

Gear testing (HaDES)

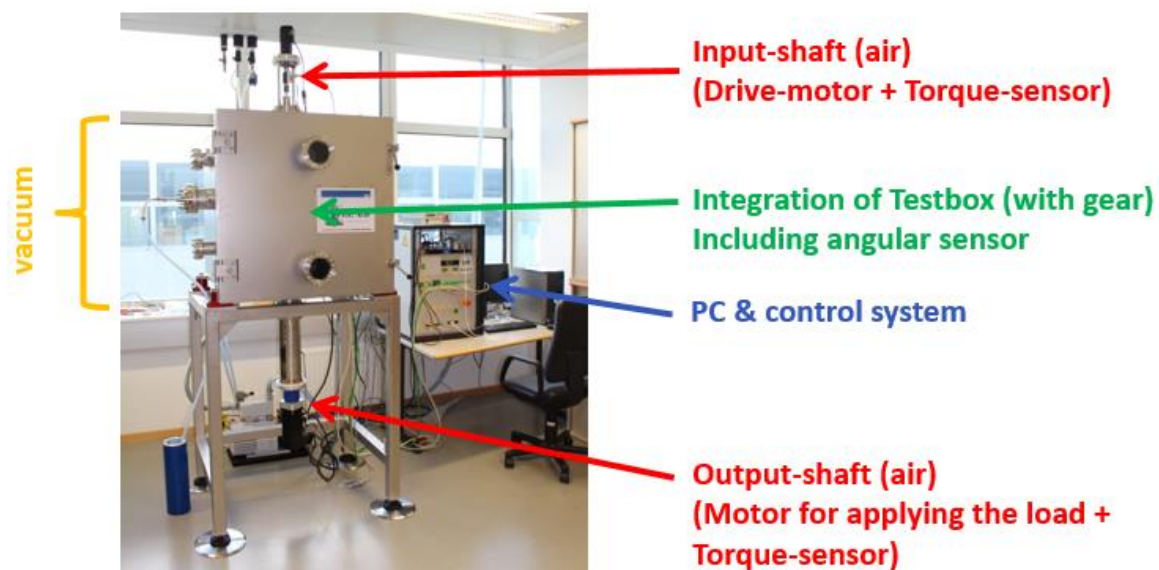
The test facility HaDES (Harmonic Drive[®] Experimental Setup) enables to test harmonic-drive[®] gears for their lifetime under vacuum.

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 +200°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 HaDES test facility.

Post-Analysis may cover inspection of the gear parts with SEM to detect wear mechanisms or material transfer.

The device is fully PC-controlled. To the control parameters, e.g. sliding distance, motion profiles (unidirectional, oscillating) can be selected. On-line-data acquisition offers to post-process data, e.g. for automatic calculation of efficiency or stiffness



Available measurements for Harmonic-Drive[®] gears:

- Endurance testing
- Efficiency profile:
 - efficiency during torque-ramp
 - efficiency at various speeds
- Transmission accuracy
- Stiffness (manually or automatically during endurance testing)
- Axial-force
- No-Load-Running-Torque
- No-Load-Back-Driving-Torque
- Environmental Data, Temperature



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| Specifications | |
|-----------------------|---|
| Test | online measurement of <ul style="list-style-type: none"> • Torque (input and output) • Axial forces (using special gear box) • High-resolution incremental angular sensor on input- and output-shaft • Environmental Data |
| Temperature | from -150°C up to + 200 °C, thermal cycles available |
| Loads | 2 to 30 Nm |
| Speed / Motion | Input-speed: 1 rpm to 600 rpm (others on demand) Motion: unidirectional (oscillation on demand) |
| Environments | Vacuum selectable down to 10 ⁻⁶ mbar Air with controlled humidity Gases with controllable pressure (e.g. Mars, CO ₂ at 8-15 mbar) |
| Samples | Testbox available for Harmonic Drive [®] gears size 20 (*) available, (with axial force measurement) * Supplier: Harmonic Drive AG, gear type HFUC, ZirconLine |
| Accuracy | Input-Torque ± 0.002 Nm (up to 1Nm) Output-Torque ± 0.1 Nm (up to 50Nm) Angle: High-resolution incremental angular sensor on input- and output-shaft, resolution 3 arcsec Sample temperature (housing): ±2°C |