



# Spindle analysis



Spindle analysis number: 4000000

Spindle number: 12345678

Spindle group: 3rd Party Spindle

Article number: 146008

SAP Number: 4000000

Create date: 2023-08-14 / Z. Kaminski

Modified: 2023-08-14 / Z. Kaminski

State: Pending revision

## 1. Customer Information

Customer information available:

Motor problems

Number of hours: 4568 h

Tool changes per hour:

Warranty claim:

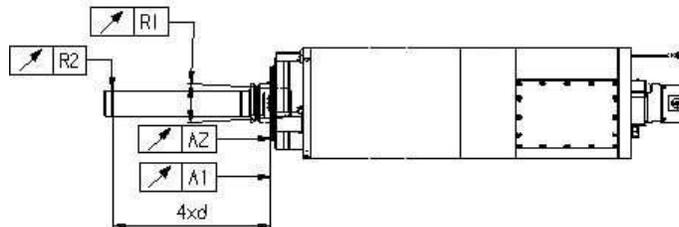
Yes  No

Remarks:

Motor faults, smell of burned motor.

## 2. Incoming spindle inspection

Run out check :



Runout:

Shaft is hard to turn

/

Nominal value R1: 0.003mm

Actual value R1: 0.003 mm

/

Nominal value R2: 0.01mm

Actual value R2: 0.0012 mm

/

Nominal value R3:

Actual value R3: mm

/

Nominal value A1: 0.001mm

Actual value A1: 0.002 mm

/

Nominal value A2:

Actual value A2: mm

/

Visual check outside:

All right

/

Collision / Marks:

All right

/

<b>Spindle in original condition:</b>				<input type="checkbox"/> / <input type="checkbox"/>
<b>Motor:</b>	Synchronous	Not ok		<input type="checkbox"/> / <input checked="" type="checkbox"/>
<b>EMF Voltage (phase-phase):</b>	Nominal value: 26.5 V eff/1000min-1	Actual value: 13.4 V eff/1000min-1		<input type="checkbox"/> / <input checked="" type="checkbox"/>
<b>Cable length:</b>	U1: m U2: m Grounding: m	V1: m V2: m Encoder type: m	W1: m W2: m Sensor: 2.0 m	
<b>PT-100:</b>	Available	Quantity: 2		<input checked="" type="checkbox"/> / <input type="checkbox"/>
<b>Spindle growth system DMD:</b>	Not available			<input type="checkbox"/> / <input type="checkbox"/>
<b>Acceleration sensor:</b>	Not available			<input type="checkbox"/> / <input type="checkbox"/>
<b>Taper blow out:</b>	All right			<input checked="" type="checkbox"/> / <input type="checkbox"/>
<b>Protecting air :</b>	All right			<input checked="" type="checkbox"/> / <input type="checkbox"/>
<b>Cooling water circuit:</b>	Pressure loss: 0 bar Water in spindle: Plugged:	Within: 30 min Contaminated: Plugged:		<input checked="" type="checkbox"/> / <input type="checkbox"/> <input type="checkbox"/> / <input type="checkbox"/> <input type="checkbox"/> / <input type="checkbox"/>
<b>Coolant through unit:</b>	Available	Leaking		<input type="checkbox"/> / <input checked="" type="checkbox"/>
<b>Clamping force :</b>	Nominal value: 18kN	Actual value: 19.6 kN		<input checked="" type="checkbox"/> / <input type="checkbox"/>
<b>Set point:</b>	Nominal value: 10.5+/-0.1mm	Actual value: 10.46 mm		<input checked="" type="checkbox"/> / <input type="checkbox"/>
<b>Acoustic bearing test:</b>	Rough			<input type="checkbox"/> / <input checked="" type="checkbox"/>
<b>Complete spindle disassembly:</b>	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>		



### 3. Sensors

<b>PNP:</b>	Sensor S1: Wear and tear		<input checked="" type="checkbox"/> / <input type="checkbox"/>
	Sensor S2: Wear and tear		<input checked="" type="checkbox"/> / <input type="checkbox"/>
	Sensor S3: Wear and tear		<input checked="" type="checkbox"/> / <input type="checkbox"/>
	Sensor S4: Wear and tear		<input checked="" type="checkbox"/> / <input type="checkbox"/>
	Sensor S5: Not available		<input type="checkbox"/> / <input type="checkbox"/>
<b>Analog:</b>	Sensor A1: actual value: / target value: 3800		<input type="checkbox"/> / <input type="checkbox"/>
	Sensor A2: actual value: / target value: 3800		<input type="checkbox"/> / <input type="checkbox"/>
	Sensor A1: Wear and tear	Contaminated	<input type="checkbox"/> / <input checked="" type="checkbox"/>
	Sensor A2: Not available		<input type="checkbox"/> / <input type="checkbox"/>
<b>Analog controller:</b>	Not available	No.:	<input type="checkbox"/> / <input type="checkbox"/>
<b>Remarks:</b>	Contamination from leaking coolant through unit on analog sensor.		

Analog



PNP



### 4. Encoder

<b>Encoder type:</b>	VCS / VCU		<input checked="" type="checkbox"/> / <input type="checkbox"/>
<b>Encoder:</b>	Wear and tear		<input type="checkbox"/> / <input checked="" type="checkbox"/>
<b>Encoder wheel visual:</b>	All right		<input checked="" type="checkbox"/> / <input type="checkbox"/>
<b>Encoder wheel values:</b>	All right		<input checked="" type="checkbox"/> / <input type="checkbox"/>

**Remarks:** Contamination on encoder. Encoder wheel tests OK after cleaning.

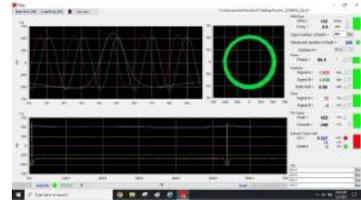
Encoder



Encoder wheel visual



Encoder wheel values



## 5. Electric drive

**Motor type:** Synchronous

**Stator windings comparison:** Windings are damaged  /

**Stator leakage current:** Stator is grounded  /

**Temperature sensor:** PTC: Ohm      KTY: 564 Ohm      NTC/K227: kOhm  /

**Fitting set No.:**

**Remarks:** Stator windings shorted to ground.



## 6. Clamping system

**Type:** HSK

**Pull bolt:** Wear and tear      Vibration Damage  /

<b>Gripper segment:</b>	Wear and tear	Vibration Damage	<input type="checkbox"/> / <input checked="" type="checkbox"/>
<b>Valve block:</b>	All right		<input checked="" type="checkbox"/> / <input type="checkbox"/>
<b>Clamping force:</b>	All right		<input type="checkbox"/> / <input type="checkbox"/>
<b>Springs:</b>	Wear and tear	Broken	<input type="checkbox"/> / <input checked="" type="checkbox"/>
<b>Drawbar:</b>	Wear and tear	Vibration Damage	<input type="checkbox"/> / <input checked="" type="checkbox"/>
<b>Threaded rod:</b>	Not available		<input type="checkbox"/> / <input type="checkbox"/>
<b>Chucking lever shaft:</b>	Not available		<input type="checkbox"/> / <input type="checkbox"/>
<b>Unclamping unit:</b>	Not available		<input type="checkbox"/> / <input type="checkbox"/>
<b>Lubrication:</b>	Contaminated		<input type="checkbox"/> / <input checked="" type="checkbox"/>

Pull bolt



Gripper segment



Valve block



Springs



Drawbar



Lubrication



## 7. Seal

<b>Seal type:</b>	Protecting air	Contaminated	<input type="checkbox"/> / <input checked="" type="checkbox"/>
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Bearing No. 1



Bearing No. 2



Bearing No. 3



Bearing No. 4



## 10. Hydraulic- pneumatic cylinder

Cylinder:

Hydraulic

Change seals / Wear and tear  /



## 11. Coolant through unit

Available:

Yes  No

No.:

Type:

DDF/OTT  
Transition piece (OTT)

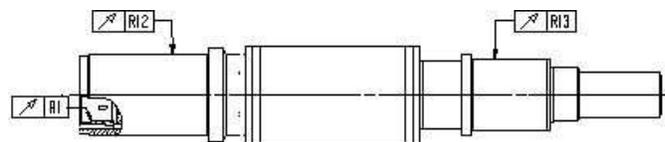
Leakage  
Mechanical damage

/   
 /



## 12. Spindle shaft

Run out after disassembly:



R.12: Nominal value: 0.002mm Actual value: 0.005 mm  /

R.13: Nominal value: 0.002mm Actual value: 0.0015 mm  /

R.1: Nominal value: 0.002mm Actual value: 0.003 mm  /

Straighten shaft: Yes  No

Run out after straighten:

R12: Nominal value: Actual value: mm  /

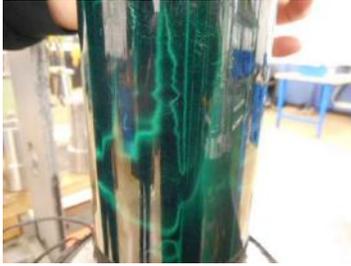
R13: Nominal value: Actual value: mm  /

R1: Nominal value: Actual value: mm  /

Refurbish shaft: Yes  No

Remarks:

Shaft rotor demagnetized, carbon wrap damaged. Green LCD paper shows demagnetized area of rotor. Fretting corrosion on front bearing journal. Shaft will be replaced.



### 13. Spindle housing

Visual check outside:	All right	<input checked="" type="checkbox"/> / <input type="checkbox"/>
Visual check inside:	Contaminated	<input type="checkbox"/> / <input checked="" type="checkbox"/>
Bearing seat:	Not available	<input type="checkbox"/> / <input type="checkbox"/>
Remarks:	Rust / scale in cooling water passages.	



### 14. Stator housing

Available:	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	
Visual check outside:	Contaminated	<input type="checkbox"/> / <input checked="" type="checkbox"/>
Visual check inside:	All right	<input checked="" type="checkbox"/> / <input type="checkbox"/>
Bearing seat:	Not available	<input type="checkbox"/> / <input type="checkbox"/>
Remarks:	Rust / scale on cooling water passage.	



## 15. Rear bearing housing

- Available:** Yes  No
- Visual check outside:** All right  /
- Bearing seat:** Fretting corrosion  /
- Water circulation:** Contaminated  /

Bearing seat



Water circulation



## 16. Front bearing flange

- Available:** Yes  No
- Visual check outside:** All right  /
- Bearing seat:** Fretting corrosion  /
- Water circulation:** Contaminated  /

Bearing seat



Water circulation



## 17. Cartridge

Available: Yes  No

Visual check outside:  /

Visual check inside:  /

Bearing seat:  /

Remarks:

## 18. Connecting plate (rear cover)

Available: Yes  No

Visual check outside: All right  /

Remarks:

## 19. Cause of failure

Component causing failure: Electric drive

**Main breakdown reason:** Overload  
 Shaft rotor demagnetized / mechanical damage from carbon wrap coming apart. Vibration damage to bearings and clamping system. Cooling circuit heavily contaminated.

**Proposed solutions:** Spindle repair  
 Recommend checking cooling system for proper cleanliness / concentration. Clean and flush as needed. Check cables / connections to motor in case of electrical damage from failure.

**New assembly :** Who:

**Last repaired:** 05/26/2022 Who: FISCHER USA

## 20. Warranty

**Repair accompanying document from customer available:** Yes  No

**Detailed application information available:** Yes  No

**Spindle still under warranty:** Yes  No

**Engineering fault:** Yes  No

**Defective material:** Yes  No

**Improper workmanship:** Yes  No

**Repair Charges:** Liable to pay