# **TWIST DRILLS**

* 1. Types of steel drill bits
     1. Carbon – Low speed – softer materials – shank not marked.
     2. High Speed Steel (H.S.S.) – Harder, most common.
     3. Cobalt – Hard, split point, shank end different
  2. Sizes of drills
     1. Fractional – 1/64” – 4” General purpose. 1/64th increments.
     2. Number, Wire Gage, Decimal Drill – Range from

#80 (.013”) to #1 (.228”) – used for tap work, jet sizing,

reamer work.

* + 1. Letter, Alphabetical Drills – A (.234”) to Z (.413”) – special use drills, tap work, reamer.
  1. Lengths
     1. Short Drills – Stubby, special use, restricted space areas.
     2. Long Drills – Extended shanks, special use, deep pilot hole.
     3. Jobber Length Drills – Average, length increases with diameter.
  2. Shanks
     1. Straight Shank – Most common up to ½” diameter. The drill body and shank are the same diameter. Always tighten at least 2 of the 3 chuckholes.
     2. Reduced Shank – The shank is smaller in diameter than the drill body. Dangerous if not used properly.
     3. Taper Shank – Usually morse taper. The most accurate and strongest. The tang prevents the drill from twisting.

# **DRILL BODY**

* 1. Flutes – Helical grooves running along opposite sides of the drill. They form the correct cutting angle at the cutting lips.
  2. Margin – Ear shaped tabs running along outside leading edge of the flutes. Determines the exact diameter of the hole. Runs the entire length of the drill.
  3. Cutting Edges or Lips – They must be equal in length and angle (59°). The degree may vary according to the type of drill. Unequal edges will produce a triangular shaped hole.
  4. Dead Center or Web – At the tip of the drill. It is the width of the web at its narrowest point. It does not cut.
  5. Land – Area behind the cutting edges, slopes back away from the cutting edges at a 12° angle.
  6. Heel – The back edge of the land.

# **USE**

* 1. Rate of Feed – Depth of cut per revolution
  2. RPM - #80 to ½” drills – fastest speeds

½” and over – slower speeds (check chart on drill press)

* 1. Use a pilot drill when drilling a hole over 3/8” in diameter to allow for the dead center. The pilot drill must be larger than the dead center of the larger drill.
  2. Step drill when drilling a hole over 3/8” in diameter. Start with a smaller bit and work your way up to the 3/8” or larger size. This will result in a cleaner cut and less damage to the work or drill bit.

# **PROCEDURE**

* 1. Locate (layout and measure)
  2. Prick punch – check – center punch
  3. Select drills – check condition of drills – Pilot drill, Step drill for safe, easy drilling.
  4. Select proper speed from chart on drill press.
  5. Secure work in a vise or clamp – check for clearance.
  6. Make sure you have eye protection on.
  7. Drill – curl off an even chip, Lighten up prior to completing hole.
  8. Clean up
  9. Check drill and sharpen only if necessary

# **PROBLEMS**

* 1. Drill does not cut – STOP – It will work harden the metal and burn up the drill. Check to make sure the drill is turning the right direction.
  2. Margins are dull – rough cut
  3. Cutting edges chipped – regrind edges
  4. Cutting edges unequal – Use gage to check when grinding.
  5. Drill jams in metal – shut off drill, back drill bit out. Use less down pressure on the bit.