TDW is a subsidiary of MBDA Deutschland that can look back on over 50 years of experience in designing, developing, manufacturing and testing warhead systems. At our site in Schrobenhausen, Bavaria, we operate a 20 Hectare (49.4 Acres) test facility as well as an environmental simulation center.

Besides testing of our own products, cooperation relationships have been evolved in the recent years with external partners in the areas of explosives engineering and ballistics as well as in environmental simulation and chemical analyses.
For environmental simulation, we operate state-of-the-art systems for testing performance under mechanical and thermal stresses such as temperature, temperature shock, humidity, pressure, dust, salt fog, salt water and sunlight and to provide vibration, mechanical shock stress and acceleration tests. All systems can be remotely controlled and monitored from a control center.

Our environmental test center is accredited according to DIN EN ISO/IEC 17025:2005. We perform tests according to all relevant standards, e.g. MIL-STD-810, STANAG, DIN EN 60068 and AK-LV.

Our entire environmental simulation facility is designed for tests on objects containing explosives or which require test under safety. Environmental simulations with normal test devices and also special ones under safety (e.g. high-voltage storage units, electrical machines, hydrogen tank systems and airbag modules) are part of our day-to-day business.
VIBRATION TEST

- Frequency range max. 2 Hz…3,000 Hz
- Force vectors max. 178 kN
- Acceleration max. 225 g
- Velocity max. 4.5 m/sec
- Displacement max. 76 mm DA
- DUT weight up to 1,800 kg
- Slip table dimensions max. 1.35 x 1.25 m (LxW)
- Expander up to 2,500 x 900 mm available
- Temperature chamber up to 3.8 x 1.9 x 1.5 m (LxWxH)
- Temperature range max. -65°C … 180°C
- Temperature dynamic heating / cooling up to 5 K/min
- Remotely controllable
• Acceleration max. 3,000 g
• Falling velocity max. 21 m/sec
• Shock duration 0.2 … 100 ms
• Platform size max. 95 x 115 cm
• Weight of test object max. 1,134 kg
• Shock-resistance test up to 20,000 g
• Remotely controllable

Centrifugal machine
• Acceleration max. 650 m/sec
• Weight of test unit max. 2 x 25 kg
• Clamping area 2 x 0.25 x 0.25 m
TEMPERATURE TESTS

- Temperature and climate chambers up to 3.5 x 1.5 x 2.1 m (LxWxH)
  - Temperature range -80°C … +180°C
  - Climate range 10°C … +95°C
  - Relative humidity 10 … 98%
  - Temperature dynamic heating/cooling up to 10 K/min

- Temperature shock chambers up to 0.83 x 1 x 0.52 m test basket size
  - Temperature range -66°C … 200°C

- Sun simulation
  - Test unit size up to 0.95 x 1.1 x 0.95 m (LxWxH)
  - Temperature range -54°C … +120°C
  - Climate range +10°C … +90°C
  - Rel. humidity 10 … 90%
  - Capacity up to 1,120 W/m²

Other test capabilities
- Pressure testing in climate chamber 10 … 1,100 mbar
- Pressure test up to 0.5 x 1 m (up to 6 bar 200 l)
- Salt fog test up to 2.5 x 0.95 x 1.05 m (LxWxH) at RT
  - Rel. humidity up to 98%
  - Condensation water test possible
- Salt water test up to 2.2 x 0.75 x 1.0 m (LxWxH)
  - Temperature range RT to 8°C
- Dust test up to 3 x 0.74 x 0.58 m (LxWxH)
The chemical department reflects TDW's claim as a unique integrated warhead system manufacturer. As a consequence, the pilot plant and the chemical and physical laboratories comprise state-of-the-art hardware and apply modern analytical methods in accordance with the international requirements for high explosives (e.g. STANAG, MIL, TL). The scope of work is represented by:

- Incoming and life cycle inspection of chemical raw materials and metallic hardware.
- Manufacturing of prototype warheads and development of upgraded high explosive composites for future application requirements.
- Support in the quality assurance on high explosive production batches and
- Support of surveillance & life extension programmes by chemical and physical analyses.

**Chemical Analyses**

- Determination of acidity & basicity of pure materials or mixtures using an automated titration system.
- Water content measurement by automated Karl-Fischer titration
- Separation, identification and quantification of pure materials or compounds by gas-chromatography analysis and high-performance liquid chromatography
- Classification and identification of substances by infrared transform spectroscopy acc. to Fourier

**Physical Analyses**

- Thermo-analytical determination of melting point, decomposition and glass transition of pure materials or mixtures by Differential Scanning Calorimetry (DSC)
- Thermogravimetric analysis of weight loss due to chemical reactions or physical change of state.
- Particle size distribution measurement by laser diffraction and sieve analysis.
- Hardness measurement of organic compounds (Shore 00 – A - D)
- Volumetric mass density measurement of solids and liquids
- Determination of impact and friction sensitiveness of high explosives with BAM impact machine and BAM friction machine
- Determination of ignition temperature of high explosives with an automated heating system
- Investigation of solid state compatibility by vacuum stability test.

**Materials Science**

- Multiple hardness measurement of metal compounds
  - Brinell-, Vickers-, Rockwell hardness
  - Micro hardness HV 0,1
  - Ball indentation hardness
- Full range determination of mechanical properties on polymer composites or metal compounds.
  - Tensile, compression and bending tests with universal test equipment (Zwick, max. force 100 kN, T = -60°C to +100°C)
  - Dynamo-Mechanical Analysis (DMA)
- Non-destructive 3D-overview shot & material surface investigation and destructive material examination on polished metal sections with digital (100 x- 1,000 x-) and scanning electron microscope (up to 5,000 x)
- Qualitative and semi-quantitative investigations on organic and metallic compounds by energy dispersive X-ray spectroscopy
Our explosives engineering test range contains multiple test sites, indoor and outdoor firing ranges, a 160 m sled track and a light-gas compressed air cannon, as well as state-of-the-art measuring equipment, including X-ray and high-velocity diagnostics.

We are authorised to conduct explosive tests with up to 50 kg net explosive quantity (25 kg for fragmentation charges).

In addition to warhead function and performance testing (shaped charge, blast/fragmentation or penetration) and testing of insensitive munitions according to STANAG 4439, we conduct e.g. explosive tests in the context of fundamental development (initiation, performance and characterisation) as well as ballistic tests and mechanical shock tests.

We operate a high-powered light gas/compressed-air cannon especially for shock tests on components. The components under test are enclosed in projectiles.
with a diameter of 60 mm or 100 mm which can be accelerated to velocities of up to 1,000 m/s. The projectiles are captured in the 7 m long target zone. In addition to component tests, the system can also be used for other purposes, such as material characterisations through firing.

A further important line of business comprises tests on armoured civil and military vehicles and their components. We perform complete certifications according STANAG 4569 resp. BRV 1999 / 2009 to at our site. We can conduct ballistic tests up to a calibre of 25 mm. Firing experiments with hand grenades, RPG, TNT mines and PETN charges can be realised even on complete vehicles at short notice and unscaled. Measurements of forces, accelerations and pressures are standard. To determine the survival chances of vehicle passengers, we can use Hybrid III and Euro SID-ATD. If required, all tests can be recorded using high-speed video cameras both from outside and inside the passenger compartment. Our experienced team members take pride in their competence, high flexibility and customer orientation.
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