

## Journal bearing test rig

The JBT allows to test materials and coatings for use in plain bearings on spacecrafts or for exploration (torque and life time).

Plain bearings are used for articulations or linear guidance systems dedicated to single shot or low life time requirement. These include for example solar array panel articulations, radiator panel articulations, HDRM fold back articulations, exploration rovers articulations and linear guidances, landing pointing system articulations. The plain bearing tribometer allows the measurements of friction and wear of a complete journal bearing for alternate rotations <math><180^{\circ}\text{C}</math> and small loads <math><150\text{N}</math>. The working environment will be the same as for the vacuum tribometer: humid air, high vacuum and controlled gases (eg  $\text{CO}_2$  at 6mbar to simulate Martian atmosphere). It works basically -100 to +300°C.

Post-Analysis may cover measurement of wear by profilometry, SEM, investigation of surface structure or material transfer by SEM/EDX.



Image of the Ultra High Vacuum Tribometer:  
Internal View showing the Tribo-System with ball holder and disc

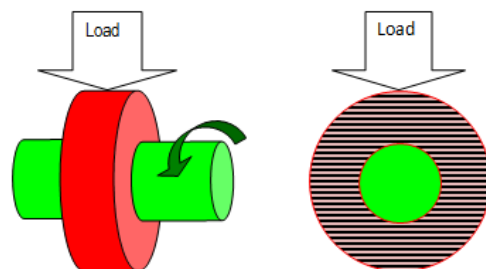
The device is fully PC-controlled. To the control parameters, e.g. sliding distance, motion profiles (uni, oscillating, ...), can be selected. On-line-data acquisition offers to post-process data, e.g. for automatic calculation of torque in running-in- or steady state, as well as endurance of solid lubricant coatings.

### Measurement of

- Torque/Friction force/coefficient
- Environmental Data
- Optional (e.g. residual gas, user defined)

Test principle: Bush is radially loaded against shaft

Different options are available:



- a) Testing in controlled gas environment: eg simulating Martian atmosphere (6 mbar in CO<sub>2</sub>)
- b) Contamination monitoring: a mass spectrometer may be used to detect on-line contamination (e.g. outgassing of fluid lubricants or their cracks).

Specifications	
Test	online measurement of <ul style="list-style-type: none"> <li>• Torque / Friction force / coefficient</li> <li>• Environmental Data</li> <li>• residual gas analysis (mass spectrometer of outgassing particles)</li> </ul>
Temperature	from -100 up to + 300 °C, thermal cycles available
Loads	10 <> 250 N
Speed / Motion	Motion selectable from unidirectional to reciprocating (angles from 5° to 360°) 0.00005 <> 0,262 m/s (0,1 to 500rpm)
Environments	Vacuum selectable down to 10 <sup>-6</sup> mbar Air with controlled humidity Gases with controllable pressure (e.g CO <sub>2</sub> at 6mbar)
Samples	Bush on shaft
Accuracy	Friction force ± 0.01 N Sample temperature (pin and disc separately): ±2°C Linear Wear: 0 <> 2mm, ± 0.002 micrometer

**Further AAC-devices enabling component testing under vacuum:**

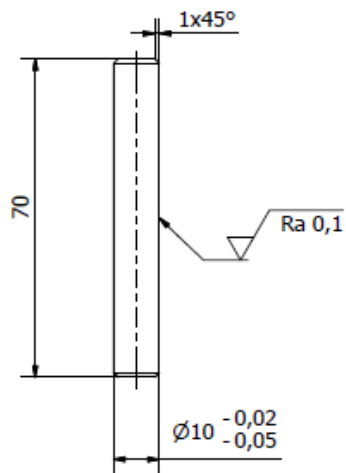
SALOTTE 1: gear testing

BBT: ball bearing testing

## Journal bearing test rig

Specimen:

Shaft  
(M1:1)



Bush

A-A ( 2:1 )

