Introduction to CAD systems

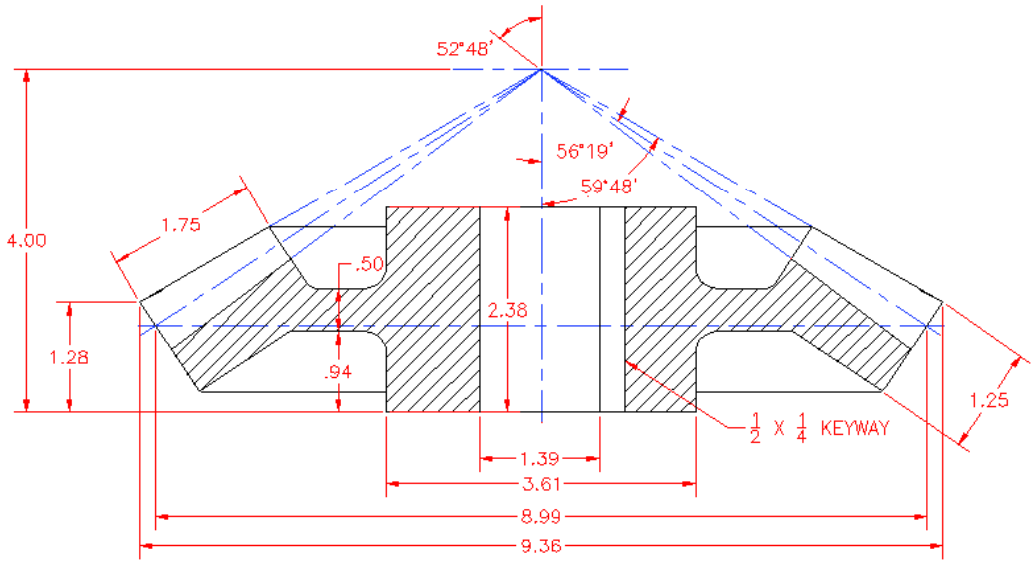
Graphical representation means dealing with the expression of ideas by lines and marks impressed on a surface.

A **drawing** is graphical representation of objects and structures and is done using free hand, mechanical or computer methods.

It takes special knowledge and skills to be able to represent technical ideas with sufficient precision for the product to be mass produced and parts to be easily interchanged. This special knowledge is called **technical drawing**.

Typical Branches of Engineering Graphics

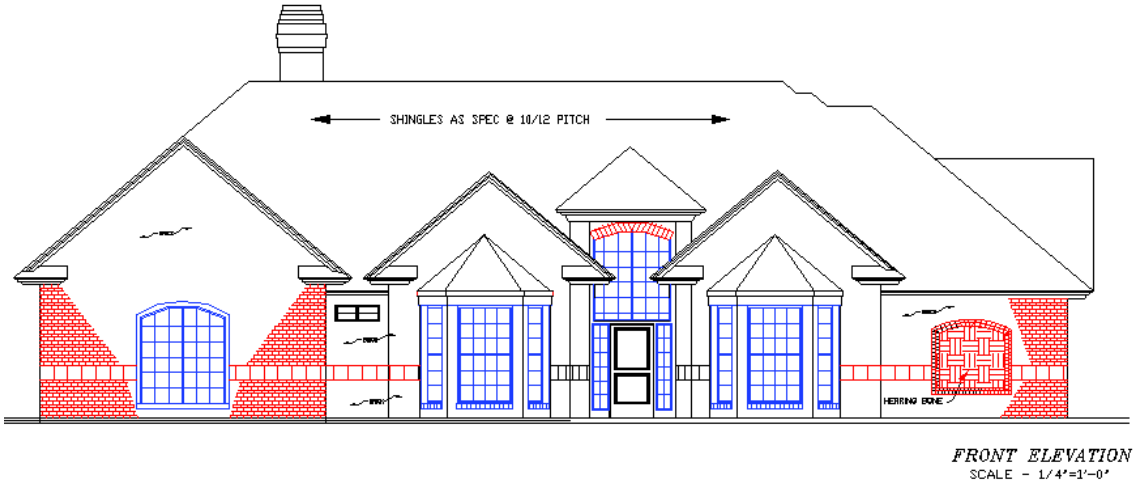
Power Generation
Transportation
Manufacturing
Power Services
Atomic Energy
Marine Vessels



Mechanical

Typical Branches of Engineering Graphics

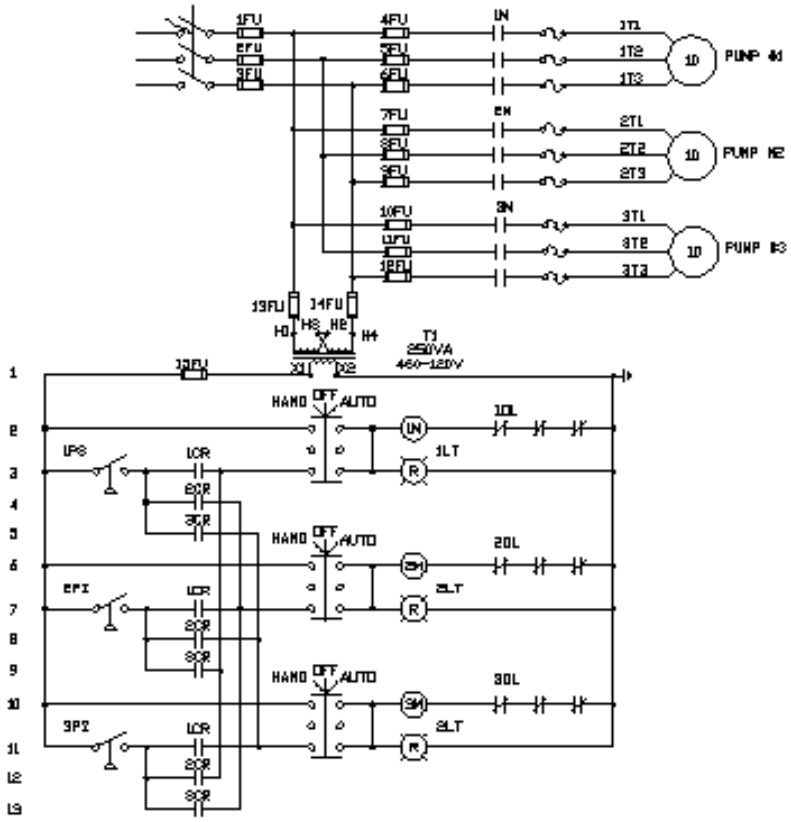
Commercial Buildings
Residential Buildings
Institutional Buildings
Environmental Space Forms



Architectural

Typical Branches of Engineering Graphics

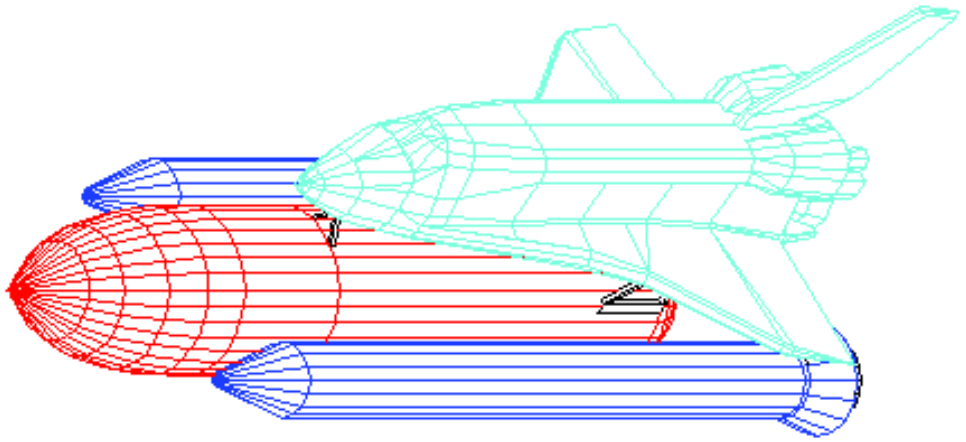
Power Generation
Power Application
Transportation
Illumination
Industrial Electronics
Communications
Instrumentation
Military Electronics



Electrical

Typical Branches of Engineering Graphics

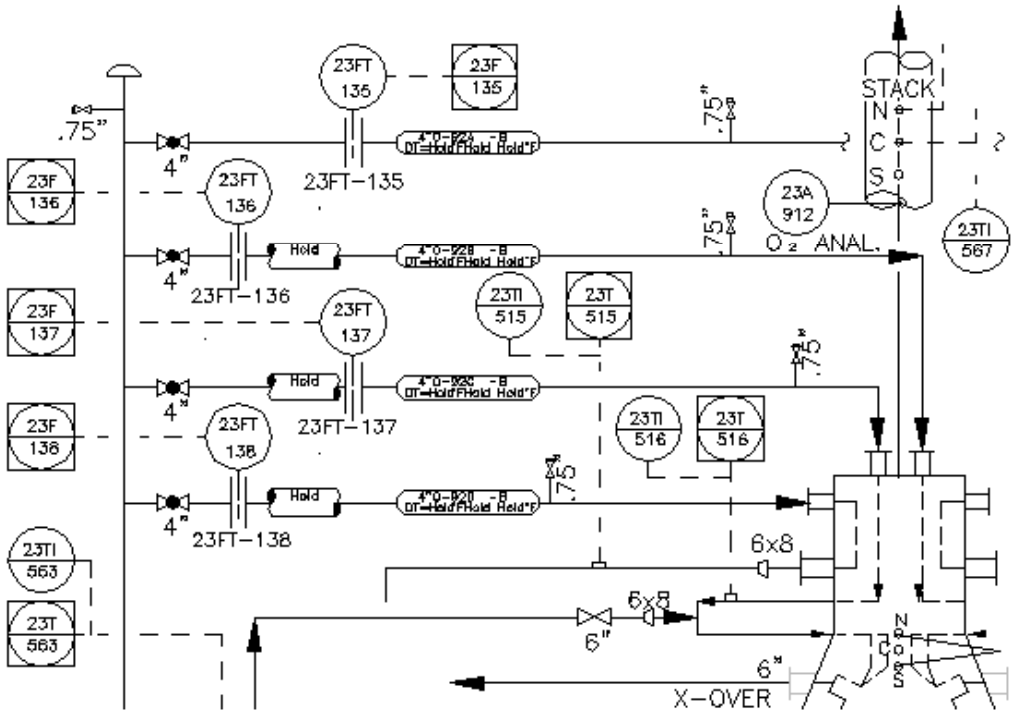
Aerodynamics
Structural Design
Instrumentation
Propulsion Systems
Materials
Reliability Testing
Production Methods



Aerospace

Typical Branches of Engineering Graphics

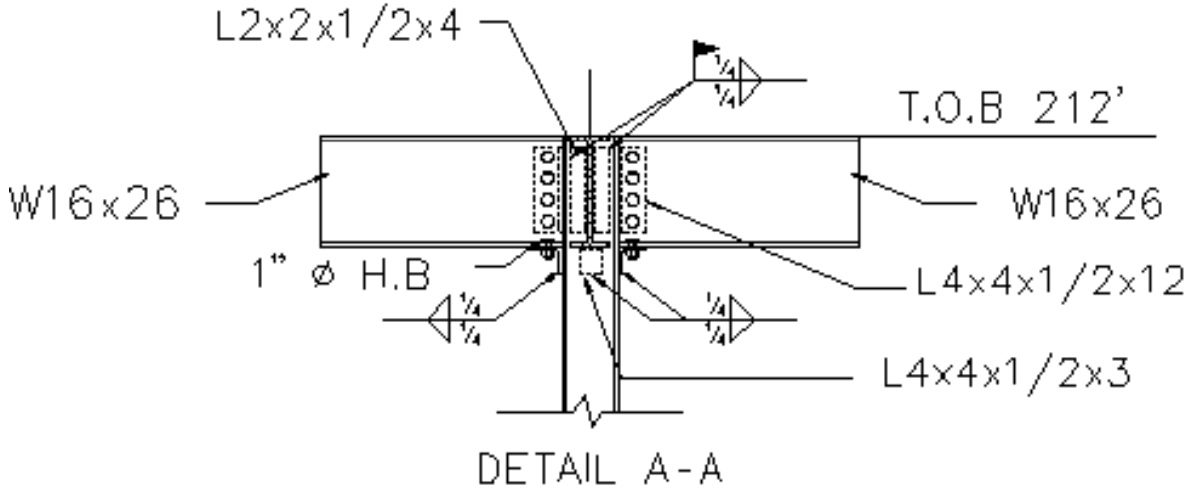
Liquid Transportation
Manufacturing
Power Services
Hydraulics
Pneumatics



Piping

Typical Branches of Engineering Graphics

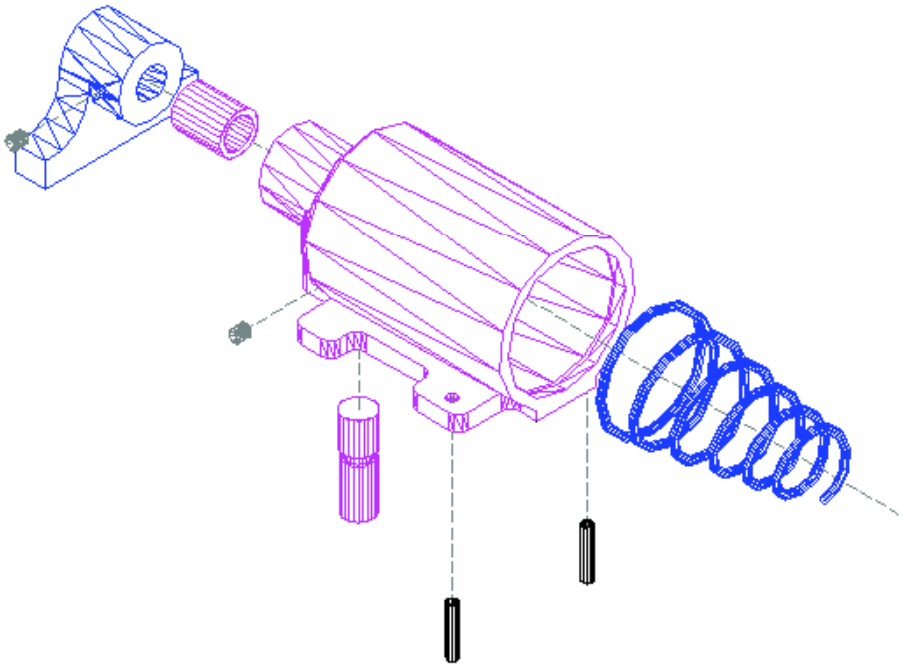
Structural Designs
Buildings
Planes
Ships
Automobiles
Bridges



Structural

Typical Branches of Engineering Graphics

New Products
Assembly Instructions
Presentations
Community Projects
Renewal Programs

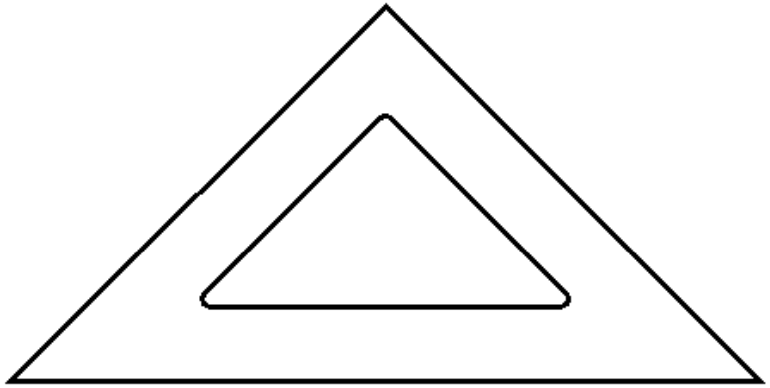


Technical Illustration

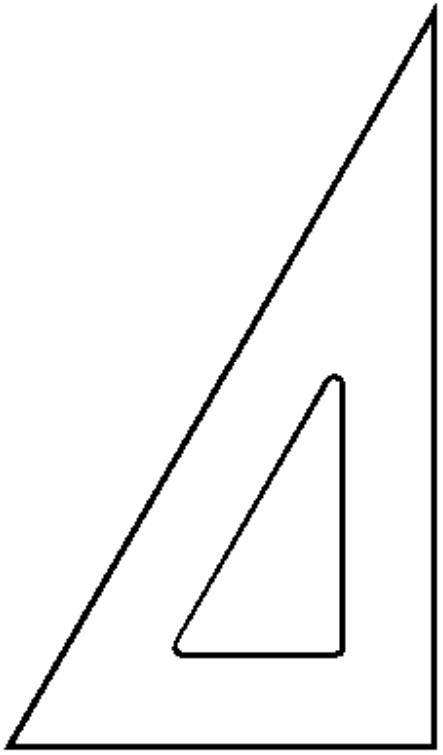
Drafting Equipment

Drafting Machine

Drafting Equipment



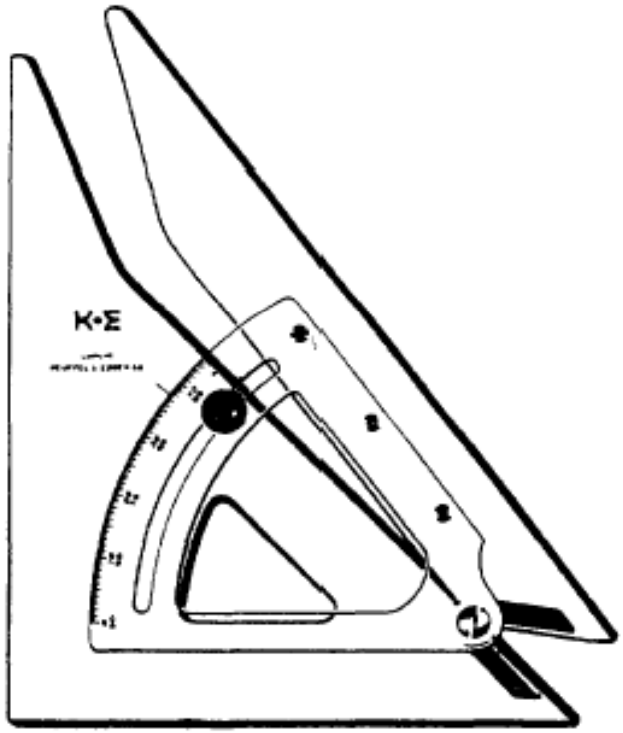
45°



30°/60°

Triangles

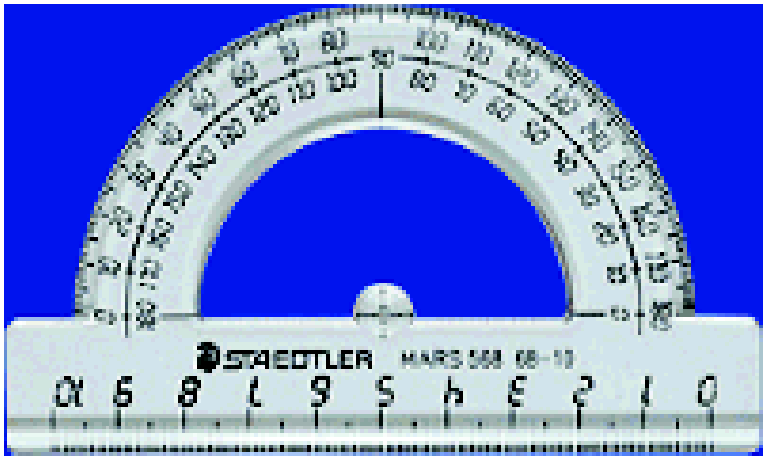
Drafting Equipment



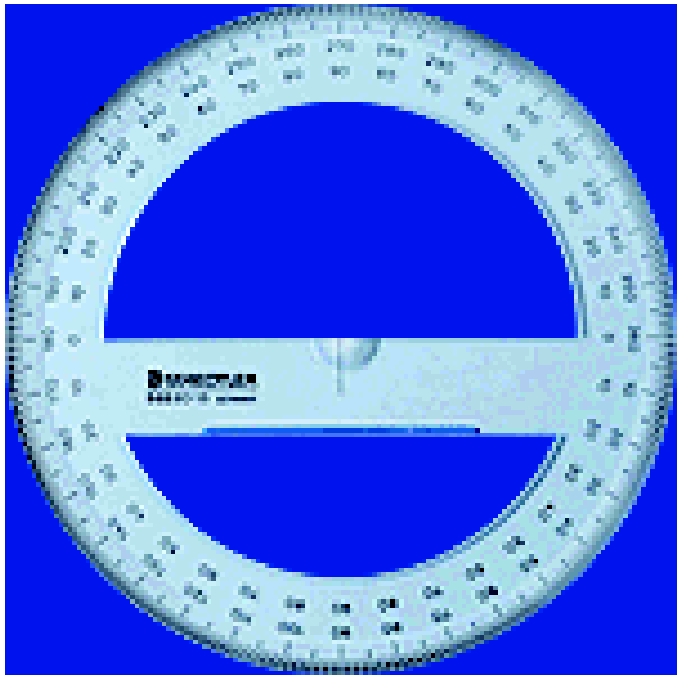
Courtesy of Keuffel & Esser Company, Rockaway, NJ

Adjustable Triangle

Drafting Equipment



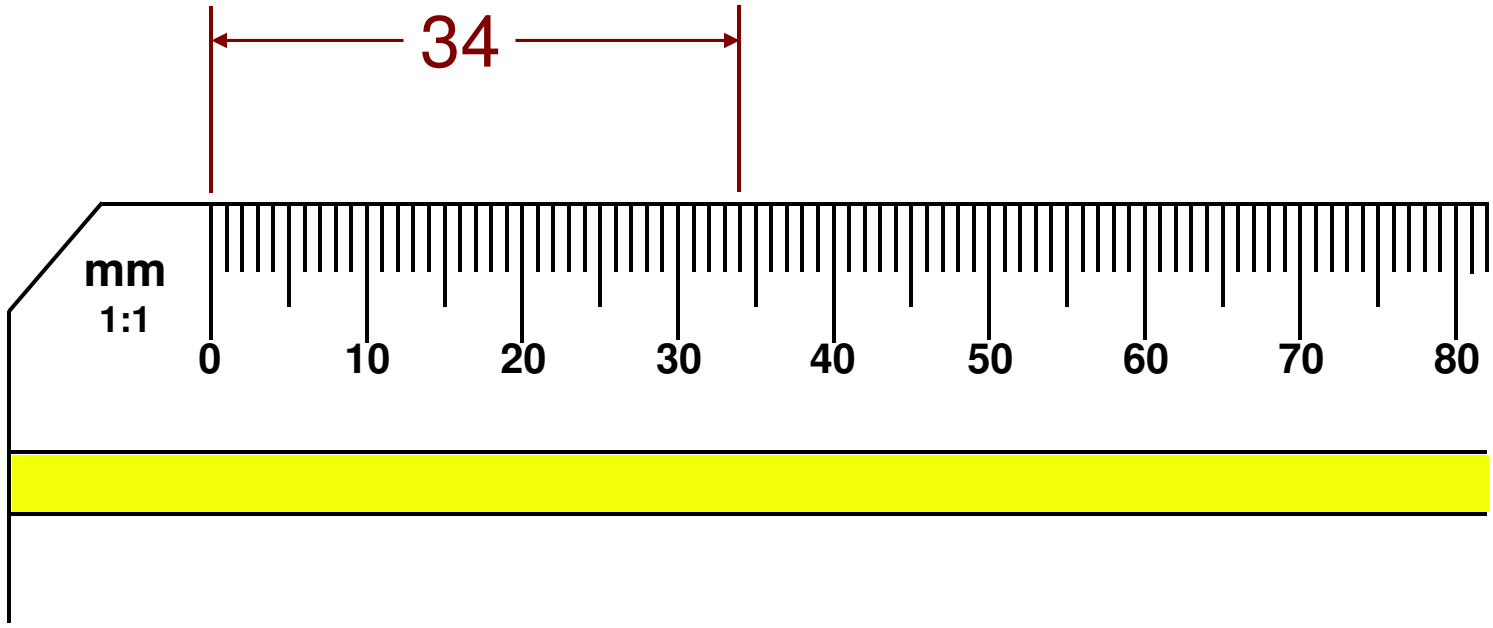
Half-Circle



Full-Circle

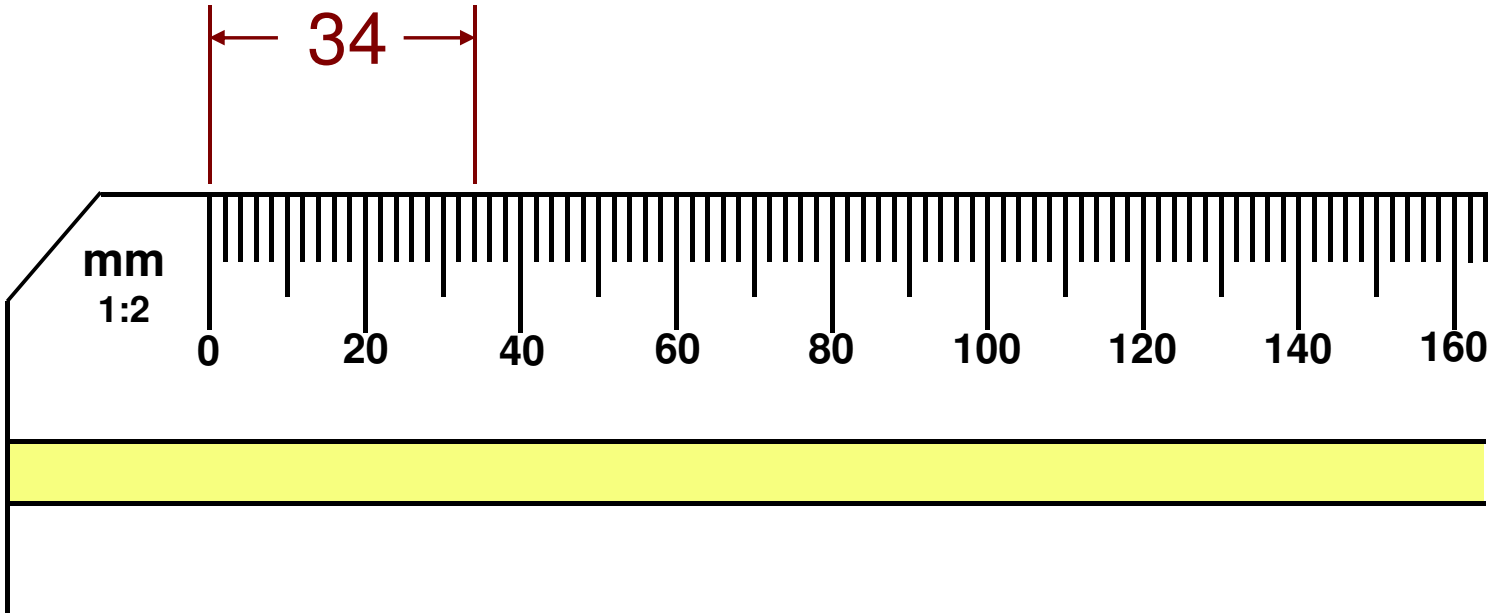
Protractors

METRIC SCALE



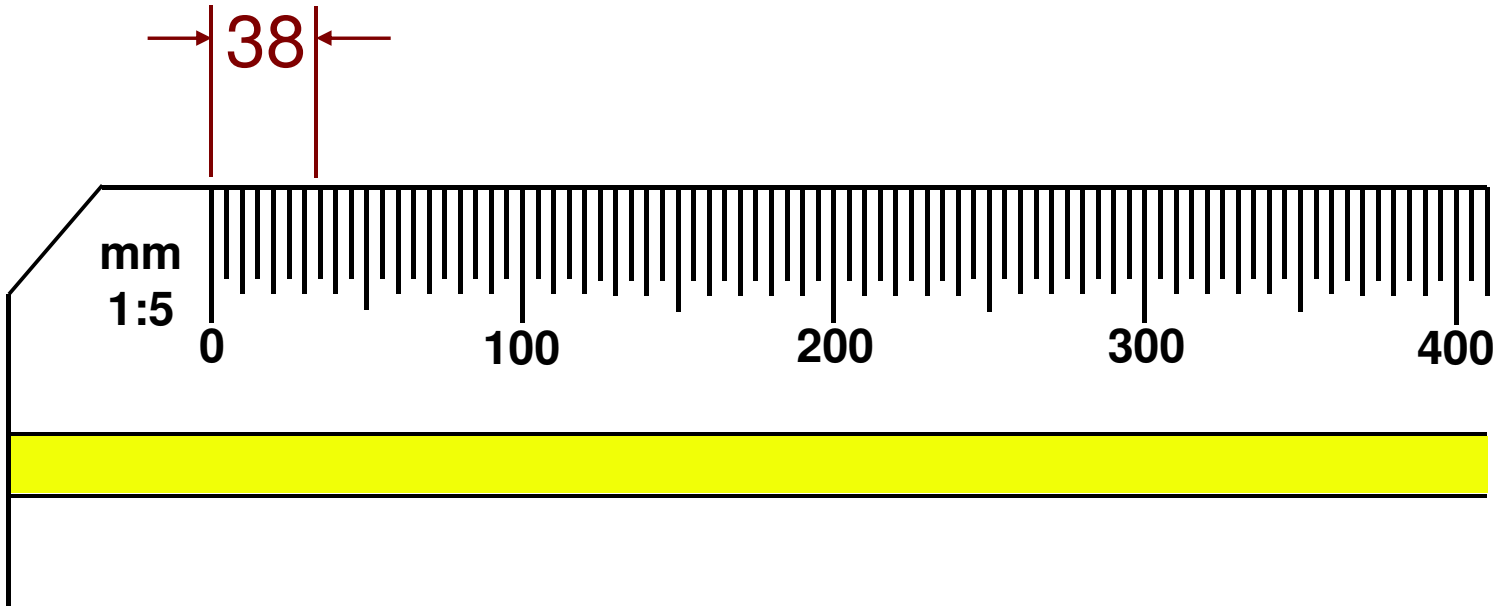
1:1 SCALE (1mm DIVISIONS)

METRIC SCALE



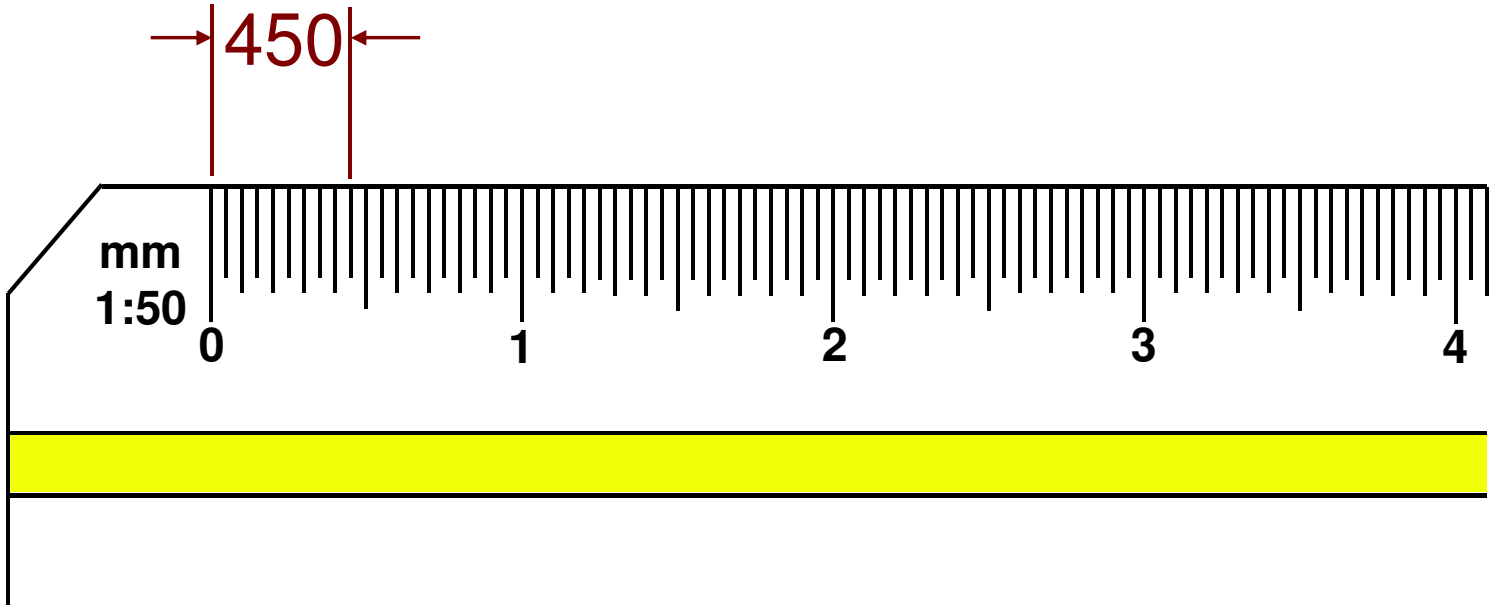
1:2 SCALE (2mm DIVISIONS)

METRIC SCALE



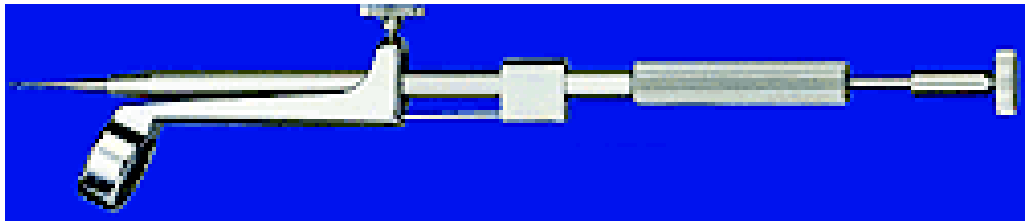
1:5 SCALE (5mm DIVISIONS)

METRIC SCALE

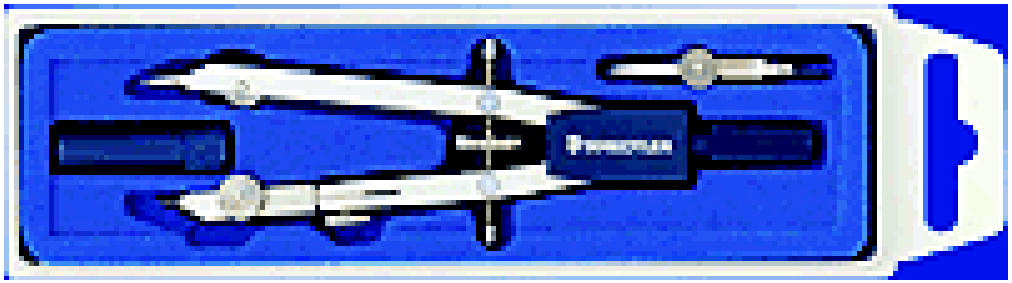


1:50 SCALE (50mm DIVISIONS)

Drafting Equipment



Drop Bow



Bow

Compasses

Drafting Equipment

Beam

Compasses

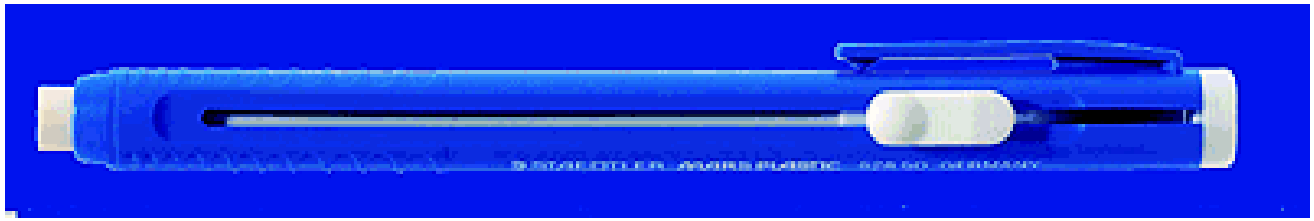
Drafting Equipment

Wooden Pencil

Automatic Pencil

Mechanical Pencil

Drafting Equipment

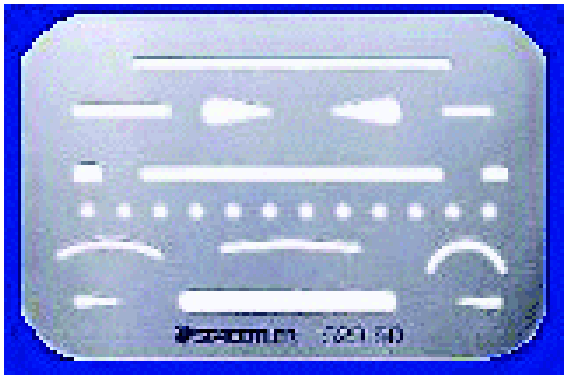


Erasers

Drafting Equipment

Erasing Machine

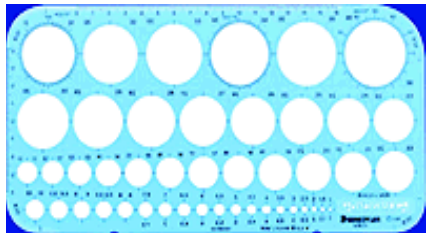
Drafting Equipment

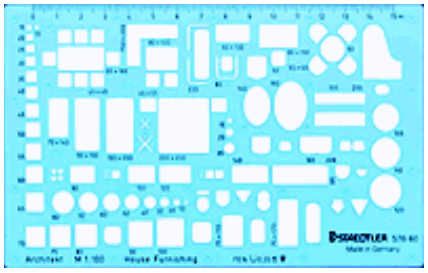


Erasing Shield

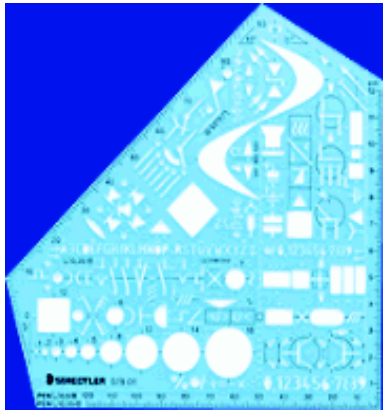
Drafter's Brush

Drafting Equipment

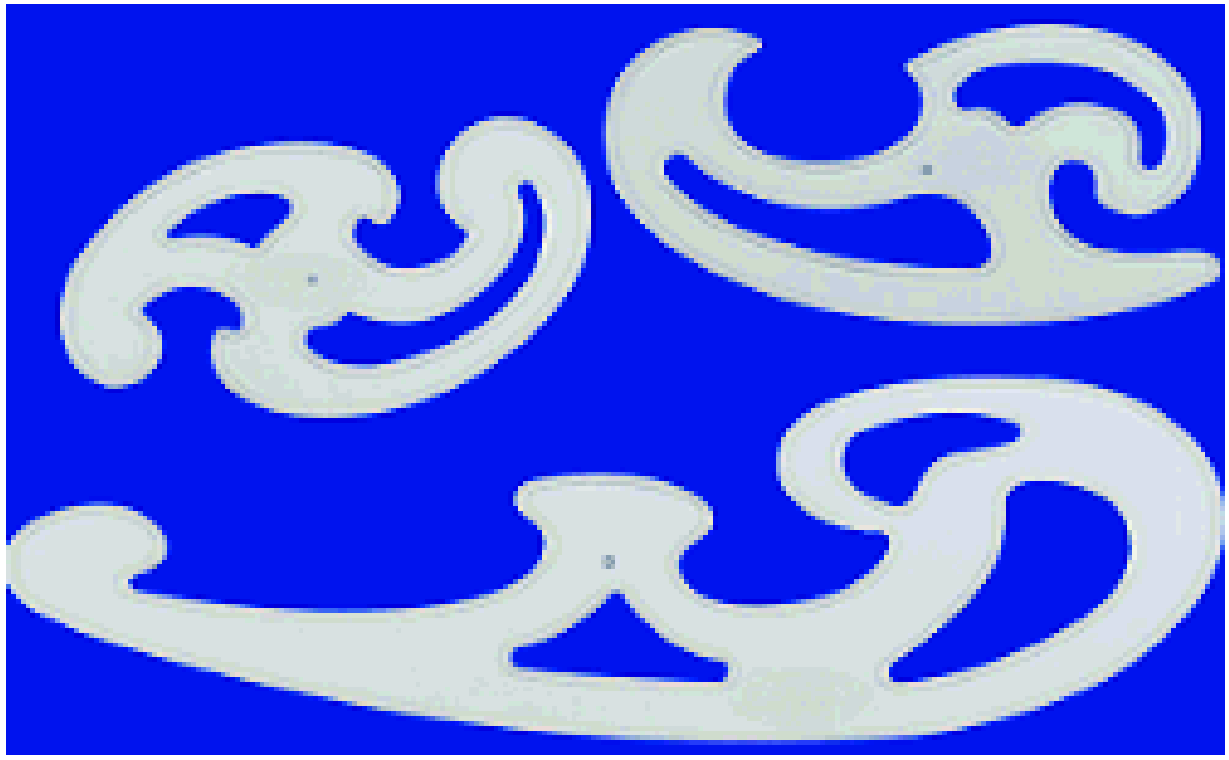




Templates



Drafting Equipment



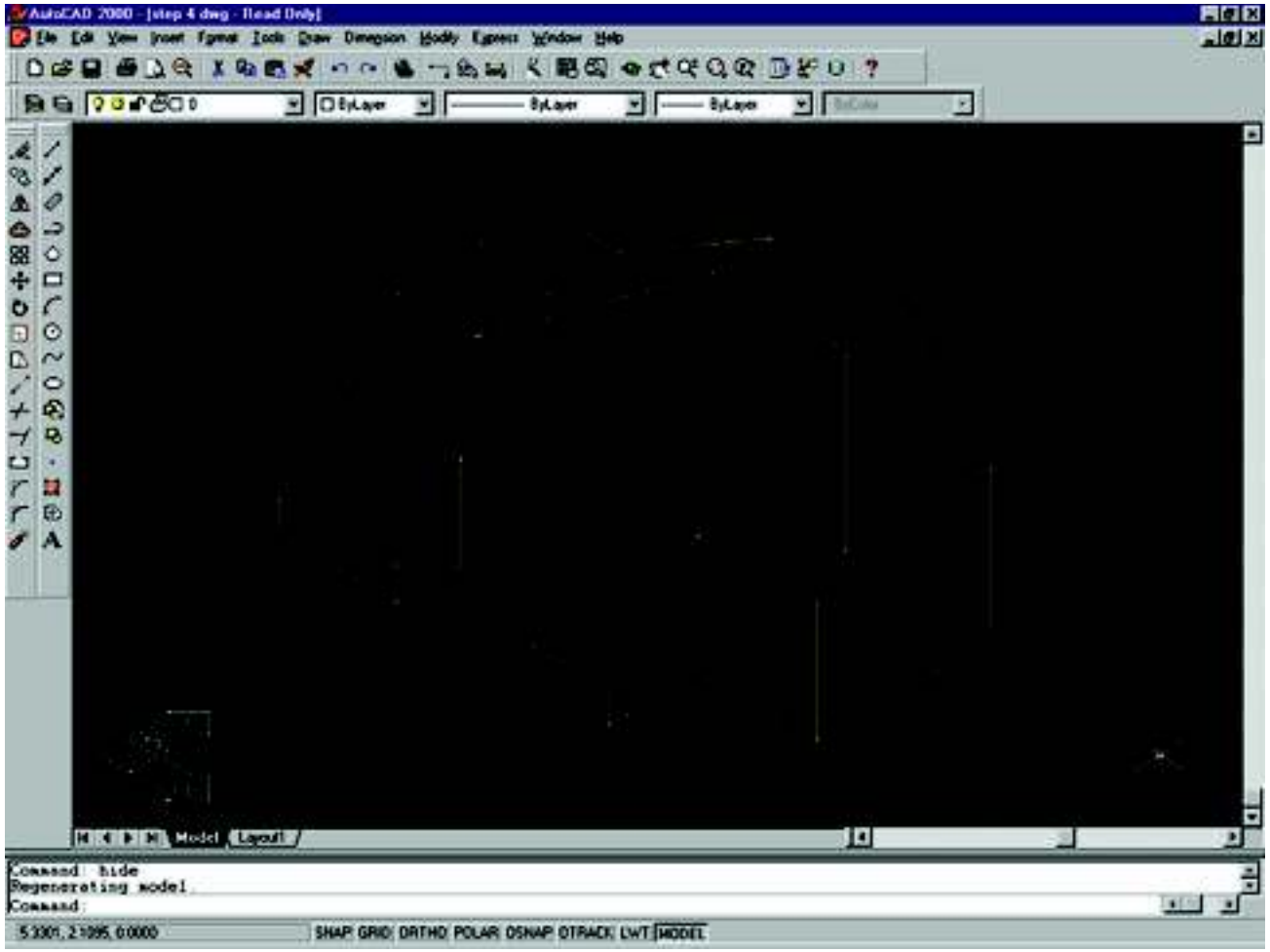
Irregular Curves

Drafting Equipment

Technical Pens

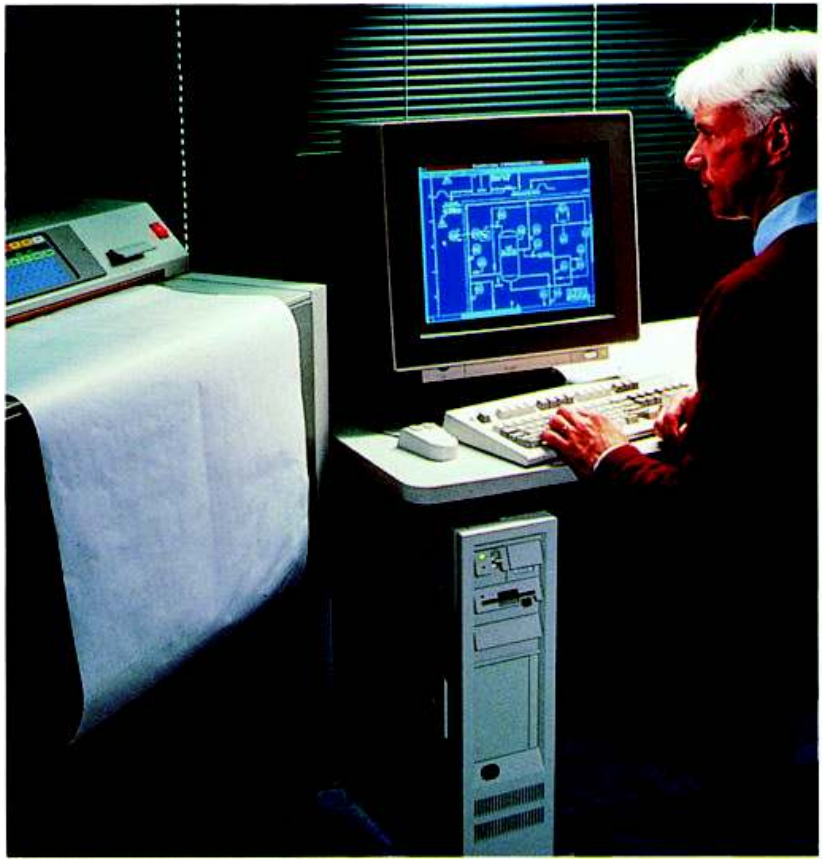
COMPUTER-AIDED DESIGN

GUI (GRAPHICAL USER INTERFACE)



COMPUTER-AIDED DESIGN

INTERACTIVE COMPUTER GRAPHICS TERMINAL

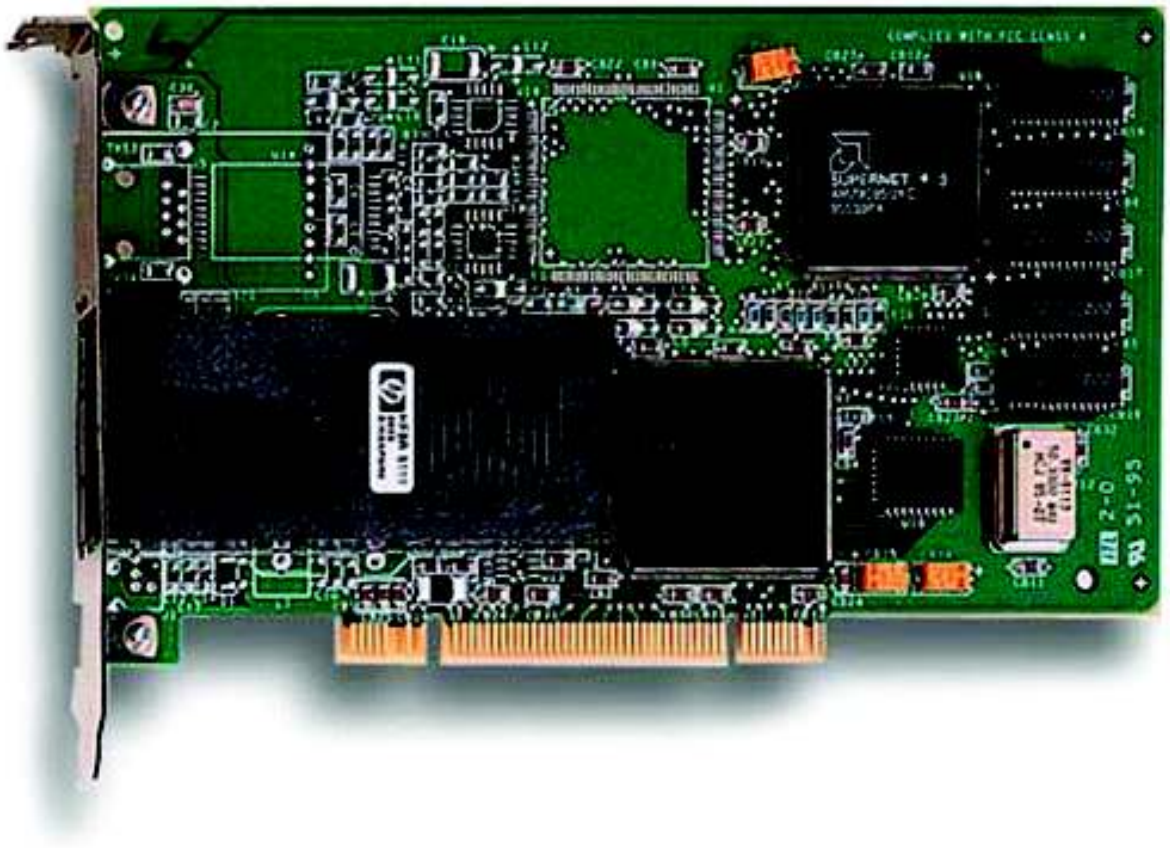


(Photo Courtesy of International Business Machines Corporation)

** Unauthorized Use Not Permitted **

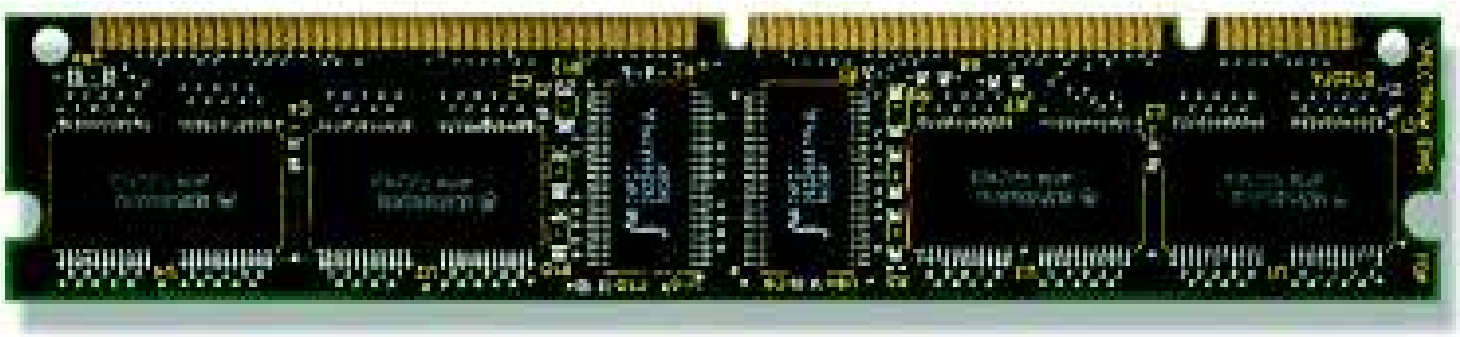
COMPUTER-AIDED DESIGN

NETWORK INTERFACE CARD (NIC)



COMPUTER-AIDED DESIGN

RAM (RANDOM ACCESS MEMORY)



COMPUTER-AIDED DESIGN

HARD DRIVE

COMPUTER-AIDED DESIGN

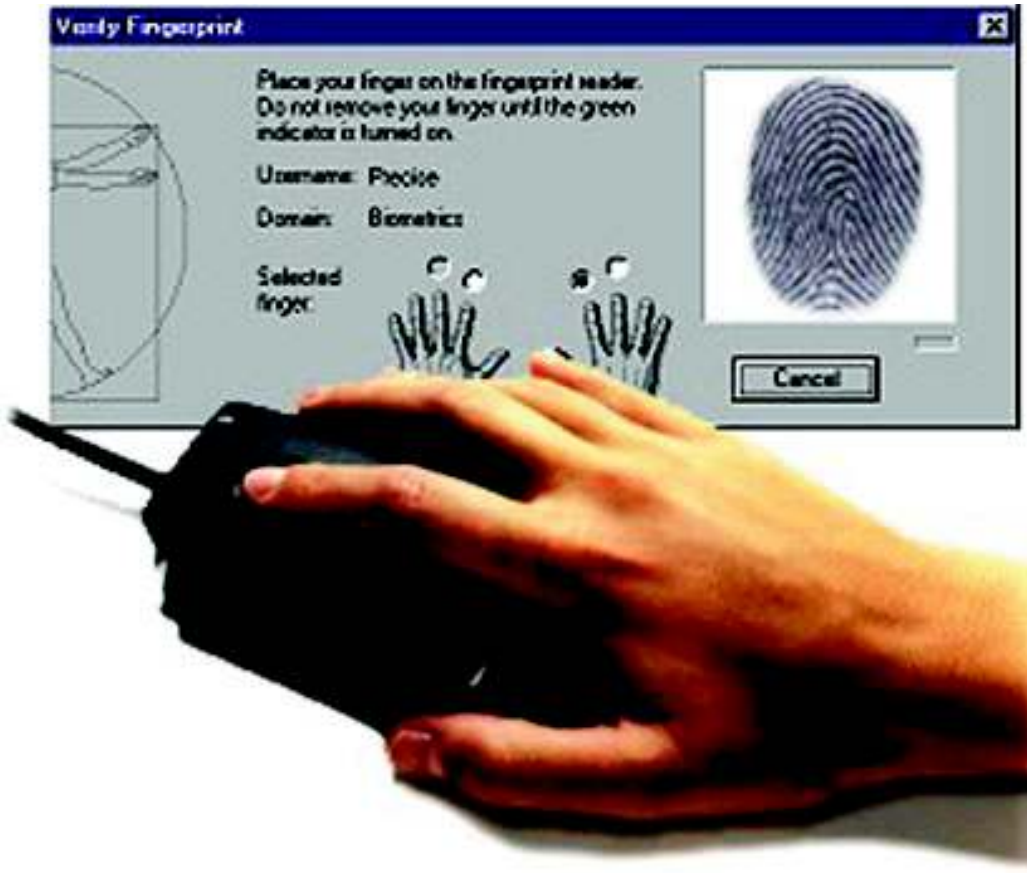
CD-ROM DRIVE

COMPUTER-AIDED DESIGN

UPS – UNINTERRUPTIBLE POWER SUPPLY

COMPUTER-AIDED DESIGN

BIOMETRIC INDENTIFICATION SYSTEM



COMPUTER-AIDED DESIGN

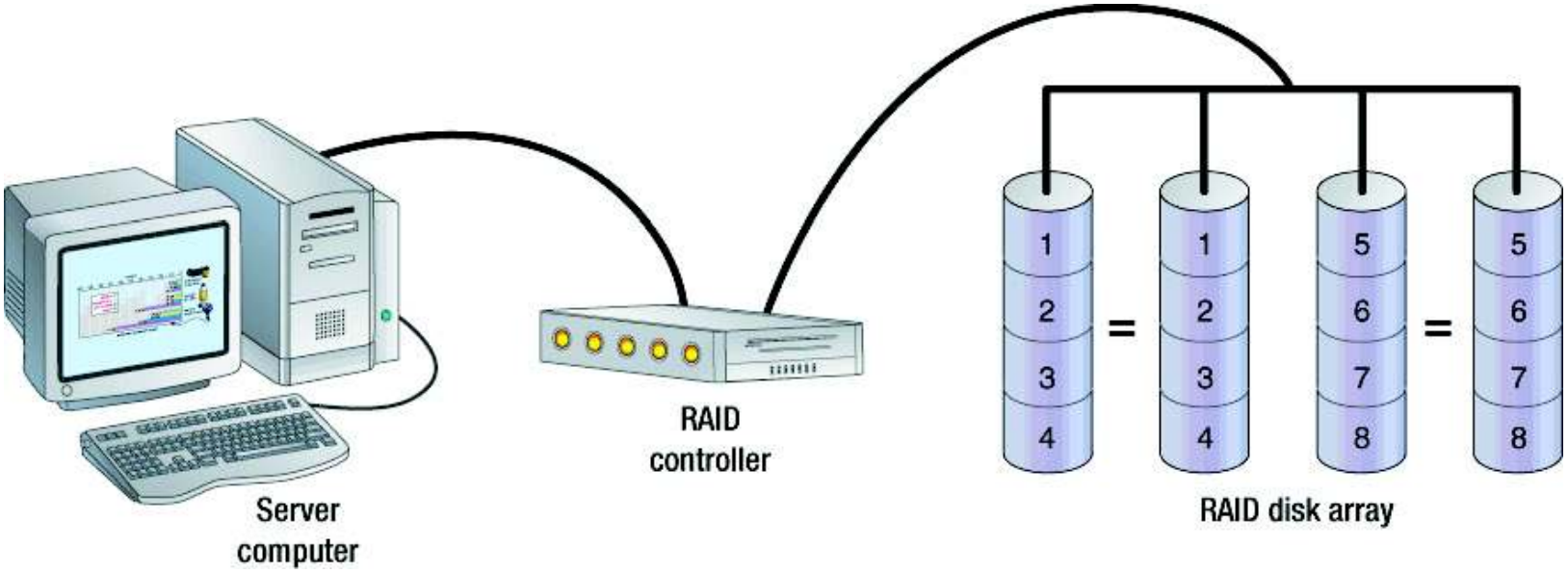
CRT – CATHODE RAY TUBE

COMPUTER-AIDED DESIGN

FPD (FLAT PANEL DISPLAY)

COMPUTER-AIDED DESIGN

RAID – REDUNDANT ARRAYS OF INDEPENDENT DISKS
For data storage



COMPUTER-AIDED DESIGN

JAZ DRIVE_Disk Storage System

COMPUTER-AIDED DESIGN

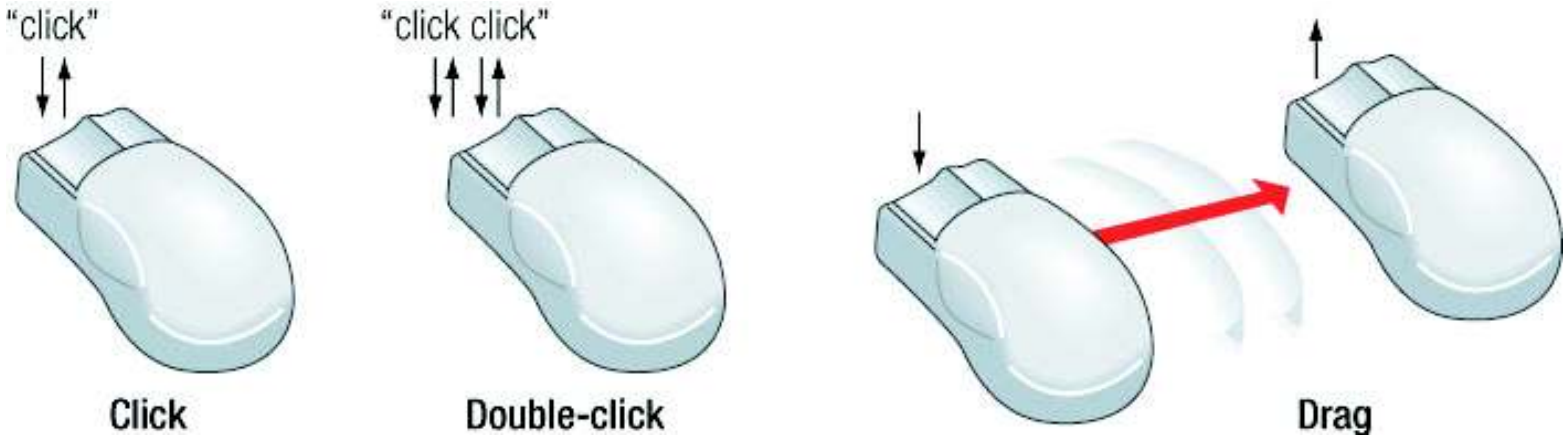
DLT (DIGITAL LINEAR TAPE)

COMPUTER-AIDED DESIGN

INPUT DEVICES - KEYBOARD

COMPUTER-AIDED DESIGN

INPUT DEVICES - MOUSE

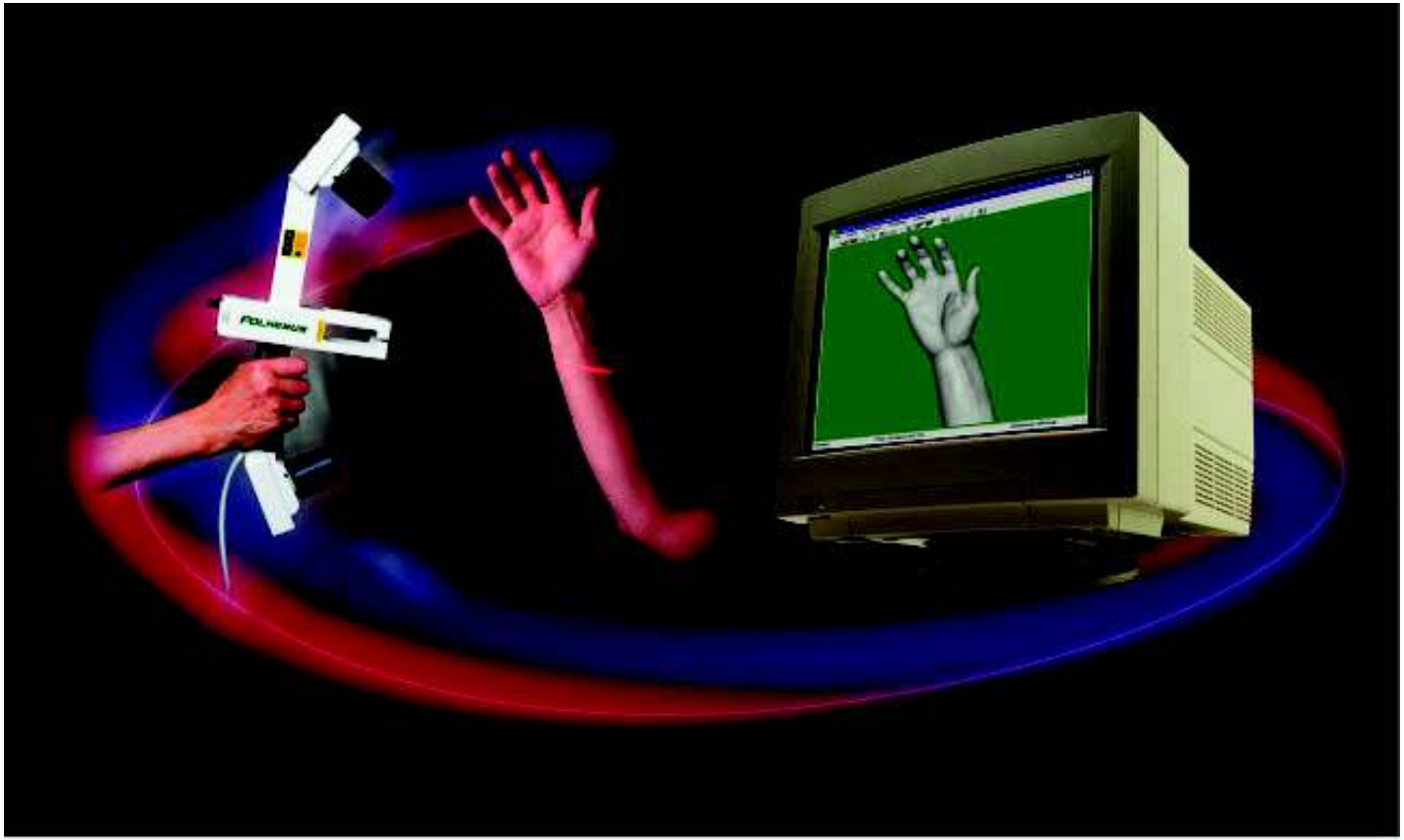


COMPUTER-AIDED DESIGN

INPUT DEVICES

COMPUTER-AIDED DESIGN

INPUT DEVICES - 3-D SCANNER



(A) SCANNER BEING USED

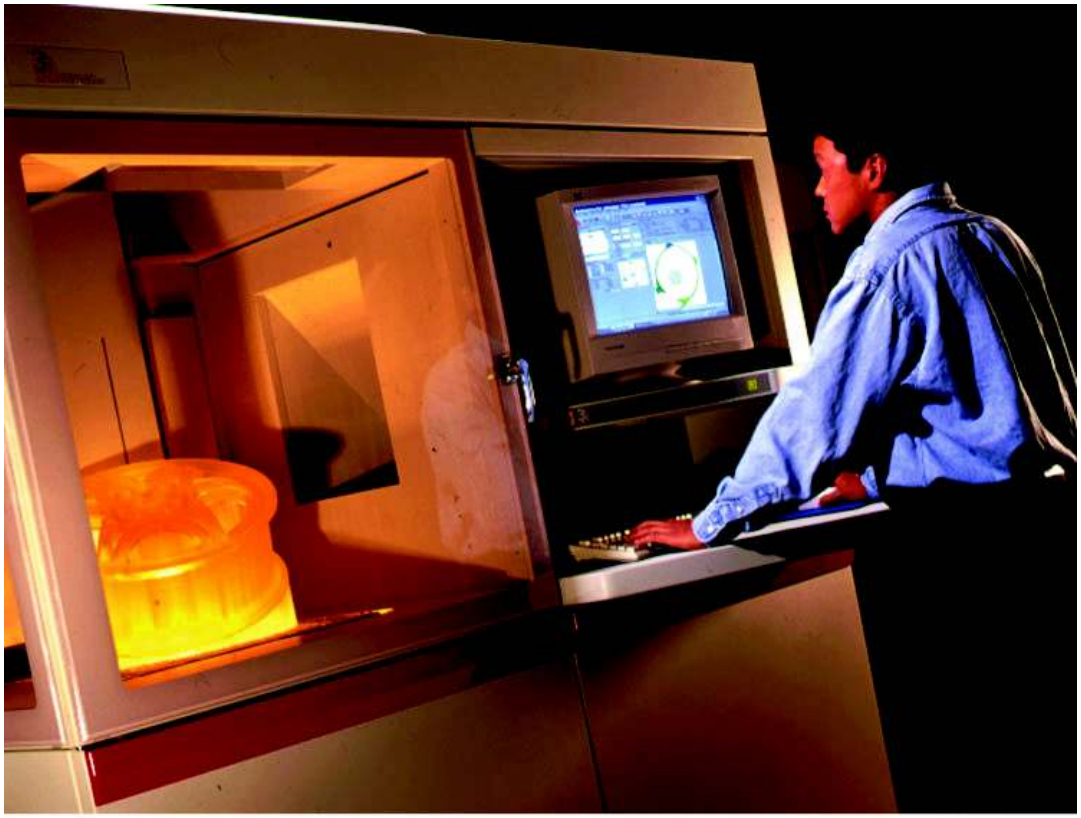
COMPUTER-AIDED DESIGN

INPUT DEVICES - 3-D SCANNER

(B) TYPICAL SCANNED OUTPUT

COMPUTER-AIDED DESIGN

SLA – STEREO LITHOGRAPHY APPARATUS



(A) SLA SYSTEM

(Photo Courtesy of 3D Systems Corporation)

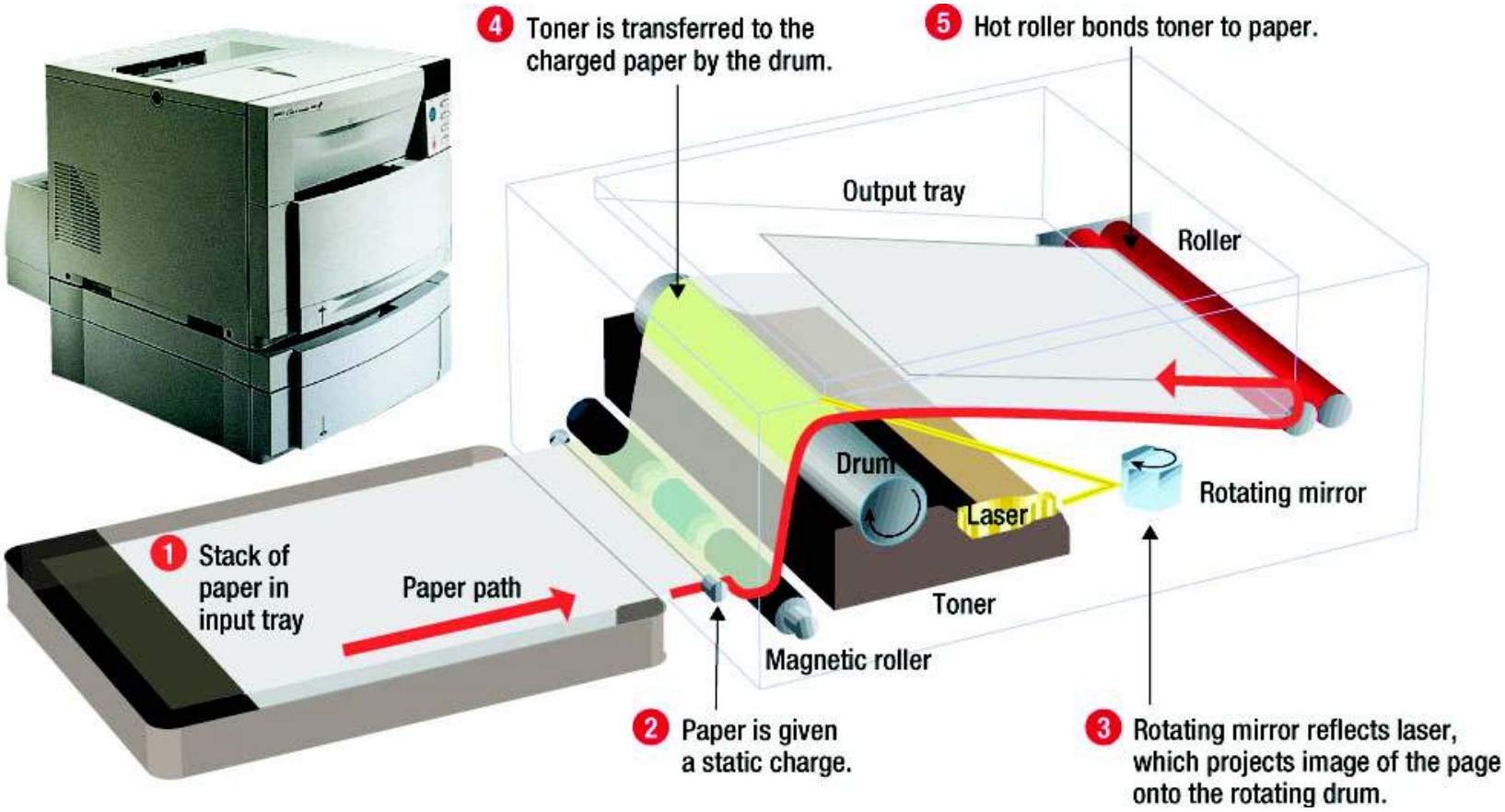
COMPUTER-AIDED DESIGN

3-D OUTPUT

(B) TYPICAL OUTPUT

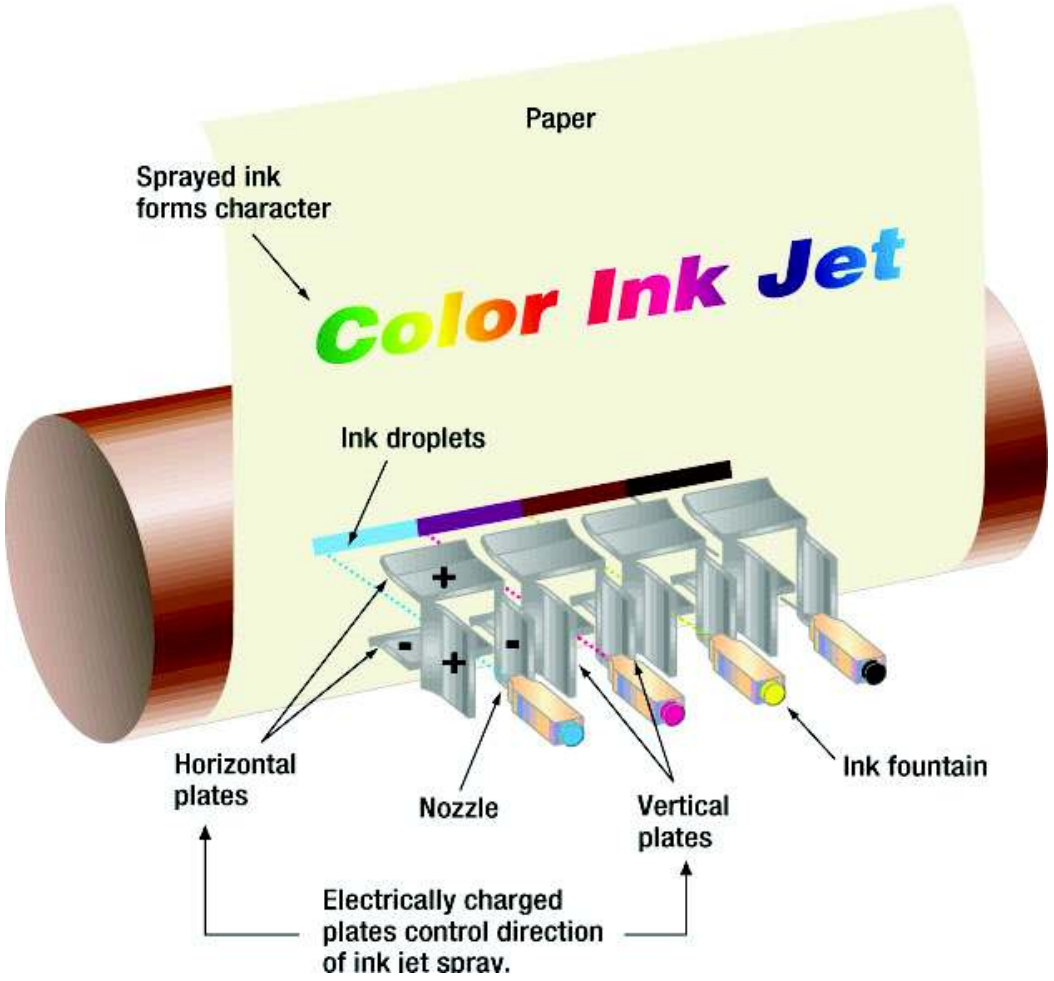
COMPUTER-AIDED DESIGN

LASER PRINTER



COMPUTER-AIDED DESIGN

INK JET PRINTER

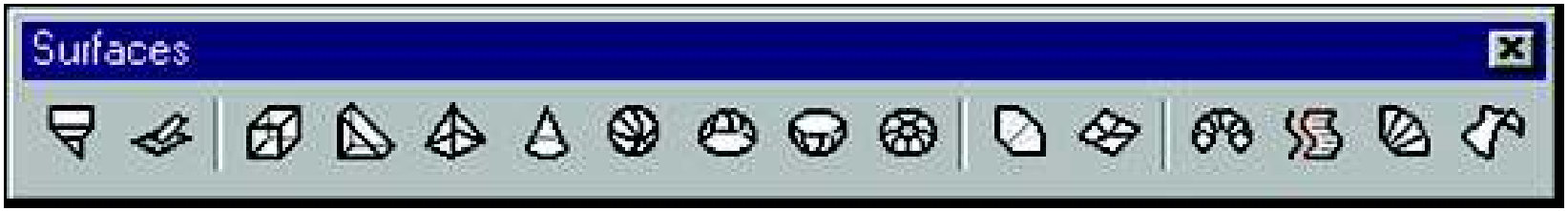


COMPUTER-AIDED DESIGN

PLOTTER

COMPUTER-AIDED DESIGN

GUI – GRAPHICAL USER INTERFACE

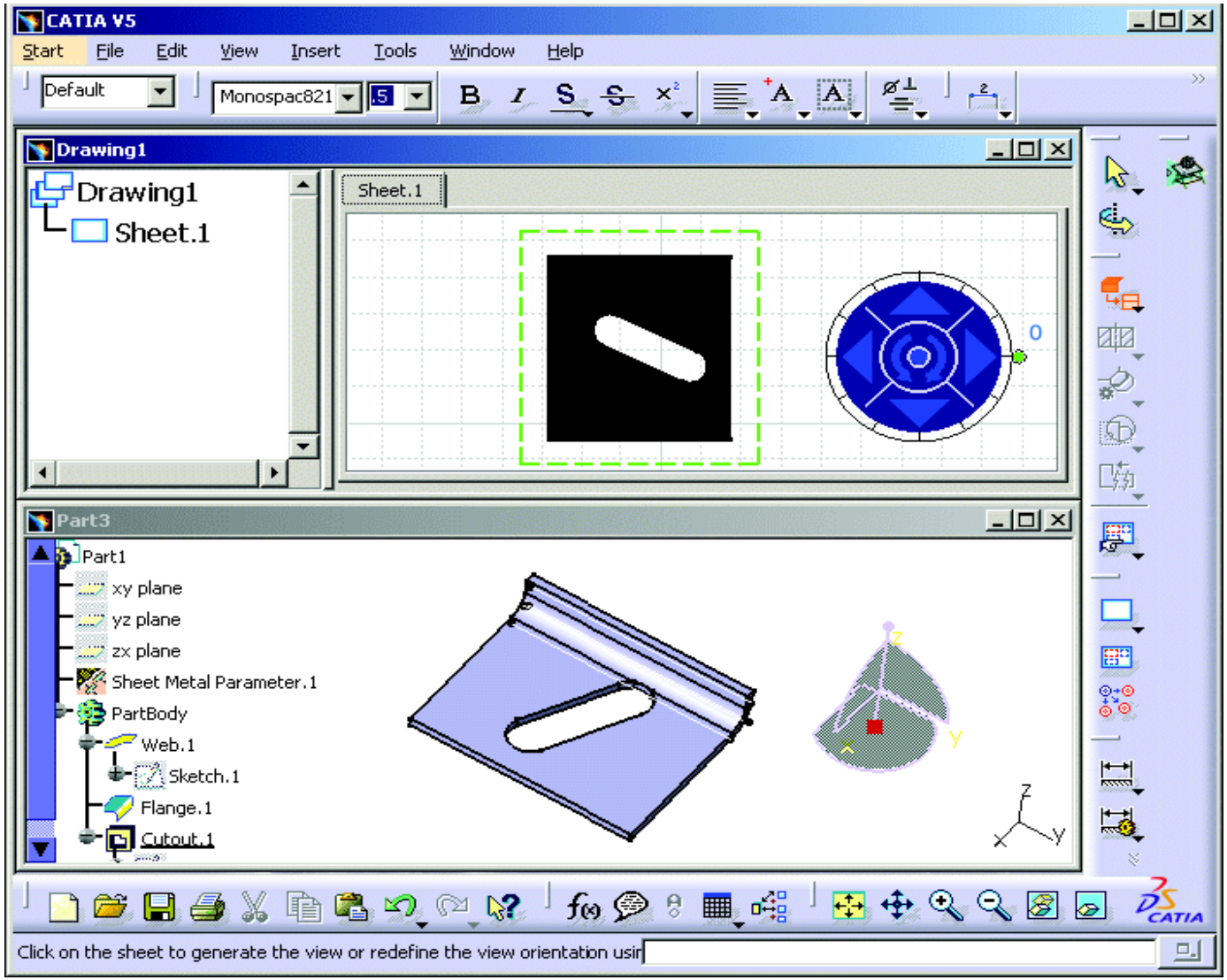


COMPUTER-AIDED DESIGN

DROP DOWN MENUS

COMPUTER-AIDED DESIGN

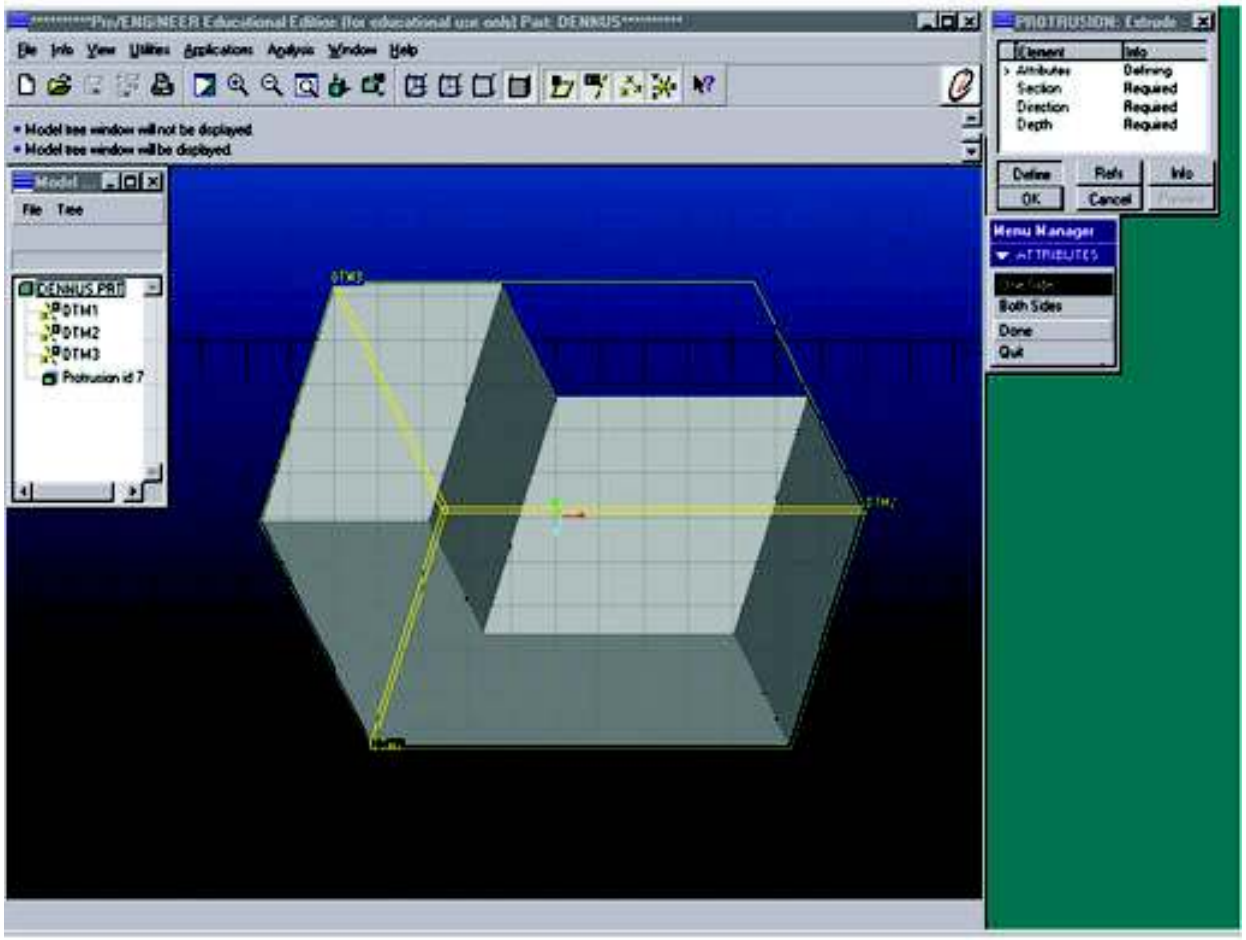
CATIA



(Dassault Systemes Company)

COMPUTER-AIDED DESIGN

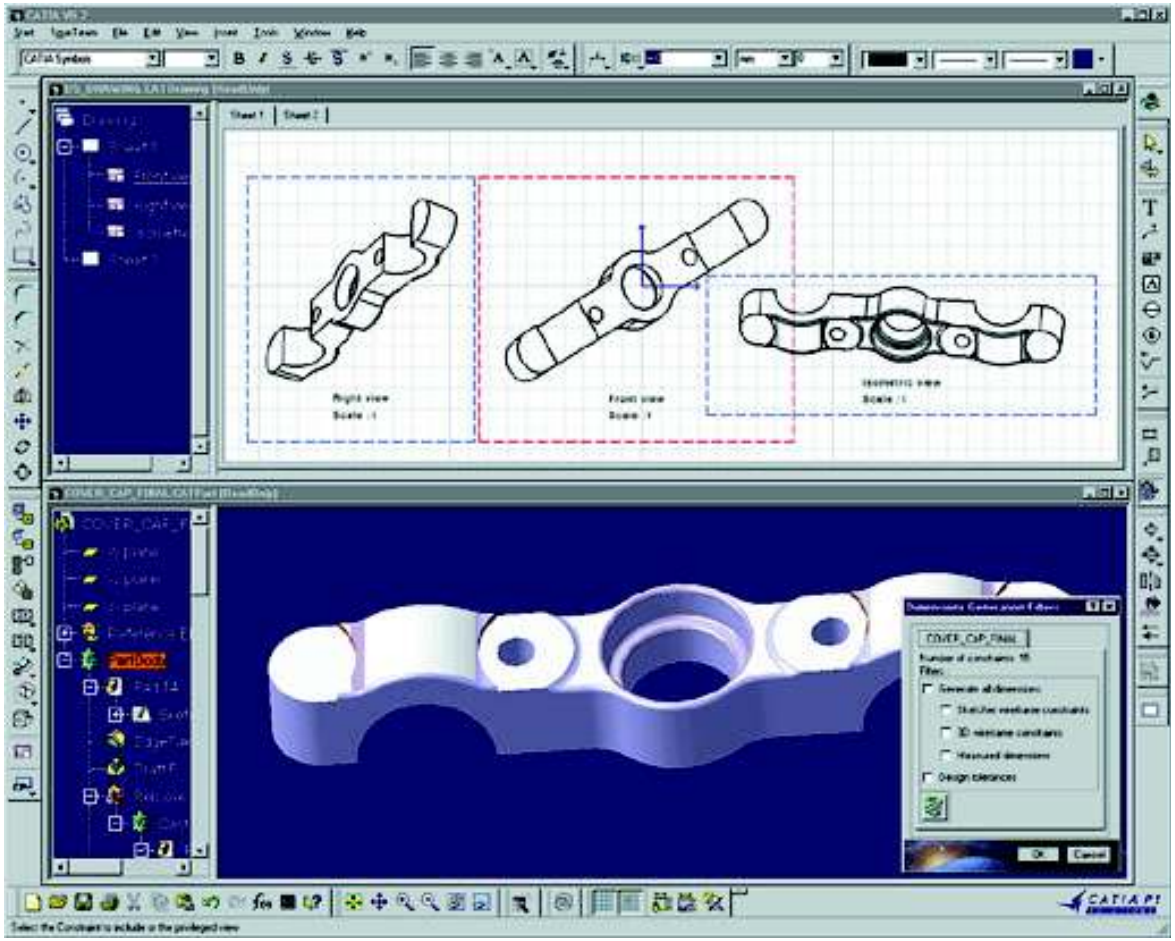
PRO-ENGINEER



(PARAMETRIC TECHNOLOGY CORPORATION)

COMPUTER-AIDED DESIGN

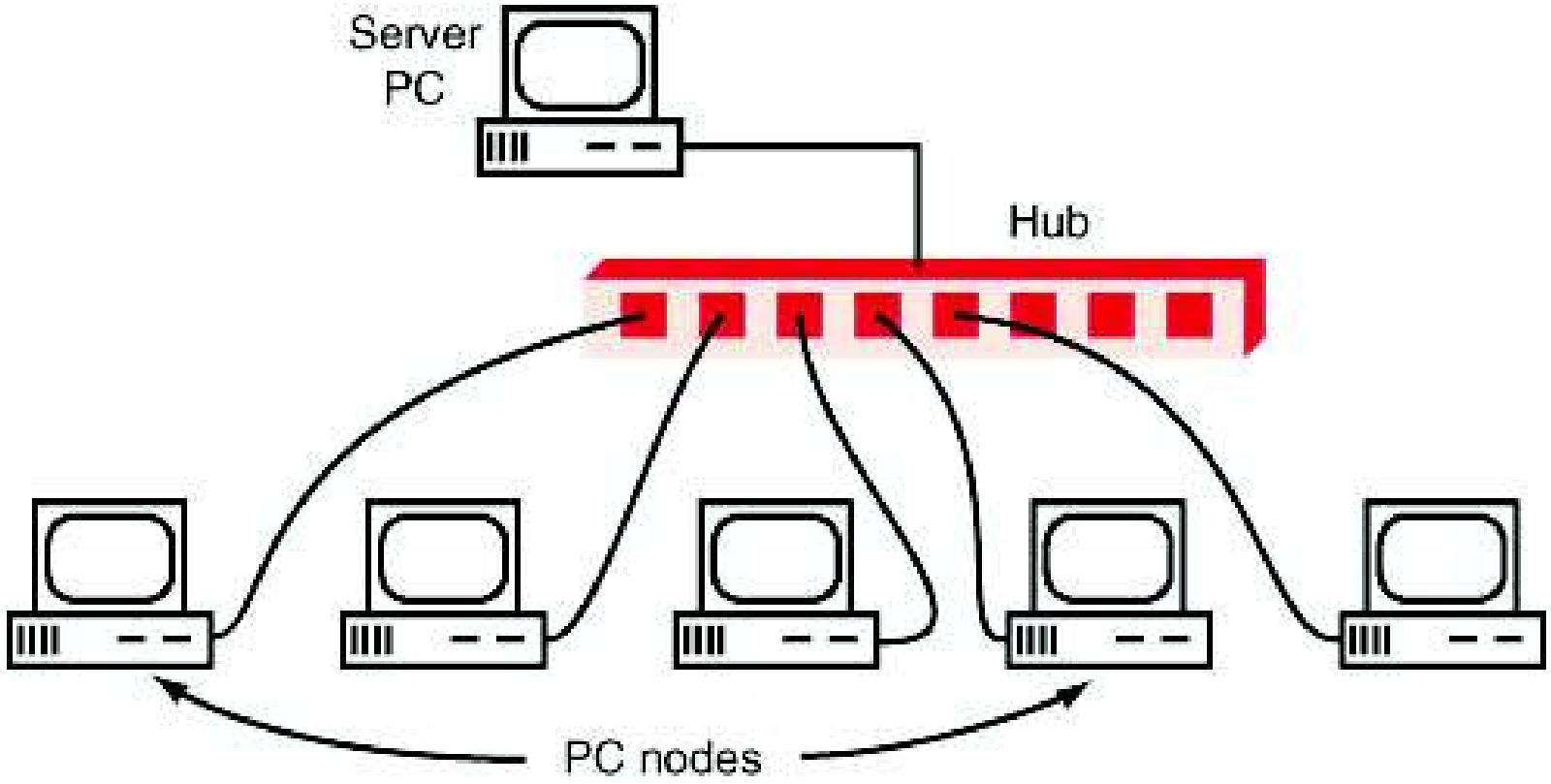
SDRC I-DEAS



(STRUCTURAL DYNAMICS RESEARCH CORPORATION)

COMPUTER-AIDED DESIGN

LOCAL AREA NETWORKS (LANs)

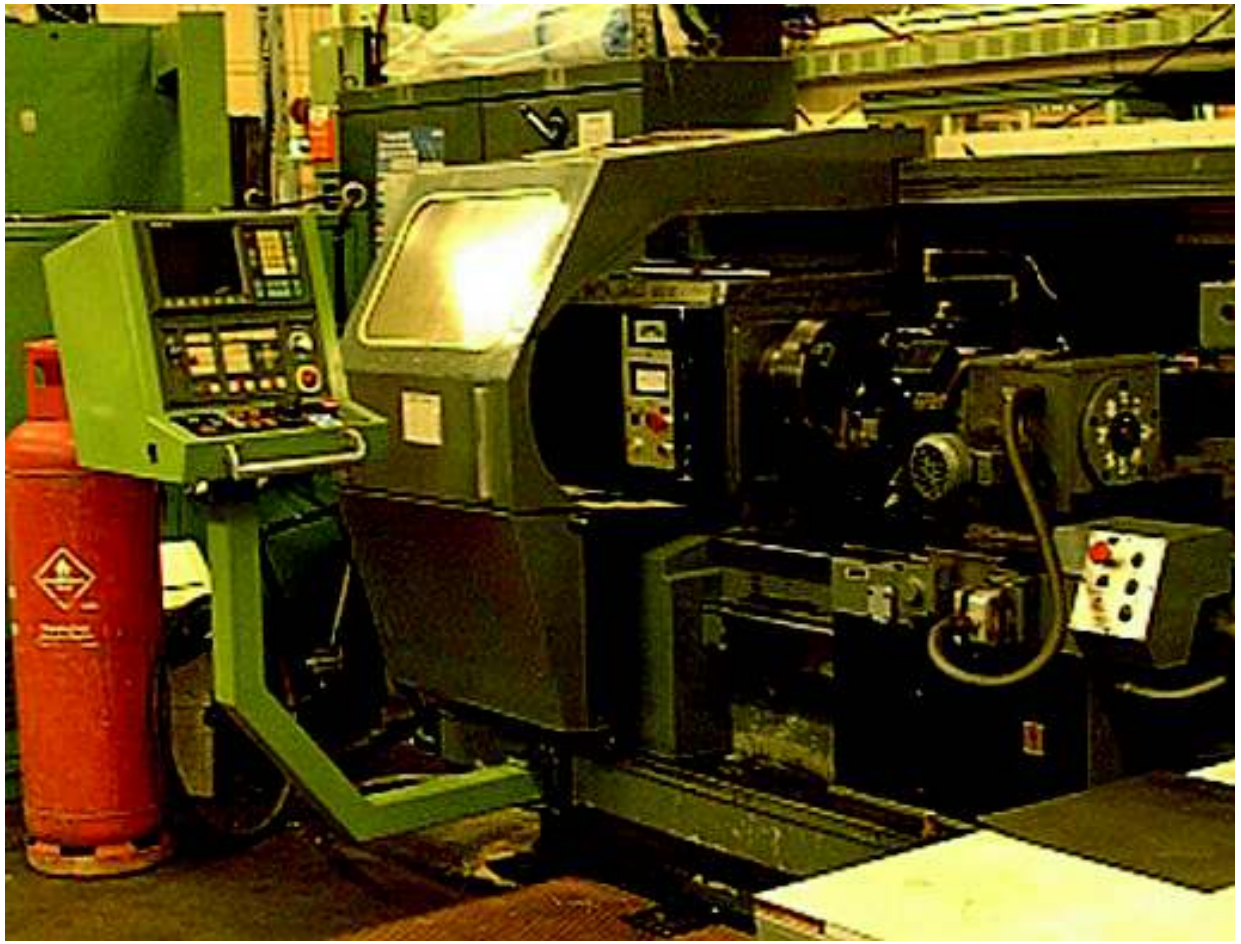


COMPUTER-AIDED DESIGN

HTML – HYPERTEXT MARKUP LANGUAGE

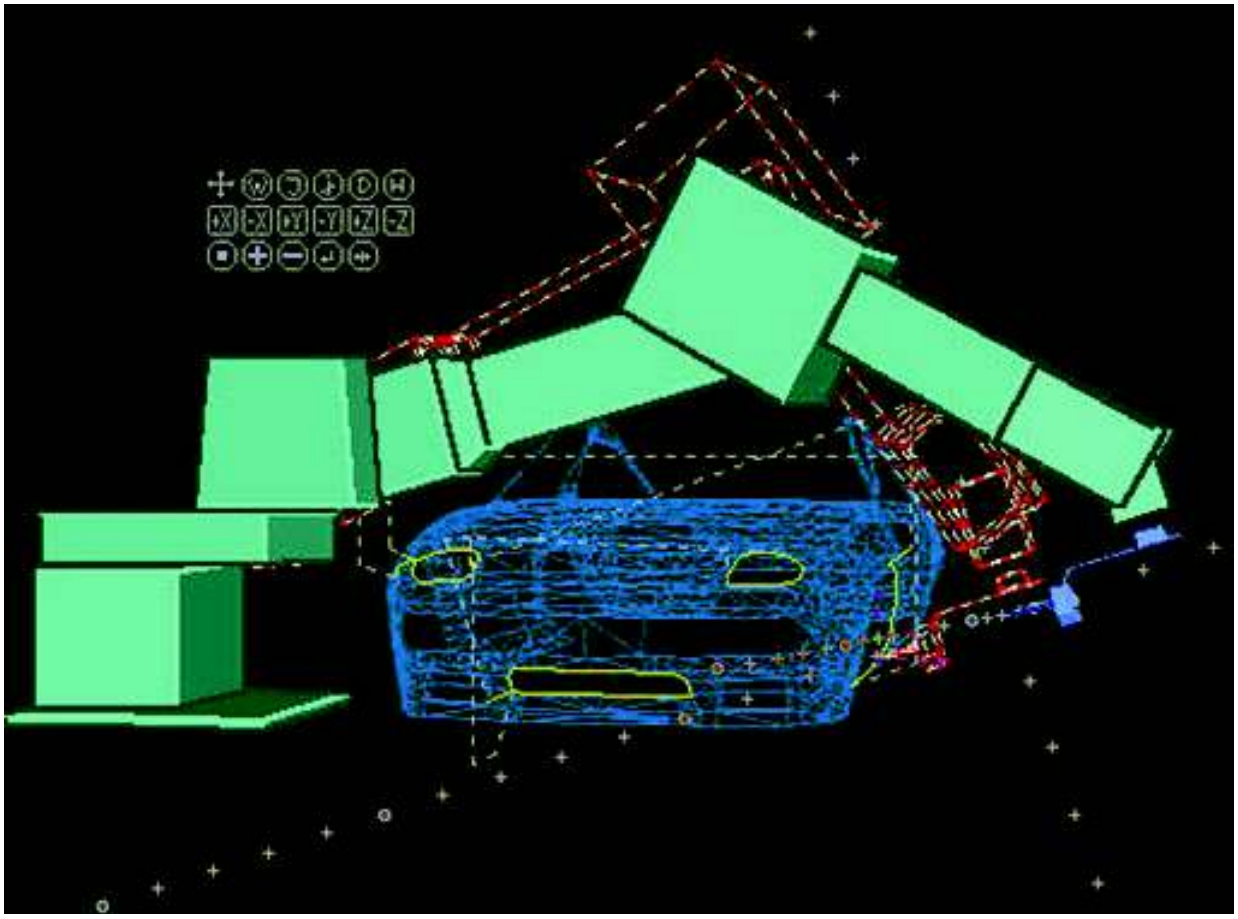
COMPUTER-AIDED DESIGN

(CNC) COMPUTER NUMERICAL CONTROL



COMPUTER-AIDED DESIGN

(CAM) ROBOTICS

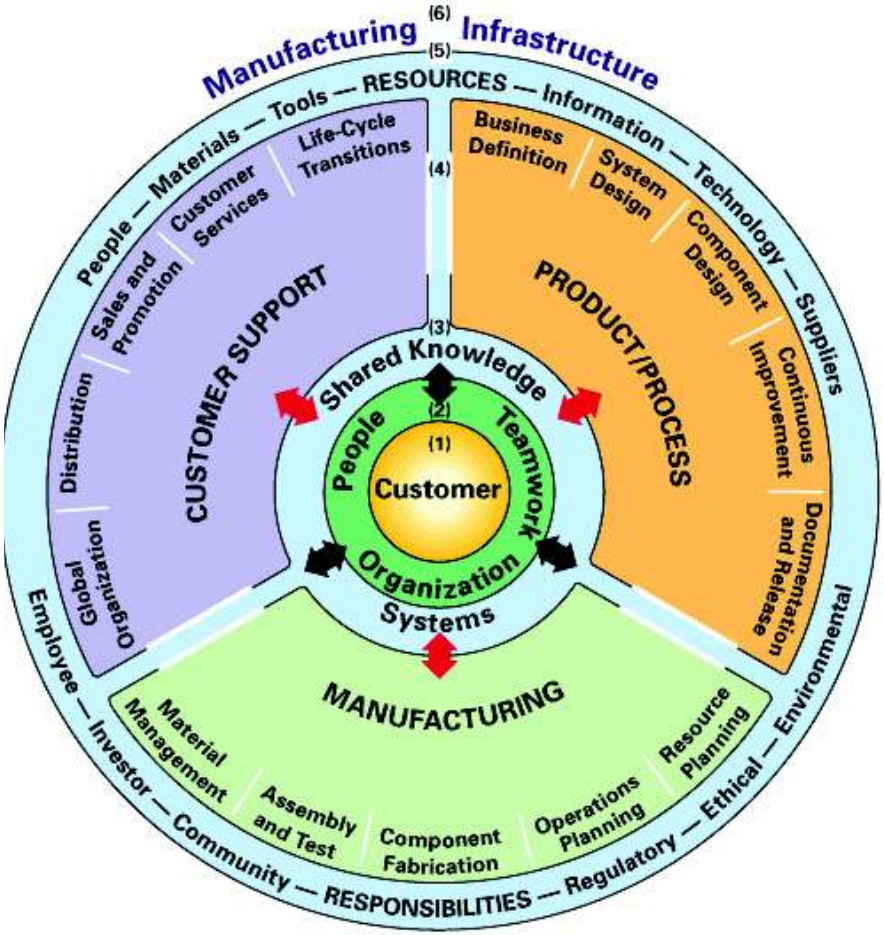


COMPUTER-AIDED DESIGN

(CAM) ROBOTICS

COMPUTER-AIDED DESIGN

(CIM) COMPUTER INTEGRATED MANUFACTURING



Drawing Media, Filing, Storage,

Drawing Media: The material on which orijinal drawing is made

Standard drawing sizes:A0, A1, A2, A3, A4

Drawing Formats: Border lines, zoning system, information blocks

Information blocks: Title blocks, Item list, revision list

Drawing Media, Filing, Storage,

Filing systems:

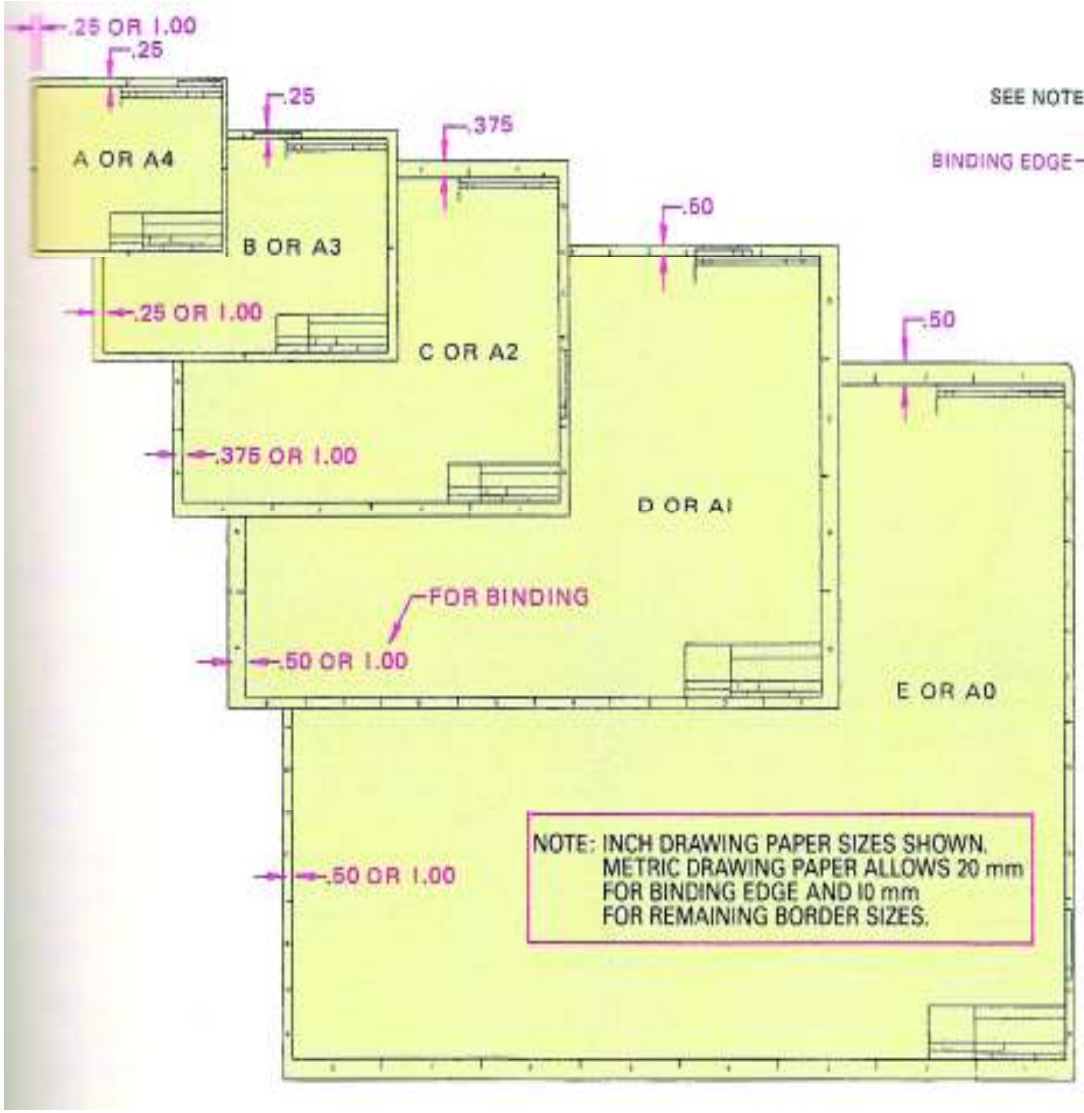
- **Original drawings**
- **Microfilms**
- **CD's and DVD's**

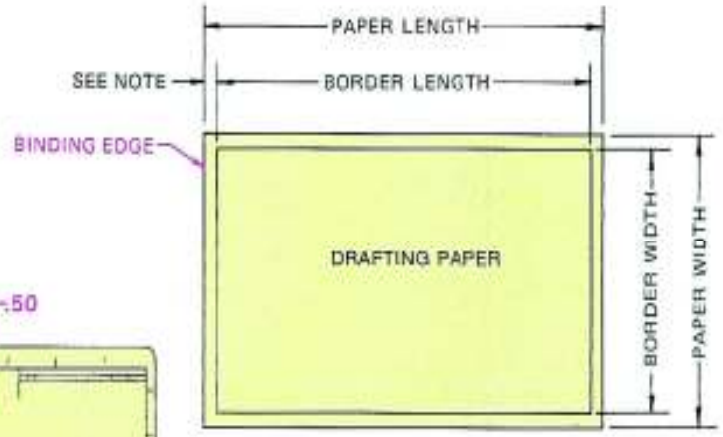
Folding of prints: Use standard folding

Drawing reproduction:

- **Copiers**

Drawing Media, Filing, Storage,





INCH DRAWING SIZES		
DRAWING SIZE	BORDER SIZE*	OVERALL PAPER SIZE
A	8.00 X 10.50	8.50 X 11.00
B	10.50 X 16.50	11.00 X 17.00
C	16.25 X 21.25	17.00 X 22.00
D	21.00 X 33.00	22.00 X 34.00
E	33.00 X 43.00	34.00 X 44.00

METRIC DRAWING SIZES (MILLIMETERS)		
DRAWING SIZE	BORDER SIZE*	OVERALL PAPER SIZE
A4	190 X 267	210 X 297
A3	277 X 390	297 X 420
A2	400 X 564	420 X 594
A1	574 X 811	594 X 841
A0	821 X 1159	841 X 1189

*WITHOUT BINDING ALLOWANCE

Fig-3.1 Standard drawing sizes

Drawing Media, Filing, Storage,

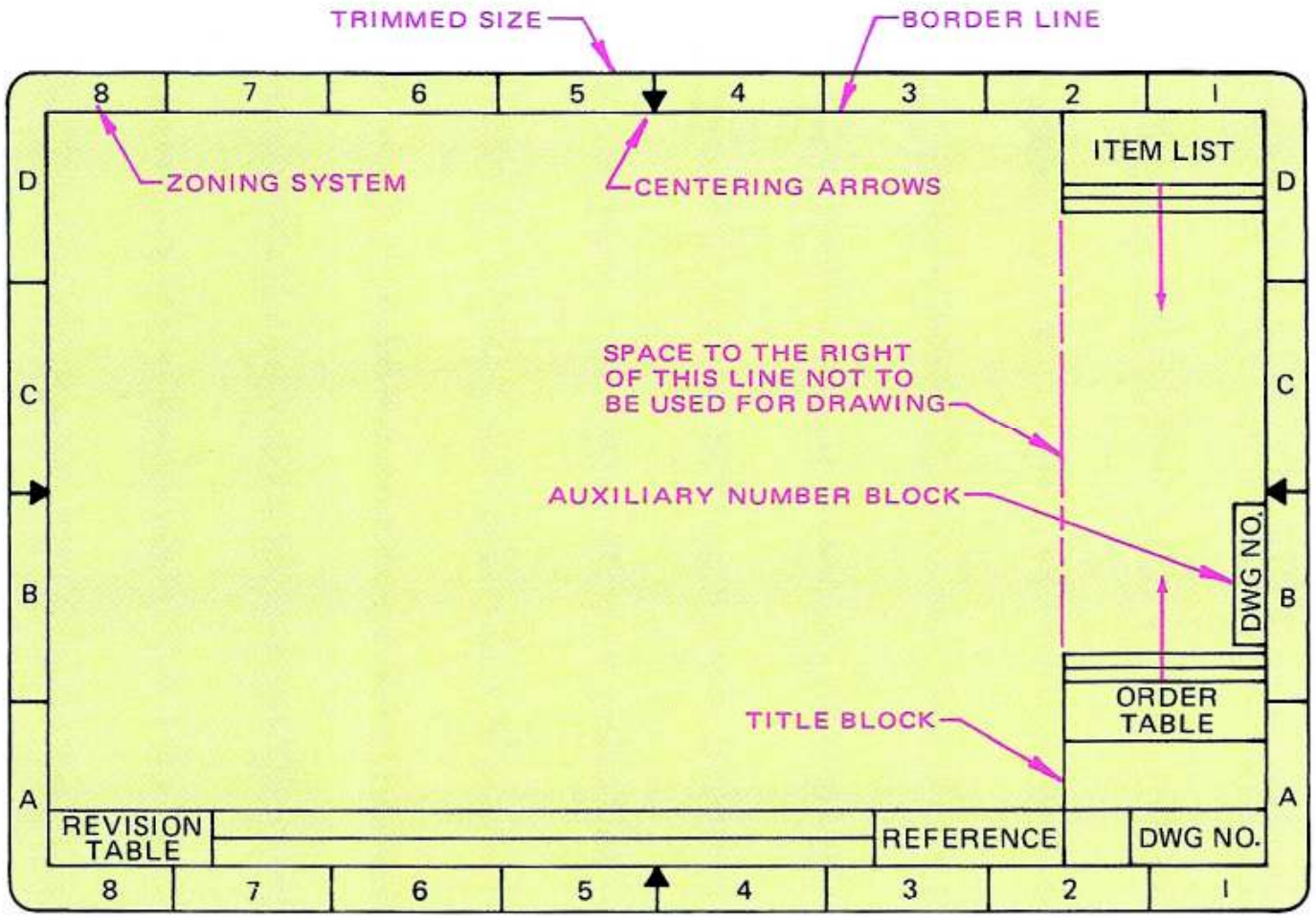
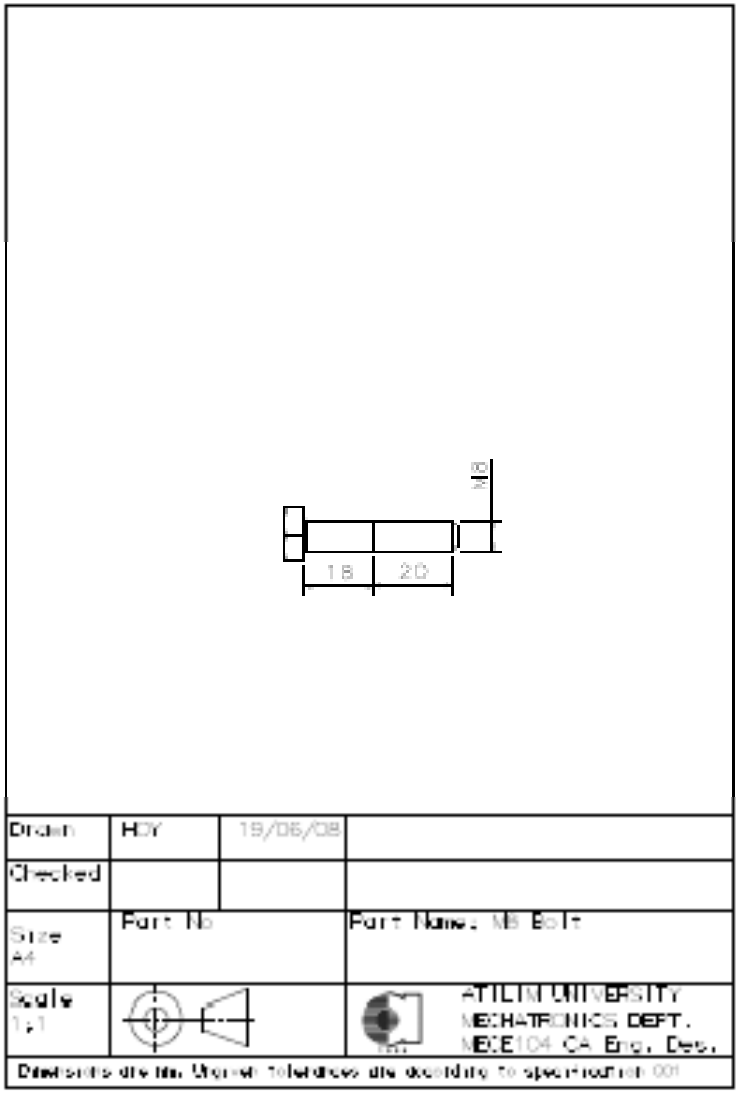


Fig. 3-3 Drawing format.

Drawing Media, Filing, Storage,



Drawing Media, Filing, Storage,

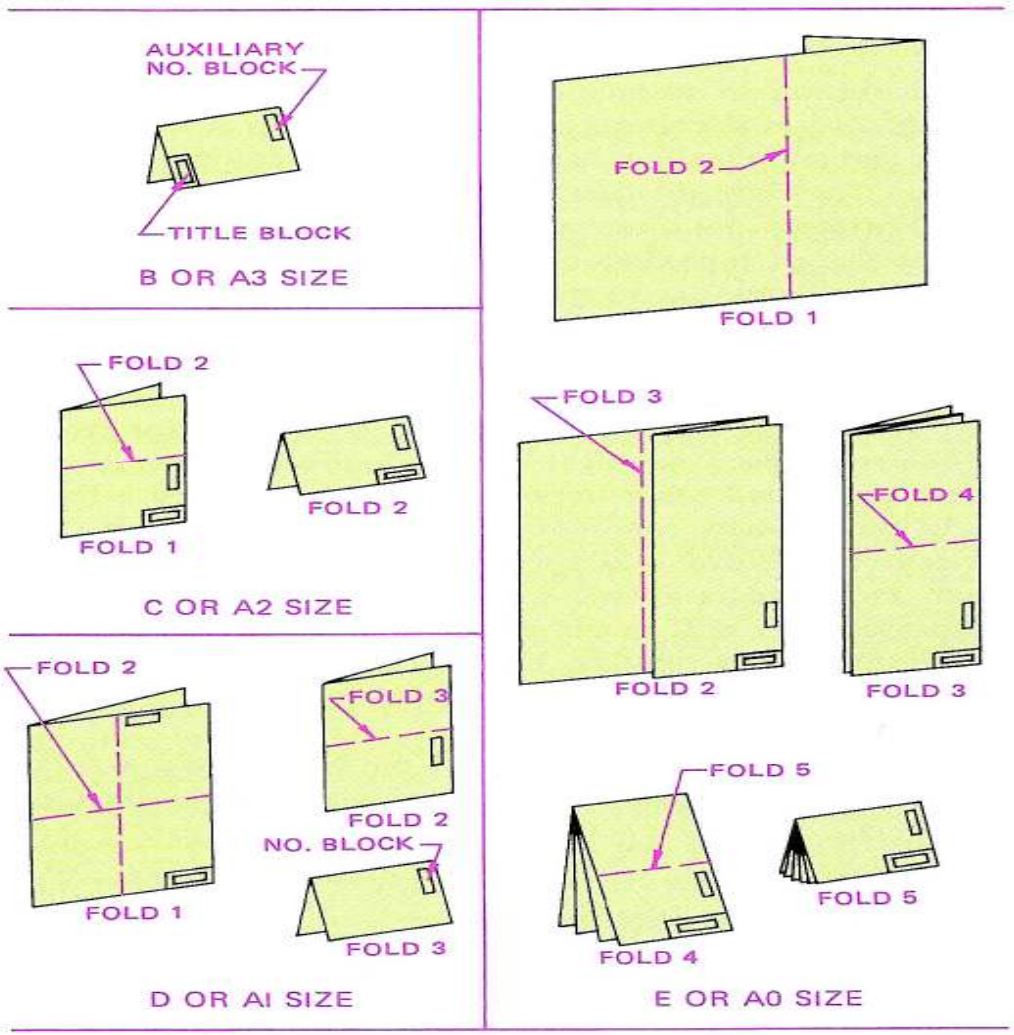


Fig. 3-9 Folding of prints.

Drawing Media, Filing, Storage,

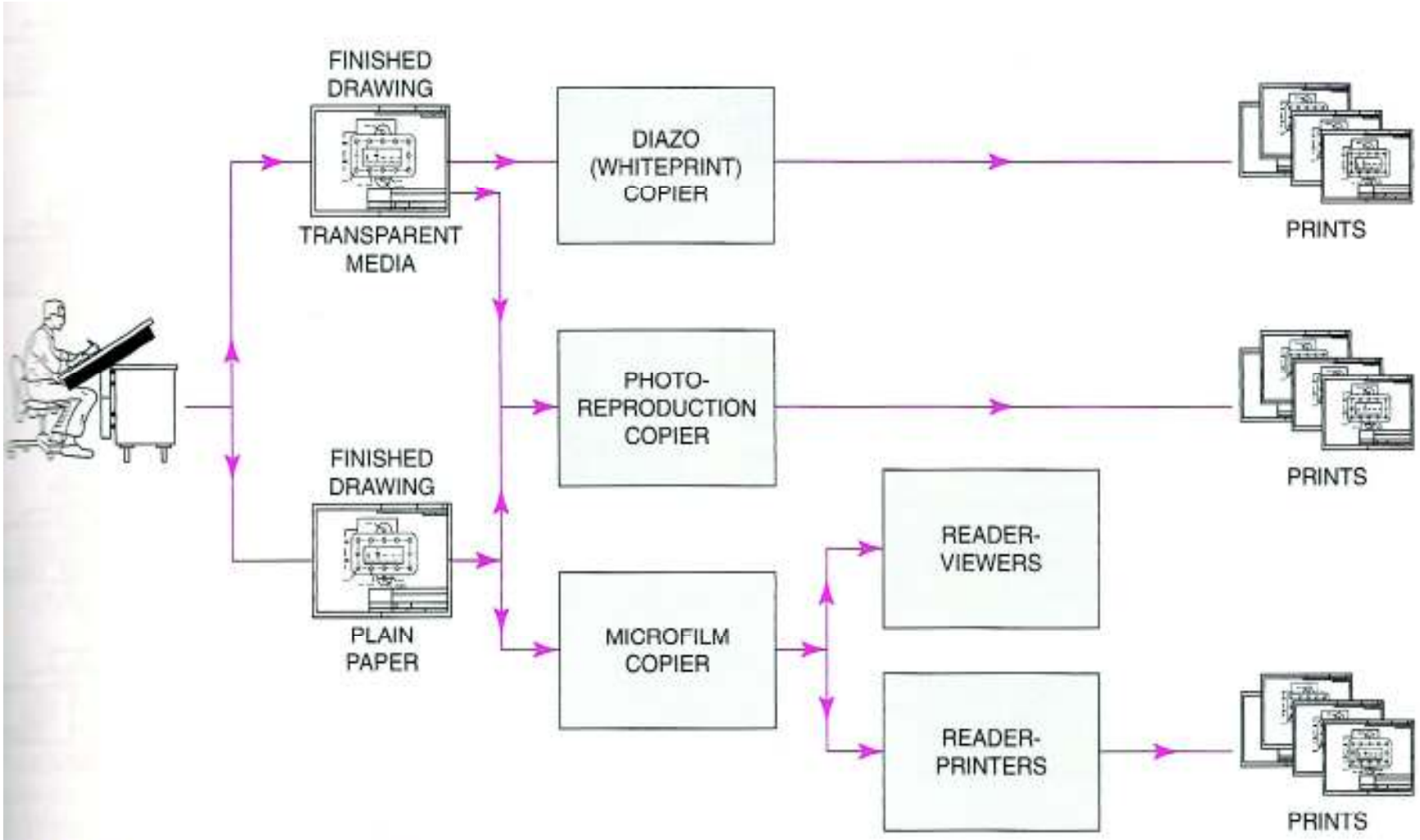


Fig. 3-10 Flowchart for manually prepared drawings.

Drawing Media, Filing, Storage,

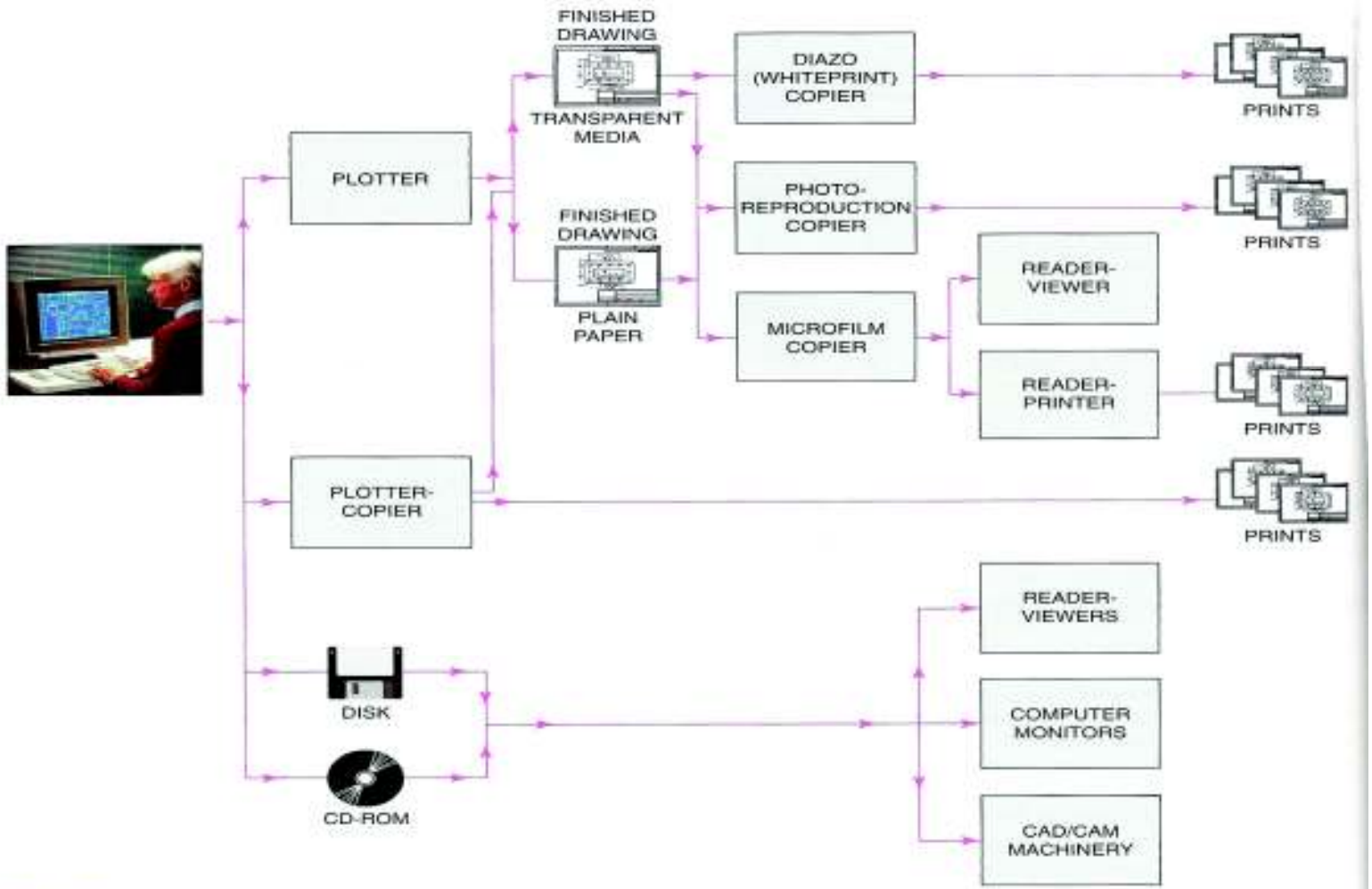


Fig. 3-11 Flowchart for CAD-prepared drawings.