MATİL

Material Testing And Innovation Laboratories Co.

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MATERIAL TESTING AND INNOVATION LABORATORIES CO.

MATİL CO.;

Founded in 2012, MATİL CO. provides services in the following areas:

- Accredited Laboratory Services
- Product Development (P&D) and Research and Development (R&D) Activities
- Sectoral Training

Starting its accredited testing and analysis services in 2016, MATİL CO. operates as an R&D center with pilot-scale steel production and slag evaluation laboratories. It undertakes projects in green transformation, such as waste valorization and emission reduction, as well as works on developing new steel grades, cost reduction, improving existing grades, and failure analysis. These services cater primarily to the steel industry but also benefit various other sectors.

In addition to providing technical solutions, MATİL CO. organizes training programs through its Steel Academy, which brings academia and industry together under an innovative framework to meet the evolving and unique needs of companies.

With its qualified personnel, innovative engineering solutions, continuous training programs, advanced and state-of-the-art laboratory infrastructure, internationally recognized accredited testing and analysis services, and R&D activities, MATİL CO. serves as a meeting point and solution partner not only for the steel industry but also for organizations and companies from numerous other sectors.

COMPETENCIES

ACCREDITED LABORATORY
TS EN ISO/IEC 17025

RECOGNISED PRODUCT
TESTING LABORATORY

MATIL
Material Testing And Innovation Laboratories Co.

REPUBLIC OF TURKEY
MINISTRY OF INDUSTRY
AND TECHNOLOGY
R&D CENTER

REPUBLIC OF TURKEY
MINISTRY OF ENVIRONMENT,
URBANIZATION AND
CLIMATE CHANGE
AUTHORISED
ENVIRONMENTAL
LABORATORY

R&D

MATİL CO. is a dynamic R&D center with competent personnel, offering testing and analysis, training, research and development (R&D), and product development (P&D) services. Since being granted the "R&D Center" status by the Ministry of Industry and Technology in 2017, our studies have primarily focused on various material groups, particularly steel and its alloys.

Our Core R&D and P&D Areas Include:

- Green Transformation and Sustainability Projects
- Evaluation of Industrial Wastes Such as Slag, Fly Ash, and Flue Dust
- Carbon Capture and Evaluation Technologies
- Development of Steel Alloys
- Carbon and Advanced Material Technologies
- Product and Technology Development
- Cost-Reducing Process Improvement
- Metal Recovery

ADVANCED R&D FACILITIES

In addition to our competent human resources, MATİL CO. possesses a robust infrastructure and physical facilities necessary for R&D studies.

Within MATİL CO., we have:

- Test and analysis laboratories
- Research laboratories conducting non-destructive testing, graphene, and nanomaterial studies for product development
- Pilot-scale steel production and waste evaluation pilot facilities, along with rich infrastructure opportunities, are effectively utilized for R&D activities.

NATIONAL AND INTERNATIONAL PARTNERSHIPS

MATİL CO. engages in projects with numerous national and international groups within the metal and general material sectors. Through participation in EU-funded project processes alongside international consortiums, we have gained valuable experience in large-scale projects. These projects utilize national or international funds, while also leveraging MATİL CO.'s internal resources for R&D studies.

GREEN STEEL AND SUSTAINABILITY

Continuing our efforts to reduce carbon emissions stemming from steel production, we focus on "green steel" and related industrial output through completed and ongoing waste recovery studies. Moreover, we persist in our work on materials for challenging processes such as transportation and storage of hydrogen, critical for "green steel" production, and associated tests and analyses.

PROJECT EXAMPLES

Steel Development

- Determination And Enhancement of Mechanical Properties Of High Manganese Trip Steels Based On Process Parameters
- Development of Boron Additive High-Strength AHSS Steel

Waste Evaluation and Recycling

- Development of Slag-Based Insulated Refractory Concrete
- Development of Slag-Based Weight/Balance Concrete
- Development of Slag-Based Aerated Concrete/Construction Material

Carbon Capture Technologies

- Development of An Integrated CO_2 Capture And Slag Mineralization Process For Steel Production

Material, Product, and Technology Development

- Development of Synthesis Parameters for Graphene Derivatives, Characterization Compliant with Relevant Iso Standards and The Development of Functionalized Graphene Additive Materials

R&D OBJECTIVES

MATİL CO. continues its studies in line with environmental consciousness, innovative technologies, and sustainability.

In many industrial branches, hydrogen is used as a clean energy source and is expected to gain wider usage in the future, despite facing challenges in its usage, transportation, and storage processes.

For hydrogen to be used as a fuel, it is essential for suitable materials and products to possess specific properties. Accordingly, our aim is to conduct tests of material analyses in MATİL CO. Laboratories, determined by standards such as EIGA (European Industrial Gases Association) and ASME and approved by various authorities

Within the scope of clean steel production:

- Improving energy efficiency and diversity: utilizing hydrogen for DRI/HBI production and enhancing energy efficiency by assessing local ores and similar topics are among MATİL CO.'s short- and medium-term R&D objectives.

INTELLECTUAL PROPERTY AND PUBLICATIONS

Two new products have been introduced and patent applications have been made in the laboratories of MATİL CO.

- Insulated Refractory Concrete Based on Electric Arc Furnace Slag and Production Method
- Development of Insulated Construction Brick from Enriched Electric Arc Furnace Slag Wastes

A selection of articles published in national and international refereed journals, as well as presentations delivered at various symposiums and similar events, stemming from the R&D and P&D activities conducted by MATİL CO.' in collaboration with single or multiple partners to date:

- Development Of Insulated Construction Brick by Foaming Method From Enhanced EAF Slag Waste (EFRS'2022 Türkiye İzmir)
- High Performance Pilot Scale Refractory Insulated Concrete Production from Electric Arc Furnace Slag Waste (EFRS'2022 Türkiye İzmir)
- Use Of Electric Arc Furnace Slag Waste as Raw Material of Refractory Insulating Brick (International Colloquium on Refractories 2022 Germany Aachen)
- Development Of Aerated Concrete Brick with Chemical Additives from Electric Arc Furnace Slag Waste (The International Federation for Structural Concrete (Fib) Symposium 2023)
- Study of The Microstructure And Mechanical Property Relationships Of Shielded Metal Arc And TIG Welded S235jr Steel Joints (Materials Science and Engineering: A, 2022)
- Investigation of the Effect of Copper Element and Copper Equivalent on Fatigue Performance in Structural Steels (National Thesis Center, 2019)
- Prediction of Calorific Value of Coal by Multilinear Regression and Analysis of Variance (Journal of Energy Resources Technology, 2022)
- Magnetic iron-based nanoparticles encapsulated in graphene/reduced graphene oxide: Synthesis, functionalization and cytotoxicity tests (Journal of Science: Advanced Materials and Devices, 2024)"

MATİL STEEL ACADEMY

MATİL Steel Academy aims to provide you with the knowledge and skills you need in the sector with innovative and sector-oriented training programs, expert trainers from the academy and/or industry.

We offer a wide range of material science and corporate communication trainings including steel grades, metallurgical principles, welding applications, corrosion mechanisms, damage analysis and much more.

These trainings are a perfect opportunity for those who want to specialize in the sector, those who want to advance their careers and those who want to learn new generation steel technologies.

In addition to the current training program, we can design customized trainings and provide consultancy services in line with your requests. To arrange specialized training tailored to the specific needs of your business, simply contact us with your request.

Continue to follow us for more information and registration, we will be very happy to see you among us.

The list of trainings given in previous periods is shared on the next page. A calendar will be created for the trainings you will select from this list (if you request, training topics other than the list) and the most efficient scheduling of the trainings will be ensured.

Kindly direct your training requests to matil@matil.org and we will respond at the earliest opportunity.

SOME OF OUR TRAININGS	
Training No	**Training Name**
1	Training on the Development, Nomenclature, Represantation in International Standards, and Comparison of Steel Grades Based on Metallurgical Principles Training
2	Welding Metallurgy and Key Considerations in Welding Applications of Steels Training
3	Metallurgical Characterization of Steel Materials, Industrial Applications and Steel Selection Training
4	Corrosion of Steel, Corrosion Mechanisms, Analysis, Protection Methods, and Selection of Appropriate Steel Training
5	Oxygen-Hydrogen Control and Effects in Steel Production
6	Microstructure of Steels, Failure Analysis, Applications and Case Studies Training
7	Grain Size Measurement, Residue Analysis, Inclusion Identification and Sample Preparation Training in Steels
8	Mechanical Behaviour of Materials, Mechanical-Physical Metallurgy and Heat Treatment of Steels Training
9	Steel Materials and Heat Treatment Applications Training
10	Thermomechanical Rolling and New Generation Steels Training
11	Scrap Evaluation and Expertise in The Iron and Steel Industry Training
12	Alumina Silicate Bricks, Monolithic Materials and Basic Refractories Used in Steel Production Training
13	Refractory Materials: Damage Analysis, Characterization and Tests Training
14	Advanced Steel Technologies, Steel Selection and Applications in Engineering Studies Training
15	Controlled and Thermomechanical Rolling, Application Examples and Product Characterization Training
16	Market Shares of Steel Materials, Sales and Marketing Strategies, Steel Groups, Turkey and World Statistics Training
17	Finite Element Analysis (FEA) and Design Engineering Training for Steel Production
18	Material Testing and Quality Control Training
19	Basic Materials Science Training
20	Fasteners: Materials and Possible Damage Mechanisms Training
21	Formation and Production of Coal and Laboratory Tests Training
22	TS EN ISO-IEC 17025:2017 Laboratory Accreditation Training
23	Method Validation and Verification Training
24	Iron and Steel Technology and Deformation Mechanisms Training
25	Failure Analysis in Aluminium Alloys
26	Draft Survey Training
27	Corrosion in Steel Materials: Formation Mechanisms, Types, Protection Methods and Failure Analysis Training
28	Metallic Materials and Welding Methods Training

LABORATORY POLICY

As MATİL CO. Laboratory, in our test/analysis services provided;

By demonstrating good professional and technical practices, by continuously trained, skilled and competent expert personnel and by responding quickly to changes that become necessary as a result of technological developments with the ability to provide resources and by keeping quality at the highest level,

By using national/international standard methods,

By ensuring the traceability of reference standards according to the international and interlaboratory system, by ensuring its reliability and competence through interlaboratory comparisons, by keeping the measurement uncertainties required by the customer at the lowest level without neglecting them,

With the total application of the principles of speed, accuracy, continuity, reliability, equality, impartiality and confidentiality and with the help of cooperation with customers, all necessary studies are carried out to reduce customer complaints and thus increase customer satisfaction, and laboratory activities are carried out consistently.

In this context, in order to eliminate the factors that negatively affect the test/analysis results, the awareness that the Laboratory Quality Handbook, procedures, instructions and other documents created within the Quality Management System should be read, understood and used effectively in all applications by all relevant personnel has been ensured.

The top management of our laboratory undertakes to effectively implement and continuously improve the Quality Management System with the contribution of all personnel in accordance with the TS EN ISO/IEC 17025:2017 standard, TS EN ISO 9001 standard, customer requirements, legal requirements and Accreditation Body requirements.

LABORATORIES

MECHANICAL TESTING LABORATORY

- TENSILE TEST (2500 kN)
- TENSILE TEST (0.3–600 kN)
- NOTCH IMPACT TEST
- HIGH-CYCLE FATIGUE TEST
- LOW-CYCLE FATIGUE TEST
- RIB GEOMETRY MEASUREMENT
- BEND AND REBENDING TEST
- REVERSE BENDING TEST

MICROSTRUCTURE AND MATERIAL ANALYSIS LABORATORY

- METALLOGRAPHIC SAMPLE PREPARATION
- OPTICAL MICROSCOPE MICROSTRUCTURE ANALYSIS
- STEREO MICROSCOPE MACROSTRUCTURE ANALYSIS
- SCANNING ELECTRON MICROSCOPE (SEM) ANALYSIS
- UNIVERSAL HARDNESS MEASUREMENT
- BRINELL HARDNESS MEASUREMENT
- MICROHARDNESS MEASUREMENT
- JOMINY HARDENABILITY TEST
- FAILURE ANALYSIS AND CHARACTERIZATION
- METALLIC MATERIAL FAILURE ANALYSIS AND CHARACTERIZATION
- REFRACTORY MATERIAL FAILURE ANALYSIS
- CHARACTERIZATION OF REFRACTORY AND CERAMIC RAW MATERIALS

X-RAY LABORATORY

- XRF CHEMICAL ANALYSIS

PILOT-SCALE STEEL PRODUCTION LABORATORY

- THERMOCHEMICAL SIMULATION
- MELTING
- HEAT TREATMENT
- SLAB AND BILLET ROLLING

CHEMICAL AND COAL ANALYSIS LABORATORY

- CHEMICAL ANALYSIS
- MOISTURE, ASH, VOLATILE MATTER, FIXED CARBON, AND LOSS ON IGNITION ANALYSIS
- CARBON-SULFUR-HYDROGEN ANALYSIS
- CALORIFIC VALUE DETERMINATION
- COATING WEIGHT DETERMINATION

NON-DESTRUCTIVE TESTING LABORATORY

- RESIDUAL STRESS MEASUREMENT
- SURFACE AND SUBSURFACE DISCONTINUITY DETECTION

GRAPHENE AND NANOMATERIALS LABORATORY

- SYNTHESIS OF GRAPHENE DERIVATIVES
- COATING WITH GRAPHENE DERIVATIVES
- SYNTHESIS OF FUNCTIONALIZED GRAPHENE-BASED NANOCOMPOSITES
- CARBON MINERALIZATION

REFRACTORY AND WASTE MATERIAL RECYCLING LABORATORIES

- PRIMARY COARSE CRUSHING
- SUB-MICRON GRINDING
- MAGNETIC SEPARATION
- MORTAR PREPARATION
- CONCRETE CURING
- SIEVE ANALYSIS
- SINTERING AND CORROSION TESTS
- COMPRESSIVE STRENGTH AND THREE-POINT BENDING TEST
- COLD CRUSHING STRENGTH TEST
- STRENGTH UNDER LOAD TEST
- SETTING TIME CONTROL AND MICROCRACK ANALYSIS

MECHANICAL TEST LABORATORY

TENSILE TESTING (2500 kN)

Technical Properties

- 2500 kN load capacity
- Accurate yield strength, tensile strength, percentage total extension at fracture, percentage total extension at maximum force, percentage reduction of area, determination of elastic modulus
- 1 to 100 mm flat and 6 to 100 mm round round material testing capability
- Class 0.5 sensitivity
- Full automatic contact type extensometer

Product Standarts

- TS 708*
- BS 4449*
- BS 6744*
- BS 4482*
- BS 4483
- ISO 4136*
- ISO 898-1*
- API 5L*
- API 1104*
- ASTM A615/A615M *
- ASTM A706/A706M*
- DIN 488-2*
- NEN 6008* / BRL 0501*
- NBN A 24 -301
- NF A35 - 80 -1
- ISO 898-2
- SS560*
- CS2*
- MS146*
- TS 5680*
- ASTM A416/A416M*
- BS5896*
- SFS1300
- EN 10080
- NS3576
- SS212540
- LVS191-1
- DS/INF 165
- AS/NZS 4671
- BS8666
- ISO 6935-2

Sample Types

- Rebars
- Profiles
- Steel Blades
- Flat products
- Welded Materials
- Coils
- Round Bars
- Pipe & Tubes
- PC Strand
- PC Wires
- PC Indented Wire
- Bolts

Applications

- Flat Products
- Round Materials / Rebars
- PC Wire, PC Intented Wire
- PC Strand

Test Standards

- EN ISO 6892 – 1*
- TS EN ISO 15630 – 1*
- TS EN ISO 15630 – 2
- TS EN ISO 15630 – 3*
- ASTM E8/E8M*
- ASTM A370*
- ISO 15835 – 2*
- ASME Section IX-QW150*
- AWS D1.1/D1.1M
- GOST 12004*
- ASTM A1061/A1061M*
- TS 3721*

* These tests are carried out within the scope of accreditation according to the TS EN ISO/IEC 17025 standard.

TENSILE TESTING (0,3-600 kN)

Technical Properties

- 600 kN load capacity
- 30 kN loadcell for 0,1 to 10 mm wire and sheet metal tests
- M6 – M16 Bolts (250 kN capacity) (M20-M30 bolt tests with apparatus)
- 0 to 100 mm flat ve 8 to 65 mm round material testing capability
- 3 point bending tests: Interchangeable upper mandrels between 50-224 mm diameters and 220 mm bending distance
- 250 kN capacity, 200 mm diameter compression test apparatus (Device capacity:600kN)
- Class 0.5 sensitivity
- Full otomatic contact type ekstansometer

Product Standarts

- TS 708*
- BS 4449*
- BS 6744*
- BS 4482*
- BS 4483
- ISO 4136*
- ISO 898-1*
- API 5L*
- API 1104*
- ASTM A615/A615M*
- ASTM A706/A706M*
- DIN 488-2*
- NEN 6008* / BRL 0501*
- NBN A 24 -301
- NF A35 - 80 -1
- ISO 898-2
- SS560*
- CS2*
- MS146*
- TS 5680*
- ASTM A416/A416M*
- BS5896*
- SFS1300
- EN 10080
- NS3576
- SS212540
- LVS191-1
- DS/INF 165
- AS/NZS 4671
- BS8666
- ISO 6935-2

Sample Types

- Rebar
- Profile
- Steel Blades
- Flat products
- Bolts & Nuts
- Coil
- Welded Materials
- Round Bars
- Bulon pipes
- Pipe & Tubes
- PC Strand
- PC Wire
- PC Intended Wire

Applications

- Flat Products
- Round Materials / Rebars
- Wire
- Pipe & Tubes
- Bolts & Nuts
- Welded Materials Tensile & Bending
- Metallic Materials 3 Point Bending Tests

Test Standards

- TS EN ISO 6892 – 1*
- TS EN ISO 15630 – 1*
- TS EN ISO 15630 – 2
- TS EN ISO 15630 – 3*
- ASTM E8/E8M*
- ASTM A370*
- ISO 15835 – 2*
- ASME Section IX-QW150*
- AWS D1.1/D1.1M
- GOST 12004*

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CHARPY IMPACT TEST

Technical Properties

- 450 joule capacity -80 to +70°C sample conditioning
- V & U notch tests
- Optical measurement sytem check for samples
- 2 & 8 mm hit anvil

Sample Types

- V-notch sample
- U-notch sample

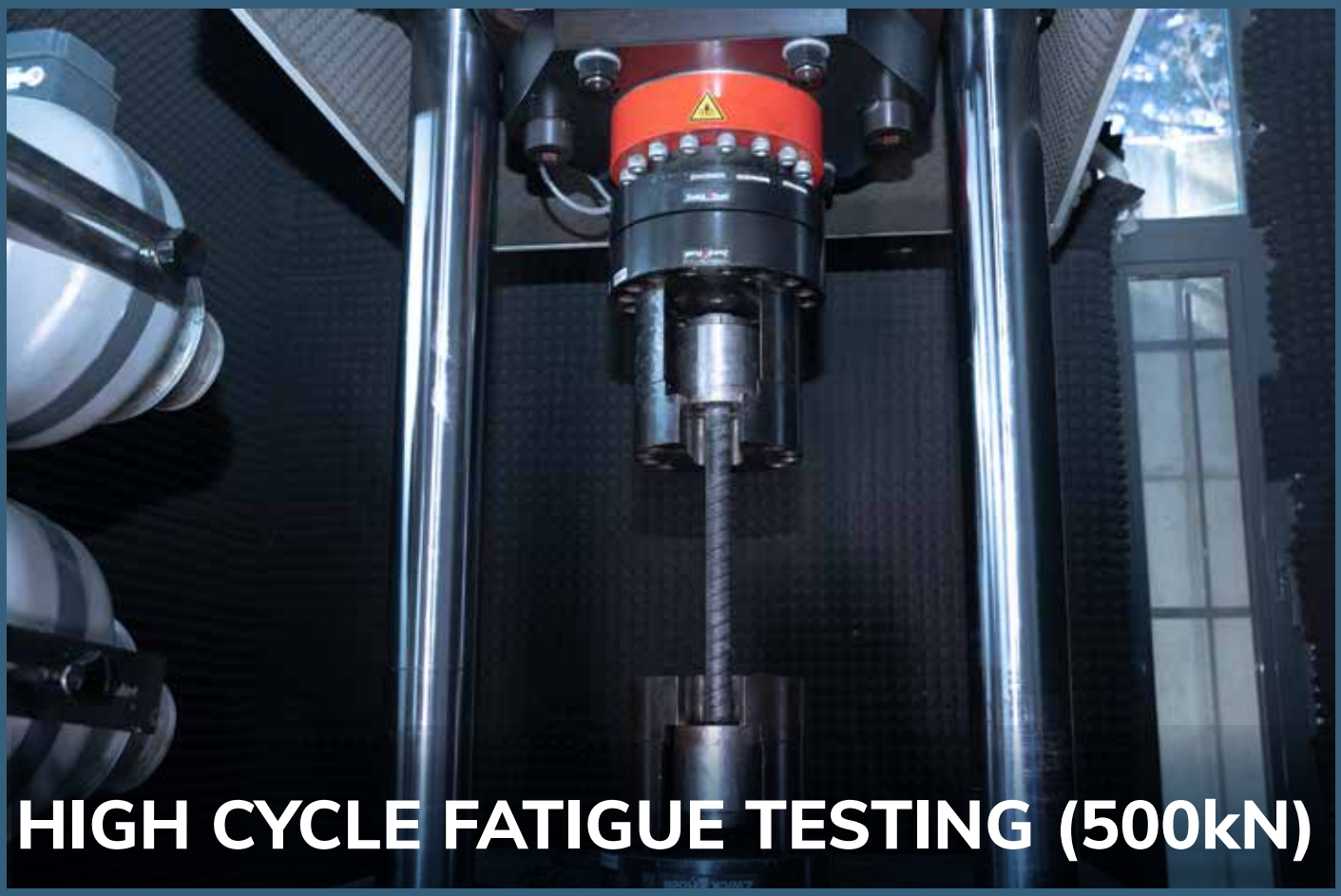
Test Standards

- EN ISO 148-1*
- ASTM A370*
- ASTM E23*

Applications

- Structure Steels
- Hardening Steel
- Oil Pipe Lines
- Special Projects
- Submarine Steel
- Armor Steel
- High Alloy Steels
- Defense Industry

* These tests are carried out within the scope of accreditation according to the TS EN ISO/IEC 17025 standard.



HIGH CYCLE FATIGUE TESTING (500kN)

Technical Properties

- 500 kN loadcell capacity
- Resonation type between 35 to 300 Hz frequency working bandwith
- M5, M6, M8, M10, M12, M14, M16, M20, M24 & M30 size bolt capable
- Ø6mm-Ø50mm rebar fatigue
- Class 0,5 sensitivity

Sample Types

- Rebar
- Bolts

Applications

- Rebar
- Round bar (prepared samples)
- Bolts

Test Standards

- TS EN ISO 15630-1*
- BS 4449*
- TS 708*
- ASTM E466*
- DIN 50100
- ISO 15835-2*
- BRL 0501*
- EN 10080
- DIN 488-2*
- BS 6744
- ISO 3800-1*
- SS560*
- NEN 6008*
- CS2*
- GOST 52544*
- TU 14-1-5596*
- MS146*

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HIGH CYCLE FATIGUE TESTING (250kN)

Technical Properties

- 250 kN loadcell capacity
- Resonation type between 35 to 300 Hz frequency working bandwith
- Ø6 mm-Ø50mm rebar fatigue
- Class 0,5 sensitivity

Sample Types

- Rebars
- Bolts

Applications

- Rebar
- Round bar (Prepared samples)
- Bolts

Test Standards

- TS EN ISO 15630-1*
- BS 4449*
- TS 708*
- ASTM E466*
- DIN 50100
- ISO 15835-2*
- BRL 0501*
- EN 10080
- DIN 488-2*
- BS 6744
- ISO 3800-1*
- SS560*
- NEN 6008*
- CS2*
- GOST 52544*
- TU 14-1-5596*
- MS146*

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HIGH CYCLE FATIGUE TESTING (100kN)

Technical Properties

- 100 kN loadcell capacity
- Resonation type between 35 to 300 Hz frequency working bandwith
- Ø6mm -Ø25mm rebar fatigue
- Class 0,5 sensitivity

Sample Types

- Rebar
- Bolts
- Round bar (Prepared samples)

Applications

- Rebar
- Round Samples
- Bolts
- Defense Industry
- Aviation Industry
- Automotive Industry

Test Standards

- TS EN ISO 15630-1*
- BS 4449*
- TS 708*
- ASTM E466*
- DIN 50100
- ISO 15835-2*
- BRL 0501*
- EN 10080
- DIN 488-2*
- BS 6744
- ISO 3800-1*
- SS560*
- NEN 6008*
- CS2*
- GOST 52544*
- TU 14-1-5596*
- MS146*

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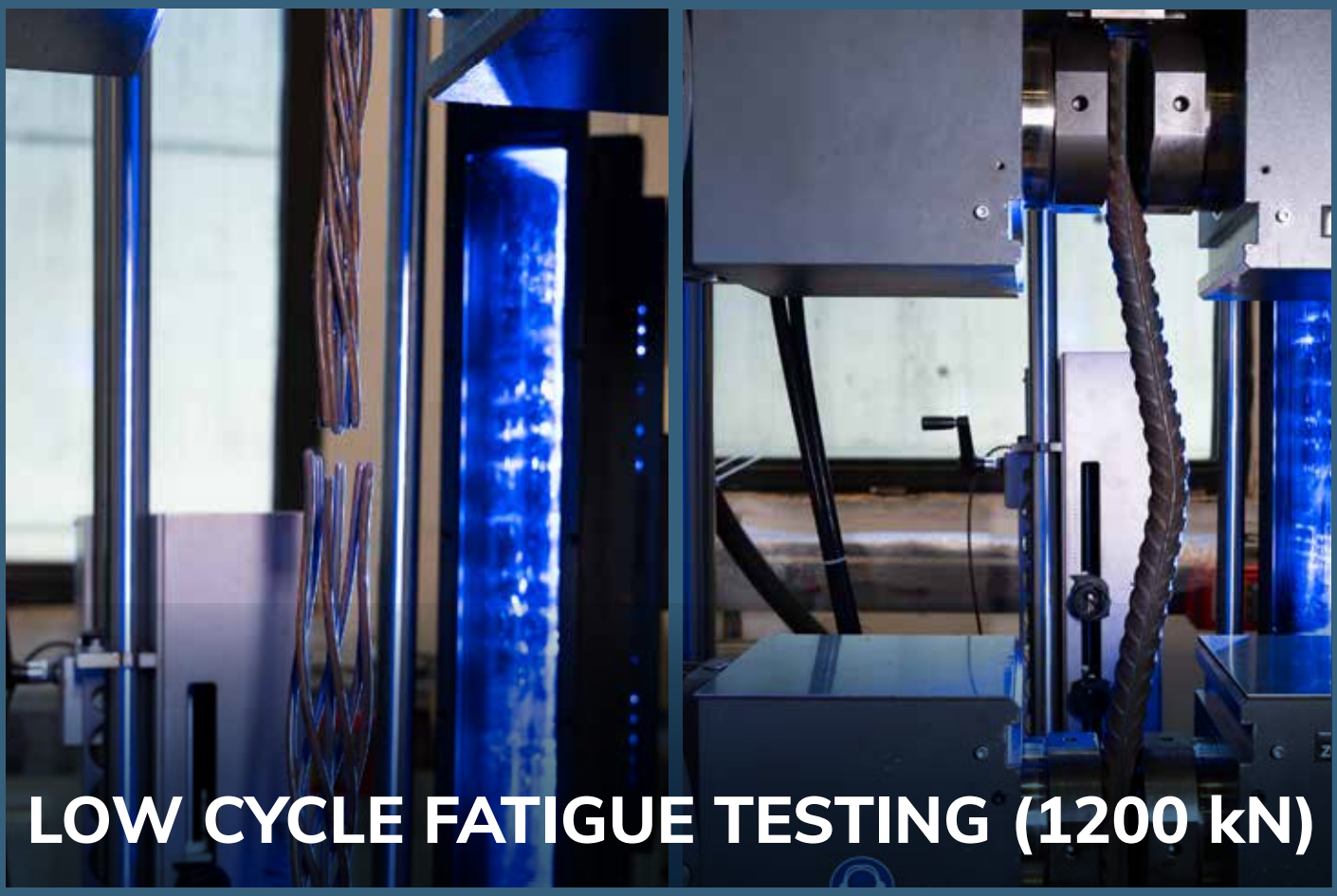

LOW CYCLE FATIGUE TESTING (1200 kN)

Technical Properties

- 1200 kN Load Cell capacity for static tests, 850 kN Load Cell capacity for dynamic tests
- ±9 mm, total 18 mm stroke
- 1-3 Hz frequency with up to 10 cycles of one block
- Ø5,5mm-60mm rebar gripping
- 1- 75 mm flat product gripping
- Full otomatic contact type extensometer
- Ability to perform tensile and compression tests at a load application capacity of 1200kN
- **VideoXtens Array extensometer**with 6 cameras having 680 mm view, 0.6 µm measurement resolution, Class 0.5 measurement accuracy according to ISO 9513 standard, new generation blue light technology that does not require sample marking

Product Standarts

- BS 5896*
- PN-H-93220*
- ASTM A416/A416M*
- TS 5680*

Sample Types

- Up to Ø60 mm rebar
- PC Wire
- PC Intented Wire
- PC Strand
- Round Bar
- Hot & Cold Rolled flat products

Applications

- Deformation Controlled Rebar fatigue tests
- PC Wire & PC Intended Wire tensile tests
- PC Strand tensile tests
- Special designed test on flat products.

Test Standards

- EN ISO 15835-2*
- TS EN ISO 15630-1*
- TS EN ISO 15630-3*
- ASTM A1061/A1061M*
- TS 3721*
- ASTM A370
- UNE 36065
- SI 4446
- EN 10138-3
- SI 739

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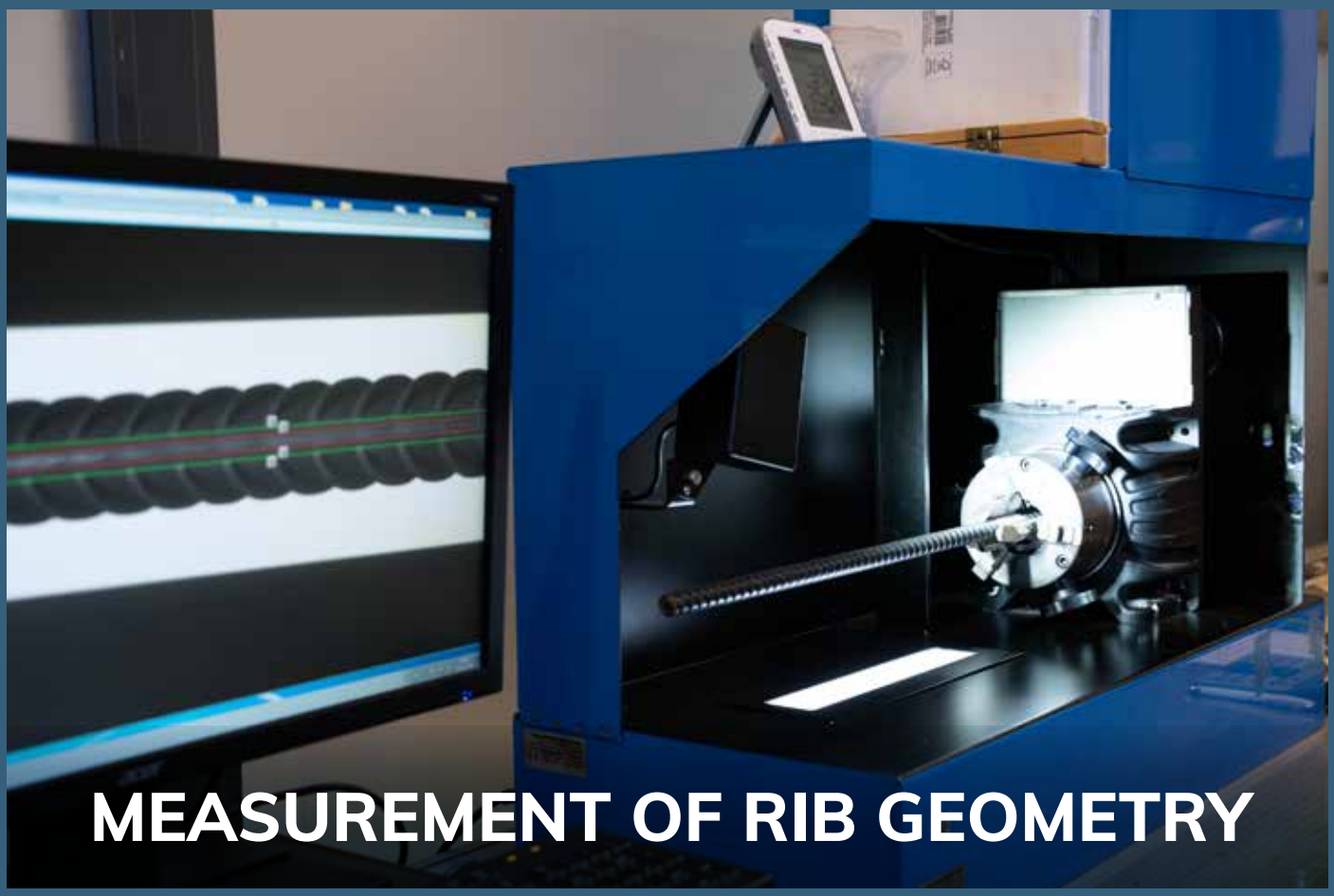

MEASUREMENT OF RIB GEOMETRY

Technical Properties

- Ø6mm-50mm rebar measurements.
- Ability to determine surface geometry with laser measurement equipment

Sample Types

- Hot & Cold Deformed Rebar
- PC Intended Wire

Applications

- Determination of Surface Geometry Properties

Product Standarts

- TS 708*
- BS 4449*
- BS 5896
- ASTM A615/A615M*
- ASTM A706/A706M*
- DIN 488-2*
- NEN 6008* /BRL 0501
- TU 14-1-5596*
- NBN A 24 -301
- NF A35 - 80 -1
- SS560*
- CS2*
- GOST 52544*
- MS146*
- ISO 6935-2

Test Standards

- TS EN ISO 15630 - 1*
- TS EN ISO 15630-2
- TS EN ISO 15630-3

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BEND – REBEND – REVERSE BEND TEST

Technical Properties

- Bend & Rebend tests for rebar up to 50 mm diameter (Mandrel diameter up to 350 mm).
- Reverse bending tests of PC wires up to Ø13mm (mandrel suitable for each diameter)
- Artificial aging furnace for rebend tests.

Sample Types

- Rebar
- Flat products
- Round Bars
- Pipes
- PC Wire
- PC Intended Wire

Test Standards

- EN ISO 15630 – 1*
- EN ISO 15630 – 2
- EN ISO 15630 – 3*
- ASTM A370*
- EN ISO 7438*
- TS 205- ISO 7801*
- EN ISO 5173*
- BS 5896*
- TS 3721*

Applications

- Rebar
- Round Materials
- Pipes
- PC Wire & PC Intended Wire

* These tests are carried out within the scope of accreditation according to the TS EN ISO/IEC 17025 standard.

CHEMICAL AND COAL ANALYSIS LABORATORY

CHEMICAL ANALYSIS

OPTICAL EMISSION SPECTROMETER

Technical Specifications:

- Provides optimal sensitivity, accuracy, precision, and stability using photomultiplier tube technology (PMT high-end)
- Detection of concentrations of 33 elements in steels (Fe, Al, As, B, Bi, C, Ca, Ce, Co, Cr, Cu, La, Mg, Mn, Mo, Nb, Ni, P, Pb, S, Sb, Se, Si, Sn, Ta, Te, Ti, V, W, Zn, Zr, N, O)
- Reliable detection of C, N, and O concentrations in the ppm range
- Detection of B in low-alloy steels down to 1.5 ppm
- Fast results

Sample Types

- Analysis possible for samples with a minimum of 3 mm diameter and 0.8 mm thickness

Main Applications

- Carbon Steels
- Case Hardening Steels
- Tempering Steels
- Free-Cutting Steels
- Nitriding Steels
- Stainless Steels
- Tool Steels
- High Manganese Steels
- General Manufacturing Steels
- Cast Irons

Experiment Standards

- ASTM E 1806*
- EN ISO 14284*
- ASTM E 415*
- ASTM E 1086*
- ASTM E 1999*
- ASTM E 2209*
- JIS G 1253*

* These tests are conducted under accreditation according to the TS EN ISO/IEC 17025 standard.

MOISTURE, ASH, VOLATILE MATTER AND FIXED CARBON ANALYSIS

Technical Specifications:

- Sample analysis up to 5 g with 0.1 mg accuracy
- High performance and stability with capsule weighing cells
- Fast heating with a total capacity of 5400W
- Operating temperature range from room temperature to 1000 °C with 1 °C intervals
- Ability to analyze up to 19 samples in a single run
- Automatic placement and movement control of crucibles and lids via a carousel system
- Integrated monitoring of balance, heating, and precise weighing with programmable furnace
- Simultaneous analysis of moisture, ash, and volatile matter in a single run
- Short analysis time and quick results with a simple working method

Test Standards

- ASTM D7582*
- ASTM D7348
- ISO 589 (Methode B2) *
- ISO 26845
- ASTM D 3175
- TS 711 ISO 562
- TS ISO 1171
- ASTM D 3172

Sample Types

- Powder samples with 212 µm and 250 µm particle sizes

Main Applications:

- Moisture, ash, volatile matter, and fixed carbon analysis in coal and all types of coke (bituminous coal, anthracite, lignite, charcoal, etc.)
- Loss on ignition analysis in solid fuel waste
- Analysis of waste moisture and loss on ignition in cement
- Waste moisture and loss on ignition analysis in refractories and bricks
- Ash and moisture analysis in paper
- Mass loss analysis
- Ash and moisture analysis in flour

* These tests are conducted under accreditation according to the TS EN ISO/IEC 17025 standard.

CARBON-SULFUR-HYDROGEN ANALYSIS

Technical Specifications:

- Fast, precise, and reliable element detection
- Analysis of small scales (100-300 mg)
- Operating temperature up to 1350 °C
- Capability for solid sample analysis
- Simultaneous determination of carbon, sulfur, and hydrogen in organic samples:
  - Carbon determination in the range of 5-100%
  - Sulfur determination in the range of 0.005-6%
  - Hydrogen determination in the range of 0.01-6%

Test Standards

- ASTM D 5373*
- ASTM D 4239*
- ASTM D 5016
- ASTM D 1619
- ASTM D 5291
- ASTM D 1552
- EN ISO 10694
- EN ISO 15178
- TS 12089 EN 13137

Sample Types

- Powder samples with 212 µm and 250 µm particle sizes

Main Applications:

- Coke and Coal
- Oil, Petroleum, and Rubber
- Ash Carbon and Sulfur Analysis
- Graphite
- Calcium Carbonate
- Limestone
- Cement
- Plaster
- Plastic

* These tests are conducted under accreditation according to the TS EN ISO/IEC 17025 standard.

CALORIFIC VALUE DETERMINATION

Technical Specifications:

- Analysis according to the isoperibol static jacket method
- Measurement capability up to 40,000 Joules
- Results within 6 minutes
- Operating at 22 °C and 30 °C
- Capable of working at pressures up to 30 bar

Test Standards

- ISO 1928*
- ASTM D 5865

Sample Types

- Powder samples with 212 µm and 250 µm particle sizes

Main Applications:

- Calorific analysis of all types of coke and coal
- Calorific analysis of jet fuels like kerosene
- Calorific analysis of liquid fuels such as diesel, oil, and biodiesel
- Calorific analysis of biological fuels
- Calorific analysis of grains and cereals
- Calorific analysis of cement, food, solid waste, and recycling products

* These tests are conducted under accreditation according to the TS EN ISO/IEC 17025 standard.

COATING WEIGHT DETERMINATION

WET METHOD

Technical Specifications:

- Zinc and zinc alloy coating weight determination on wire and wire products
- Galvanized coating weight determination on metallic materials
- Electrolytic tin coating weight determination on metallic materials

Sample Types

- Zinc and Tin Coated Metal Materials

Main Applications:

- Metallic Materials

Test Standards

- ISO 7989:1-2*
- EN 10346*
- EN 10202

* These tests are conducted under accreditation according to the TS EN ISO/IEC 17025 standard.

MICROSTRUCTURE AND MATERIAL ANALYSIS LABORATORY

METALLOGRAPHIC SAMPLING PREPARATION

CUTTING DEVICE

Technical Specifications:

- Automatic sliding table feeding system; adjustable cutting force, impact cutting mode, motorized the sample in the X and Y axes
- Pulse cutting method without deformation of hard samples
- Cutting circle, which allows to safely monitor the sample with LED illuminated, completely closed and wide window
- Cutting process, which allows sensitive surface cutting in materials such as composite, plastic and ceramics, along with iron and non -iron metals in different sizes and geometries

MOUNTING DEVICE

Technical Specifications:

- Hydraulic pressure automatic digital moulding press for 30 mm diameter samples
- Adjustable pressure, molding temperature, heating and cooling time
- Moulding for materials that require edge sharpness
- Compliance for all current hot mouldings used in metallography

SANDING AND POLISHING DEVICE

Technical Specifications:

- Sanding and polishing of metallographic sample with a diameter of 250 mm in diameter
- Disk rotation speed, time and cooling water setting
- Microprocessor controlled automatic sample holder, pneumatically all -adjustable force can be applied up to 6 samples that allow 6 samples

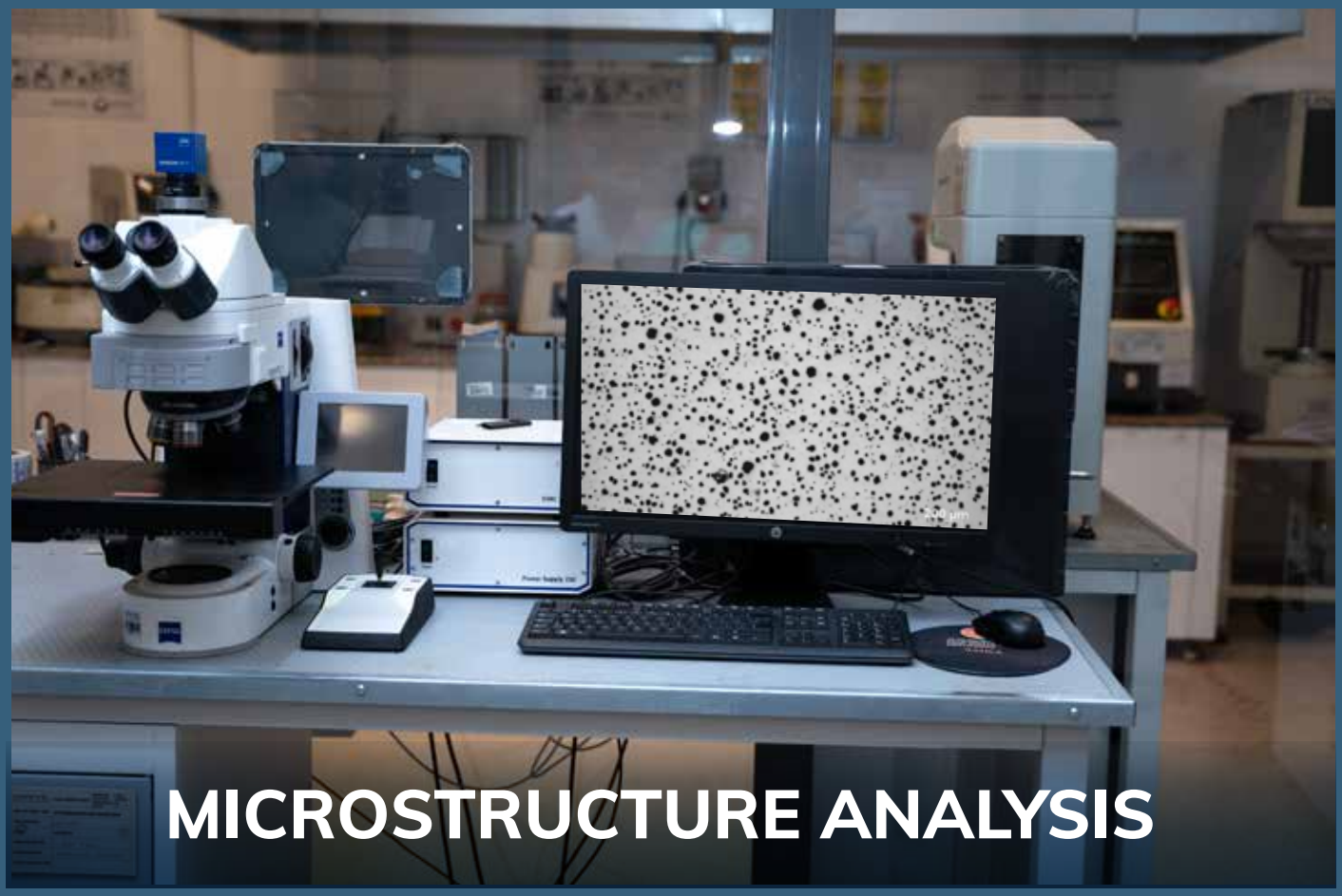
Main Applications

- Surface preparation for microstructure analysis studies of metal materials, especially steel,
- Possibility of precise cutting of samples with fully automatic sample cutting device
- Sample preparation with conductive bakelite powder for Scanning Electron Microscope examinations

Experiment Standards

- ASTM E3*

* These tests take place within the scope of accreditation according to TS EN ISO/IEC 17025 standard.



MICROSTRUCTURE ANALYSIS

Technical Specifications:

- Motorized table and Z focus
- Contrast modules: bright area, dark area, polarize
- LED lighting, 5MP CCD sensor camera
- 5x, 10x, 20x, 50x, 100x high contrast apochromat lens set

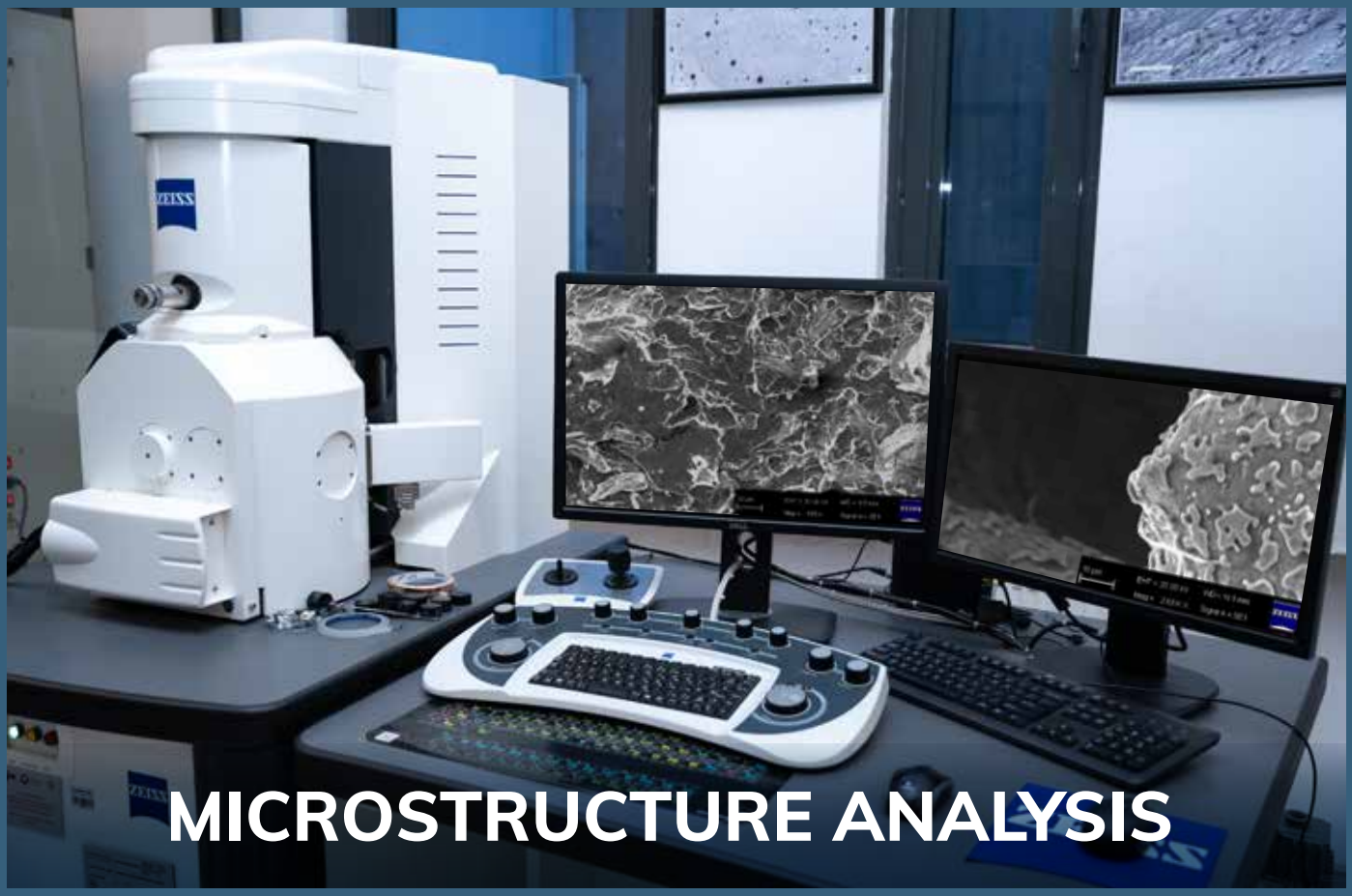
Main Applications

- In iron and non -iron materials:
- Inclusion Analysis
- Grain size measurement
- Phase analysis
- Decarburization depth measurement
- Coating thickness measurement
- Metallographic examination for damage analysis

Experiment Standards

- ASTM E45*
- EN ISO 10247*
- DIN 50602*
- ASTM E112*
- EN ISO 643*
- ISO 3887*
- ASTM E381*
- ASTM 1382
- ISO 4967
- EN 13674-1 (Article 9.1.4)*
- ASTM E1077*
- EN 10143

* These tests take place within the scope of accreditation according to TS EN ISO/IEC 17025 standard.



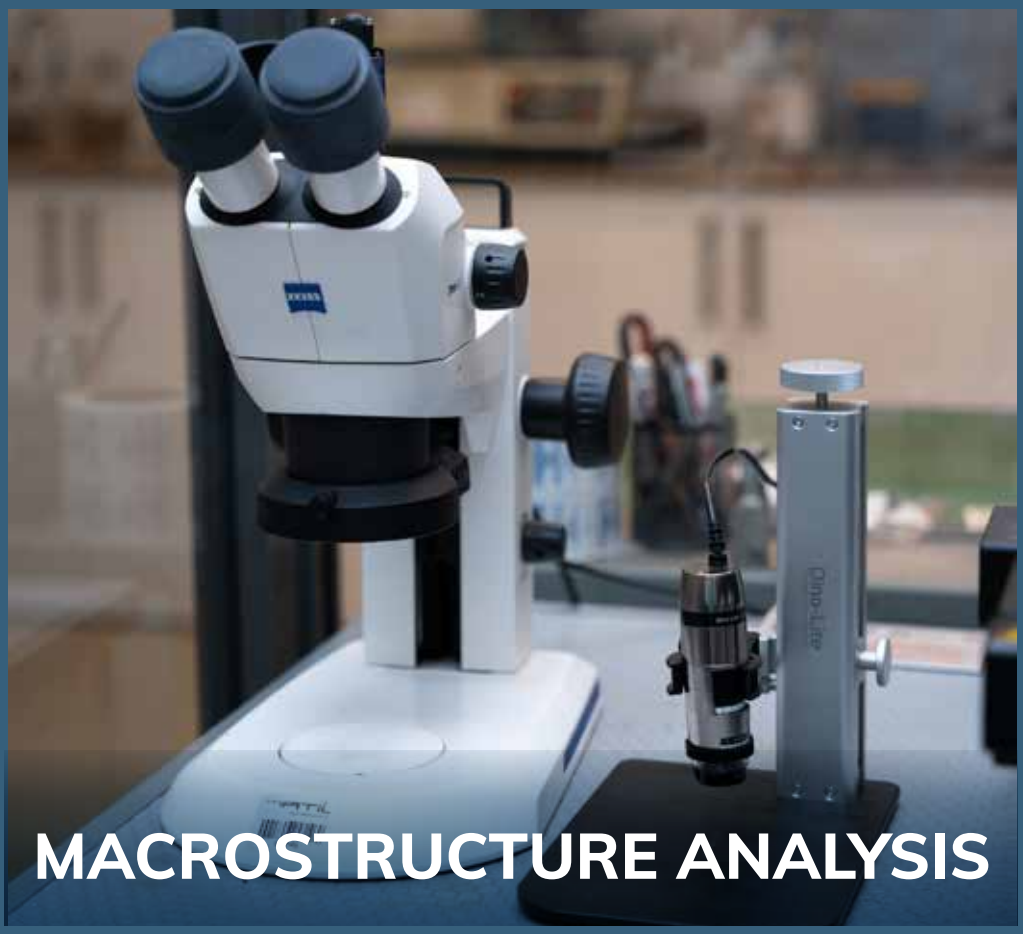
MICROSTRUCTURE ANALYSIS

Technical Specifications:

- Analysis with tungsten filament source
- Topographic imaging with secondary electron (SE) detector
- Compositional imaging with the back scattered electron (BSE) detector
- Qualifications and quantitative chemical composition analysis with the EDS detector along with the EDS detector
- 8.5 mm operating distance and 25 mm2 imaging area
- Sampling analysis up to 100 mm height and 120 mm diameter
- Insulating samples with VP mode, if necessary, without coating.

Main Applications

- Image analysis and characterization of metallic materials
- Analysis of elementary compositions of samples with the EDX detector
- Phase, microstructure, revision analysis and
- characterization of metallic materials
- Failure analysis and broken surface investigations



MACROSTRUCTURE ANALYSIS

STEREO MICROSCOPE

Technical Specifications:

- Integrated Ring-Led Lighting
- 10x/23mm ocular set
- 0.8x, 1x, 2x, 3x, 4x zoom range
- 5MP CMOS camera
- 200 LP/mm -Coquetting 2.5 µm

Main Applications

- Broken Surface Macro Building Investigations for
- Damage Analysis
  Macro Earning Analysis

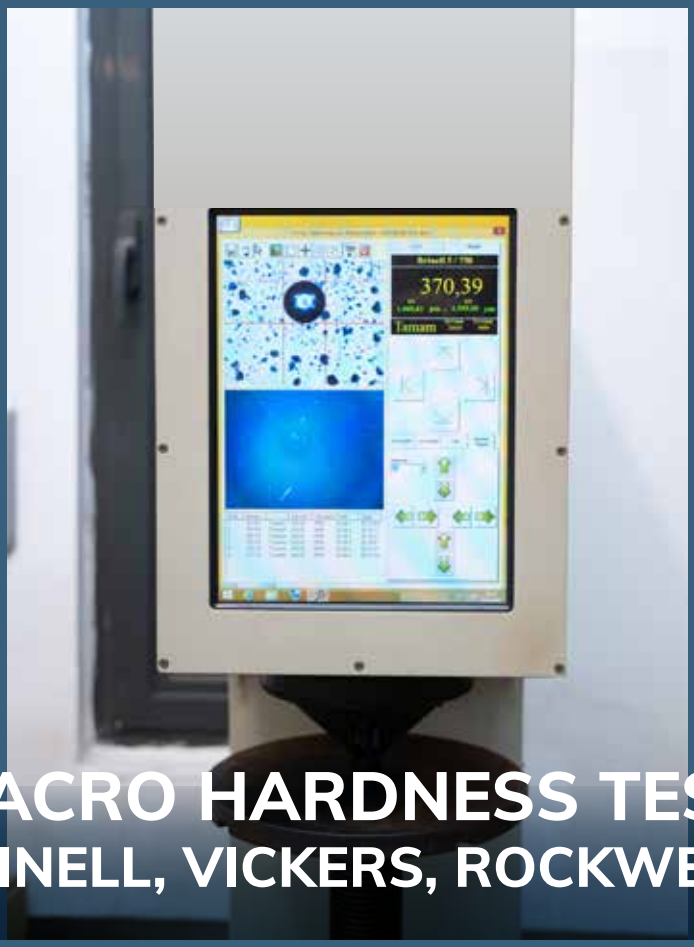
DIGITAL MICROSCOPE

Technical Specifications:

- 10x -20x enlargement
- 2592x1944 resolution-5mp CMOS camera
- Adjustable LED Control (FLC)
- Automatic Enlargement Reading (AMR)
- Adjustable contrast range (EDR)
- Adjustable Polarizer
- Adjustable Focus (EDOF)

Main Applications

- Broken Surface Macro Building Investigations for Damage Analysis
- Visual examination



MACRO HARDNESS TEST (BRINELL, VICKERS, ROCKWELL)

Technical Specifications:

- Rockwell, Brinell and Vickers hardness measurement
- 2.5-62.5, kg.f, 2,5-187,5kg.f, 5-750, 10-3000 load range Brinell hardness measurements
- 5, 10 and 30kg.f Vickers hardness measurements
- Table controlled, 2.5x, 5X and 10x lens fully automatic hardness measurement
- Software controlled, automatic positioning, lens and test tip selection

Main Applications

- Hardness measurement for iron and non -iron metal materials
- Surface and core hardness measurements in heat treated steels

Experiment Standards

- EN ISO 6506-1* / ASTM E10*
- EN ISO 6507* / ASTM E92*
- EN ISO 9015-1*
- EN ISO 6508-1* / ASTM E18*

* These tests take place within the scope of accreditation according to TS EN ISO/IEC 17025 standard.

MICROHARDNESS TEST

Technical Specifications:

- Microhardness measurement in the 10-2000 gr load range
- 10x, 40X and 100x enlargement lenses
- The motorized system that allows automatically transition between the lenses and the measurement end
- 100x100mm size, X-Y 25x25mm moving digital micrometer manual table

Main Applications

- Hardness measurement for metal materials
- Hardness depth measurement on heat treated surfaces
- Coated (galvanized, tin/chromium, electrolytic, thermal spray, etc.) materials hardness measurement
- Surface processed materials (cementation, nitration hardened) hardness depth measurement

Experiment Standards

- EN ISO 6507-1*
- ASTM E384*
- ASTM E92

* These tests take place within the scope of accreditation according to TS EN ISO/IEC 17025 standard.

JOMINY HARDENABILITY TEST

Technical Specifications:

- Possibility of heat treatment up to 1000 ° C temperature
- Closed Circuit Water Giving Cooling System
- Material Hardness Depth Analysis for Jominy Method for Steel Materials

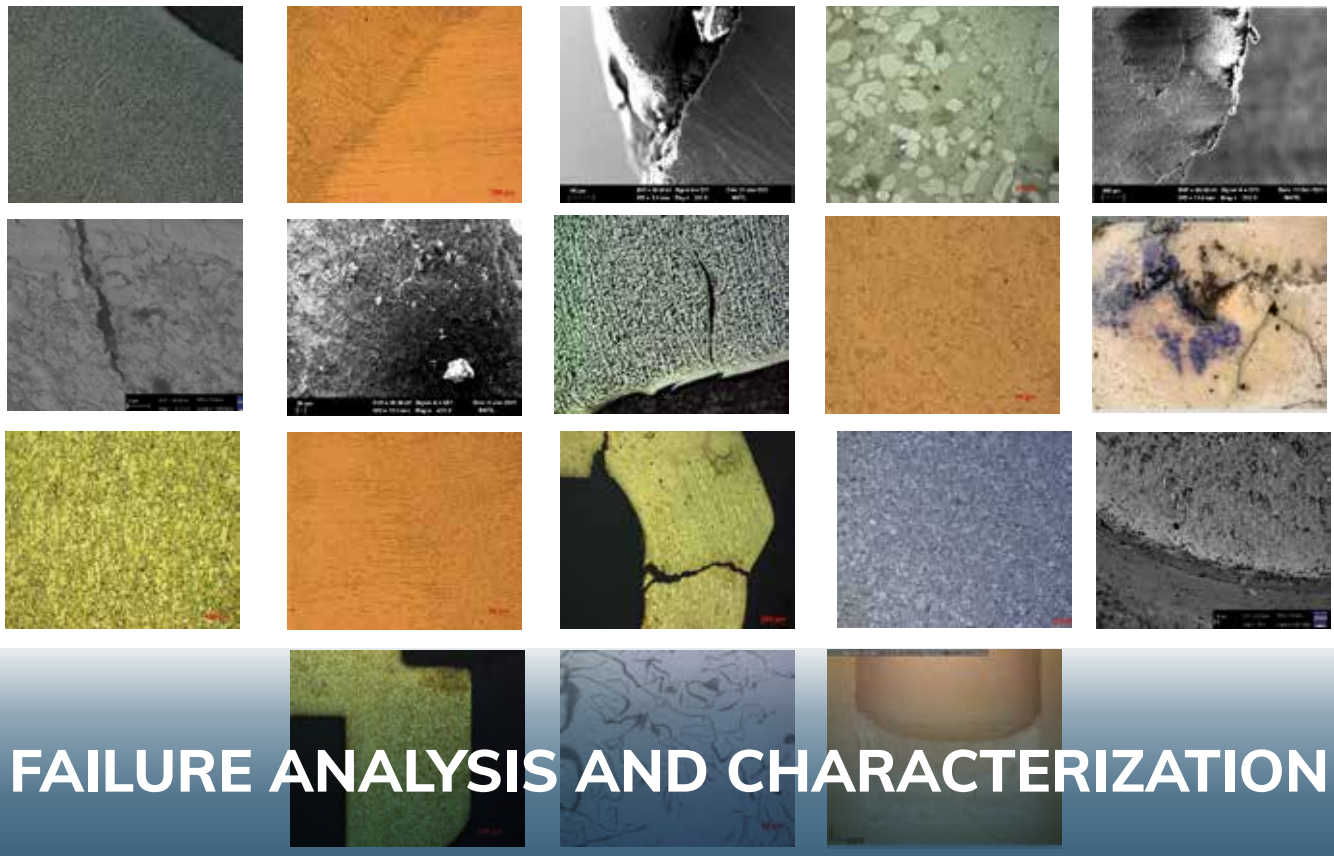
Main Applications

- Measure the ability of steels to harden
- Material hardness depth graph with the Rockwell test application

Experiment Standards

- ASTM A 255*
- EN ISO 642*

* These tests take place within the scope of accreditation according to TS EN ISO/IEC 17025 standard.



FAILURE ANALYSIS AND CHARACTERIZATION

Failure is defined as the inability of a produced part or system to perform expected functions in working conditions. The main causes of the failures are the technical errors caused by processes such as design, manufacturing, wrong material selection and use of the part. Failure analysis is the stage of examining why a material is damaged.

This process may include the following stages depending on the damaged sample and failure mechanism:

On -Site Failure Mechanism Examination

Detailed examinations are made to examine the on -site examination of the damaged areas and to understand how the failure occurs. These examinations are carried out to determine the size and spread of the damage and to determine possible causes.

Sampling Operations On -Site

It is prepared for laboratory analysis by taking necessary samples from the regions examined. Sampling processes are meticulously carried out from the appropriate and undamaged areas in terms of containing representative examples of damaged and undamaged samples for comparison.

Material Test and Characterization Studies

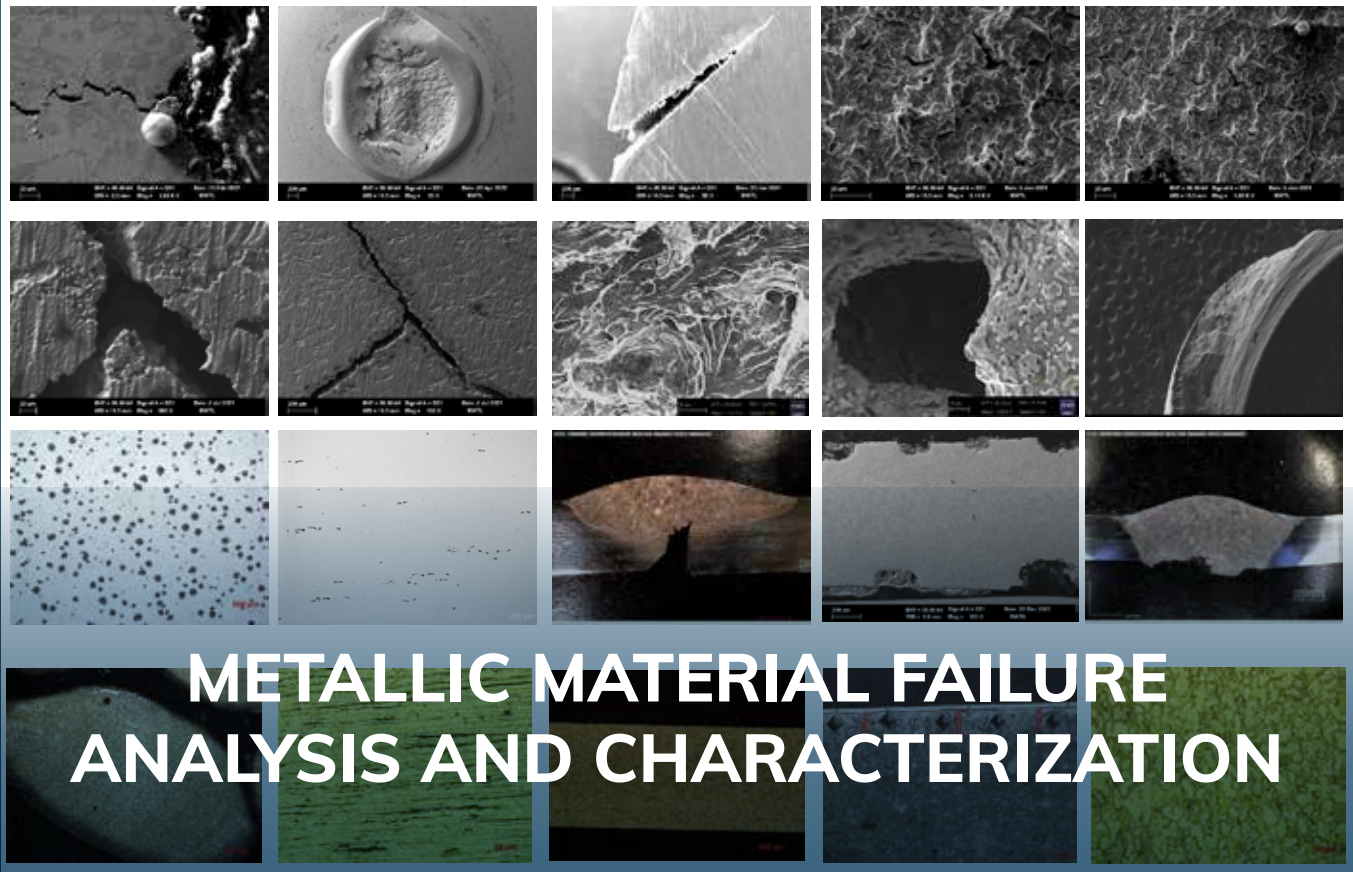
Various tests and characterization works are performed on the samples taken. These tests are characterization tests and microstructure analyses that determine the chemical, physical and mechanical properties of the material.

Academic Interpretation and Evaluation

The data obtained are interpreted within the framework of the relevant academic literature and engineering principles. The root causes of the failure are evaluated in the light of the findings obtained and explained in the theoretical framework.

Reporting

The results of all examinations, analysis and evaluation studies are presented in a detailed report. This report contains information about the root causes of the failure and its mechanisms.

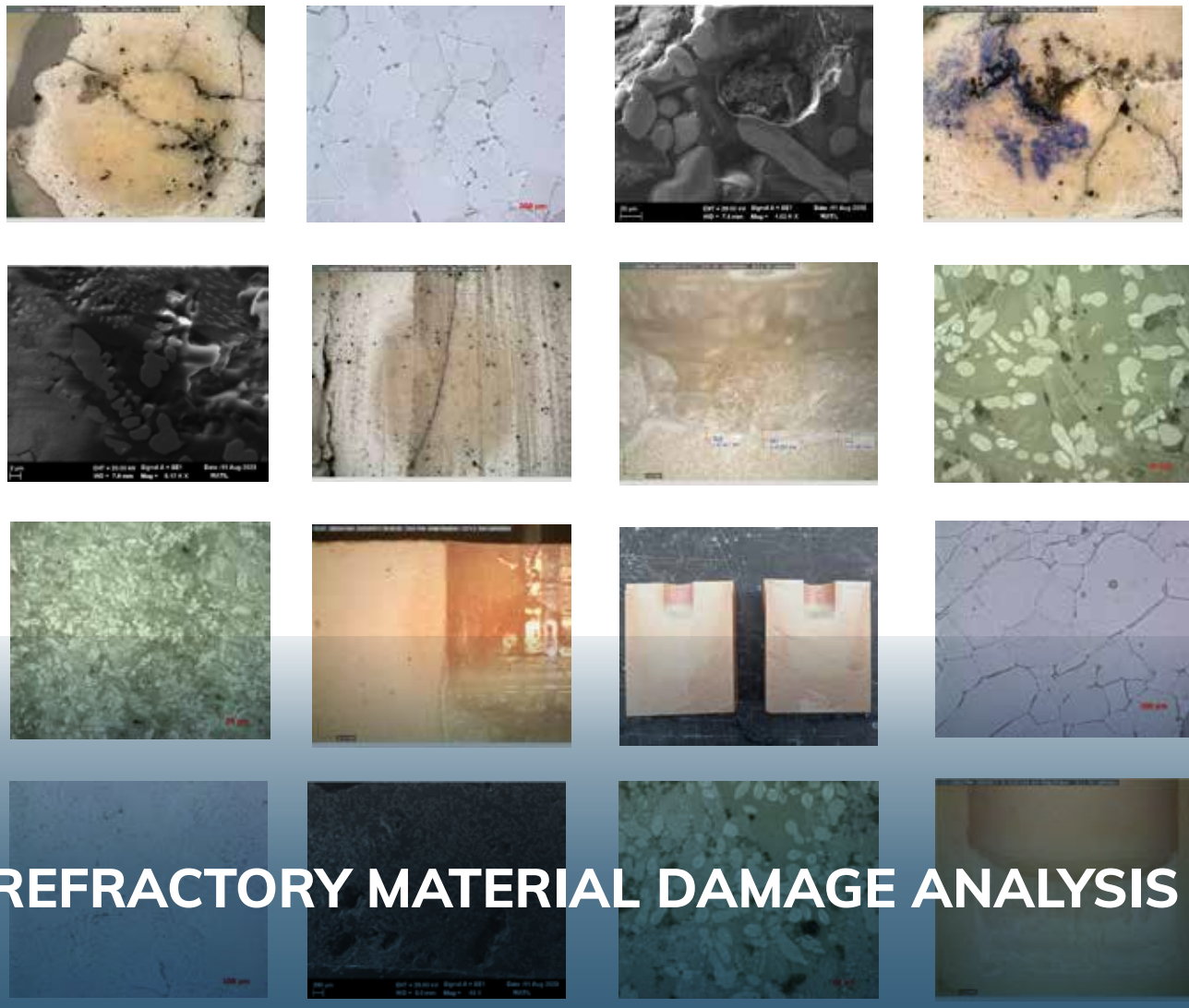


METALLIC MATERIAL FAILURE ANALYSIS AND CHARACTERIZATION

The microstructure and mechanical properties of the materials are examined to investigate the root causes of the failure caused by metallic materials such as steel, aluminium and brass.

Main Applications

- Steel materials
- Brass materials
- Aluminium materials
- Copper and alloys
- Bronze materials
- Coating materials

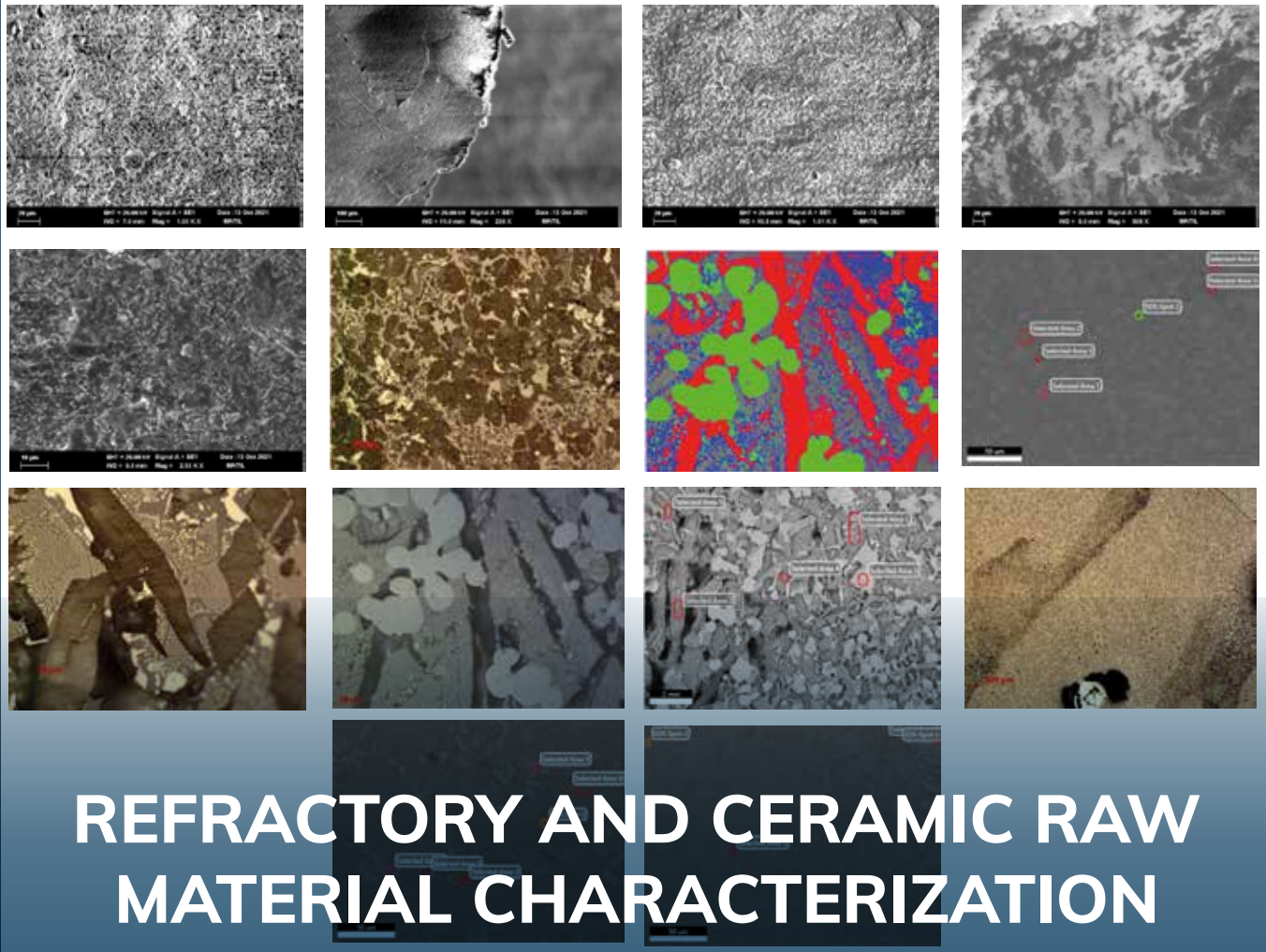


REFRACTORY MATERIAL DAMAGE ANALYSIS

The microstructure and mechanical properties of the materials are examined to investigate the root causes of failure occurring during the production or use stages of refractory bricks and concrete materials.

Main Applications

- Refractory Concrete Material (Alumina, Magnesia, Zircon, Alumina-Zircon-Silica)
- Fire concrete
- Vibrated concrete
- Spraying concrete
- Plastic refractory materials
- Refractory Brick
- Alumina silicate bricks
- Silica bricks
- Alumina zirconium silicate precast bricks
- Resin-linked bricks (alumina-magnesia-carbon, magnesia carbon, alumina-silisium
- Carbide-carbon brick)



REFRACTORY AND CERAMIC RAW MATERIAL CHARACTERIZATION

Characterization studies of the raw materials of refractory and ceramic materials for production are tested.

Main Applications

- Bauxite
- Mullit
- Tabular Alumina
- Fireclay
- Feldspar group
- Kaolinites
- Zircon and so on. Raw material characterization
- Magnesia
- Dolomite

CONSTRUCTION BUILDING MATERIALS FAILURE ANALYSIS AND CHARACTERIZATION

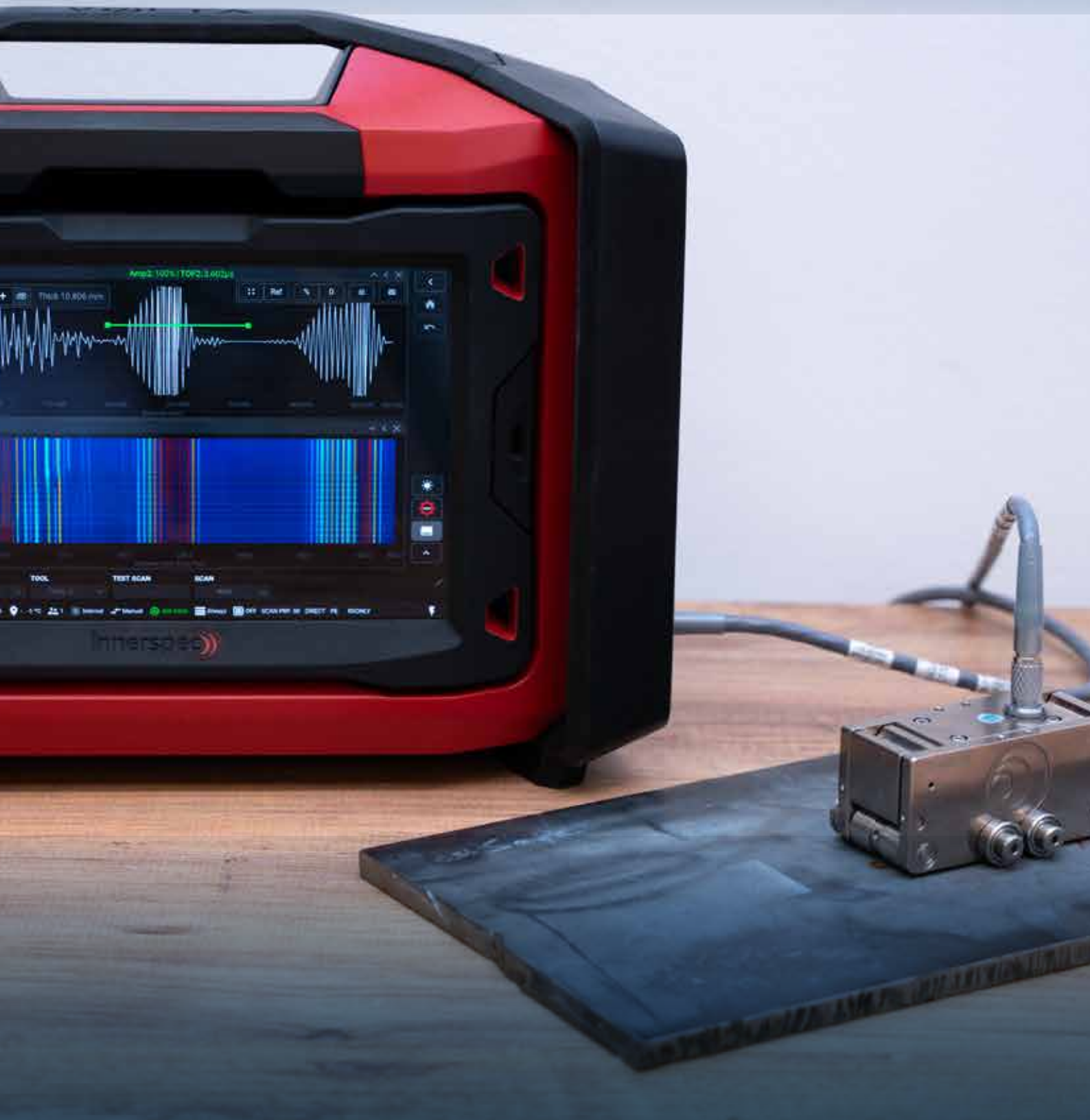
The root causes of failure occurring during the production or usage stages of concrete, precast products, bricks and monolithic building materials used in the construction industry are investigated.

Main Applications

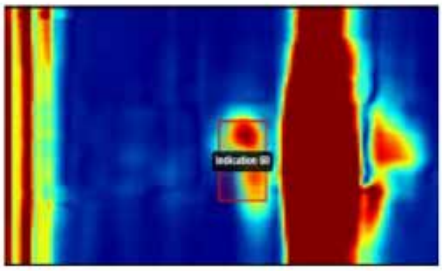
- Construction concrete
- Construction bricks
- Precast products


ZEISS

NON-DESTRUCTIVE TESTING LABORATORY



Innerspec VOLTA II



RESIDUAL STRESS MEASUREMENT AND DETECTION OF SURFACE AND SUBSURFACE DISCONTINUITIES

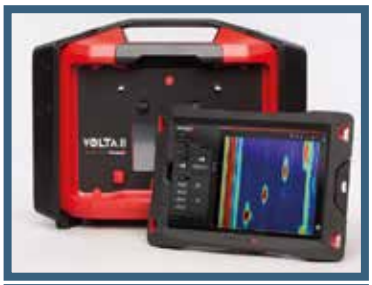
Technical Specifications:

- EMAT (Electro-Magnetic Acoustic Transducer) Technology
- Measurement Without Couplant
- Operates Within a Range of -50 to 650 °C
- Dual Ultrasonic Channel Capability
- Bandwidth of 20kHz to 8MHz
- Supports Normal Wave, Angle Wave, Guided Wave, LRUT (Long-Range Ultrasonic Testing), and MRUT (Medium-Range Ultrasonic Testing)
- Portable Measurement

Main Applications

- Volumetric Residual Stress Measurement
- Detection of Surface and Subsurface Discontinuities (Voids, Cracks, Inclusions)
- Corrosion Detection in Pipes, Tanks, and Plates
- Corrosion Mapping
- Thickness Measurement
- Weld Inspection
- R&D and Product Development Studies

* For your requests, you can contact matil@matil.org for Visual Inspection (VT), Liquid Penetrant Testing (PT), Magnetic Particle Testing (MT), Radiographic Testing (RT), and Ultrasonic Testing (UT) services.









CUSTOM ON-LINE, OFF-LINE & PORTABLE NDT SOLUTIONS

Main Applications

Custom industrial (on-line & off-line) and portable NDT solutions integrated into the production line in collaboration with Innerspec, The Global Leader in EMAT Technology:

- Thickness and Corrosion Measurement (EMAT, DCUT, UT, PAUT)
- Bolt Load (Torque) Measurement (EMAT)
- Volumetric Residual Stress Measurement (EMAT)
- 100% Inspection of Pipes, Bars, and Plates (UT, PAUT, ET, MFL, PMI)
- Weld Inspection (EMAT, PAUT) (Internal Voids, Overlaps, Misalignment, Poor Cut Quality, Porosity, Lack of Fusion, Cracks, Gas Holes, Inclusions, Surface Cleaning Defects)
- Surface Inspection of Ingots, Billets, and Slabs (EMAT, Laser Profilometer, ET)
- Planar Defect, Surface and Subsurface Flaw, and Lamination Control on Plates and Sheets (EMAT, DCUT)
- Mill Roll Inspection (UT and ET)
- Boiler Inspection (EMAT)
- Electrical Conductivity Measurement (ET)
- Dip Tanks Inspection (UT, PAUT)

INDUSTRIES SERVED UNDER NDT

X-RAYS LABORATORY

X-RAY FLUORESCENCE LABORATORY

X-Ray Fluorescence (XRF) analysis is an analytical technique employed for the precise determination of the chemical composition of both metallic and non-metallic materials. Its primary applications encompass several industries, including metallurgy, chemistry, food, and geology, among others.

Brand-Model: BRUKER S6 JAGUAR

Technical Specifications:

- Wavelength scattering (WDXRF),
- 50kV, 400W,
- Element range: 9-92 (F-U),
- Suitable for measuring metal, liquid and powder samples,

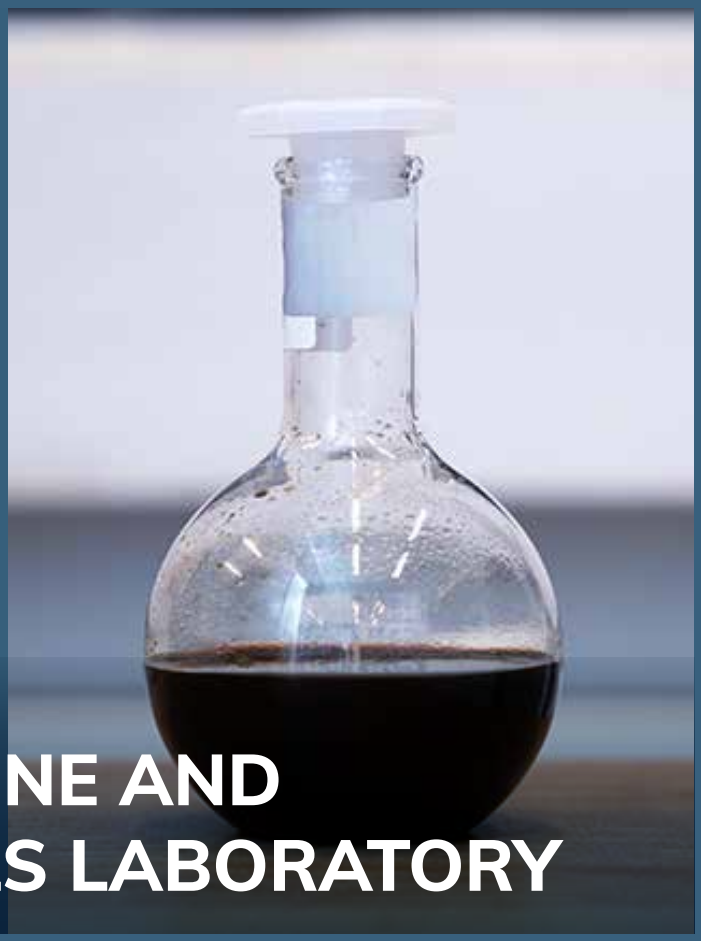
Sectors Served;

- Metals
- Cement and Building Materials
- Minerals and Mining
- Glass and Ceramics
- Petrochemicals and Fuels
- Food and Feed
- Pharmaceuticals and Chemistry

Experiment Standards

- TS EN 62321-3-1
- DIN EN ISO 12677
- ASTM D4326
- TS EN 196-2
- ASTM E1085
- TS EN 15309
- ASTM E 50

GRAPHENE AND NANOMATERIALS LABORATORY



GRAPHENE AND NANOMATERIALS LABORATORY

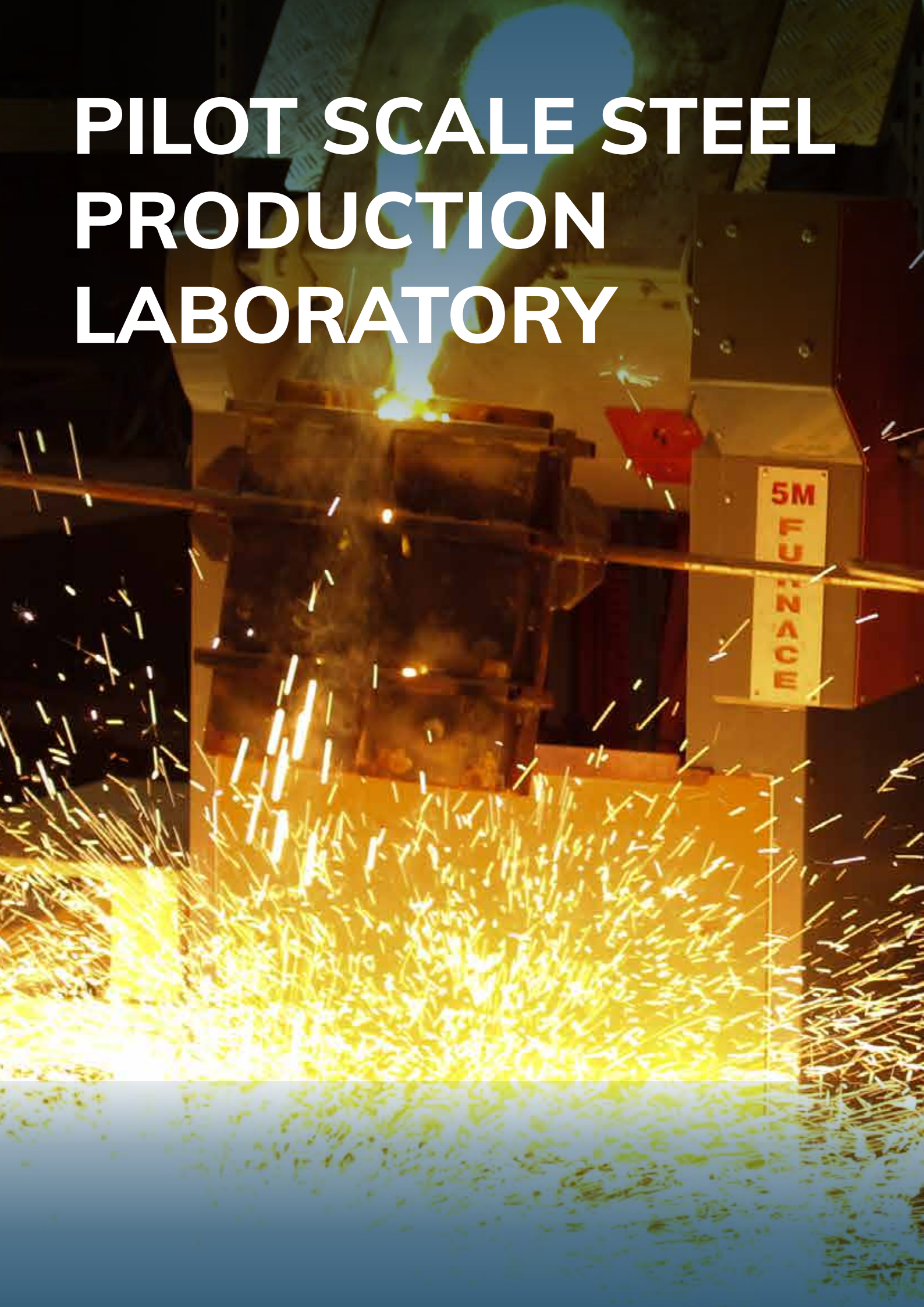
Main Applications

- Synthesis of graphene oxide (GO) and reduced graphene oxide (rGO) using chemical methods
- Synthesis of functionalized graphene derivatives via the electrochemical exfoliation method, along with optimization studies for large-scale and cost-effective production
- Coating of conductive materials with graphene derivatives using the EPD (Electrophoretic Deposition) method
- Synthesis of functionalized graphene-based nanocomposites for alternative applications
- Studies on carbon mineralization

Laboratory Infrastructure

- Fume hood
- Magnetic stirrer
- Heating mantle
- Vortex mixer
- Direct current power supply
- Ultrasonic water bath (40 kHz)
- Centrifuge (6 x 50 ml - 9000 rpm)
- Vacuum oven (52L-250 °C)
- Chemical-resistant vacuum pump (2 m^3/h-7 mbar)
- CO_2 gas flow system

PILOT SCALE STEEL PRODUCTION LABORATORY



MELTING

Technical Specifications:

- Casting up to 50 kg
- Compliance with alloying
- Possibility of casting in different geometries
- 20 mm x 20 mm x 300 mm of billet casting
- 20 mm x 100 mm x 200 mm sizes slab casting

Main Applications

- Improvement of new steel quality, cost reduction and quality improvement efforts
- Alloy steels, stainless steel, cast iron, as well as aluminum, copper and bronze, such as pouring out of iron metals

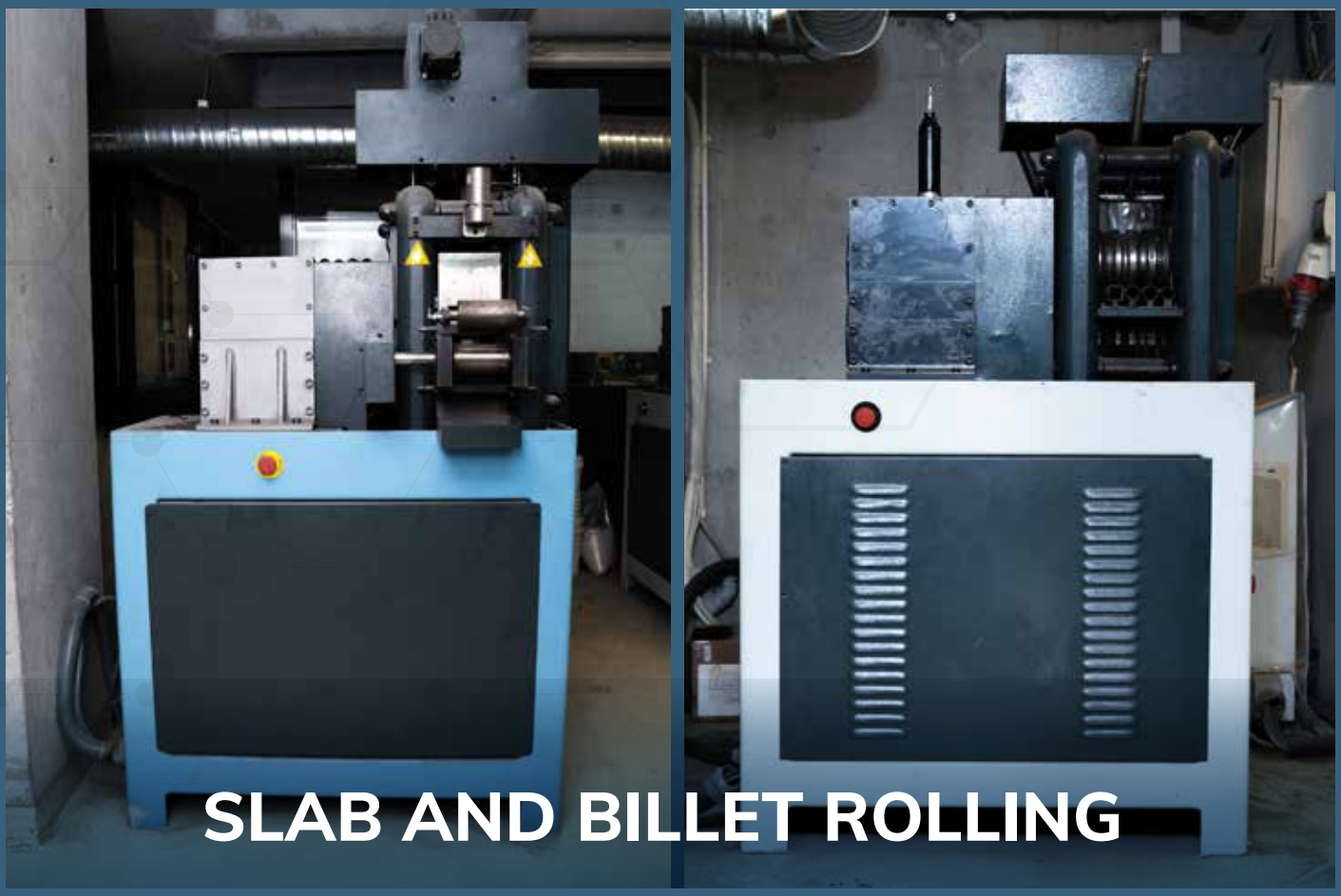
HEAT TREATMENT

Technical Specifications:

- Possibility of heat treatment up to 1300 ˚C
- Temperature control of 1 ˚C sensitivity
- Programmable temperature and time control
- 50 cm x 50 cm x 80 cm: 187 L internal volume (furnace 1)
- 20 cm x 20 cm x 30 cm: 12 L internal volume (Furnace 2)

Main Applications

- Thermal processing works with two laboratory -scale pan oven
- Opportunity to work with multiple samples at the same time
- Possibility to work for critical transition temperatures with precision temperature control
- Surface heat treatment works with the possibility of cooling air, water and oil



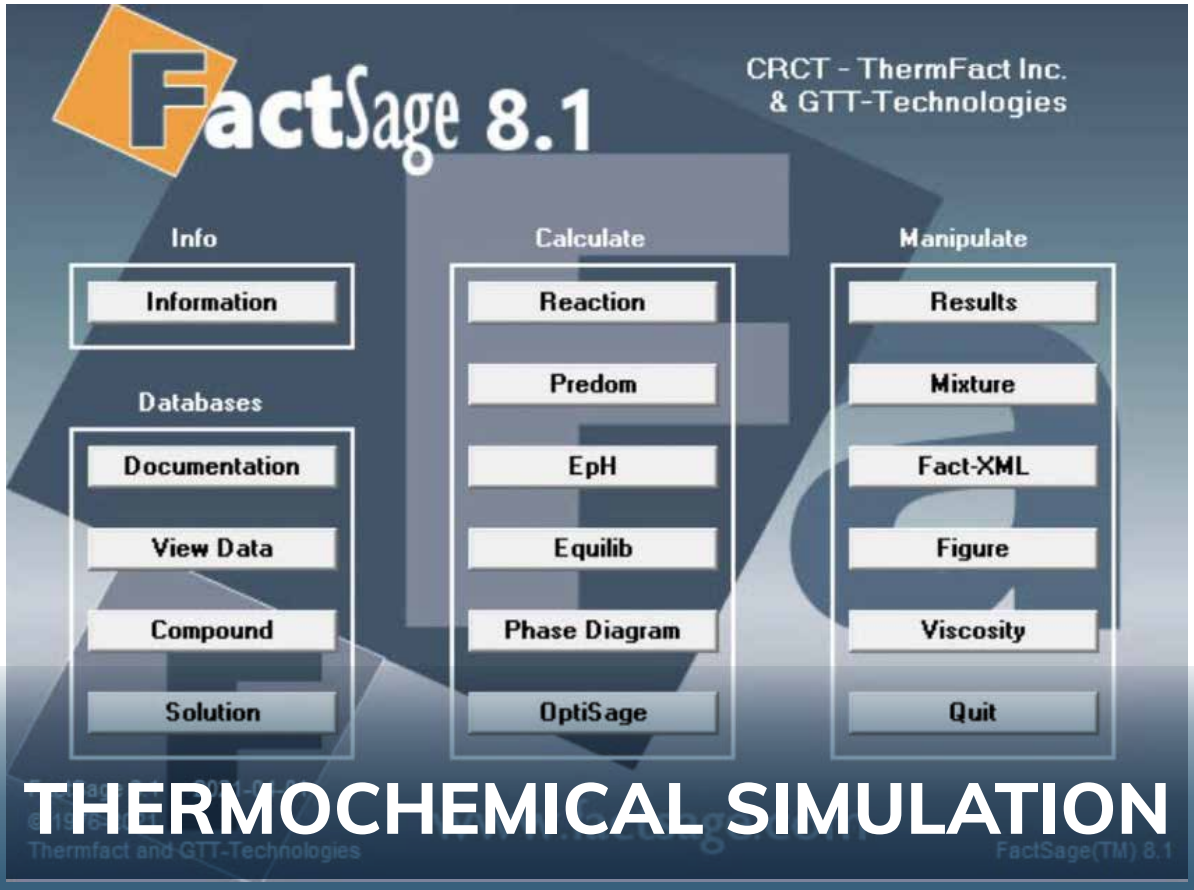
SLAB AND BILLET ROLLING

Technical Specifications:

- Separate rolling stalls for long and flat products
- 22 mm diameter hot rolling possibility
- Hot and cold rolling up to 1 mm in flat materials
- Rolling possibility for steel and non -iron metals
- Software controlled load, compression ratio and rolling rate
- Possibility to change roller for factory simulations

Main Applications

- Production simulation studies
- Studies on product development
- Possibility to investigate the effects of thermomechanical rolling on the product



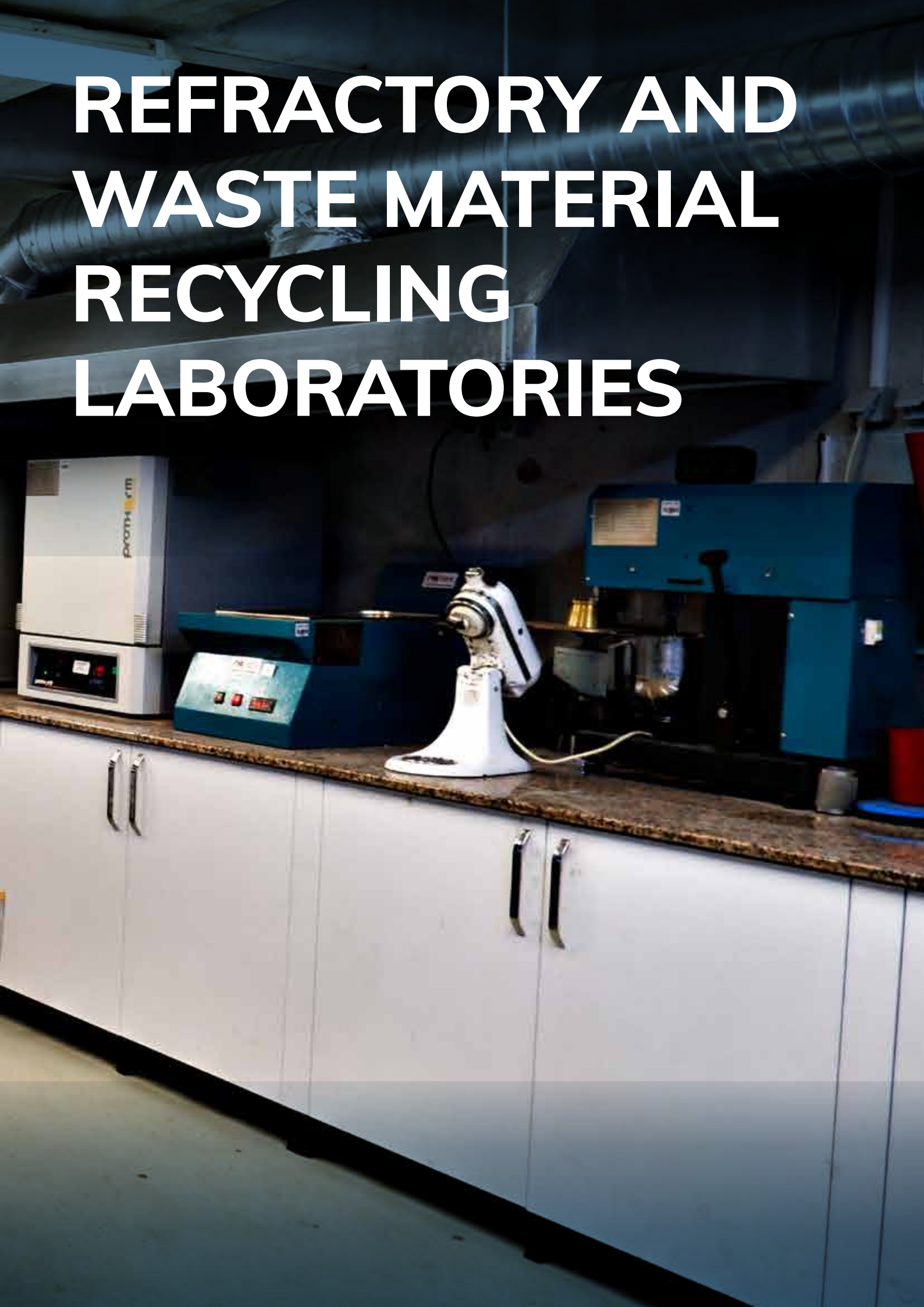
Technical Specifications:

- Chemical reaction equations
- Slag viscosity modelling
- Phase stability diagrams
- EH-PH diagrams
- Complex balance diagrams
- Diagrams of oxide phases
- Diagrams of melted salt phase
- Phase diagrams for alloys

Main Applications

- Windows based system that performs thermochemical calculations before application with a large database
- Examine the effects of different variables on the balance of multiple phases and remove the relevant chemical balance graphics

REFRACTORY AND WASTE MATERIAL RECYCLING LABORATORIES



ORE PREPARATION AND ENRICHMENT LABORATORY

PRIMER COARSE CRUSHING

Technical Specifications:

- 100 x 100 mm jaw entry range
- Infinitely adjustable output ranges from 0 to 20 mm
- Electric motor in 4 HP-driven,
- Made of high-strength, heat-treated, wear-resistant steel and designed as a machine-mounted crushing jaw
- 2 product collection drawers

Main Applications

- Mine samples
- Ceramic materials and raw materials
- Refractory raw materials
- Waste materials
- Ferroalloy materials

ORE PREPARATION AND ENRICHMENT LABORATORY

SUB-MICRON GRINDING

BALL MILL

Technical Specifications:

- 1-piece Ø 178 x 362 mm size, 9 L internal volume
- AISI 304 made of stainless-steel material
- Grinding tube with a rubber gasket, double lid, suitable for wet and dry grinding
- Maximum feed grain size <8 mm
- The product that is ground from the mill <40 micron
- The maximum material volume that can be grinded at one time: 1.5 lt. (between 3-4 kg)
- Adjusting the grinding tube to horizontal and vertical positions with a hand wheel 1.5 hp, 900 giant/min, 380 V, 3 p, electric motor and V belt drive.
- Mill rotation speed with 0 - 100 cycle/min. 1 charging grinding ball (Alloy Steel, Heat Hardened)
- With 1 charging grinding bar (rods made of AISI 304 stainless steel)

RING MILL

Technical Specifications:

- Grinding sets made of heat-treated, hardened steel with a chrome alloy for high strength and abrasion resistance, hardness: 59–62 HRC
- 1.1 kW, 1.5 hp, 1000 cycle/min, 380 V, 3 p, 50 Hz, Special double bearing mounted eccentric weighted vibration motor
- Processing fragile materials and minerals smaller than 63 microns and in a very short time (within seconds)
- Digital time relay that can be programmed between 0 - 999 seconds
- 50 cc, 100 cc and 250 cc volume steel and tungsten carbide grinding sets

Main Applications

- Mine samples
- Ceramic materials and raw materials
- Refractory raw materials
- Waste materials

ORE PREPARATION AND ENRICHMENT LABORATORY

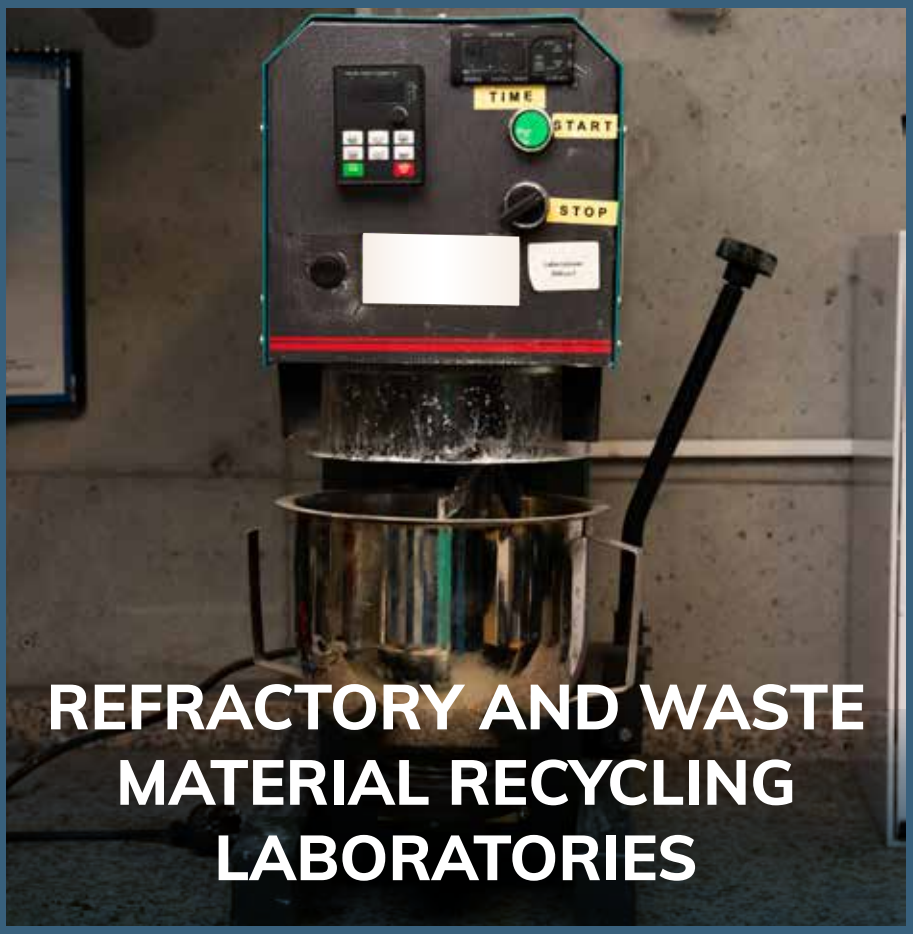
MAGNETIC SEPARATOR

Technical Specifications:

- AISI 304 quality stainless drum
- Used magnet: y35 -300 oxide magnet BR: 4100 Gauss Max. Working temperature: ≤200°C
- Magnetic drum (height: 350 mm band width: 300 mm band length: 800 mm)
- Magnetic flux density measured on the surface of the drum's stainless armor B: 1800 ± 10%GAUSS (Radial Poles)
- Speed adjustment controlled
- Vibration motor sample feeding
- The magnet is permanent and does not require energy for magnetization.
- The magnet is fully magnetic and works with conveyor belt.
- 1 T (Tesla) = 10 kGs (kilogauss) = 104g (Gauss) = 1 kOe = 103 Oe = 79.6 ka/m, 1 MGOe = 7.96 kJ/m³

Main Applications

- Discrimination and enrichment of minerals, waste and raw materials
- Magnetic mineral samples
- Ceramic and refractory raw materials,
- Magnetic waste materials



REFRACTORY AND WASTE MATERIAL RECYCLING LABORATORIES

MORTAR PREPARATION

MIXER

Technical Specifications:

- 5 L capacity.
- Pallet speeds: 62 and 125 rpm
- Mixer Speeds: 140 and 285 RPM
- Monitoring of rheological properties of concrete during the mixing process

Main Applications

- Mortar Mixing Procedures

REFRACTORY AND WASTE MATERIAL RECYCLING LABORATORIES

CONCRETE CURING

Technical Specifications:

- Water circulation pump
- Working at maximum 50˚C temperature with ± 1 ˚C sensitivity
- Control panel

Main Applications

- Concrete curing processing

REFRACTORY AND WASTE MATERIAL RECYCLING LABORATORIES

SIEVE ANALYSIS

Technical Specifications:

- Sieves with a diameter of 200 and 300 mm should be swung with the device and capable of wet elimination
- Sieve fixing
- Fast and acceptable recurrence
- A dynamic power supply for applying vibration to the sieves and materials
- 14 sieves of different diameters

Main Applications

- Ceramic material age sieve analysis
- Refractory monolithic material sieve analysis
- Ready dry mortar compositions sieve analysis
- Refractory and ceramic raw materials, mining, ore sieve analysis

SINTERING AND CORROSION TESTS

Technical Specifications:

- 20 L internal volume
- Temperature working limits: +5 - +1550˚C
- Programmable PID control system
- Digital display panel
- Temperature sensitivity +/- 2˚C
- Timer 1 min - 99.9 hours + indefinite work
- Time to reach temperature is 30 minutes
- Inner cabin material fiber plate and fire brick

Main Applications

- Sintering of ceramic and refractory materials
- Refractory corrosion tests

REFRACTORY AND WASTE MATERIAL RECYCLING LABORATORIES

COMPRESSIVE STRENGTH AND 3 POINT BENDING TEST

Technical Specifications:

- Loading at low speeds
- Digital display
- 250 kN capacity, fully automatic or manual adjustment on digital display
- 3-point bending strength device with interchangeable device
- Serial printer connection
- Test results can be recorded graphically by connecting to a suitable computer
- Compression test in accordance with TSE EN 196-1 Standards

Main Applications

- Ceramic and refractory material strength tests
- Cement and concrete compressive strength and 3-point bending strength measurement

REFRACTORY AND WASTE MATERIAL RECYCLING LABORATORIES

COLD COMPRESSION STRENGTH TEST

3000 kN AND 2000 kN COMPRESSION STRENGTH DEVICE

Technical Specifications:

- 3000 kN EN 12390-4 and 2000 kN EN 12390-4 automatic pressure resistance test
- UTouch PRO control unit
- Ø300mm lower and upper (spherical bearing) loading plate for cubes and cylinders
- Vertical clearance: 350mm, piston diameter: 300mm, piston movement: 50mm
- Limited to Ø160x320mm (largest) cylinder and machine capacity
- 200mm (largest) cube samples testing capacity
- Fully automatic hydraulic power unit (UTC-4830FPR) two-stage motor capable of rapid loading
- Pressure sensor load measurement 100mm, 50mm, 30mm height x Ø205mm intermediate distance pieces
- Centering devices (UTC-4622E) and demountable transparent front-back safety
- Cylinders and spacer addition for cube samples

Main Applications

- High strength ceramic and refractory material tests
- High strength cement and concrete compressive strength

REFRACTORY AND WASTE MATERIAL RECYCLING LABORATORIES

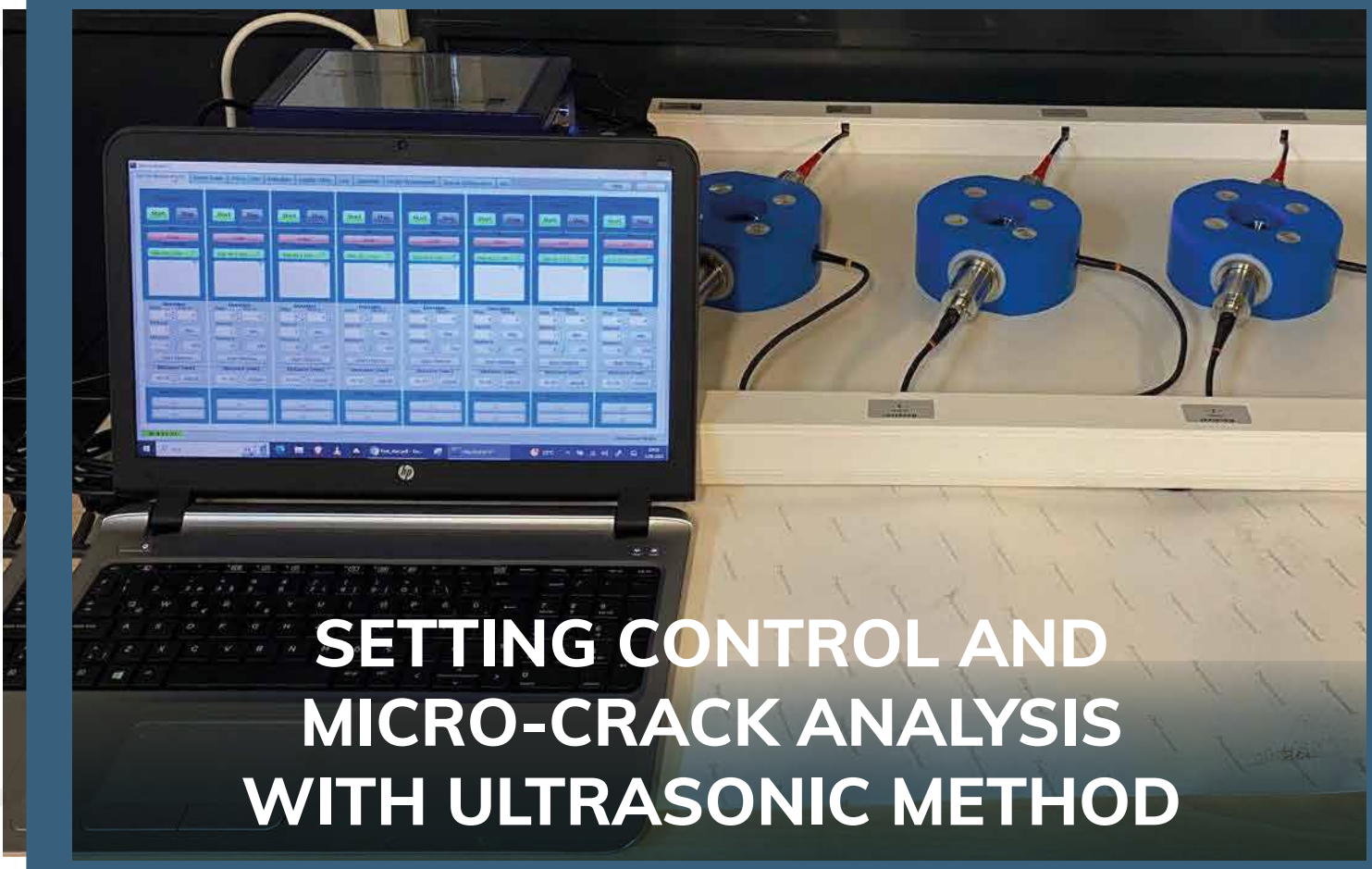
STRENGTH TEST UNDER PRESSURE

Technical Specifications:

- Stainless steel hopper
- Sampling container capacity of 10 pieces of 5x5x5 cm3
- Pressure measurement manometer with a capacity of 0-600 psi (0-40 bar) and a temperature range of 180-250°C
- The desired settings, pressure regulation and heat control mechanism
- Autoclave tester, safety valve, protection cabin and sample holders

Main Applications

- Testing refracts, ceramics, concrete materials up to 12 bar pressure in 220˚c heat



SETTING CONTROL AND MICRO-CRACK ANALYSIS WITH ULTRASONIC METHOD

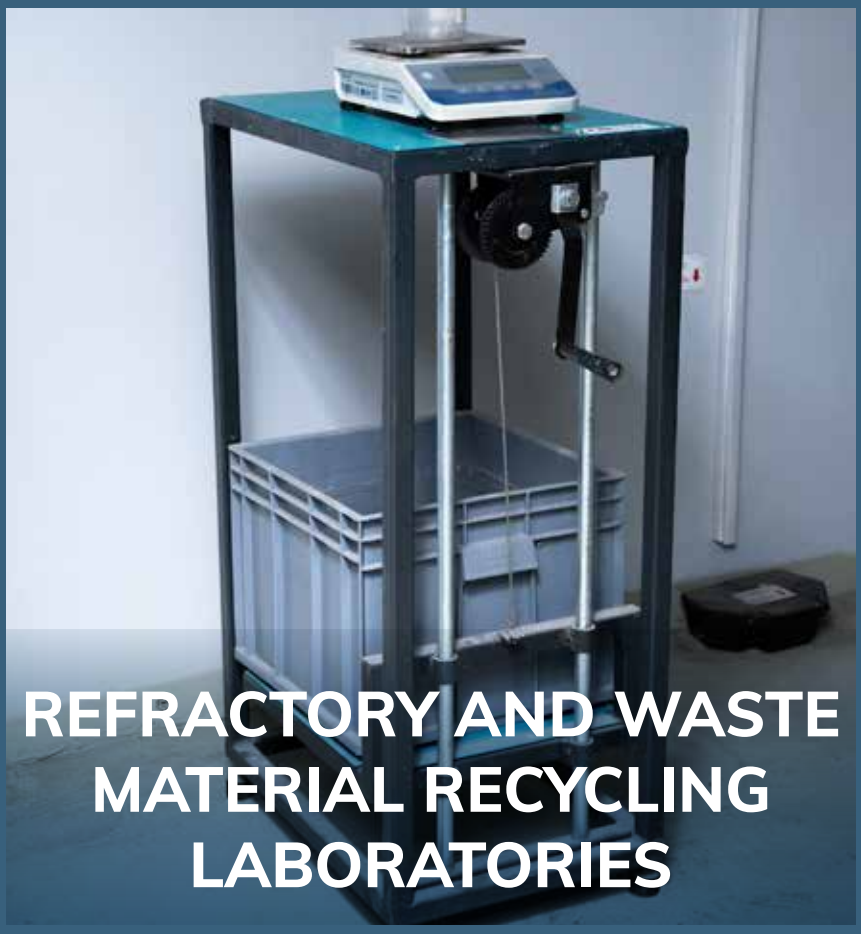
SETTING CONTROL AND MICRO CRACK ANALYSIS

Technical Specifications:

- Simultaneous 4 samples up to 8 pairs of probes and 8 thermal sensors
- Vibration absorbent for gypsum, cement and refractory samples, reinforced casting silicone measurement pattern
- 140-50 BL32 HR, measurement distance approximately. 40 mm, volume 95 ml, 1280 gr
- Integrated A/D coverture temperature sensor
- 4 measurement channel platform (mounted cable ducts for cables and temperature sensors, vibration absorbent feet)
- IP-8 new generation software for control and evaluation of measured data

Main Applications

- Construction concrete, refractory mortar materials and shaped ceramics are time-dependent socket control controls, changes in when chemical additives are used and controls of temperature changes due to reactions
- Ceramic, concrete and refractory material crack controls between parallel surfaces
- Sound transmission speed, elastic module detection and crack controls in refractory, ceramic and building concrete materials



REFRACTORY AND WASTE MATERIAL RECYCLING LABORATORIES

VISIBLE DENSITY, VISIBLE POROSITY AND WATER ABSORPTION DETERMINATION

Technical Specifications:

- Vacuum between 2-20 kPa vacuum container
- Vacuum application in the sample air environment
- Vacuum application in sample water

Main Applications

- Refractory, ceramic and concrete materials
- Fast measurement results according to the boiling method
- Test in accordance with TS EN 1936 standard
- Visible porosity, visible density and water absorption calculation

REFERENCES

* Our references are listed in alphabetical order.

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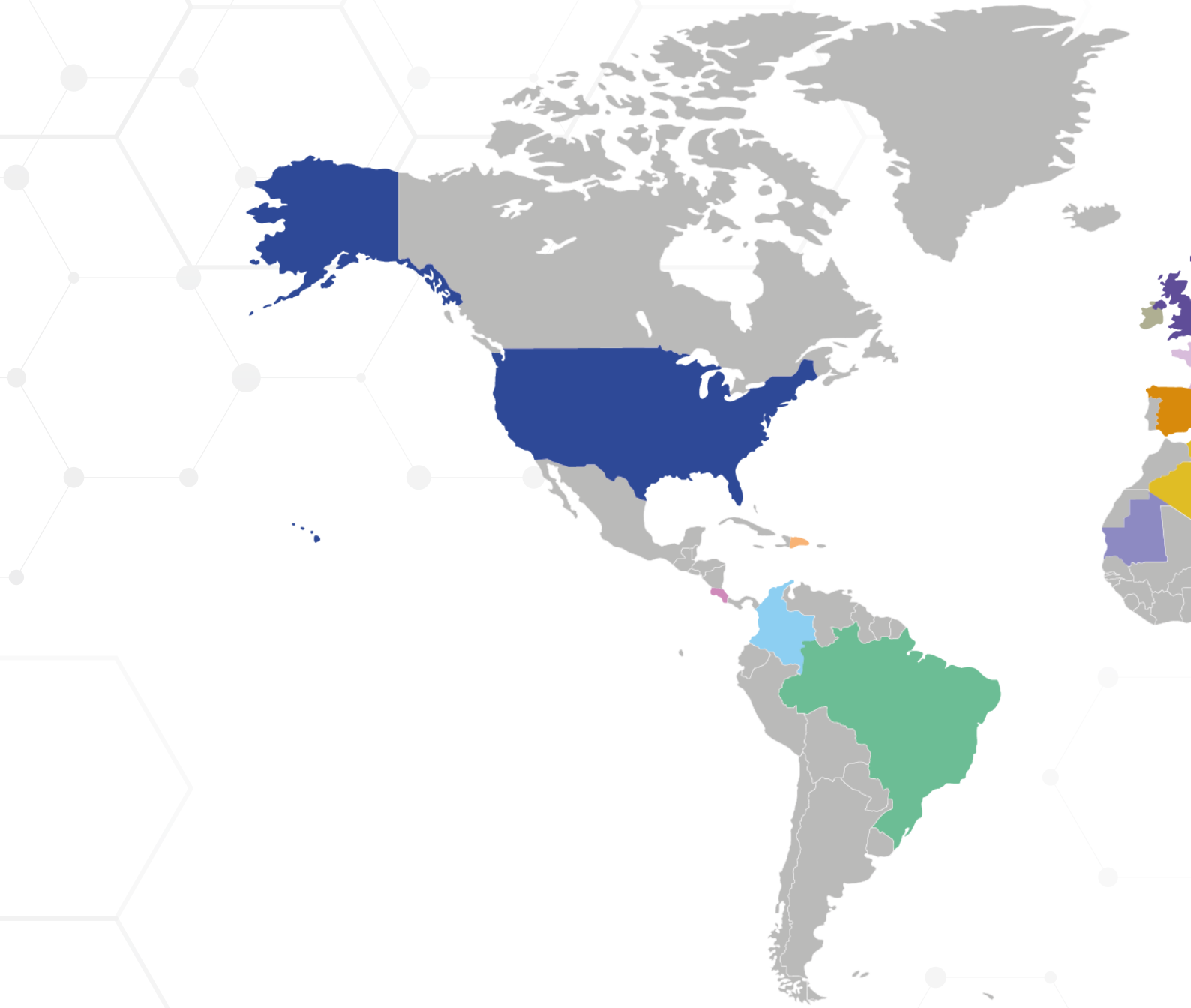
COUNTRIES WE SERVE



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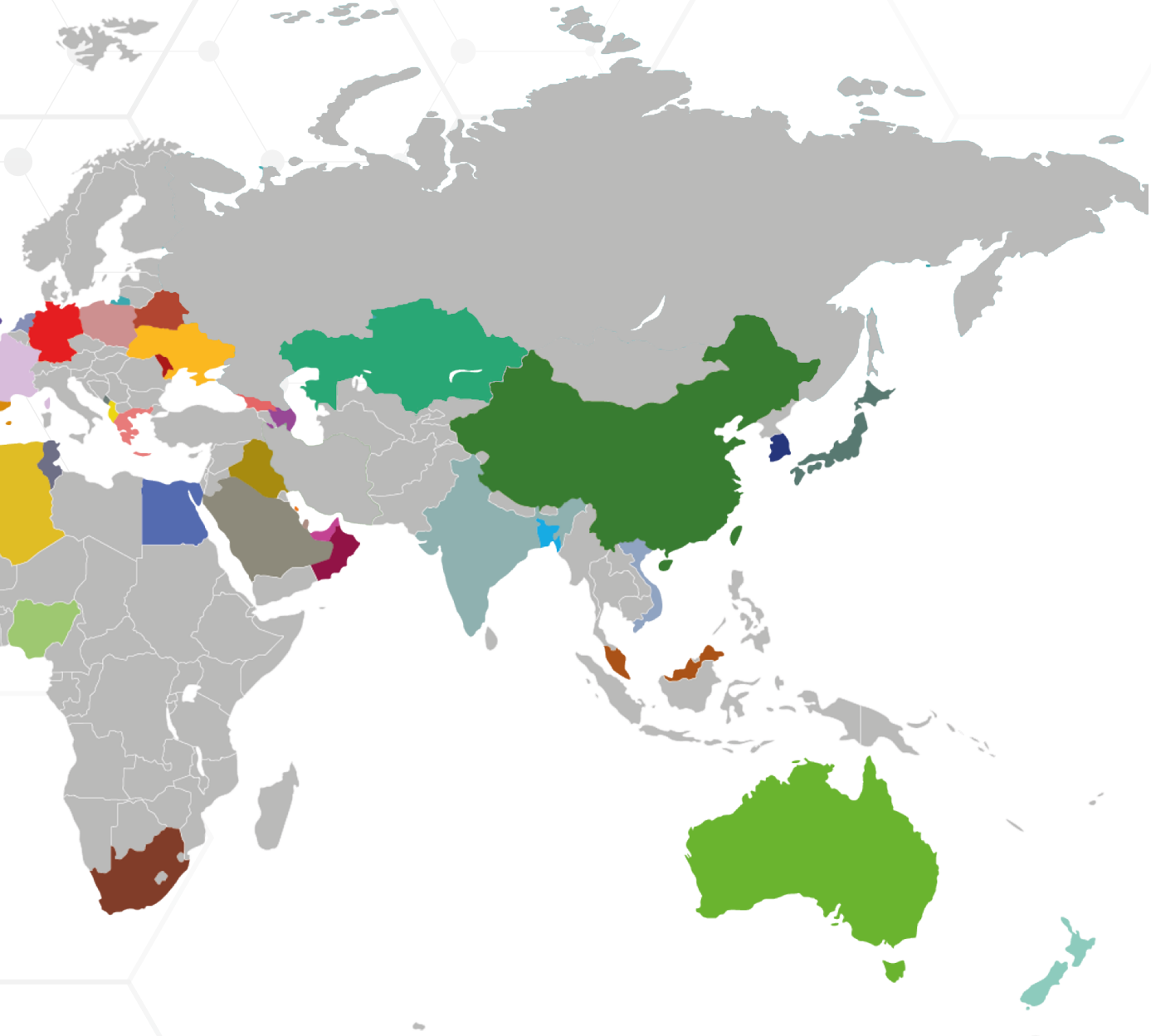

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MATIL MATERIAL TESTING AND INNOVATION LABORATORIES CO.

İstanbul Teknik Üniversitesi / Ayazağa Kampüsü
Reşitpaşa Mah. Katar Cad. Apt.No:2 / 90 Sarıyer / İSTANBUL

+90 212 286 33 80

matil@matil.org

www.matil.org

Material Testing And Innovation Laboratories Co.

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MATIL MATERIAL TESTING AND INNOVATION LABORATORIES CO.

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