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ENG 246:0 8/6/22

Course Outline

1. Conventional presentation of thread and their application.
2. Detailed and Simplified presentation of Standard part such as bolt, Nut and rivets.
3. Detailed and Simplified dimensioning of welded joint
4. Locking devices and their element such as keys and pins
5. Profile of thin Section.
6. Presentation of Springs, Seal, Shafts pipe connection
7. Pipe Connection and piping System
8. Drawing and dimensioning of machine part.

Assembly Drawing

Assembly drawing is a drawing of various part of a machine or structure assembled in their relative working position. Alternatively, a drawing which displays the part of a machine or a machine Unit assembled in their relative working position.

Assembly drawing should be such that it should satisfy

1. Manufacturing requirement
2. Operational "
3. Maintenance "

Assembly drawing contains the following:

1. Completed shape of the product
2. Overall dimension
3. Relative position of each part
4. Functional relationship among various component.

Assembly Drawing

- Design Assembly
- Layout Assembly
- Installation Assembly
- Working drawing Assembly
- General Assembly

Working Rules to be Observed in preparing Assembly drawing

1. Selection Of Views.
2. Sectioning
3. Dotted lines
4. Dimension
5. Detailed dimensions are given on working drawing when the detailed drawing are not prepared.

Bill Of Materials.

Each part Of the machine are identified, by the leader line on the assembly drawing which are used by the quantity Surveyor. The Bill Of materials shows the following.

(a) The Number Of part.
(b) Material Of part required for 1 unit
(c) Standard norm / Standard measurement.
(d) Scale Of the drawing
(e) Method Of projection
(f) Shop processes
(g) Name Of the Company that you are working
(h) Design by, checked by, drawn by
(i) Any Other Special remark.

Suggested approach.

Preparing an Assembly from exploded view is easy-as due to the position and Sequence is available.

For preparing assembly drawing from Orthographic View Of individual Component, Some Skills are needed. The following are the Suggested approach.

1. Functional matching or Mapping
2. Geometrical mapping
3. Dimensional "

Sequences Of drawing Assembly drawing.

1. Study functional requirement Of each Component and their inter-relationship.
2. Learn the actual working Of the machine.
3. Study Carefully the Views Of each Component in the detailed drawing and decide the relative location Of each part for the proper functioning Of the machine.

3 Decide the ~~feature~~ mating dimension between two components which are required to be assembled
4 Prepare free-hand sketch of the main view or important view generally front elevation. (add additional view if necessary).
5 Select a suitable scale for the entire assembly drawing
6 lay out the views of the assembly drawing so that it becomes easier to understand
7 Prepare the bill of material.
8. Label each component by the ~~leader~~ leader line and number it.
9. Show Overall dimension
10. Draw section lines according to the convention
11. Show the required fits and tolerances between the two mating component.

STEPS IN DRAWING A SPRING:

Step 1 :-> Draw the circle for external and internal diameter.
Step 2 :-> Divide the circle into twelve equal part.
Step 3 :-> Project the vertical line from the mean diameter ~~Origin~~ to the end of the total vertical height.
Step 4 :-> Draw a line at 45° starting from the main ~~beam~~ base and the base of the vertical line.
Step 5 :-> Divide the line in Step 4 into equal parts based on the number of turns required (5cm is recommended)
Step 6 :-> Connect the 45° line to the vertical line
Step 7 :-> Draw the horizontal line across the vertical line from the point at which Step 6 line meet the vertical line.
Step 8 :-> Draw a circle with a radius equivalent to a radius of a circular cross section at the intersection of the vertical line and the horizontal line of ~~Step~~ 7
Step 9 :-> Draw a tangent on the circle in Step 8 of both up and down of the circle.
Step 10 :-> Thicken the tangent drawn in Step 9.
Step 11 :-> Hatch the upper part of the ~~screen~~ spring.

Question 1

Draw 2 complete turn of ~~any~~ Helical Spring of Circular Cross Section of 20mm diameter, Outer diameter and inner diameter are 140mm and 100mm. The total vertical height is 120mm

Cracker

Spring (Helical Spring)

A Spring is a metallic material which is in its coil form has the ability to elast and contract on the application of an external load or force.

Solution

$d_o = 140mm$

$d_i = 100mm$

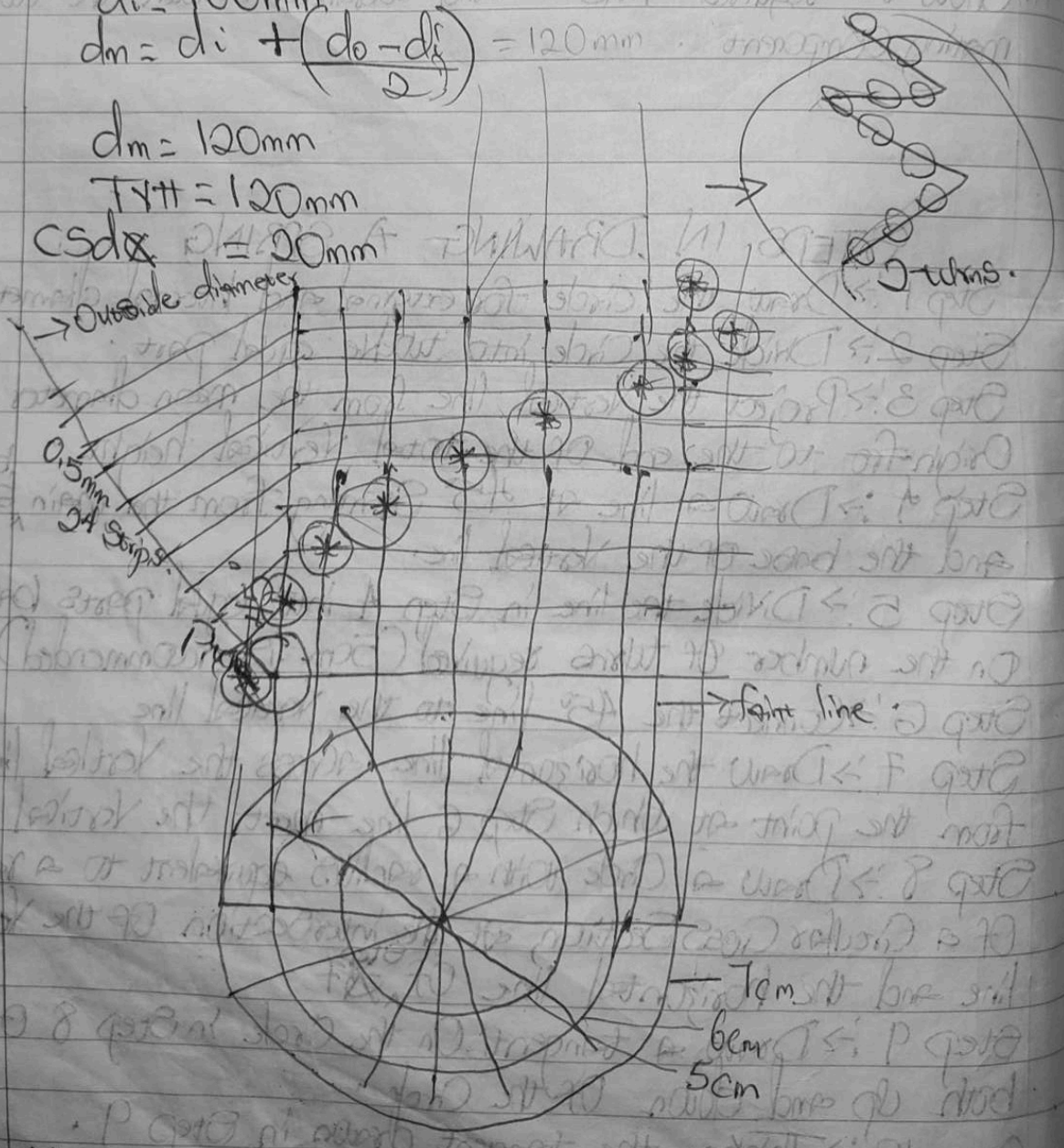
$d_m = d_i + \left(\frac{d_o - d_i}{2}\right) = 120mm$

Pitch = 120mm

$d_m = 120mm$

Pitch = 120mm

CSd = 20mm



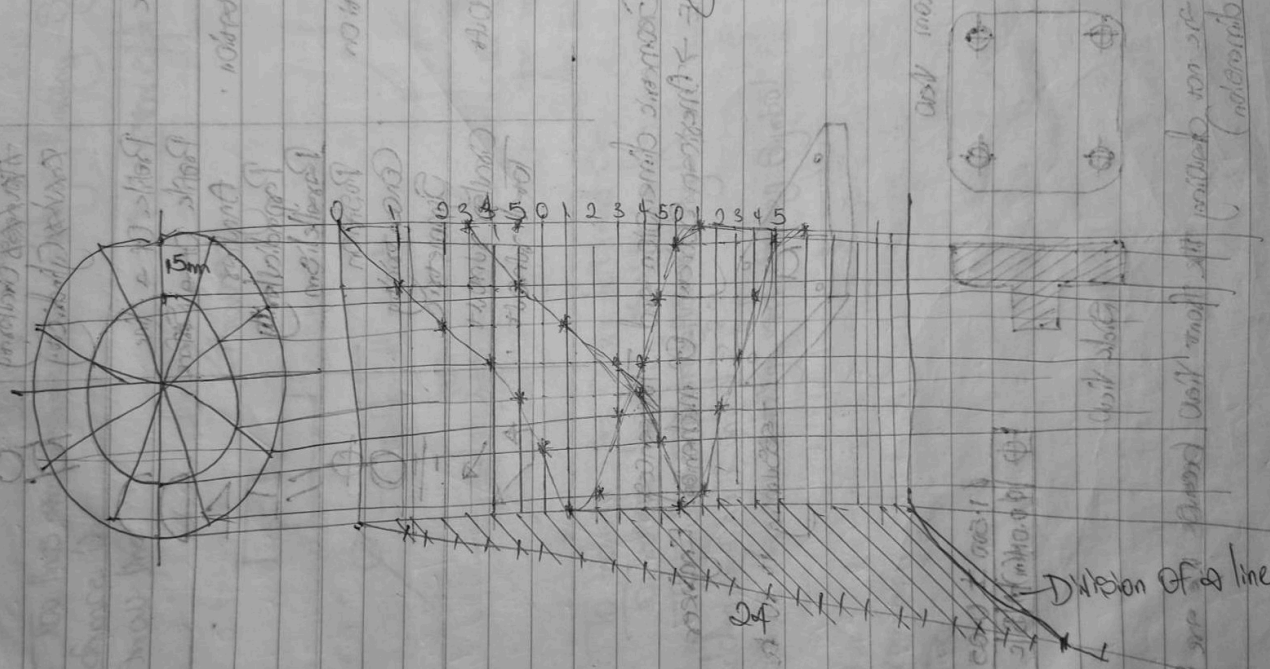
N.B: Ink are to project from Our main diameter.

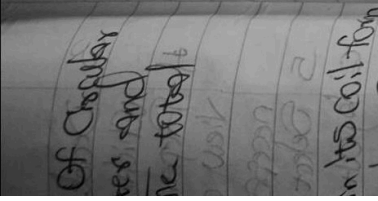
Assignment:-

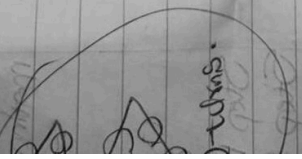
Some Question, three Questions.

Draw a complete turns of a left hand helical Spring, 120mm Outside diameter, 36mm pitch and it is made from 15mm Square material.

Helical Spring with Square Section.



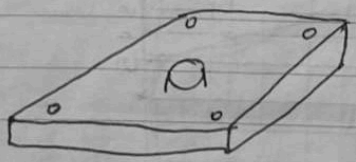




Type of Tolerance	Geometric	Symbols.
Form	Straightness	—
	Flatness	▱
	Circularity	○
	Cylindricity	⌭
Profile	Profile of a line	⌒
	Profile of a surface	⌓
Orientation	Angular	∠
	Perpendicularity	⊥
	Parallelism	∥
Location	Position	⌖
	Concentricity	◎
	Symmetric	⌯
Run Out	Circular runout	↗
	Total runout	⌰

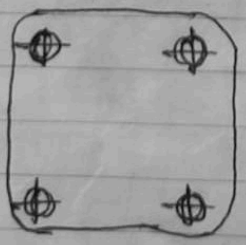
Geometric dimension and Tolerances

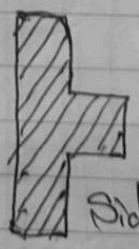
ASME → American Society Of mechanical Engineer



- assuming it to be a square

bottom view





Side View

$\phi 1.500 \pm 0.05$

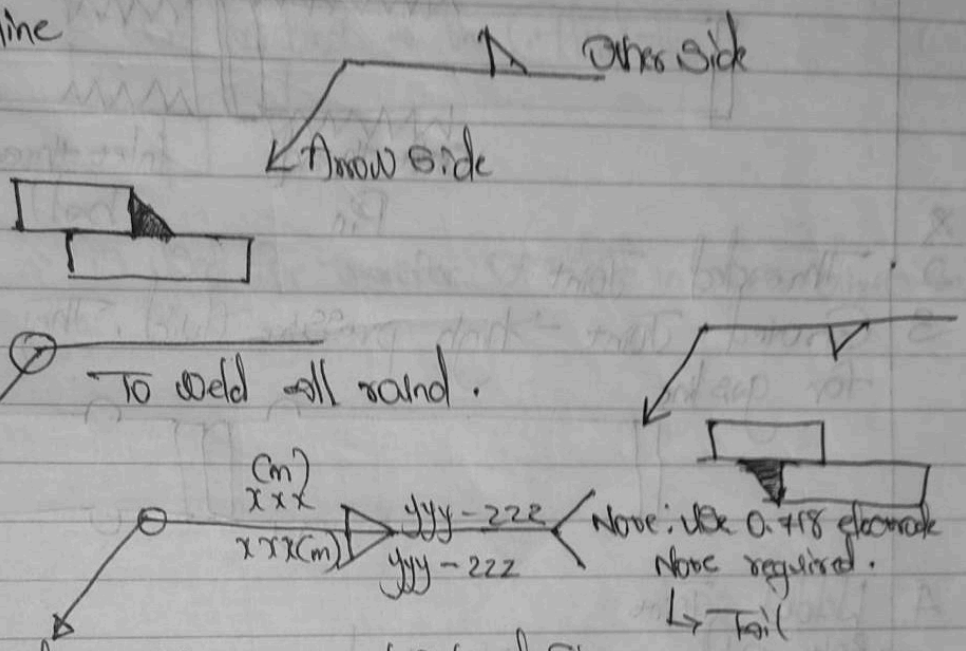
⌖	ϕ 0.04(M)	A	B	C

N.B We are not drawing the front view because we are seeing it (the dimension)

Welding Drawing.

Fillet weld (△)
Beveled Weld.

- Two lines are Imporante in Welding drawing Symbol.
* Reference line
* Arrow line



To indicate Size on the left hand Side
To indicate length on the right hand Size
To indicate pitch (after the length).

⇒ Welding drawing Symbol :- ??
* Difference between Welding and Welding Symbol.

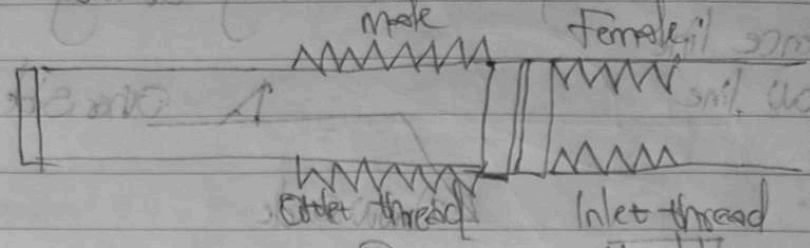
Piston
Connecting rod
Ring

Pipes & pipe Joints

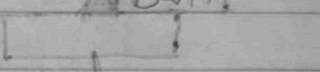
Pipes are medium by which we use to transports fluids.

Method of joining pipes

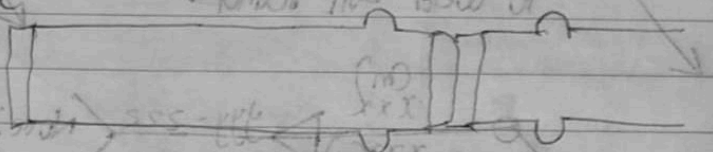
1. Flanged Joint:



2. Threaded Joint

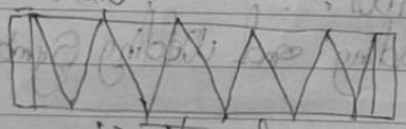


3. Groved Joint → high pressure fluid. They are mostly used for gas line.



4. Welded Joint
   - Bolt weld — mostly used
   - ...

5. Compression Joints → They have springs and are used to transport hot fluid.

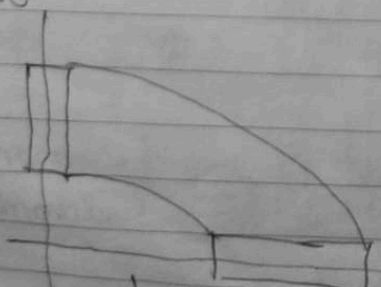


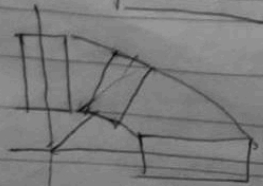
6. Soldered Joints → You don't use soldering for cast iron it is used for copper, low temperature material.

Pipe fittings

→ It is used whenever there is an obstruction of pipeline

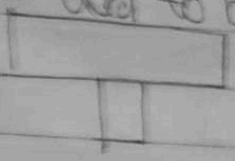
1. Elbow





2. TEE

3. Plug :- It is used to block a line (fluid flow).



4. Cross :- is used for transfer of fluid in four direction.

5. Drain - processed plant.