

# Design & Manufacture

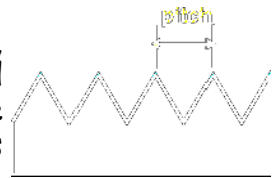
## Homework 38

### Metalwork-Threading

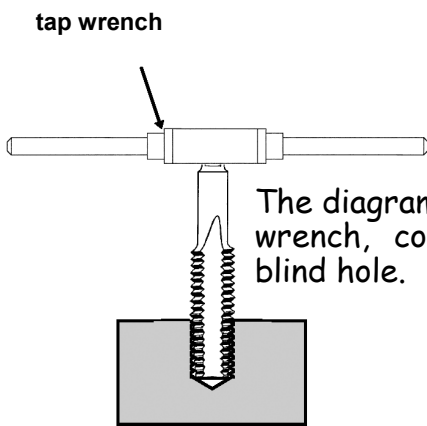
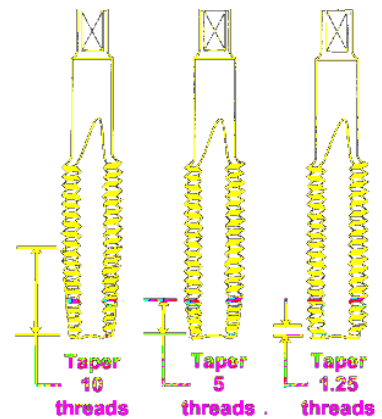
When the size of the thread has been decided the hole has to be drilled to the correct **tapping size**. This is a hole that is smaller in diameter than the thread diameter (nominal size), so that the thread can be cut into its side. There are printed tables to tell you which size drill bit to use.

Metal can be held together by screws screwed into threaded holes, and also threaded rod can be screwed into a threaded hole. Cutting an internal thread into the side of a hole is known as **Tapping** the hole, because the tools used to cut the thread are called **Taps**. Cutting an external thread on the outside of a length of rod is known as **Threading** and the tool used to cut the thread is known as a **Die**.

Before a hole can be threaded, the size of the thread must be decided. In school, threads from 2mm diameter to 12mm diameter in 1mm jumps can be cut. A tap and die have the size stamped on them, e.g. M8 x 1.25. The 'M' stands for Metric. The 1.25 is the distance in millimetres, between the tip of each thread tooth, this is called the **Pitch**.



Taps are normally sold in sets of three. If a **blind hole** (a hole that does not go all the way through a piece of material) is to be tapped all three taps are used in turn, starting with the taper tap. The taper allows the tap to start with its tip firmly in the hole and the thread to be cut gradually deeper into the side, with each turn.



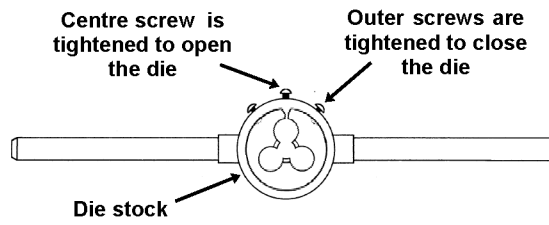
The diagram shows a plug tap, held in a tap wrench, completing the threading of a blind hole.



An external thread on a metal rod is cut by using a die held in a die stock. The die is adjustable so that threads that are slightly smaller or larger than the nominal size can be cut. This allows for a loose or tight fit between the external and internal threads.

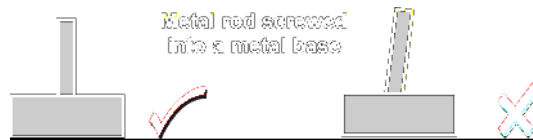
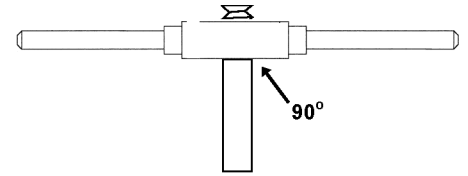


Adjustable split die



It is a good idea to cut the thread with the die split open as far as possible and then test the fitting of the external and internal threads. If the threads are too tight then close the die a little, re-cut and test again. Repeat the process until the thread runs smoothly.

Make sure that the die stock is at right angles to the rod to stop a 'drunken' thread being cut.



True thread    Effect of drunken thread

## Questions

1. What does the term 'tapping a hole' mean?  
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2. Where would you find M10x1.5 printed and what does each part stand for?  
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3. How can you measure the 'pitch' of a thread?  
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4. What is a 'tapping size' hole?  
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5. Illustrate a 'blind' hole.  
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6. What are the three taps that make up a set? How can you tell the difference between them?  
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7. Make a neat sketch of a Tap Wrench.  
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8. What is used to cut an external thread?  
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9. Explain the use of the three screws found on the Die Stock.  
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10. With the help of diagrams explain the effect of a drunken thread. How can this be avoided?