

HighTemp Vacuum Tribometer

This device was developed to determine friction factors under vacuum/high vacuum and high temperature conditions up to 700°C for lifetime tests and benchmarking of different materials.

The sample temperature is measured on-line, the torque measurement is done punctual (individual interval 10 <> 120 s) using following method: the rotation is done CW and CCW for a defined number of rotations, then a difference measurement is done. This is necessary for piezo sensors which are not usable for on-line measurement due drifting of the signal.

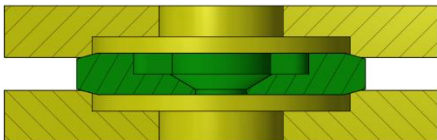
Post-Analysis may cover measurement of wear by topographic means. Investigation of surface morphology or material transfer is possible using SEM/EDX. Changes in the subsurface microstructure can be analysed locally resolved by EBSD (Electron Back Scattering Diffraction).

The device is fully PC-controlled. On-line-data acquisition offers to post-process data, e.g. for automatic calculation of friction coefficients in running-in or steady state, as well as benchmark of different materials under high vacuum and high temperature conditions.

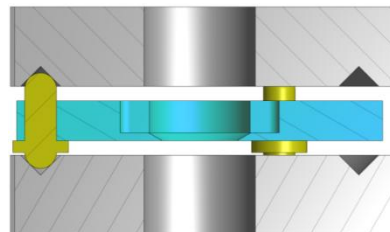
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Measurement of

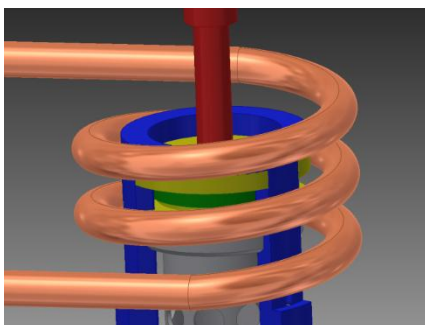
- Friction force / coefficient (punctual, individual interval 10 <> 120 s)
- Temperature (on-line)
- Wear (geometric or mass loss)



Geometry: cone-disk-on-ring



Geometry: pin-on-disk



Mounted setup with inductive heating



Whole testing facility

Specifications	
Samples	Cone-ring-on-disk, pin-on-disk <ul style="list-style-type: none"> • Pins DM 4 – 7 mm • Rings OD ~ 60mm with V-grooves for self-alignment
Test (Output)	online measurement of <ul style="list-style-type: none"> • Friction force / coefficient (punctual, defined interval 10 <> 120 s) • Temperature (on-line) • Wear (geometric or mass loss) residual gas analysis (mass spectrometer of outgassing particles, optional)
Loads	3 to 30 N (50kPa <> 300kPa for Cone-ring-on-disk, higher hertzian pressure up to MPa range possible depending on radius of pin-on-disk)
Speed / Motion	0.001 <> 0.2 m/s (1 <> 150 rpm)
Vacuum / Environments	Vacuum to high vacuum (10^3 <> 10^5 mbar depending on outgassing behaviour of sample)
Temperatures	from RT up to + 700 °C
Accuracy	Torque 10 Nm max (piezo) Sample temperature ± 10 °C Load ± 0.1 N