

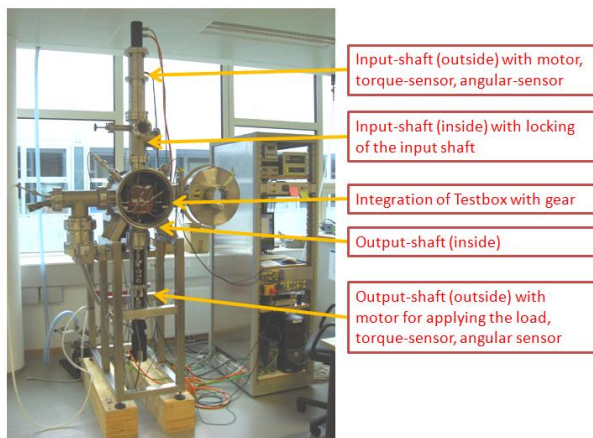
Gear testing (SALOTTE1)

The SALOTTE1 enables to test gears (planetary and harmonic) for their lifetime under vacuum.

This facility enables the investigation of gears (e.g. Harmonic-drive® gears, planetary gears). Environments vary from vacuum, non aggressive gases (e.g. CO₂) under controllable pressures (e.g. to simulate Martian environment) or to air with controlled humidity. The tests can be performed at temperatures from -150°C to +250°C.

Harmonic-drive® gears can be used in drive units for e.g. solar array panels, antennas. Therefore lifetime and performance can be measured in SALOTTE-1 test facility.

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

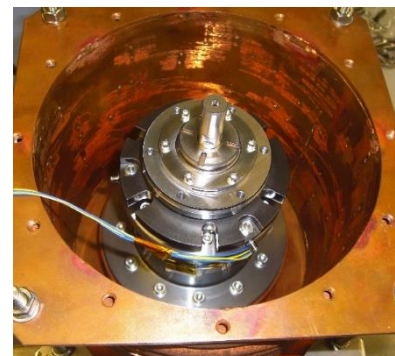


The device is fully PC-controlled. To the control parameters, e.g. sliding distance, motion profiles (uni, oscillating, ...), can be selected. On-line-data acquisition offers to post-process data, e.g. for automatic calculation of friction coefficients in running-in- or steady state, as well as endurance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

SALOTTE-1 test facility with integrated Gear box

Available measurements for Harmonic-Drive® gears:

- continuous monitoring efficiency possible at constant speed and torque
- Efficiency profile:
 - efficiency during torque-ramp
 - efficiency at various speeds
- Transmission accuracy
- Stiffness
- Axial-force
- No-Load-Running-Torque
- No-Load-Back-Driving-Torque
- Environmental Data, Temperature



Gear box for HFUC20 (developed in coop with HDAG)



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Specifications	
Test	online measurement of <ul style="list-style-type: none"> • Torque (in and output) • Axial forces (using special gear box) • High-resolution incremental angular sensor on input- and output-shaft • Environmental Data • residual gas analysis (mass spectrometer of outgassing particles)
Temperature	from -150°C up to + 300 °C, thermal cycles available
Loads	0.5 <> 45 Nm (on output shaft for Harmonic Drive ® HFUC20)
Speed / Motion	Motion selectable from unidirectional to reciprocating (angles selectable) 0,1 to 500rpm Up to 4000rpm for planetary gears
Environments	Vacuum selectable down to 10 ⁻⁶ mbar Air with controlled humidity Gases with controllable pressure (e.g. CO ₂ at 6mbar)
Samples	Testbox available for Harmonic Drive ® HFUC20 available, (with axial force) others on demand (also for planetary gears)
Accuracy	Input-Torque ± 0.01 Nm (up to 1Nm) Output-Torque ± 0.05 Nm (up to 50Nm) Angle: High-resolution incremental angular sensor on input- and output-shaft, resolution 3 arcsec Input-torque (Piezo): 1Nm Sample temperature (housing): ±2°C



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This device enables also testing of planetary gears under vacuum:

Here the setup is slightly different:

- The input motor is inside the vacuum chamber enabling input speed up to 4000rpm
- Input torque is measured using a piezo cell (i.e. no continuous monitoring is possible)
- Output load is applied by a hysteresis brake (i.e. no back-driving torque is possible)



Setup for planetary gear

Available measurements for planetary gears:

- Efficiency measurement after individual intervals (no continuous monitoring)
- Environmental Data, Temperature