

MANUFACTURING PRACTICES

BETP 1303

- Materials in manufacturing practices
- Hand and measuring tools, tolerance and fits

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Lesson Outcomes

At the end of this topic, students be able to:

1. Recognize the function and importance of machine tools.
2. Read and understand the main technical drawing's symbols.
3. Take precise measurement using Vernier Caliper and Micrometer.

Contents

- Introductions
- Engineering drawing
 - Main structure of lathe
 - Types of cutting tools, tool holders and insert
 - Lathe operations
 - Cutting speeds and feeds for lathe work
 - Cutting tools geometry
 - Examples of products by lathe
 - Advance lathe/ CNC lathe machine

Introductions

-The importance of tools-

- Machine tools are used directly in the manufacture of products
- Machine tools are needed to create the machinery and the equipment necessary for product processing

Introductions

-What is machine tools-

- A machine tool is a power-driven machine not portable by hand, used to shape of form metals or materials by cutting, impacting, forming, eroding or a combination of these processes

The main categories of machine tools :

- Non-chip producing machine tools.
- Conventional chip producing machine tools
- New generation of machine tools

Non-chip producing machine tools

- This type of machine shapes metals by shearing, pressing and drawing to a desired shape

Conventional chip producing machine tools

- They shape metal to a size and contour by cutting away the unneeded portions in the form of metal chips
- The collection of material-working processes used is called conventional machining
- The operator uses machine handwheels to manually control the machine to produce the part
- The accuracy of the part produced depends upon the skill of the operator or machinist

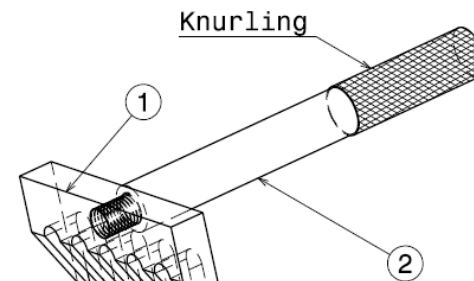
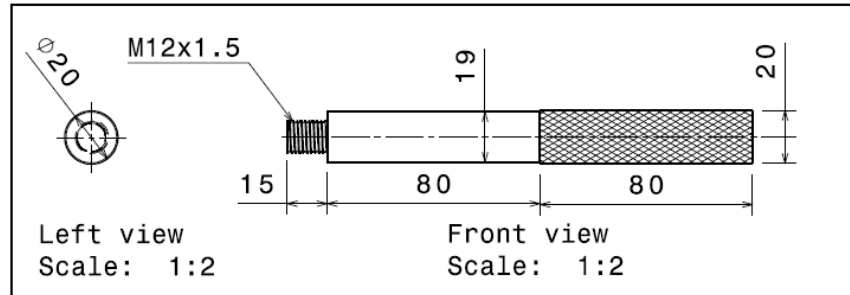
New generation of machine tools

- Computerized Numerical Control (CNC) machines
- Electric Discharge Machines (EDM)
- Electrochemical Machines
- Their purpose:
 - To increase the production rate
 - To increase the preciseness of machined parts
- The programmer programs the machine control unit (MCU), through the use of symbols, letters and numbers (coded instructions) which automatically control the machine tool movements to produce the desired part

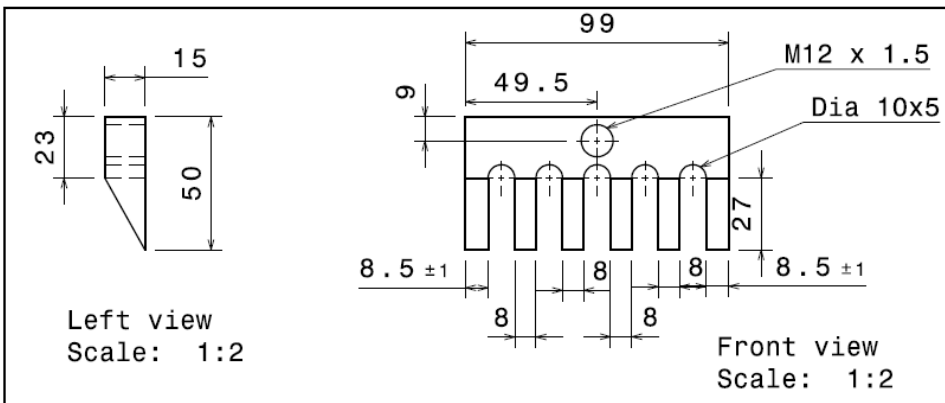
Engineering Drawing

- It is a common language between drafts persons, tool designers, engineers machinist and tolerance.
- Drawing are made up of a variety of lines, which represent contours, surfaces and edges of a workpiece.
- By adding symbols, sizes, word notes and dimension lines. The draft person can indicate the exact specifications of each individual part.

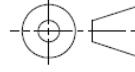
Example of Engineering Drawing



Isometric view
Scale: 1:2



No	Part	Qty
1	Hoe	1
2	Handle	1

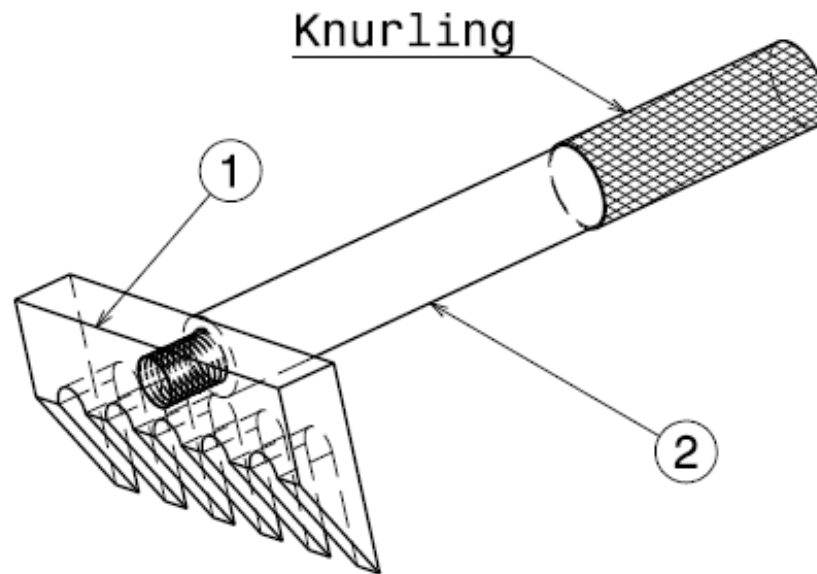
DESIGN BY: MOHD NAZRI AHMAD	DATE: 10/02/2016	TOLERANCE IN MM (EXCEPT AS NOTED)	PROJECTION 	 UNIVERSITI TEKNIKAL MALAYSIA MELAKA
DRAWN BY/ISSUED BY: MOHD NAZRI AHMAD	DATE: 10/02/2016	X. ± 0.5 .X ± 0.3 .XX ± 0.10 ANGLE ± 0.5°		
CHECKED/APPROVED BY:	DATE:	DATE:	PROJECT TITLE: Hoe Assembly	
MATERIAL/FINISH: Mild steel	SCALE: 1:1		TITLE: Lab - Manufacturing Practice (Turning & Milling)	
FINISH:	QTY: 1		DRAWING NO.: 1/1	

Types of Engineering Drawing

- Orthographic projection
 - Drawing a 3D object from different directions and useful when design is almost ready to manufacture.
- Sectional view
 - To clarify interior or hidden details on a multi-view drawing of an object
 - Located by creating a cutting plane line in one view
 - Mainly to distinguish the solid portions from the hollow areas of an object.

Types of Engineering Drawing

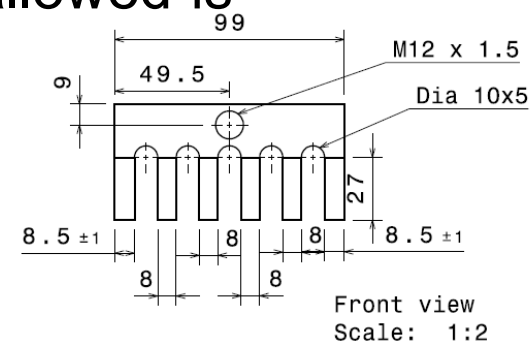
- Isometric drawing
 - Consist of two-dimensional drawings that are titled some angle to expose other views and give the viewer the feeling that what he/she is viewing is a three-dimensional drawing.



Isometric view
Scale: 1:2

Engineering Drawing

- Tolerance
 - Permissible variation of specified size of a part.
 - Basis dimension plus or minus the variation allowed is given on a drawing



- Example :

- **The largest permissible dimension** = 9.5 mm
 $(8.5 + 1.0 = 9.5 \text{ mm})$
- **The smallest permissible dimension** = 7.5 mm
 $(8.5 - 1.0 = 7.5 \text{ mm})$
- **The largest tolerance** = 2.0 mm $(9.5 - 7.5 = 2.0 \text{ mm})$

Engineering Drawing

- Allowance
 - Intentional difference in the sizes of mating parts.
- Fit
 - The range of tightness between two mating parts.
 - Two general categories of fits:
 - Clearance fits, whereby a part may involve or move in relation to mating part
 - Interference fits, whereby two parts are forced together to act as a single piece.

Common Symbols and Abbreviations

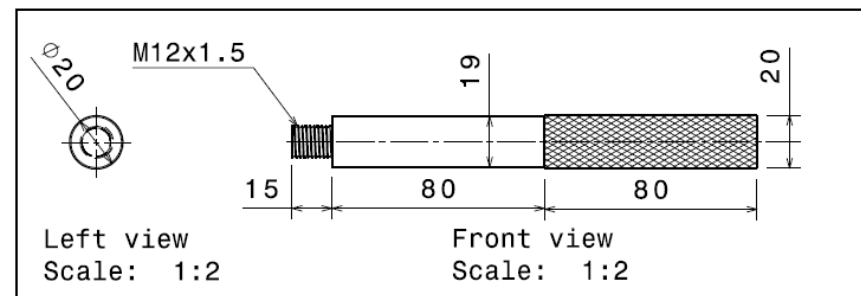
- R : Radius of circle
- $\varnothing$: Dia. Diameter
- TYP : Typical dimensions
- P : Pitch of the thread
- mm : The unit of measurement is in millimeter
- M : Metric thread

Example : M12 X 1.5

M = Metric thread (screw)

12 = Diameter

1.5 = Thread pitch



Measurement

- Two measuring systems :
 - International system of measurement (SI)
(IS from System International)
 - Imperial system (Old system using Yard as basic unit of length)
 - 1 yard = 36 inch
 - 1 inch = 25.4 mm

Using Measuring Tools

- Care must be taken when using measuring tools.
- Most of tools have very sharp edges that may result in severe injuries.
- Tools could be damaged easily if bended, twisted or screwed with extra force.
- When using the graduated measuring tools, you must lock at 90 degree for accurate measurement.

Metric Micrometer

- It is a device incorporating a calibrated screw used widely for precise measurement of small distances in mechanical engineering and machining as well as most mechanical trades.

Basic Types of Micrometer

- Outside micrometer

For external measurement.

- Inside micrometer

Used to measure the diameters of holes.

- Depth micrometer

Measure depths of slots and steps

Summary

- ✓ Recognize the function and importance of machine tools.
- ✓ Read and understand the main technical drawing's symbols.
- ✓ Take precise measurement using Vernier Caliper and Micrometer.