Mechanical Drawing (MDP 115)

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Threads and Fasteners

Topics

Exercises

Threads & Fasteners: Topics

Threads & Fasteners: Exercises

Threads and Fasteners

Summary

Summary

- What will we learn in this topic?
  - How to represent threads on an engineering drawing.
  - How to calculate bolt and screw clearance holes.

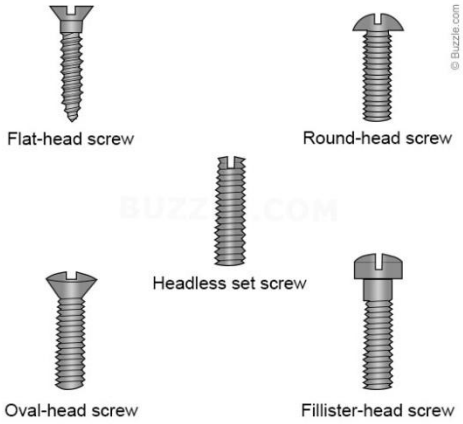
- Key points
  - Threads are represented by thread symbols, not by a realistic drawing.

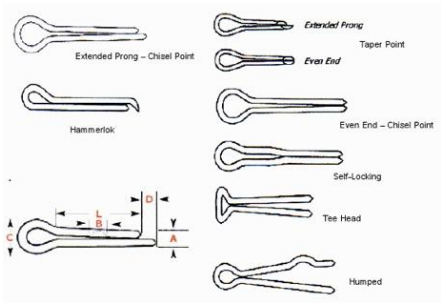
Threads and Fasteners

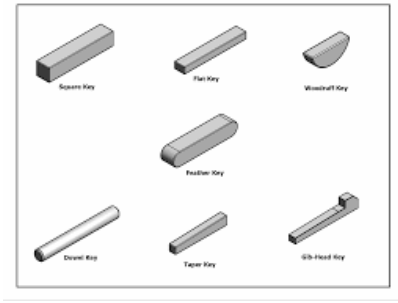
1) Fasteners

Fasteners

- Fasteners include:
  - bolts and nuts (threaded)
  - set screws (threaded)
  - washers
  - keys
  - Pins







- Fasteners are not a permanent means of assembly such as welding or adhesives.

Fasteners

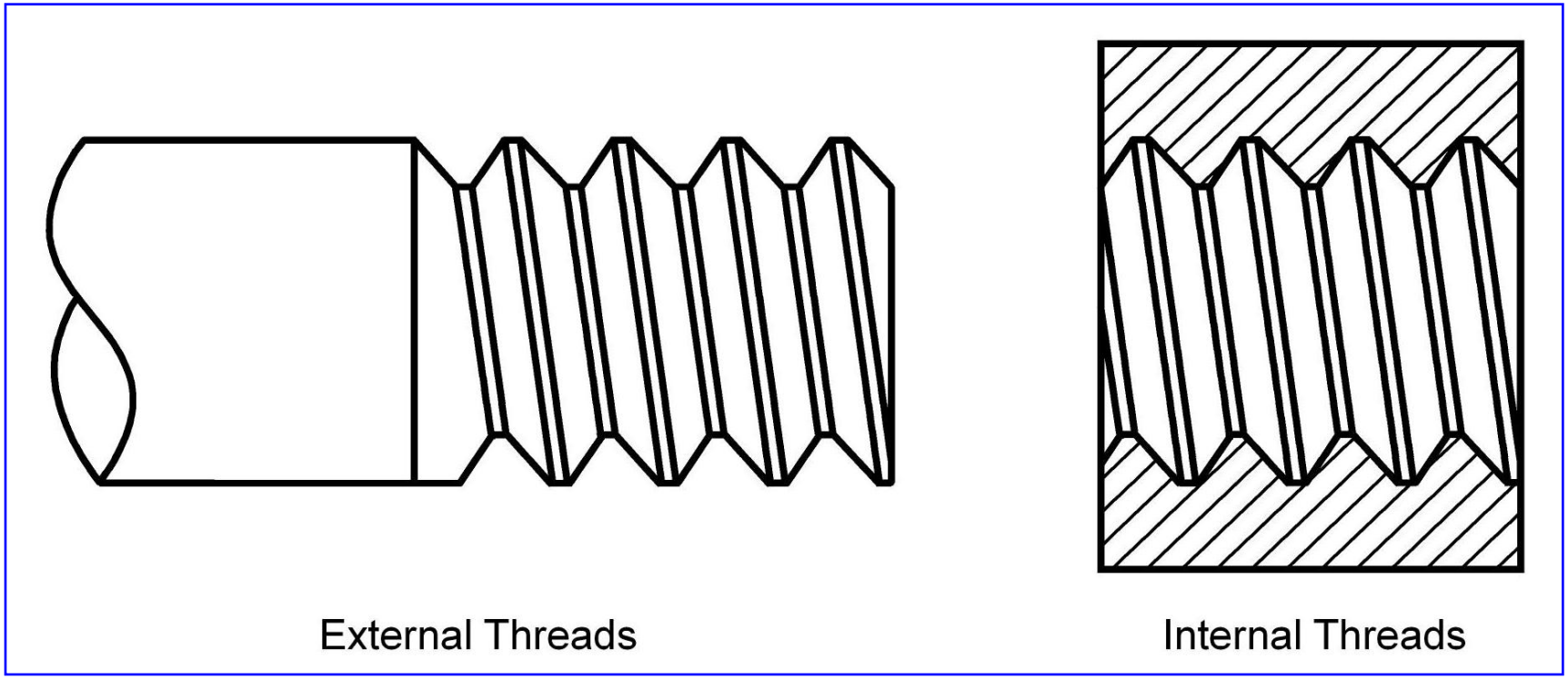
- Fasteners and threaded features must be specified on your engineering drawing.
  - Threaded features: Threads are specified in a thread note.
  - General Fasteners: Purchasing information must be given to allow the fastener to be ordered correctly.

Threads and Fasteners

2) Screw Thread Definitions

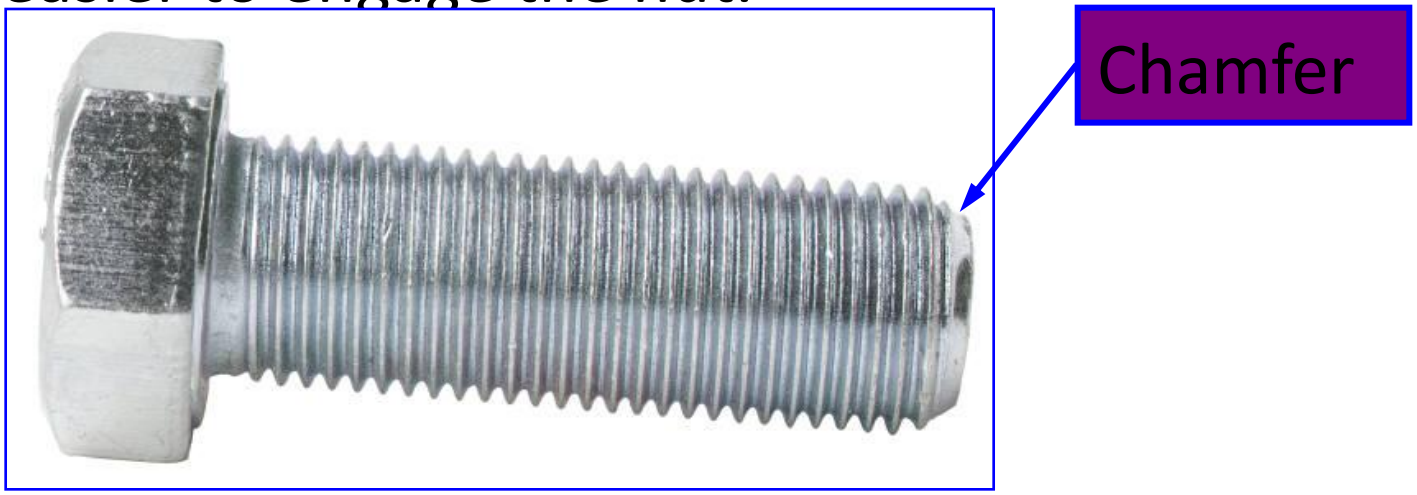
Thread Definitions

- Screw Thread: A ridge of uniform section in the form of a helix.



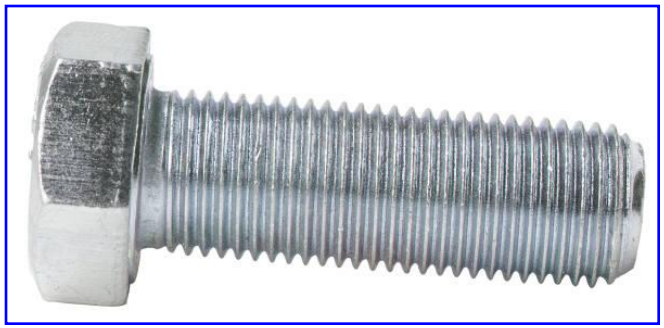
Thread Definitions

- External Thread: External threads are on the outside of a member.
  - A chamfer on the end of the screw thread makes it easier to engage the nut.



Thread Definitions

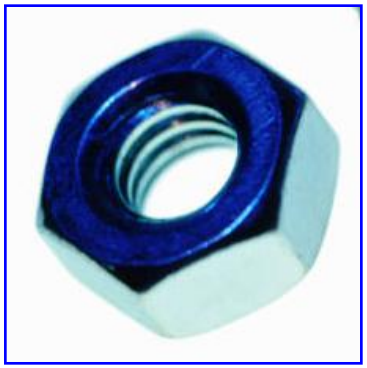
- External Thread:



  - An external thread is cut using a die or a lathe.

Thread Definitions

- Internal Thread: Internal threads are on the inside of a member.



  - An internal thread is cut using a tap.

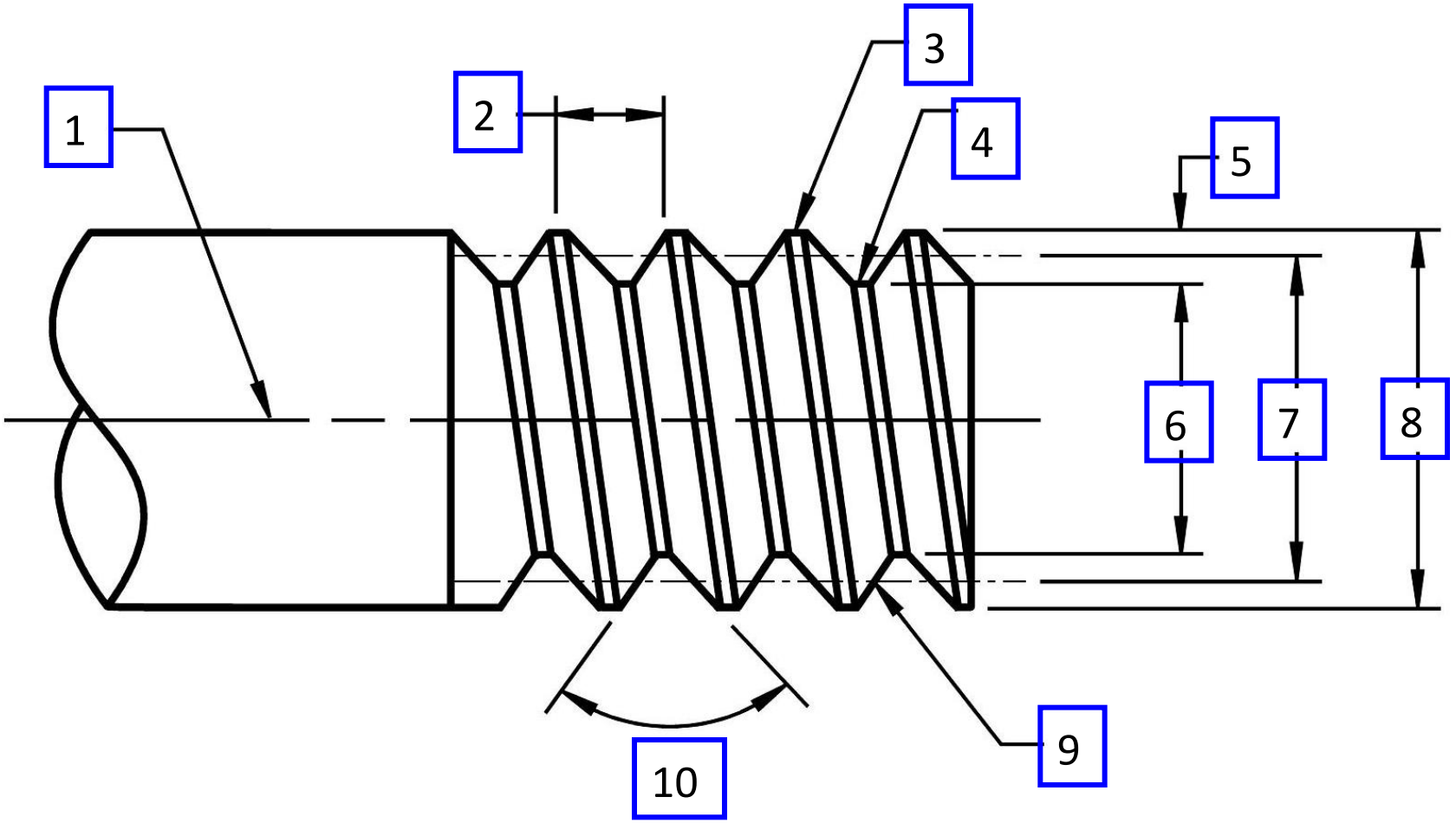
Thread Definitions

- Major DIA (D): The largest diameter (For both internal and external threads).
- Minor DIA (d): The smallest diameter.
- Depth of thread: (D-d)/2
- Pitch DIA (d_P): The diameter at which a line cuts the spaces and threads equally.

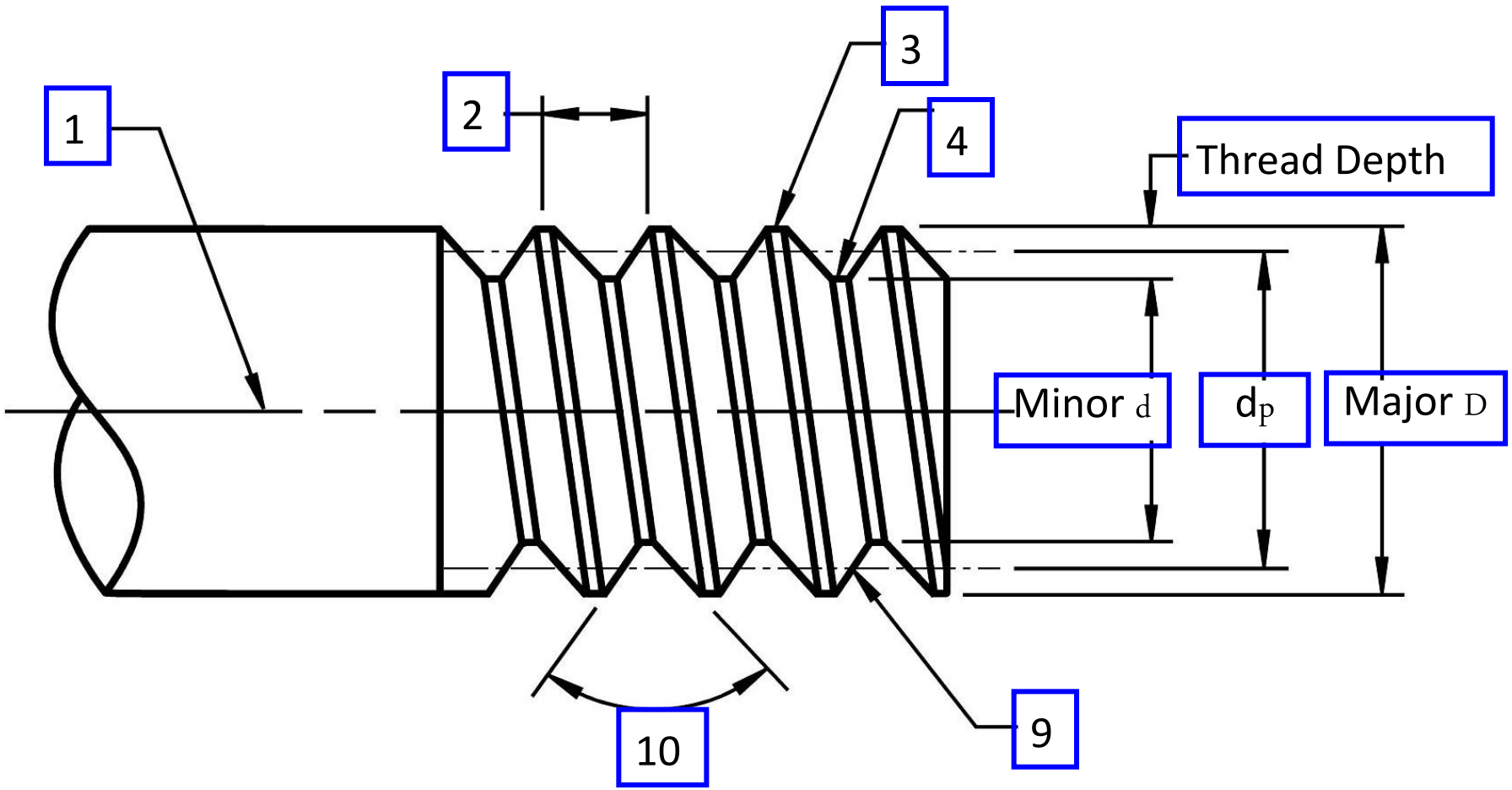
Exercise 1

Screw thread features

Identify the *Major, Minor & Pitch* diameters and the *Thread Depth*.



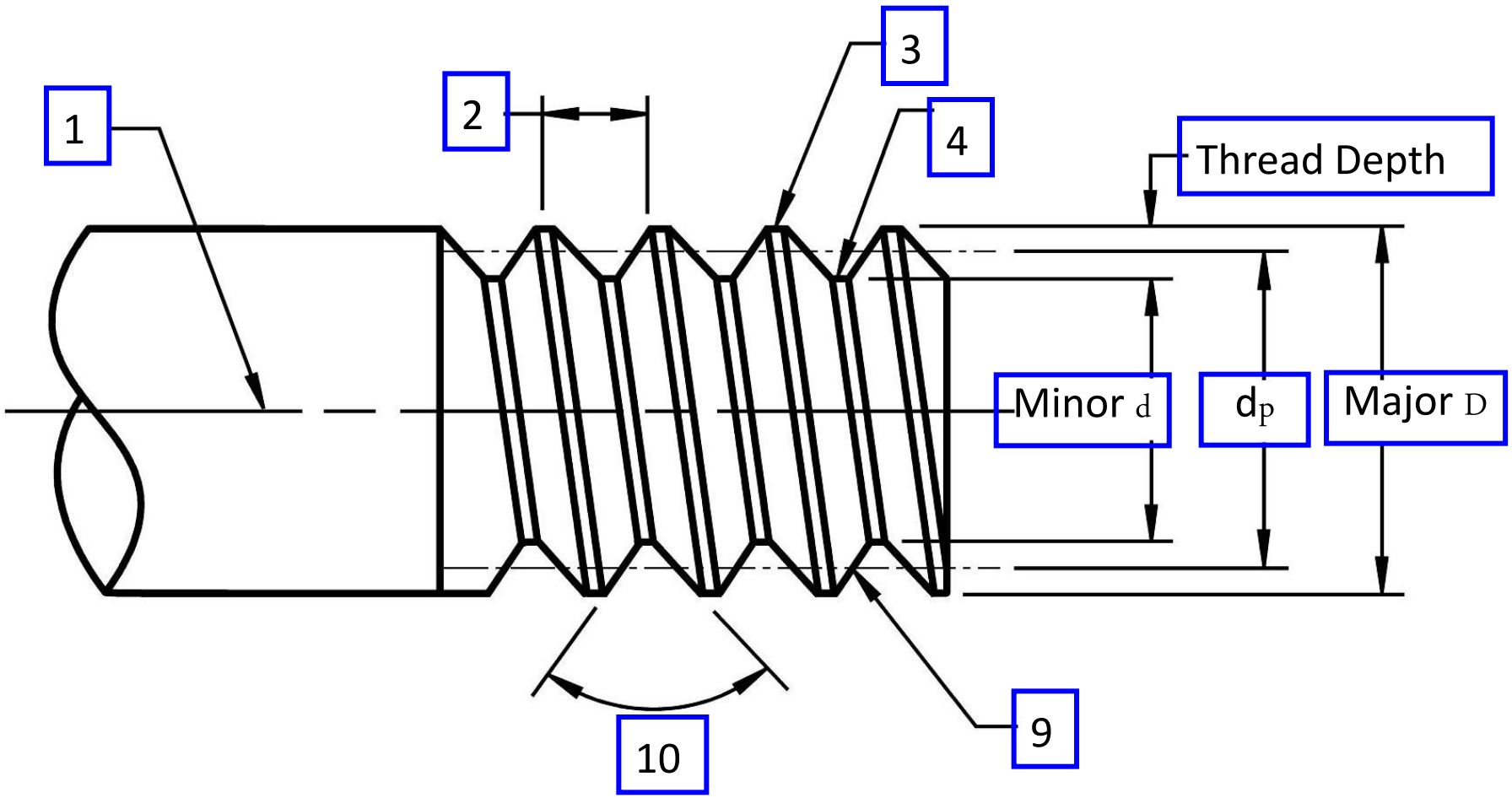
Identify the *Major, Minor & Pitch* diameters and the *Thread Depth*.



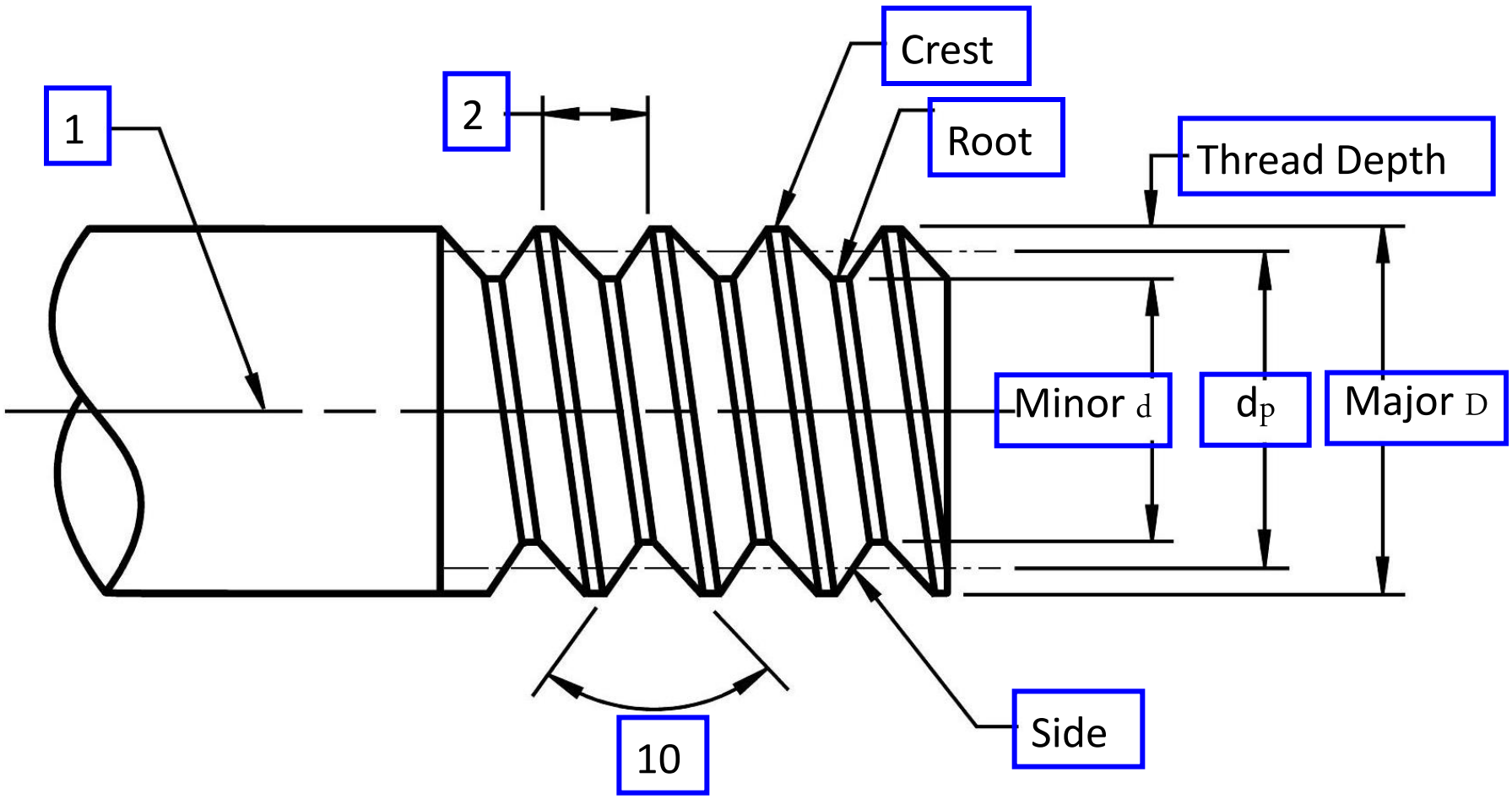
Thread Definitions

- Crest: The top surface.
- Root: The bottom Surface.
- Side: The surface between the crest and root.

Identify the *Crest*, *Root* and *Side*.



Identify the *Crest*, *Root* and *Side*.



Thread Definitions

- Pitch (P): The distance from a point on a screw thread to a corresponding point on the next thread (in/Threads).

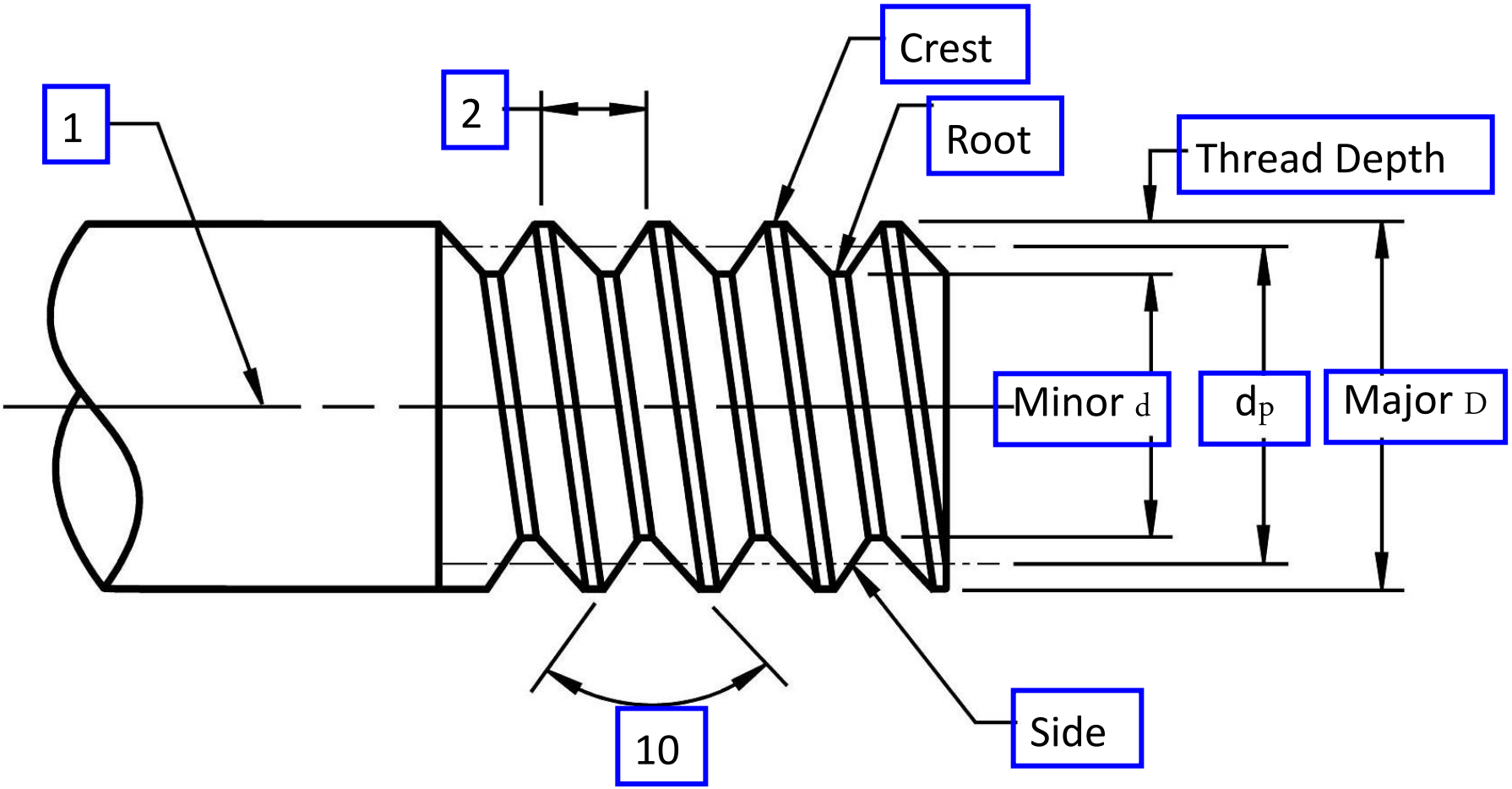
- Angle of Thread (A): The angle between the threads.

Thread Definitions

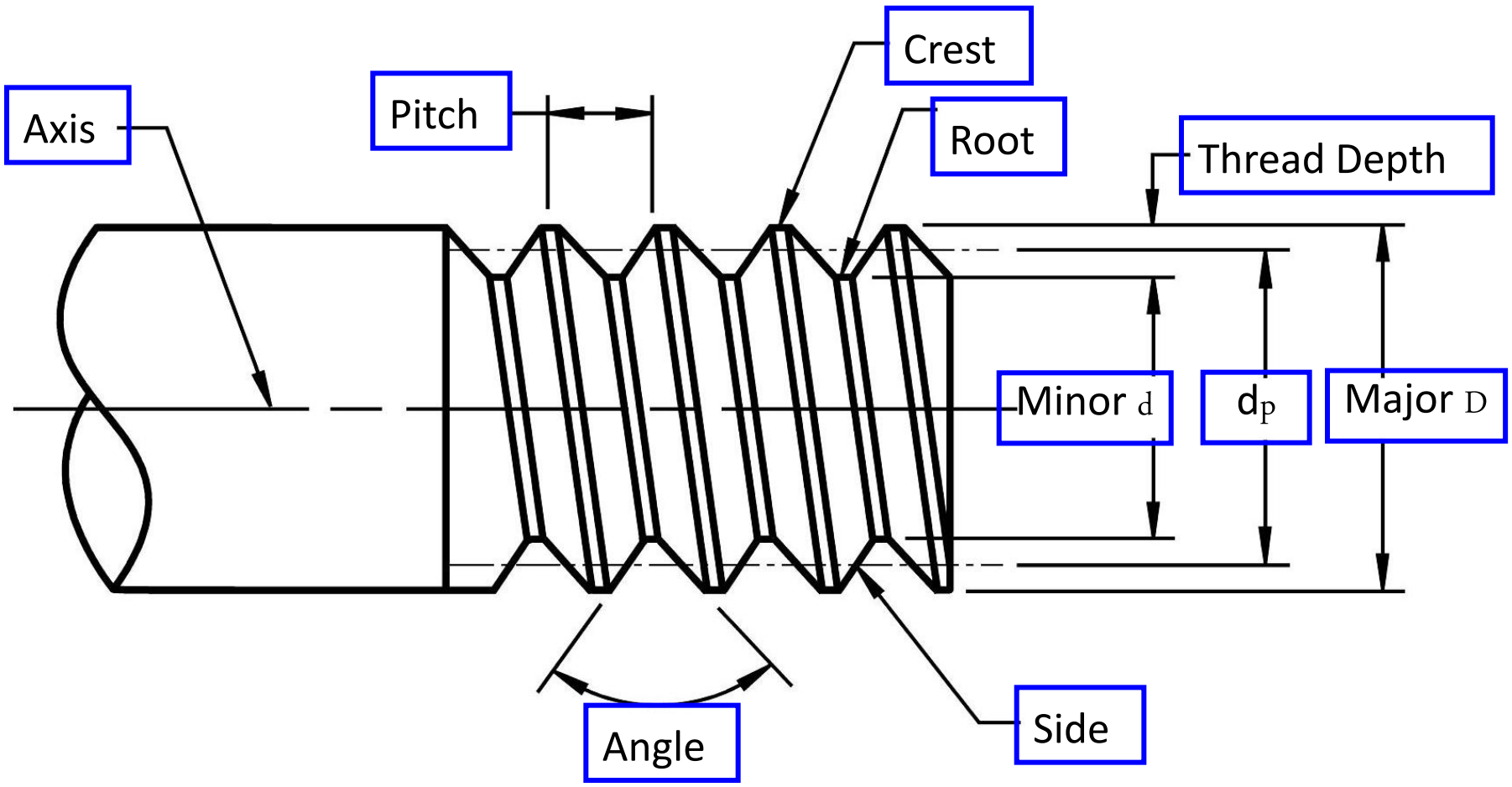
- Screw Axis: The longitudinal centerline.

- Lead: The distance a screw thread advances axially in one turn.

Identify the *Pitch*, *Screw Axis* and *Thread Angle*.



Identify the *Pitch*, *Screw Axis* and *Thread Angle*.



Thread Definitions

- Right Handed Thread: Advances when turned CW. (Threads are assumed RH unless specified otherwise.)

- Left Handed Thread: Advances when turned CCW.

Application Question 1

- Name an example of a left handed thread.

Left peddle of a bike

Threads and Fasteners

3) Types of Thread

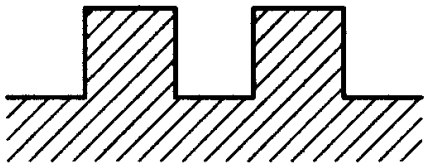
Types of Thread

- There are many different types of thread forms (shape) available. The most common are;
  - Unified
  - Metric

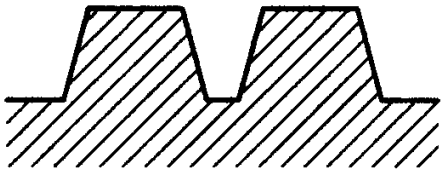
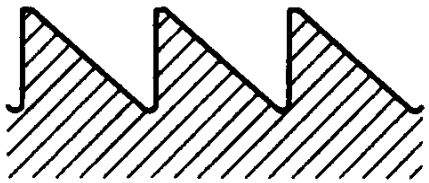
Types of Thread

- Thread form choice depends on;
  - what it will be used for
  - length of engagement
  - load
  - etc…

Types of Thread (Form)

Thread Name	**Figure**	**Uses**
Unified screw thread		General use.
ISO metric screw thread		General use.
Square		Ideal thread for power transmission.

Types of Thread (Form)

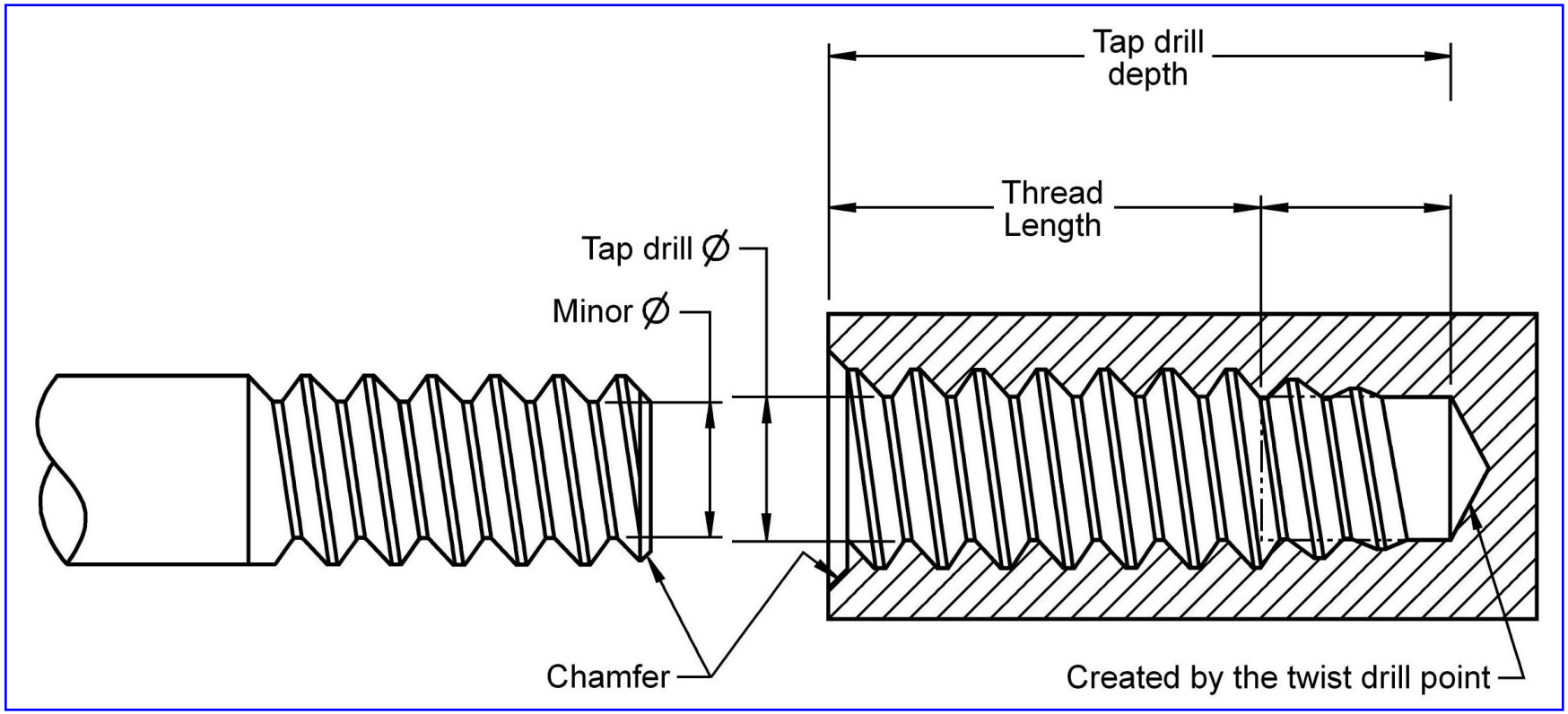
Thread Name	**Figure**	**Uses**
ACME		Stronger than square thread.
Buttress		Designed to handle heavy forces in one direction. (Truck jack)

Threads and Fasteners

4) Manufacturing Screw Threads

Manufacturing Threads

- Internal Threads
  - First a tap drill hole is cut with a twist drill.

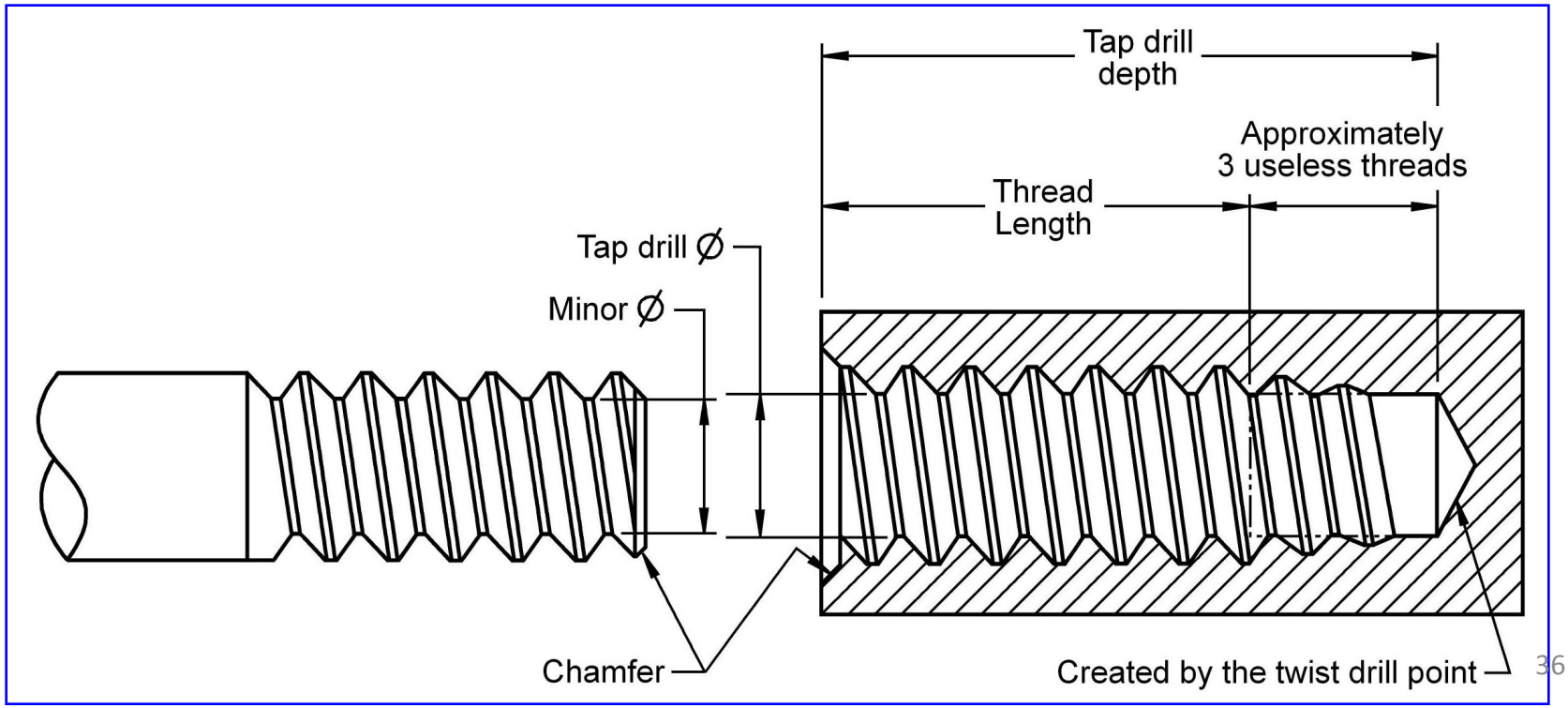


Manufacturing Threads

- Internal Threads
  - Then the threads are cut using a tap.

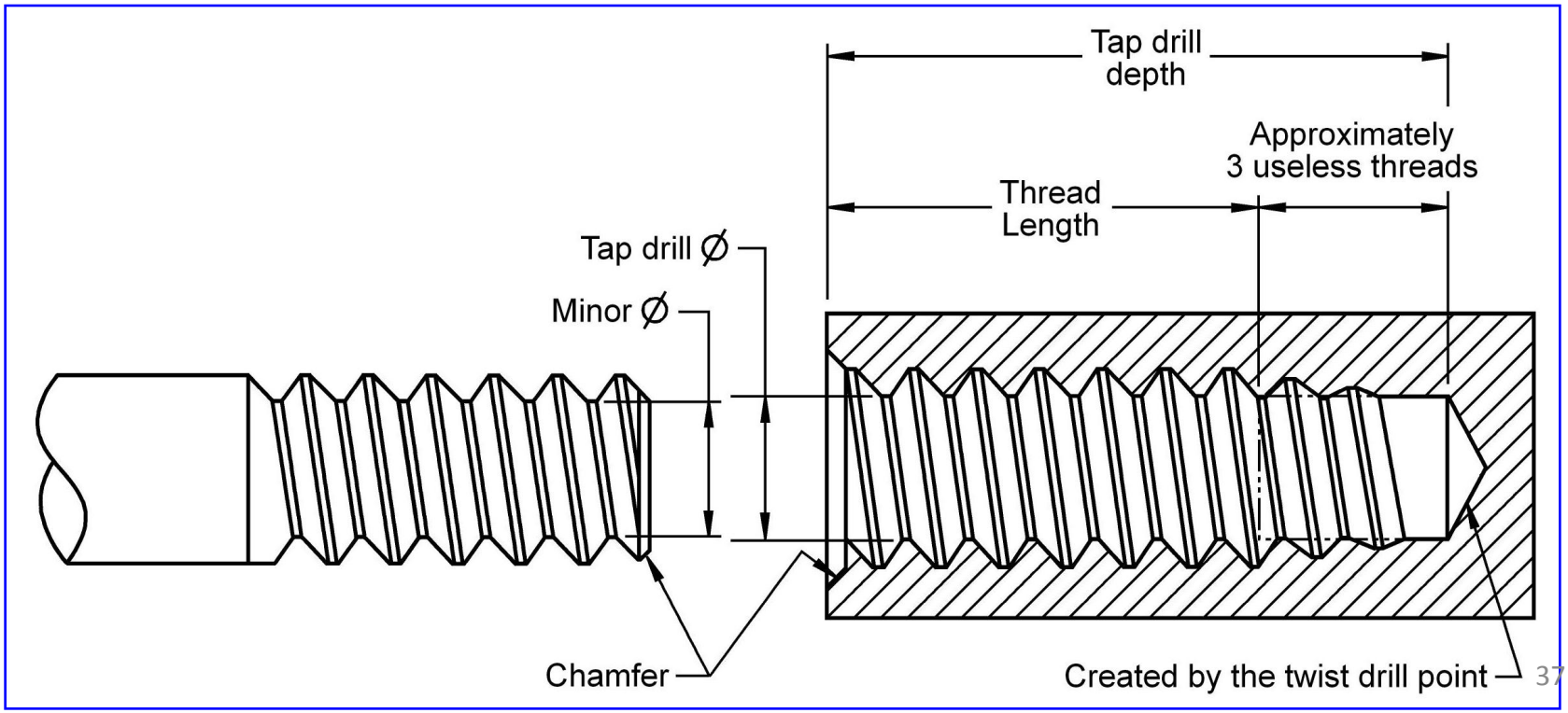
Manufacturing Threads

- Internal Threads
  - Chamfers are sometimes cut to allow for easy engagement.



Manufacturing Threads

- External Threads
  - You start with a shaft the same size as the major diameter.



Manufacturing Threads

- External Threads
  - The threads are then cut using a die or on a lathe.