



Now and Tomorrow
Excellence in Everything We Do

Essential Skills and Apprenticeship

Using Essential Skills: On the Job with a Machinist

Are you starting an apprenticeship in machining or are you thinking about a career in this trade? Pursuing a career as a machinist requires strong essential skills such as reading, document use, numeracy and critical thinking.

Use this booklet to:

- learn how machinists use essential skills;
- follow the daily routine of a machinist; and
- find out how your essential skills compare to those of a journeyman in machining.

How machinists use essential skills

Machinists use essential skills to perform a variety of job-related tasks, for example:

- **document use** to read work orders, drawings and specifications;
- **numeracy** to calculate precise dimensions and tolerances, or to measure and lay out work pieces; and
- **critical thinking** to visualize the products they make through drawings and their own sketches to be able to anticipate design issues.



Machinist

Essential Skills

- | | |
|--------------------|---------------------|
| Reading | Working with Others |
| Document Use | Thinking |
| Numeracy | Computer Use |
| Writing | Continuous Learning |
| Oral Communication | |

Machinists set up and operate a variety of machining tools to cut or grind metal and similar materials into parts or products with precise dimensions. Machinists are employed by companies that manufacture machinery, equipment, motor vehicles, automotive parts, aircraft and other metal products; they are also employed by machine shops.

A day in the life of a machinist: Andrew's story

Reading a work order

Andrew is a machinist in the aerospace industry. He is a specialist in jigs and fixtures, which are devices used to hold down work pieces and guide cutting tools to produce accurate duplicate parts. The shop Andrew works for specializes in making parts used in airplanes. When he arrives for his shift, he picks up a work order to modify 1000 brackets so they can be used to attach airplane doors (*document use*). The work order shows that these brackets are missing four holes; all new brackets on order will already have the holes. These brackets are made for a standard door hinge that is used for several different types of airplanes.

Work order

Note: \emptyset refers to number zero
 \varnothing holes refers to diameter of hole

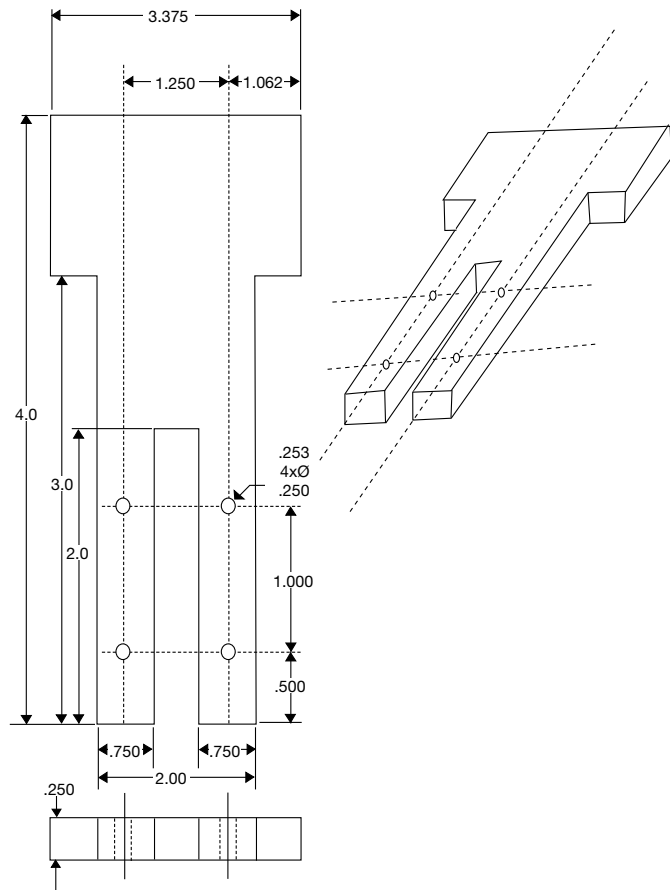
Manufacture drill jig to add 4-250 \varnothing holes to bracket. Next batch of brackets on order will already have 4-250 \emptyset holes included.
Receive brackets from stores
Receive hardware from stores

Meeting with the supervisor

Before Andrew gets started, he discusses the drawing and specifications with his supervisor (*document use, oral communication*). They discuss making a basic drill jig that can be used by a production worker to add the four holes missing in the brackets. Andrew must pay attention to the finish and tolerances of the working area of the drill jig only. The supervisor tells Andrew to add a bevel, or slanting edge and to think about how he will mount the jig. Andrew must consider how to make the jig safe to use and how to prevent the brackets from being inserted the wrong way (*thinking skills – problem solving*).

Designing a jig

With these extra instructions, Andrew is on his own to figure out how to accomplish his task. He thinks about the brackets and refers to the drawings that are attached to the work order. He checks the requirements for the placement of the drill holes (*document use*). The drill holes must be precise. Tolerances are very small – there can only be a 0.003-inch difference between specifications and actual measurements – and each bracket must be drilled in exactly the same place. He designs a drill jig to keep each bracket firmly in place while it is drilled (*thinking skills – problem solving*). The actual drilling job will be given to one of the production workers, who will put the brackets into the jig one at a time and drill the holes in the same spot for each one.



Calculating dimensions for the jig

Andrew starts by making a drawing of the jig that will guide the drill bit. He refers to the work order drawing for the measurements (*document use, numeracy*). He has to consider who will use the jig as he designs; if a worker uses the jig incorrectly because of the design, the worker could suffer an injury or the brackets could become damaged. Andrew also has to consider how soon the brackets are needed, how long the jig needs to last and what materials to use (*thinking skills – critical thinking*).

Making a list of materials

As he designs the jig, Andrew also starts a list of materials and supplies he will need (*writing*). He checks the stock on hand and orders any items that are missing to avoid having to delay the job once it has started (*document use*).

List of materials/supplies:

- 4 hardened drill bushings
- mild steel top plate
- mild steel bottom plate
- 4 socket head cap screws
- 2 dowel pins

