

The manufacturer's limited warranty states that its spindles are to be free from defects in material, design and workmanship under normal and proper use.

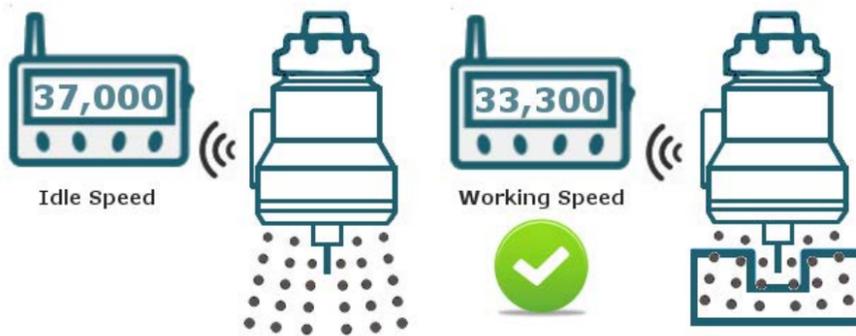
- ✔ Following these guidelines will ensure proper functionality of the Spindle and should yield optimum machining results. See Spindle Warranty at: https://ssl.ingersoll-imc.com/resources/pdf/BUS-067-1_Typhoon_Warranty.pdf/
- ✔ The HPC Jet Spindle is designed for Finishing and Semi-finishing operations using small cutting tools; recommended max diameter of 4.0mm (5/32").
- ✔ **CNC MACHINE PREREQUISITES**
 1. Coolant flow through the main CNC machine spindle.
 2. Min. coolant pressure, at main spindle outlet: 40 bar (580 psi).
 3. Max. coolant pressure, at main spindle outlet: 70 bar (1020 psi).
 4. Minimum flow rate: 16 L/min (4.23 Gal/min.).
 5. Coolant filtration level: Max. 100 µm.

- ✘ Subjecting the HPCJet Spindle to incorrect cutting conditions, may result in damage to the Spindle, the tool, the work-piece or the machine.
- ✘ **The HPC Jet Spindle is an auxiliary spindle speed increaser and is not to be used as a replacement for the CNC main machine spindle.**
- ✘ **Do not allow main spindle to rotate during HPCJet Spindle operation.**
 1. When the HPC Jet Spindle is mounted on the machine, the CNC machine spindle must be locked in a stationary position.
 2. Use the correct software M-code to lock: M19 code locks spindle at a defined angle.

NOTE: Some CNC machines do not enable main spindle locking. Check with the manufacturer.

Follow the 10% Rule:

As the cutting tool enters the work piece, RPMs will be reduced due to load. The HPC Jet Spindle RPM value when working should not drop more than 10% of the RPM value registered at 'idle speed'.



TO REGISTER IDLE SPEED:

1. Mount the HPCJet Spindle on the machine with cutting tool installed.
2. Turn on fluid pressure and note RPMs on the display monitor.

EXAMPLE: Improper conditions

HPC Jet Spindle: TJS HPC-ER32

Application: Milling/Slotting

Material: DIN ST 52-3

Cutting tool: End Mill Ø2.0 mm (Ø.079")

No. of teeth: Z = 2

Cutting conditions: Ae – cutting width = 2.0mm (.079"), Ap – depth of cut = 0.5mm (.02"), fz = 0.012mm/tooth (.0005"/tooth), Vc = 250m/min (820 SFM)

N – Idle: 37,000 RPM

RPM during machining: 29,600 RPM spindle overload!

In the IMPROPER EXAMPLE, following the 10% rule means that RPMs during machining should be a minimum of 33,300 RPM, however RPMs are only 29,600. Therefore load on the tool should be reduced by decreasing the cutting parameters; depth of cut (ap) and feed (Fz) should be lessened.

HPC Jet Spindle Operating Guidelines

CUTTING CONDITIONS:

1. Monitoring RPMs during HPC Jet Spindle operation is critical to ensure optimum machining conditions and to avoid damage.
2. Cutting speed may be influenced by material hardness, work piece topography and /or cutting tool geometry.
3. Dramatic RPM fluctuations during HPC Jet Spindle operation may indicate insufficient coolant pressure or a broken cutting tool.



SHOULDER MILLING												
Tool sizes less than Ø 2 (.078")												
Please refer to the cutting tool manufacturer's documentation for recommended cutting conditions using tool sizes under Ø 2 (.078")												
Cutting Tool Ø 2 (.078")												
Idle Speed RPM	Working Speed RPM	Material	SAE 4340		Al-Si 9%		SAE H13					
		Hardness	38 HRC		55HB		52 HRC					
		Method	A		B		A		B		C	
		Data	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch
22,500	20,250	ap					0.70	.027	1.00	.040		
		ae					0.80	.031	1.00	.040		
		fz					0.02	.008	0.01	.0004		
28,500	25,650	ap			1.00	.040					1.00	.040
		ae			1.00	.040					0.60	.040
		fz			0.03	.0012					0.02	.0004
33,000	29,700	ap	0.50	.020	1.00	.040					1.00	.040
		ae	1.00	.040	1.00	.040					0.80	.040
		fz	0.05	.002	0.05	.020					0.025	.0004
37,000	33,300	ap	0.50	.020	1.00	.040					1.50	.040
		ae	1.00	.040	1.00	.040					0.80	.040
		fz	0.05	.002	0.08	.031					0.03	.0004
40,500	36,450	ap			1.00	.040					1.50	.040
		ae			1.00	.040					0.60	.040
		fz			0.10	.004					0.02	.0004
42,500	38,250	ap	0.50	.020	1.00	.040					1.50	.040
		ae	1.00	.040	1.00	.040					0.60	.040
		fz	0.06	.0024	0.13	.005					0.025	.0004

SLOT MILLING							
Tool sizes less than Ø 2 (.078")							
Please refer to the cutting tool manufacturer's documentation for recommended cutting conditions using tool sizes under Ø 2 (.078")							
Cutting Tool Ø 2 (.078")							
Idle Speed RPM	Working Speed RPM	Material	SAE 4340		Al-Si 9%		SAE H13
		Hardness	38 HRC		55HB		52 HRC
		Data	mm	inch	mm	inch	mm
22,500	20,250	ap					
		fz					
28,500	25,650	ap			0.80	.031	
		fz			0.02	.0008	
33,000	29,700	ap	0.70	.0275	1.00	.040	0.70 .0275
		fz	0.012	.0005	0.025	.001	0.012 .0005
37,000	33,300	ap	0.90	.0354	1.00	.040	0.80 .031
		fz	0.01	.0004	0.025	.001	0.01 .0004
40,500	36,450	ap			1.00	.040	0.80 .031
		fz			0.03	.012	0.01 .0004
42,500	38,250	ap	1.20	.050	1.00	.040	0.90 .0354
		fz	0.01	.0004	0.03	.012	0.01 .0004

SHOULDER MILLING

Cutting Tool Ø 3 (.118")

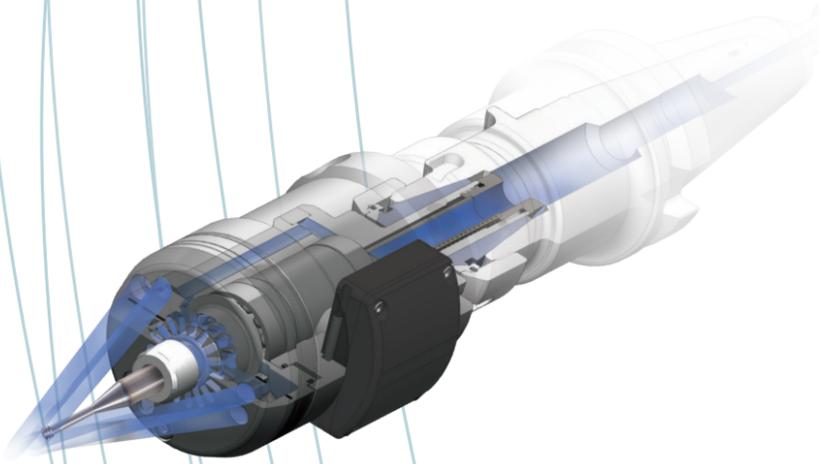
Idle Speed RPM	Working Speed RPM	Material	Al-Si 9%				SAE 316L		SAE H13	
		Hardness	55HB				95 HB		52 HRC	
		Method	A		C		A		B	
		Data	mm	inch	mm	inch	mm	inch	mm	inch
22,500	20,250	ap			3.50	.138			0.50	.020
		ae			0.20	.004			0.80	.031
		fz			0.03	.0012			0.03	.0012
28,500	25,650	ap	0.20	.008	3.50	.138	0.60	.024	0.60	.024
		ae	1.00	.040	0.50	.020	1.70	.067	0.80	.031
		fz	0.10	.004	0.05	.002	0.02	.0008	0.04	.0016
33,000	29,700	ap					0.60	.024	0.70	.027
		ae					1.70	.067	0.80	.031
		fz					0.028	.0011	0.04	.0016
37,000	33,300	ap					0.60	.024	0.80	.031
		ae					1.80	.071	0.80	.031
		fz					0.032	.0013	0.04	.0016
40,500	36,450	ap	0.80	.031	3.50	.138	0.60	.024	0.90	.035
		ae	1.60	.063	0.30	.012	1.50	.059	0.80	.031
		fz	0.10	.004	0.09	.0035	0.03	.0012	0.045	.0018
42,500	38,250	ap	1.00	.040	3.50	.138	0.60	.024	1.00	.040
		ae	1.60	.063	0.30	.012	1.80	.070	0.80	.031
		fz	0.10	.004	0.10	.004	0.032	.0013	0.045	.0018



HPC JET SPINDLE STORAGE:

The HPC Jet Spindle is free from periodic maintenance, however before storage it is recommended to:

- Clean the HPC Jet Spindle by air blowing for 10-15 seconds.
- Max. air pressure for cleaning: (2 bar / 30 psi) DO NOT EXCEED 60,000 RPM
- Disconnect the HPC Jet Spindle from the display device.
- Place the HPC Jet Spindle back in its case.



SLOT MILLING

Cutting Tool Ø 3 (.118")

Idle Speed RPM	Working Speed RPM	Mat'l	SAE 4340 / 38 HRC		Al-Si 9% / 55HB		SAE 316L / 95 HB		SAE H13 / 52 HRC	
		Data	mm	inch	mm	inch	mm	inch	mm	inch
22,500	20,250	ap			0.45	.0177	0.30	.0120	0.20	.008
		fz			0.02	.0008	0.008	.0003	0.015	.0006
28,500	25,650	ap			0.45	.0177	0.40	.016	0.35	.0138
		fz			0.04	.016	0.01	.0004	0.015	.0006
33,000	29,700	ap			0.45	.0177	0.50	.0020	0.35	.0138
		fz			0.055	.0022	0.011	.0004	0.015	.0006
37,000	33,300	ap	0.55	.022	0.45	.0177	0.55	.0022	0.35	.0138
		fz	0.015	.0006	0.08	.0031	0.011	.0004	0.015	.0006
40,500	36,450	ap	0.75	.0295	0.45	.0177	0.50	.0020	0.35	.0138
		fz	0.015	.0006	0.09	.0035	0.012	.0005	0.015	.0006
42,500	38,250	ap			0.45	.0177	0.50	.0020	0.30	.012
		fz			0.11	.0043	0.015	.0006	0.015	.0006

SHOULDER MILLING

Cutting Tool Ø 4 (.157")

Idle Speed RPM	Working Speed RPM	Material	SAE 4340				Al-Si 9%				SAE 316L		SAE H13	
		Hardness	38 HRC				55HB				95 HB		52 HRC	
		Method	A		C		A		C		A		A	
		Data	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch
22,500	20,250	ap					0.35	.014	3.00	.118	0.20	.008	0.30	.012
		ae					1.50	.059	0.20	.008	1.50	.059	1.20	.047
		fz					0.05	.002	0.02	.0008	0.03	.0012	0.03	.0012
28,500	25,650	ap					0.35	.014	3.00	.118	0.30	.012	0.40	.016
		ae					1.50	.059	0.20	.008	1.80	.071	1.20	.047
		fz					0.08	.003	0.05	.002	0.03	.0012	0.03	.0012
33,000	29,700	ap	0.50	.020	4.00	.157	0.35	.014	3.00	.118	0.40	.016	0.50	.020
		ae	1.50	.059	0.20	.008	1.70	.067	0.20	.008	2.10	.0826	1.20	.047
		fz	0.03	.0012	0.03	.0012	0.09	.0035	0.07	.0027	0.025	.001	0.04	.0016
37,000	33,300	ap			3.90	.153	0.40	.016	3.50	.138	0.40	.016	0.50	.020
		ae			0.25	.001	1.80	.071	0.20	.008	2.10	.0826	1.20	.047
		fz			0.03	.0012	0.10	.004	0.09	.0035	0.025	.001	0.03	.0012
40,500	36,450	ap					0.40	.016	3.50	.138	0.04	.0016	0.50	.020
		ae					1.90	.075	0.20	.008	2.10	.0826	1.20	.047
		fz					0.10	.004	0.10	.004	0.03	.0012	0.03	.0012
42,500	38,250	ap			3.90	.153	0.50	.020	3.50	.138	0.50	.020		
		ae			0.45	.018	1.90	.075	0.30	.012	2.10	.0826		
		fz			0.03	.0012	0.11	.0043	0.08	.003	0.025	.001		



SLOT MILLING

Cutting Tool Ø 4 (.157")

Idle Speed RPM	Working Speed RPM	Mat'l	SAE 4340 / 38 HRC		Al-Si 9% / 55HB		SAE 316L / 95 HB		SAE H13 / 52 HRC	
		Data	mm	inch	mm	inch	mm	inch	mm	inch
22,500	20,250	ap	0.20	.008	0.30	.012	0.30	.012	0.20	.008
		fz	0.02	.0008	0.015	.0006	0.007	.0003	0.015	.0006
28,500	25,650	ap	0.25	.010	0.35	.0137	0.35	.0137	0.20	.008
		fz	0.022	.0009	0.03	.0012	0.011	.0004	0.017	.0007
33,000	29,700	ap	0.35	.0137	0.35	.0137	0.35	.0137	0.30	.012
		fz	0.02	.0008	0.05	.0002	0.017	.0007	0.022	.0009
37,000	33,300	ap	0.35	.0137	0.35	.0137	0.35	.0137	0.30	.012
		fz	0.022	.0009	0.065	.0025	0.022	.0009	0.022	.0009
40,500	36,450	ap			0.35	.0137	0.40	.016	0.30	.012
		fz			0.085	.0033	0.022	.0009	0.022	.0009
42,500	38,250	ap	0.35	.0137	0.40	.016				
		fz	0.03	.0012	0.08	.003				

