



Coolant Pressure and Flow Rates

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INTRODUCTION

This document includes these topics:

1. The effect of the number and size of coolant holes on the coolant pressure, flow rate and velocity.
2. Other things which affect the performance of a coolant system.

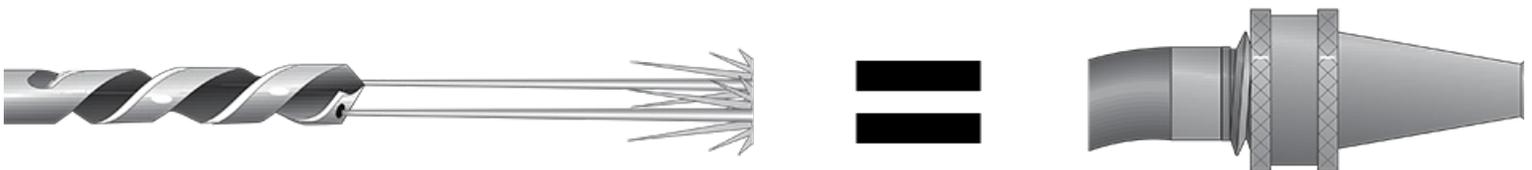
The Relationship Between Pressure, Flow Rate, and Velocity

When the voltage to the pump and inlet restriction remain constant, the flow of coolant can be compared to a garden hose. This is true for TSC and flood coolant.

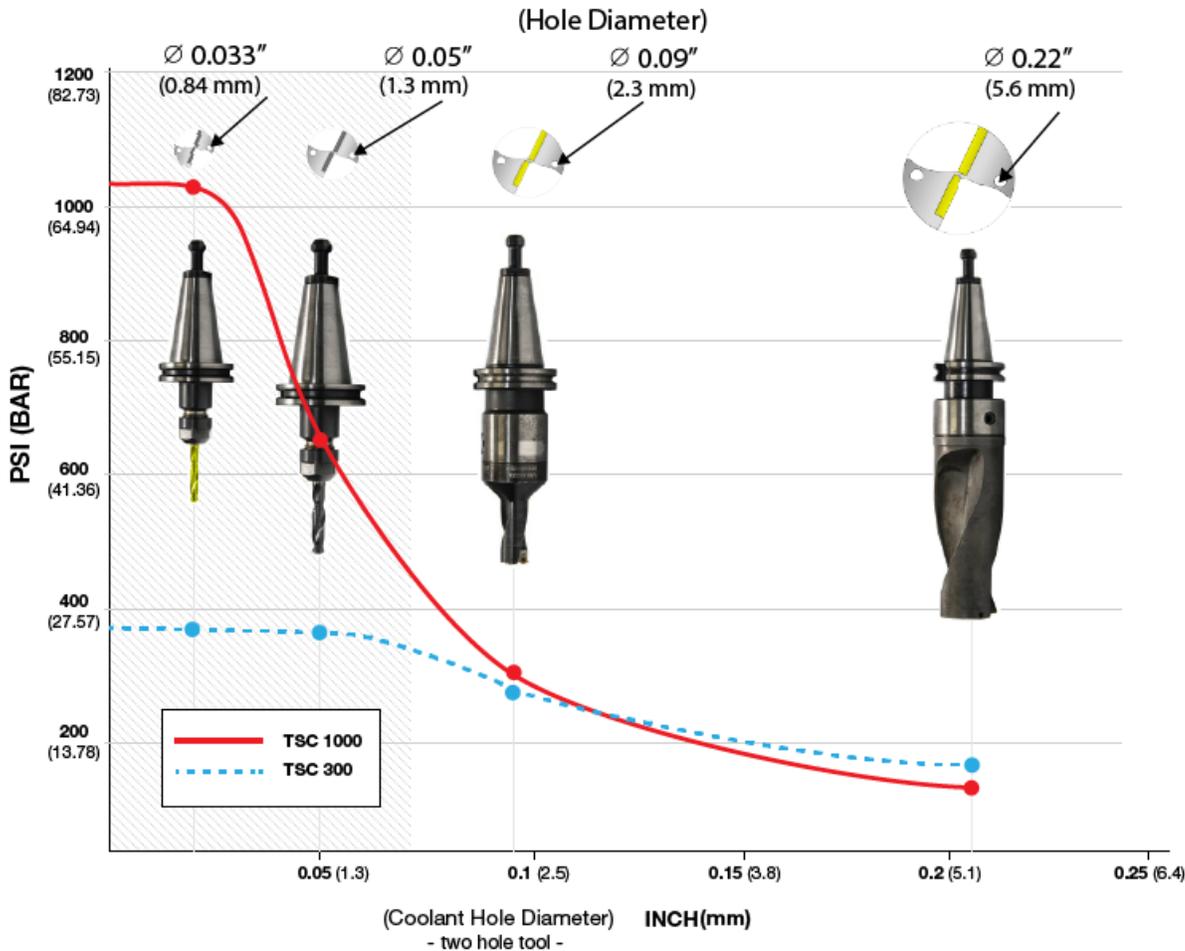
When there are a large number of coolant holes, or the coolant holes are large, more coolant is allowed to flow. But the coolant pressure is low, and the coolant velocity is low. In this example, a tool with large coolant orifices is compared to a hose with no fitting on the end. The flow looks like this:



When there are a small number of coolant holes, or the coolant holes are small, less coolant is allowed to flow. But the restriction causes the coolant pressure to increase, and the coolant velocity increases. In this example, a tool with small coolant orifices is compared to a hose with a fitting on the end. The flow looks like this:



The following graph shows approximate values for the pressure vs coolant orifice diameters for the TSC 300 and TSC 1000. The graph uses a tool with 2 coolant orifices. These values are approximate, and will vary.



The pressure in the flood coolant system is very low, and is not measured in the control. And the tool does not affect the performance of the flood coolant system. The pressure, flow, and velocity of the flood coolant system is affected by these things :

- Changes to the number or diameter of coolant nozzles.
- Closing or opening the coolant valve.

Other Factors Which Affect the Performance of a Coolant System

Other factors can also affect the performance of a coolant system. The most common factors are:

- The input voltage to the pump.
- A restriction in the inlet to the pump.
- A clog in the coolant hose from the pump to the coolant nozzles (Flood coolant only).

An inlet restriction occurs when the filter is clogged with chips. Inlet restriction can cause cavitation. This can cause the pump to run rough. It can also cause the coolant pressure to increase or decrease quickly. It is important to regularly service your coolant filter and inlet for best performance. When the inlet restriction increases, the pressure, flow, and velocity decrease. In the same way when the inlet restriction decreases, the pressure, flow, and velocity increase.

In flood coolant systems, small chips may get past the chip screen, and become stuck in the coolant plumbing. When this happens, the effect is the same as closing the coolant valve. The most likely place for chips to become clogged is behind the coolant nozzle, or at the connections near the pump.