



旭泰精密機械股份有限公司

SPINTECH PRECISION MACHINERY CO., LTD

Let Your Industry  Revolve Around Us

SPINTECH[®]



超音波主軸模組 Ultrasonic Spindle Module

適用產業

APPLICABLE INDUSTRY



IT 產業
IT Industry



醫療產業
Medical Industry



綠能產業
Green Industry



五金零件
Hardware Parts



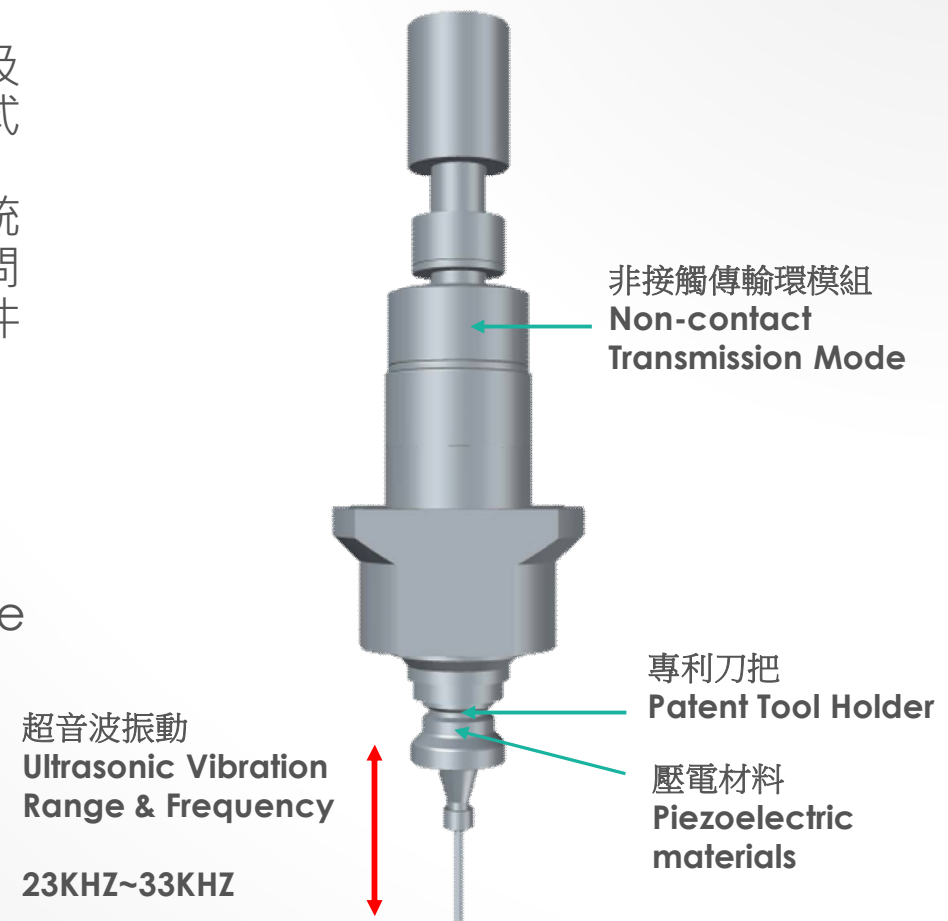
航太產業
Aerospace Industry

- 針對硬脆材料、韌性材料、極軟材料加工需求
 - 提供微細加工刀具所需的切削線速度，提高加工良率
 - 提供現有工具機設備製造廠在原有生產之機種上使用
 - 符合傳統銑削及超音波加工共存的需求
-
- To meet the demand of processing hard and brittle material, toughness material, and dead soft material
 - To provide the cutting line speed for the tool of micro machining to increase high yield rate of processing
 - Can be used on the existing machine equipment for current machine tool equipment manufacturers
 - To conform the processing needs between traditional milling and ultrasonic

超音波主軸模組

Ultrasonic Spindle Module

- 此超音波主軸模組提供了高功率、高效能的切削能力，及刀具低磨耗，電能損耗降低的適切功能，並採用非接觸式傳電方式，提升主軸轉速最高可達24000 RPM，並提高傳輸效率，並搭配旭泰獨特的超音波專利刀把，改善傳統超音波主軸將超音波震盪器建於心軸有震動效能損耗的問題，確保電性有效且穩定，並擁有自動換刀以滿足同工件多把刀的需求，及自動追頻、鎖頻與對頻的功能。
- The ultrasonic spindle module will provide high electrical conductivity and high amplitude power. The module can also increase tool life and electric power. Non-contact transmission mode will improve the transmission efficiency and enhance the spindle speed to 24000 RPM. The unique patent ultrasonic tool holder improve the vibration performance and ensure that the electrical effective and stable.



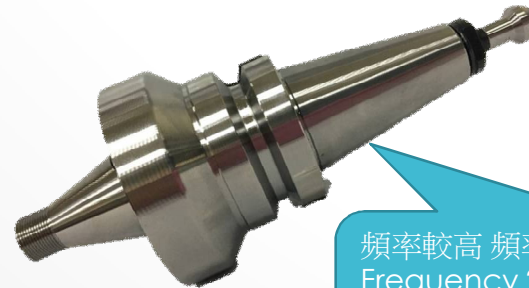
超音波產品規格

ULTRASONIC PRODUCT SPECIFICATION

- 刀把型式 : ER11 / ER16 / BT30 / BT40
- 套管外徑 : Ø95 / Ø100 / Ø120
- 夾持方式: ER筒夾、四瓣爪
- 平衡等級: G1 (ISO1940規範)
- 自動對頻，BT系列可自動換刀
- Tool holder: ER11 / ER16 / BT30 / BT40
- Housing diameter : Ø95 / Ø100 / Ø120
- Collection: Collect or jaw collect
- Balance grade: G1 (ISO1940)
- Automatic frequency adjustment & automatic tool change system



頻率較低 頻率20K~28K 平均24K
Frequency 20K~28K
震幅2um~14um 鑽孔加工
Amplitude of vibration: 2um~14um



頻率較高 頻率23K~33K 平均28K
Frequency 23K~33K
振幅2um~14um 剛性高
Amplitude of vibration: 2um~14um

超音波電源裝置

ULTRASONIC VIBRATION ACTUATOR

- 線性調整高功率(0-5V)
- 可做段數調整(0-30w)
- 最大操作功率30w
- 掃描頻率23KHz-33KHz
- 具備頻率顯示螢幕
- 輸入電壓100-220V
- High power linear adjustment(0-5V)
- Adjustable segments(0-30w)
- Maximum operating power 30w
- Scanning frequency 23KHz-33KHz
- Monitor for frequency
- Input voltage 100-220V



加工應用：氧化鋯加工

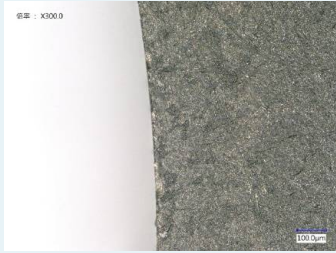
PROCESSING & APPLICATION : ZIRCONIA PROCESSING

刀 具：鑽石磨棒

Tool : Diamond point

加工目標：螺旋下刀，深度1.3mm

Processing Target : Spiral cutting, depth 1.3mm

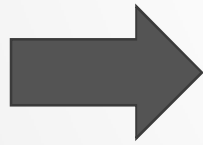
	轉速 Speed	進給速度Feedrate	入口 Front	出口 Back
1	8000RPM	300 mm 46s min		
2	18000RPM	300 mm 48s min		

超音波實際加工：錳鋅鐵氧體

ULTRASONIC PROCESSING : MANGANESE-ZINC FERRITE



粗胚
Raw Blank



成品
Finished Product



超音波實際加工：氧化鋯

ULTRASONIC PROCESSING : ZIRCONIA

材料：二氧化鋯
厚度：8mm

Material : Zirconia
Thickness : 8mm



裁切



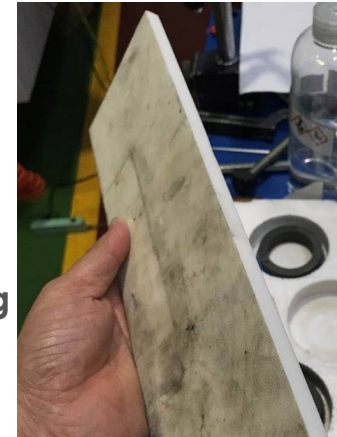
Cut



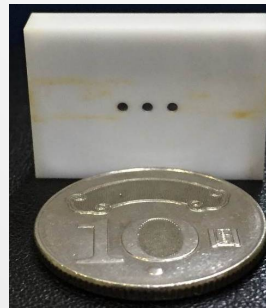
裁切面



Cutting face

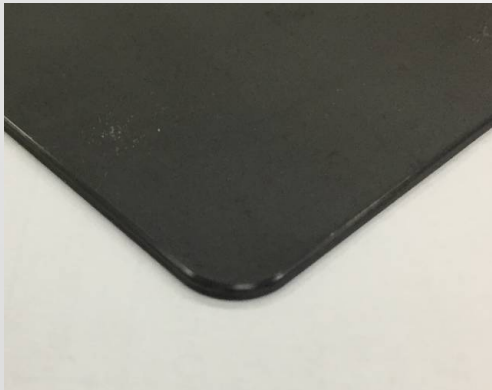


成品
Finished Product



超音波實際加工：陶瓷背板

ULTRASONIC PROCESSING : CERAMIC BACKPLANE



超音波加工不鏽鋼之測試報告

TEST REPORT OF ULTRASONIC PROCESSING ON STAINLESS STEEL

1. 目的 Purpose

了解在 $0.5 \times 6 \times 0.3\text{mm}$ 槽的加工效率及刀具(使用 0.5mm 端銑刀)壽命。

To know the life of tool (0.5mm end mill cutter) and its working efficiency on $0.5 \times 6 \times 0.3\text{mm}$ slots.

2. 方法 Method

A. 分別在有超音波及無超音波的狀態下，皆使用新磨刀進行不銹鋼板加工。

A. To process stainless steel by using new end mill cutter on traditional and ultrasonic spindles.

B. 參照表1的參數進行兩次之測試。

B. Make two tests based on chart 1 parameters.

超音波加工不鏽鋼之測試報告

TEST REPORT OF ULTRASONIC PROCESSING ON STAINLESS STEEL

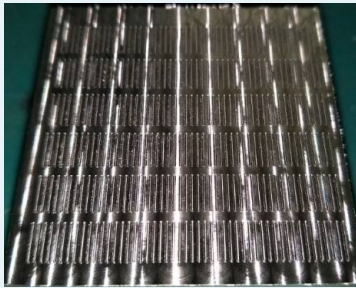
表1. 測試參數 Chart1. Test Parameters

小徑槽加工 Small Slot Processing	轉速/Speed (RPM)	進給/Feed (mm/min)	下刀量/Amount of Feed (mm)	加工時間 Time	頻率/Frequency (Hz)
使用超音波 Ultrasonic	10000	150	0.05	1min12s	28k
未使用超音波 Non-ultrasonic					無

3. 結果 Result

測試結果發現在未使用超音波加工下，皆會使磨刀斷裂。
End mill cutter was broken while using non-ultrasonic spindle.

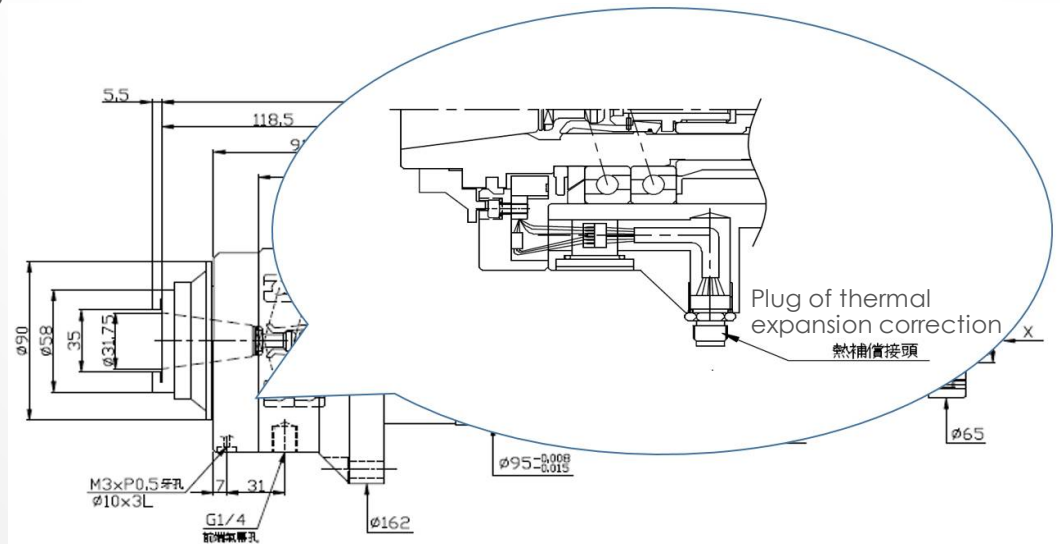
表2. 測試結果 Chart 2. Test Result

測試 Test	使用超音波加工 Ultrasonic	未使用超音波加工 Non-Ultrasonic
測試 1 (振幅10%) TEST 1 (Amplitude 10%)	 第1~300槽未斷刀 Pockets No. 1~300: Cutter unbroken	 第117槽斷刀 Pocket No 117: Cutter broken
測試 2 (振幅30%) TEST 2 (Amplitude 30%)	 第1~150槽未斷刀 Pockets No. 1~150: Cutter unbroken	 第268槽斷刀 Pocket No 268: Cutter broken



Real-Time Thermal Error Measurement Module

1. Build-in sensor
2. Correcting thermal expansion of the spindle in time
3. Customized communication interface
4. Testing the abnormal of bearing to reduce the defeat rate



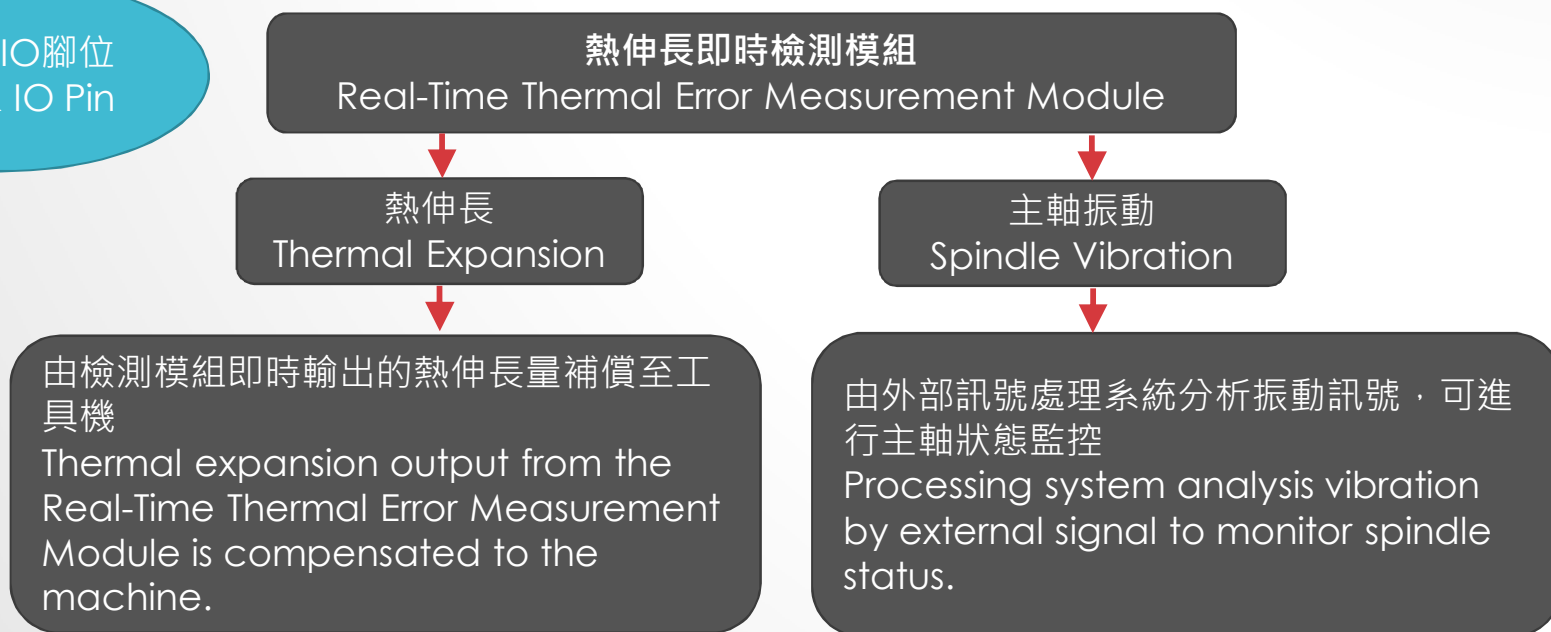
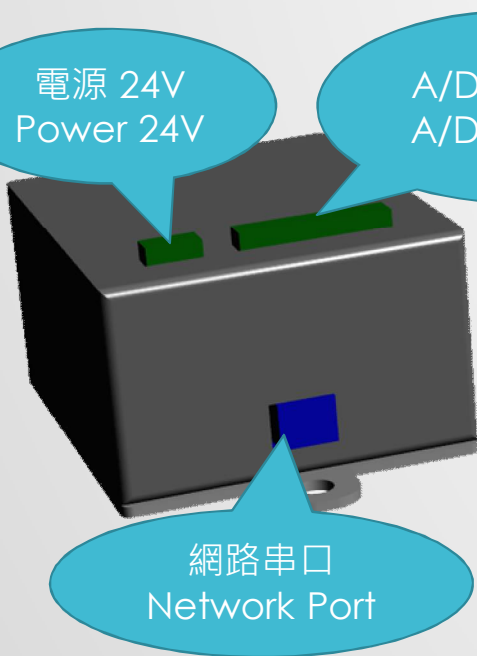
感測器功能 SENSOR FUNCTION

主要功能：主軸心軸軸向熱伸長即時檢測

Main function: Real-Time Thermal Error Measurement of shaft in spindle

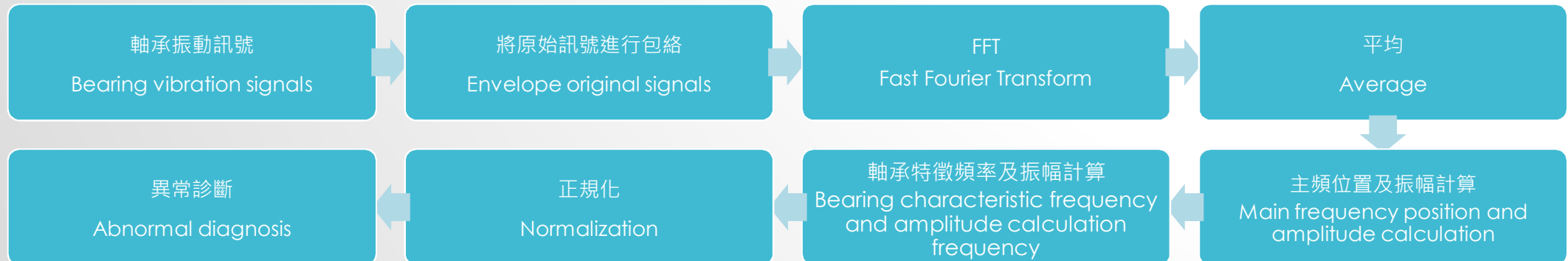
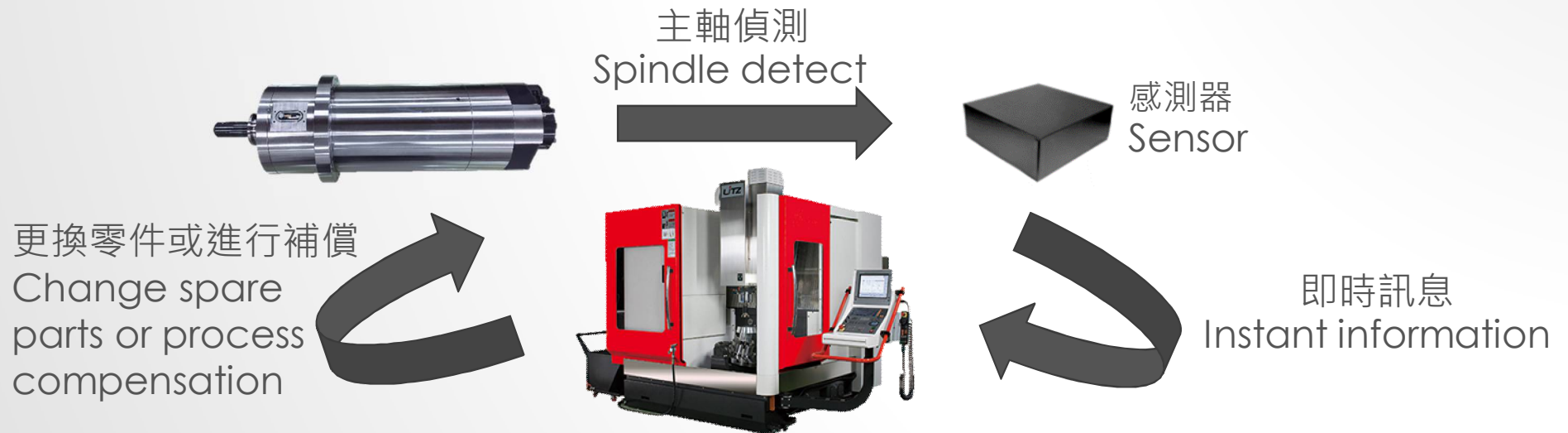
選擇功能：主軸軸向振動即時檢測模組(主軸狀態監測)

Optional function: Real-Time Axial Vibration Error Measurement of spindle(spindle status monitor)



旭泰智慧型高速主軸反饋流程

SPINTECH INTELLIGENT HIGH-SPEED SPINDLE FEEDBACK PROGRESS



產品模組規格

熱伸長即時檢測功能規格

- 量測Z軸範圍: $\pm 200\mu\text{m}$
- 量測解析度: $0.1\ \mu\text{m}$
- 線性度: 1%
- 取樣速度: 200kHz
- 頻寬: 100Hz
- 控制器溝通方式
 - Ethernet
 - RS232
 - A/D
 - 快速I/O
- ★ 適用於市面上所有的控制器

PRODUCT MODULE SPEC.

REAL-TIME THERMAL ERROR MEASUREMENT MODULE SPEC.

- Z-axis measurement range: $\pm 200\mu\text{m}$
- Measurement resolution: $0.1\ \mu\text{m}$
- Linearity: 1%
- Sampling speed: 200kHz
- Bandwidth: 100Hz
- Controller Communication Method
 - Ethernet
 - RS232
 - A/D
 - Rapid I/O
- ★ Apply to all controllers on the market

產品模組規格

振動檢測功能規格

- 量測Z軸振動範圍: $\pm 100\mu\text{m}$
- 量測解析度: $0.1\mu\text{m}$
- 取樣速度:200kHz
- 頻寬:12kHz
- 控制器溝通方式
 - Ethernet
 - RS232
 - A/D
 - 快速I/O
- ★ 適用於市面上所有的控制器

PRODUCT MODULE SPEC.

VIBRATION MEASUREMENT MODULE SPEC.

- Z-axis measurement range: $\pm 100\mu\text{m}$
- Measurement resolution: $0.1\mu\text{m}$
- Sampling speed:200kHz
- Bandwidth:12kHz
- Controller Communication Method
 - Ethernet
 - RS232
 - A/D
 - Rapid I/O
- ★ Apply to all controllers on the market



智慧型高速主軸

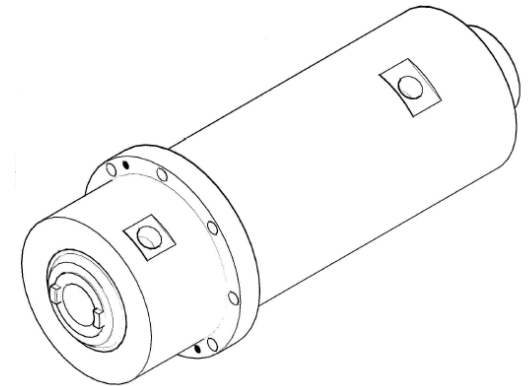
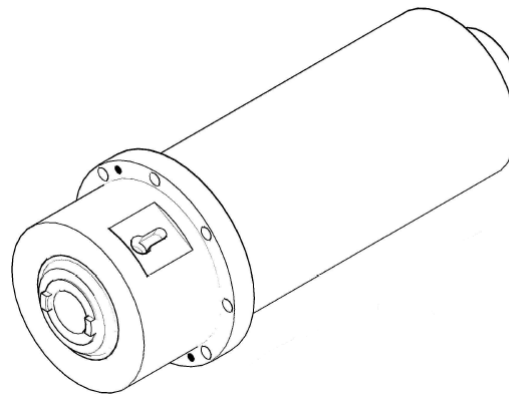
Intelligent Spindle

產品特色：

- 1.內建加速規、熱變位計、溫度計
- 2.即時監控主軸震動量及頻譜管理以達到切削顫振的預防
- 3.熱變位監控管理補償
- 4.即時監控刀具與主軸壽命

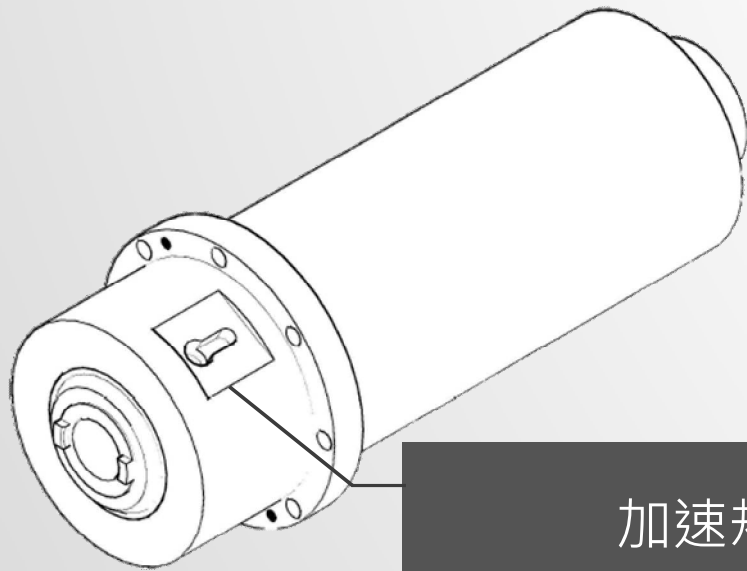
產品特色：

- 1.Built-in accelerometer, thermal displacement meter and thermometer
- 2.Real-Time monitoring of spindle vibration and frequency spectrum management to prevent cutting flutter
- 3.Thermal displacement monitoring for compensation and management
- 4.Real-Time monitoring of life time of tools and spindles

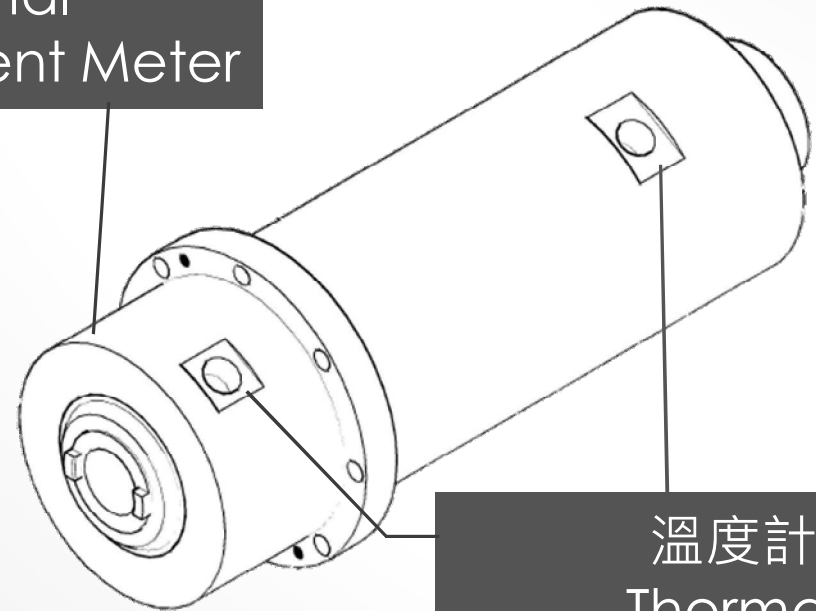


各檢測計位置 POSITIONS OF ALL METERS

熱變位計
Thermal
Displacement Meter



加速規
Accelerometer



溫度計
Thermal
Displacement



Let Your Industry  Revolve Around Us