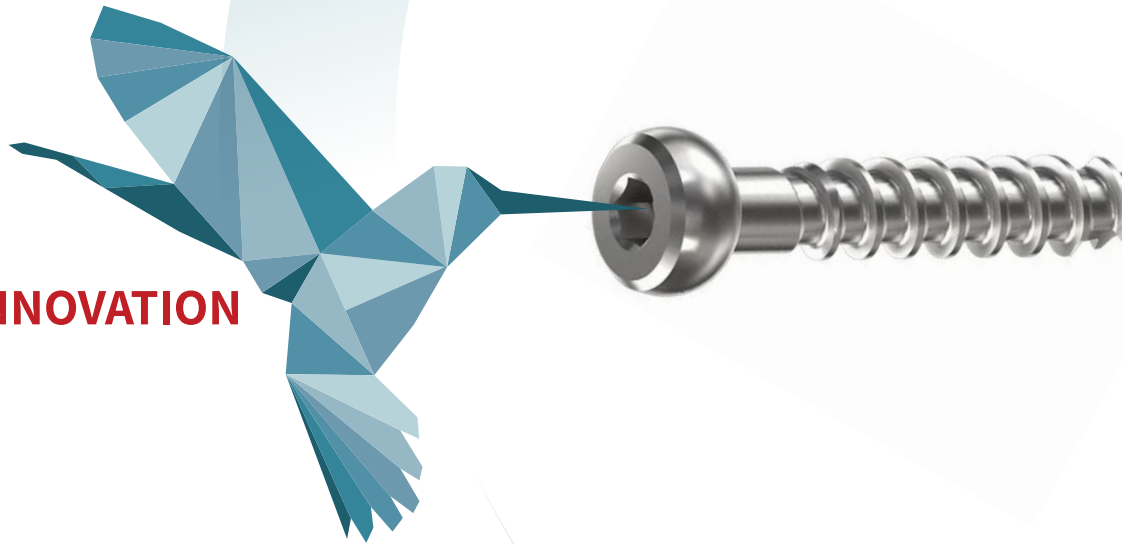


**MEDICAL**  
**INNOVATION**



JULY 2022

Ultra precision high-speed Jet Spindles for a variety of milling and drilling processes with small tools. Cuts machining time up to 70%.

**COLIBRI**  
SPINDLES

## KEY STRENGTHS

Highest standards of precision in fine milling and drilling of complex geometries, interfaces and surfaces

1

### Bone screws



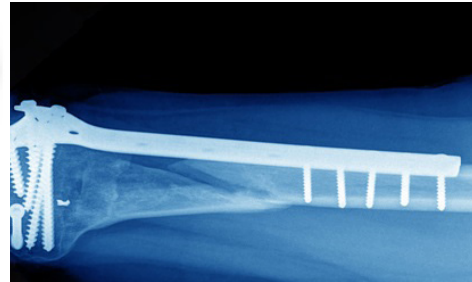
Bone screws, aka orthopedic screws are manufactured from stainless steel or titanium alloys. Bone screws are used on their own to support fractures and breaks and are further used to secure bone plates. Approximately, 900 million bone screws are consumed per annum and are produced under ISO 13485 for Medical Devices.

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## 2

## Bone plates



Bone plates play a vital role in bone fracture healing and are attached to severely fractured bones by means of bone screws. The bone plates are manufactured from stainless steel and titanium. There is a massive variety of bone plate types for each part of the skeleton including of course different sizes and geometries. Bone plates are either mass produced or custom produced individually, on order.

## 3

## Dental Abutments



Dental abutments are characterized by complex geometries and demand smooth finishing. Dental abutments are a connector between the implant (root) and the prosthesis (tooth). Abutments are usually machined from titanium alloy. The trend today is to produce custom abutments which are profile milled to a precise position relative to the crest of the gum tissue.

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**BONE SCREWS****CHALLENGE**

The threads of medical screws are usually machined on the main spindle of a lathe, and transferred to the subspindle, where the hexalobular Torx socket is produced. Because the second operation takes longer, it determines the part's cycle time.

Fine milling of the bone screw hexalobular Torx socket to ensure correct torquing of bone screws and thus positive patient outcomes in orthopaedic surgery is a critical process. Dimensions and tolerances are specified by the ISO 5835 standard which refers to cortical bone screws as HA screws are in the range of 1.5 to 3.5 microns. Bone screws are consumed in the hundreds of millions per annum and the challenge is to complete the entire manufacturing of the bone screws in one setup.

**SOLUTION**

The GJET Jet Spindle extra high speed and little to no runout, at between 20 to 20 bars of high pressure coolant, is ideal for fine milling within a CNC turning machine. The GJET Jet Spindle is a Plug n Play live tool that completes the manufacturing of medical screws in just one setup and at significantly reduced cycle times.

Ultra precision high-speed Jet Spindles for a variety of milling and drilling processes with small tools. Cuts machining time up to 70%.

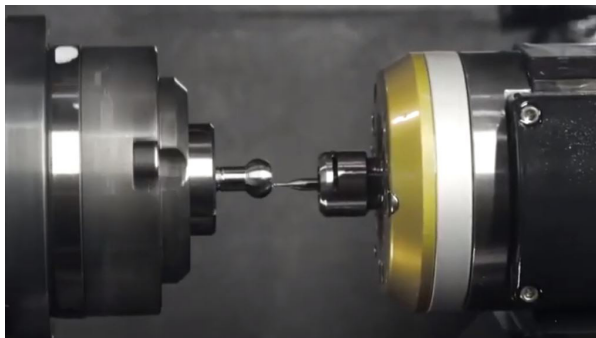
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**BONE SCREWS****FEATURES**

The revolutionary modular high-speed Jet Spindle, meticulously designed, engineered, manufactured and assembled with ultra precision industry collets and nuts, offers maximum flexibility for a wide range of small tool applications.

**BENEFITS**

- ✓ Quick and easy installation
- ✓ Free energy source
- ✓ Good chip evacuation
- ✓ Coolant at the cutting edge
- ✓ Used in tool changer
- ✓ Compact design



Ultra precision high-speed Jet Spindles for a variety of milling and drilling processes with small tools. Cuts machining time up to 70%.

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**BONE PLATES****CHALLENGE**

Orthopedic plates must conform to the shape of bones and joints – machining these parts can be complex. The low machinability rating of many of the materials involved can be a time-consuming process.

Parts are often cast to near net shape, which requires special fixtures and advanced machining techniques. Medical components must comply with extreme quality standards - tight tolerances, ultra-smooth finishes etc.

The most effective option to complete the manufacturing of bone support plates is by profile milling and this needs to be done accurately, fast and with an excellent surface finish.

In addition, there is also the holes for the bone screws that need to be produced using drilling or helical milling (recommended).

**SOLUTION**

The HPC Jet Spindle with extra high torque at high speeds provides the optimal high speed profile milling, drilling and and little to no runout

- ✓ Use Small chip at High Feed and Rotation Speed
- ✓ Minimize Ae step's values
- ✓ Skip Semi-Finish step

Ultra precision high-speed Jet Spindles for a variety of milling and drilling processes with small tools. Cuts machining time up to 70%.

**COLIBRI**  
SPINDLES



**BONE PLATES****FEATURES**

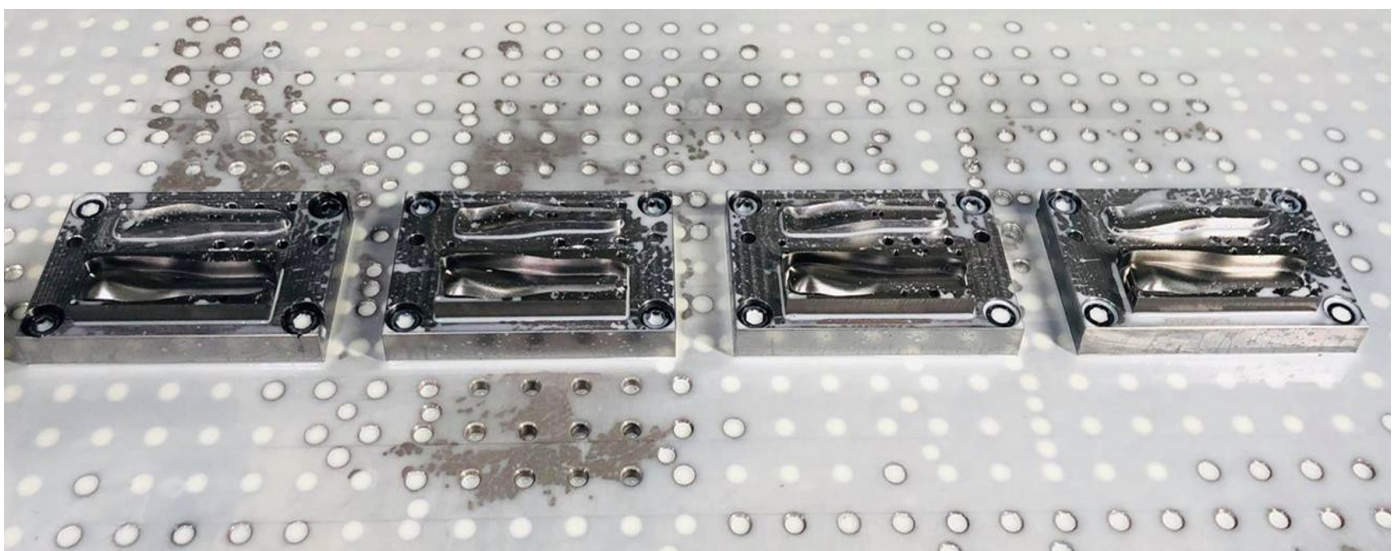
Profile finish with indexable heads

No need for Semi-Finish

Large profiles without any marks and different surface finishes.

**BENEFITS**

- ✓ Reduced tool wear
- ✓ Less need for complimentary steps
- ✓ Ability to machine Nonferrous materials at high Vc
- ✓ Better Productivity on 3 axis machines
- ✓ Switch from Solid ball nose to inserts heads
- ✓ Mass production – multi parts in 24/7 operations
- ✓ Flexible small batch machining – eliminate any Drilling steps



Ultra precision high-speed Jet Spindles for a variety of milling and drilling processes with small tools. Cuts machining time up to 70%.

**COLIBRI**  
SPINDLES

**DENTAL ABUTMENTS****CHALLENGE**

Dental abutments are characterized by complex geometries and demand for a smooth finish. Dental abutments are the connector between the implant (root) and the prosthesis (tooth). Abutments are usually machined from titanium alloy.

The milling challenge with abutments is to mill the non-symmetrical geometries on the side of the prosthesis to a fine finish.

The trend today is towards custom abutments with personalized complex geometries which are profile milled to a precise position relative to the crest of the gum tissue.

The challenge is complete the manufacturing of the abutment, including the profile milling in one setup.

**SOLUTION**

High speed milling with the HPC Jet Spindle with extra high torque and little to no runout provides the ideal solution to milling and fine milling the non-symmetrical geometries of the prosthesis side of the dental abutments.

- ✓ Remove small chips at High Feed and Rotation Speed
- ✓ Minimize Ae step's values
- ✓ Skip Semi-Finish step
- ✓ Use Finish step after Rough Step



**DENTAL ABUTMENTS****FEATURES**

Profile finish with indexable heads  
No need for Semi-Finish  
Complex profile milling without any marks and different surface finishes.

**BENEFITS**

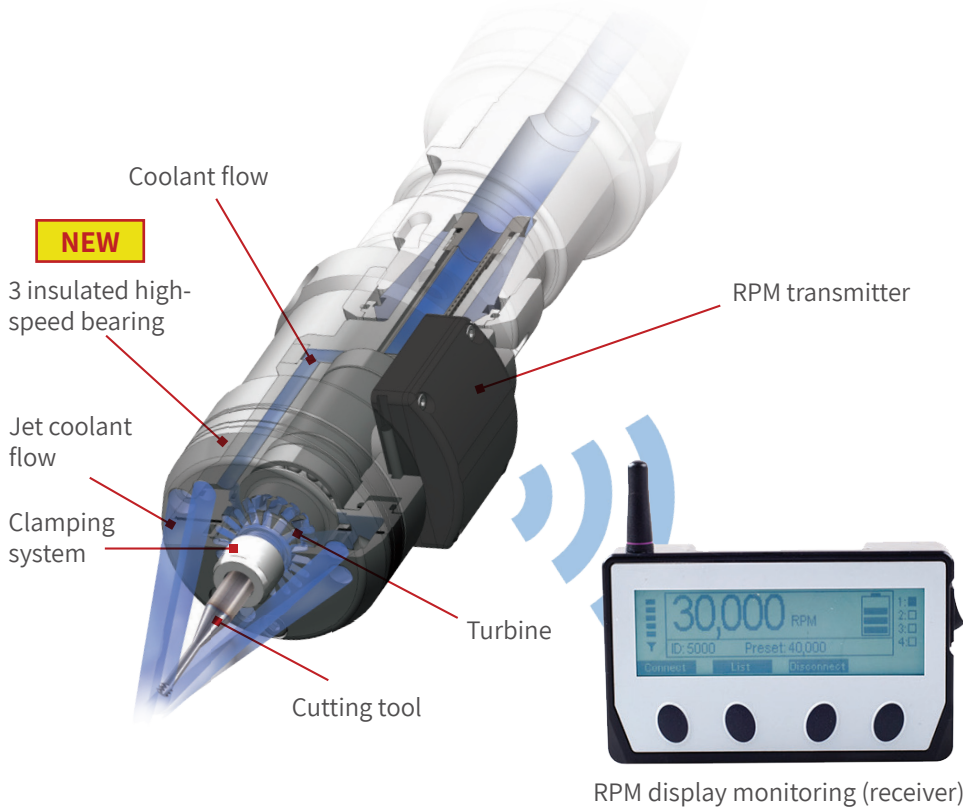
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### COOLANT DRIVEN HIGH-SPEED SPINDLES



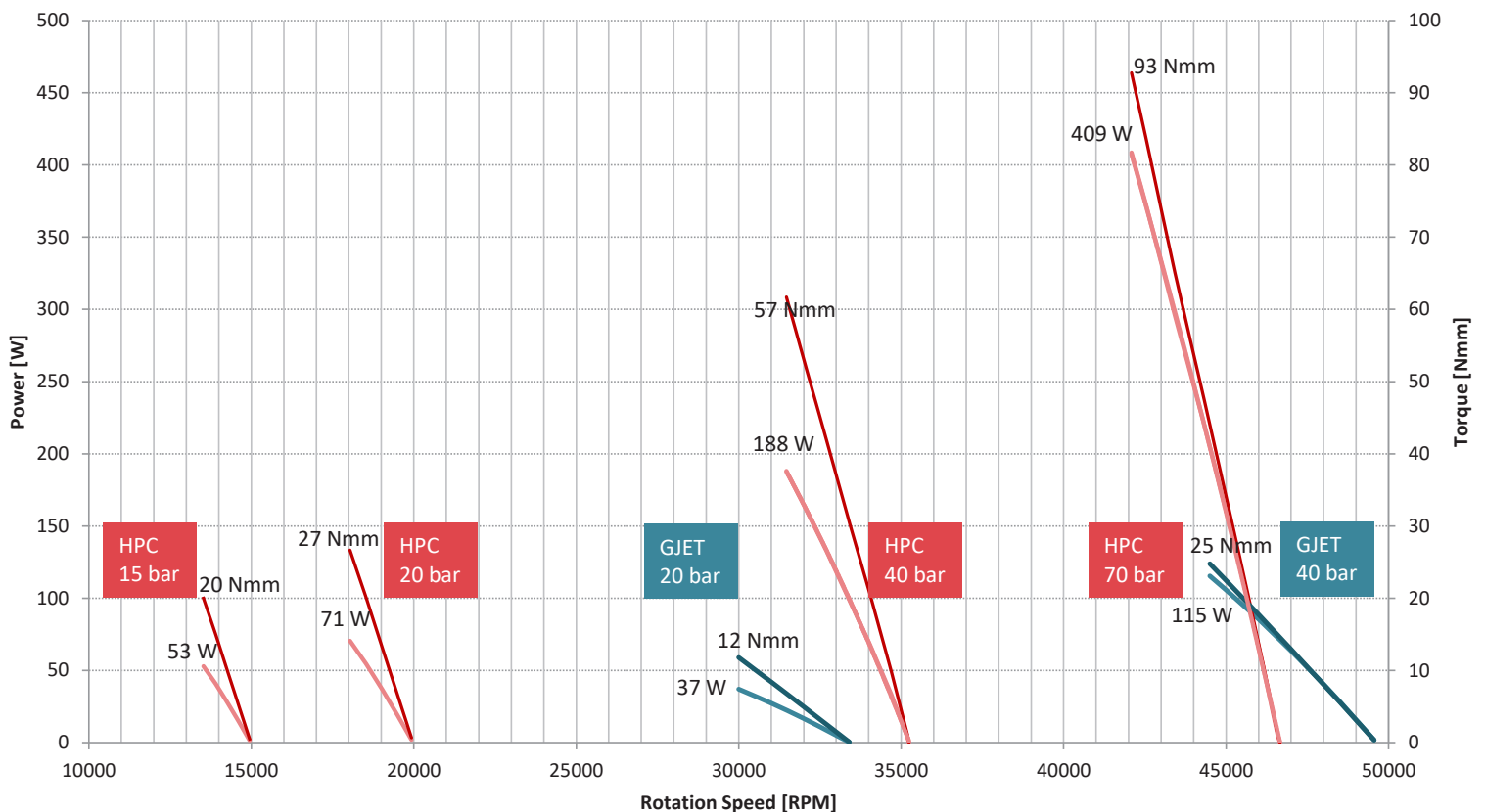
#### FEATURES

The revolutionary modular high-speed Jet Spindle, meticulously designed, engineered, manufactured and assembled with ultra precision industry collets and nuts, offers maximum flexibility for a wide range of small tool applications.

#### BENEFITS

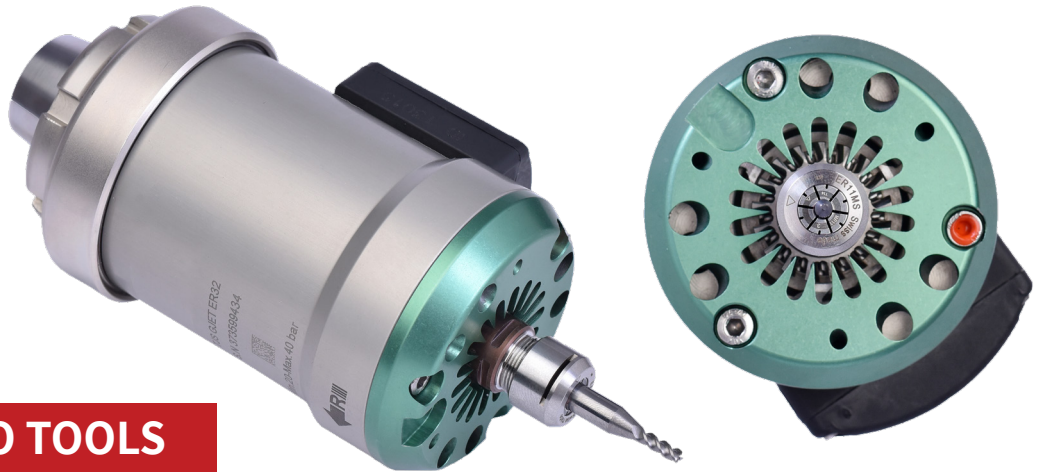
- ✓ Quick and easy installation
- ✓ Free energy source
- ✓ Good chip evacuation
- ✓ Coolant at the cutting edge
- ✓ Used in tool changer
- ✓ Compact design

### Recommended Working Zone for TJS HPC vs GJET



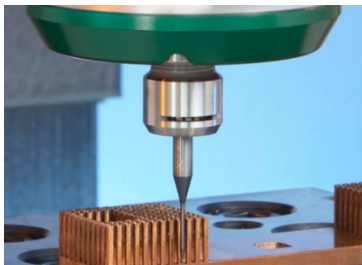
HPC JET - ideal for all small tools, both versatile and powerful and as accurate as the GJET.

GJET - ideal for applications requiring micro tools and very high speeds at 20 to 40 bar.



### SPEED FOR MICRO TOOLS

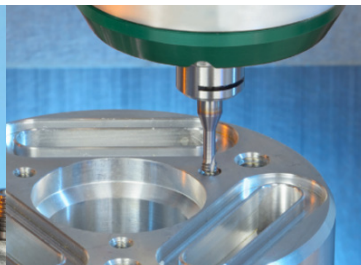
JET SPINDLE OPERATING PARAMETERS					GJET	
High Pressure Coolant (BAR)		20	40	Terms of Use		
Min Coolant Inlet Diameter		6 mm		Collet	ER11	AA/UP
Min Flow Rate (L/min)		10	20	Runout	3 micron	At length of 3D
Idle Speed (RPM)		33,000	55,000			
Max Power (W) / Torque (Nmm)		37 / 12	115 / 25	SMALL TOOL EXPERTISE REQUIRED		
Application	Cutting tool [mm]		P	M	N	S
Drilling			0.1 - 1.0		0.1 - 2.0	
Milling	Single / 2 / 4 Flute Helical, Corner Radii		0.1 - 2.0		0.1 - 3.0	
Profiling	Ball-Nose [1]		0.1 - 2.0		0.1 - 3.0	
Chamfering			0.1 - 2.0		0.1 - 3.0	
Lollipop	Lollipop [1]		0.2 - 2.0		0.2 - 3.0	
Profiling	Barrel		0.5 - 2.0		0.5 - 3.0	
Engraving			0.2 - 2.0		0.2 - 3.0	
FILES AVAILABLE FOR DOWNLOAD IN ONLINE CATALOGUE: <a href="https://colibrispindles.com/catalog/">https://colibrispindles.com/catalog/</a>						
ADAPTER	C5/6	CAT40	SK30/40	ER32/ST20	HSK-A40/A63	BT30/40



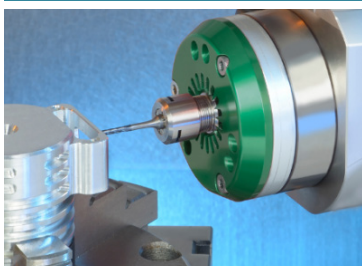
Milling



Drilling



Thread Milling



Chamfering



Engraving



Grinding





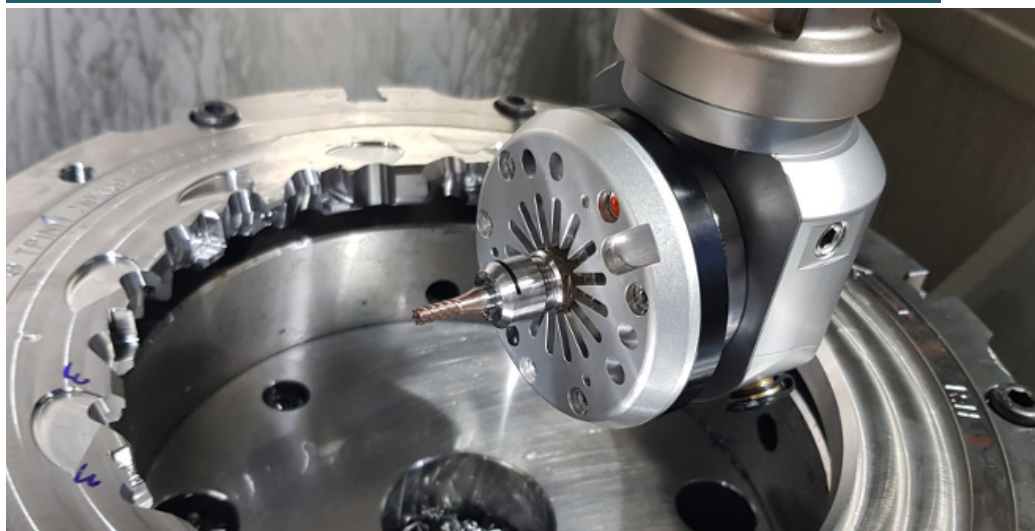


### POWER & EFFICIENCY

JET SPINDLE OPERATING PARAMETERS					HPC JET	
High Pressure Coolant (BAR)	15	20	40	70	Terms of Use	
Min Coolant Inlet Diameter	6 mm				Collet	ER11 AA/UP
Min Flow Rate (L/min)	10	12	16	22	Runout	3 micron
Idle Speed (RPM)	20,000	25,000	35,000	45,000		
Max Power (W) / Torque (Nmm)	196 / 100	261 / 134	460 / 293	694 / 444	SMALL TOOL EXPERTISE REQUIRED	
Application	Cutting Tool [mm]		P	M	N	S
Drilling			0.5 - 2.0		0.5 - 3.0	
Milling	Single / 2 / 4 Flute Helical, Corner Radii		0.3 - 4.0		0.3 - 6.0	
Profiling	Ball-Nose [1]		0.3 - 6.0		0.3 - 6.0	
Chamfering			0.1 - 4.0		1.0 - 6.0	
Deburring	Lollipop [1]		0.1 - 4.0		1.0 - 6.0	
Profiling	Barrel		0.5 - 4.0		0.5 - 6.0	
Engraving (45-60°)			0.2 - 5.0		0.2 - 6.0	
FILES AVAILABLE FOR DOWNLOAD IN ONLINE CATALOGUE: <a href="https://colibrispindles.com/catalog/">https://colibrispindles.com/catalog/</a>						
ADAPTER	C5/6	CAT 40/50	SK30/40	BT30/40	HSK-A40/A63	ER32/ST20

[1] Effective DC (DCap) - Cutting diameter at cutting depth ap

### MORE SPEED / MORE TORQUE / MORE FLEXIBILITY

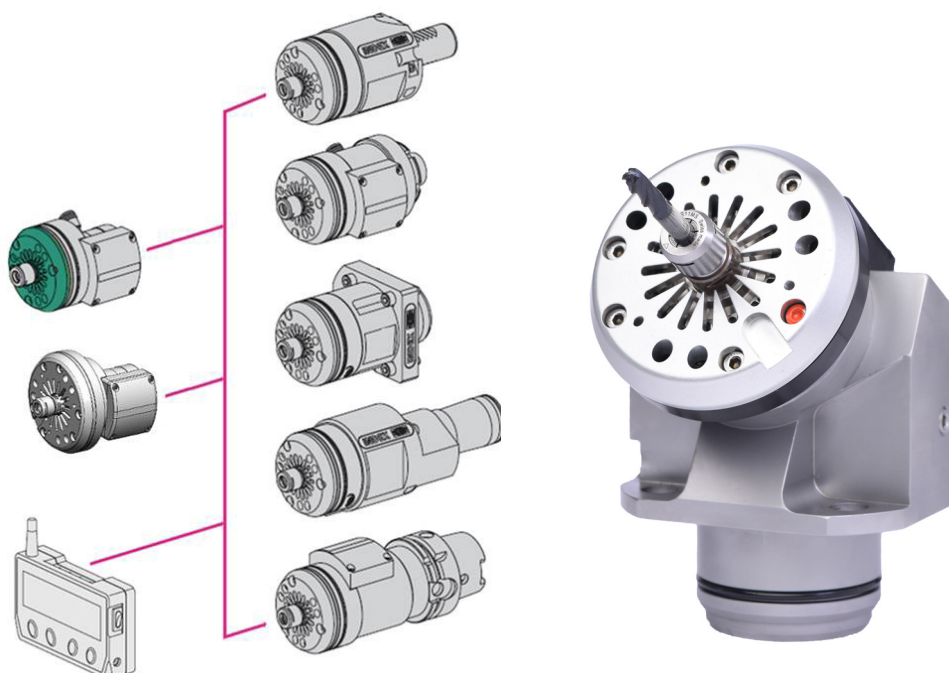


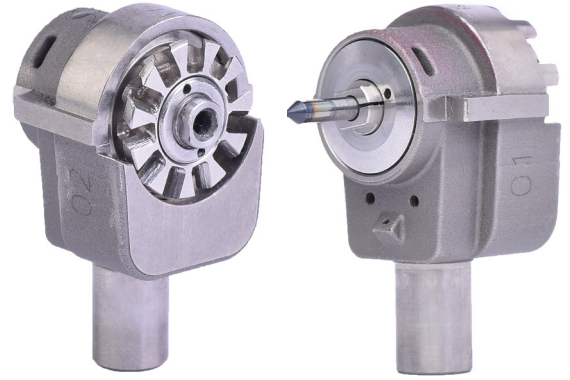


### JET GENERIC INTERFACE FOR NEW ASSEMBLIES

Spindle Operating Data	TR G-JET	TR HPC-JET
Operating range of coolant pressure [bar]	20 - 40	15 - 70
Minimum coolant flow rate [l/min]	10	10
Rotational spindle speed [Krpm]	35 - 55	21 - 45
Rotational direction	Right	
Optimum cutting tool diameter [mm] for Nonferrous Alloys	Drilling 0.1 - 2.0	Drilling 0.5 - 3.0
	Milling 0.1 - 3.0	Milling 0.2 - 6.0
Maximum tool shank diameter [mm]	6.0	6.0
Compatible adapter models	Rear and Front Clamping	

NEW





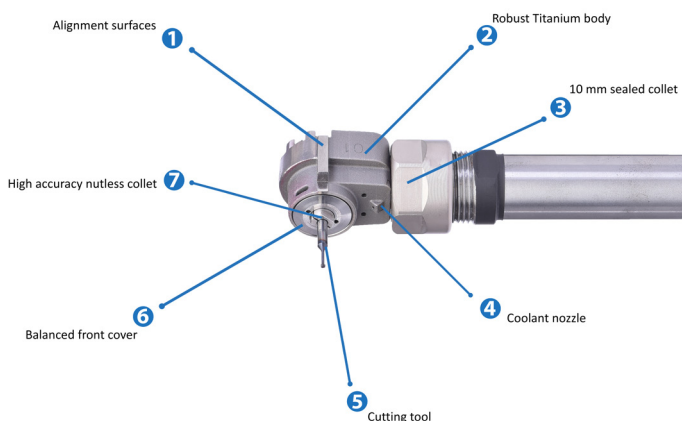
## HIGH POWER MICRO JET SPINDLE

JET SPINDLE OPERATING PARAMETERS				MICRO90 JET
High Pressure Coolant (BAR)	20	40	Terms of Use	
Min Tube Diameter	4 mm		Collect	1.6, 2.0, 3.0, 3.175 mm
Min Flow Rate (L/min)	10	20	Accessories	ERXX SEAL 10 AA
Idle Speed (RPM)	35,000	53,000	Warranty	
			SMALL TOOL EXPERTISE REQUIRED	
Cutter [mm]	P	M	N	S
Drilling	0.1 - 2.0			
Ball-Nose	0.1 - 3.0			
Chamfering	0.1 - 3.0			
Lollipop	0.1 - 3.0			
Barrel	0.5 - 3.0			
Helical			0.1 - 2.0	
Engraving	0.1 - 3.0			
FILES AVAILABLE FOR DOWNLOAD IN ONLINE CATALOGUE: <a href="https://colibrispindles.com/catalog/">https://colibrispindles.com/catalog/</a>				
Primary View 2D - DXF	Model 3D Detail - STP			Drawing - PDF

## APPLICATIONS

- Finishing & semi-finishing processes
- Small tools drilling and milling processes
- Special emphasis on the internal machining of parts
- Ideal for hard to reach places

### Example of clamping with ER16





### HIGH SPEED MACHINED PARTS



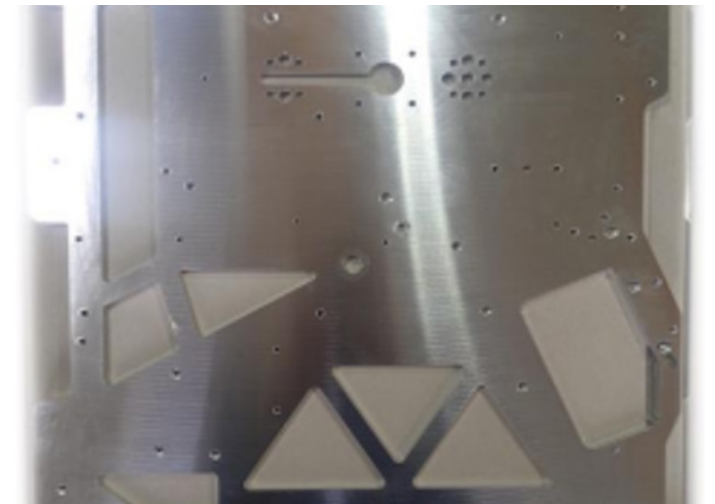
**HPC** Engraving & Chamfering



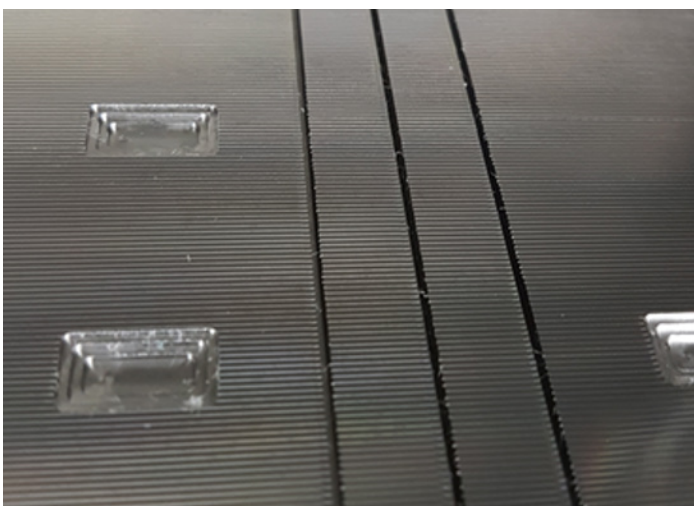
**GJET** Engraving



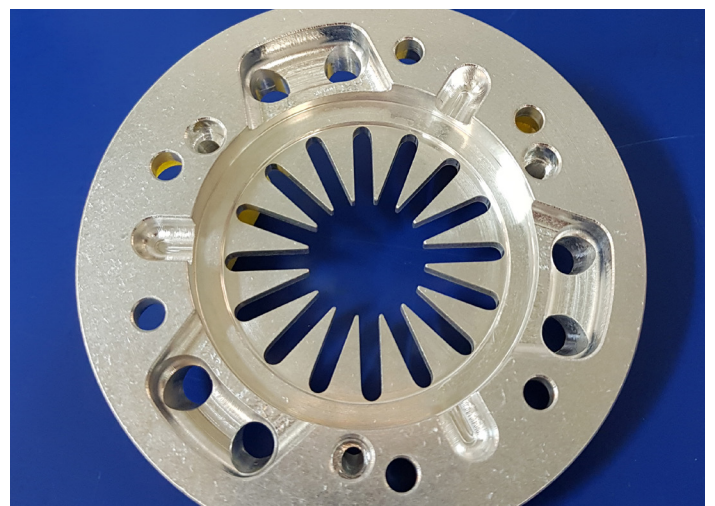
**HPC** Profiling



**GJET** Slot Milling & Drilling



**HPC** Pocket, Slot & Plan Milling



**HPC** Slot & Helical Milling



### PARTNERS



**COLIBRI**  
SPINDLES

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