

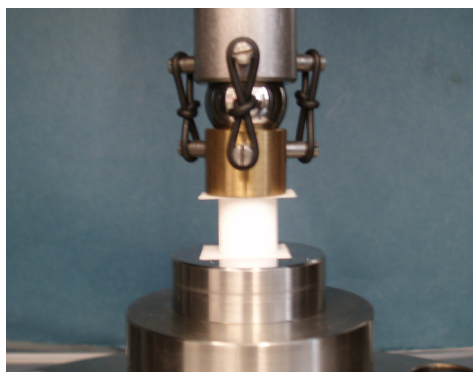
Is the strength sufficient – is the deformation permissible?

Would you like to reduce the failure risk of your products, components or parts? – Do you need materials that have to comply with specific mechanical requirements? – Would you like to examine whether your raw material meets your specifications?

If your answer to such questions is «Yes», a mechanical test with a load that is in step with actual practice is required. Static and quasi-static investigations are optimally suited to test and evaluate raw materials and/or the structural characteristics of components even at a very early stage of development and of production.

Mechanical tests in the RMS

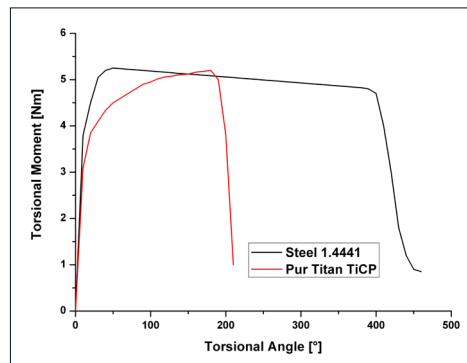
The RMS has a broad experience in static and quasistatic tests under tensile, compressive, bending or torsional loads as well as combined loads. In the process, we use two Zwick tensile/compression testing machines with a load range of 2 N to 100 kN and a force resolution of 0.01 N as well as a displacement resolution of 0.2 µm. These two machines permit tests either under 3-point or 4-point bending loads or shear. To run the torsional tests, we also use a Zwick machine with a maximum moment of up to 500 Nm, a torque resolution of 0.6 ‰ and an angle resolution <0.003°. Wherever applicable, we carry out the tests with samples or product components made of metals, polymers, ceramic or composite materials on the basis of a standard specification, but we also work according to specific customer needs and demands.



Mechanical characteristics

Independent of the type of load, the materials and components are first subjected to an elastic deformation (linear, reversible) and then

possibly to a plastic one (non-linear, irreversible) as well. The static tests permit a characterisation of the sample/product behaviour by defining a series of characteristics such as the modulus of elasticity, the elastic limit, the elongation, the stiffness, the maximum strength, the plastic deformation and finally the breaking strength. All the investigations can be carried out under load- or displacement control. Usually, the load or displacement rate are specified. However, specific profiles are possible as well.



Example of torsional tests

We test the maximum torsion angle and the torsional breaking resistances of titanium screws made of different alloys, and with head-shaft transitions of various designs (right picture). A comparison of Ø 4.5 mm steel (ISO 5832-1) and pure titanium (ISO 5832-2) bone screws shows the clear difference in their behaviour before failure (graph above).

Examples for tensile / compressive loads

In the raw material receiving inspection, we identify and check the modulus of elasticity, the elongation at break, the yield point and the strength under tensile load of standardised round steel and titanium specimens according to DIN EN 10002-1 before processing them to a product.

We test the compressive strength of cylindrical samples made of porous calcium phosphate ceramics in order to check and optimise the relation between the pore size and the strength for their use as bone substitute material (left picture).

Examples for bending tests

We use a 3-point and 4-point bending load to test ceramic specimens made of Al₂O₃, ZrO₂ and their composites in order to evaluate a possible strength-increasing effect of ceramic composite materials.

Newsletter No 05/08

Our equipment:

Tension/compression/bending

Zwick 1474 and 1475

Range 2 N – 100 kN; resolution 0.01 N and 0.2 µm; force-, displacement-, and elongation-controlled feed.

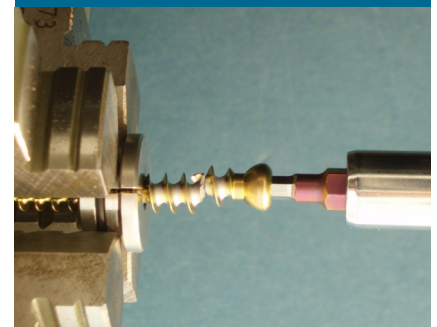
Testing rate 0.0001 – 800 mm/min; testing room (W x D x H) 400 x 400 x 1000 mm³; flat specimens of 0 – 40 mm width; round specimens of Ø 0 – 30 mm.

Torsion

Zwick TL500

Range 0 – 500 Nm, resolution 0.6‰ and <0.003°, moment- or angle-controlled feed; testing rate of 0.036 – 18,000°/min.

Testing room (W x D x L) 220 x 220 x 680 mm³, clamping jaws with Ø 0 – 200 mm.



Ask us and test us about your mechanical testing needs! We will be happy to advise you.

Or ask for our service catalogue. You will find this and other information on our website as well.

The RMS Foundation has been certified according to ISO 9001:2000. Selected services such as tensile, compression and bending tests have been accredited according to ISO/IEC 17025.