Design web

Engineering Drawing and Design
ME 1110 – Engineering Practice 1

Lecture 8

AutoCAD
History, Basic concepts, Edit&View

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Exercise DrE-5

Required: Manufacturing drawing

- Students worked in groups to measure given part
- Each student has to submit its own hand made MANUFACTURING DRAWING by Friday week 8
  - completely describes given part with as many orthographic projections and/or cross sections as necessary
  - Has all required dimensions, tolerances and surface finishes
- That drawing will later in weeks 9-11 be redrawn using AutoCAD, then printed and submitted as exercise CAD-1

Plan

- CAD systems and AutoCAD in general
- Philosophy of AutoCAD
- Model & Layout space, UCS
- Layer Technique
- Graphical & Textual window
- Options
- Drawing & Editing Commands

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History of CAD - Computer Aided Design

- *25 years ago, nearly every drawing produced in the world was done with pencil or ink on paper. CAD has fundamentally changed the way design is done.*
- *First Drafting systems started in* **1957** *by General Motors and* **1960** *by McDonell Douglas Automation Company*
- *Autodesk started their first CAD system – AutoCAD in* **1982**.

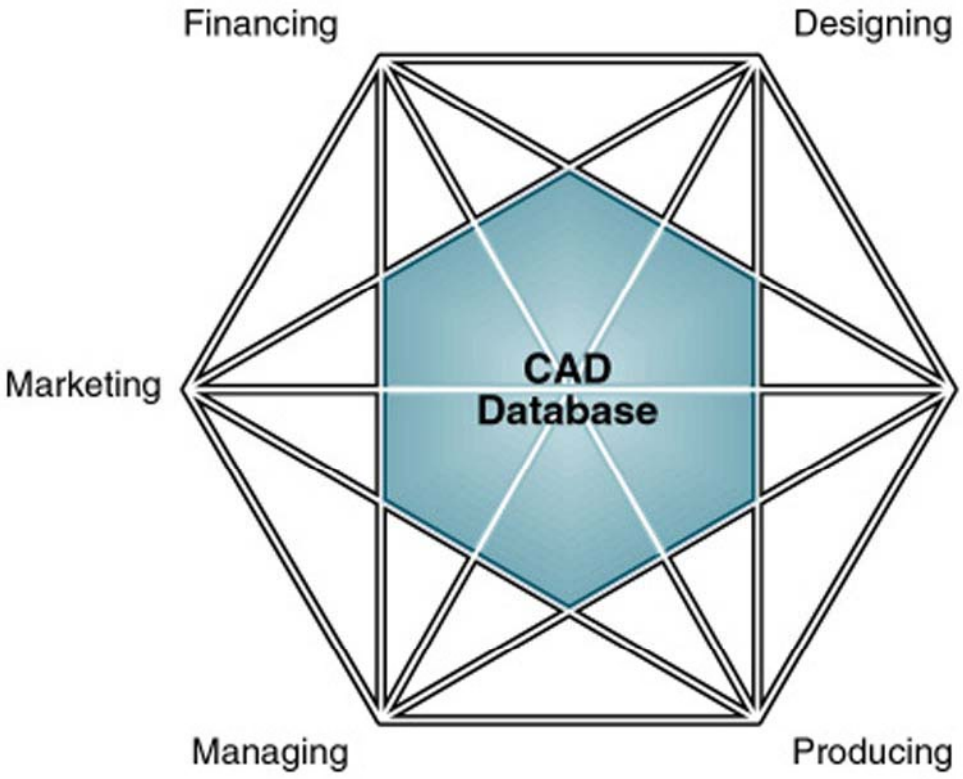
AutoCAD Version	(Beta Name)	Release Data	
Release 2005	(Neo "N")	March	2004
Release 2004	(Red Deer "V")	March	2003
Release 2002	(Kirkland "K")	June	2001
Release 2000i	(Banff "U")	July	2000
Release 2000	(Tahoe "T")	April	1999
Release 14	(Sedona "S")	April	1998
Release 13		November	1994
Release 12		June	1992
Release 11		October	1990
Release 10		October	1988
Release 9		September	1987
Version 2.6	(Release 8)	April	1987
Version 2.5	(Release 7)	June	1986
Version 2.1	(Release 6)	May	1985
Version 2.0	(Release 5)	October	1984
Version 1.4	(Release 4)	October	1983
Version 1.3	(Release 3)	August	1983
Version 1.2	(Release 2)	April	1983
Version 1.0	(Release 1)	December	1982

CAD systems in general (1)

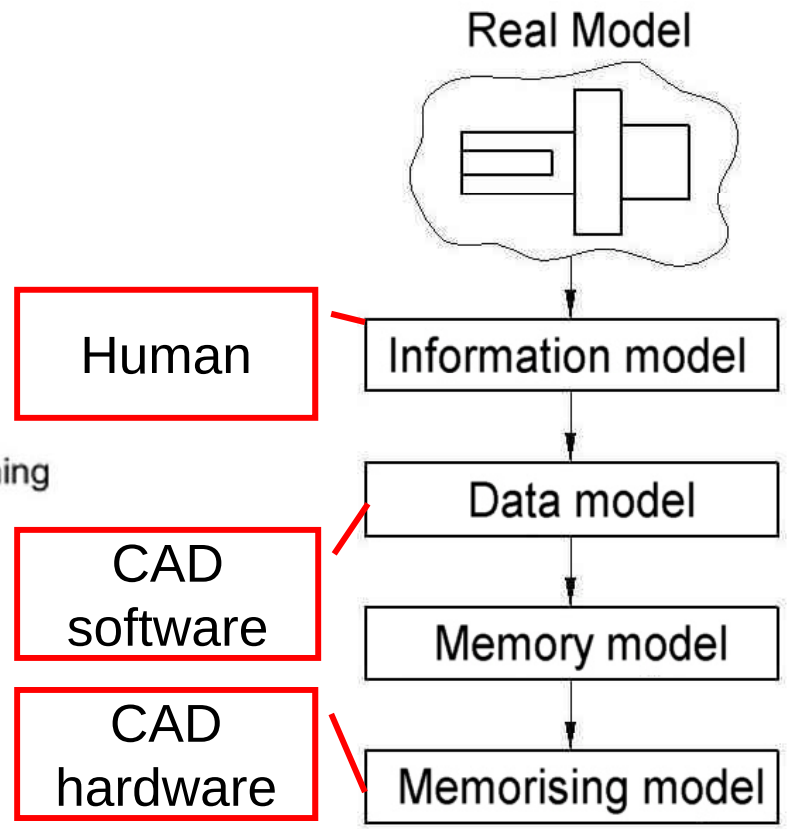
- Consists of:
  - » CAD User - Human
  - » CAD Hardware
  - » CAD Software
- Human: *knowledge*
- CAD Hardware use of Digital Computer:
  - » CPU
  - » Memory: *internal & external*
  - » Storage: *mostly external*
  - » Input devices
    - – Keyboard, Mouse, Optical pen, Tablet, Scanner, Modem, Digitiser
  - » Output devices
    - – Computer screen (graphical&textual), Printer, Plotter, Modem

CAD systems in general (2)

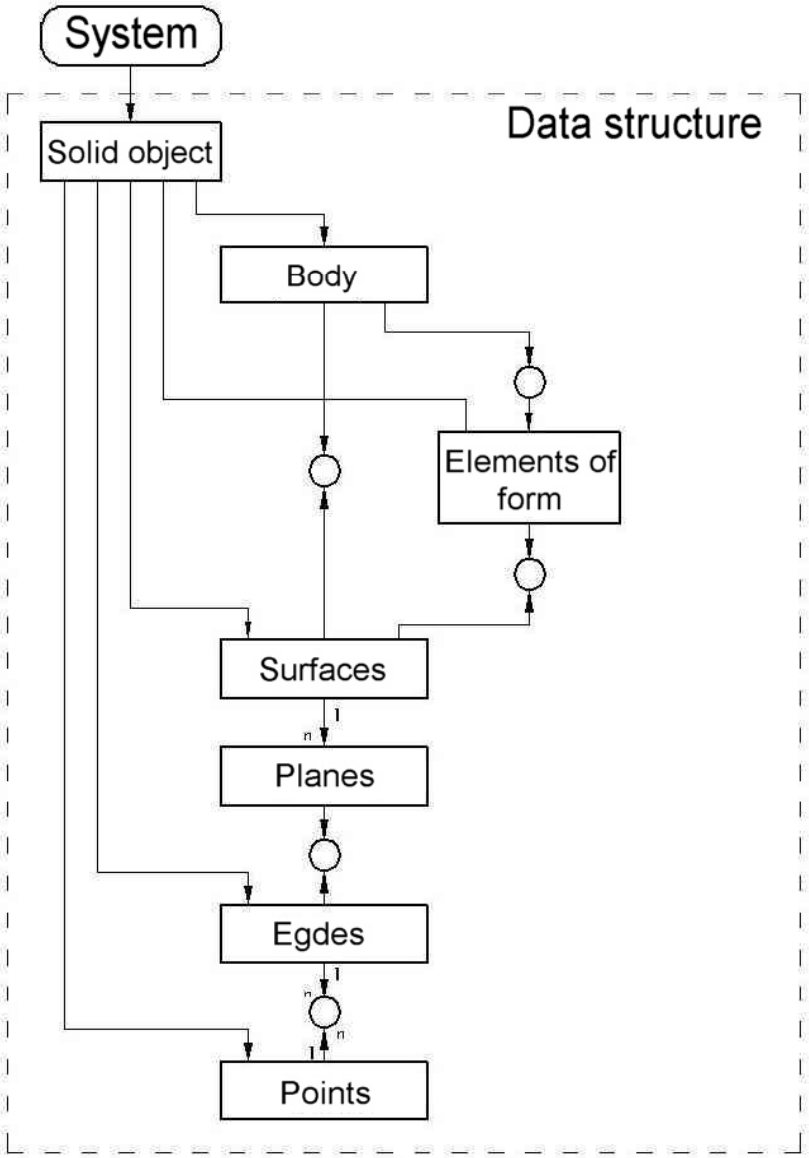
- CAD Software:
  - » System Software
  - » Application Software



ICR
(Internal Computer Representation)

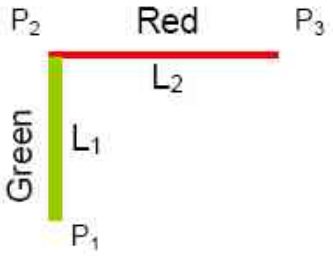


CAD systems in general (3)



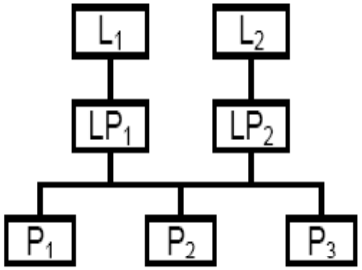
1. Information model:
   - » Real world→
     → set of primitives
     - – 2D
     - – 2½ D
     - – 3D Wireframe
     - – 3D Surface
     - – 3D Solid

CAD systems in general (4)

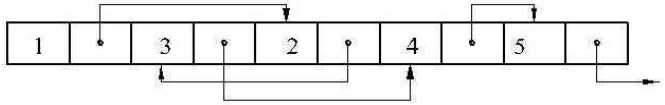


LINE			POINT	
Name	Color	Thickness	Name	Type
L_1	G	2	P_1	E
L_1	G	2	P_2	E
L_2	R	1	P_2	E
L_2	R	1	P_3	E

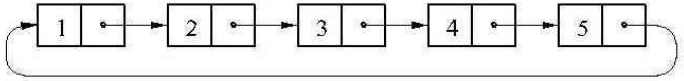
POINT - LINE	
Point	Line
P_1	L_1
P_2	L_1
P_2	L_2
P_3	L_2



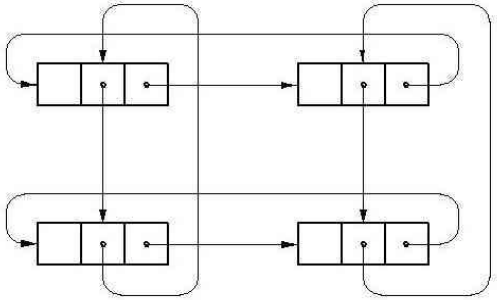
Linear (Seqential) list



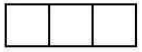
Chain list



Circular list



Circular Structure



Memory field

Data flow

2. Data model:

Representation of primitives (Formal & Relational)

3. Memory model:

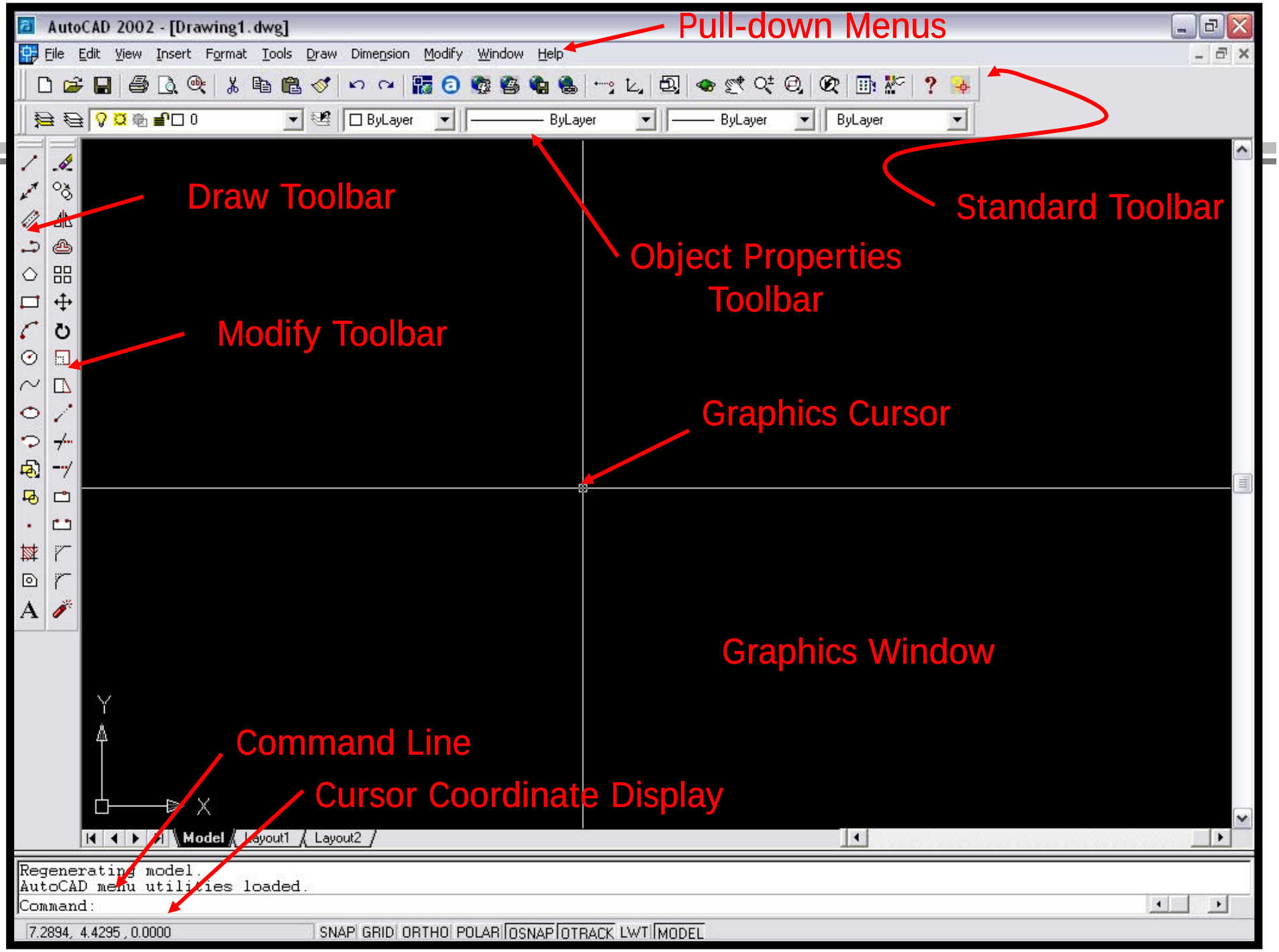
Data representation and organisation

4. Memorising model:

Physical data storage

Philosophy of AutoCAD

- In early days AutoCAD was used as a drafting tool
- Through the years and many releases it become a design tool
- 'Icon' based environment - icons grouped in toolbars
- AutoCAD screen contains two parts: graphical screen and textual (command) line
- AutoCAD saves files in .DWG format but can import and export different formats (DXF, IGES)
- Model (2D) is made in a 'MODEL SPACE' drawings are generated in 'DRAWING SPACE'

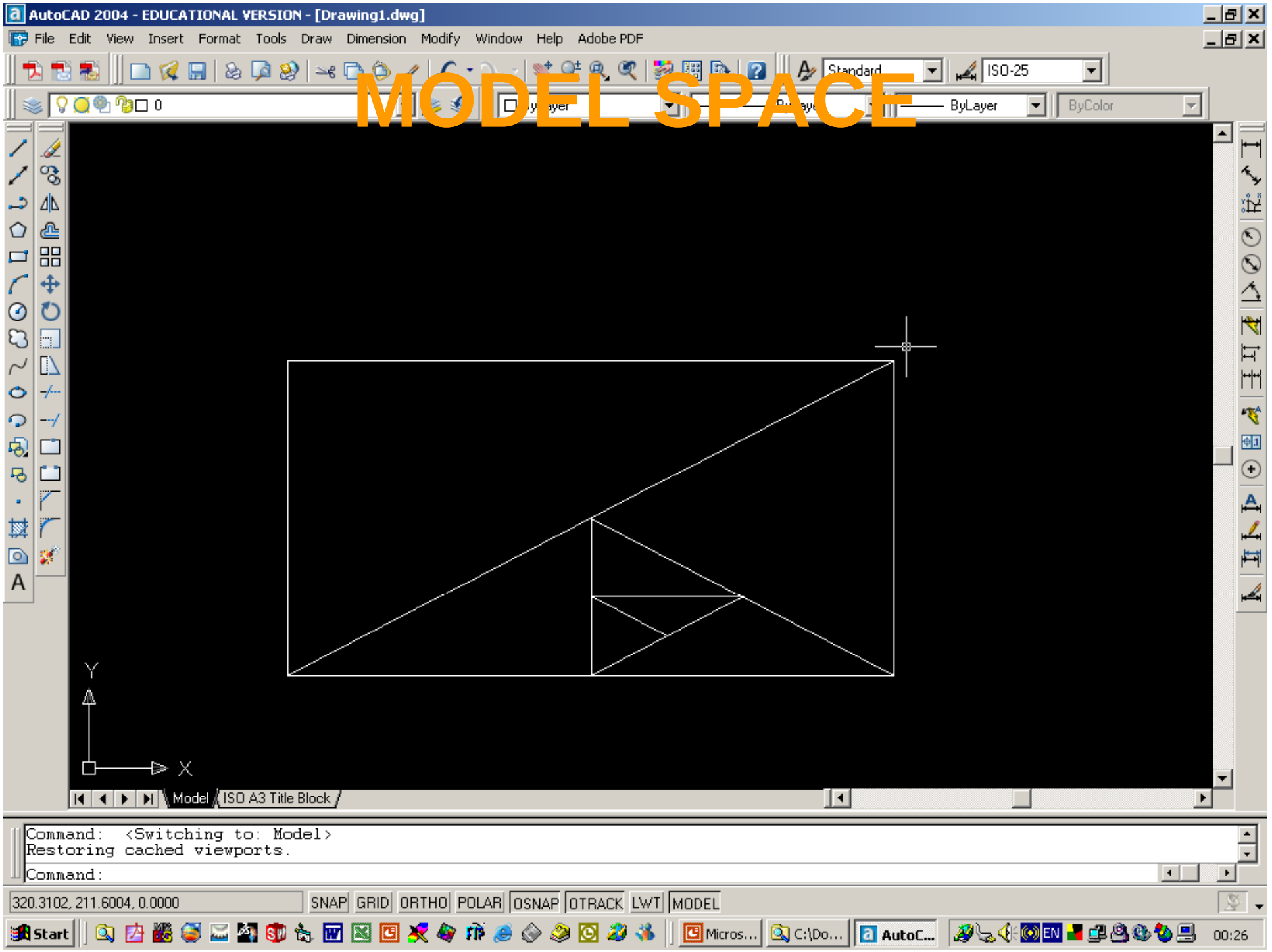

AutoCAD 2002 - [Drawing1.dwg]
Pull-down Menus
File Edit View Insert Format Tools Draw Dimension Modify Window Help
ByLayer
ByLayer
ByLayer
ByLayer
Draw Toolbar
Standard Toolbar
Object Properties Toolbar
Modify Toolbar
Graphics Cursor
Graphics Window
Command Line
Cursor Coordinate Display
Model
Layout1
Layout2
Regenerating model.
AutoCAD menu utilities loaded.
Command:
7.2894, 4.4295, 0.0000
SNAP GRID ORTHO POLAR OSNAP OTRACK LWT MODEL

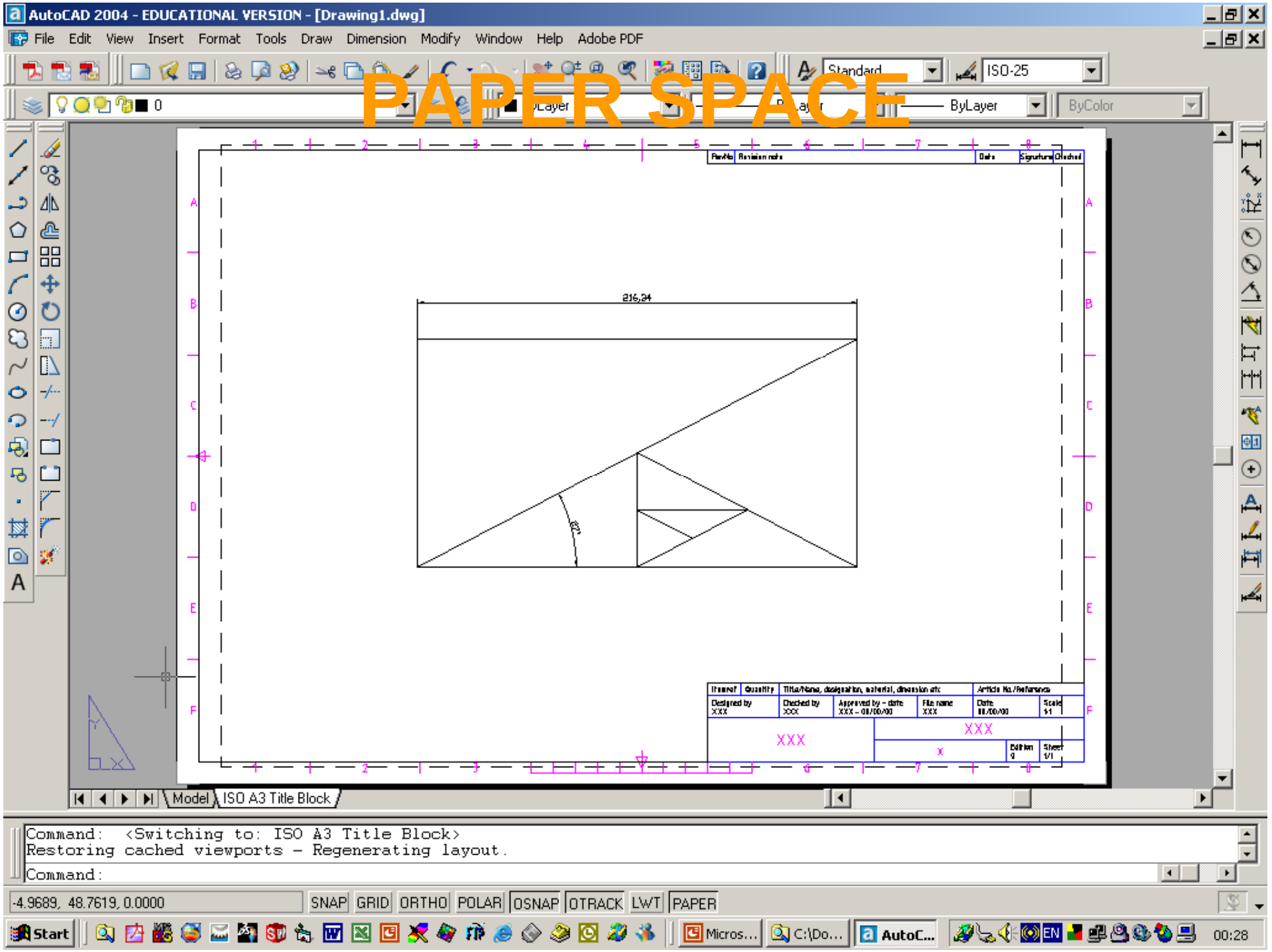
Model space

- There are two main domains within an Autocad, MODEL space and PAPER space.
- MODEL space
  - » All drawing or 'modelling' is done in here
  - » It is the main ‘modelling’ area in Autocad
- PAPER space
  - » It is an area used to plot (print) the drawing created in the model space
  - » It is actually a blank sheet in which a real object drawn in model space can be represented as a printable drawing in a proper scale.

NOTE:

Model space - 1:1; Paper space – any standard scale


AutoCAD 2004 - EDUCATIONAL VERSION - [Drawing1.dwg]
File Edit View Insert Format Tools Draw Dimension Modify Window Help Adobe PDF
MODEL SPACE
Standard
ISO-25
ByLayer
ByColor
Model
ISO A3 Title Block
Command: <Switching to: Model>
Restoring cached viewports.
Command:
320.3102, 211.6004, 0.0000
SNAP GRID ORTHO POLAR OSNAP OTRACK LWT MODEL
Start
00:26


AutoCAD 2004 - EDUCATIONAL VERSION - [Drawing1.dwg]
File Edit View Insert Format Tools Draw Dimension Modify Window Help Adobe PDF
PAPER SPACE
Standard
ISO-25
ByLayer
ByColor
216,34
Model
ISO A3 Title Block
Command: <Switching to: ISO A3 Title Block>
Restoring cached viewports - Regenerating layout.
Command:
-4.9689, 48.7619, 0.0000
SNAP GRID ORTHO POLAR OSNAP OTRACK LWT PAPER
Start
00:28

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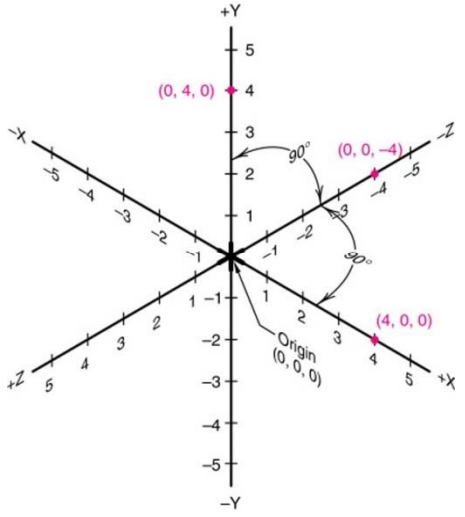
Coordinate Systems

World Coordinate System (WCS):

- Used to define global position of *all objects as well as the other coordinate systems*

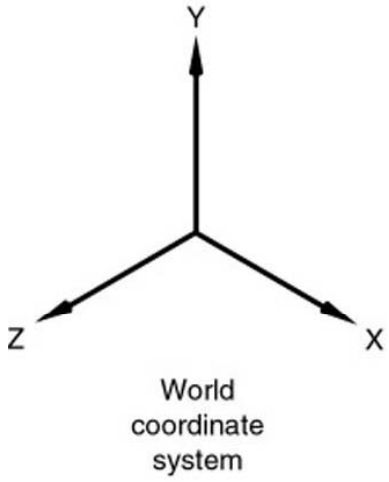


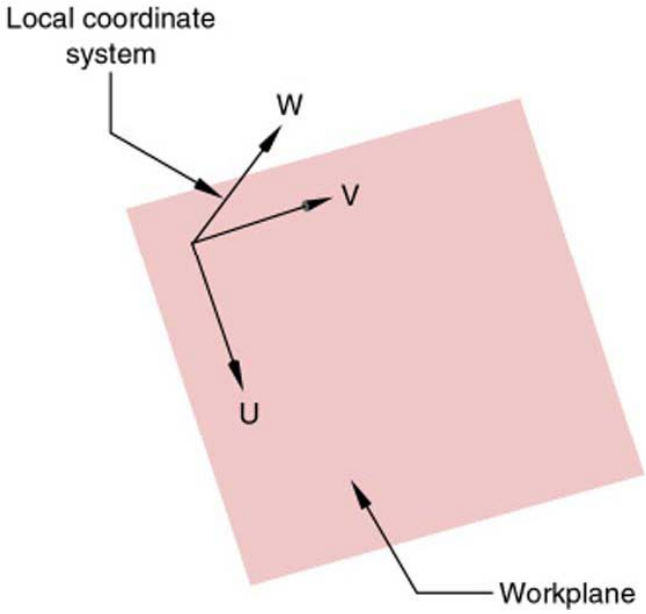
User Coordinate System (UCS)

- Used to define the orientation of X, Y, and Z axes in 3D space.

The UCS determines the default placement of a geometry in the drawing

Run UCS Movie





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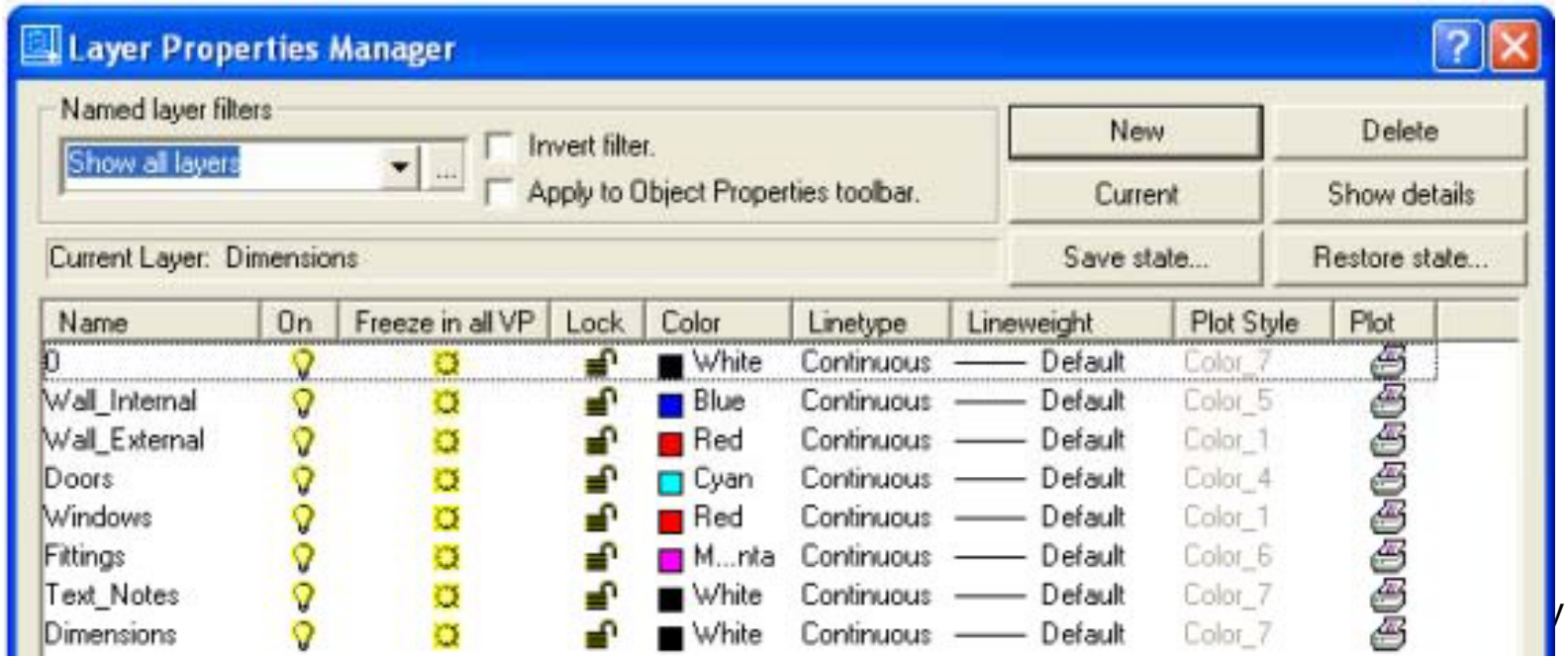
Layers

Run LPM Movie

Run LAYERS Movie

- A layer can be thought of as a large piece of clear plastic on which a part or whole drawing is made
- Layers are controlled by the **layer properties manager** button located on the object properties toolbar



Graphical User Interface (GUI)

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Using Options

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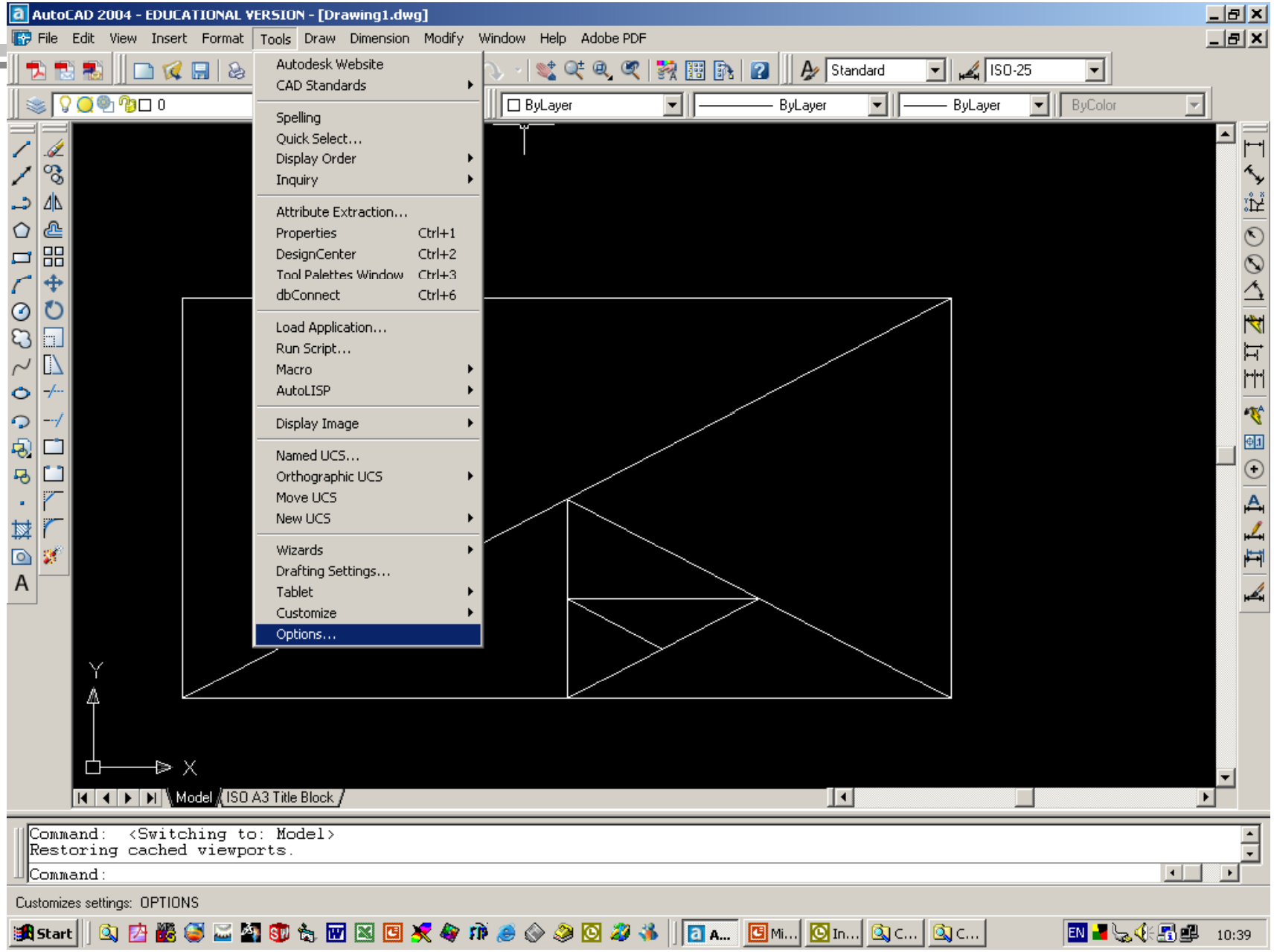

Using Command line

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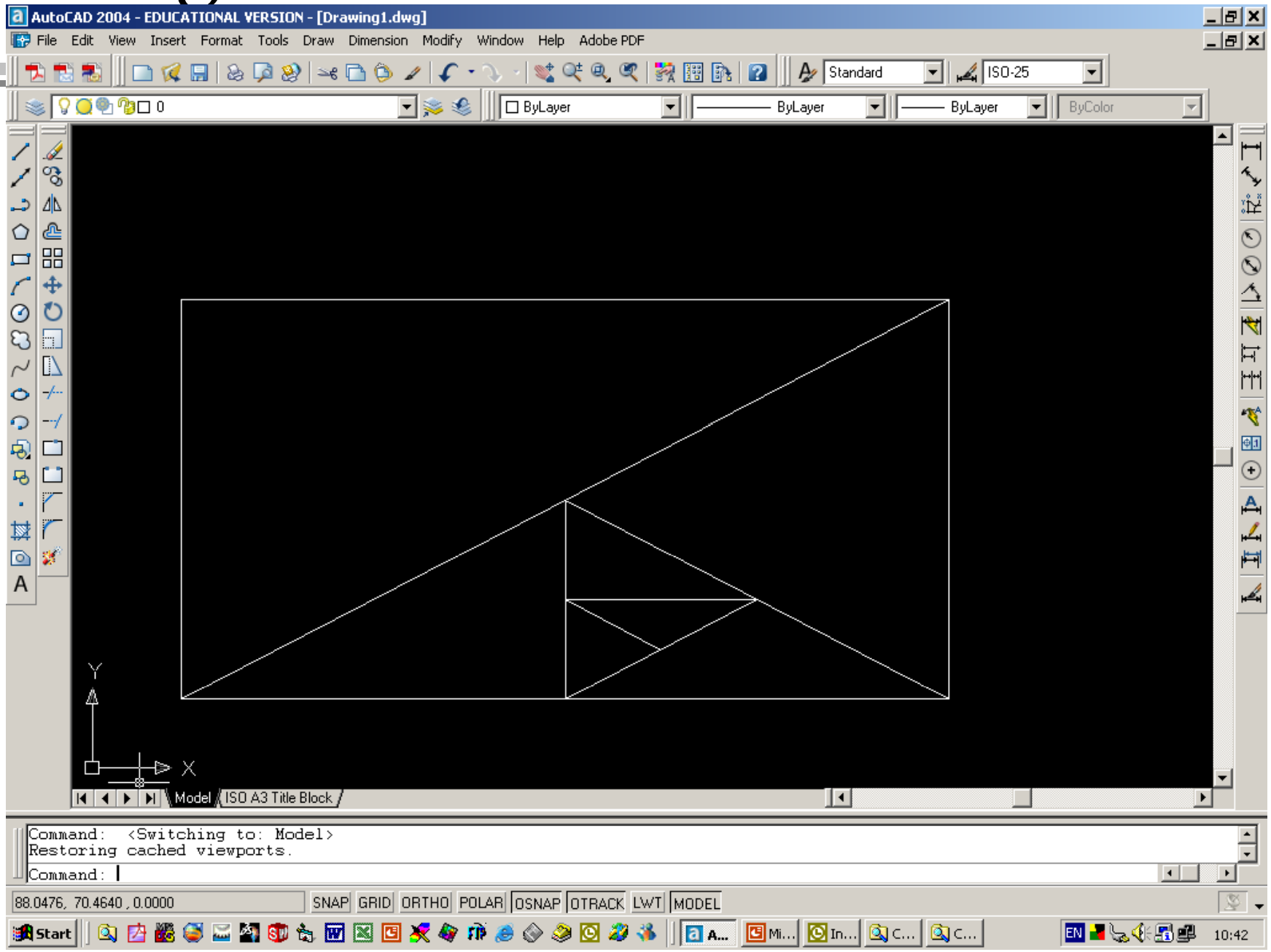

Drawing & Editing Commands

- Drawing Menu

- Modify (Edit) Menu

Play the Movie

AutoCAD Tutorials

- TUTORIALS for week 9, week 10 and week 11 in SEMS IT laboratory room CM250 A

- Groups A & B:
  - » Fridays 9,00 – 12,00
- Groups C, D & E:
  - » Fridays 14,00-17,00