Haas Technical Documentation

Rotary Brake Torque

This document includes these topics:

How to calculate the rotary brake torque at pressures other than 100 psi (6.89 bar)

How to calculate the minimum rotary brake torque for your application

Example

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How to calculate the rotary brake torque at pressures other than 100 psi (6.89 bar)

Each rotary unit has a specified rotary brake torque, which is measured at 100 psi (6.89 bar). For most rotary units, the brake torque changes with air pressure. But some rotary units are internally regulated. These rotaries include:

- HRT 450 (prior to May 2015)
- HRT 600 (prior to May 2015)
- Some built-in rotary axis

Use this formula to calculate the rotary brake torque when you have these conditions:

- The air pressure to your machine is not 100 psi (6.89 bar)
- The axis is not internally regulated

$$\frac{A}{100} \times B = C$$

- **A** is the specified brake torque for the rotary table. Find this value on the specification chart for your particular model.
- **B** is the air pressure to your machine (in PSI). Use the air pressure gauge on the machine, or an external gauge.
- **C** is the brake torque the rotary unit supplies.

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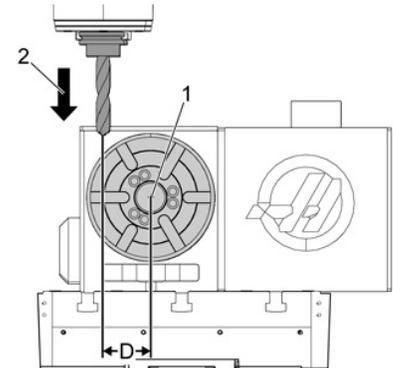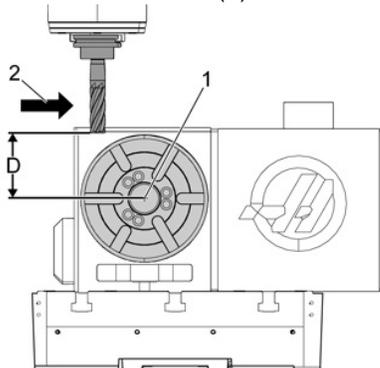**How to calculate the minimum rotary brake torque for your application**

Before you select or install a rotary unit, make sure it can supply enough brake force for the work. This can become a problem when you do one of these operations:

- heavy drilling
- heavy milling
- drilling or milling far from the rotary center.

Use the this formula to calculate the minimum brake torque for your application.

$$\frac{D}{12} \times E = F$$

- **D** is the distance (inches) away from the rotary center. You must measure this distance differently for different types of tool paths. See the following illustrations for reference. The illustration on the left shows you how to calculate **D** for milling applications. The illustration on the right shows you how to calculate **D** for drilling applications. The illustrations show the rotary center (1) and the feed direction (2).

- **E** is the cutting force (lb) necessary for the operation. This information is available from your cutting tool manufacturer.
- **F** is the minimum rotary brake torque. (ft-lb)

Generally, the actual brake torque (C) should be larger than the minimum brake torque (F) by a reasonable margin. For example, if (F) is 100 ft-lb (135.6 nm), then (C) may be 120 ft-lb (176.3 nm) or greater.

> **Note:** Do not adjust the air pressure to the machine to change the brake torque. The machine operates in a range of pressures. If you change the pressure, this has an effect on other systems on the machine. This information is to select the best rotary unit for the work, and to make adjustments to the program.

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Example

Here is an example of an A-Axis milling operation:

- 1018 mild steel
- .5" (12.7 mm), 4 flute square end mill, 4600 rpm
- .5" (12.70 mm) width of cut, .15" (3.81 mm) depth of cut, .007" (.18 mm) feed per tooth
- Cutting force = 190 lb (supplied from cutting tool company based upon cutting parameters)
- Air pressure = 85psi

Use the formula to find the necessary brake torque:

$$\frac{D}{12} \times E = F$$

- **D** is 5" away from the rotary center
- **E** is 190 lb (supplied from cutting tool company based upon cutting parameters)
- **F** is calculated to be 79 ft-lb of minimum brake torque. 95 ft-lb or more of brake torque is best.

Because of the part's size, an HRC 210 or HRT 210 are the best selections. But the air pressure is 85 psi. We must calculate the supplied brake torque to be sure it is sufficient.

$$\frac{A}{100} \times B = C$$

- An HRC 210 supplies 114 ft-lb at 85 psi
- An HRT 210 supplies.170 ft-lb at 85 psi

In this example, any 210 mm or larger rotary table will work for the application.