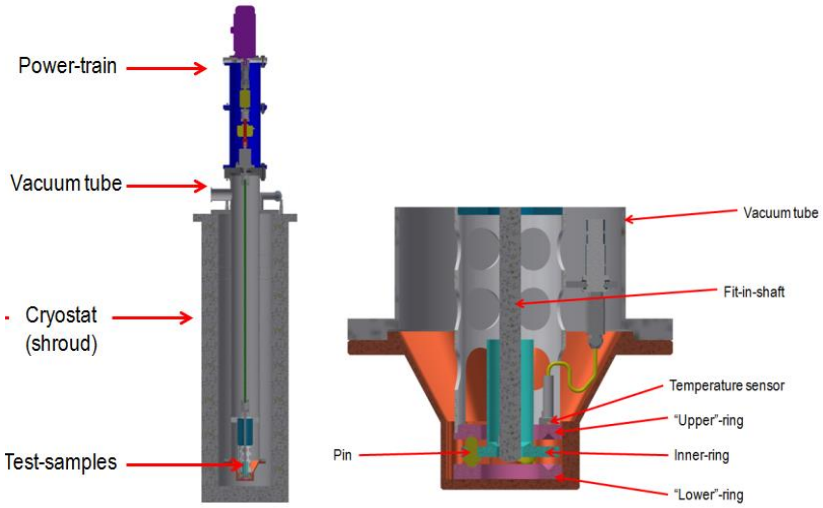
Aerospace & Advanced Composites GmbH
Viktor-Kaplan-Straße 2
2700 Wiener Neustadt, Österreich
office@aac-research.at
+43 2622 90550-50
+43 2622 90550-99

Cryo Vacuum Tribometer

The "Cryo-tribometer" enables to derive friction and wear from cryogenic temperatures up to RT. It works in gHe (gaseous Helium) or vacuum environment.
The "Cryo-tribometer" is an adoption to the existing He-cryostat (“shroud”). It consists of the tube-like vacuum-chamber with a power train on tip of it. This “tube” will be mounted in a shroud (



). This shroud (cryostat) is capable of cooling with liquid nitrogen or helium. The test-pair (containing "upper" and "lower" disc and three pins) are mounted inside a vacuum-tube so the wear contact is under vacuum (or gHe).

The power train consists of

- Servomotor
- Torque-sensor (strain gauge based)
- Angular sensor
- vacuum rotary feedthrough (for shaft)

couplings for compensation of axial displacement

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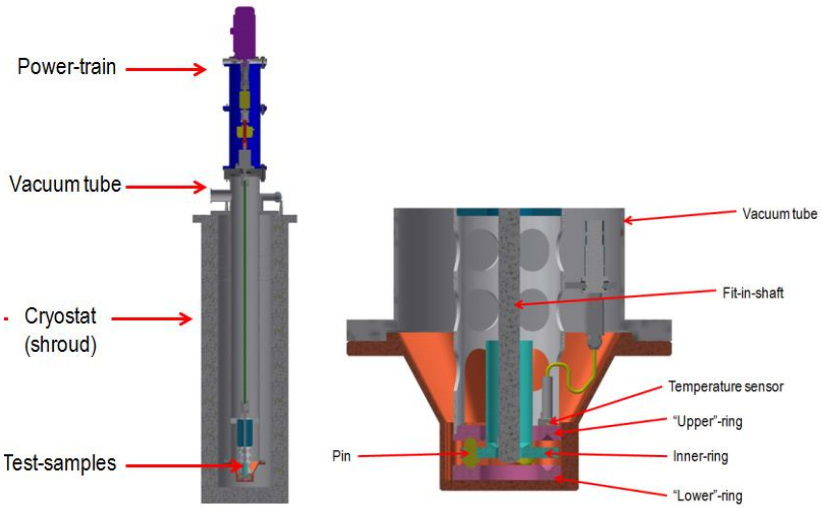
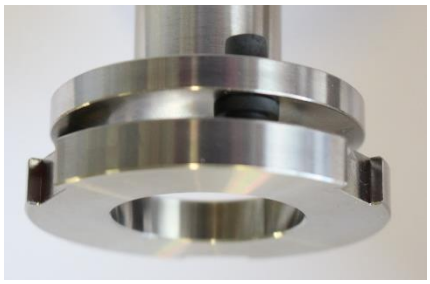


Cryo-Tribometer in shroud and section view

Lower Ring and 3 Pins:



Specifications	
Samples	3-Pin-on-Ring • Pins DM 4 – 7 mm with spherical tips on both ends • Rings OD ~ 60mm with V-grooves for self-alignment (See Annex for drawings)
Test (Output)	online measurement of • Friction force / coefficient (Torque) • Temperature (on-line) Offline: Wear (geometric or mass loss)
Loads	1 – 20N (per pin), 100 to 2000 MPa
Motion **Speed**	Unidirectional or oscillating 0,01 to 0,2 m/s (< 100 RPM)
Vacuum / **Environments**	gHe down to high vacuum (10^{-5} mbar)
Temperatures	from RT downto 4K
Accuracy	Torque ± 0,01Nm (up to 5 Nm) Sample temperature ± 10 °C

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Your contact at AAC:
Marc SCHUSTER
Junior researcher
T +43 (0) 2622 90550-390
F +43 (0) 2622 90550-99
marc.schuster@aac-research.at
http://www.aac-research.at

For scientific assistance:
Dr. Andreas MERSTALLINGER
Key researcher
M +43 (0) 664 8251136
andreas.merstallinger@aac-research.at

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Annex – Specimens (examples):