



I3D PRODUCT FAMILY

Indentation testing for yield strength and tensile strength directly on the component



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Mechanical material testing without tensile specimens – fast, localized, and automatable. The i3D® models from Imprintec set new standards in mechanical material testing. Using the indentation method in accordance with DIN SPEC 4864 and ASTM E3499, yield strength (R_{Ip0.2}), tensile strength (R_{Im}), and ductility of a component can be determined directly – without the need for conventional tensile specimens in a quickly, accurately, and fully automated process.

The powerful i3D® software uses inverse FEM calculation models to analyse each individual indentation. Complete stress-strain curves are available within a very short time and can be used immediately for research, development, and quality assurance.

Thanks to the partnership with FOERSTER, Imprintec i3D® technology has been seamlessly integrated into the FOERSTER product portfolio. This offers customers an expanded range of solutions for material characterization, including professional application support.

YOUR ADVANTAGES AT A GLANCE

Efficient testing: Test time only approx. 60 seconds per indentation

Component-level testing: Testing possible directly on the component

High measurement accuracy: Comparable to tensile testing within $\pm 2\%$ to 10%

High repeatability: Comparable to tensile testing within $\pm 2\%$ to 10%

Industry 4.0 ready: Ideal for serial testing and automation

NORMS

DIN SPEC 4864: Describes a standardized, minimally destructive testing method for determining flow curves and comparative characteristic values of metallic materials.

ASTM E3499: Is an international ASTM test standard for the indentation plastometry (IP) of metallic materials.

I3D WLI PRO

High-end-platform of the i3D® series with fully automated Imprint Test for the determination of mechanical material properties



High automation and maximum data depth for local material characterization in laboratory, R&D and QA. The i3D® WLI Pro is the high-end platform of the i3D® series for the fully automated determination of local mechanical material properties. The system utilizes the Imprint Test method in accordance with DIN SPEC 4864 and ASTM E3499 and delivers local yield strength ($R_{p0.2}$), local tensile strength (R_m) as well as stress–strain curves – directly from the test indentation and without the need for a conventional tensile specimen. Equipped with a precise XY cross table, an integrated overview camera, and a Z-axis positionable measuring head, the system enables reproducible scanning of grids, lines, and point sequences.

This allows for efficient multi-sample screening, weld and heat-affected zone (HAZ) testing, as well as component analysis with a high density of measurement points in a continuous, automated workflow. In standard mode, the measurement time is approximately 72 seconds per point. With the optional Superspeed module, cycle times of around 20 seconds per point can be achieved. An optional, integrated white light interferometer (WLI) is available for 3D measurement of indentations and surface topography. Data evaluation is performed using the powerful i3D® software, based on inverse FEM calculations, ensuring precise and reliable material characterization.

YOUR ADVANTAGES AT A GLANCE

Fully automated standard testing: Fully automated high-throughput testing according to DIN SPEC 4864 / ASTM E3499 without tensile specimen

Precise multi-point positioning: XY cross table and Z-axis positionable measuring head for reproducible multi-point programs

Documented point placement: Overview camera for documented point placement and visual control

High testing speed: Standard cycle approx. 72 s/point; optional Superspeed mode from approx. 20 s/point

Optional 3D-Topography: Optional integrated white light interferometer (WLI) for 3D indentation and topography analysis

Material property determination: Inverse FEM evaluation via i3D® software – local $R_{p0.2}$, R_m and stress-strain curves

Wide range of application: Ideal for multisample screening, weld/HAZ testing, parameter studies and component analysis

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TECHNICAL INFORMATION

TEST METHOD:	Instrumented Imprint Test according to DIN SPEC 4864 / ASTM E3499 (i3D®) - without tensile specimen
DETERMINED VALUES:	Local yield strength $R_{p0.2}$, local tensile strength R_m , stress-strain curve
MEASUREMENT TIME (STANDARD):	approx. 72 seconds per measurement point
MEASUREMENT TIME (SUPERSPEED, OPTIONAL):	from approx. 20 seconds per measurement point
AUTOMATION:	Motorized XY cross table, Z-axis positionable measuring head
VISUALIZATION:	Integrated overview camera for point selection and documentation
OPTIONAL MODULES:	White light interferometer (WLI) for 3D measurement, Superspeed mode, software packages
SOFTWARE:	i3D® software with inverse FEM evaluation

I3D WLI ECO

Compact semi-automated laboratory solution for local yield strength, tensile strength and stress strain curves based on i3D® Imprint test



Start using local material data internally – compact, reproducible and without a large automation project. The i3D® WLI Eco is specifically designed for an efficient and streamlined entry into local material characterization. It is based on the proven i3D® methodology according to DIN SPEC 4864 and ASTM E3499, also used in the WLI Pro, while offering a more compact platform with a reduced level of automation. Despite its simplified setup, the system enables the precise determination of key material properties, including local yield strength $R'_{p0.2}$, local tensile strength R'_m , and complete stress–strain curves – all generated directly in the laboratory without the need for conventional tensile specimens.

Data evaluation is carried out using the identical i3D® software with inverse FEM calculation, ensuring the same data depth and methodological consistency as larger i3D® systems. This makes the i3D® WLI Eco an ideal solution for feasibility studies, internal routines, and screening applications. In standard mode, the measurement time is approximately 72 seconds per point. With the optional Superspeed module, testing cycles can be significantly accelerated, enabling comparisons from around 20 seconds per point. Additionally, white light interferometry (WLI) is optionally available for high-precision 3D measurement of indentation and surface structures.

YOUR ADVANTAGES AT A GLANCE

Easy entry: Semi-automated entry into the Imprint Test according to DIN SPEC 4864 / ASTM E3499

Compact lab solution: Compact laboratory platform with a lower barrier to entry than the WLI Pro

Proven software platform: Identical i3D® software and inverse FEM evaluation as on larger systems

Fast test cycles: Standard cycle approx. 72 s/point; optional Superspeed from approx. 20 s/point

Optional 3D topography: Optional white light interferometry (WLI) for 3D topography

Scalable system concept: Later expansion towards higher automation/mapping possible

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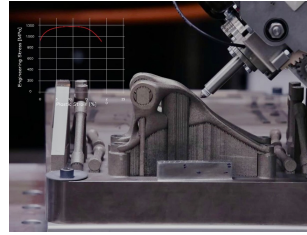
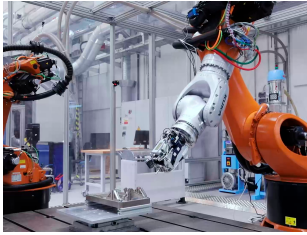
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TECHNICAL INFORMATION

TEST METHOD:	Instrumented Imprint Test according to DIN SPEC 4864 / ASTM E3499 (i3D®)
DETERMINED VALUES:	Local yield strength $R_{p0.2}$, local tensile strength R_m , stress-strain curve
MEASUREMENT TIME (STANDARD):	approx. 72 seconds per measurement point
MEASUREMENT TIME (SUPERSPEED, OPTIONAL):	from approx. 20 seconds per measurement point
PLATFORM:	Compact semi-automated system architecture for laboratory, R&D and QA
OPTIONAL MODULES:	White light interferometer (WLI), Superspeed mode, software packages
SOFTWARE:	i3D® software with inverse FEM evaluation

I3D INLINE

Process-near i3D® testing concept for inline quality assurance of additive and conventional components



Local material data moves closer to production, QA and critical component zones - instead of arriving late in the laboratory process. With the i3D® Inline solution, the Imprint Test according to DIN SPEC 4864 / ASTM E3499 is seamlessly integrated into production-near quality assurance (QA). The test module is fully automatable and can be flexibly integrated into existing production and inspection lines – either via connection to a six-axis robot or as part of the FOERSTER NDT-COMBICELL. This enables direct access to local yield strength $R_{p0.2}$, tensile strength R_m , and stress-strain curves on the real component within the production environment. Inline QA with i3D® is particularly relevant for additive manufacturing. For 3D-printed components, process data, geometric defects, and local mechanical properties collectively determine the actual component quality.

By combining indentation testing with complementary inspection methods such as high-resolution process monitoring or μ CT analysis, a multi-stage quality profile is created that integrates local mechanical properties and defect information within the same inspection context. As a result, local deviations become visible at an earlier stage in the process and can be fed back more quickly into release decisions, process adjustments, or serial production decisions. Typical application areas include aerospace, automotive, and medical technology – wherever mechanical reliability and cost efficiency must be ensured simultaneously in series production and release environments.

YOUR ADVANTAGES AT A GLANCE

Process-integrated: Process-near i3D® testing instead of a late lab-only path

Flexible automation: Generally automatable – flexibly adaptable to different production and inspection environments

Robotic integration: Robot-supported integration (six-axis robot) without manual component re-clamping

System integration: Integration into the FOERSTER NDT-COMBICELL for combined non-destructive testing workflows

Direct component analysis: Local material properties directly on the additive or conventional component

Fast feedback: Faster feedback into incoming inspection, process monitoring and serial release

Wide application range: Suitable for additive manufacturing, component release and industrialization

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TECHNICAL INFORMATION

TEST METHOD:	Instrumented Imprint Test according to DIN SPEC 4864 / ASTM E3499 (i3D®)
DETERMINED VALUES:	Local yield strength $R_{p0.2}$, local tensile strength R_m , stress-strain curve
TESTING CONCEPT:	Inline / process near - integration into production cycles and component handling
AUTOMATION:	Generally automatable – connection to six-axis robot or integration into the FOERSTER NDT-COMBICELL
FOERSTER NDT COMBICELL INTEGRATION:	Embedding the i3D® test into combined non-destructive testing cells (e.g. with eddy current, magnetic flux leakage or hardness testing)
TYPICAL APPLICATIONS:	Additive manufacturing, incoming inspection, serial release, process monitoring
COMBINATION OPTIONS:	Indentation testing + high-resolution process monitoring + μ CT analysis
INDUSTRY FOCUS:	Aerospace, automotive, medical technology, defence, marine
SOFTWARE:	i3D® software with inverse FEM evaluation
DELIVERY FORM:	Project-based / customer-specific integration

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