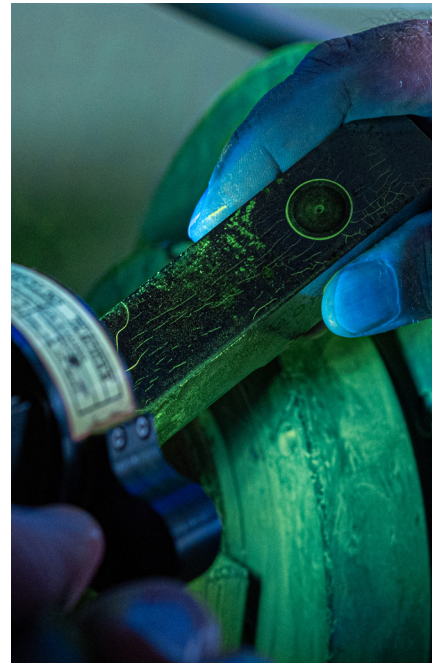


RUAG TEST CENTER

Materials Testing



➤ Materials testing is important for safety and as such is an indispensable instrument for quality assurance and quality control in many industrial sectors. No gas or oil supply, no aircraft or bridge construction and no operation of a power plant are conceivable without comprehensive and detailed control of materials by means of a materials test.

With the help of our comprehensive test procedures for materials, we can identify weak points promptly and guarantee an improved quality of your products through detailed damage analysis. Safety is critical to the success of your projects.

Our Services

With their expertise, experience and tailor-made services, the specialists at the Test Center for Materials Testing perform well in all aspects of testing materials. They meet the high requirements for quality, reliability and accuracy. For comprehensive quality assurance, they are already involved in the start-up phase of projects.

Materials testing at RUAG comprises of three areas on two sites: Thun and Emmen

DESTRUCTIVE TESTING	NON-DESTRUCTIVE TESTING (NDT) IN ACCORDANCE WITH EN ISO 9712	METALLOGRAPHY
Notched bar impact test	Penetrant testing (PT)	Microscopic cleanliness level
Tensile testing	Magnetic testing (MT)	Particle size determination
Pressure testing	Ultrasonic testing (UT)	Structure determination
Three-point bend testing	Visual inspection (VT)	Non-metallic inclusions
Hardness testing (Rockwell; Brinell; Vickers)	Laser induced breakdown spectroscopy (LIBS)	Decarburization depth
Approximate analysis [spectral analysis]	X-ray fluorescent (XRF)	Hardness depth
Fatigue Testing with variable amplitude		

Your Benefits

Thanks to the most modern infrastructure, we test under standardized conditions. You will benefit from maximum transparency and our high quality standards, supported by the standards set by the Swiss Accreditation Service [SAS]. In addition, we work closely with our partners for tests with special requirements. You will receive precise and complete results in a timely manner.

Our range of offers includes the following services in particular:

- Comprehensive advice and tests in one place.
- Support in conception of the optimal test requirements for the material.
- Advice on creating a material-specific design for materials testing.
- Accurate results via accredited measurement methods.
- Maximum transparency and consistently high quality with cost-efficient implementation.
- Rapid support in damage analytics
- Most of our test procedure are mobile and can be tested onsite

LIFE CYCLE OF A SYSTEM

The life cycle of a system can be divided into different phases (see phase model according to EN 50126). It begins with conception and ends with decommissioning or management. In order to permanently meet qualitative requirements, tests should be constant companions in the life cycle of a system. The RUAG Test Center for Materials Testing will advise you during the various project phases.

Quality assurance in the field of materials testing takes place during different phases of the system cycle. We advise and support you during the following phases:

➤ CONCEPTION AND SPECIFICATION

- Advice on material specification.
- Advice and services in determining material-specific norms and standards.
- Advice and services for the creation of test requirements for the material.

➤ OPERATIONS TRANSFER

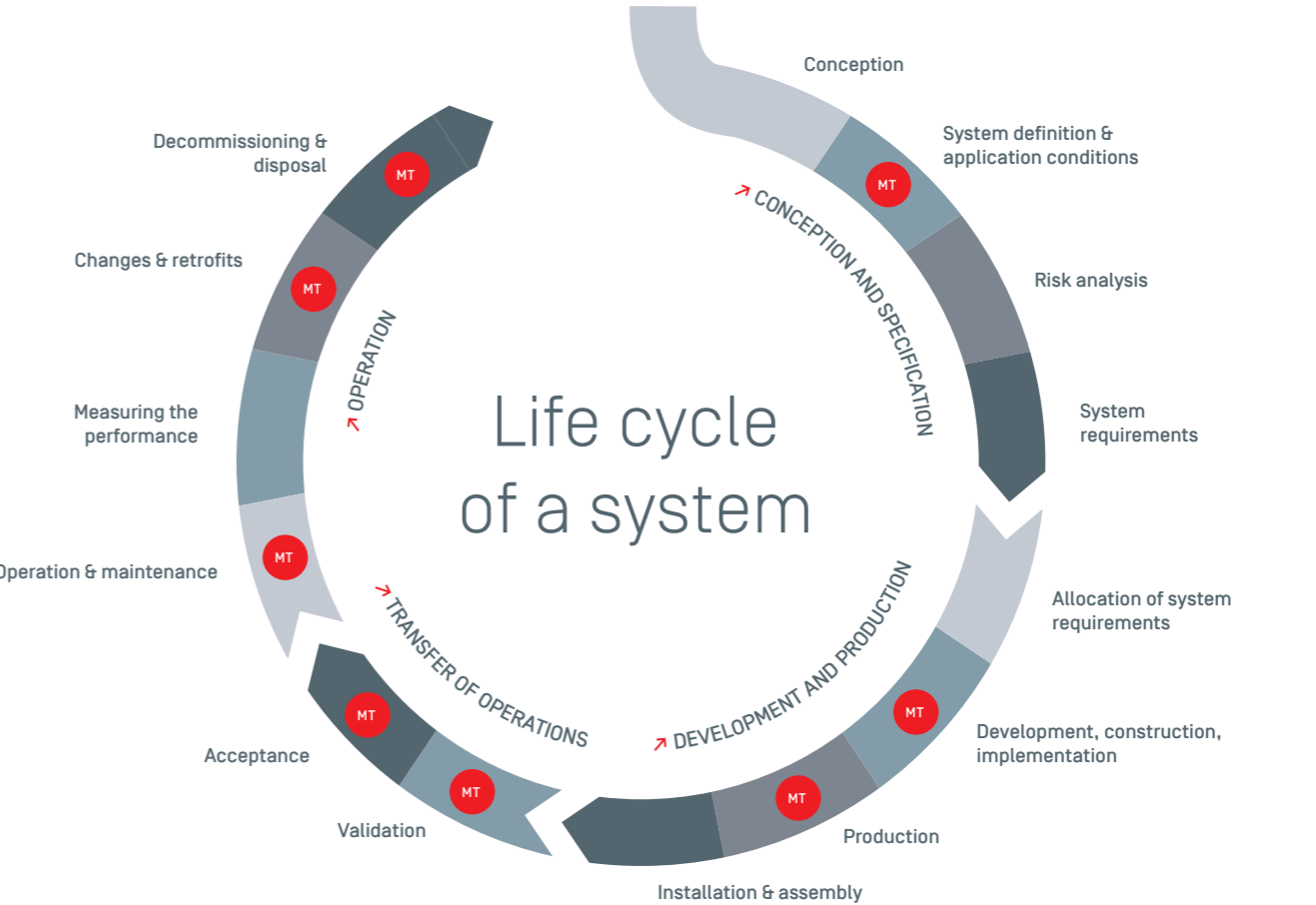
- Non-destructive or destructive testing to determine damage.
- Material test certificates.

➤ DEVELOPMENT AND PRODUCTION

- Support in the creation of test instructions for the material.
- Examination of existing material test regulations.
- Definition of the material tests.
- Non-destructive tests (e.g. weld seams).
- Checking of material properties of raw materials or workpiece blanks.

➤ OPERATION

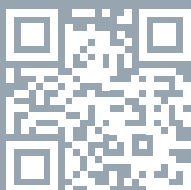
- Non-destructive testing to determine damage.
- Non-destructive testing of the parts to be changed for damage.
- Determination of material composition for environmentally-friendly disposal.



Applied Test Methods

THE TEST CENTER FOR MATERIALS TESTING APPLIES VARIOUS TESTING METHODS:

➤ TEST METHOD	➤ DESCRIPTION
- Notched bar impact testing	- EN ISO 148-1
- Tensile testing	- EN ISO 6892-1 - EN ISO 6892-2 - EN ISO 6892-3
- Pressure testing	- DIN 50106
- Three-point bend testing	- EN ISO 7438
- Vickers hardness testing	- EN ISO 6507-1
- Brinell hardness testing	- EN ISO 6506-1
- Rockwell hardness testing	- EN ISO 6508-1
- Mobile hardness testing HV [UCI]	- DIN 50159-1, DIN 50159-2
- Metal analysis	- Mobile operating spectrometry using Fe-based spark excitation; C to max. 2.5% iron, aluminium, titanium, copper and nickel-based alloys
- Fatigue testing with variable amplitude	- ISO 12110-01
- Qualification and certification of non-destructive testing personnel	- EN ISO 9712
- Penetrant testing (PT)	- EN ISO 3452
- Magnetic testing (MT)	- EN ISO 9934
- Ultrasonic testing (UT)	- EN ISO 16810 - EN ISO 16811 - EN ISO 16823
- Visual inspection (VT)	- EN 13018
- Mobile laser induced breakdown spectroscopy	- own test procedure
- Mobile X-ray fluorescent	- own test procedure
- Particle size determination	- EN ISO 643
- Structure determination	- DIN 50600
- Non-metallic inclusions	- EN 10247
- Decarburization depth	- EN ISO 3887
- Hardness depth	- EN ISO 2639 - EN 10328 - DIN 50190-3 - DIN 50190-4



➤ WE ARE HAPPY TO PROVIDE YOU WITH FURTHER INFORMATION UPON REQUEST.

Accreditations & certifications

- Accredited test laboratory according to ISO/EC 17025
- Accreditation number STS 0050
- Certified according to ISO 9001
- The testing staff is certified in the NDT procedure according to EN ISO 9712 to level 3