

High Pressure Coolant System at 1000 psi versus 100 psi machine tool flood coolant

In 2014, a process engineer from a company in Dallas, Texas that machines components for the oil and gas industry approached MP Systems for help. The engineer said that frequent manual intervention to clear chips was slowing his machining processes and he believed that incorporating a 1000 psi high pressure coolant system would allow him to automate his processes and improve productivity. MP Systems worked with him to perform the following case study.

Customer: We had technically advanced machine tools, and felt strongly that we should be able to run an unattended, 'lights out' process. This would improve ROI by reducing the amount of non-value added time in our process, reduce the number of machine operators required to tend to our machine tools and it would improve our ability to deliver product to the customers. To optimize our process, we realized that we would have to understand the inefficiencies in our existing process and find ways to eliminate them.

We found chip evacuation to be our biggest problem. It caused us to stop our existing process at seven points to remove chips which our flood coolant had not been able to remove. Using flood coolant, our cycle time was 24 minutes and 1 second.

We spoke with our machine tool distributor who advised us that the flood coolant system with which our CNC lathes were equipped delivered coolant at only 100 psi. Our distributor and our tooling vendors suggested that high pressure coolant would provide the chip evacuation capability that we needed.

After implementing an MP Systems RF8 high pressure coolant system which delivered 8 gallons of coolant per minute at 1000 psi we found that we could eliminate all of the stops that were required in our process for the manual removal of chips.

MP Systems and our tooling vendor also explained that 1000 psi coolant is powerful enough to remove the vapor barrier that can occur at the work piece when cutting with low pressure coolant. High pressure coolant breaks through that barrier and performs two functions: it provides a much higher level of lubrication to the cutting tool which can prolong tool life, it also quenches the hot chip and helps it break before it turns into a longer, stringier chip, facilitating rapid chip evacuation.




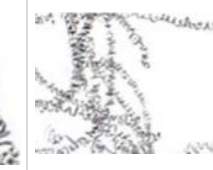
Adding a high pressure coolant system reduced our cycle time in this process from 24 minutes and 1 second to 12 minutes 30 seconds, a 48% decrease, and allowed us to run unattended, "lights out" production.

**Process Flow with 112 PSI
Machine Tool Flood Coolant**

- FACE
- OD TURN
- DRILL THREAD
- DRILL BALL RACE
- BORE THREAD BOX
- 
- BORE BALL RACE
- 
- UNDERCUT
- 
- JIG MILL
- TRANSFER
- 
- FACE
- OD TURN
- DRILL
- ROUGH UNDERCUT
- 
- FINISH UNDERCUT
- 
- BORE
- 
- ANGLE DRILL

| Machine Stops | Cut Time | Chip Time | Cycle Time |
|---------------|------------------|-----------------|-----------------|
| 7 | 19 min., 25 sec. | 4 min., 36 sec. | 24 min., 1 sec. |

Machining Issues Prevent “Lights Out” Automation!

| Chip Shavings with 112 PSI Flood Coolant | | | |
|---|--|---|---|
| Steel | Stainless Steel | HRSA | Aluminum |
| SS1672 CNMG 120408-PF CNMG 432-PF 4225 | AISI 316L CNMG 120408-MF CNMG 432-MF 2025 | Inconel 718 CNGG 120408-SGF CNGG 432-SGF S05F | Alumec CNGP 120408 CNGP 432 H13A |
|  |  |  |  |







Process Flow with 1000 PSI High Pressure Coolant System

- FACE
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- ROUGH UNDERCUT
- FINISH UNDERCUT
- BORE
- ANGLE DRILL

| Machine Stops | Cut Time | Chip Time | Cycle Time |
|---------------|------------------|-----------|------------------|
| 0 | 12 min., 30 sec. | 0 | 12 min., 30 sec. |

48% Cycle Time Reduction!

No Chip Removal Stops, Machining Issues Removed.

| Chip Shavings with 1000 PSI High Pressure Coolant | | | |
|--|---|--|--|
| Steel | Stainless Steel | HRSA | Aluminum |
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