# I-04

# TOOLMAKER TRAINING

## SKILL DEVELOPMENT GUIDE

**Duty I: Jig Bore**
**I-04: Chart Dimensions**

Issued 04/01/98

## Task Preview

### Chart Dimensions

This task provides information for charting a piece part. Charting is the process of taking measurements and creating a drawing or sketch. Typically, charting is required when one of these situations occur: a part is presented with a print and the dimensions must be verified; a part is presented with no documented dimensions; or a part is presented and the mating part must be charted. In any case, the part is set up and dimensions measured. As with any machining task, the first steps involve ensuring that the work surfaces are clean and parts are free of burrs. Next, set the machine origin or reference point. Dimensions are then measured, and the print is drawn or corrected. Upon receiving a request to make a replacement part from a sample, the Toolmaker may be requested to site the locations of holes, face, pins, and other types of piece part locations. The Toolmaker may also be asked to fabricate a part using the mating part.

The Toolmaker performs this task to meet new or existing Assembly and some Production needs. The Toolmaker must set up the machine and know how to check linear coordinates before charting dimensions. The part could be machined wrong if the dimensions are not charted correctly. Incorrect charting of dimension may also lead to additional cost associated with reworking the job and the additional stock. Inaccurate information could be relayed to others in production if charting is not done accurately.

### How your skills will be checked

The Skill Check will require you to chart dimensions. All tools, materials, and resources will be available. The Evaluator will verify that your demonstration meets the skill objective by observing or measuring each task standard. You must demonstrate safe work practices during the Skill Check. Contact your Evaluator when you are ready for the Skill Check.

## Skill Objective

Given a jig bore with the work surfaces clean, setup equipment indicated, and the machine origin set, chart the dimensions.

### Task Standards

1. Charted dimensions must match the part dimensions.

2. All safe practices must be demonstrated during machine operation.

## What You Will Need

This section contains the safety information, tools, and resources you will need before charting dimensions.


- ☐ Follow all Caterpillar facility safety standards when performing this task.
- ☐ During machine setup, the machine spindle must be in the neutral state.

- ☐ jig bore
- ☐ required tool room equipment
- ☐ dial indicator (tenths)


- ☐ prints
- ☐ piece parts

## Task Steps

### Chart Dimensions

**Note: This task lists the steps for charting holes on a chart. Example: Charting tasks may consist of grooves, secondary edges, etc.**

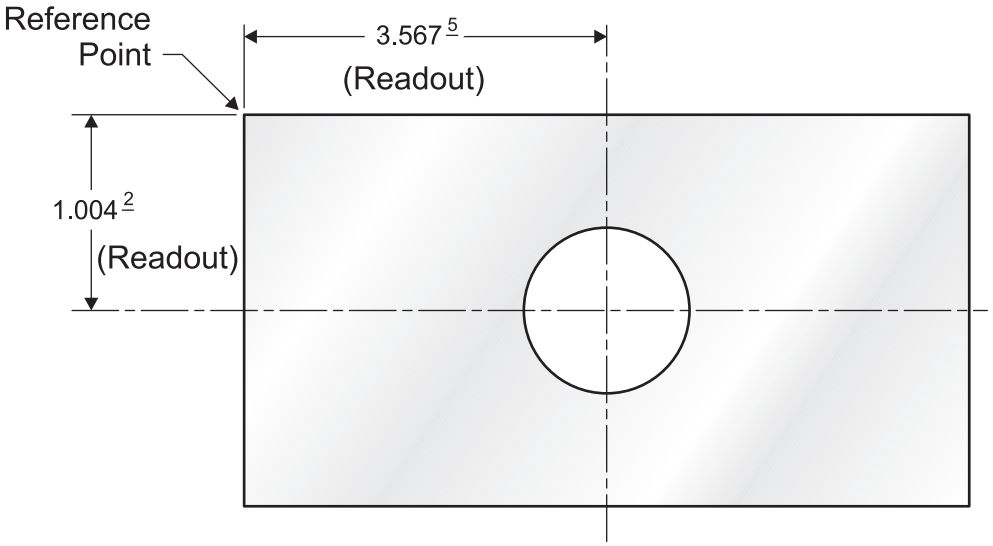
**Chart Piece Part**

1. **Set up the part.**

2. **Clamp the piece part wrench-tight.**

3. **Square the two adjacent edges.**

**Note: Depending on the type of jig bore machine, an origin may not always be set at X, 0 and Y, 0. A reference point, or origin point, is the location on the setup from which the measurements are taken.**



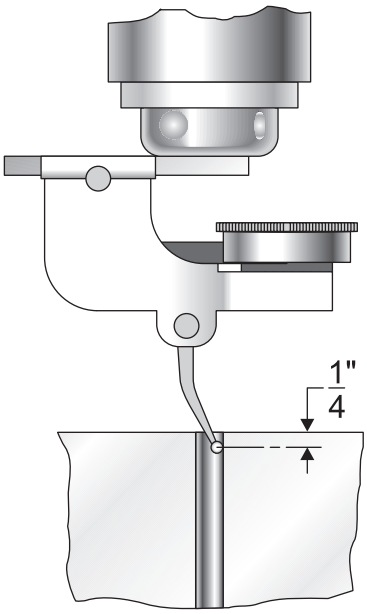

**Part Reference Point**

**4. Zero the machine.**

- ☐ Observe the machine readouts and record the measurements.
- ☐ Draw a sketch of the piece part.
- ☐ Locate the reference point on the sketch.
- ☐ Note the reference points on the sketch. Write legibly. Careful charting communicates accurate information.

**5. Indicate a hole.**

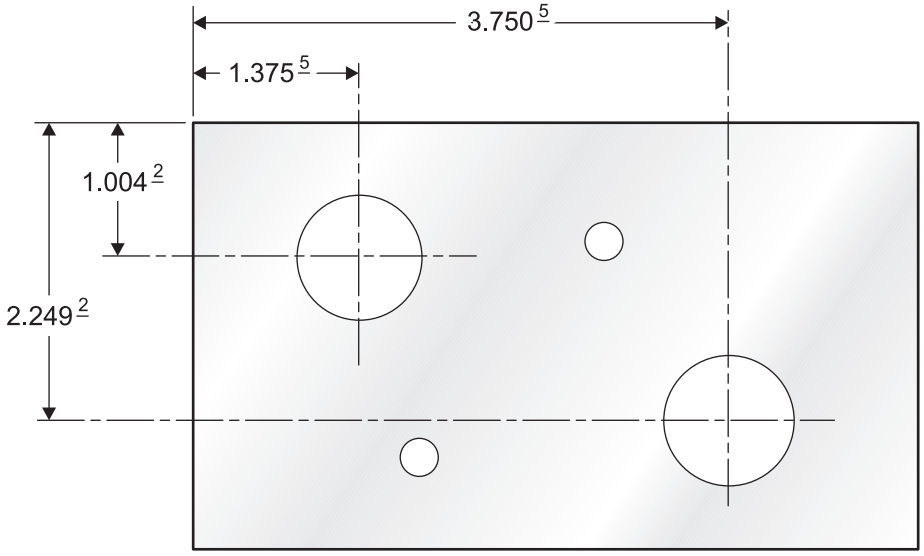
- ☐ Select and document one of the holes for the starting hole.
- ☐ Visually move both axes until the dial probe is approximately centered over the hole.
- ☐ Lower the spindle until the probe is approximately ¼" into the hole.




**Indicated Hole**

- ☐ Sweep the dial 360° around the inside face of the hole. Continue to move the axis from side-to-side or front-to-back until the 360° sweeping action shows indicator needle deflection of ± .000.

- ☐ Record the hole position and the dimension indicated on the machine readout.
- ☐ Ask the trainer to check your dimensions. Sample dimensions are shown below.




**Sample Drawing**

**6. Indicate a second hole.**

- ☐ Select a second hole and repeat step 5.
- ☐ Check your documentation with the print and piece part tolerances.

**7. Remove the part from the machine.**

## Concept Check

### Chart Dimensions

Answer the following questions to check your understanding of charting dimensions. Circle the correct answer in each question. Then compare your responses with the answers at the bottom of this page. Some of the questions may have more than one correct answer. If you have difficulty answering a question, review the Skill Development Guide or ask your Trainer for assistance.

1. Charting is the process of _____ and creating a drawing or sketch.

    a. fabricating a part

    b. taking measurements

    c. documenting

    d. changing a part

2. Typically, charting is required when one or more of these situations occur:

    a. a part is presented with a print and the dimensions must be verified.

    b. a part is presented with no documented dimensions.

    c. a part is presented without a print and the dimensions must be verified.

    d. a part is presented and the mating part must be charted.

3. The Toolmaker may be asked to _____ a part using the mating part.

    a. construct

    b. indicate

    c. draw

    d. size

Answers: (1. b, c  2. a, b, c,  d  3. a, b)

## Next Step

If you are ready to demonstrate the task now, ask your Evaluator or Trainer to schedule the Skill Check.  However, if you need to practice some of the steps first, continue to the next section.

## Practice

The following practice will help prepare you for the Skill Check. Ask your Trainer to set up the practice for you. After you complete a practice, ask your Trainer to check your work.

### Practice

Using the same piece part used in the skill steps, set up the part and chart the hole pattern.

### Practice Objective

Each hole must be charted according to the specifications. The Trainer must agree that the drawing accurately displays the hole dimensions. All safe practices must be demonstrated while completing the charting activity.

### Tools and equipment:

jig bore machine, corner knee, piece part with four holes, paper, pencil, dial indicator (tenths), ruler

## Next Step

Continue to practice until you are ready for the Skill Check. When you are ready to demonstrate the task, ask your Evaluator or Trainer to schedule the Skill Check.