ME-372 : Heat transfer and Metrology lab

Inspection of Screw Thread

Contents

Introduction

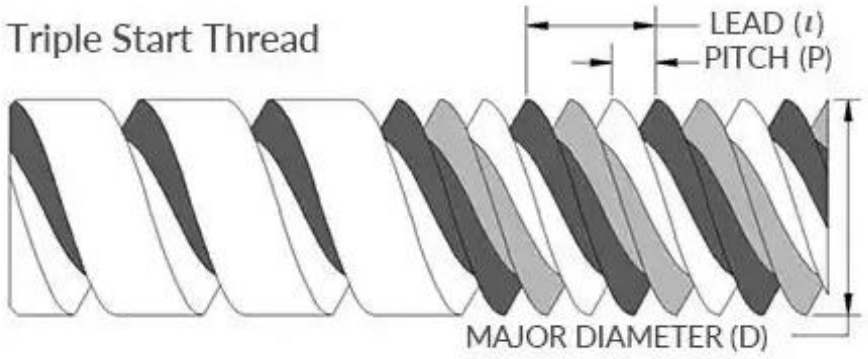
- Screw thread is a helical structure, generally used for the transmission of the force and motion. Eg. Screw Jack, Nuts, Bolts, lathe, etc.
- Various types of thread forms have been developed for different applications. eg:square, triangular, trapezoidal etc.
- It is important that the machining parts of a thread pair must be produced with matching dimensions that should be closely maintained during manufacturing.
- Hence the inspection of threads is vital for the proper functioning of assembled parts.

Objective:-

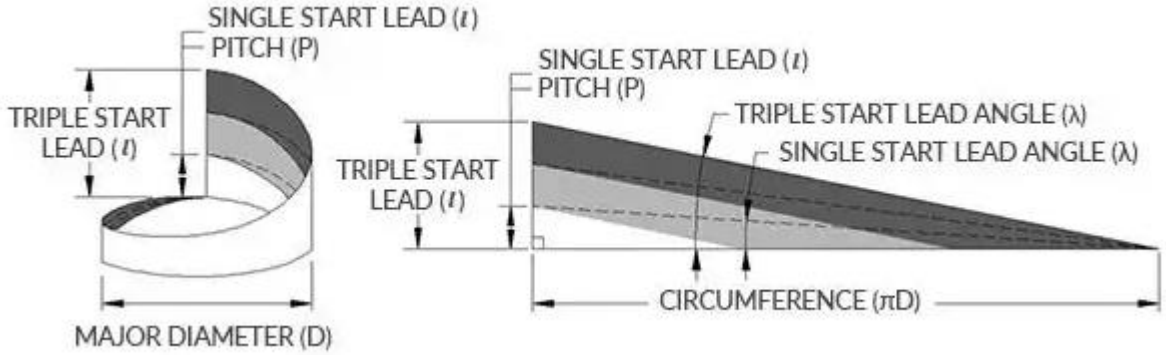
- To inspect the screw thread for pitch, thread angle, major and minor diameters and to determine the pitch errors.

Screw Thread Design and Terminology

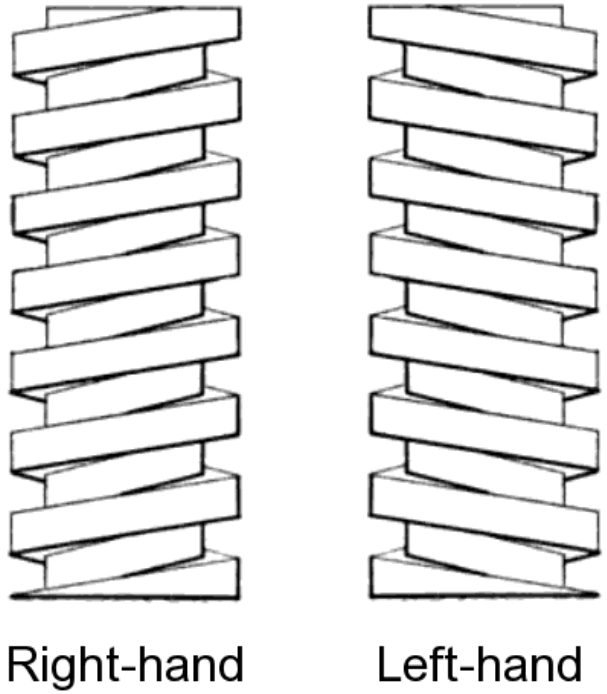
Single start and Multi start Thread:



Pitch, Lead and Lead angle:

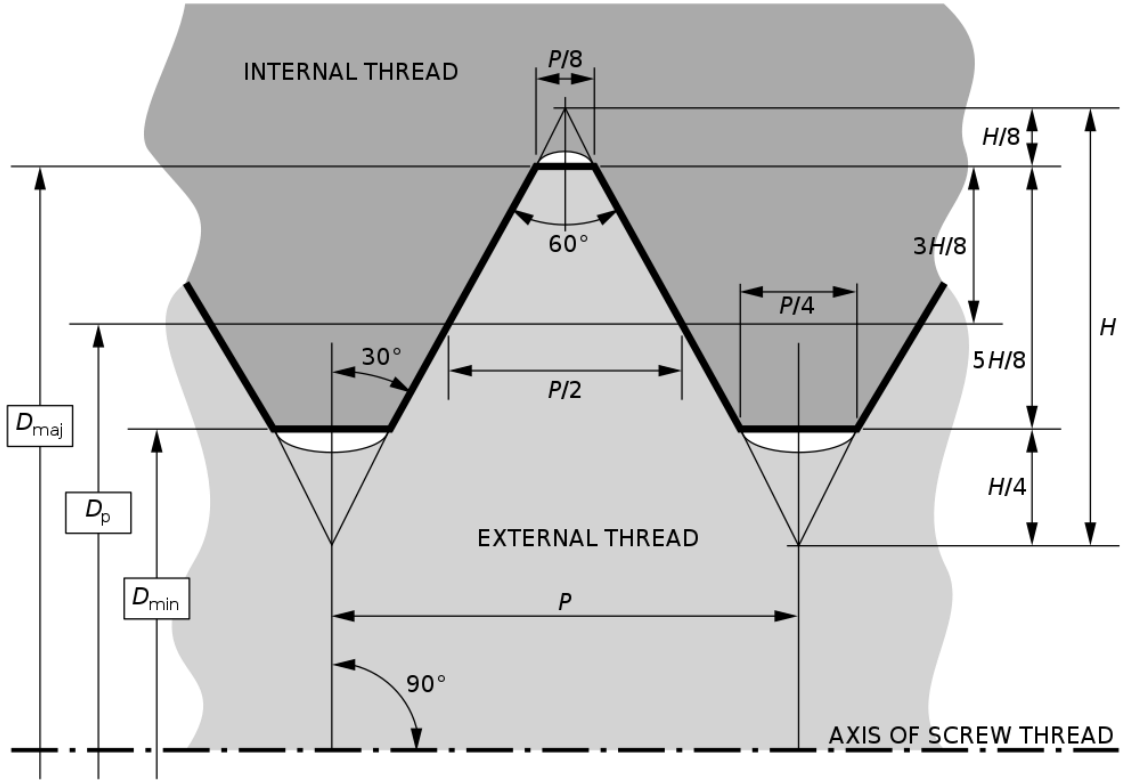


Right and Left hand thread

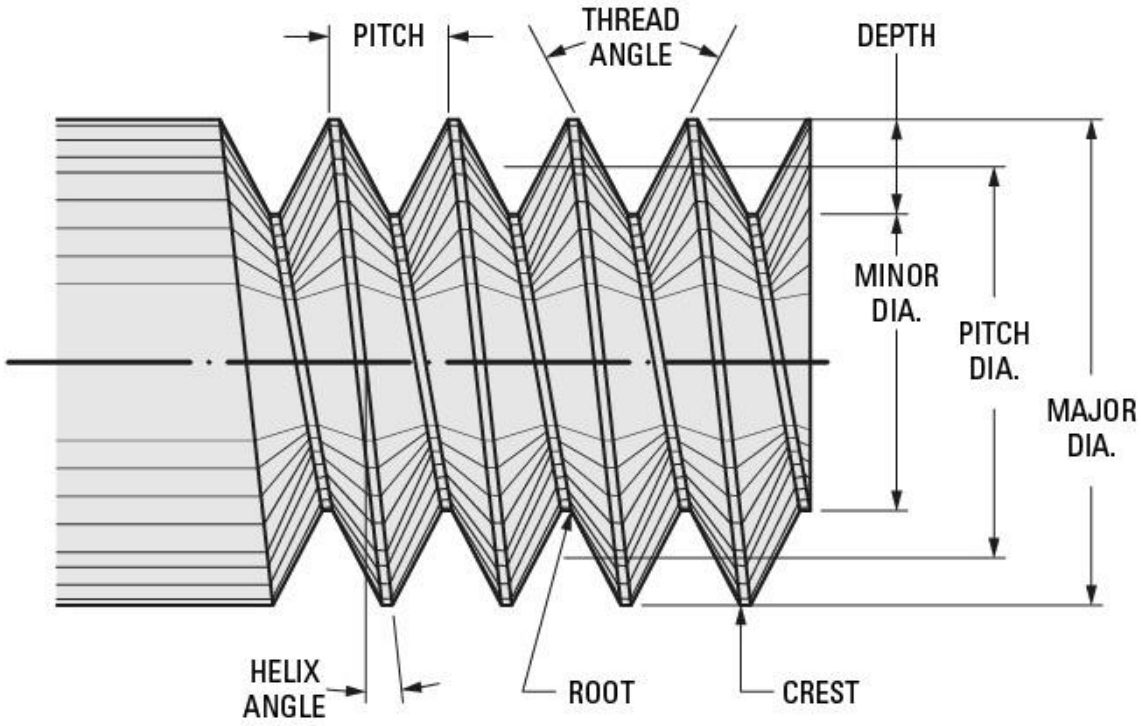


*Source Google

Basic profile for the ISO metric screw thread



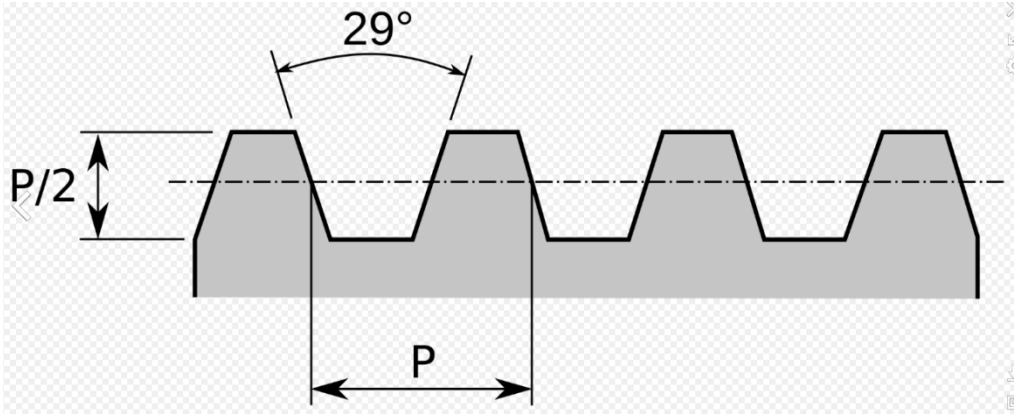
Terminology



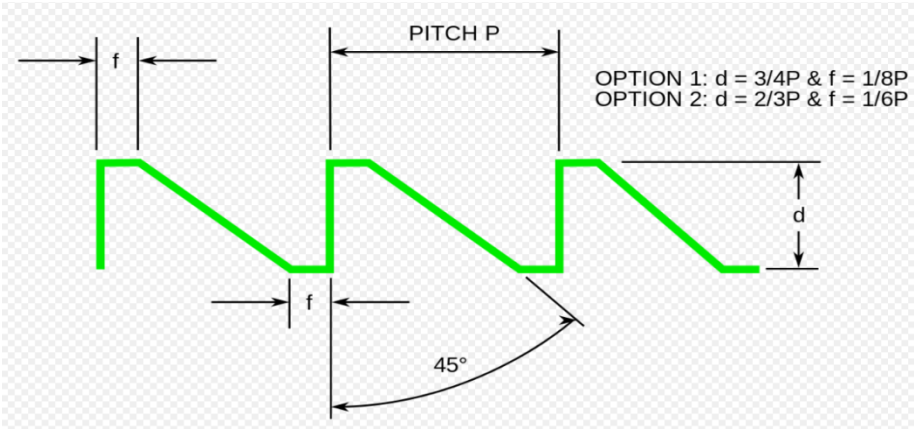
*source google

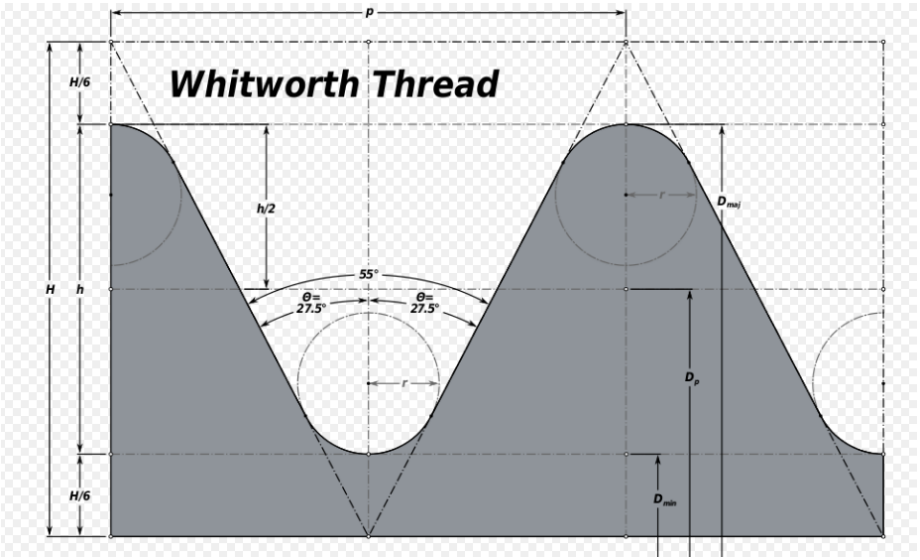
Some Important Form of Threads

Acme thread



Buttress Thread





*source Wikipedia

Threads with application

Acme Screw Treads: Acme Screw Threads are typically used for power transmission and linear motion applications, with slower rotational speeds and heavy load requirements

Buttress Screw Threads: Buttress threads are used in projects requiring movement of heavy loads with unidirectional force. A good example of this in action is a thumb screw on an adjustable wrench.

Standard V-Threads: V-threads are used to hold components together and control position. They are not well suited for linear motion or power transmission.

Pitch Error in Screw Thread

If screw thread is generated by a single point cutting tool its pitch depends on:

- The ratio of linear velocity of the tool and angular velocity of the work being correct.
- The ratio being constant.

If these conditions are not satisfied then pitch error will occur.

Types of Pitch error:

- Progressive Pitch Error: Occurs when tool-work velocity ratio constant but incorrect.
- Periodic Pitch error: Occurs when tool-work velocity ratio is not constant.

Procedure

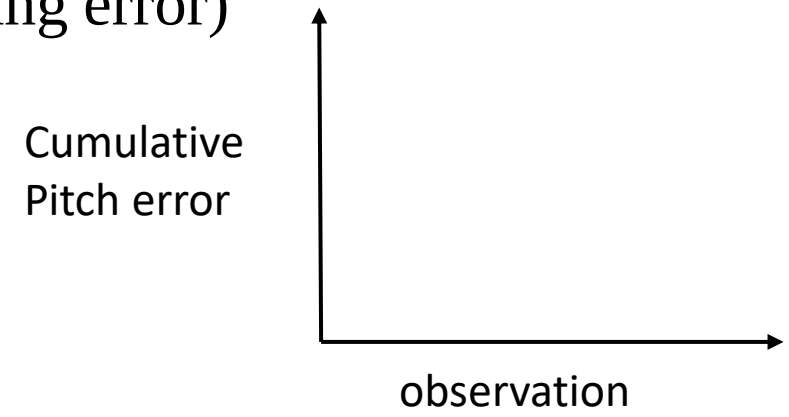
1. Calibrate the instrument before taking any measurement.
2. Measurement of Pitch, Thread angle, Major and Minor Diameters to be done.
3. Measure the above parameters for at least 10 threads

Results and Analysis

- Tabulate all the parameters measured.
- Present the results about the Major and Minor Diameter using control chart:

Observation	Major Dia	Minor Dia
10 observations at different thread		
Mean		
Standard deviation		

- Plot diagram of Cumulative Pitch error: (take theoretical pitch = 2.5mm for calculating error)



Conclusion

- Comments on the sources of error in the measurements.
- Give your conclusion about the type of thread you have inspected.