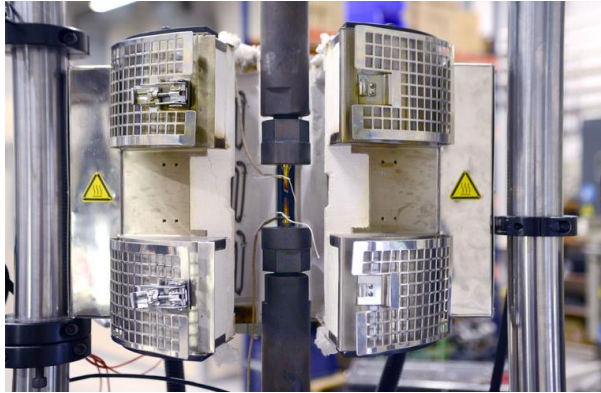


Metallic materials testing

Characterization of the behavior of metal materials for their optimum use in products and components.



Metallic materials have a widespread use in industry. Therefore, characterizing their behaviour allows us to optimize both their application as well as the actual component manufacturing processes and metal-metal and hybrid bonds. The study of new or standard metal materials and the improvement of their features and applications is a competitive advantage for both, new products and existing products.

Network of accredited materials testing laboratories

Applus+ has a network of ISO 17025 accredited laboratories for testing metal materials in Europe and Asia. We have a team of experts in metals and bonds as well as their applications in leading industries such as aerospace (Nadcap Accreditation), automotive, renewable energies, oil and gas or construction. Our metal materials testing service covers:

- Support in RandD+I programs
- Characterization and/or qualification testing
- Manufacturing quality control
- Destructive testing for Welding Procedure Qualification (WPQ)
- On-site testing (Material recertification including replica for Oil and Gas)

Our technical team performs standard tests (EN, ISO, ASTM, MIL-STD, among others.) or tests designed according to the client's specific regulations (AITM, SP, GD, DNV, API, among others) for any type of application.

We test both, standard materials and materials for advanced applications:

- Steel and its alloys
- Aluminium and its alloys
- Nickel, titanium and super alloys
- Standard welded joints
- Components with advanced welding procedures

Metals Testing Capabilities

Mechanical testing

Test Specimen preparation capabilities (machining and test tool design and manufacturing). Mechanical tests are conducted under different temperature and humidity conditions:

- Tensile (Strength, Modulus, High Temperature)
- Torsion
- Compression (Strength, Modulus)
- Flexural/Bend
- Shear
- Fracture toughness (K_{IC} , CTOD, J-R Curve, R-Curve)
- Crack propagation (dA/dN)
- Impact (Charpy)
- Fatigue (Low Cycle Fatigue, S-N curves, Wöhler curves)
- Creep (creep, stress rupture)

Chemical Analysis

- Optical Emission Spectrometry (OES)
- Positive Material Identification (PMI) / Mobile OES
- Positive Material Identification (PMI) / X-Ray Fluorescence (XRF)

Hardness Testing

- Brinell Hardness
- Rockwell Hardness
- Microhardness
- Vickers Hardness

Metallographic Examinations and Fractography

- Metallographic samples preparation
- Micro and Macro Examinations
- Microetching and Macroetching of metals and alloys
- Grain Size

- Inclusions
- Decarburization
- Cementation depth
- Alpha Case
- Effective Case Depth
- IGA / IGO
- Oxidation
- Local thickness
- Fractography Examination - Scanning electron microscopy (SEM - EDX)

Corrosion Testing

- Intergranular corrosion resistance
- Salt Spray

Non-Destructive Testing (NDT)

- Ultrasonic
- Magnetic Particle
- Eddy Current
- Penetrant

Benefits

- Optimize the design of components with metal materials
- Ensure the structural integrity and reliability of the components
- Optimize the manufacturing process of components with metal materials
- Predict the in-service behaviour of metal materials