrical surfaces or located on symmetry planes.
♦   For some of the trickier parts, in addition to the figures showing the dimensions, there will be some discussion and hints to help you get going.

When we get to the final assembly in Lesson 8, remember that it is an easy matter to modify dimensions of the various parts so that the assembly fits together. Don't be too concerned when you are modeling the parts if you have to guess at one or two dimensions. These can be modified later if the need arises.

When you are creating the parts, try to be aware of the design intent for the part and how it might eventually be placed in the assembly[4]. For example, if the part has one or more planes of symmetry, it is common practice to use the default datum planes for these. In the assembly, the **Align** constraint using these datum planes is an easy way to position the part (usually with another symmetric part).

Although a suggested part name is given, feel free to make up your own part names (although this might cause confusion in Lesson 8!). Remember that Pro/E is fussy about files that get renamed in isolation, or moved to another directory. If a part has been used in an assembly (or sub-assembly) or drawing, make sure the assembly or drawing is in session if you rename or move the part so that the related files can also be updated.

For the entire project, you will require about 10 Megabytes of disk space to store all the parts and assemblies. This does not include parts we will make during the lessons themselves, just the cart project parts. If you are not particularly careful about disk housekeeping (like deleting older version of the part files), you will require more space.

This lesson should have given you enough ideas and ammunition to allow you to customize the interface so that it will be most efficient for the type of work that you do. There are a surprising number of users who are unaware of many options available in *config.pro*. Check them out!

In the next lesson we will look at functions directly involved in model creation. These are for the creation of sweeps.

Questions for Review

1.   What is the name of the file containing your configuration settings?
2.   What is the name of the file containing your screen layout settings?
3.   When, and from where, are your configuration settings loaded? Why is there more than one location?
4.   What happens if your configuration file contains multiple entries for the same option, each with different values?
5.   How can you find out where your start-up directory is?
6.   How can you create/edit/delete configuration settings?
7.   When do configuration settings become active?
8.   Is it possible to have more than one customized screen layout?
9.   How do you place toolbars on the top/left/right edge of the graphics window?
10.   How do you add/delete shortcut buttons on the toolbars?
11.   How many empty toolbars are there?
12.   Where are the toolbar definitions saved?
13.   What is a mapkey?

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[4] You might like to look ahead to the last lesson to see what assembly constraints are used for each part.
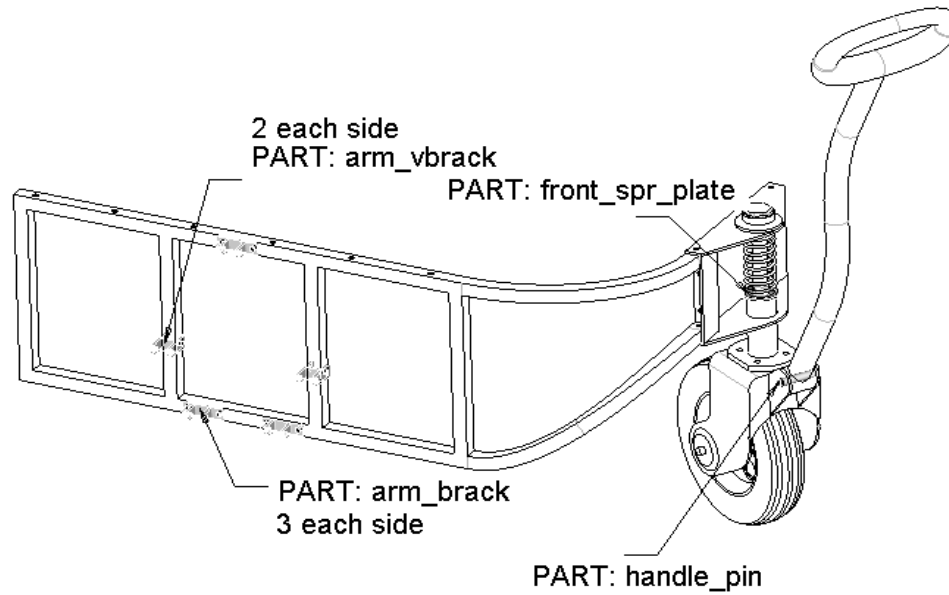
14.   Why do you usually want to keep mapkey names short?
15.   How is the mapkey name different from the mapkey sequence?
16.   How do you create a new mapkey?
17.   Are new mapkeys stored automatically? Where?
18.   What is the purpose of a part template? Where are they stored and how do you access them?

Exercises
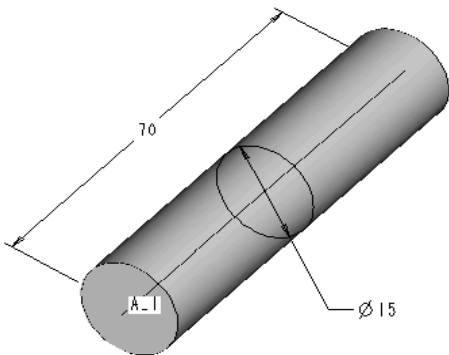
1.   Create an assembly template. This should have named datums and named views to match your view selection mapkeys and default units to match your default part template. Make this the default template for assemblies.
2.   Set up a mapkey to create a new assembly using the default assembly template.
3.   Put the Create Assembly mapkey on the pull-down File menu.
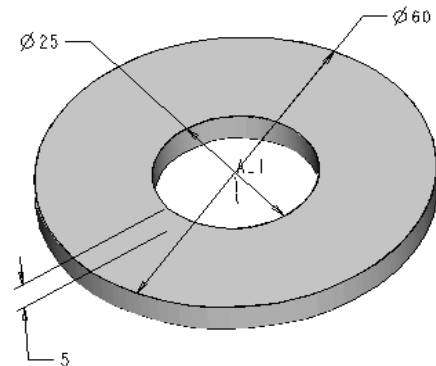
Project Exercises

We're going to start off with some of the easier parts in the cart. These should give you some time to experiment with your configuration file, mapkeys, and part template. The project parts are shown in the figures below. Their location in the cart is also shown for reference in the Figure here:
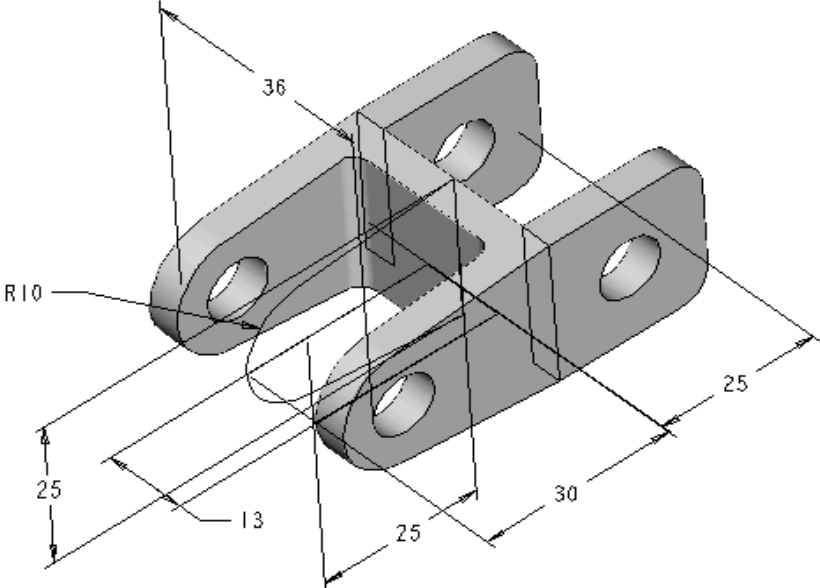

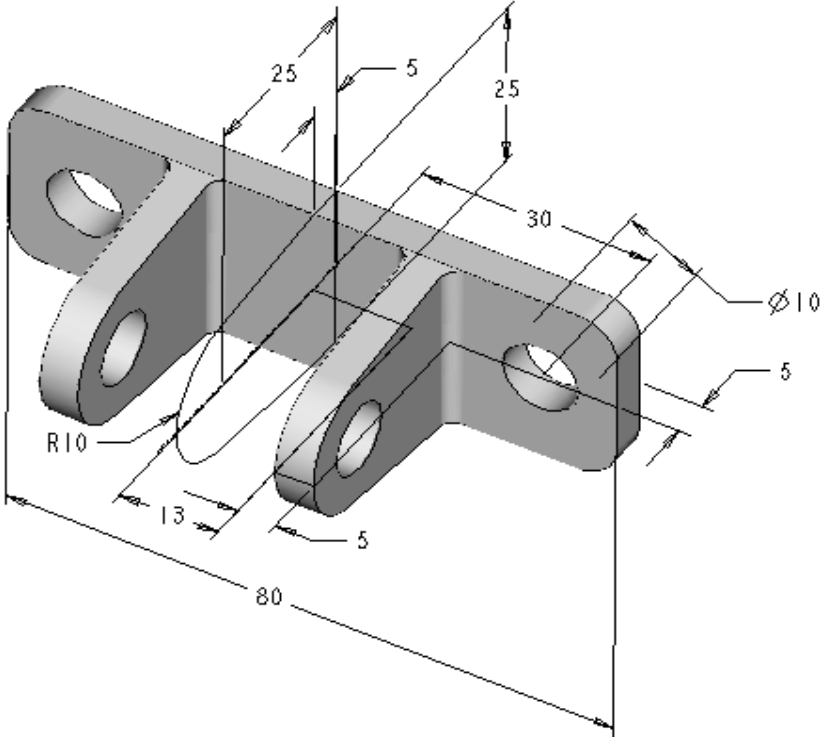
Figure 14 Project parts in Lesson #1

Part: *handle_pin*

Part: *front_spr_plate*

Part: *arm_vbrack*

Part: *arm_brack*