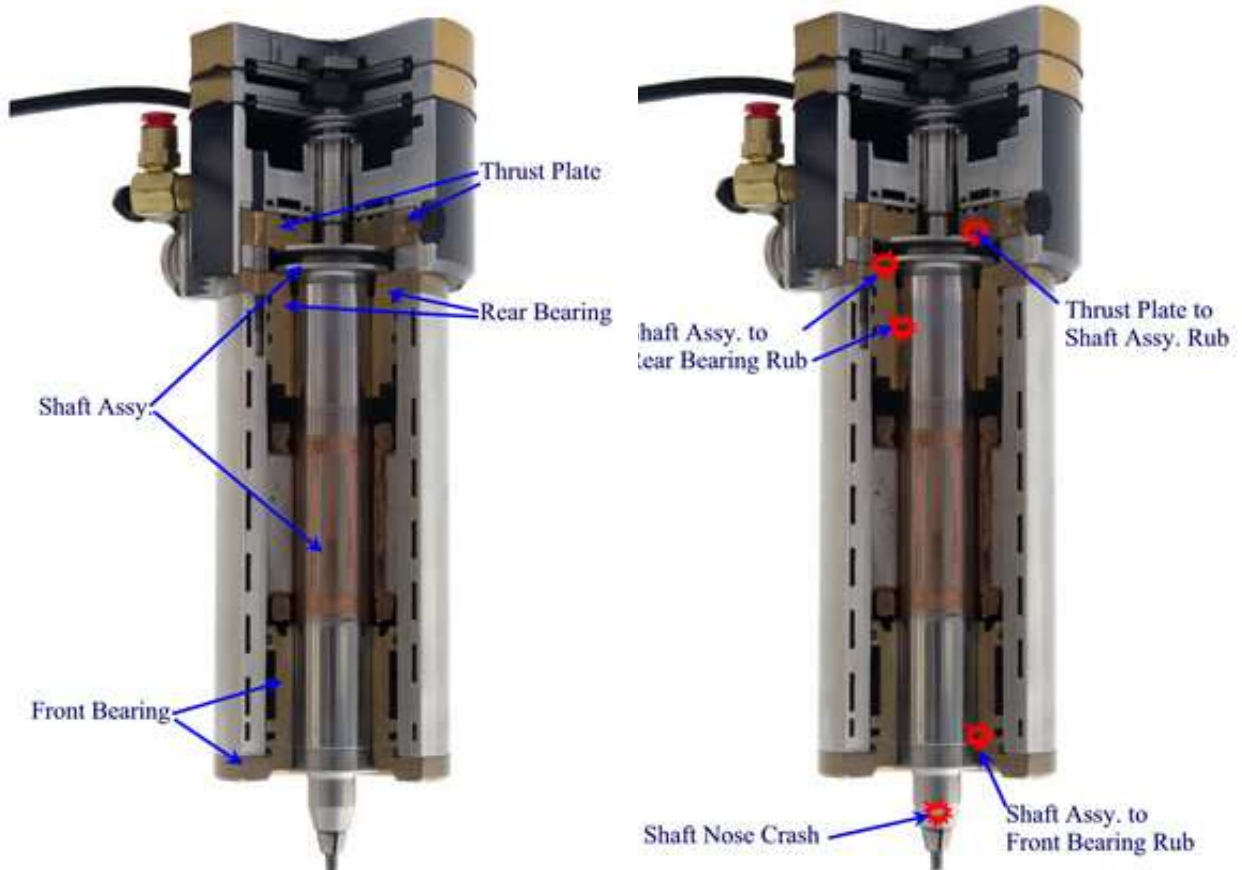


## Spindle Repair-Service

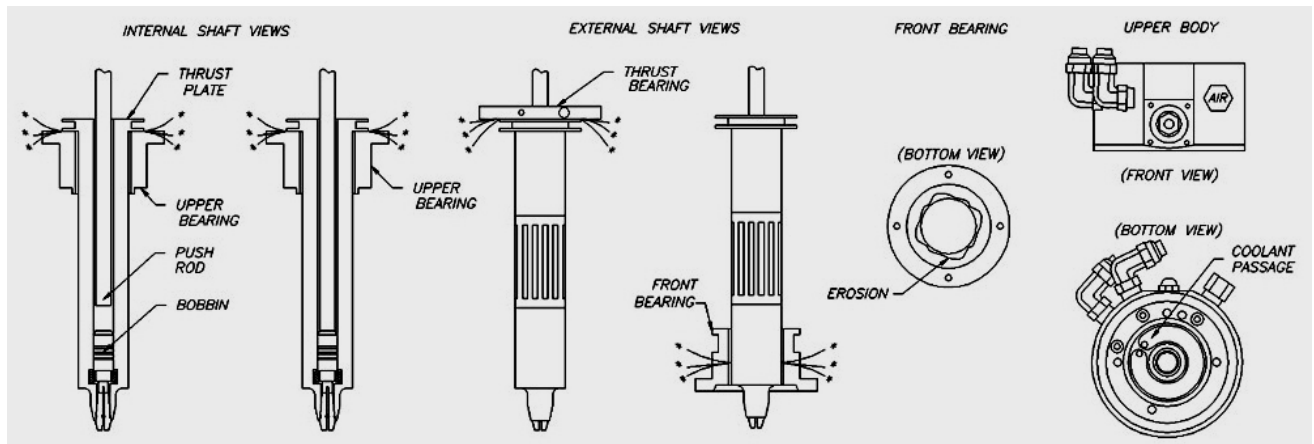
### Spindle components



### Main failures on ball bearing and air bearing spindles



## Drawings:



## Erosion on air bearings of spindles

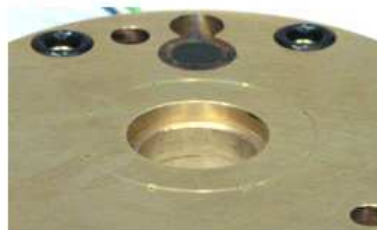
Figure 2



Rear Bearing Rub



Figure 3



Thrust Bearing Rub

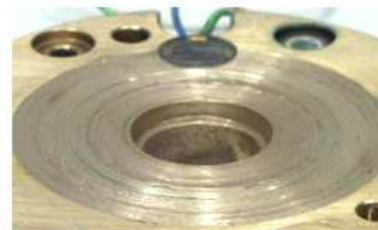


Figure 4



Front Bearing Rub



Figure 5



Air / Debris Erosion



## Frictional damage

### Repair Procedure

#### 1. Evaluation:

Spindles for rework are received and logged into repair database. Each spindle is assigned an transport bin and tracked throughout the repair

Each spindle is disassembled into its major components and all critical features and tolerances are inspected for damage or wear.



An estimate of the cost of repair including services and parts is generated and sent tom the customer for approval, prior to any further work being performed

#### 2. Repair

After cost approval by customer new replacement parts are installed, all spindle parts are thoroughly cleaned, when needed reground and reassembled.

Collet taper is reground if total indicated runout exceeds 0,001 mm

Complete replacement of O-rings and seals.



### 3. Balancing

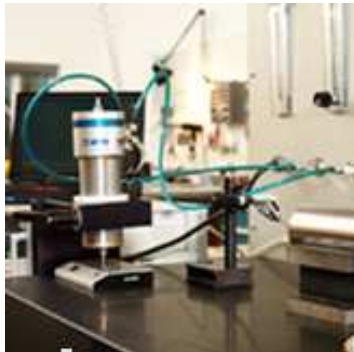
The heart of a quality repair is a well balanced shaft.  
All armature shafts are balanced to less than 0,5 mg/inch on a high precision balancing machine



### 4. Testing

After balancing and reassembly, vibration is measured and recorded  
High-speed dynamic runout is measured and recorded  
Air/ water pressure is measured and recorded  
Electrical resistance of stator against ground is measured and recorded  
All information incl. amp draw, coolant flow, air usage, static and dynamic runout is recorded

### Taper Grinding



A dedicated inside diameter grinding machine is configured specifically to grind shaft tapers, which ensures a collet is drawn into the end of a shaft, and seated concentric to the axis of rotation.

### Balancing



Our balancing machine utilizes air bearings to properly balance a Westwind armature shaft, and ABEC 7 High speed instrument bearings to balance conventional ball bearing shafts to measurements reading into micro grams allow correction to exceed new O.E.M specifications.



The polar indication is presented to the operator on two vectrometers as well as the exact digital indication.

-Imbalance measurement range:  
-1:2,000,000.

-Imbalance tolerance:

Air Bearing Spindles – Less than .5 mg

Ball Bearing Spindles – Less than 1.0 mg -

Balancing speed range:

-120... 100,000 rpm

## Vibration Testing

Our Vibrotest 60 following measurement functions:

- Absolute bearing vibrations
- Relative shaft vibrations
- Bearing Conditions Unit measurements (BCU)
- Temperature
- Process values

### Overall vibration / BCU

- Air Bearing Spindles – Less than .4 mm/s rms
- Ball Bearing Spindles – Less than 1.2 mm/s rms



## Runout Testing



The Targa II system is used to measure and display the Total Indicated Runout and RPM of high speed spindles during the testing phase of your repair. By understanding the relationship between runout and RPM you can be assured of the optimal performance of your spindle at all operating speeds.

### Total indicated Runout Testing

Air Bearing Spindles – 8  $\mu$  meters (with most being less than 6  $\mu$  meters)  
Ball Bearing Spindles – 12  $\mu$  meters