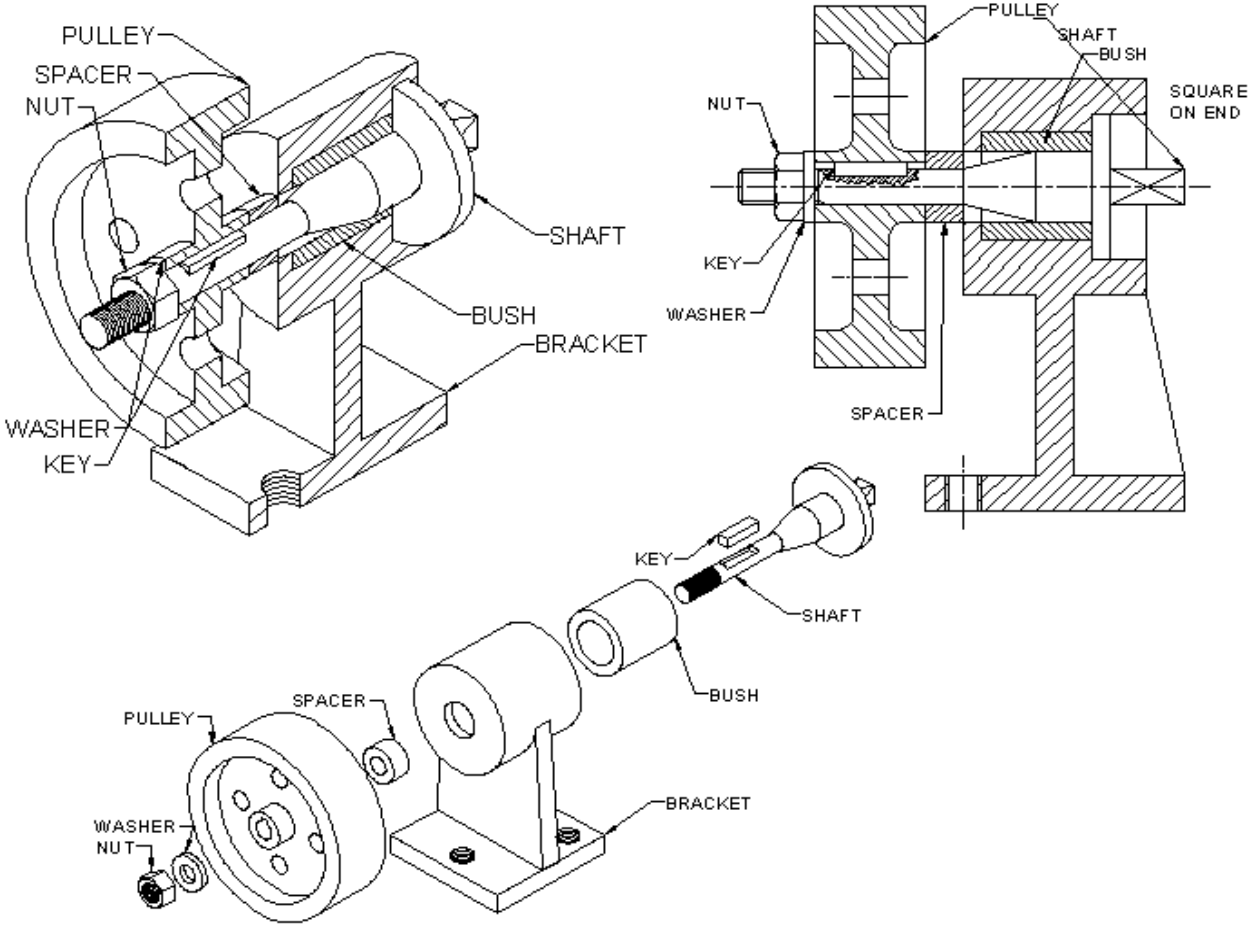
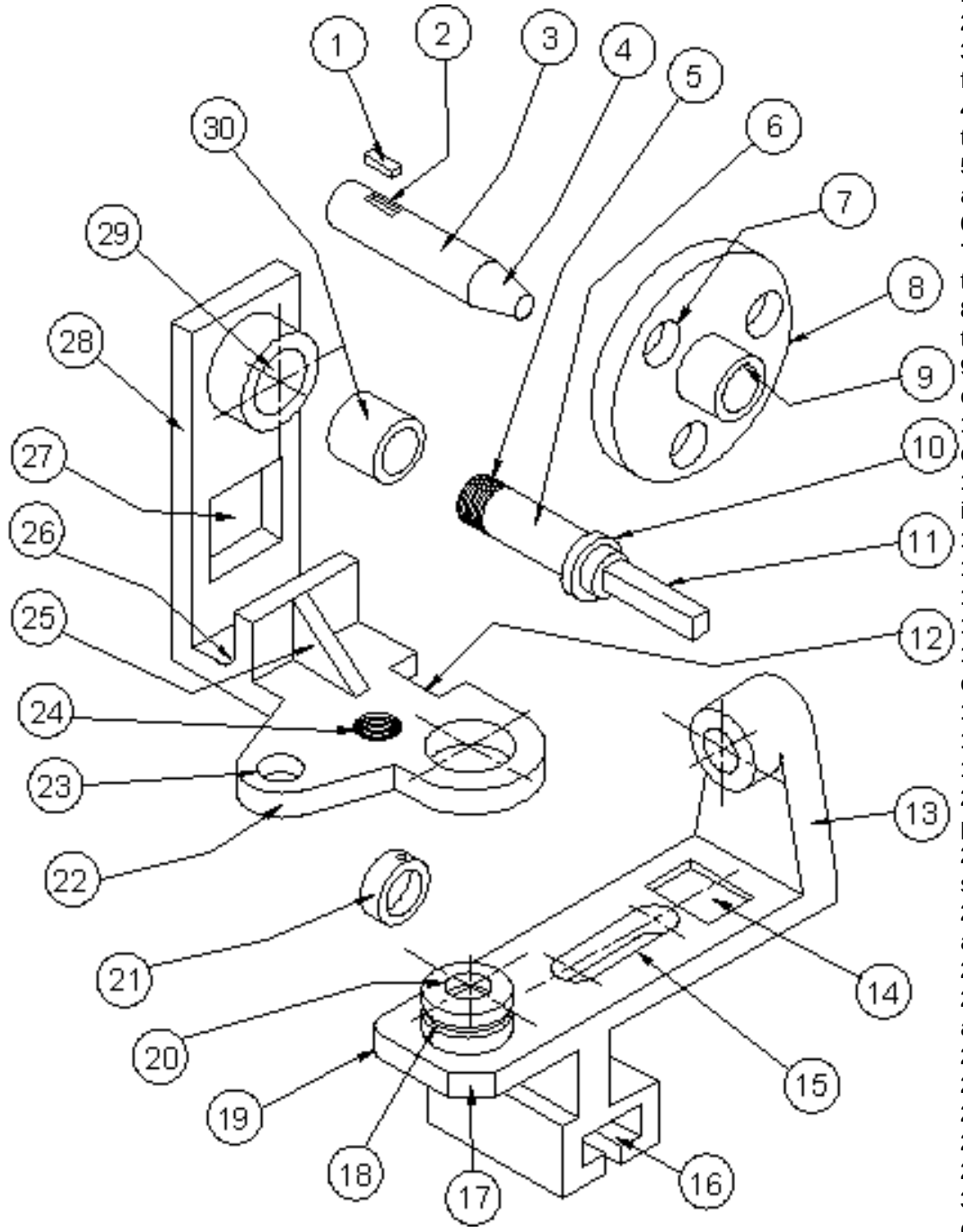
MECHANICAL - ASSEMBLIES

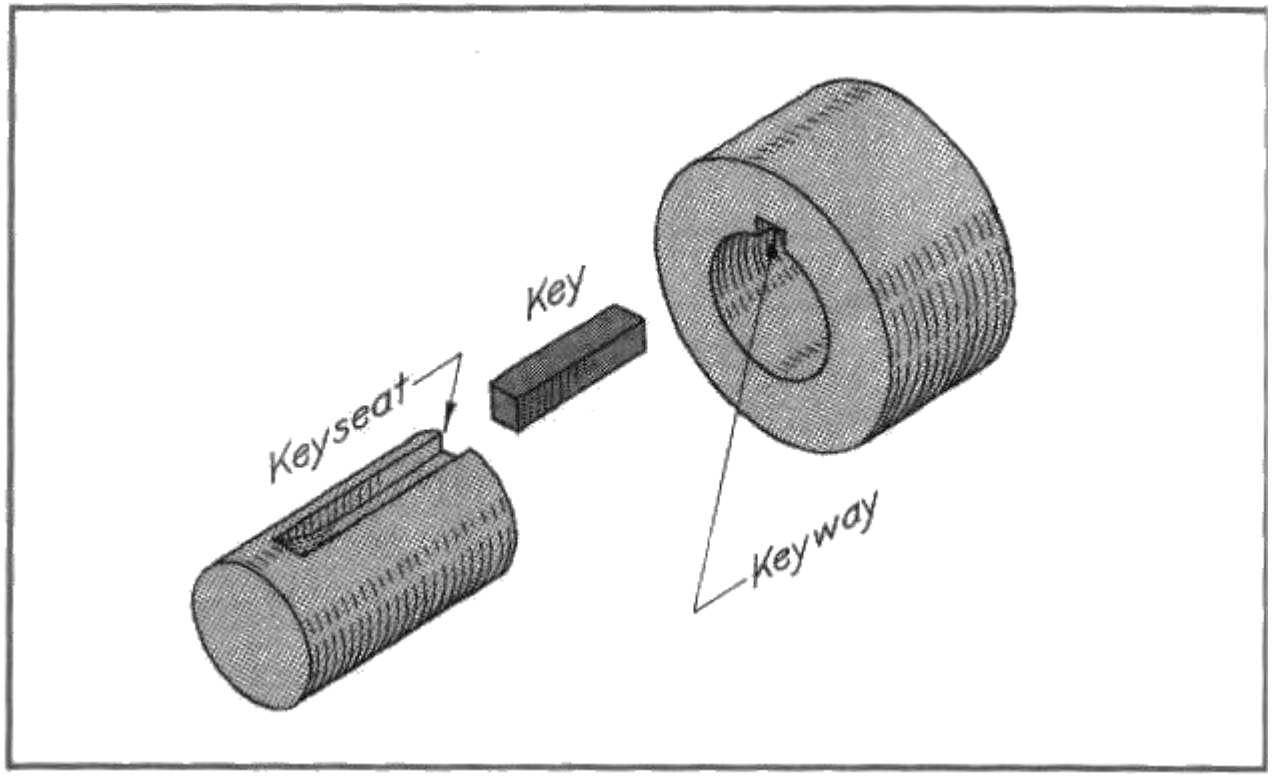
CONTENT TRAINING





1. KEY is used to prevent a shaft slipping inside a pulley
2. KEYWAY is a groove for a key
3. SHAFT is a long cylindrical component used to transmit turning force
4. TAPER is a reducing diameter, from thin to thicker or thicker to thinner
5. EXTERNAL TREAD has helical grooves cut around a shaft to attach a nut or other internal thread
6. SHAFT
7. THROUGH HOLE passes from one side of the component through to the other
8. FLANGE is a disk at the end of a pipes or shafts to join them together
9. KEYWAY is a groove that is used with a key to prevent rotation of components
10. FIXED COLLAR is a raised part of a shaft used to position components
11. SQUARE on shaft can be used to rotate another component instead of a key
12. SQUARE SLOT is a shape to fit another feature
13. RIB (also called a web) strengthens or supports another feature
14. RECESS is a shallow hole
15. SLOT is an elongated hole usually with round ends
16. TEE SLOT or **TEE GROOVE** allows another shaped component to slide along it
17. CHAMFER is when a corner is removed, usually at 45 degrees
18. GROOVE is a long narrow channel
19. ROUND is when an outside corner is rounded
20. BLIND HOLE is a hole that does not go all the way through a part
21. MOVABLE COLLAR is a ring used to locate components on a shaft
22. LUG is part of a casting that sticks out used for securing or adjusting the position
23. THROUGH HOLE passes from one side to the other
24. INTERNAL THREAD has helical grooves cut inside a hole to attach a bolt or other external thread
25. WEB (rib) is a thinner, strengthening piece on a casting
26. FILLET is a rounded corner to prevent casting cracking
27. SQUARE HOLE saves material
28. BRACKET is a supporting device
29. BORE is a cylindrical hole inside a casting
30. BUSH is a sleeve placed inside a casting that will wear our and can be replaced easier and cheaper than the casting

KEYS & KEYWAYS

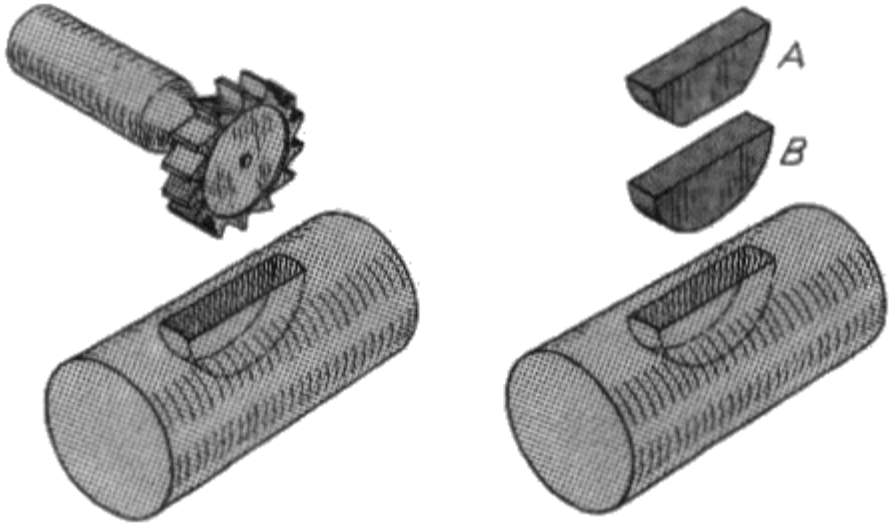


1. 3 FACTORS

1.1. Keyseat (Shaft)

1.2. Key

1.3. Keyway (Casting)

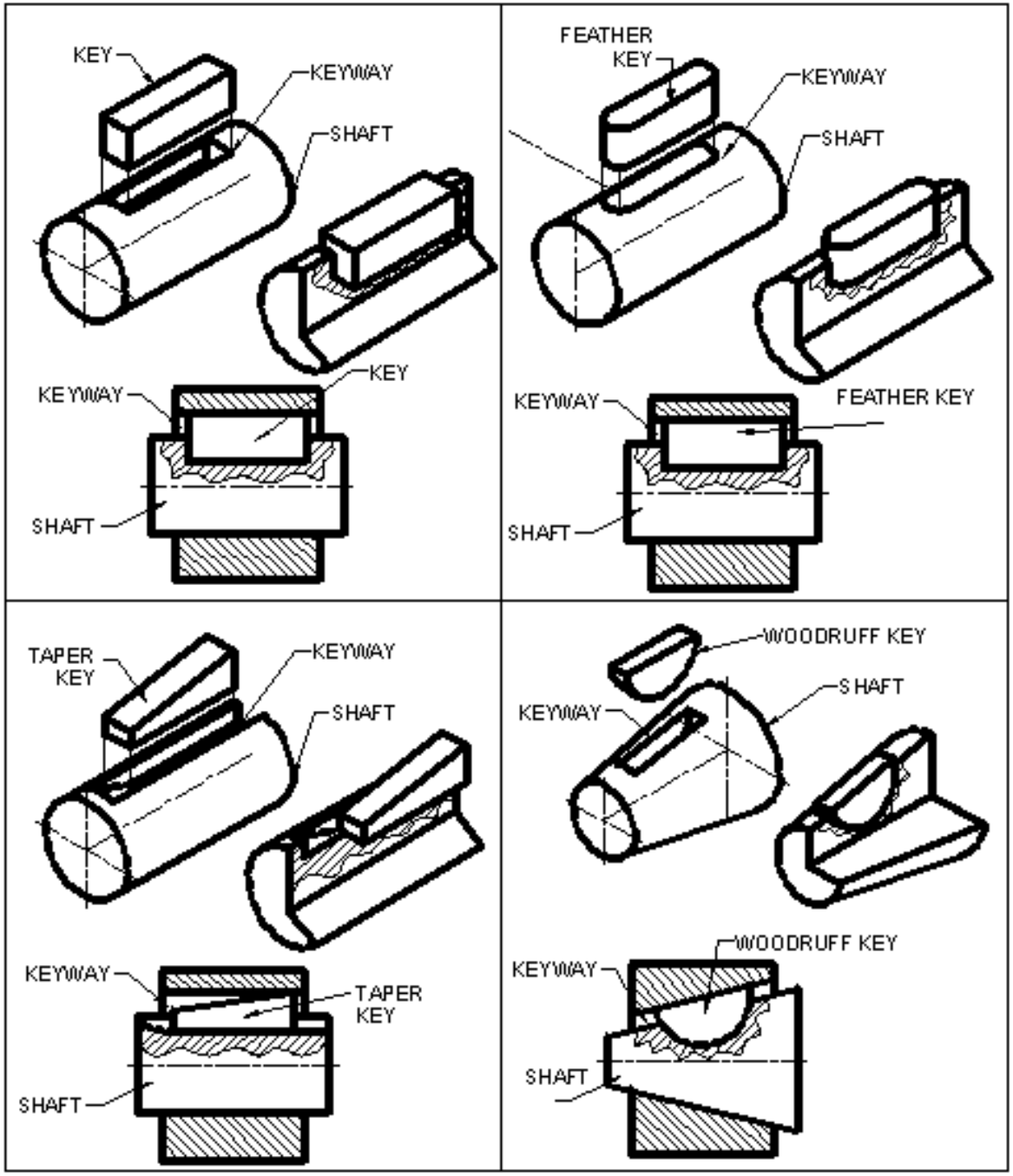


2. KEY DESIGN

2.1. Machine Keyseat into the shaft

2.2. Shape Key to fit both Keyseat & Keyway

2.3. Woodruff Key



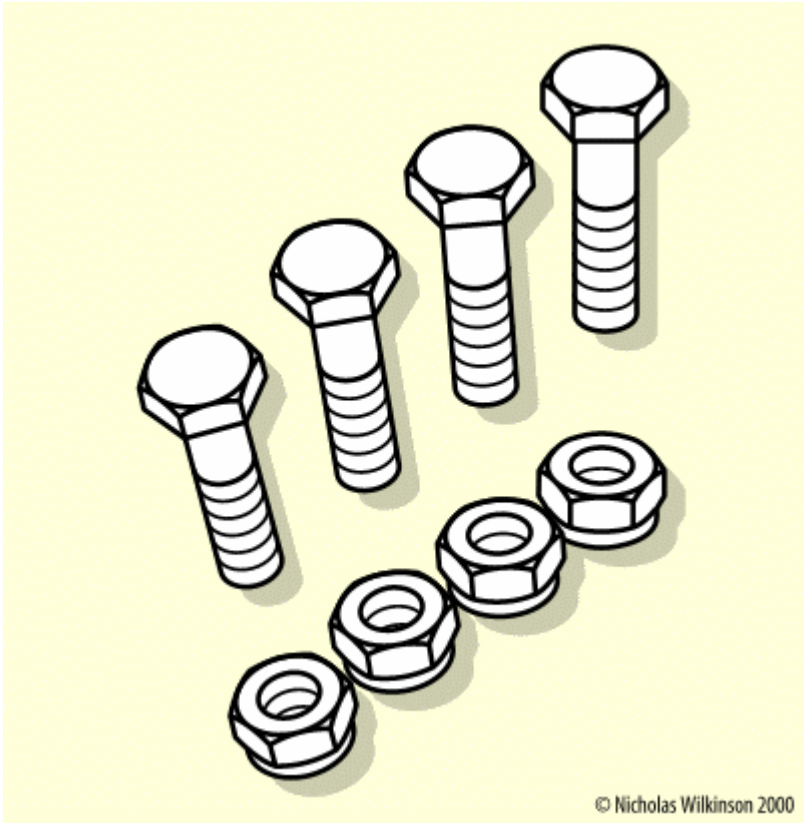
KEYS & KEYWAYS

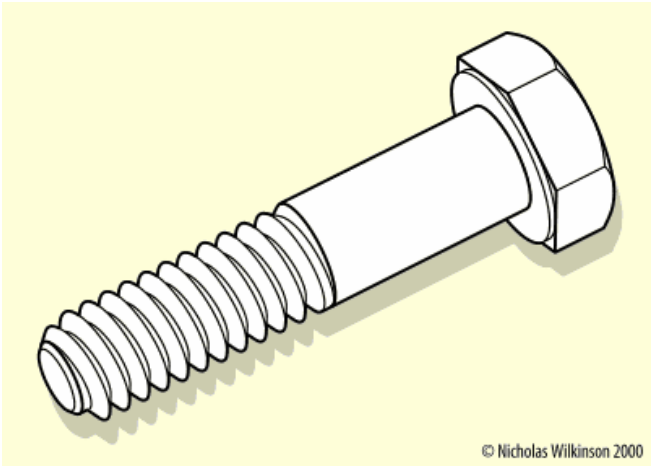
-The key sits in the keyway and the keyseat.

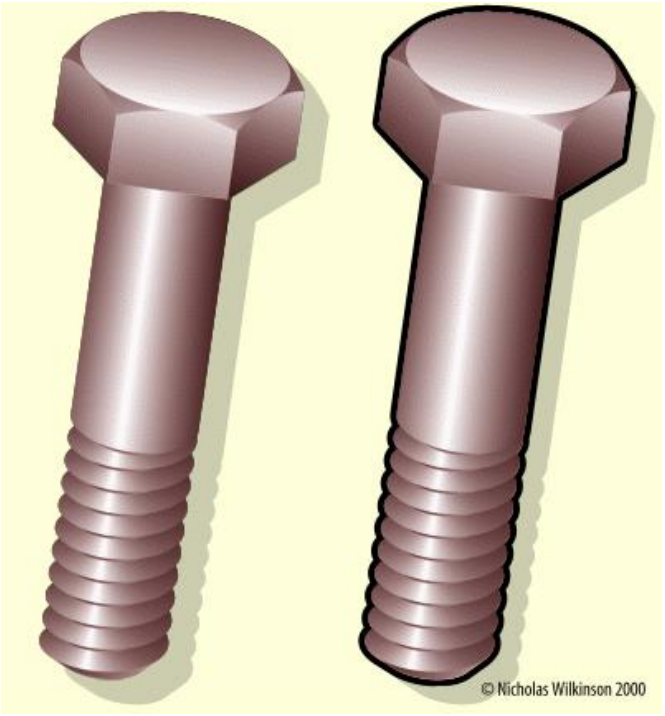
-The woodruff key is unique as it can only sit in a tapered shaft.

-The tapered key sits in a normal shaft.

-Keys are Part-Sectioned in the shaft as the entire shaft is not sectioned.







NUTS & BOLTS

-Bolts are the male external threads

-Nuts are the female internal threads

-These are standard parts

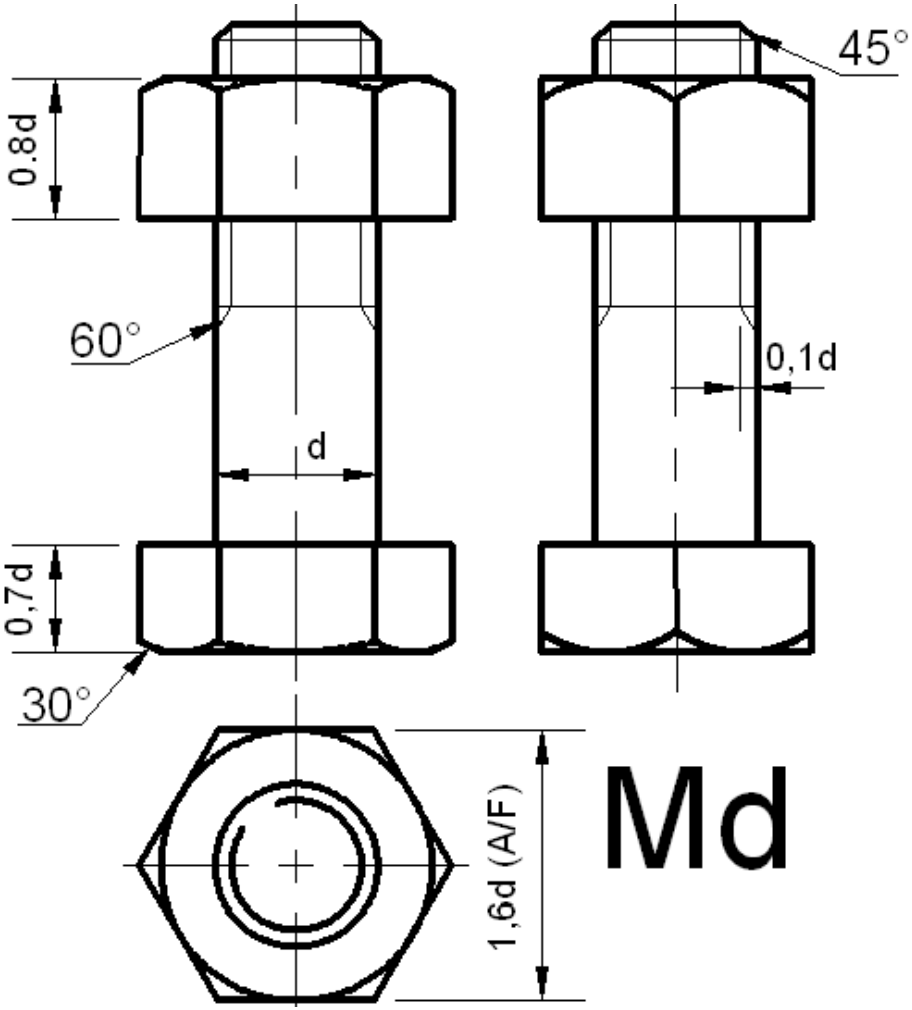
-Work with the Metric System

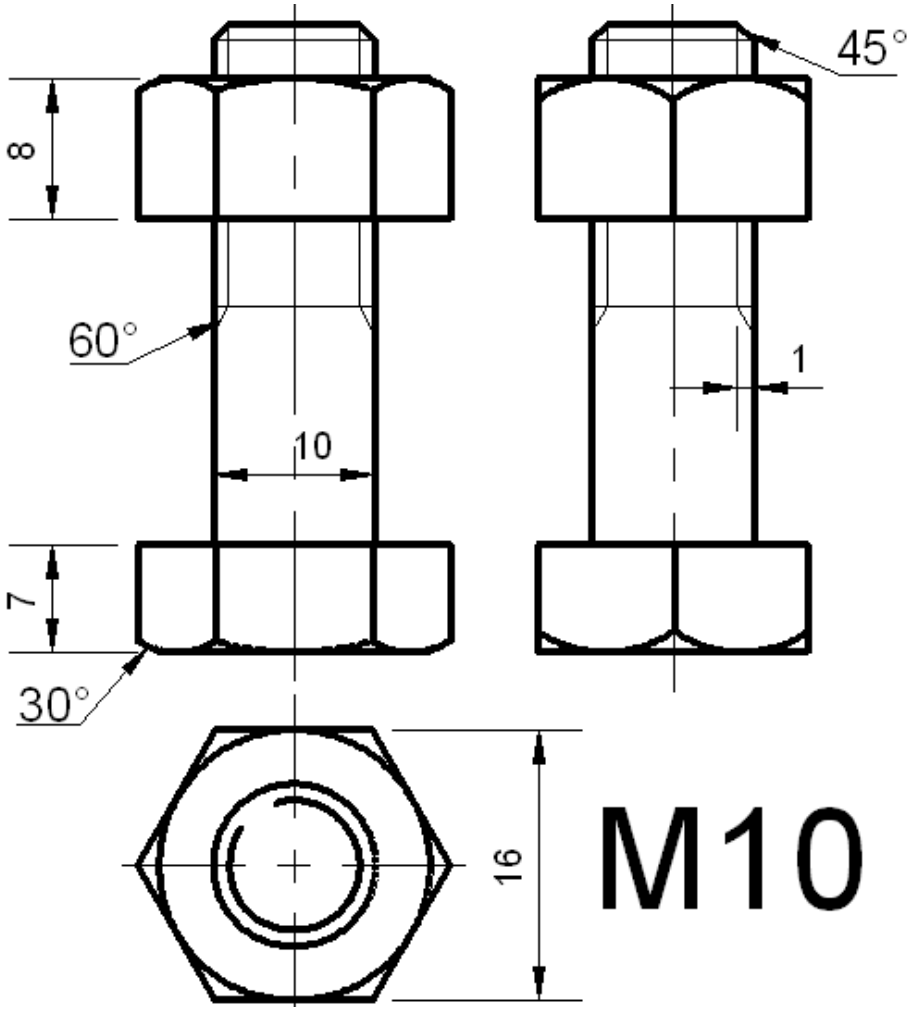
-An M20 Bolt will fit into an M20 Nut anywhere in the world.

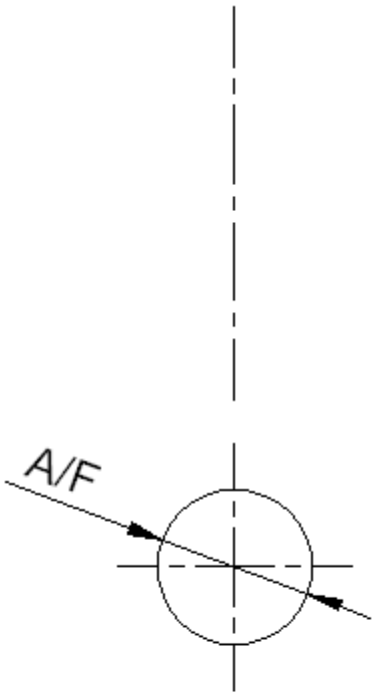
Nut & Bolt Size	= Md
Shaft Diameter	= d
Nut Height	= 0,8 X diameter of shaft (d)
Bolt Head Height	= 0,7 X diameter of shaft (d)
Thickness of Thread	= 0,1 X diameter of shaft (d)

CHAMFERS

Bolt End Chamfer	= 45 degrees
Bolt Thread Start	= 60 degrees
Bolt Head Chamfer	= 30 degrees
Nut Chamfer	= 30 degrees



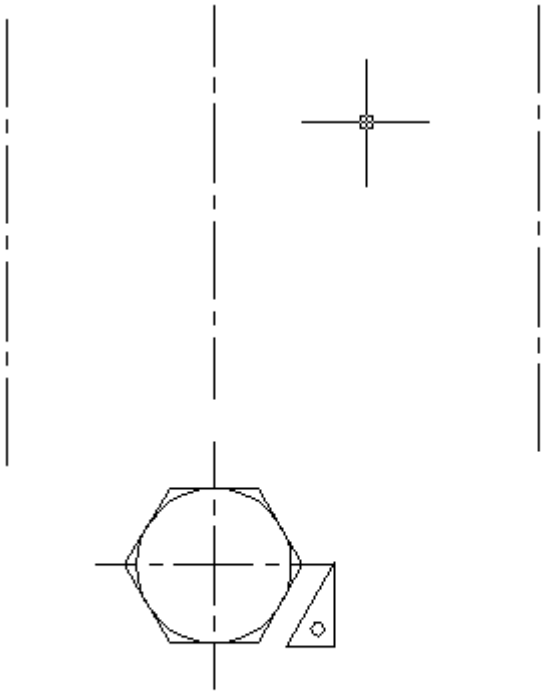




Step 1

Draw the A/F diameter and the centre lines

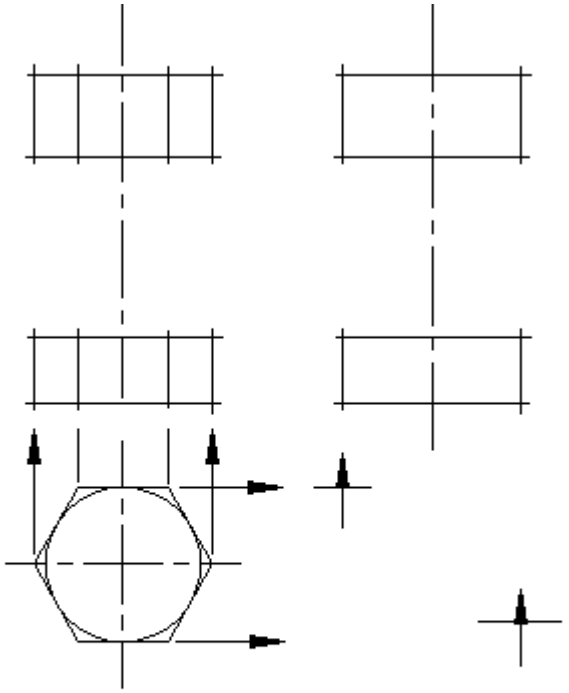
If the Across the Flats dimension is not given, calculate it using the 1,6d formula.



Step 2

Use your 60° set square and draw the hexagon

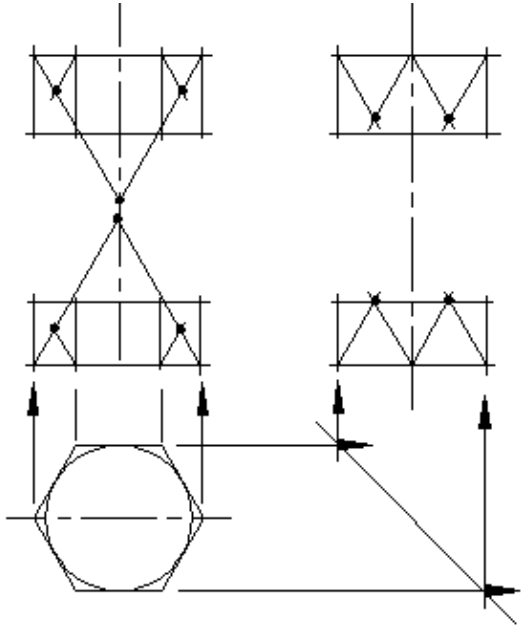
Draw tangents to the circle at 60 degrees.



Step 3

Project across and up to obtain the rectangles

If the heights of the nut & bolt are not given, use the 0,8d for the nut and 0,7d for the bolt.

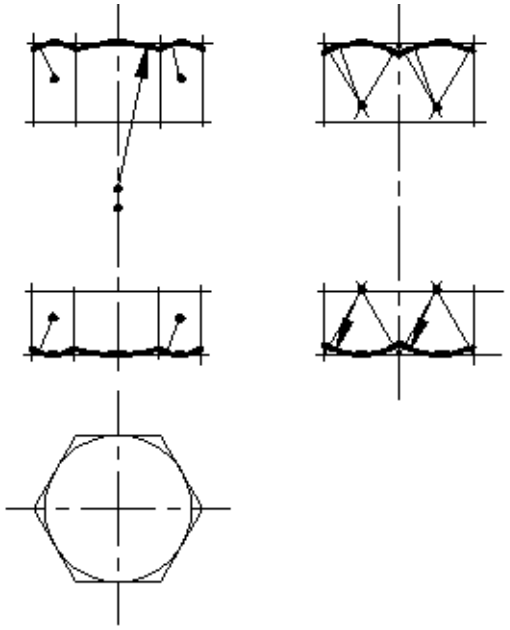


Step 4

Use your 60° set square to draw the construction lines for the arc centres

For the 3 faces you will need 3 constructions.

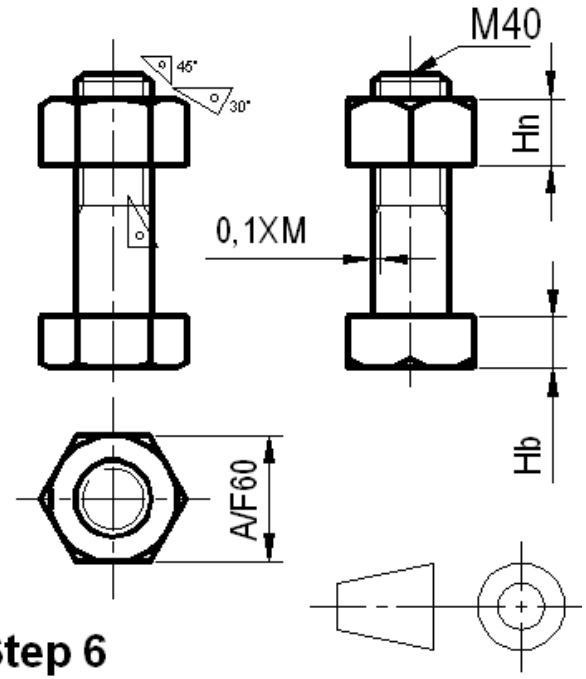
For the 2 faces you will need 2 constructions.



Step 5

Use your compass to draw the arcs for the chamfer

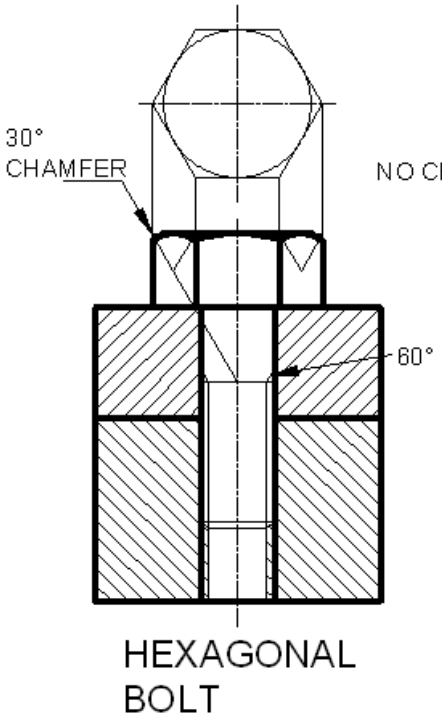
Accuracy is important when drawing the arcs.



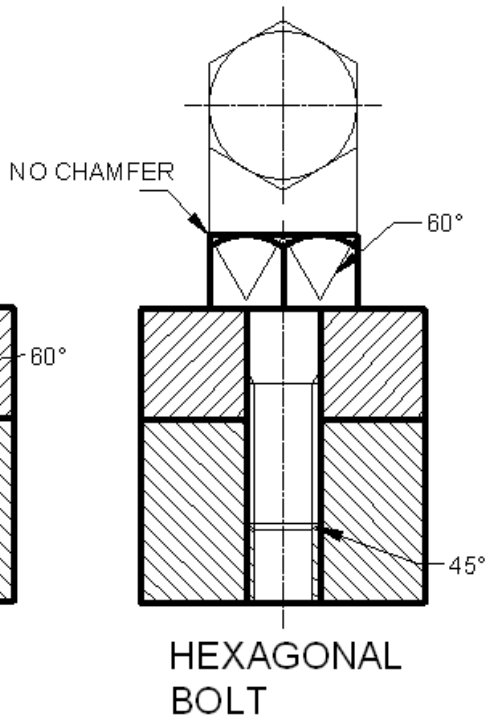
Step 6

This is the completed nut and bolt assembly. There is no chamfer for the two faces

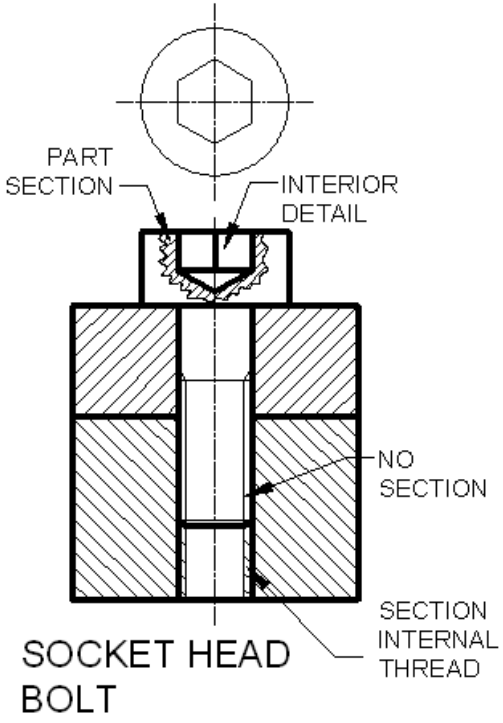
Insert all chamfers and thread.



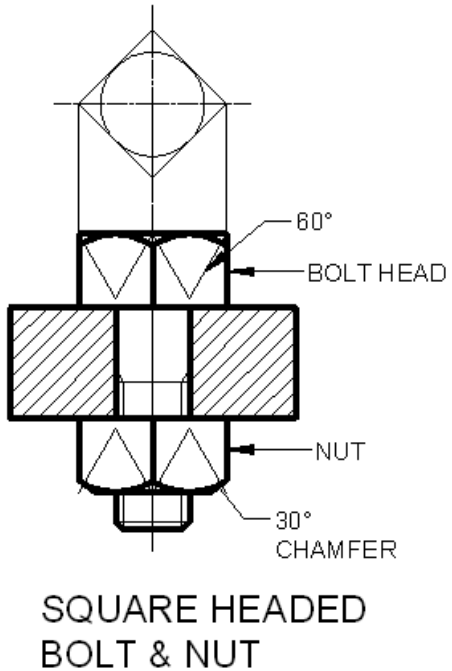
HEXAGONAL BOLT



HEXAGONAL BOLT



SOCKET HEAD BOLT

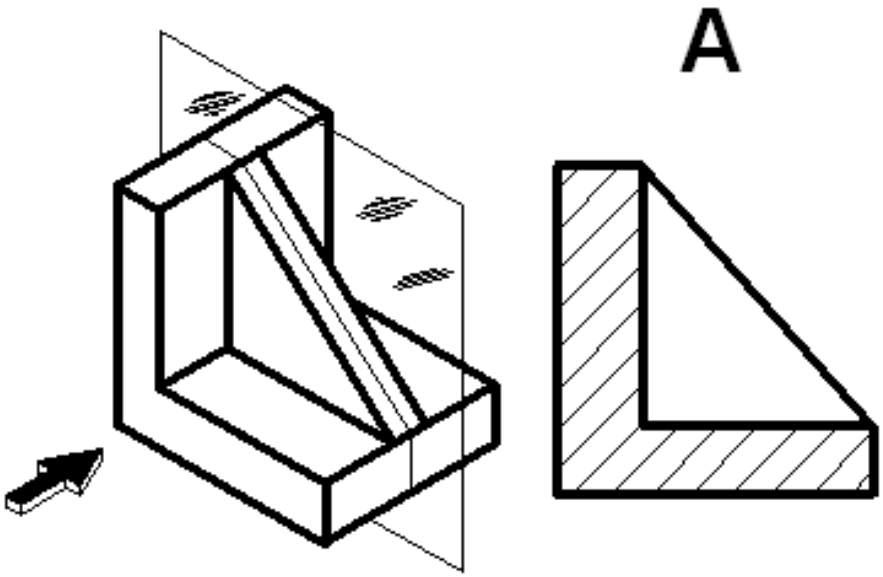


SQUARE HEADED BOLT & NUT

- Note the internal hatching of the internal thread below the bolt end.

-Note the Part Section of the Socket Head, to show all interior detail.

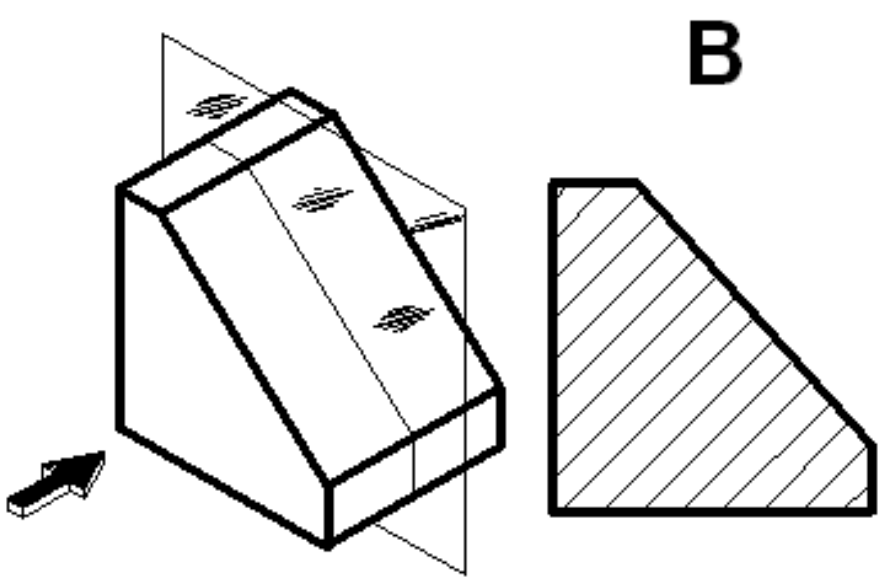
SECTIONING OF RIBS

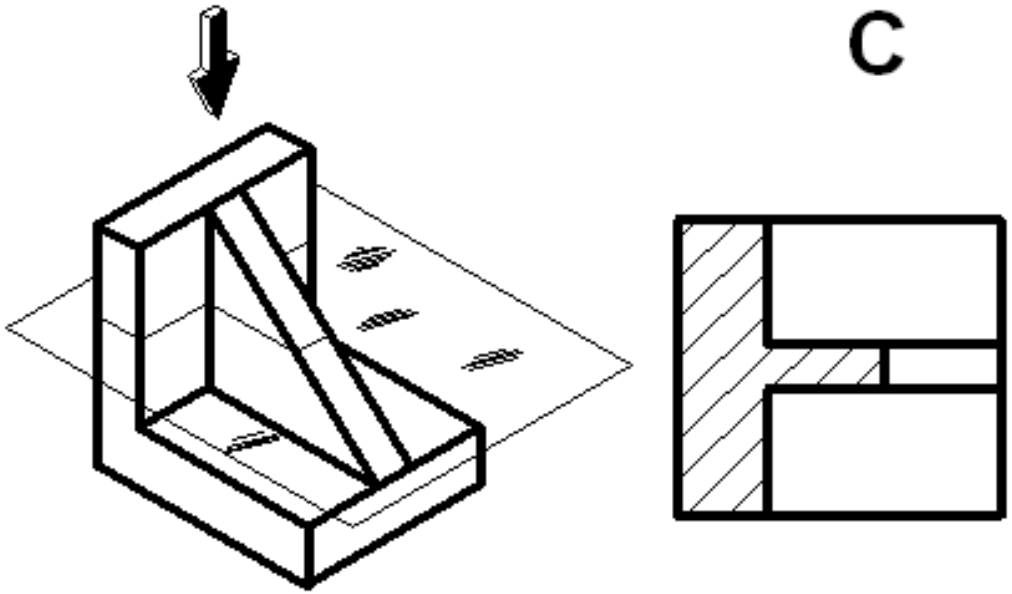


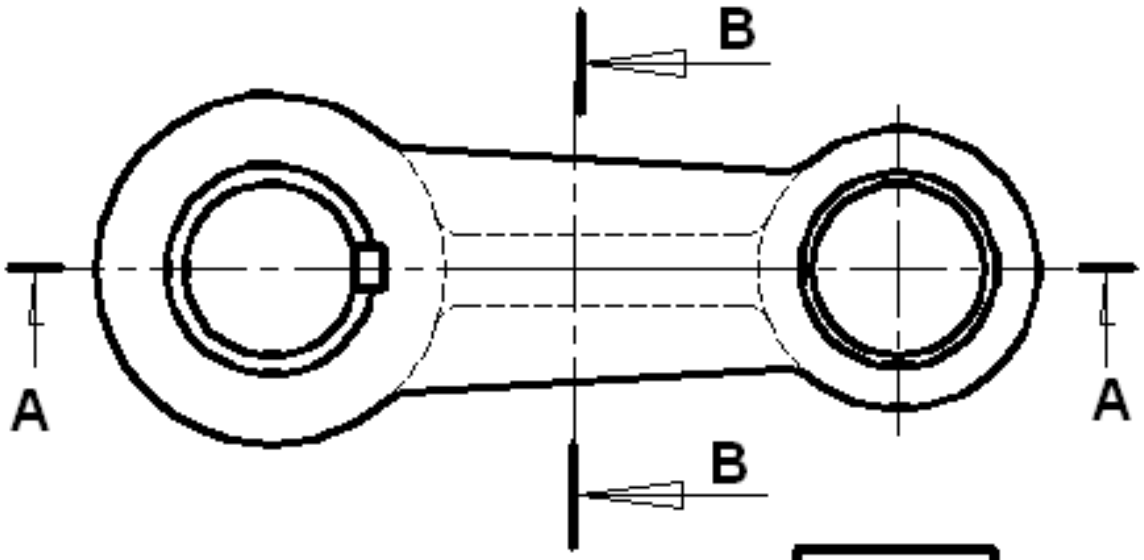
A – the rib is cut vertically. The rib is not hatched. If the rib in A was hatched, it would look like B, and we know that A & B are different models.

B – The casting is cut vertically and must be hatched. This casting does not have a rib.

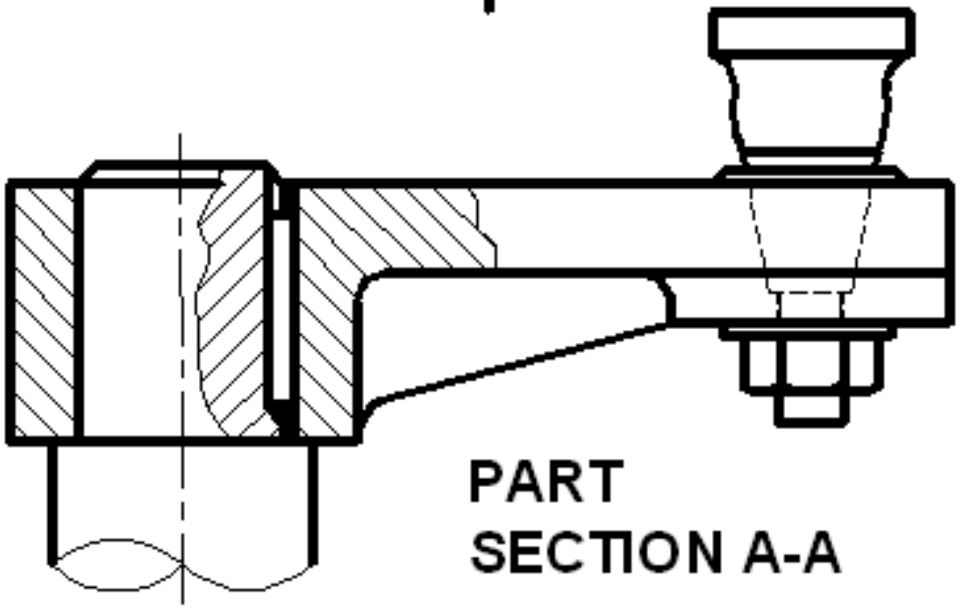
C – The rib is cut horizontally and must be hatched.







REMOVED
SECTION B-B



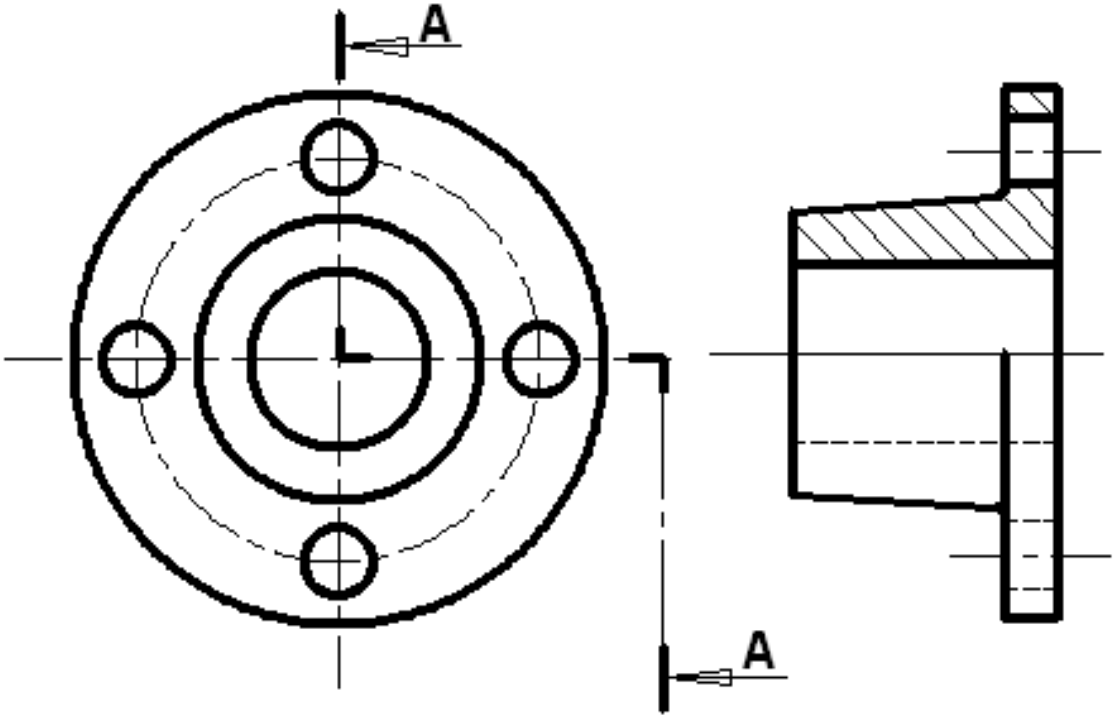
PART
SECTION A-A

Part Section

This view has been partly sectioned. Only the part that needs to be seen in more detail has been sectioned, and the rest is shown as an outside view.

Removed Section

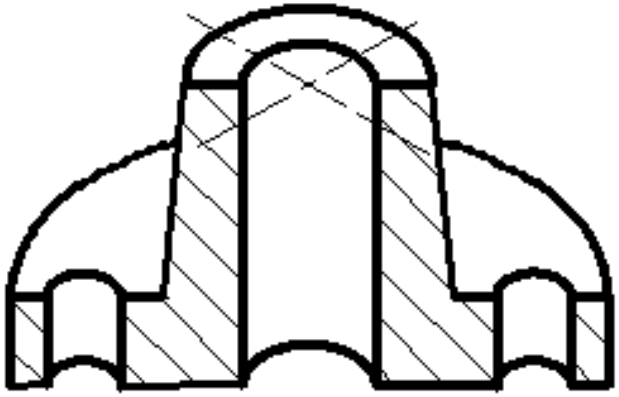
The section has been placed in a different place, and the rest of the component is not shown.



HALF SECTION A-A

HALF SECTION

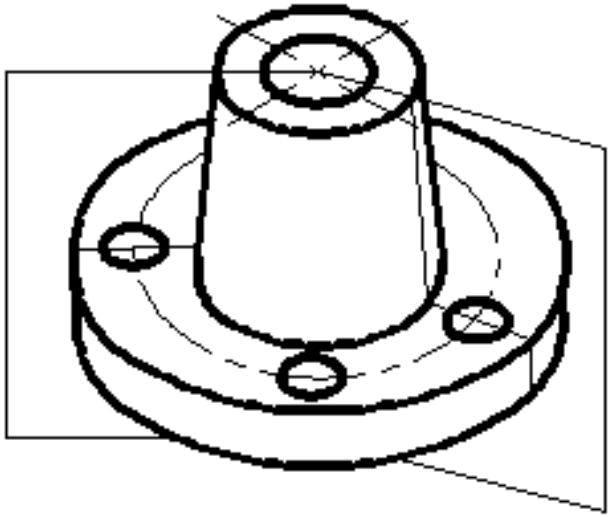
Only half of the view of the casting is sectioned and hatched. The half that is not sectioned has all hidden detail. In most cases the casting is symmetrical.

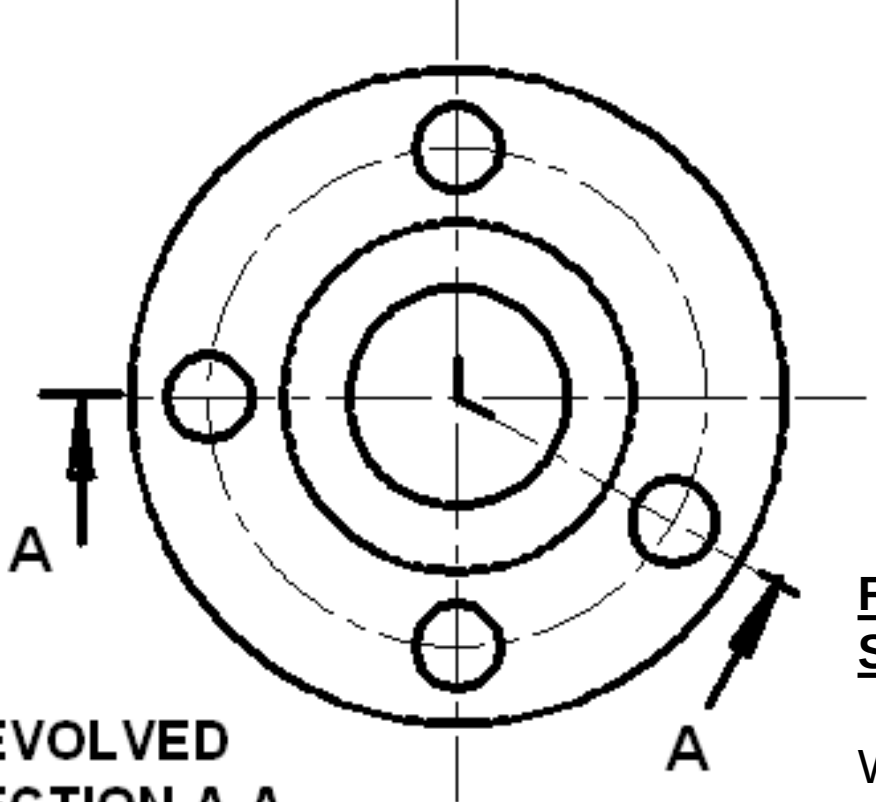


FULL SECTION

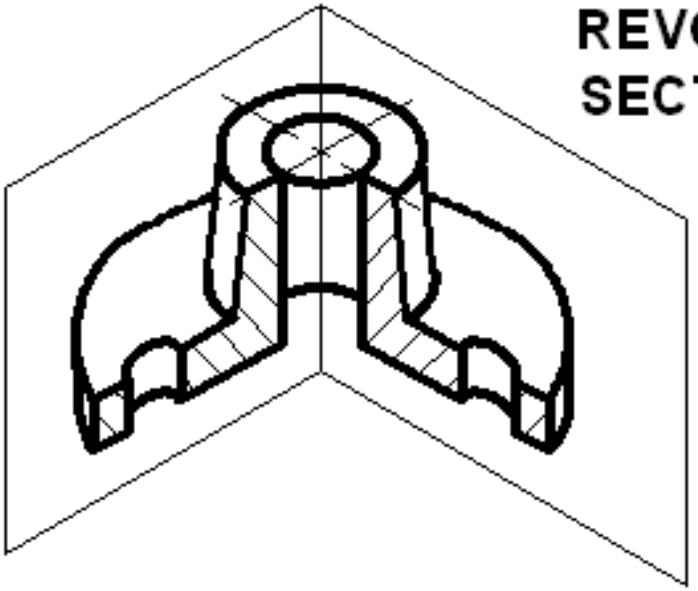
FULL SECTION

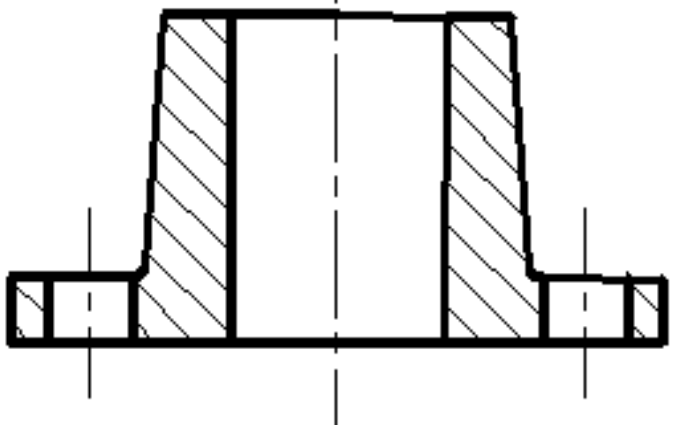
The entire view is sectioned and hatched. There is not hidden detail required in this view.





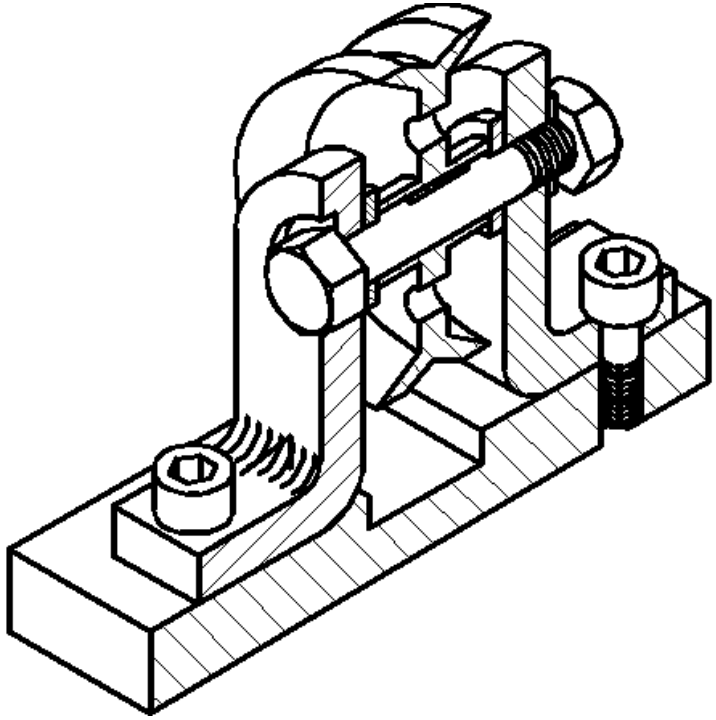
REVOLVED
SECTION A-A

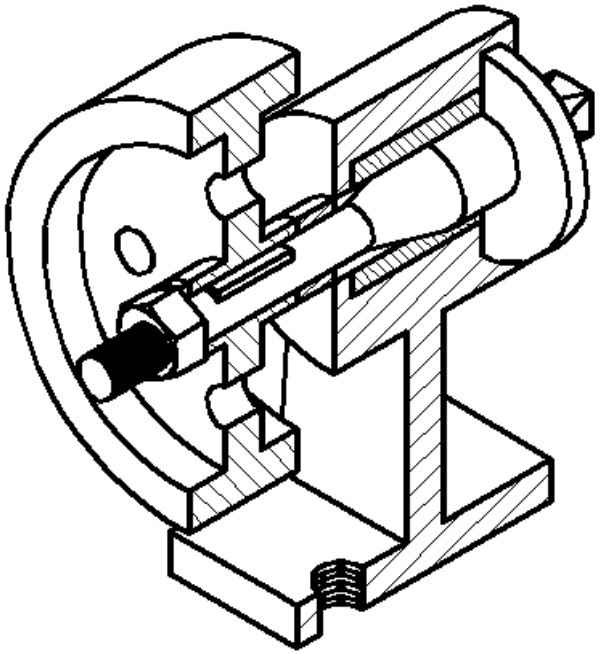


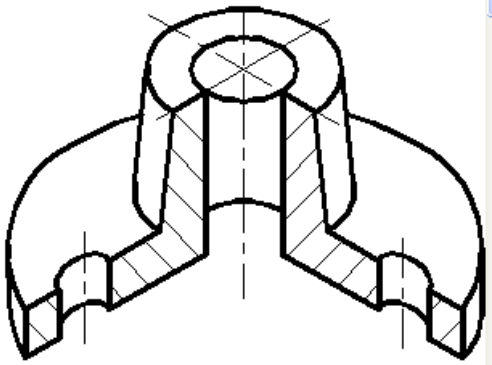


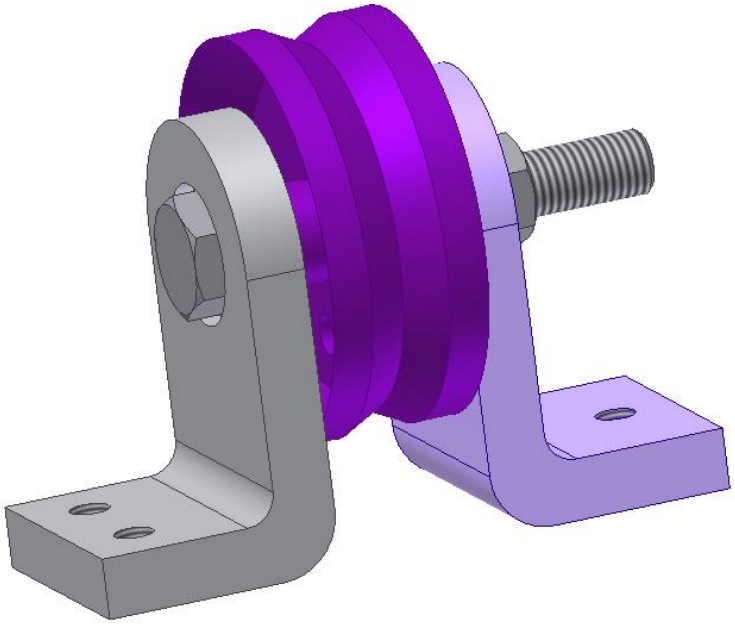
Revolved Section

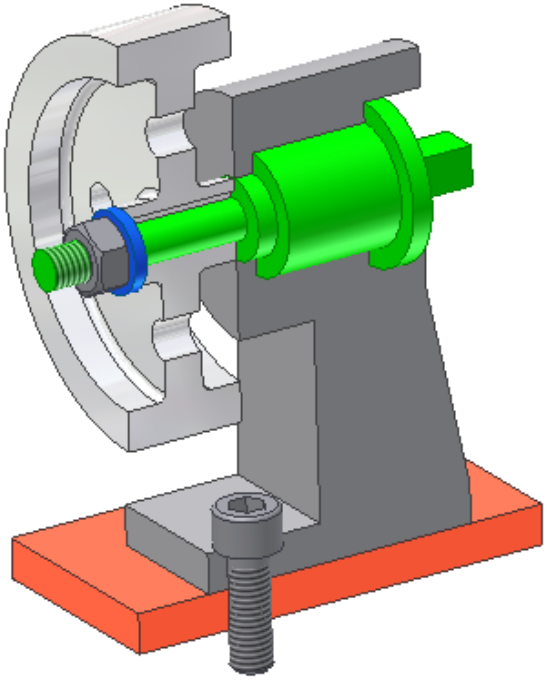
When the cutting plane swings around an axis, the sectional view is as thought the holes were in line.

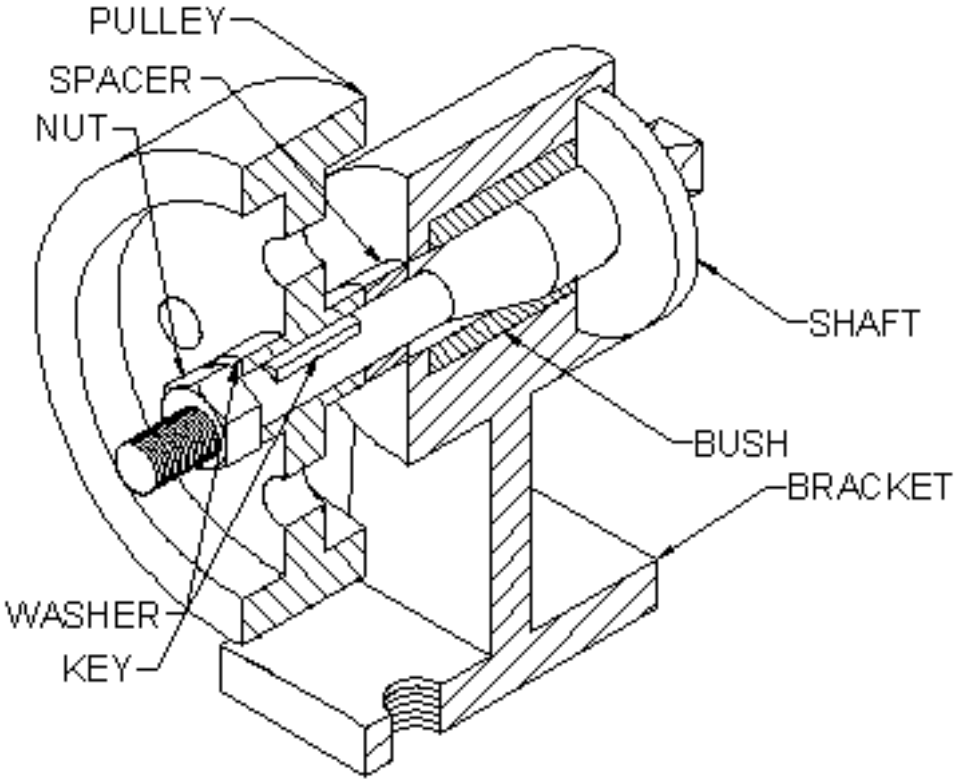


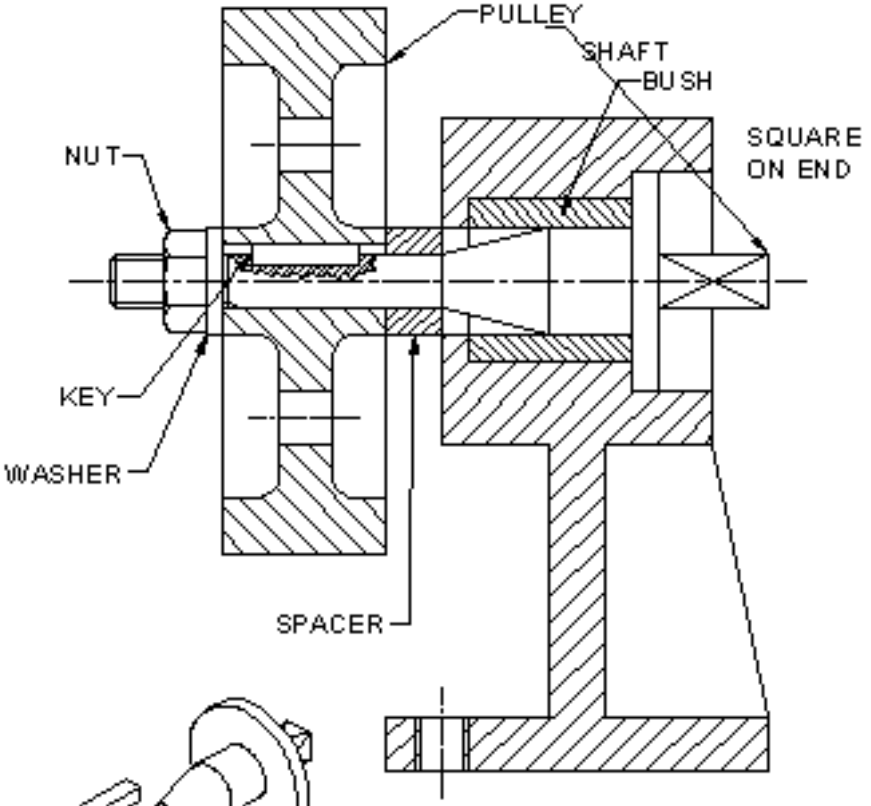


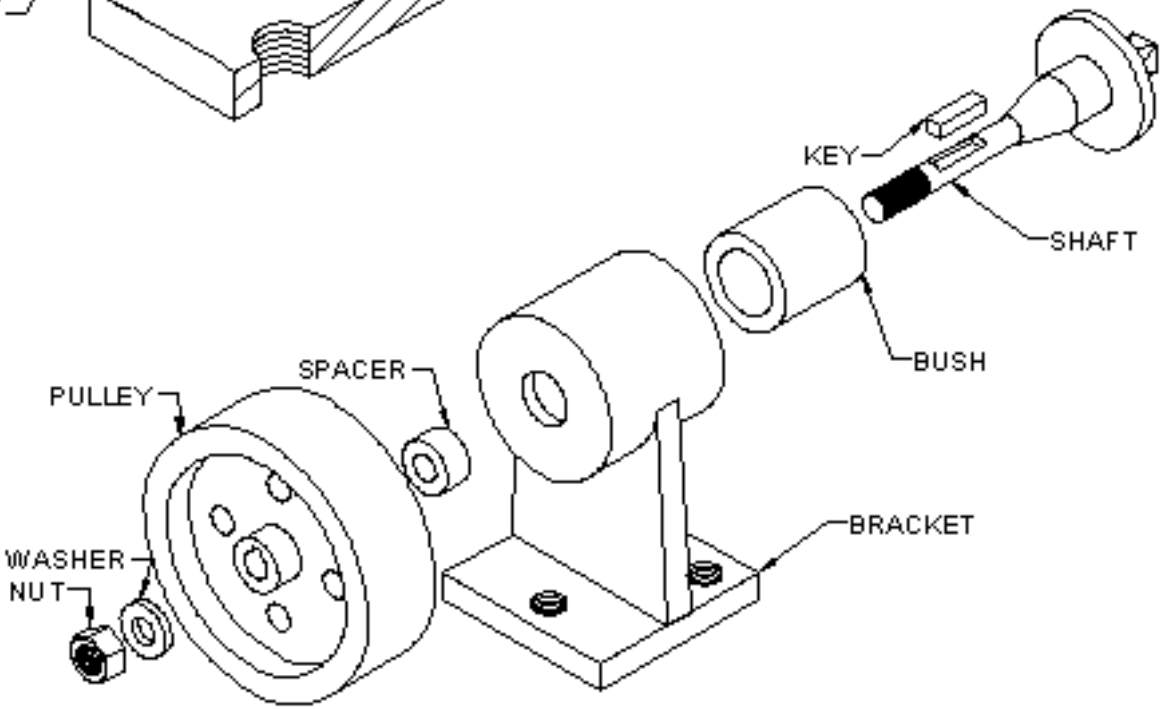




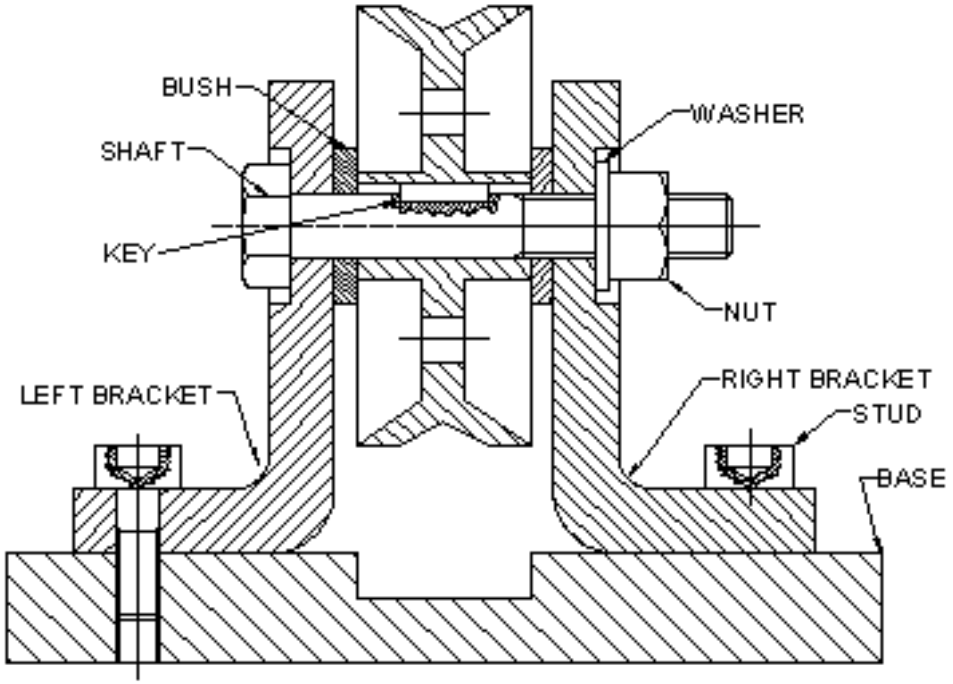






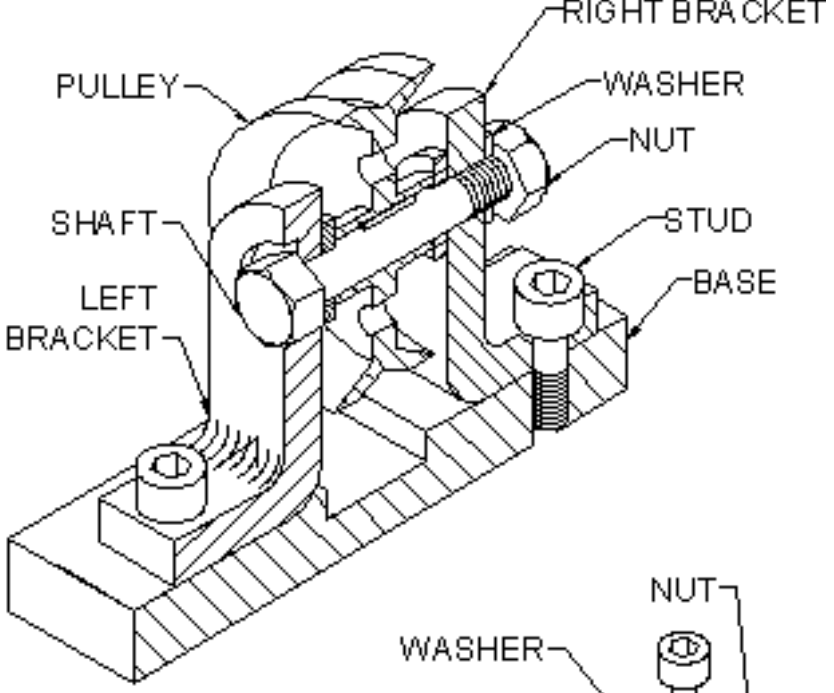


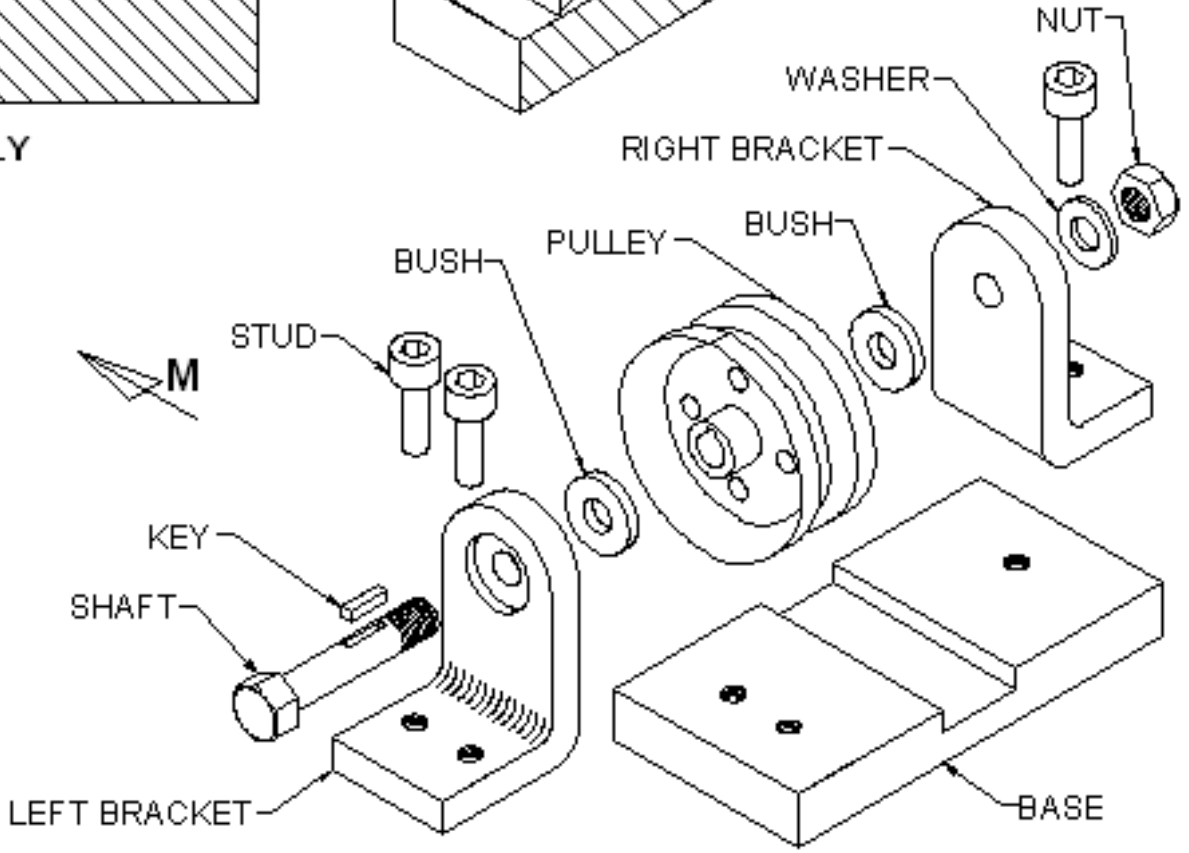
Engineering is the practice of safe and economic application of the scientific laws governing the forces and materials of nature by means of organization, design and construction, for the general benefit of mankind. S. E. Lindsay, 1920



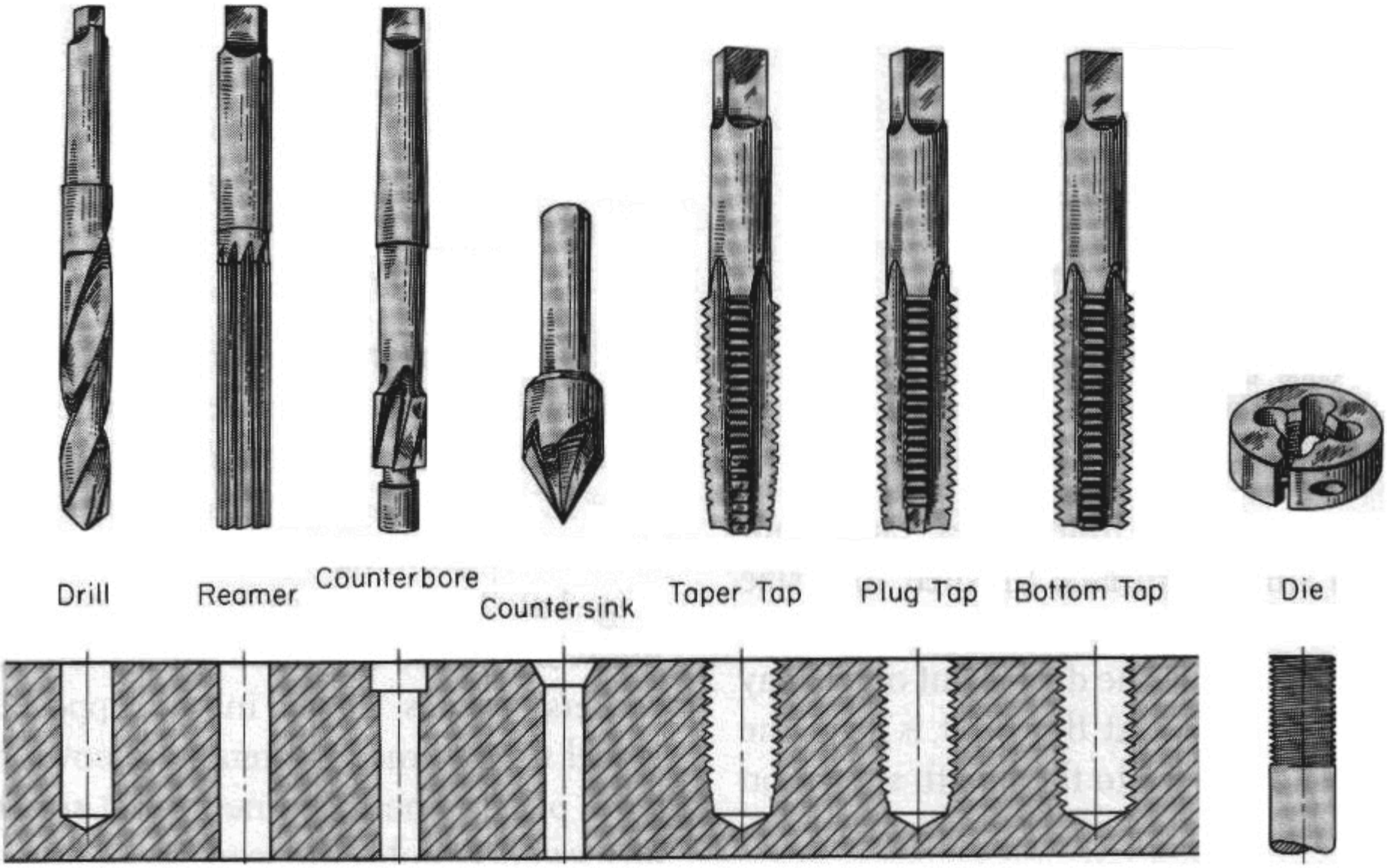
PULLEY ASSEMBLY

SCALE 1:1

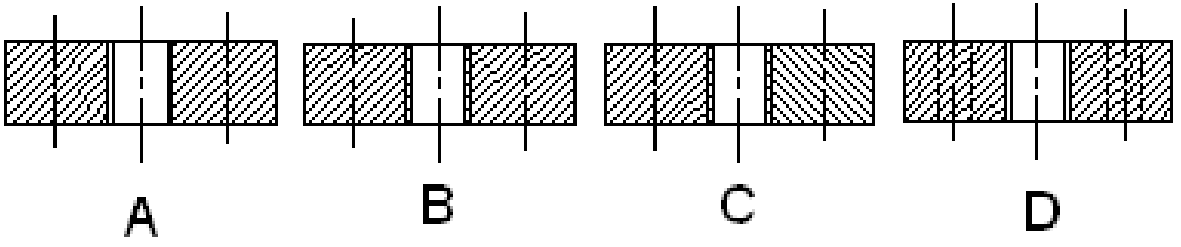




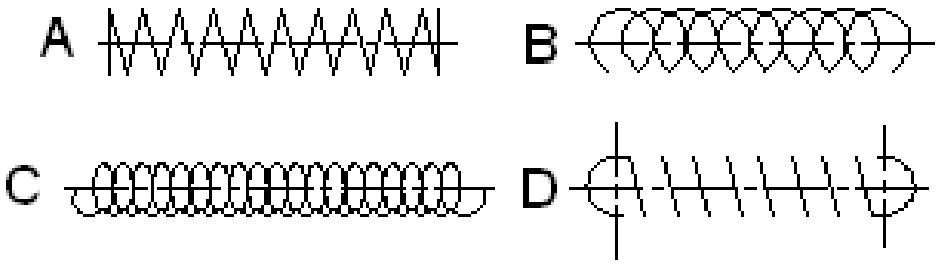
TOOLS & THE HOLES THAT THEY FORM



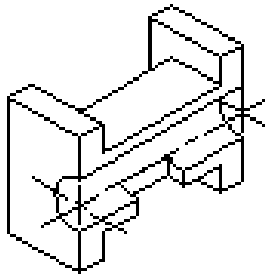
2 Which one of the following drawings *does not* contain a sectioning error?

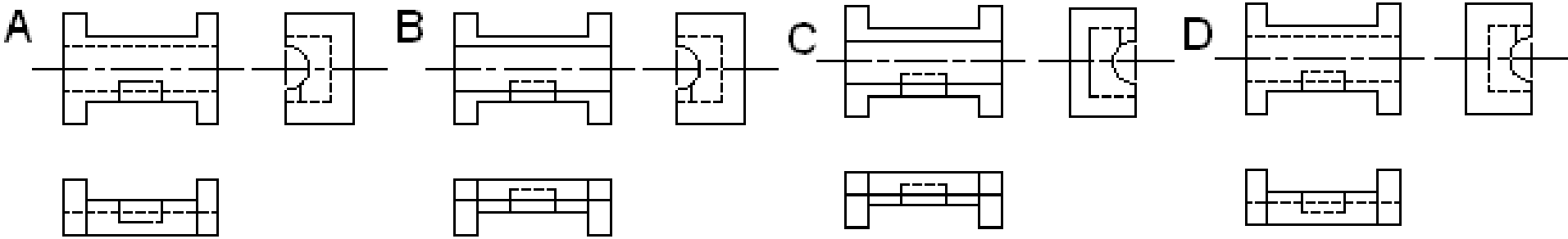


3 Which combination of figures below illustrates the conventional representation of springs?

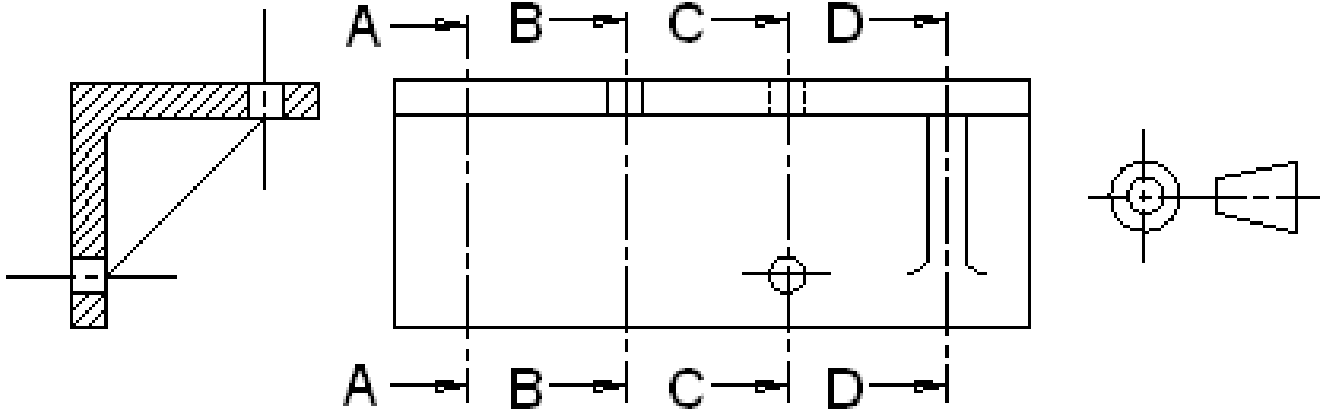


4 The pictorial view on the right shows a brass bearing. Which one of the orthographic views below correctly shows the bearing in *First Angle Orthographic* projection?

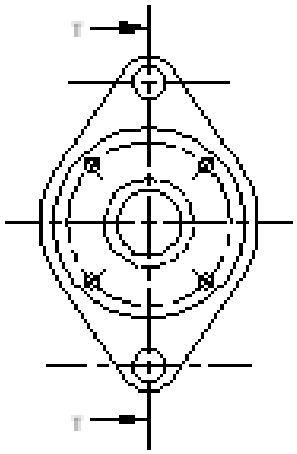




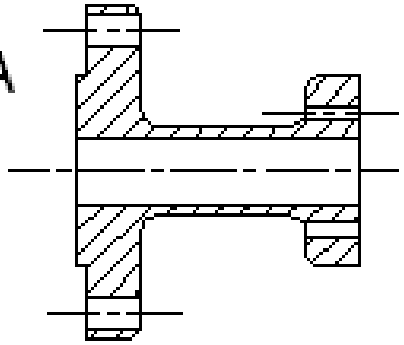
5 Which of the four *sectional cutting planes* will result in the sectional side view shown?



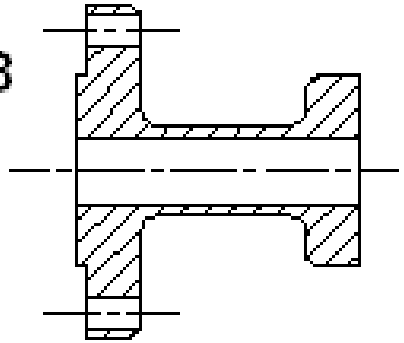
6 Which one of the sectional views below correctly shows the section T-T?



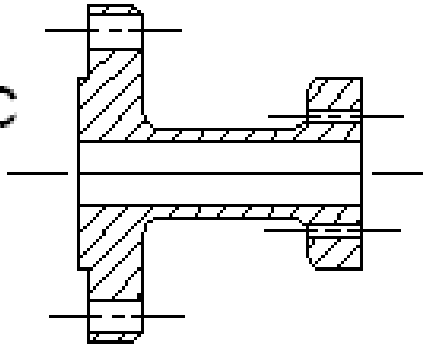
A



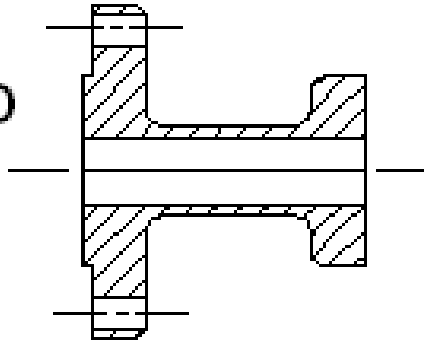
B



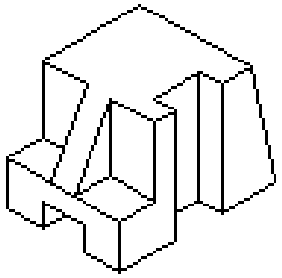
C



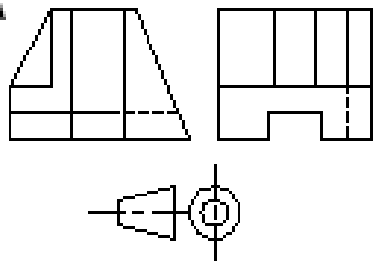
D



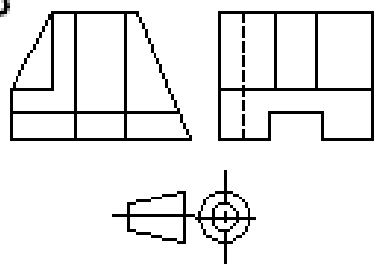
7 The pictorial view on the right shows a machined block. Which one of the views below correctly shows the machined block in the correct *Orthographic* projection?



A



B



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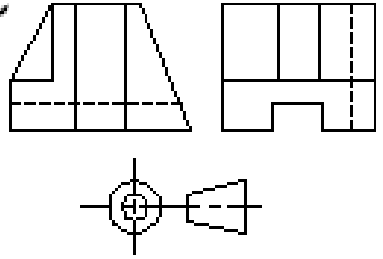
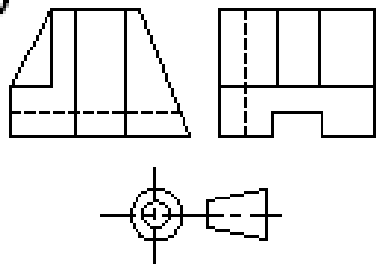
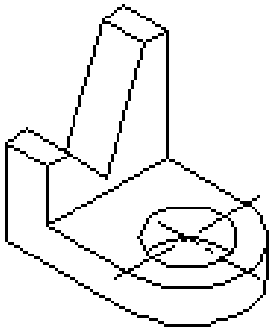


D

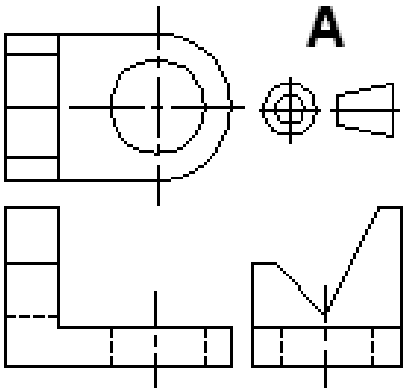


Visualization Activity

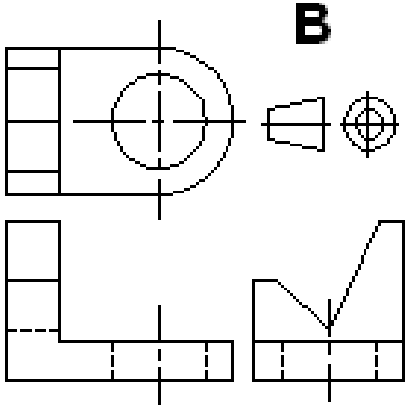
One isometric view and a number of multiview drawings are shown. Only one of the multiview drawings is correct. All the others are incorrectly drawn. Identify the correct drawing, and then find all the mistaskes in the other drawings.



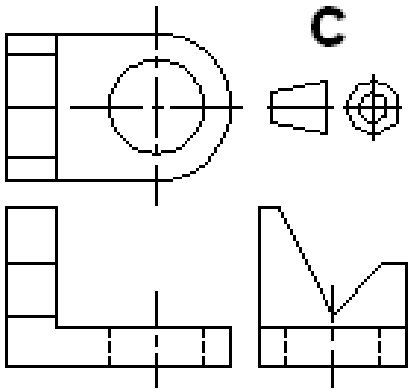
A



B



C



D