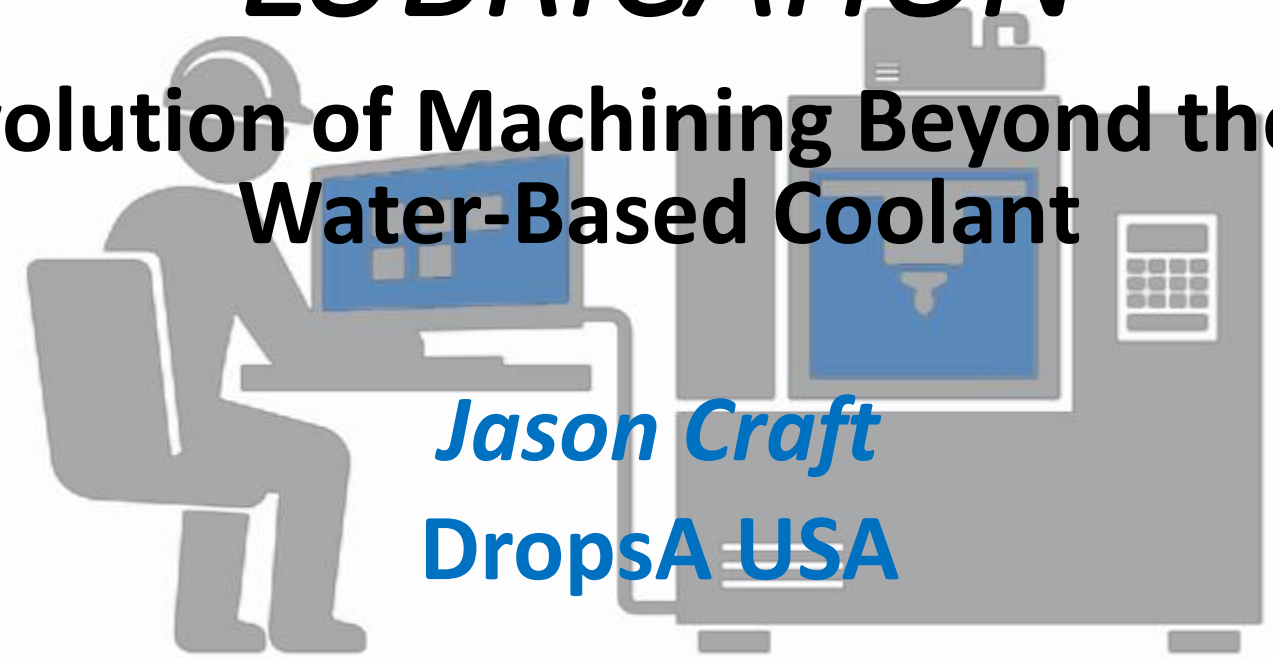
DropsA

MINIMUM QUANTITY LUBRICATION

The Evolution of Machining Beyond the use of Water-Based Coolant



Jason Craft

DropsA USA


DropsA
DropsA MaXtreme
Meet the staff of DropsA USA while previewing the latest in Minimum Quantity Lubrication (MQL) technology. Witness how DropsA can help eliminate coolant from your machining process.
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30X Deep
(Through-Tool Lubrication)
ELIMINATE COOLANT
BOOTH #2825
southtec
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Jason Craft
VP Sales & Marketing

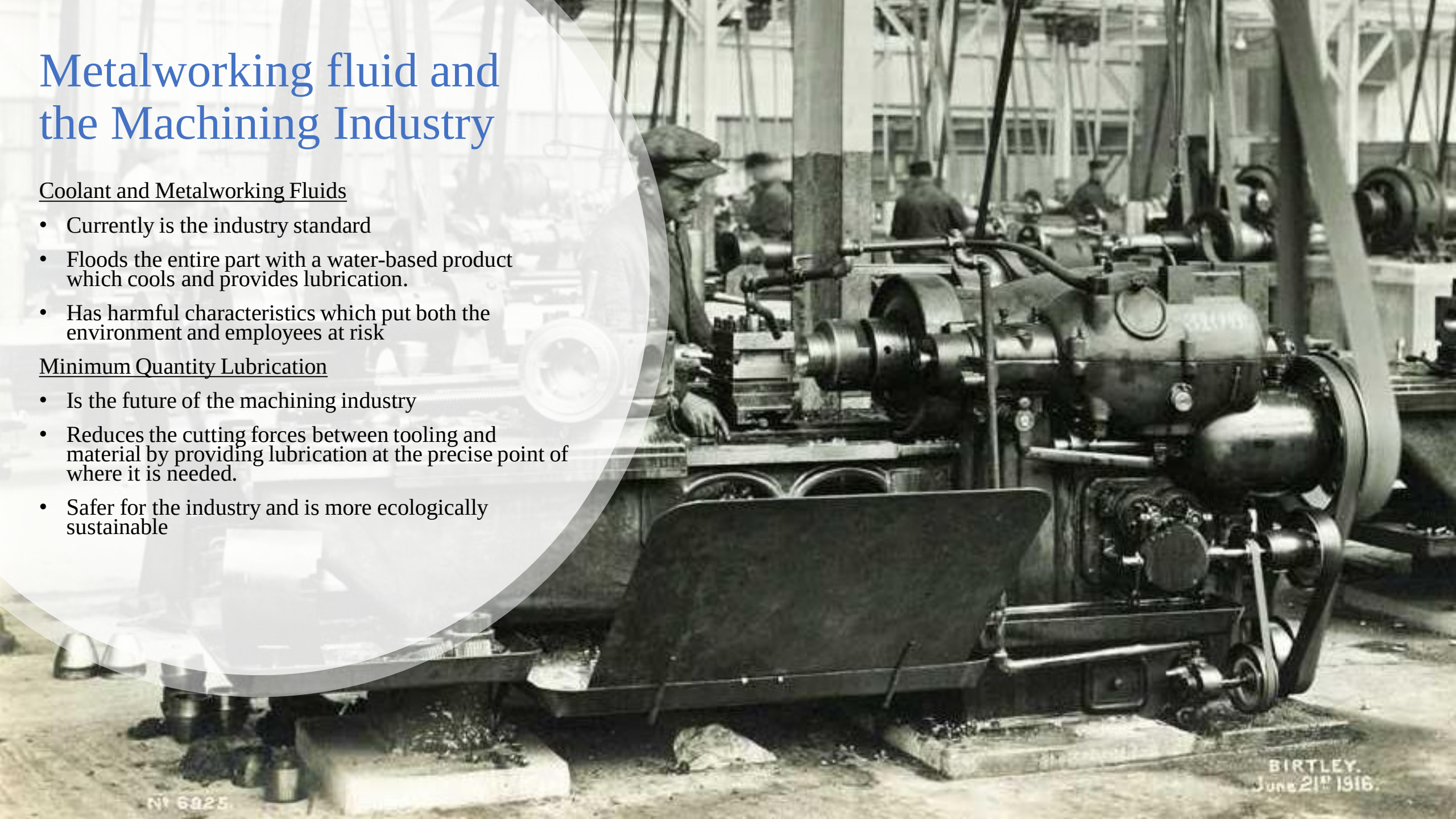
EDUCATION:

- Bachelor of Science Degree in Industrial Engineering – University of Michigan

EXPERIENCE:

- Over 20 years of experience in industrial lubrication
- 10 Years in machine tool industry working with MQL technology

Metalworking fluid and the Machining Industry



Coolant and Metalworking Fluids

- Currently is the industry standard
- Floods the entire part with a water-based product which cools and provides lubrication.
- Has harmful characteristics which put both the environment and employees at risk

Minimum Quantity Lubrication

- Is the future of the machining industry
- Reduces the cutting forces between tooling and material by providing lubrication at the precise point of where it is needed.
- Safer for the industry and is more ecologically sustainable

Issues with Coolant and Metalworking Fluids

- Requires daily maintenance
- Can contain hazardous chemicals and may require special care when handling and removing
- Users may rely on a third-party company to handle the disposal of coolant that is no longer applicable
- Parts that are machined need to be thoroughly washed and dried before shipment
- 15% of the overall machining costs are directly related to metal working fluid

Minimum Quantity Lubrication Advantages

- Improving the work environment in both economical and ecological ways
- Provides a safer workplace for employees
- Promises a green future for the machining industry.
- Increased efficiencies
- Tool life improvements
- Improved product output
- No disposal costs
- No harmful VOC’s released into the environment
- Contains no chlorinated perfins
- Biologically enhanced lubricants offers safe alternatives
- Reduced down time

Our first steps in MQL

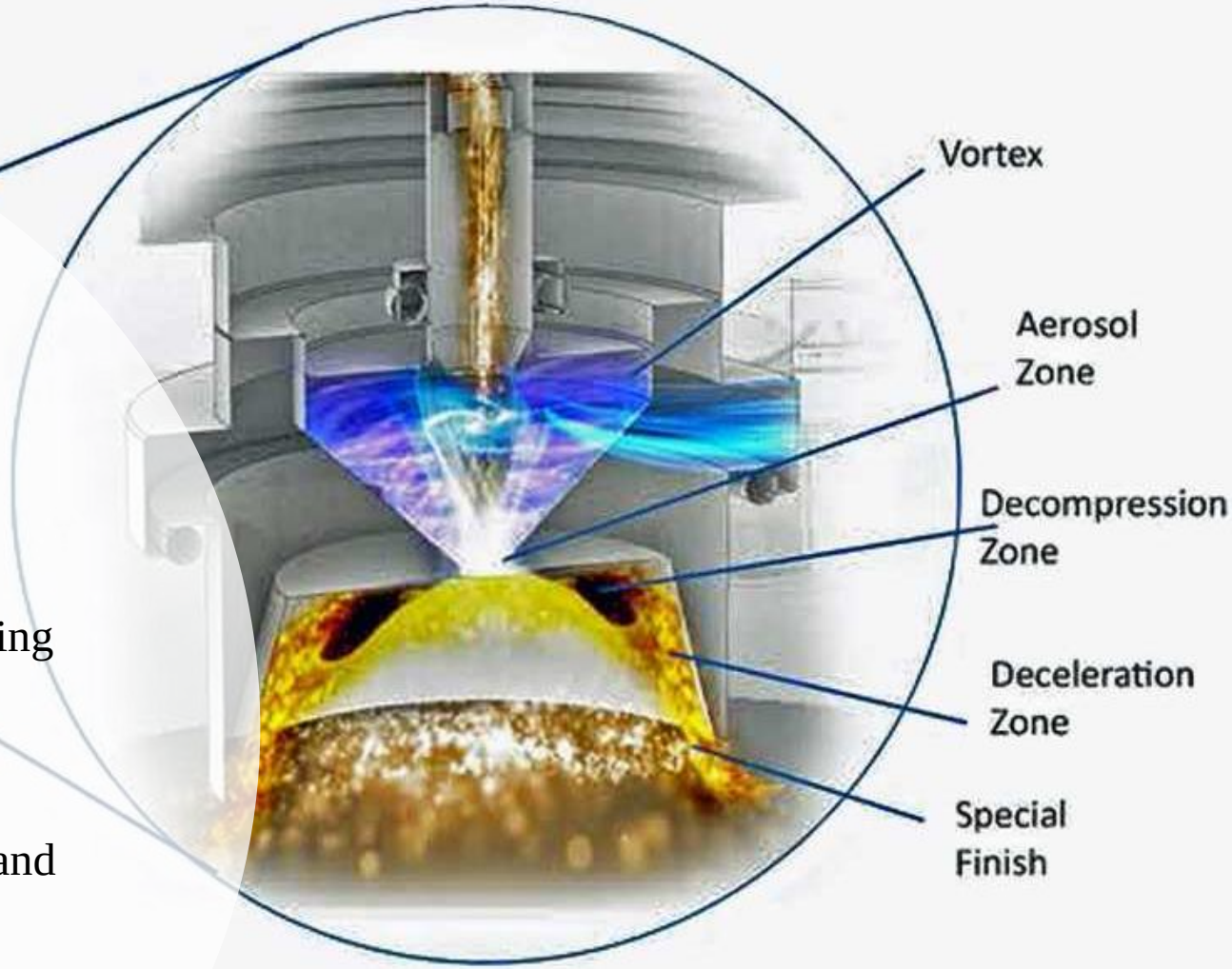
- DropsA first entered the MQL market as a user in 2005
- MKD served as a through tool application
- VIP for tools served as an external air oil application
- The main goal was to reduce overall production costs and create a higher quality part in less time
- Allowed our company to control cost while competing on a global level

Obstacles Implementing MQL within DropsA

- Tooling technology provided limited uses in through tool applications
- Applications with respect to through tool were limited by the size of the orifice.
- Both oil and aerosol technology still had room to improve
- Resistance from machine operators to convert to new technology
- ROI is case by case basis

Improvements in Technology

- MQL technology has improved in the mixing process. Smaller oil droplet sizes are possible.
- Oil technology improvements providing a superior lubrication for both through tool and external applications.
- Increase in understanding of aerosol generation



MaXtreme leading the future of MQL

- MaXtreme has proven that the obstacles that once held MQL back are no longer a cause of concern.
- Particle sizes have decreased significantly and now are on the sub micron level
- More advance machining techniques are now applicable when it comes to MQL
- Through tool capabilities extending all the way down to, but not limited to 2.5mm (0.0984252in)

MAXTREME

MACHINE TO THE EXTREME

Single vortex vs Dual vortex solutions

- Single vortex can be used in general machining where through tool orifice is not restricted
- When tooling is nonrestrictive MQL applications can be easily adaptable

- Dual vortex allows for a higher performance aerosol to be generated
- In situations were tool orifice size is decreased a system such as this allows MQL to still be applicable

How MQL can help you

- May reduce coolant disposal fees
- Employees are no longer exposed to toxic airborne particulates found in standard machining environments with water based cutting fluids
- Tooling costs decrease as tool life increases with the application of MQL
- Chips are no longer wet meaning the need for a drying and detergent process before disposal not needed.
- Workers safety and environmental safety is improved throughout the entire machining process.

MQL and Machinability

- MQL eliminates thermal cracking in carbide tools
- Less heat in tool = Better performance and tool life
- Due to tooling temperatures being decreased this means there is a reduction in heat that is transferred to the work piece through thermal conductivity
- A near total loss system allows for chips to stay separate from the process allowing for continuous production

MQL Improvements in Quality

- Surface finishes improve as there are no suspended particulates causing abrasions on the work piece
- Due to a near total loss lubrication system surface finishes do not diminish throughout production runs
- Better surface finishes mean that total machining time is decreased.
- Product spends less time in the machining phase.

Time savings Coolant vs. MQL

MAIN STAGES OF PROCESSING								
Tools	Quantity	Coolant Machining			MQL Machining			SAVING TIME
		Cutting speed V_c (m/min)	Feed rate f_n (mm/min)	Time (Min)	Cutting speed V_c (m/min)	Feed rate f_n (mm/min)	Time (Min)	(min)
Milling cutter Ø 65		245	400	0,27	245	400	0,27	-
Drill Ø 8,3 – Prof. 48	2	119	652	0,42	120	652	0,42	-
Drill mm Ø 8 – Prof.51	2	120	430	0,118	120	673	0,075	**0,043**
Tap G 3/8 20,8	4	500	668,42	0,24	500	668,42	0,24	-
Drill Ø 2,5 Prof. 20	8	50	318	0,50	47	480	0,33	**0,17**
Tap M 16x1 12,5	4	800	800	0,125	800	800	0,125	-
Drill Ø 5 Prof.	8	78,5	611	0,32	78,5	940	0,20	**0,12**
Gun drill Ø 12 – Prof 56	4	80	34	6,56	80	42,5	5,58	**0,98**
Gun drill Ø 8 – Prof 48	4	80	46,5	4,12	80	58	3,38	**0,74**
Tap M 14x1 Prof. 11,9	8	1000	1000	0,19	1000	1000	0,19	-
Tap G ¼ Prof. 16,1	8	1000	1336,84	0,19	1000	1336,84	0,19	-
		Total time of the Listed processing		**13,053**	**Total time of the Listed processing**		**11**	**2,053**
Other Operations - Fast Feeds – Tool changes …								

Why make the Switch?

- Obtain at least double your current tool life
- Eliminate the cost of coolant disposal
- Reduce the cost of machining and increase profit margins

Switching to MQL

- Any machine with through tool capabilities can be retrofitted with ease
- Often setup time lasts only a few hours, so machine downtime is limited
- Existing machine hardware can be repurposed
- MaXtreme is simply tied into the existing coolant lines of the machine

Examples of Materials but not limited to

- 6160 Aluminum
- 4140 Cold Rolled Steel
- 304 Stainless Steel
- Titanium