ASCENT - Center for Technical Knowledge®
ENOVIA V5-6R2018
DMU Navigator and Space Analysis
1st Edition

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Preface

The ENOVIA V5-6R2018: DMU Navigator and Space Analysis learning guide is an introduction to the DMU workbenches of the ENOVIA suite of products. Digital Mock-Up (DMU) is primarily used as a viewing and analysis tool for 3D CAD data. You will be introduced to the DMU interface by viewing, manipulating and analyzing 3D model geometry. Specific focus is made on the Space Analysis workbench, which provides access to clash, sectioning, and comparison tools. Based on the results of these analyses, you will learn to create annotations directly on the 3D geometry in order to communicate information back to the designers.

Topics Covered

• DMU user interface
• Model navigation and visualization
• File management
• Measurement tools
• Clash analysis
• Sectioning
• Distance and band analysis
• Compare products
• Arc through three points
• 3D annotations
• Annotation views
• Image capture
• Printing images
Prerequisites

• Access to the V5-6R2018 version of the software, to ensure compatibility with this guide. Future software updates that are released by Dassault Systèmes may include changes that are not reflected in this guide. The practices and files included with this guide might not be compatible with prior versions (i.e., V5-6R2017).

• Completion of the CATIA V5-6R2018: Introduction to Modeling or CATIA V5-6R2018: Introduction for Managers & Reviewers course is recommended.

Note on Software Setup

This guide assumes a standard installation of the software using the default preferences during installation. Lectures and practices use the standard software templates and default options for the Content Libraries.

Lead Contributor: Scott Hendren

Scott Hendren has been a trainer and curriculum developer in the PLM industry for over 20 years, with experience on multiple CAD systems, including Pro/ENGINEER, Creo Parametric, and CATIA. Trained in Instructional Design, Scott uses his skills to develop instructor-led and web-based training products.

Scott has held training and development positions with several high profile PLM companies, and has been with the Ascent team since 2013.

Scott holds a Bachelor of Mechanical Engineering Degree as well as a Bachelor of Science in Mathematics from Dalhousie University, Nova Scotia, Canada.

Scott Hendren has been the Lead Contributor for ENOVIA: DMU Navigator and Space Analysis since 2013.
In this Guide

The following images highlight some of the features that can be found in this guide.

Practice Files

The Practice Files page tells you how to download and install the practice files that are provided with this guide.

Chapters

Each chapter begins with a brief introduction and a list of the chapter’s Learning Objectives.

Getting Started

In this chapter you learn how to start the AutoCAD® software, become familiar with the basic layout of the AutoCAD screen, how to access commands, use your pointing device, and understand the AutoCAD Cartesian workspace. You also learn how to open an existing drawing, view a drawing by zooming and panning, and save your work in the AutoCAD software.

Learning Objectives for this Chapter

- Launch the AutoCAD software and complete a basic setup of the drawing and environment.
- Identify the basic menu and features of AutoCAD screens including the ribbon, drawing window, and application menu.
- Locate commands and launch them using the ribbon, shortcut menus, application menu, and pop-up menus.
- Locate points in the AutoCAD Cartesian workspace.
- Open and save existing drawings and save them to locations.
- Move around a drawing using the mouse, the Zoom and Pan commands, and the Navigator tab.
- Save drawings in various formats and set the automatic save options using the Save As commands.
1.3 Working with Commands

The main way to access commands in the AutoCAD software is to use the Ribbon. Several of the ribbon commands are available in dedicated tool panels. The command line or Command Palette are also available in the ribbon. Both methods are available in the ribbon. The command line is available in the ribbon. The Command Palette is available in the ribbon. The Command Palette is available in the ribbon.

Side notes

Side notes are hints or additional information for the current topic.

Instructional Content

Each chapter is split into a series of sections of instructional content on specific topics. These lectures include the descriptions, step-by-step procedures, figures, hints, and information you need to achieve the chapter’s Learning Objectives.

Practice Objectives

Practices enable you to use the software to perform a hands-on review of a topic.

Some practices require you to use prepared practice files, which can be downloaded from the link found on the Practice Files page.
Introduction to DMU

This chapter provides an introduction to the Digital Mock-Up (DMU) workbenches of the ENOVIA suite of products. DMU is primarily used as a viewing and analysis tool for 3D CAD data. This chapter introduces you to the interface and methods of working in DMU.

**Learning Objectives in this Chapter**

- Understand the DMU product solution.
- Learn how to access the DMU Workbenches.
- Review the DMU user interface.
- Learn how to manipulate the DMU toolbars.
- Understand the fundamentals of solid modeling.
1.1 DMU Product Solution

ENOVIA is part of the PLM (Product Lifecycle Management) products that are used to manage and distribute developmental data and knowledge. Digital Mock-up (DMU) is part of the ENOVIA product line. It enables companies to collaborate, review, analyze, and simulate models created in Computer Aided Drafting (CAD) programs such as CATIA V5. The ENOVIA DMU workbenches are described as follows:

<table>
<thead>
<tr>
<th>Workbench</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>DMU Navigator</td>
<td>Navigator supplies the basic functions used in all workbenches, Viewing, Measuring, and annotation tools.</td>
</tr>
<tr>
<td>DMU Kinematics</td>
<td>Kinematics enables you to apply mechanisms to your assembly model to simulate motion. This provides the ability to analyze the motion and check for critical information such as interference and minimum distances.</td>
</tr>
<tr>
<td>DMU Space Analysis</td>
<td>Space Analysis enables you to cut sections, look for interferences, and perform complex measurements. 3D geometry comparisons can also be performed from this workbench.</td>
</tr>
<tr>
<td>DMU Fitting</td>
<td>Fitting Simulator provides the ability to create, record, and play back animations that simulate the assembly and disassembly of your products.</td>
</tr>
<tr>
<td>DMU Digital Plant and Ship Review</td>
<td>Digital Plant and Ship Review is similar to DMU Navigator but is dedicated to the Plant and Ship industry. It has tools to help locate, select, and analyze AEC objects.</td>
</tr>
<tr>
<td>DMU Tolerancing Review</td>
<td>Dimensioning &amp; Tolerancing enables you to visualize, search, and filter dimensions and tolerances.</td>
</tr>
<tr>
<td>DMU Optimizer</td>
<td>Optimizer provides the ability to create alternate representations of products. It generates simplified representations that are reduced in size, but still accurate.</td>
</tr>
<tr>
<td>DMU 2D Viewer</td>
<td>2D viewer enables you to manipulate, annotate, import and export, and compare 2D documents.</td>
</tr>
</tbody>
</table>
1.2 Access Workbenches

A workbench is a set of tools used for completing certain tasks. The active workbench is indicated by an icon in your toolbar. By default, the icon is located in the upper right corner of the screen. Hover the cursor over the icon until the workbench name displays, as shown in Figure 1–1.

Accessing a workbench can be done using the following methods:

- Start menu
- Favorite Workbench

**Start Menu**

The Start menu contains all of the available workbenches that can be accessed. For example, to access the DMU Space Analysis workbench, select Start>Digital Mockup>DMU Space Analysis, as shown in Figure 1–2. The toolbars update for the active workbench.
ENOVIA DMU can be customized to display the most commonly used workbenches by clicking the Workbench icon, as shown in Figure 1–1. The Welcome to ENOVIA PORTAL dialog box opens by default when you first click this icon, as shown in Figure 1–3.

How To: Add a Workbench to the Welcome to ENOVIA PORTAL dialog box

1. Select Tools->Customize in the menu bar. The Customize dialog box opens, as shown in Figure 1–4.
2. Select the required workbenches in the left column of the Start Menu tab.
3. Click to add them to the “Favorites” column on the right.
4. The Favorites are automatically stored with the settings for ENOVIA. Click Close to complete the operation.
The next time the Workbench icon is clicked, the Welcome to ENOVIA dialog box opens the list of favorite workbenches, as shown in Figure 1–5.

![Welcome to ENOVIA dialog box](image)

**Figure 1–5**
Click one of the workbench icons to switch Workbench modes. All toolbars update for functions specific to the selected workbench.

Once workbenches are customized, the list of favorites is also available for quick selection in the **Start** menu, as shown in Figure 1–6.

![Start menu with favorites](image)

**Figure 1–6**
1.3 User Interface

When you open a model in the DMU Navigator workbench, the screen displays as shown in Figure 1–7. The major areas of the screen are labeled and described in this section.

Figure 1–7
Toolbars & Menus

The primary way of interacting with the system is to click icons in the toolbars or select commands in the menu bar. You can customize the interface by arranging the location of the toolbars and selecting which icons to show.

In addition to the toolbars and menus, you can right-click to open a menu containing a list of appropriate options that can be used.

Message Area

In many cases, the system displays a single line prompt in the message area. This area of the screen is intended to guide you through the process of performing a certain task.

Specification Tree

The specification tree displays a variety of information about the model. The specification tree displays the features of the part in the order in which they were created. This is useful because it provides quick access to parameters, functions, materials, and commonly-used measurements.
1.4 Toolbar Manipulation

Depending on monitor size and screen resolution, your screen might not be able to display all of the toolbars. You can increase your productivity by understanding how to customize the toolbars so that more frequently used icons are easy to access.

You can reposition toolbars on the screen with separators or double arrows.

Separators

Each toolbar contains a separator, as shown in Figure 1–8. To move the toolbar, simply select and drag the separator to a new position.

Double Arrows

If there is not enough room to display more toolbars, double arrows appear at the corner of the screen. The double arrows indicate that additional icons are present and not currently displayed.

The DMU Review Navigation toolbar is shown in Figure 1–9. The double arrows or the separators can both be used to move the toolbar.
Toolbar Placement

Toolbars can be displayed in the following ways:

- Docking on the top, bottom, right, or left side of the screen.
- Floating away from the top, bottom, right, or left side of the screen.
- Stacking multiple levels on the top, bottom, right, or left side of the screen.

Some examples of toolbar placement are shown in Figure 1–10. Any combination of the placement methods can be used.

Add/Remove Toolbars

Toolbars can also be customized to display task-specific icons using one of the following methods:

- Select **View>Toolbars** and select the toolbar name so that ✅ displays to add a toolbar. Clear ✅ to remove the toolbar from the display.
- Right-click in an area of the toolbar and toggle on the toolbar name using ✅.
An example of the toolbar selection option box is shown in Figure 1–11.

Some toolbar icons contain flyouts, which display additional icons when selected. For example, the Track, Clash Detection, and Reset Position operation icons contain flyouts, as shown in Figure 1–12.
Selecting the flyout displays the additional icons, as shown in Figure 1–13. Flyout options are grouped by type.

You can reposition the icons displayed in the flyout as their own toolbar instead of using the flyout. To show the flyout as a toolbar, drag the separator that displays for the flyout to a new position on the screen, as shown in Figure 1–14. You can position the flyout as a floating, docked, or stacked toolbar.

Creating a new toolbar from a flyout does not remove the original flyout icon.
1.5 Modeling Fundamentals

ENOVIA DMU is a viewing and analysis tool that uses models created in a solid modeling CAD application such as CATIA. An understanding of the process used to make these models is useful when viewing and analyzing them. This section explains the qualities of these programs using CATIA V5 as the example.

CATIA can be used to create three-dimensional (3D) Solid Models. This means that the system understands that the model is “filled” with material. With a Solid Model, you can perform the following functions:

- Obtain the mass properties of a part.
- Determine whether components in an assembly interfere with one another.
- Create cross-sections of an assembly or display part cross-sections on a drawing.

It is important to understand that part models are also used to develop 2D Drawings. You do not need to manually “draw” the views in the drawing. You simply reference the part model to generate views and display the dimensions from the 3D geometry, as shown in Figure 1–15.

*Part model is referenced to create drawing views.*

![Figure 1–15](image)
This process is also true for assemblies, as shown in Figure 1–16. You can locate existing part and assembly models relative to one another. The assemblies can then be referenced by a drawing.

![Assembly model is referenced to create drawing views.](image)

**Figure 1–16**

**Feature-Based**

The solid model evolves by creating features, one by one, until the geometry is complete. The part model shown in Figure 1–17 is constructed by consecutively creating the following features:

1. Create a sketch.
2. Create a Pad feature.
3. Draft several walls of the part using the Draft feature.
4. Remove sharp edges of the geometry by creating a Fillet feature.
5. Create a Shell feature to hollow out the part.
6. Create another Pad feature to act as a cylindrical boss.
7. Center a Hole feature on the cylindrical Pad.
8. Duplicate the two features of the boss to create the second boss, as shown in Figure 1–17.

You typically organize the features based on your design intent. This process means that you begin with features that define the overall size and major geometric shape, leaving the small, finishing details until the end.

Features that are created using CATIA are parametric. This means that all of the dimensional constraints you create to define a feature’s shape are considered “parameters” and are accessible at any time. Simply double-click on a feature to display its dimensional constraints and change any of its values to alter the geometry.

The dimensional value that positions the Pocket feature shown in Figure 1–18 is changed. The position of the feature updates to reflect the design change.
As mentioned, drawings are created by referencing a model. When the model is changed, any drawings of that model are automatically updated the next time they are opened. This case is the same with assemblies; changing a part model automatically reflects in the assembly. In addition, changes made in the assembly update throughout the other modes in CATIA, as shown in Figure 1–19.

Figure 1–19

This associativity creates a dependency between models. The part models referenced by an assembly and/or drawing must be retrievable to work with the assembly and/or drawing.