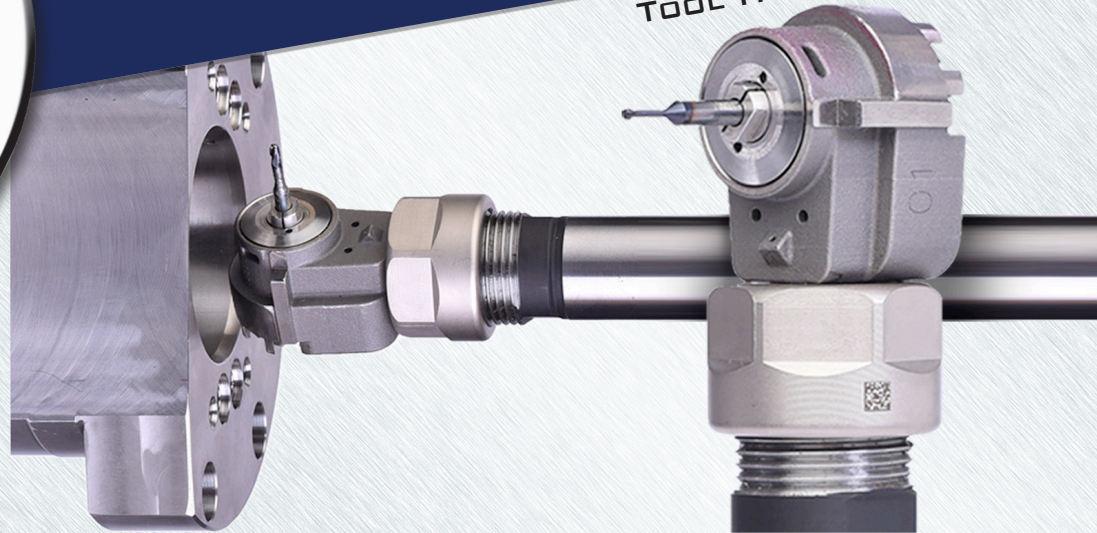




TYPHOON MICRO™

TOOL HOLDING PRODUCTS



Head Angles

- 90 degree (Right Angle)
- 0 degree (Straight)
- 45 degree - coming soon
- 30 degree - coming soon

Spindle Adaption

- 10 mm cylindrical shank
- Recommended for use in ER straight shank collet chuck

Cutting Tool Diameters

- 0.0039" - 0.125"
- (0.1-3.0 mm)

Cutting Tool Shank Diameters

- Inch: 0.062" or 0.125"
- Metric: 2 mm or 3 mm

Coolant Pressure & Flow Rate

- 290-580 psi (20-40 bar)
- 2.6-5.2 gallons/minute

Applications

- Milling
- Drilling
- Thread Milling
- Deburring
- Engraving

High Speed Coolant-Driven Spindles for Small-Diameter Applications

The Typhoon MICRO spindle provides a powerful solution for accurate machining in limited space and difficult to reach work areas. Its simple, 6-piece assembly includes a 3D-printed titanium case for strength and lightweight operation.

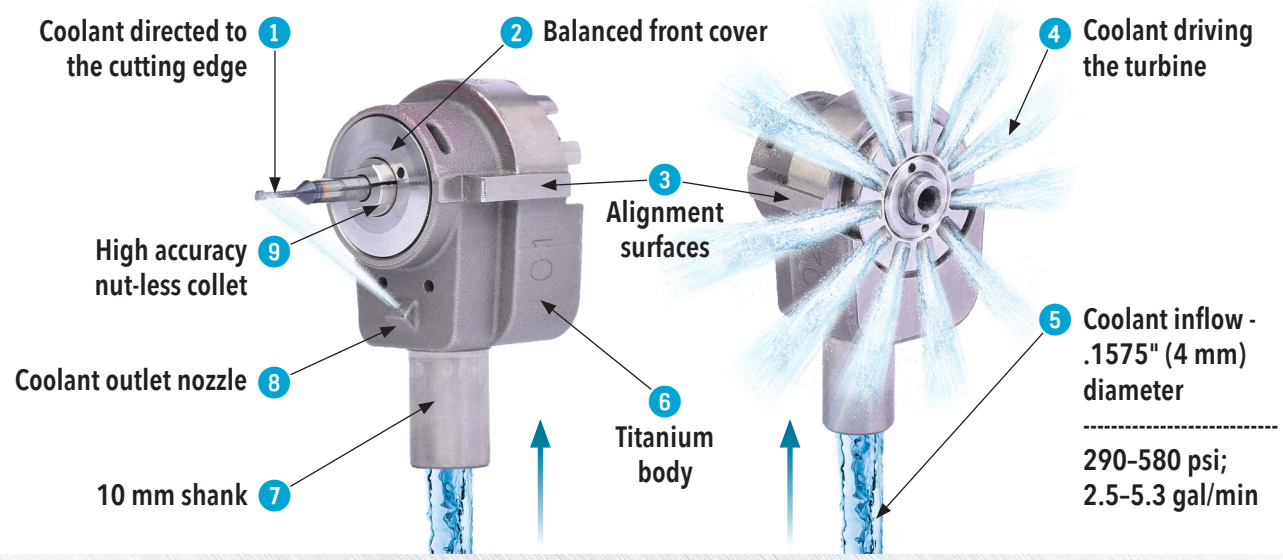
Capable of achieving speeds from 35,000 to 53,000 RPM while the main machine spindle remains stationary, the Typhoon MICRO spindle is ideal for milling, drilling, thread milling, engraving, chamfering, and deburring operations using small diameter cutting tools in a wide variety of semi-finishing and finishing applications.

Features & Benefits:

- Cost-effective solution for unlimited, non-stop high-speed machining capabilities in existing machines
- Supports both milling and turning machines
- Ideal for turning/milling holders with limited space in Swiss-type machines
- Integration using static holders to provide live tooling capabilities to static pockets
- Special emphasis on the internal machining of parts
- Excels not just in power and speed, but also precision, with runout of 3 microns
- Competitive solution compared to use of mechanical gear or electric motor spindles
- Unique nut-less collet system improves dynamic balancing and offers quick, simple tool change with no set up time and low runout
- Turbine coolant outlet and an additional pinpointed coolant outlet nozzle direct coolant to the cutting edge
- Simple, generic interface with identical dimensions and integration options across all Typhoon MICRO spindle models

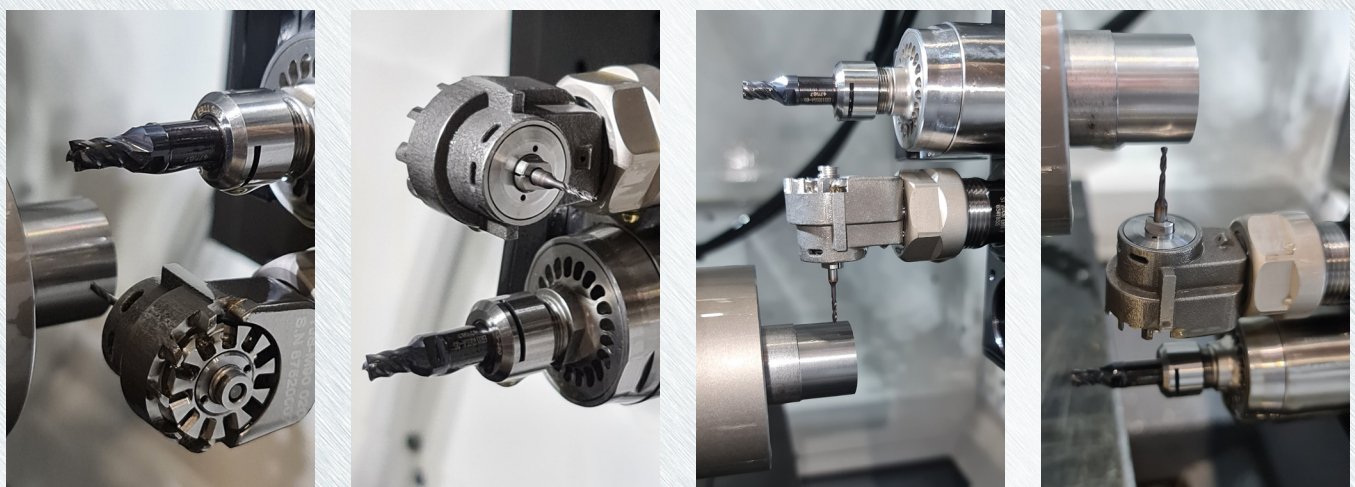


FEATURES AND COOLANT FLOW



INDUSTRIES FOR SMALL TOOL APPLICATIONS

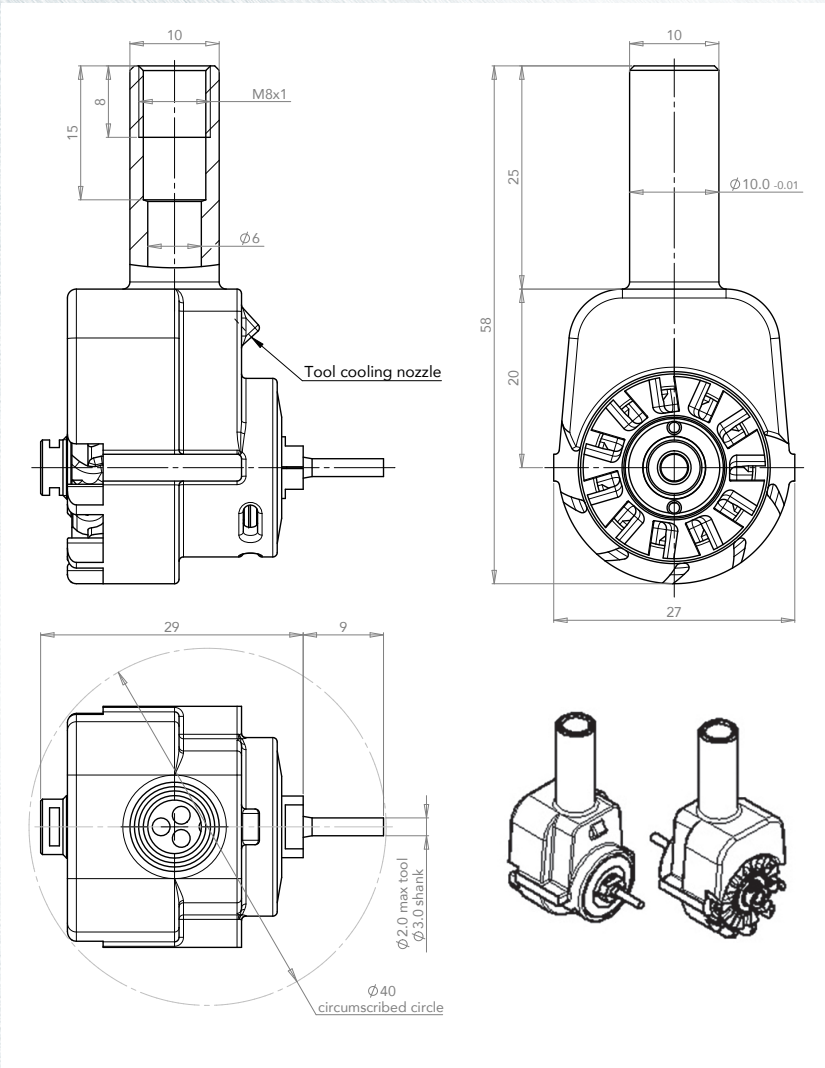
LEADING INDUSTRIES ▶	 Automotive	 Connectors	SECONDARY INDUSTRIES ▶	 Computers
	 Aerospace	 Medical		 Bearings
				 Jewelry
				 Clocks
				 Hydraulic Pneumatic



SPINDLE REQUIREMENTS

- Continuous flow coolant through the main machine spindle
- Coolant pressure at main spindle outlet:
 - » Minimum 290 psi (20 bar)
 - » Maximum 580 psi (40 bar)
- Minimum coolant inlet diameter: 0.1575" (4 mm)
- Coolant flow rate: 2.6-5.3 gal/min (10-20 l/min)
- Coolant filtration: 100µm (10µm is recommended when using electroplated grinding tools)
- Active mist collector
- Ensure water-based emulsion or cutting oil viscosity are up to 20 cP
- When using emulsion coolant, use an anti-foaming agent additive suitable for emulsion
- When using oil-based coolant, high pressure increases oil fumes:
 - » Use appropriate means of fire protection
 - » Use anti-dissolution additive suitable for oil

DESIGN/DIMENSIONS

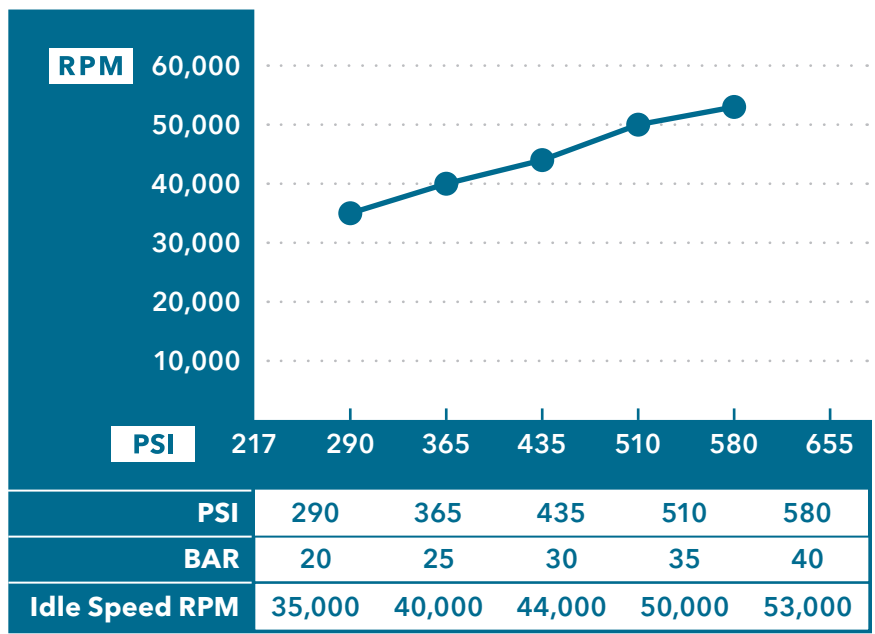




SPINDLE OPERATING PARAMETERS

High Pressure Coolant (PSI)	290 (20 Bar)	580 (40 Bar)	Terms of Use		Note:	
Minimum Tube Diameter	0.1575" (4 mm)		Collet	1.6, 2.0, 3.0, 3.175 mm	<ul style="list-style-type: none"> Coolant pressure is measured from the spindle inlet. It is recommended to select the smallest diameter cutting tool according to the application requirements. It is recommended to select cutting tools in grades that are suitable for high-speed machining. 	
Flow Rate (gal/min)	2.6	5.3	Accessories	ER Straight Shank Collet Chuck; ER SEAL10AA Collet		
Idle Speed (RPM)	35,000	53,000	Warranty	See page 5 for details		
▼ Small tool expertise required ▼						
Cutter (inch)			P	M	N	S
Drilling			0.0039-0.0787" (0.1-2.0 mm)			
Ball-Nose			0.0039- 0.125" (0.1-3.0 mm)			
Chamfering			0.0039- 0.125" (0.1-3.0 mm)			
Lollipop			0.0039- 0.125" (0.1-3.0 mm)			
Barrel			0.0197- 0.125" (0.5-3.0 mm)			
Helical			0.0039-0.0787" (0.1-2.0 mm)			
Engraving			0.0039- 0.125" (0.1-3.0 mm)			

PRESSURE VS SPEED



APPLICATION LIMITS

Milling

- Slotting - up to 0.0394" (1 mm) and ap=0.0020" (0.05 mm)
- Shouldering - up to D=0.0397" (1 mm), ae=0.0039" (0.1 mm), and ap=0.0039" (0.1 mm)

Thread Milling

- Max. M3 thread

Drilling

- Max. drill diameter = 0.0787" (2 mm)

Deburring

- Max. tool diameter = 0.0787" (2 mm)
- Can use 45° to 60° end mill

Engraving

- Max. tool diameter = 0.125" (3 mm)
- Max. ap = 0.0098" (0.25 mm)

OPERATING TIPS

- Attainable cutting speeds are based on coolant pressure and flow rate, but may also be impacted by workpiece material and hardness, the shape of the machined surface, a machining strategy, and cutting tool geometry. Refer to cutting tool manufacturer's documentation.
- Dramatic fluctuations of the rotational speed can indicate problems such as an inadequate coolant pressure or a broken tool.

PACKAGE CONTENTS

- (1) TJS-M90-030
- (2) TJS-M90WRENCH-2430
- (1) TJS-M90COLLET-3.0



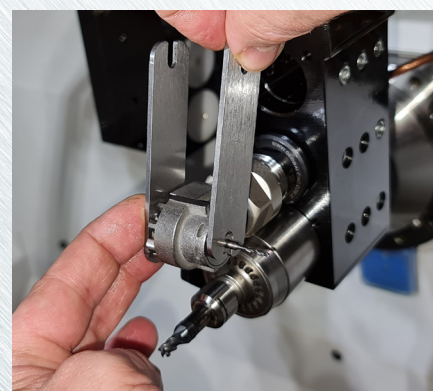
TOOL INSTALLATION



1 Insert the collet into the shaft.



2 Lock the shaft using the dedicated key as shown in the picture, and screw the collet in position.



3 Insert the cutting tool into the collet, then tighten the collet using both keys as shown in the picture.



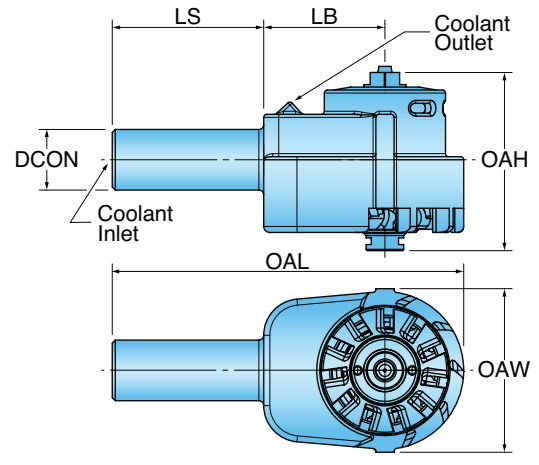
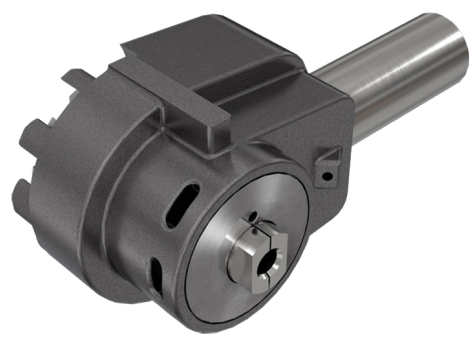
4 Use a dial indicator to align the spindle housing on the ground edge.



5 Use ER wrench to fasten the ER nut on the holder.



TYPHOONMICRO™



EDP	Part Number/ ISO Number	DCON Connection Diameter	CCWS Connection Code Workpiece Side	LB Body Length	LS Shank Length	OAL Overall Length	OAH Overall Height	OAW Overall Width	CNSC Coolant Entry Style Code	CXSC Coolant Exit Style Code	DCP Data Chip Provision
3388091	TJS-M90-030	10 mm	CHS	20 mm	25 mm	58 mm	29 mm	27 mm	1	3	No

SATISFACTION GUARANTEE! A Qualification Form needs to be completed and approved prior to purchase. The Ingersoll product team reviews all applications upfront to ensure the units will be used in an appropriate manner. Demo units are provided free-of-charge with no obligation to purchase.

WARRANTY POLICY

The manufacturer warrants that Typhoon MICRO spindles are to be free from defects in material, design, and workmanship under proper use. Maintenance and service, for a period commencing from the date of invoice referenced by the Spindle Serial No., is valid for **30 days** from the date of invoice.

Within the frame of warranty, the following conditions are in effect:

- Warranty does not apply to spindles that have been subject to operator/programmer error (i.e. crashed or improper preventative maintenance, installation errors, and/or contamination).

- Warranty does not apply to spindles that have been repaired or have attempted to be repaired by anyone other than a manufacturer authorized representative.
- Warranty does not apply to worn-out bearings.
- Claim of defect must be issued by returning the spindle in its original packaging accompanied by a written claim form, with an explanation of the malfunction, inclusion of the spindle serial no. and a copy of the product invoice.

The manufacturer's liability under this warranty shall be limited to the repair of, or replacement of, at the manufacturer's discretion, any part determined to the manufacturer's satisfaction to be defective, and which has not been found to have been misused, abused, abnormally used, or damaged by accident or improper maintenance, altered, or carelessly handled.



TYPHOON MICRO™ OPERATING GUIDELINES

ISO	Material	Hardness	Process	Type	Cutting Tool Diameter inch (mm)	Coolant Pressure (psi)	n Speed (RPM)	ap Depth of Cut inch (mm)	ae Width of Cut inch (mm)	fz* Feed/Tooth inch (mm)			
N	Al-Si 9%	HB 110	Drilling	Drill	0.0197 (0.5)	290	35,000	0.0039 (0.10)	0.0020 (0.05)	0.00039 (0.010)			
						435	44,000	0.0039 (0.10)	0.0020 (0.05)	0.00039 (0.010)			
						580	53,000	0.0039 (0.10)	0.0020 (0.05)	0.00039 (0.010)			
					0.0394 (1.0)	290	35,000	0.0079 (0.20)	0.0394 (1.00)	0.00039 (0.010)			
						435	44,000	0.0079 (0.20)	0.0394 (1.00)	0.00039 (0.010)			
						580	53,000	0.0079 (0.20)	0.0394 (1.00)	0.00039 (0.010)			
				0.0787 (2.0)	290	35,000	0.0118 (0.30)	0.0787 (2.00)	0.00059 (0.015)				
					435	44,000	0.0118 (0.30)	0.0787 (2.00)	0.00067 (0.017)				
					580	53,000	0.0118 (0.30)	0.0787 (2.00)	0.00071 (0.018)				
				435	44,000	0.0020 (0.05)	0.0024 (0.06)	0.00012 (0.003)					
				580	53,000	0.0051 (0.13)	0.0028 (0.07)	0.00012 (0.003)					
				0.0787 (2.0)	290	35,000	0.0031 (0.08)	0.0028 (0.07)	0.00016 (0.004)				
			435		44,000	0.0031 (0.08)	0.0028 (0.07)	0.00016 (0.004)					
			580		53,000	0.0059 (0.15)	0.0031 (0.08)	0.00016 (0.004)					
			0.125 (3.0)	290	35,000	0.0031 (0.08)	0.0031 (0.08)	0.00024 (0.006)					
				435	44,000	0.0035 (0.09)	0.0035 (0.09)	0.00024 (0.006)					
				580	53,000	0.0059 (0.15)	0.0039 (0.10)	0.00024 (0.006)					
			435	44,000	0.0047 (0.12)	0.0197 (0.50)	0.00079 (0.020)						
			580	53,000	0.0059 (0.15)	0.0197 (0.50)	0.00079 (0.020)						
			0.0394 (1.0)	290	35,000	0.0039 (0.10)	0.0394 (1.00)	0.00098 (0.025)					
				435	44,000	0.0059 (0.15)	0.0394 (1.00)	0.00098 (0.025)					
				580	53,000	0.0059 (0.15)	0.0394 (1.00)	0.00098 (0.025)					
			0.0787 (2.0)	290	35,000	0.0079 (0.20)	0.0787 (2.00)	0.00098 (0.025)					
				435	44,000	0.0079 (0.20)	0.0787 (2.00)	0.00098 (0.025)					
				580	53,000	0.0079 (0.20)	0.0787 (2.00)	0.00098 (0.025)					
			435	44,000	0.0197 (0.50)	0.0197 (0.50)	0.00079 (0.020)						
			580	53,000	0.0197 (0.50)	0.0197 (0.50)	0.00098 (0.025)						
			290	35,000	0.0039 (0.10)	0.0079 (0.20)	0.00059 (0.015)						
			435	44,000	0.0039 (0.10)	0.0079 (0.20)	0.00059 (0.015)						
			580	53,000	0.0039 (0.10)	0.0079 (0.20)	0.00059 (0.015)						
			H	See page 8									
			M	See page 9									

Note: Feed and speed recommendations are starting operating parameters. They are only guidelines from which further optimization should take place. Operating parameters are influenced by many machining variables. These variables may cause for reductions in feeds and speed or dramatic increases. Additionally, DOC and WOC may need to be revised to optimize the tools performance.



TYPHOON MICRO™ OPERATING GUIDELINES

ISO	Material	Hardness	Process	Type	Cutting Tool Diameter inch (mm)	Coolant Pressure (psi)	n Speed (RPM)	ap Depth of Cut inch (mm)	ae Width of Cut inch (mm)	fz* Feed/Tooth inch (mm)				
H	H13	HRC 58	Profile Milling	Ball Nose	0.0394 (1.0)	290	35,000	0.0020 (0.05)	0.0020 (0.05)	0.00020 (0.005)				
						435	44,000	0.0020 (0.05)	0.0020 (0.05)	0.00020 (0.005)				
						580	53,000	0.0020 (0.05)	0.0020 (0.05)	0.00020 (0.005)				
					0.0787 (2.0)	290	35,000	0.0028 (0.07)	0.0028 (0.07)	0.00024 (0.006)				
						435	44,000	0.0031 (0.08)	0.0031 (0.08)	0.00024 (0.006)				
						580	53,000	0.0031 (0.08)	0.0031 (0.08)	0.00024 (0.006)				
					0.125 (3.0)	290	35,000	0.0031 (0.08)	0.0031 (0.08)	0.00024 (0.006)				
						435	44,000	0.0039 (0.10)	0.0035 (0.09)	0.00024 (0.006)				
						580	53,000	0.0039 (0.10)	0.0039 (0.10)	0.00024 (0.006)				
					SAE 1.2316	HRC 35	Drilling	Drill	0.0197 (0.5)	290	35,000	0.0020 (0.05)	0.0197 (0.50)	0.00039 (0.010)
										435	44,000	0.0020 (0.05)	0.0197 (0.50)	0.00039 (0.010)
										580	53,000	0.0020 (0.05)	0.0197 (0.50)	0.00039 (0.010)
	0.0394 (1.0)	290	35,000	0.0039 (0.10)					0.0394 (1.00)	0.00039 (0.010)				
		435	44,000	0.0039 (0.10)					0.0394 (1.00)	0.00039 (0.010)				
		580	53,000	0.0039 (0.10)					0.0394 (1.00)	0.00039 (0.010)				
	0.0787 (2.0)	290	35,000	0.0039 (0.10)					0.0787 (2.00)	0.00039 (0.010)				
		435	44,000	0.0039 (0.10)					0.0787 (2.00)	0.00039 (0.010)				
		580	53,000	0.0039 (0.10)					0.0787 (2.00)	0.00039 (0.010)				
	Profile Milling	Ball Nose	0.0394 (1.0)	290					35,000	0.0020 (0.05)	0.0020 (0.05)	0.00012 (0.003)		
				435					44,000	0.0020 (0.05)	0.0020 (0.05)	0.00012 (0.003)		
				580					53,000	0.0020 (0.05)	0.0020 (0.05)	0.00012 (0.003)		
			0.0787 (2.0)	290	35,000	0.0031 (0.08)	0.0031 (0.08)	0.00016 (0.004)						
				435	44,000	0.0031 (0.08)	0.0031 (0.08)	0.00016 (0.004)						
				580	53,000	0.0031 (0.08)	0.0031 (0.08)	0.00016 (0.004)						
			0.125 (3.0)	290	35,000	0.0039 (0.10)	0.0039 (0.10)	0.00024 (0.006)						
				435	44,000	0.0039 (0.10)	0.0039 (0.10)	0.00024 (0.006)						
				580	53,000	0.0039 (0.10)	0.0039 (0.10)	0.00024 (0.006)						
			Slot Milling	End Mill	0.0197 (0.5)	290	35,000	0.0020 (0.05)	0.0197 (0.50)	0.00024 (0.006)				
						435	44,000	0.0020 (0.05)	0.0197 (0.50)	0.00024 (0.006)				
						580	53,000	0.0020 (0.05)	0.0197 (0.50)	0.00024 (0.006)				
	0.0394 (1.0)	290			35,000	0.0039 (0.10)	0.0394 (1.00)	0.00024 (0.006)						
		435			44,000	0.0039 (0.10)	0.0394 (1.00)	0.00024 (0.006)						
		580			53,000	0.0059 (0.15)	0.0394 (1.00)	0.00024 (0.006)						
	0.0787 (2.0)	290			35,000	0.0047 (0.12)	0.0787 (2.00)	0.00039 (0.010)						
		435			44,000	0.0055 (0.14)	0.0787 (2.00)	0.00039 (0.010)						
		580			53,000	0.0055 (0.14)	0.0787 (2.00)	0.00039 (0.010)						
	0.125 (3.0)	290			35,000	0.0047 (0.12)	0.1181 (3.00)	0.00039 (0.010)						
		435			44,000	0.0047 (0.12)	0.1181 (3.00)	0.00039 (0.010)						
		580			53,000	0.0059 (0.15)	0.1181 (3.00)	0.00039 (0.010)						
	Shoulder Milling	End Mill	0.0787 (2.0)	290	35,000	0.0197 (0.50)	0.0197 (0.50)	0.00004 (0.001)						
				435	44,000	0.0197 (0.50)	0.0197 (0.50)	0.00067 (0.017)						
				580	53,000	0.0197 (0.50)	0.0197 (0.50)	0.00071 (0.018)						
			290	35,000	0.0031 (0.08)	0.1575 (4.00)	0.00035 (0.009)							
			435	44,000	0.0031 (0.08)	0.1575 (4.00)	0.00035 (0.009)							
			580	53,000	0.0035 (0.09)	0.1575 (4.00)	0.00035 (0.009)							
	N	See page 7												
	M	See page 9												

Note: Feed and speed recommendations are starting operating parameters. They are only guidelines from which further optimization should take place. Operating parameters are influenced by many machining variables. These variables may cause for reductions in feeds and speed or dramatic increases. Additionally, DOC and WOC may need to be revised to optimize the tools performance.



TYPHOON MICRO™ OPERATING GUIDELINES

ISO	Material	Hardness	Process	Type	Cutting Tool Diameter inch (mm)	Coolant Pressure (psi)	n Speed (RPM)	ap Depth of Cut inch (mm)	ae Width of Cut inch (mm)	fz* Feed/Tooth inch (mm)
M	SS 316	HB 220	Slot Milling	End Mill	0.0394 (1.0)	290	35,000	0.0039 (0.10)	0.0394 (1.00)	0.00059 (0.015)
						435	44,000	0.0059 (0.15)	0.0394 (1.00)	0.00059 (0.015)
						580	53,000	0.0059 (0.15)	0.0394 (1.00)	0.00059 (0.015)
					0.0787 (2.0)	290	35,000	0.0059 (0.15)	0.0787 (2.00)	0.00059 (0.015)
						435	44,000	0.0059 (0.15)	0.0787 (2.00)	0.00059 (0.015)
						580	53,000	0.0079 (0.20)	0.0787 (2.00)	0.00059 (0.015)
			Drilling	Drill	0.0197 (0.5)	290	35,000	0.0020 (0.05)	0.0197 (0.50)	0.00059 (0.015)
						435	44,000	0.0020 (0.05)	0.0197 (0.50)	0.00059 (0.015)
						580	53,000	0.0020 (0.05)	0.0197 (0.50)	0.00059 (0.015)
					0.0394 (1.0)	290	35,000	0.0039 (0.10)	0.0394 (1.00)	0.00059 (0.015)
						435	44,000	0.0039 (0.10)	0.0394 (1.00)	0.00059 (0.015)
						580	53,000	0.0039 (0.10)	0.0394 (1.00)	0.00059 (0.015)
					0.0787 (2.0)	290	35,000	0.0020 (0.05)	0.0787 (2.00)	0.00059 (0.015)
						435	44,000	0.0020 (0.05)	0.0787 (2.00)	0.00059 (0.015)
						580	53,000	0.0020 (0.05)	0.0787 (2.00)	0.00059 (0.015)
			Shoulder Milling	End Mill	0.0787 (2.0)	290	35,000	0.0059 (0.15)	0.0138 (0.35)	0.00079 (0.020)
						435	44,000	0.0059 (0.15)	0.0157 (0.40)	0.00079 (0.020)
						580	53,000	0.0071 (0.18)	0.0197 (0.50)	0.00098 (0.025)
					290	35,000	0.0028 (0.07)	0.1575 (4.00)	0.00059 (0.015)	
					435	44,000	0.0028 (0.07)	0.1575 (4.00)	0.00059 (0.015)	
					580	53,000	0.0031 (0.08)	0.1575 (4.00)	0.00059 (0.015)	
N	See page 7									
H	See page 8									

Note: Feed and speed recommendations are starting operating parameters. They are only guidelines from which further optimization should take place. Operating parameters are influenced by many machining variables. These variables may cause for reductions in feeds and speed or dramatic increases. Additionally, DOC and WOC may need to be revised to optimize the tools performance.