G-17: Spot, Drill, Ream/Tap Hole

SAFETY FIRST

- ☐ Follow all Caterpillar facility safety standards when performing this task.
- ☐ Be aware of spinning and thrusting spindle and sudden movement by the work head.

EQUIPMENT

- ☐ indicators (1/10000 - .0001)
- ☐ Jo blocks (Gage blocks)
- ☐ micrometers (inside/outside/depth)
- ☐ Vernier calipers
- ☐ hole gages
- ☐ gage pins

RESOURCES

- ☐ manufacturer's manuals
- ☐ Machinery Handbook Drill Chart (for reamers and taps)
- ☐ print

Spot, Drill, Ream/Tap Hole

1. **Verify the piece setup.**

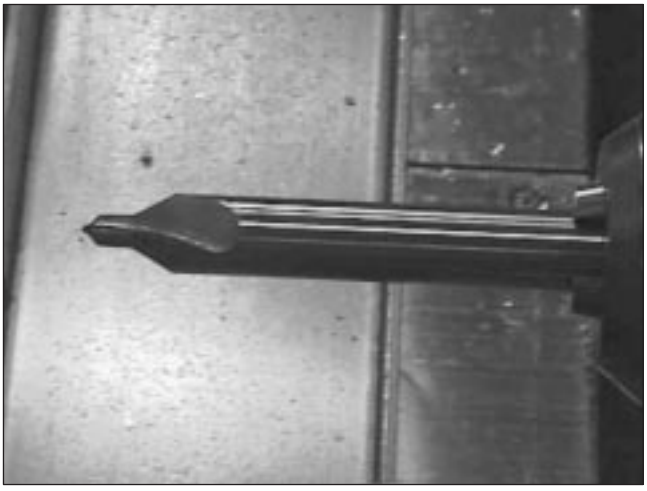
2. **Scribe the part, if needed, according to the print specifications to mark the hole location.**

3. Set the zero on the numeric control.

- ☐ Follow the Toolmaker procedure to chart dimensions or center piece.
- ☐ Zeroing allows the work head to be moved to install the various tools into the spindle, then sent to the home (zero) position.

4. Select the center drill for spotting.

- ☐ Select the drill according to the hole requirements on the print.



5. Set the speeds and feeds for the center drill.

6. Spot the hole.

Lined Up Center Drill

- ☐ Spot drill the hole.

7. Select the drill.

- ☐ To step drill holes larger than .500" select a smaller sized drill and step up to the larger size in increments.
- ☐ Use the Drill Chart to select the appropriate sized drill, if you are tapping or reaming a hole.

8. Install the drill in the appropriate holder.

Drills and Arbors

9. Set the feeds and speeds for the drill.

10. Drill the hole to print requirements.

11. Select the reamer, if reaming the hole.

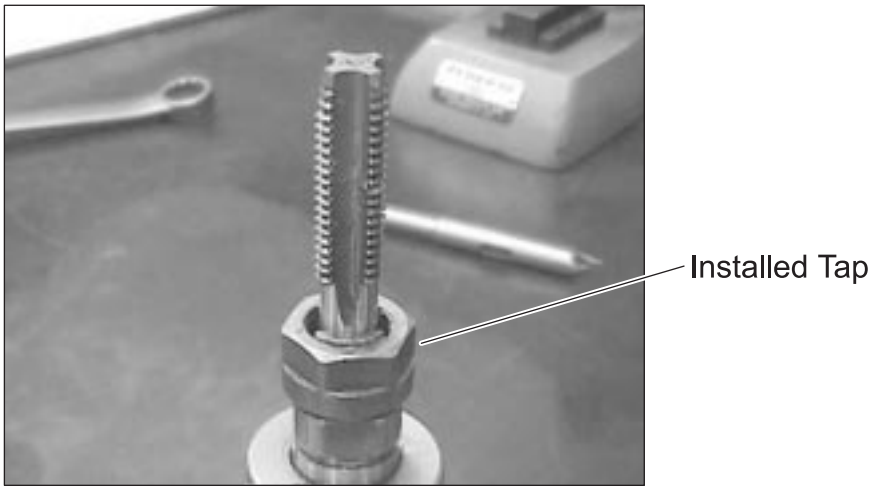
Reamer

Note: Remember to leave 1/64" stock on holes up to 1/2" and 1/32" stock on holes over 1/2 inch. As shown in the Machinery Handbook on gage tolerances.

12. Set the speeds and feeds.

13. Ream the hole.

14. Select the tap, if tapping the hole, according to print requirements.



Installed Tap Holder

15. Select the appropriate tap holder.

Note: The tap arbor is a special arbor not secured to the spindle when installed, allowing the tap to thread itself into the hole.

16. Place the arbor in the spindle and manually move the spindle to the hole.

17. Reduce the speed to approximately 60 to 100 rpm.

18. Set the machine to no feed.

19. Verify that the spindle rotates clockwise (for a right hand tap).

20. Manually force the lip of the tap into the hole until it starts to feed itself into the hole.

21. Stop the spindle when the tap reaches the desired depth.

22. Reverse the direction of the spindle.

23. Restart the spindle to back the tap out of the hole.

24. Follow the Toolmaker procedures to bore the hole, if not reaming or tapping the hole.