Student Notes:

CATIA V5 Training
Foils

Part Design Features Recognition

Version 5 Release 19
January 2009

EDU_CAT_EN_FR1_FF_V5R19

Student Notes:

About this course

Objectives of the course

Upon completion of this course you will be able to:

- Build comprehensive V5 data structures for solids whose specifications are lost or unreachable

- Build data structure for solids that have been imported from other CAD systems

Targeted audience

Mechanical Designers

Prerequisites

Students attending this course should have knowledge of CATIA V5 Fundamentals and CATIA Part Design.

4 hrs

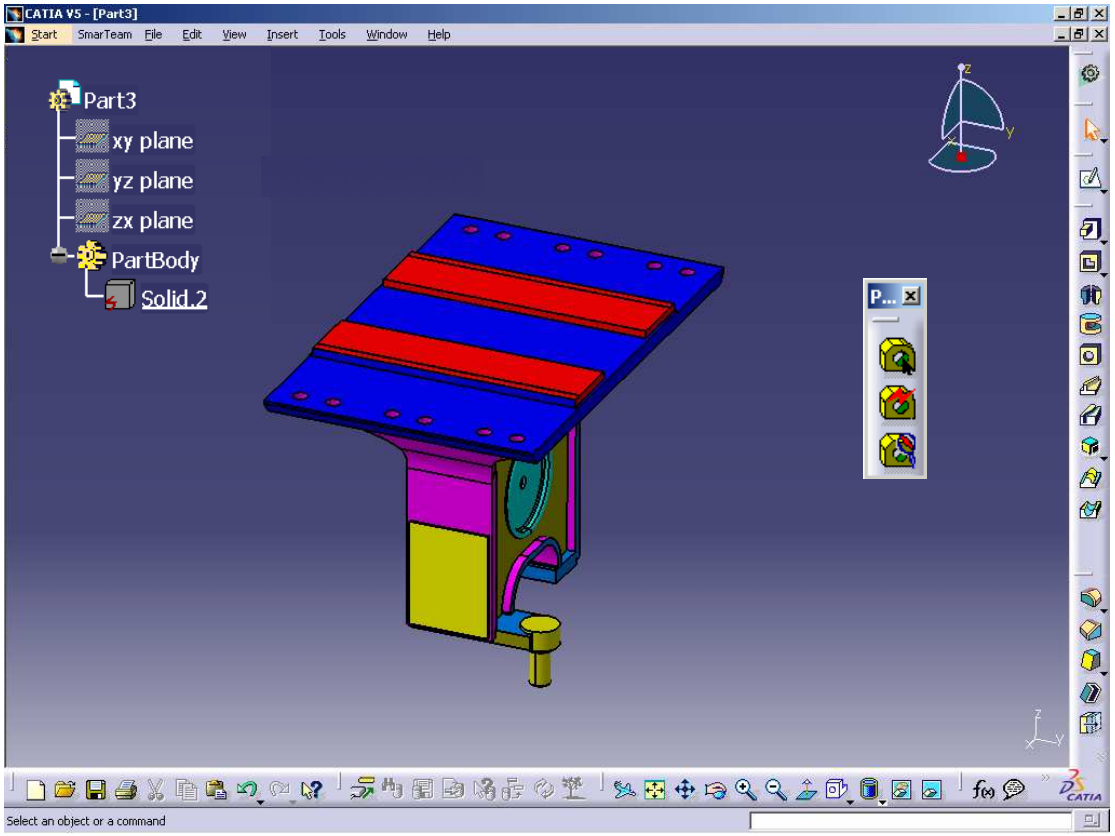
Student Notes:

Table of Contents

Student Notes:

Feature Recognition: Introduction

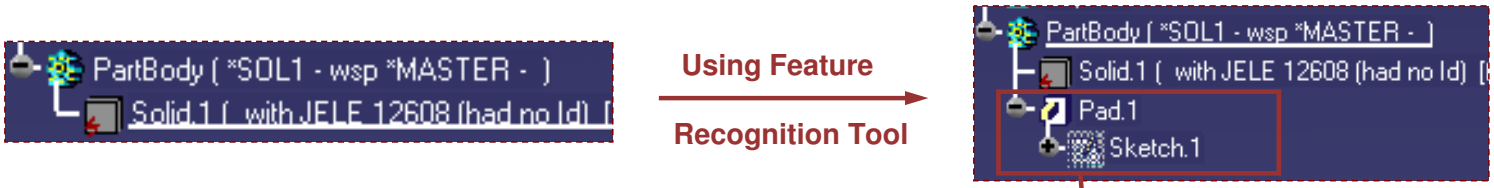
In this lesson, you will become familiar with the user interface and the general process of Feature Recognition functionality.

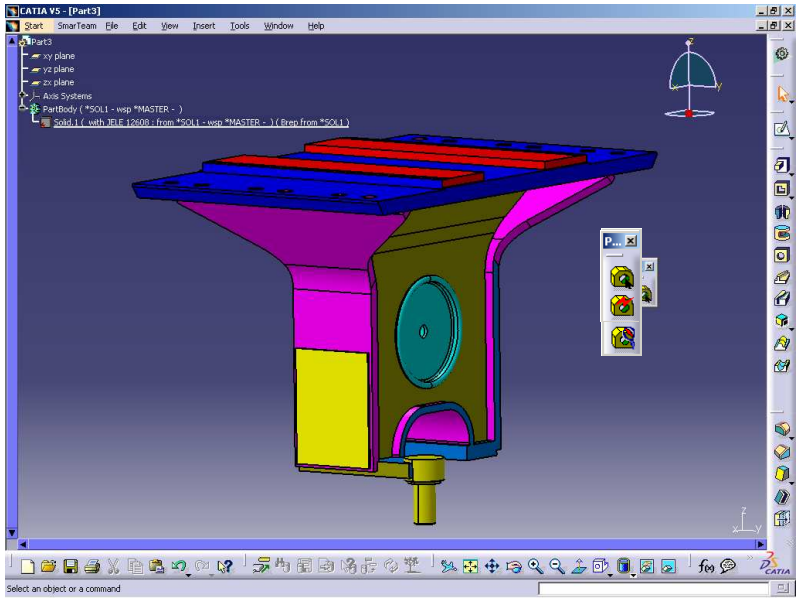


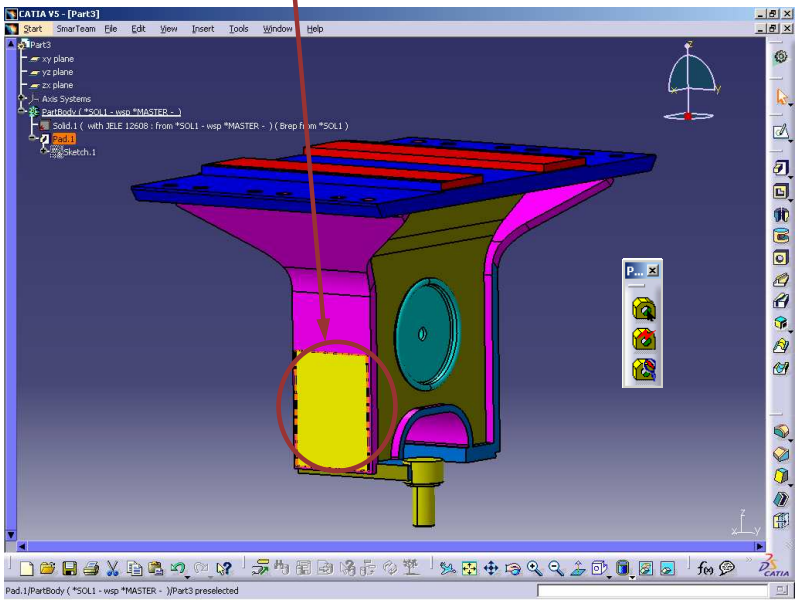
Student Notes:

What is Feature Recognition?

- An isolated solid (B-Rep) can be provided by:
  - CAD system other than CATIA V5.
  - Migration of data from V4.
- After using the Feature Recognition Tool you will obtain a comprehensive CATIA V5 data structure (Product Structure) made of retrieved elementary Part Design feature.







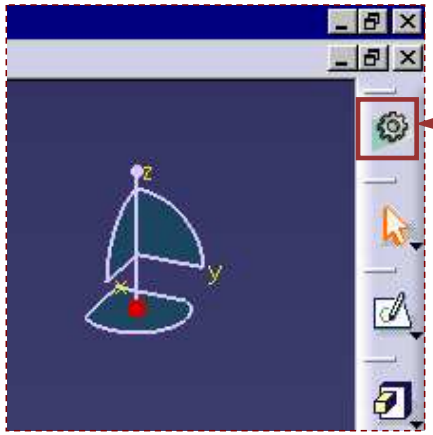
Student Notes:

Accessing the Workbench

Feature Recognition is a complementary tool to the Part Design basic tools. Feature Recognition icon is available in the Part Design Workbench.

1 **Select Start > Mechanical Design > Part Design**

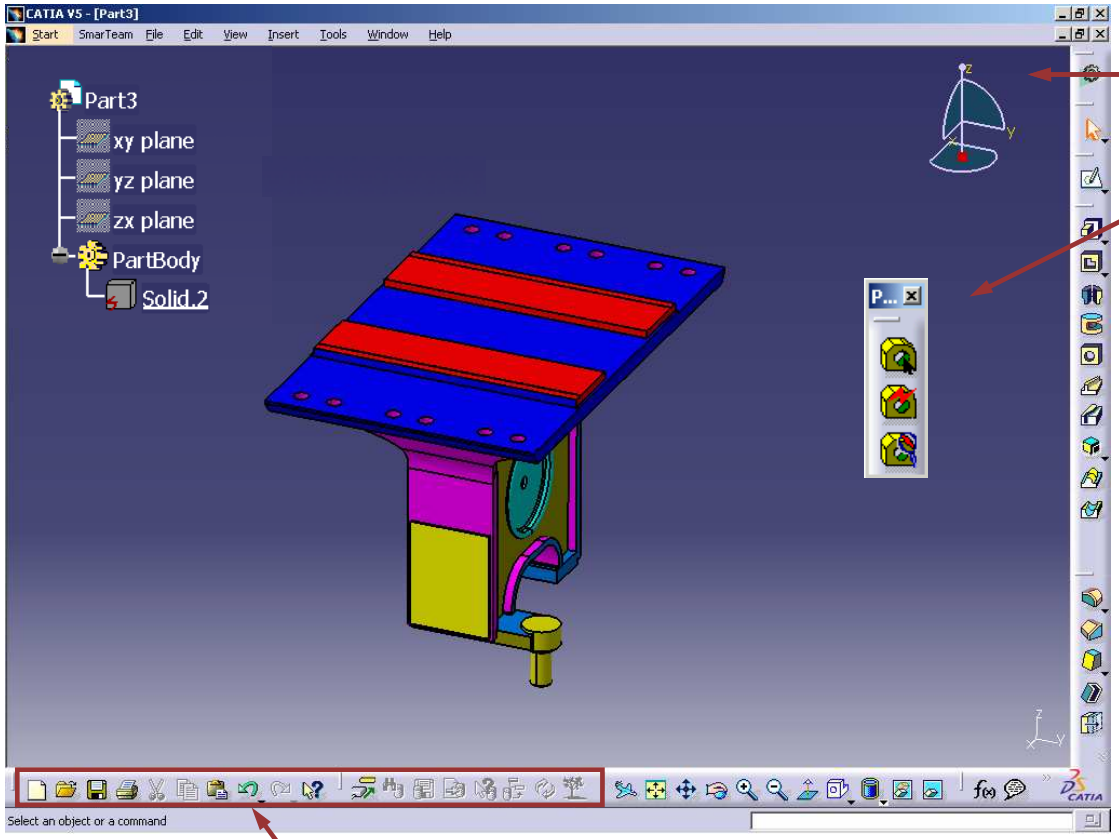
2 **Part Design Feature Recognition tool is reachable using this toolbar. The three icons stand for Manual FR, Automatic FR and a Part Analysis tool.**



The current workbench is indicated by an icon on the right hand Tool Bar.

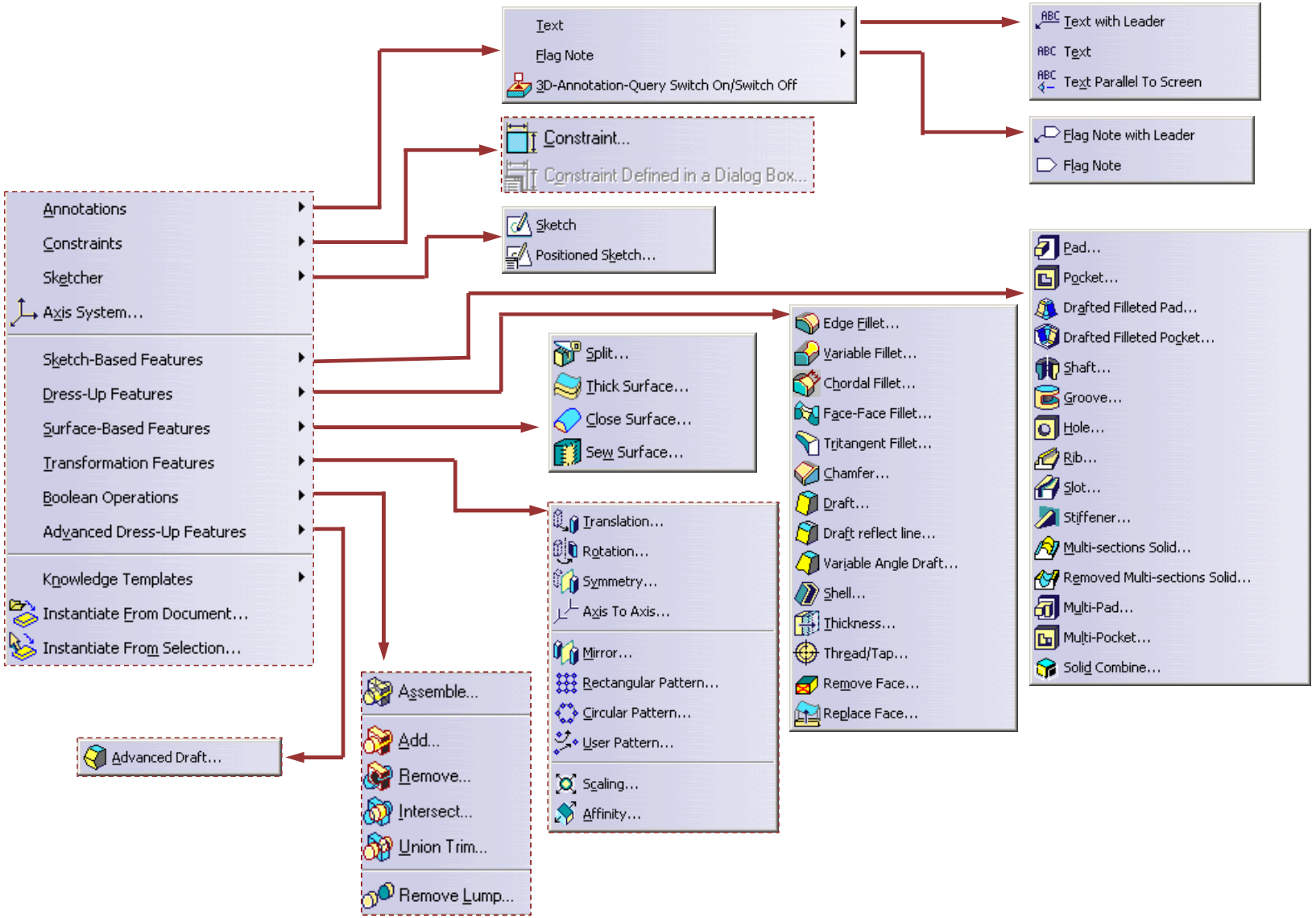
Exploring the User Interface (1/2)

Student Notes:



Student Notes:

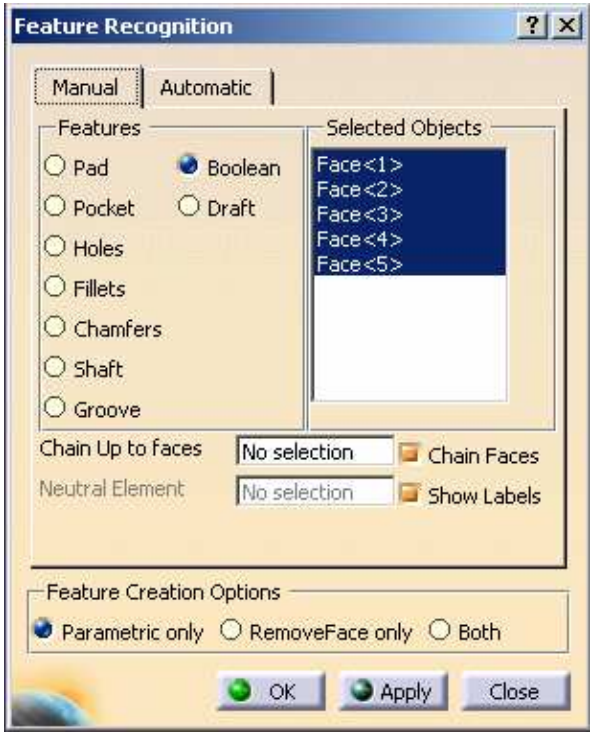
Exploring the User Interface (2/2)

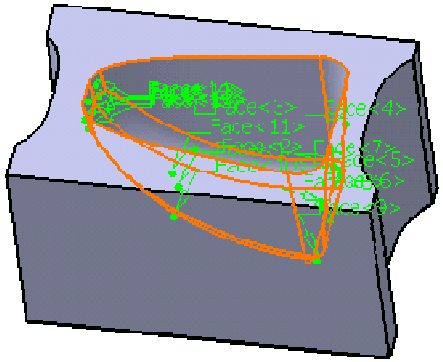


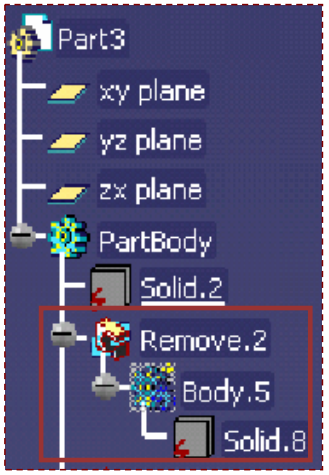
Student Notes:

Performing Feature Recognition

In this lesson, you will become familiar with the general process of performing Feature Recognition.





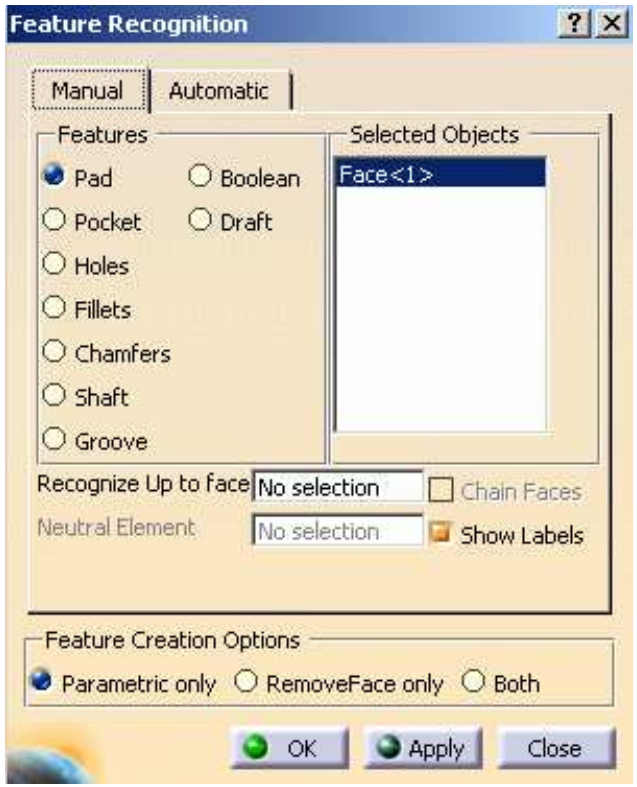


Student Notes:

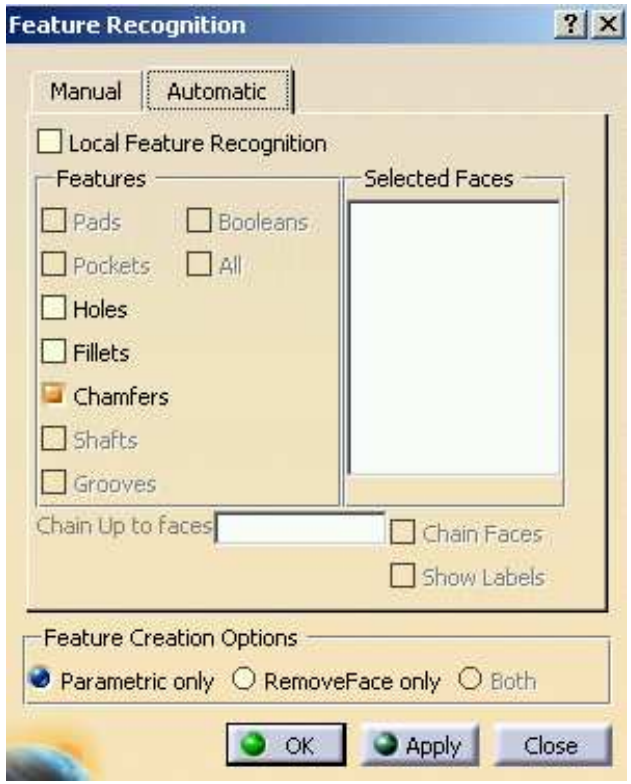
Feature Recognition Panel (1/5)

Through the Feature Recognition dialog box, you can recreate specifications for the element to be recognized, either manually or automatically.

Manual Feature Recognition



Automatic Feature Recognition



Student Notes:

Feature Recognition Panel (2/5)

Manual FR allows to recognize a large range of feature types, selecting the geometry in a precise way.

A. Features:

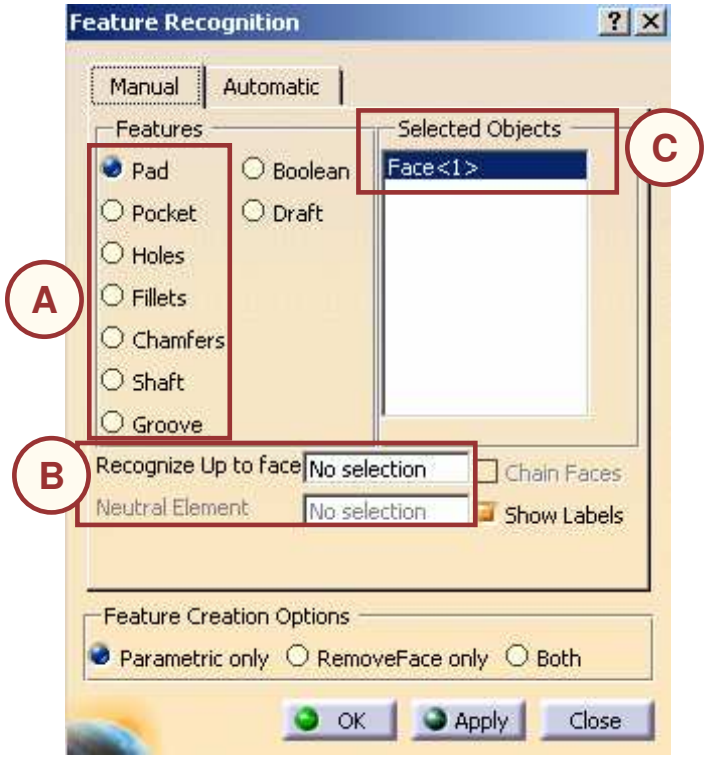
- **a. Major basic features can be recognized: sketch-based features (pad, pocket, hole, shaft, groove), as well as dress-up features (fillet and chamfer).**
- **b. In future, other types of features will be recognizable, such as stiffeners, ribs, patterns and mirrors.**

B. Selection Type: The user can input additional information to help the objects selection, such as:

- **a. A limiting face for the selected for the 'Recognize up to face' option to recognize features that are extruded using 'Up to Face' option.**
- **b. Neutral Element for draft recognition.**

C. Selected Objects:

- **a. A list of the selected objects is displayed in this window. You can select as many surfaces as wanted.**
- **b. To deselect a face from the selection, click it once more on the geometry.**

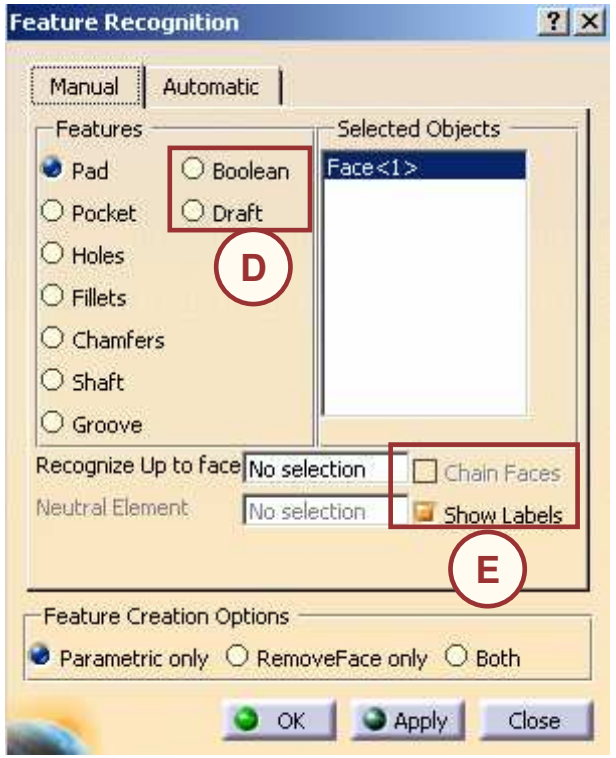


Student Notes:

Feature Recognition Panel (3/5)

D. **Boolean and Draft:** You can recognize Boolean features (add/remove), in cases:
   a. When the initial geometry is composed of complex shapes.
   b. When the recognition of standard features fails.
   c. When the draft can be recognized by selecting faces making the draft and a neutral surface.

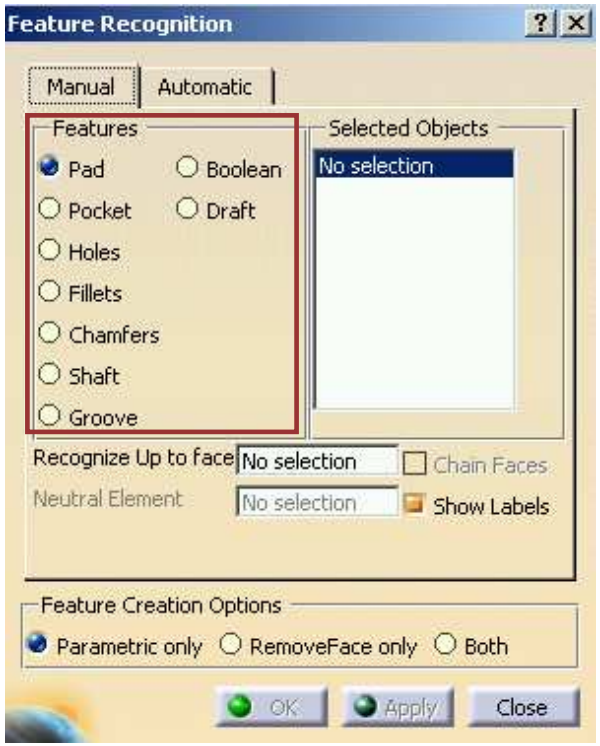
E. **Chain Faces option:**
   a. Allows an automatic selection of the faces which are in contact with the selected objects.
   b. Especially useful in detecting holes or grooves, of faces which are not easily reachable.
   c. Allows to create tags on faces that are part of recognition selection using Show Labels option.



Student Notes:

Feature Recognition Panel (4/5)

- The 'Manual' tab has an exhaustive list of all the Features which can be recognized. These include:
  - Pad (blind /up to next, normal direction)
  - Pocket (blind /up to next, normal direction)
  - Simple Holes (blind /up to Next)
  - Countersunks Holes (blind /up to next)
  - Counter drill Holes (blind /up to next)
  - Counterbore Holes (blind /up to next)
  - Tapered Holes (blind /up to next)
  - Fillet (rolling ball, constant radius)
  - Chamfer (length-length)
  - Chamfer (angle-length)
  - Shaft
  - Groove
  - Draft
  - Boolean



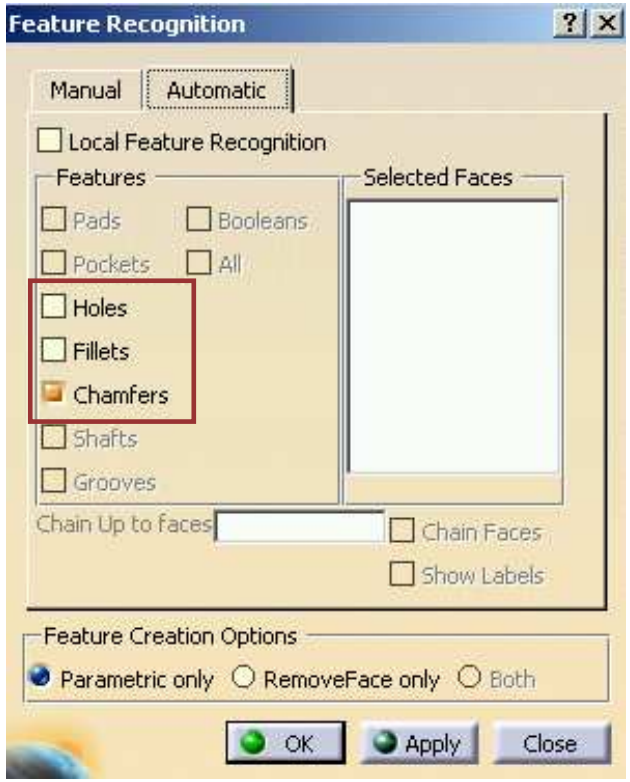
Annotations, publications and constraints are not recognized during a recognition operation.
Sketches created as 'Positioned Sketches' are not associative. To make them associative, you need to associate them to a planar face or a plane as support.

Student Notes:

Feature Recognition Panel (5/5)

Automatic Feature Recognition allows a simple and fast recognition, for the three most common feature types.

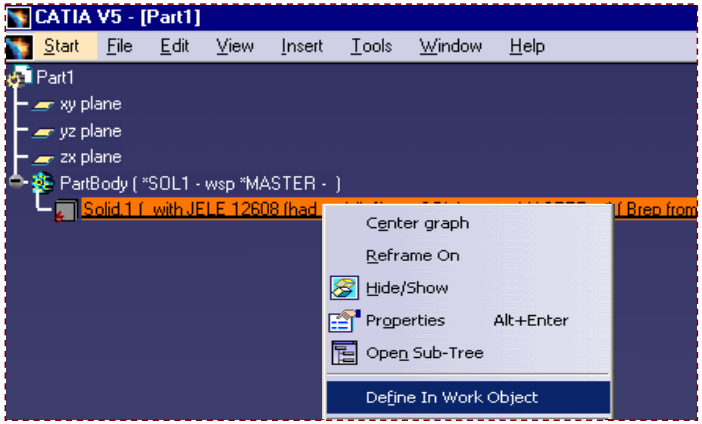
- **The only input in an Automatic Feature Recognition operation is the type of features we want to recognize, among holes, fillets and chamfers.**
- **One or several types of features can be recognized in one single operation.**
- **Selecting the 3D geometry is not necessary. The recognition is made automatically.**



Student Notes:

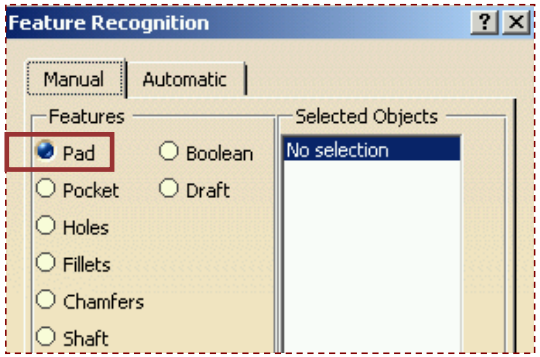
Performing Manual Feature Recognition

A Activate the solid to be recognized, in the tree.

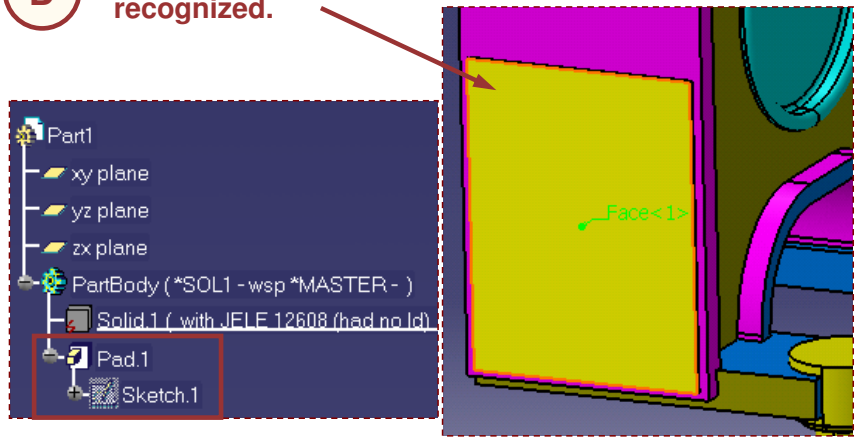


B Click the Manual Feature Recognition icon.

C Select the feature type (Hole, Fillet or Pad) in the dialog box.



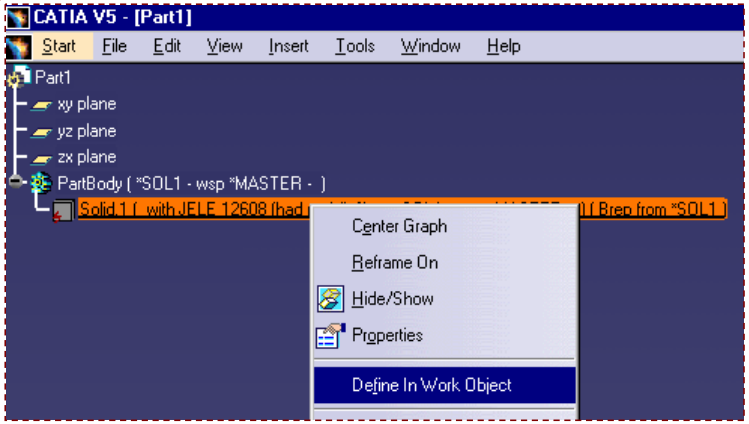
D Click the corresponding geometric element to be recognized.



Student Notes:

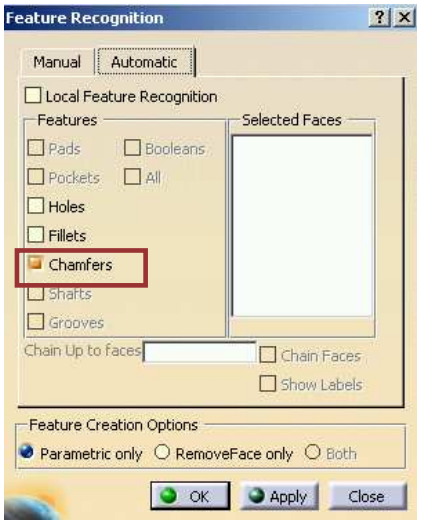
Performing Automatic Feature Recognition

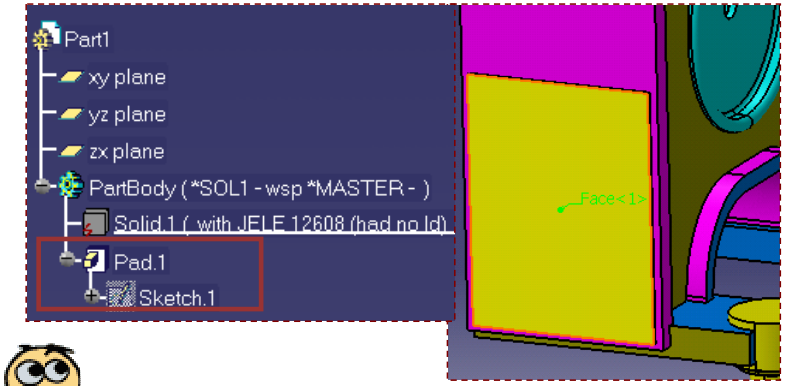
A Activate the solid to be recognized, in the tree.



B Click the Automatic Feature Recognition icon.

C Select the feature type (Hole, Fillet or Chamfers) in the dialog box.



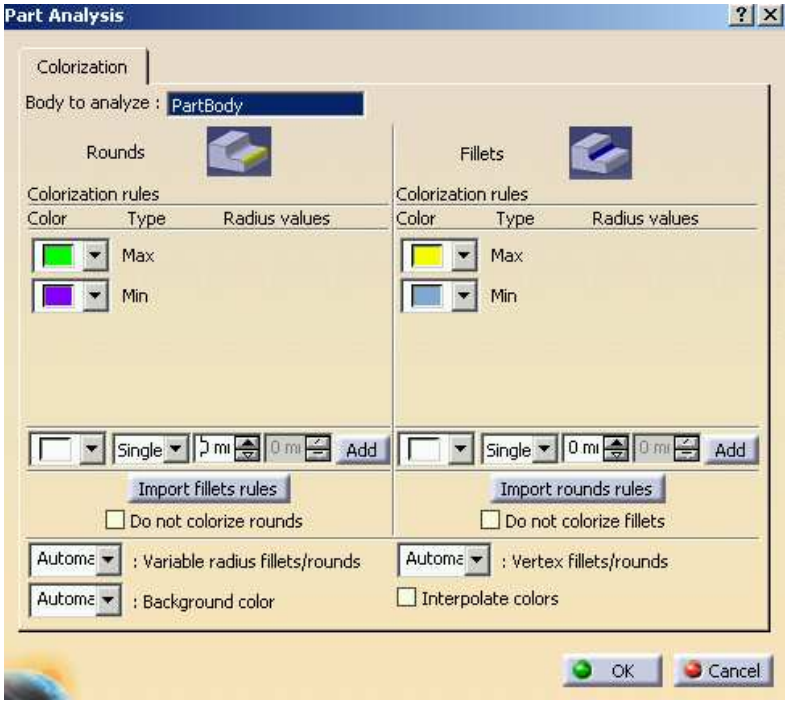


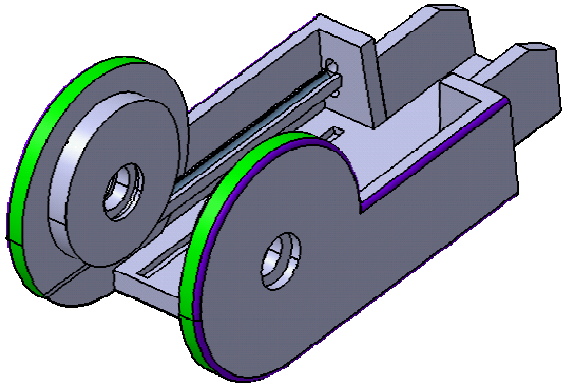
It is not necessary to click the geometrical elements to be recognized, this is done automatically.

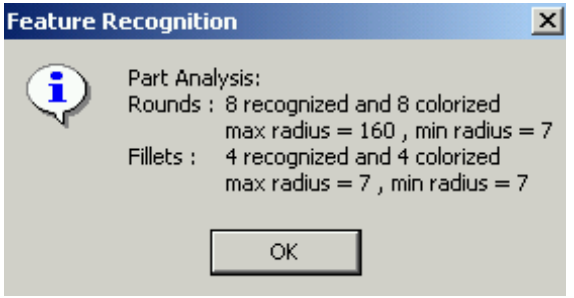
Student Notes:

Part Analysis Tool

- This command operates on any Part Design body. It recognizes all rounds and fillets in the body and colorizes them, depending on the radii and polarities.
- The user is able to specify the colors that are to be used for certain important radii, for instance the minimum and maximum radii.



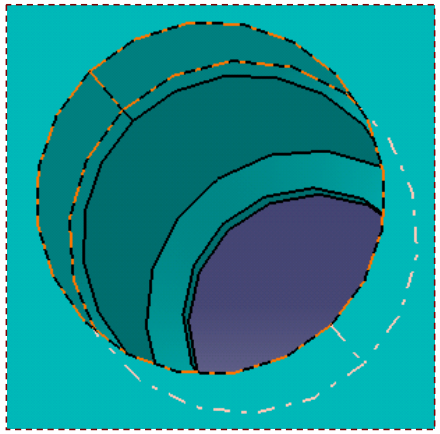


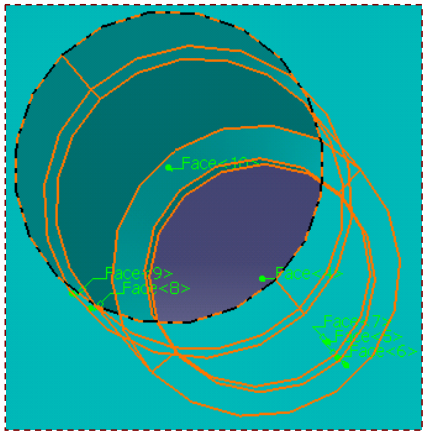


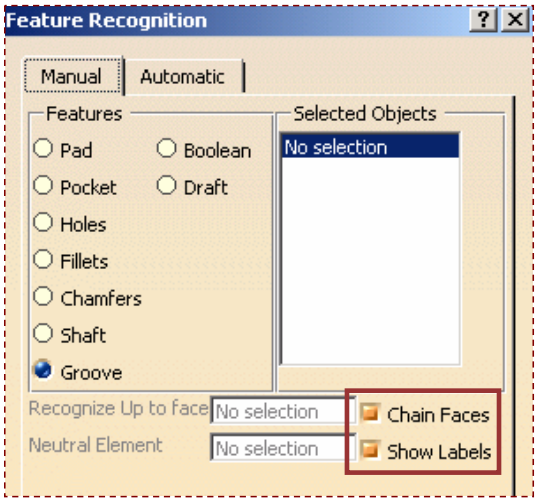
Feature Recognition Examples (1/3)

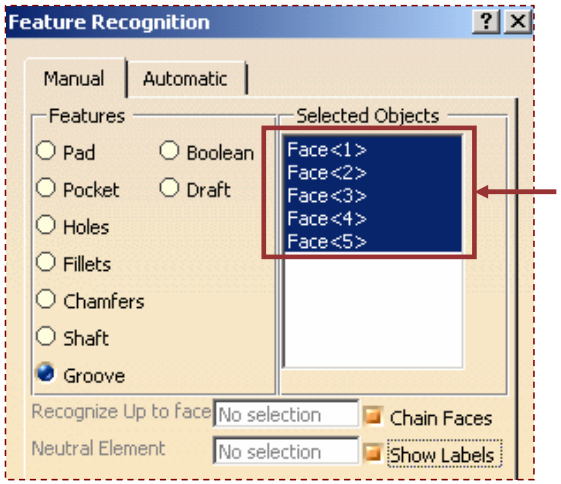
Student Notes:

Chain Faces:









By checking "Chain Faces" option, faces adjacent to the selected face are automatically included in the Selected Objects list.

Student Notes:

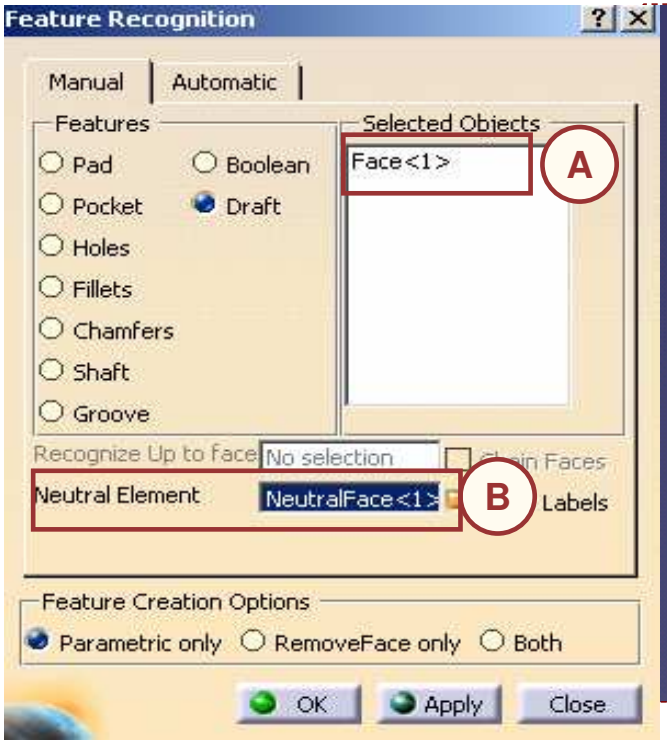
Feature Recognition Examples (2/3)

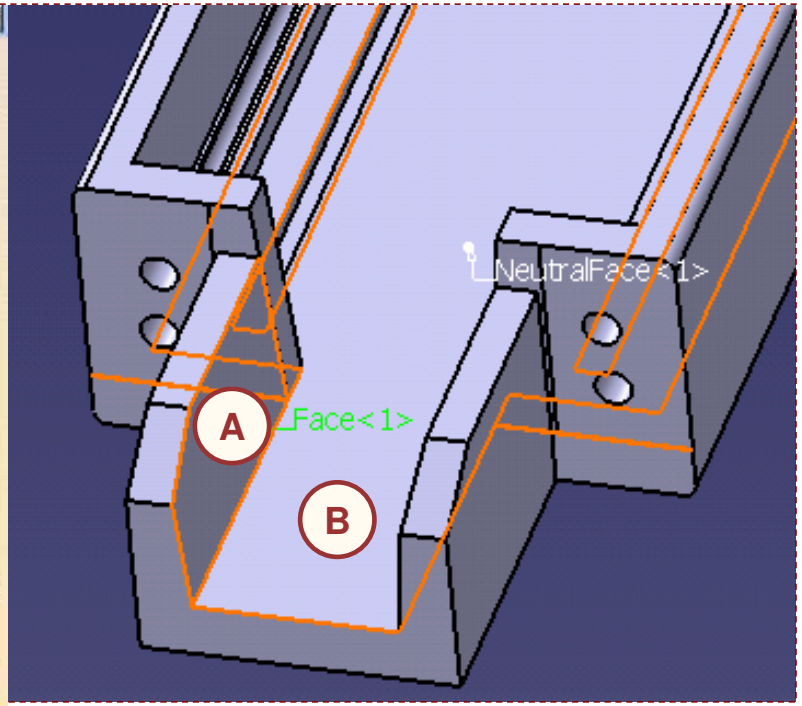
Draft:

The Draft Feature recognition involves two steps:

A. Selecting the draft face(s)

B. Selecting a neutral face





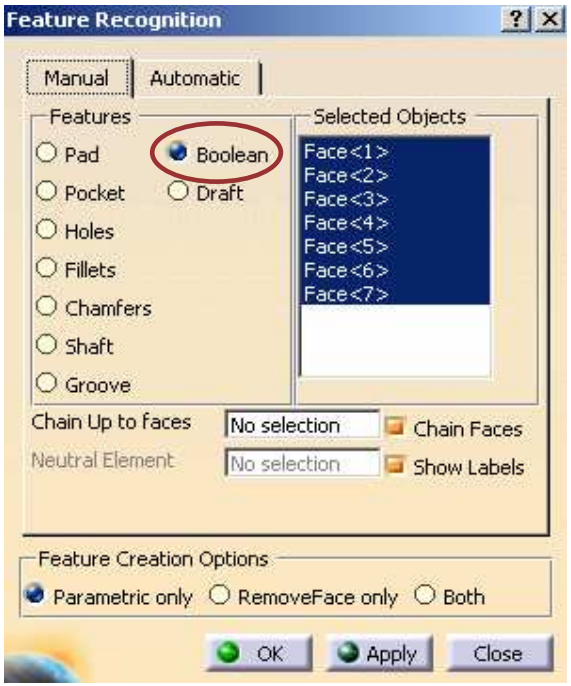
Student Notes:

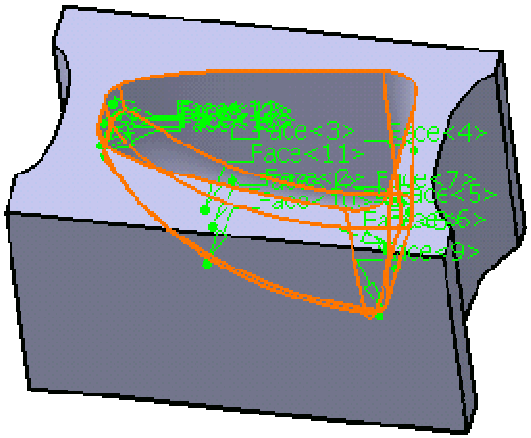
Feature Recognition Examples (3/3)

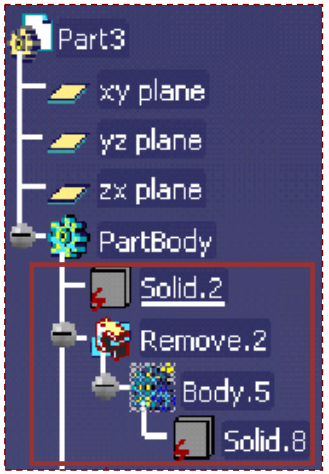
Boolean:

Boolean recognition allows to recognize complex shaped that have been added or removed using Boolean operation.

It is also very useful in case the standard recognition failed.



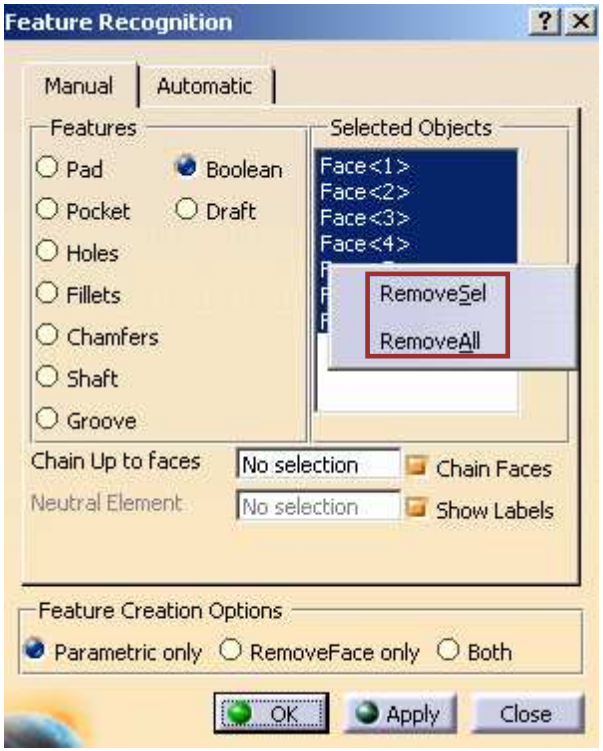




Student Notes:

Methods and Practices (1/3)

- **In case you made a mistake in your selection, you can remove some elements from the Selected Objects' list:**
  - **Edit the list, by right-clicking in the Selected Objects window.**
  - **Choose between the two options:**
    - **RemoveSel will remove only the element on which you clicked the right mouse button.**
    - **RemoveAll will remove all elements from the list.**



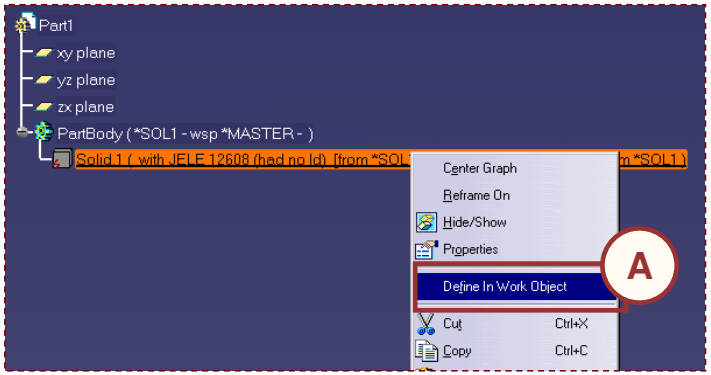
Student Notes:

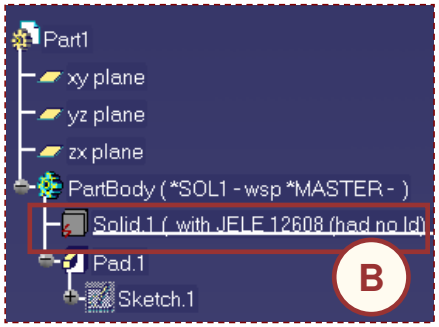
Methods and Practices (2/3)

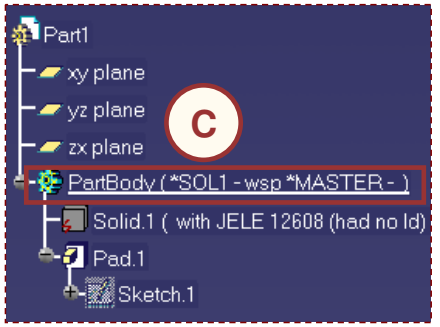
A. To perform a Feature Recognition on a Solid, the latter has to be the active element. Choose Define in Work Object in the contextual menu before performing a recognition.

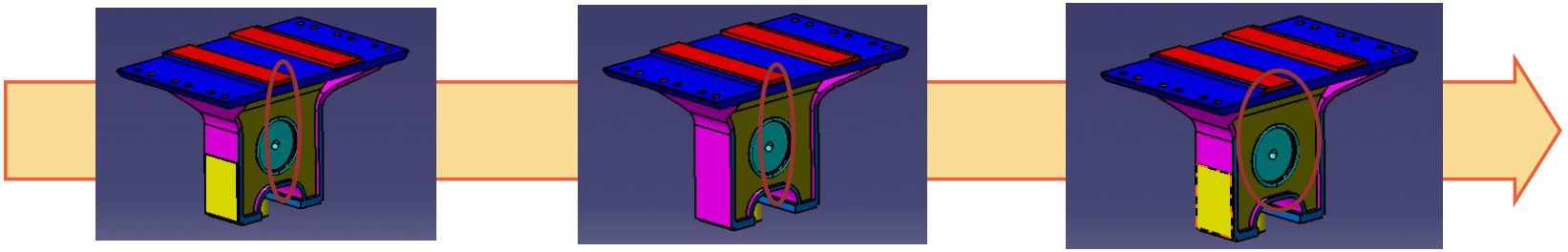
B. After having performed the Feature Recognition operation, the active part by default is still the initial solid, therefore the pad (the recognized feature) is not visible.

C. To visualize the whole body correctly, it is necessary to activate the main PartBody, using Define in Work Object in its contextual Menu.





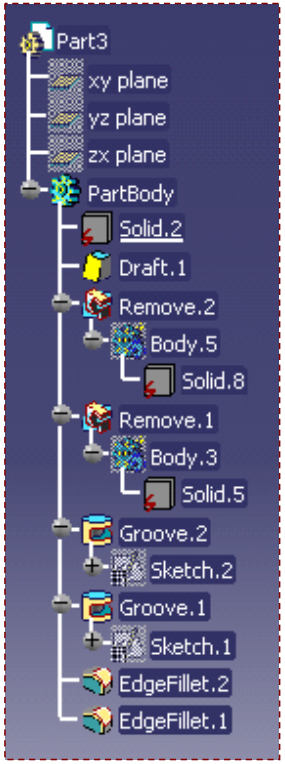


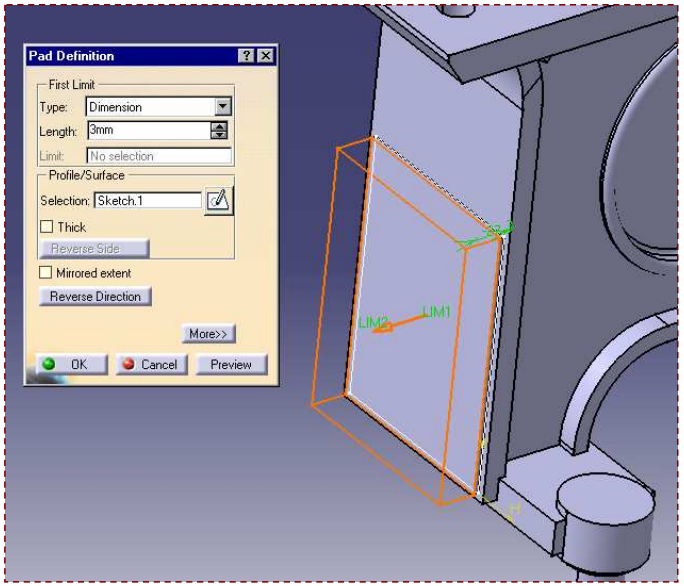


Student Notes:

Methods and Practices (3/3)

- After having recognized some elements as V5 features, we can edit their parameters and modify them, in the usual way:
  - By double-clicking them in the specification tree.
  - By double-clicking them directly in the geometry.





Feature Rework

Student Notes:

To Sum Up

In this course you have learned:

- To recognize features in solid models which have been imported form CAD systems other than CATIA V5 or whose data has been lost.
- To perform manual and automatic Feature Recognition.
- To use Part Analysis tool which recognizes all rounds and fillets in the body and colorizes them, depending on the radii and polarities.