

NEW

Qscratch 20
Qscratch 20^{GO}



DIN EN ISO 20502 · ASTM C1624 · ISO 27307 · ASTM G171 · PROGRESSIVE & CONSTANT LOAD

**SCRATCH TESTER FOR QUALITY CONTROL
OF COATINGS AND SURFACES**



Qscratch 20^{SD}

Semi-automatic macro/micro scratch tester for clearly defined QA workflows and production-oriented monitoring.



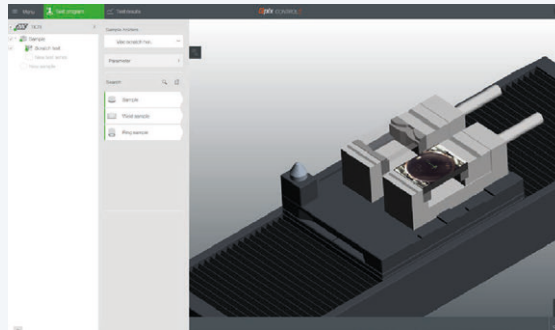
Qscratch 20

Fully automatic macro/micro scratch tester for single and multiple measurements, flexible positioning, and optional Vickers hardness upgrade and Qpix Inspect module.



FOR LABORATORIES THAT MAKE CRITICAL DECISIONS EVERY DAY

Qscratch 20 is a automated macro/micro scratch tester for coatings and functional surfaces. The system combines controlled force application, integrated optical evaluation, and guided software operation and a report generation. It was developed specifically for laboratories that make critical surface-related decisions on a daily basis.



PRACTICAL QUALITY ASSURANCE & INTEGRATED WORKFLOWS

Designed for quality assurance: The system combines standardized scratch tests with high repeatability, efficient documentation, and intuitive operation. QpixControl2, the integrated workflow, flexible export options, and optional inspection functions turn it into a powerful, all-in-one solution rather than a simple stand-alone tester.

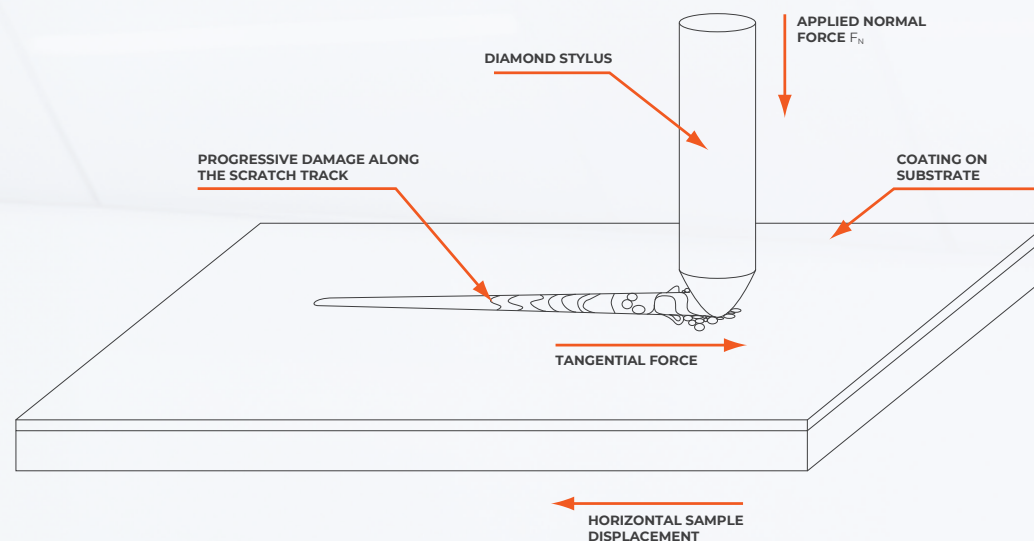


LONG-TERM INVESTMENT SECURITY THROUGH QATM EXPERTISE

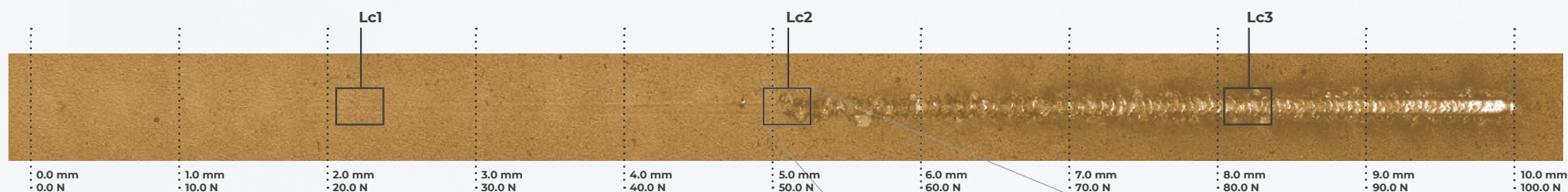
QATM brings many years of experience in hardness testing, metallography, and global service to its scratch testing portfolio, thereby safeguarding your investment in the long term.

TEST PRINCIPLE DIN EN ISO 20502 · ASTM C1624

**A DEFINED SCRATCH.
A CONTROLLED LOAD.
A CLEAR EVALUATION.**



Exemplary classification of typical failure events:



THE PRINCIPLE

In the scratch test, a diamond stylus is moved across the coated surface under a defined normal force. Visible events such as cracking, spalling, or penetration of the coating are localized along the scratch mark and assigned to the corresponding critical load. Thus, the scratch mark not only indicates that a failure is occurring; it also shows where it is occurring—and makes the load at the critical point traceable.

DEFINING AND ASSIGNING FAILURE EVENTS

- Lc1** - Initial cracking / plastic deformation
- Lc2** - Spalling
- Lc3** - Penetration of the coating down to the substrate

Lc2 = 58 N

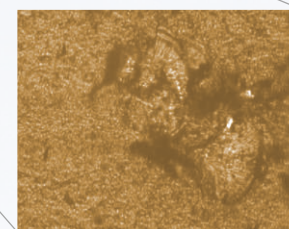
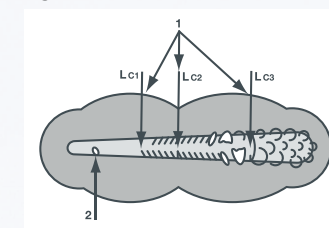


Figure: Failure Events



TEST METHODS

**PROGRESSIVE OR
CONSTANT LOAD –
TAILORED TO THE
TEST REQUIREMENTS.**

STANDARDS & PROCEDURES

CONTROLLED. EVALUABLE. COMPARABLE.

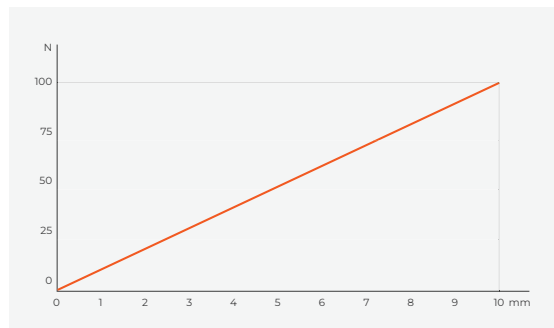


STANDARDS

DIN EN ISO 20502 / ASTM C1624 - Determination of adhesion and mechanical failure modes of hard ceramic coatings using a scratch test.

ISO 27307 - Evaluation of the adhesion and cohesion of thermally sprayed ceramic layers on a cross-section using a transverse scratch test.

ASTM G171 - Determination of the scratch hardness of material surfaces using a defined diamond stylus, a constant normal force, and evaluation of the remaining scratch width.



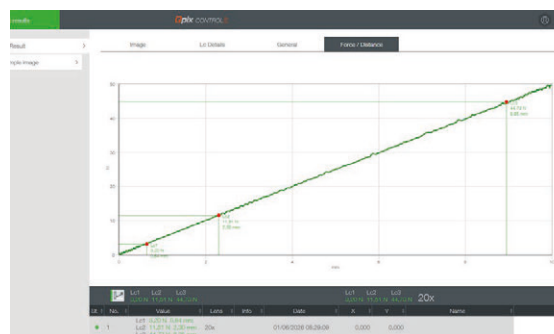
METHOD: PROGRESSIVE LOAD

The initial and final loads, as well as the load rate, are defined. The load increases along the scratch length; visible events can be assigned as Lc points at their respective positions.

ISO: PFST - progressive force scratch test

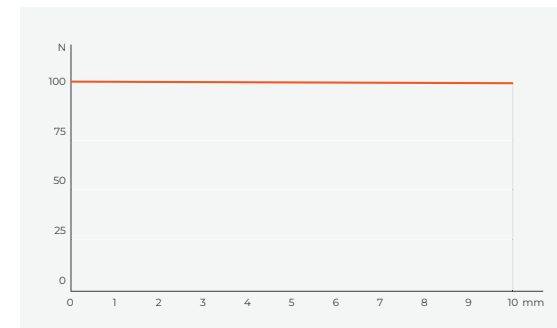
ASTM: PL - progressive load

Lc: Load critical



PRECISE DISTANCE/FORCE APPLICATION

Precise electronic load control ensures that the test load—as a critical test parameter—remains controlled, reproducible, and traceable at all times.



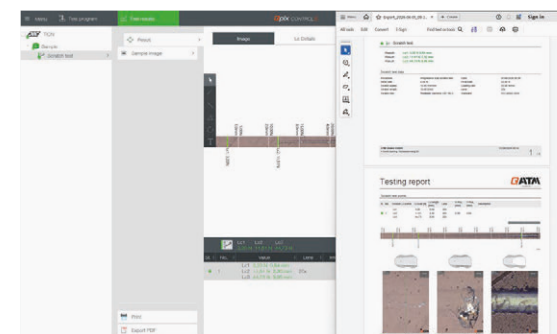
METHOD: CONSTANT LOAD

The normal force remains constant over the scratch length. This method is suitable for individual measurements, series comparisons, and recurring test conditions in a quality control setting.

ISO: CFST - constant force scratch test

ASTM: CL - constant load

Lc: Load critical

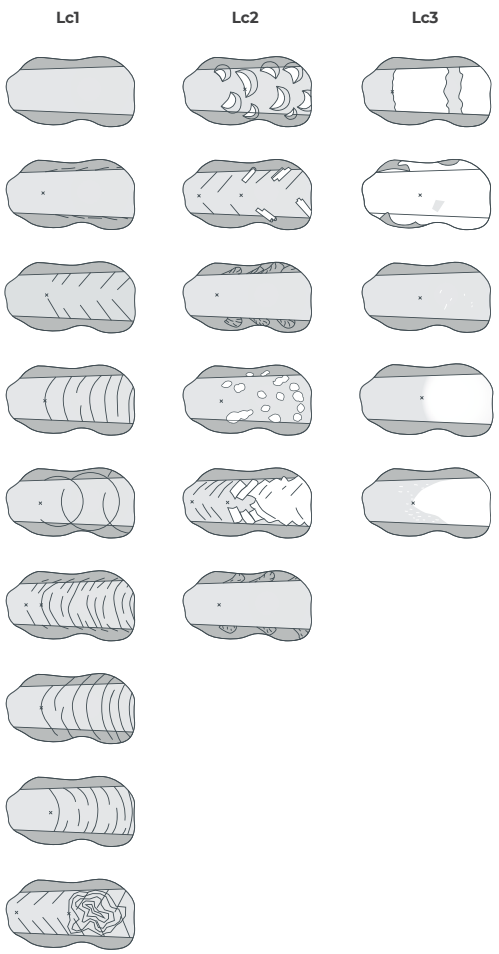


EVALUABLE AND COMPARABLE

The selected loading logic is linked to the scratch mark, position, and result. Methods can be applied to sample series, coating variants, and process comparisons.

DIN EN ISO 20502 / ASTM C1624

CERAMIC COATINGS. EVALUATION OF ADHESION AND FAILURE MODES

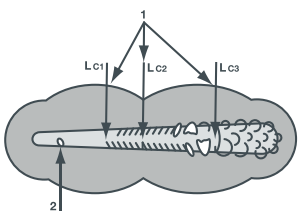


THIN, HARD CERAMIC COATINGS (TYPICALLY 0.1 - 30 µm)

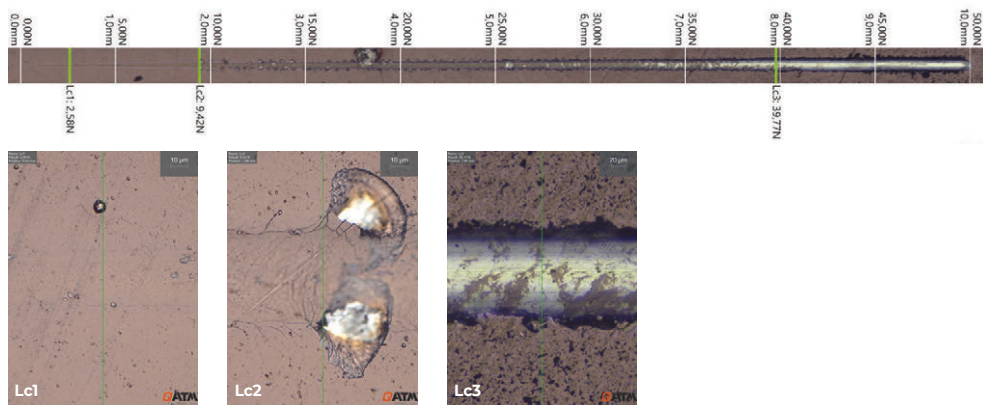
- Carbide TiC, CrC
- Nitride TiN, CrN, TiAlN
- Oxide Al₂O₃
- Diamond Diamond coating
- Diamond-Like Carbon DLC

THIN, HARD CERAMIC AND TECHNICAL COATINGS (TYPICALLY ≤ 20 µm)

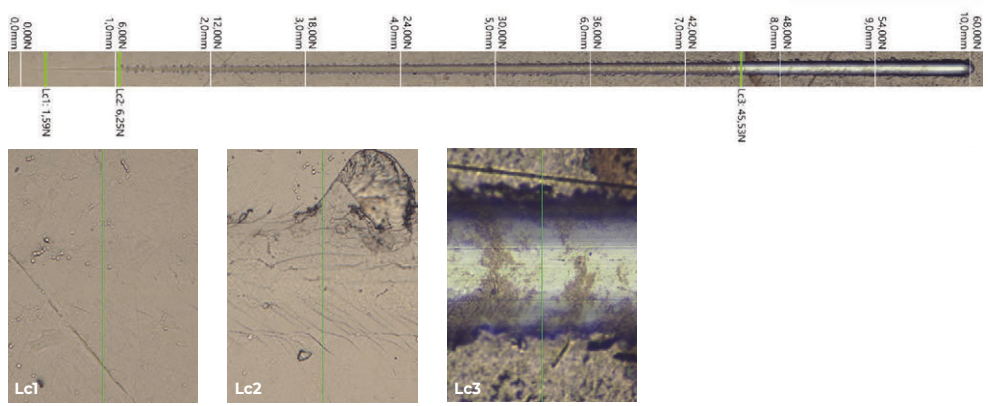
- PVD TiN
- PACVD DLC
- Arc-discharge DLC
- PVD/PACVD Cr-C
- PVD Al₂O₃
- Hard chrome



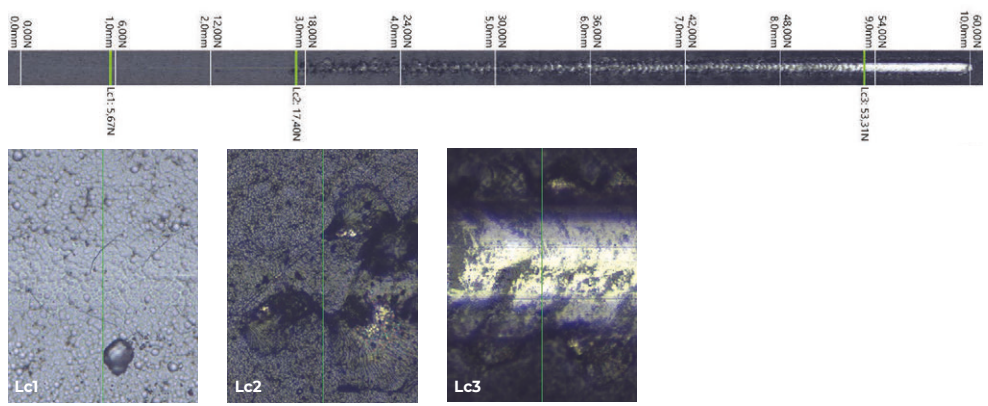
MATERIAL TiCN



MATERIAL TiCB

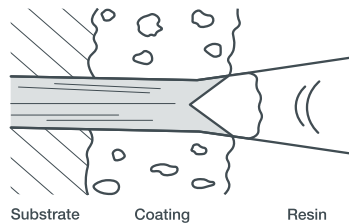


MATERIAL DLC-DUPLEX



THERMAL SPRAYED CERAMIC COATING SYSTEMS

NO CRACK



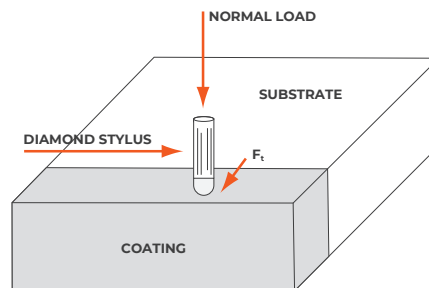
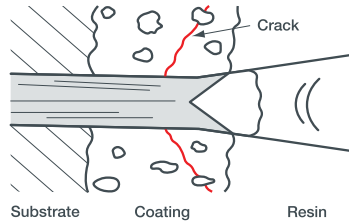
TRANSVERSE SCRATCH TEST ON A CROSS-SECTION

ISO 27307 describes a method for evaluating the adhesion/cohesion of thermal sprayed ceramic coatings using a transverse scratch test. The test is performed with a constant normal force, e.g., 3 N, 5 N, 10 N, 13 N, 15 N, or 20 N.

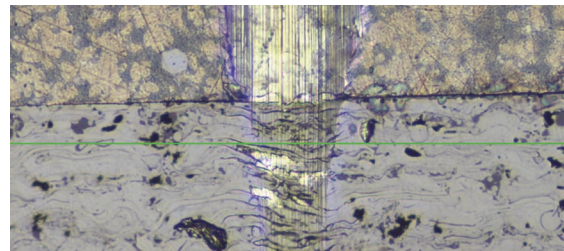
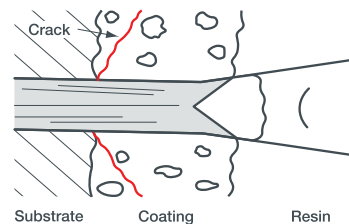
Evaluation is based on categorization

- I No crack
- II Cohesive crack
- III Adhesive crack

COHESIVE CRACK



ADHESIVE CRACK



DETERMINATION OF SCRATCH HARDNESS

FROM THE SCRATCH TEST TO A COMPARABLE MATERIAL PROPERTY

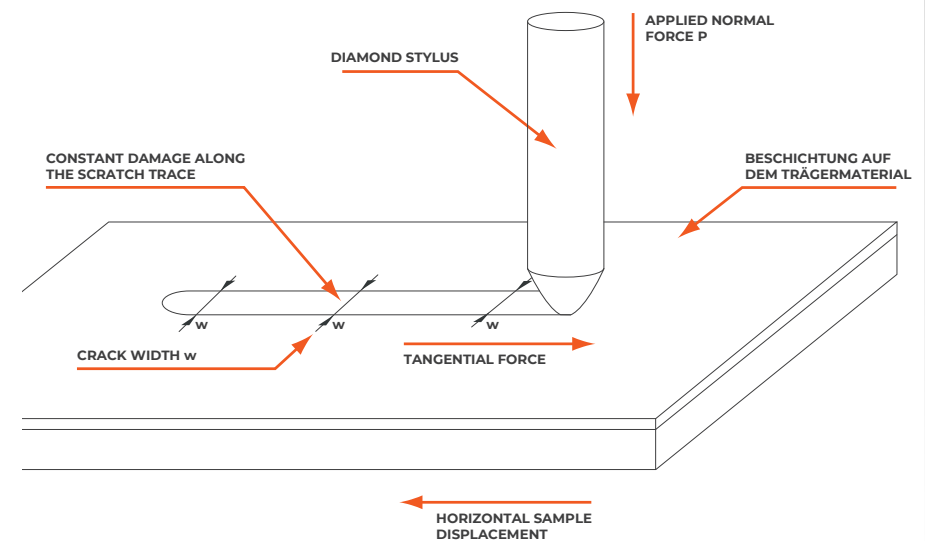
ASTM G171 describes a method for determining the scratch hardness of material surfaces using a defined diamond stylus. A scratch is created under a constant normal force and at a constant speed. The remaining scratch width is measured at several positions and used to calculate the scratch hardness.

$$HS_p = \frac{8P}{\pi w^2}$$

HS_p: Scratch hardness number

P: Normal force [N]

w: Scratch width [μm]

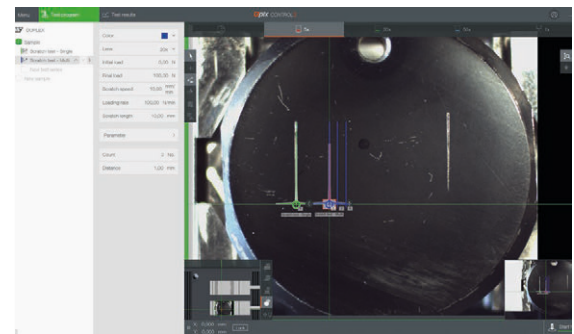


SOFTWARE **Qpix CONTROL²**

SCRATCH WORKFLOW

EASY TESTING, EFFICIENT ANALYSIS

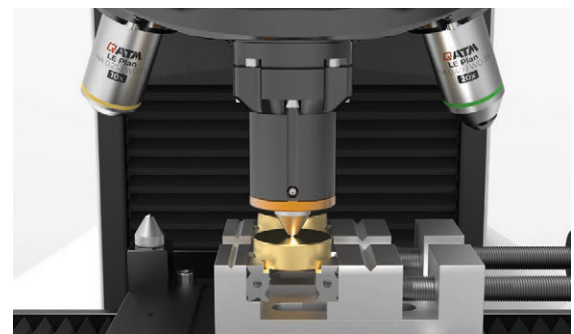
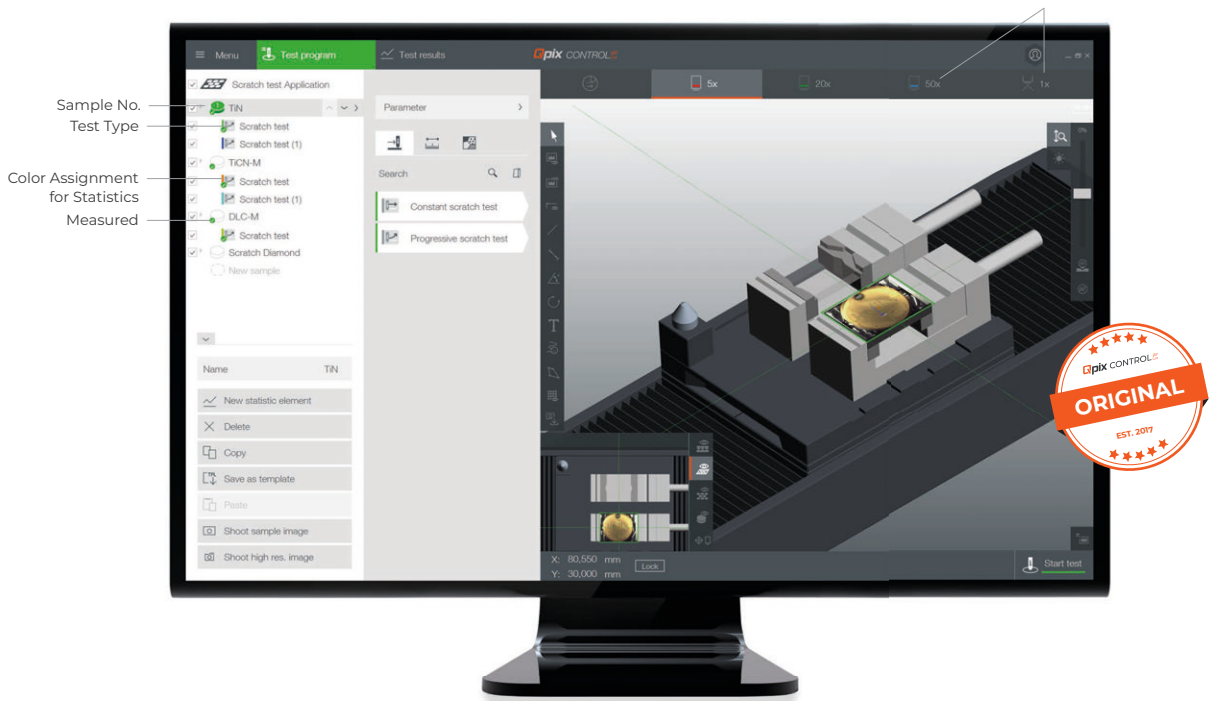
QpixControl2 is more than just a user interface: The software combines a patented 3D user concept with a seamless scratch workflow. Tests can be easily created, scratch marks visually positioned, single or multiple measurements processed automatically, and relevant Lc events evaluated in a structured manner. From test definition through image capture and evaluation to data management, export, and standardized reporting, all steps remain integrated within an intuitive software environment. This reduces operational effort, supports reproducible processes, and enables the efficient use of scratch testing in production-oriented quality assurance.



SINGLE AND MULTIPLE INSPECTIONS

Single or multiple measurements: Scratch marks can be positioned directly in the software, created with a defined offset, and processed automatically. The Lc results are evaluated for each test as well as as a series mean.

Lens selection: Viewing Samples with different fields of view



8-POSITION AUTOMATIC TOOL CHANGER

The motorized tool changer can accommodate up to three scratch test modules and up to seven lenses. This allows for overview, detailed inspection, and Lc determination to be performed directly within the scratch test sequence—on a single axis and without offset.

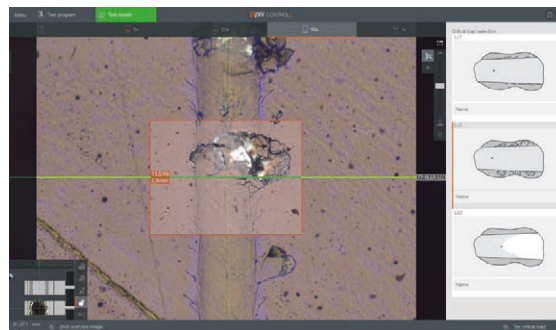
FROM SETUP TO REPORT

RESULTS IN 3 STEPS



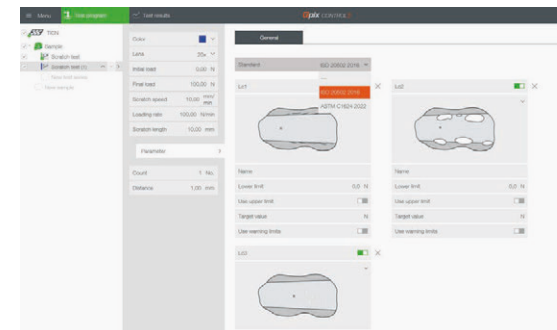
1. LOAD SAMPLE

The sample holder is automatically moved to the correct height, and the sample image is automatically captured.



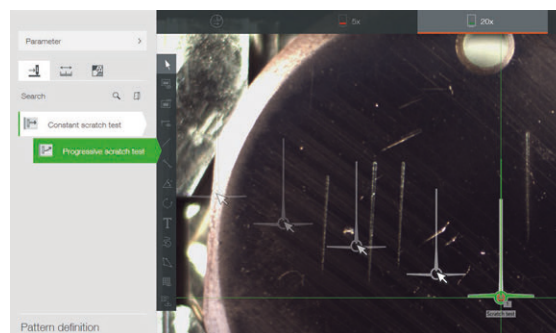
GUIDED L_c DETERMINATION

Graphical templates support the consistent classification of typical failure events. This facilitates standard-based procedures and reduces room for interpretation.



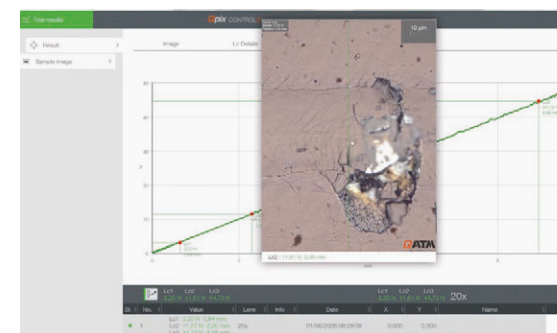
A WIDE RANGE OF SETTING OPTIONS

Load definition, crack length, load rate, speed, and lens selection are managed directly within the method. For evaluation, standardbased templates or custom templates can be used and supplemented with limit and target values.



2. POSITIONING

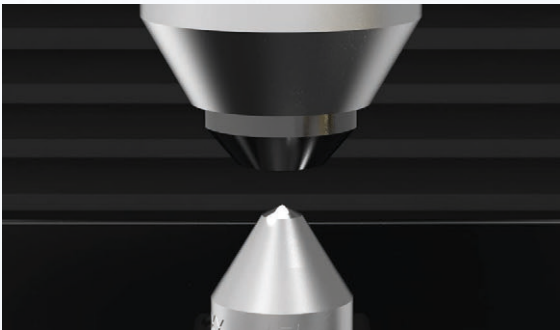
Drag and drop the starting point of the scratch test directly to the desired position.



3. START TEST SEQUENCE

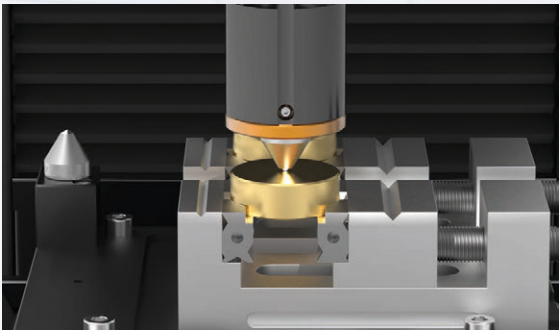
The test sequence is fully automatically and in accordance with the Scratch test standards. Subsequently, the failure events can be evaluated and assigned to the respective L_c points.

PRACTICAL APPLICATIONS



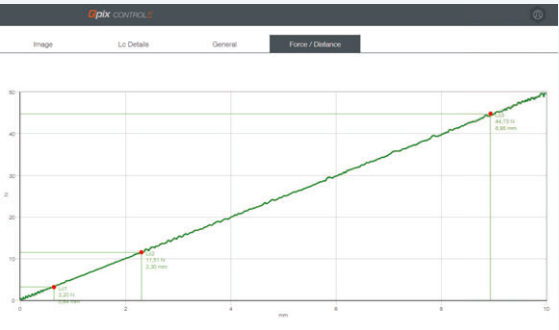
CHECKING THE DIAMOND STYLUS

The diamond tip can be visually inspected directly within the system. This allows the condition of the diamond stylus to be checked before or after the test—an important step for ensuring reproducible results and traceable test conditions.



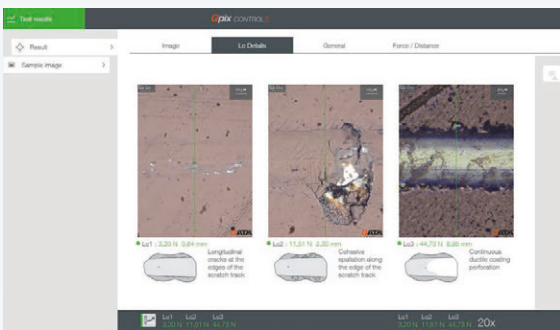
UNIVERSAL SAMPLE HOLDER

Adjustable clamping jaws allow for the secure holding of various specimen geometries—from flat and angular test pieces to round or very small specimens.



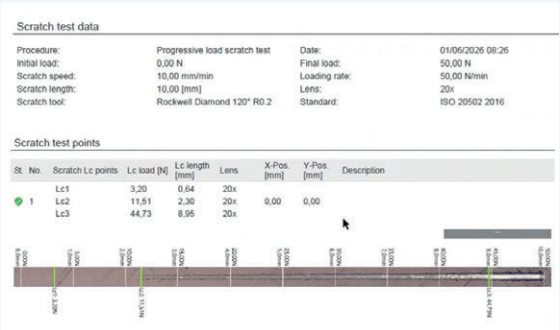
FORCE/DISTANCE GRAPH

The force-distance curve documents the applied load along the scratch track. Anomalies in the curve can be compared with visible failure events and used for Lc evaluation.



Lc DETAILS

Relevant failure events along the scratch track can be viewed in detail in the image and assigned to the corresponding Lc details. This transforms the visual assessment into a verifiable test result.



REPORT

Test parameters, scratch track, Lc values and evaluation results are compiled into a test report. This simplifies documentation, the comparison of test series, and the dissemination of results within the quality process.



QSCRATCH 20 / QNESS 60 A+ EVO

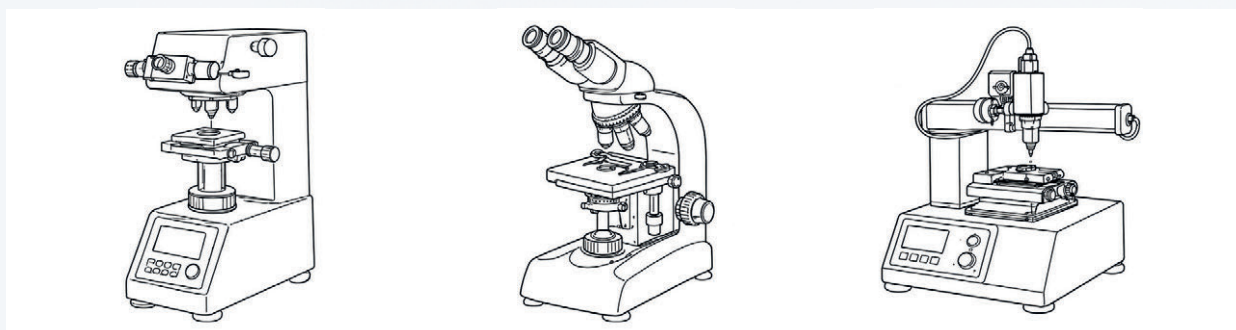
Qscratch 20 is part of a modular QATM platform. In addition to scratch testing, hardness testing methods, analysis functions, and other coating tests can be optionally integrated. This reduces the need to switch systems, consolidates results in a familiar software environment, and ensures long-term investment security.



CRATER-GRINDING COATING THICKNESS MEASUREMENT

Crater-grinding method for microscopic coating thickness determination as supplementary information for coating evaluation in accordance with DIN EN ISO 26423.

ONE PLATFORM MORE THAN JUST SCRATCH TESTING



HARDNESS TESTING

Optional hardness upgrade for Vickers, Knoop, Brinell, and Rockwell - integrated into the QpixControl2 software environment.

ANALYSIS

Optional analysis functions for coating thickness, phases, grain size, and weld seams - for more information from a single system.

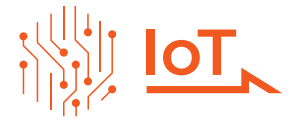
SCRATCH TESTING

Controlled scratch testing with progressive or constant load - for evaluating coatings, surfaces, and critical loads.



ROCKWELL INDENTATION TEST

Rockwell indentation test for qualitative adhesion evaluation of ceramic coatings in accordance with DIN EN ISO 26443.



VISIONARY IDEAS

FOR INDUSTRY 4.0



#QNESSCONNECTEDFUTURE

Linking up production machinery, intelligent controls for production plants and automated data-sharing for work process planning, have become essential aspects of manufacturing operations over the past few years. Visionary ideas for the Internet of Things and Industry 4.0 now ensure we also offer interconnected test and result monitoring for quality assurance.

QATM HAS A CLEARLY-DEFINED GOAL

We aim to develop all the requisite technologies, processes and resources, and ensure that customers get 100% of the benefits from all the interconnected devices installed by QATM and to profit from optimized data management. All the steps, tools and developments this requires, are integral to our project: **#QnessConnectedFuture** We can already meet many of these requirements today!

BENEFITS



Efficient documentation



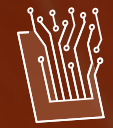
Reduced operation influence



Minimization of error sources



Faster and improved process monitoring



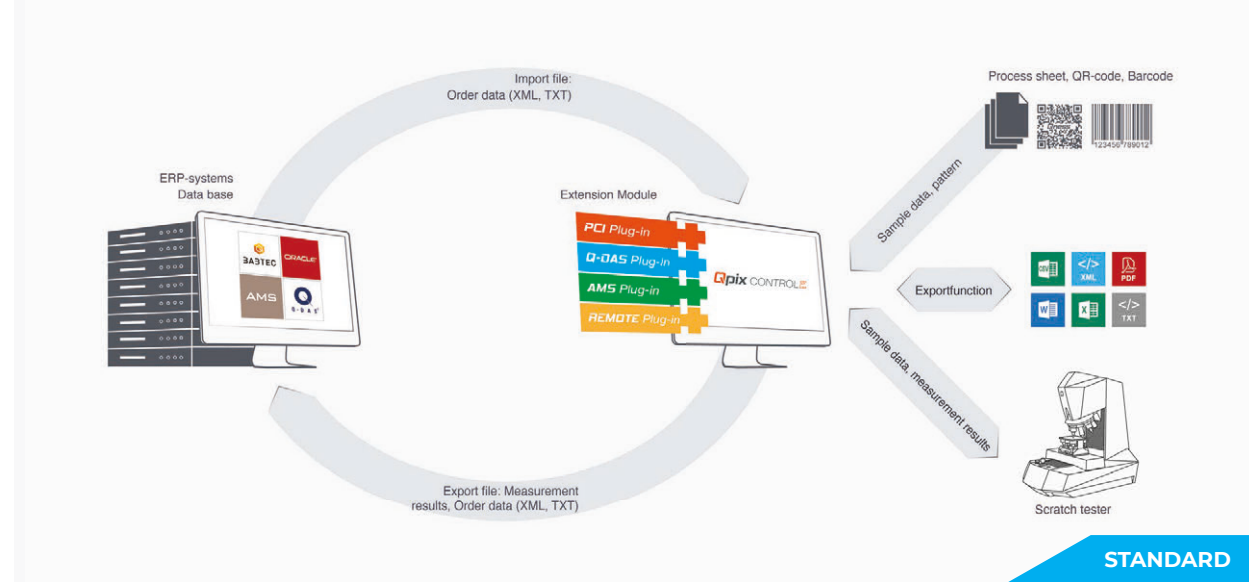
Real-time results



Reduced costs

INTELLIGENT
DATA EXCHANGE
SOLUTIONS TODAY

FOR CONNECTED TOMORROWS



QCONNECT

Qconnect is the interface in QATM QpixControl2 software, providing customers with a full portfolio of inter-device connectivity - from serial production, open XML interfaces (bidirectional) and pre-specified plug-in solutions, such as the QDAS Plug-In+, through to customer-specific connectivity solutions implemented completely by QATM. We have a professional solution for every applicational requirement.



REPORT & AUTO-EXPORT

Test results, Lc results, scratch track information, and test parameters can be documented in a structured format and exported. Standardized test reports and flexible export options facilitate the transfer of results to quality assurance, documentation, or higher-level systems.



BARCODE/QR CODE/DMC READER

Qpix software platforms support barcode and QR code readers. Whether simply inserting header files (serial), managing the complete integration of reading devices for the automatic selection of templates, or calling up data from superordinate systems (optional) – barcode/QR code readers simplify work procedures for the tester, while also preventing operating errors.



IOT - INTERNET OF THINGS

Your virtual laboratory for managing, controlling and reporting of your QATM devices. Always keep an eye on the measurement progress of your hardness testers. Automatic software updates can be carried out and backups can be saved via the cloud. All settings are of course fully customizable.

iot.verder-scientific.com

MODELS & ACCESSORIES

CONFIGURE SCRATCH TESTER



Online Configurator >

MODEL

1.



Qscratch 20 GO
Semi-automatic
Scratch tester

1 2



Qscratch 20
Fully automatic
Scratch tester

2

LOAD LEVEL

2.



1 2

INDENTER

3.



**Rockwell
Diamond**
120°; R0.2 mm

1 2



**Rockwell
Diamond**
120°; R0.2 mm
Factory certificate

1 2



**Scratch
carbide stylus**
Ø 0.5 mm
Factory certificate

1 2



**Scratch
carbide stylus**
Ø 1.0 mm
Factory certificate

1 2

LENSES

4.



5x

1 2



10x

1 2



20x

1 2



50x

1 2



100x

1 2

HQ LENSES

5.



5x

1 2



10x

1 2



20x

1 2



50x

1 2

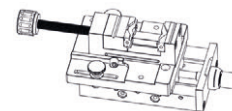


100x

1 2

XY ACCESSORIES

6.



X-axis linear slide
55 mm

1 2

SAMPLE HOLDER

7.

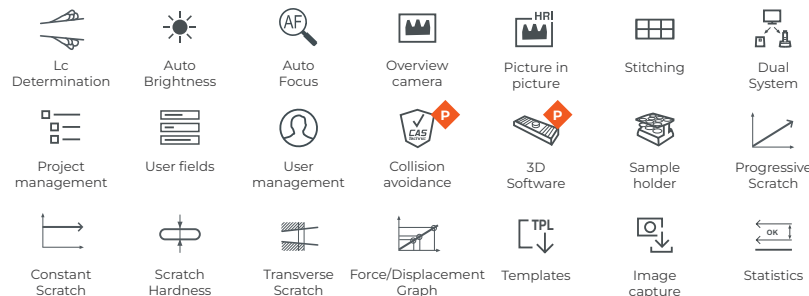


Universal sample holder

1 2

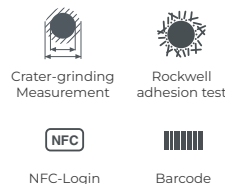
SOFTWARE INCLUDED FEATURES

8.



SOFTWARE OPTIONS

9.



MIKROSKOPIE & ANALYSE

10.



CONNECTIVITY IMPORT & EXPORT

11.



PC SYSTEM

12.



1 2 1 2 1 2 1 2

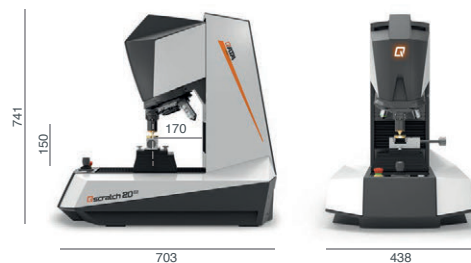
ACCESSORIES

13.

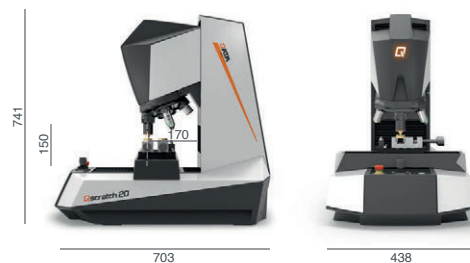


1 2 1 2 1 2

Variant 20 GO



Variant 20

**Qscratch 20^{GO}****Qscratch 20**

Test force range	0.5* - 200 N	0.5* - 200 N
Constant load	Single measurements	Single and multiple measurements
Progressive load	Single measurements	Single and multiple measurements
Z-axis	Dynamic, automated (CAS-Technic), Travelling distance Z 150 mm (5.91")	
Tool positions	8-fold motorized tool changer (max. 3 testing modules, max. 7 lenses)	
Included basic equipment	Rockwell diamond; 20x, 50x Lenses	Rockwell diamond; 5x, 20x, 50x Lenses
Lens types	Standard (Achromat) and High Quality (Semi-apochromat) for hardness testing and microscopy	
Sample image camera	-	5 Mpixel - CMOS color, USB3.0 52 x 39 mm (2.05 x 1.54")
Cross slide	Motorized Y axis	Motorized X/Y axis
Table size	150 x 120 mm (5.91 x 4.72")	150 x 120 mm (5.91 x 4.72")
Positioning accuracy	Y-axis +/- 0.2 µm	X/Y-axis +/- 0.2 µm
Traverse path	Y 150 mm (5.91")	X 150, Y 150 mm (5.91 x 5.91")
Control elements	Emergency stop, Start button, Joystick Y/Z	Emergency stop, Start button, Joystick X/Y/Z
Max. workpiece weight	50 kg (110 lbs)	50 kg (110 lbs)
Weight of basic device	58 kg (127.9 lbs)	60 kg (132.3 lbs)
Optional	Qpix Inspect Module	Hardness Upgrade and Qpix Inspect Module

KEY DATA

Test sequence	Fully automated / electronic force application
Supported Standards	EN ISO ISO 20502, ASTM C1624, ISO 27307, ASTM G171
Kamerasystem / Bildübertragung	5 Mpixel - CMOS color, USB3.0
Throat depth	170 mm (6.69")
Optical system	Upright microscope with Koehler lighting
Aperture diaphragm	motorized
Interfaces	1 x USB 3.0
Field of view (acc. to equipment)	0.074 x 0.055 mm (100x) to 1.48 x 1.11 mm
Power supply	100 – 240 V ~1/N/PE, 45-65 Hz

ONLINE PRODUCT CONFIGURATOR

Additional modules and accessories can be viewed using the online product configurator at www.qatm.com



Configurator for Qscratch >



* 0.5 N and 1 N > 1% accuracy

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PREMIUM QUALITY
MADE IN GERMANY

ATM Qness GmbH

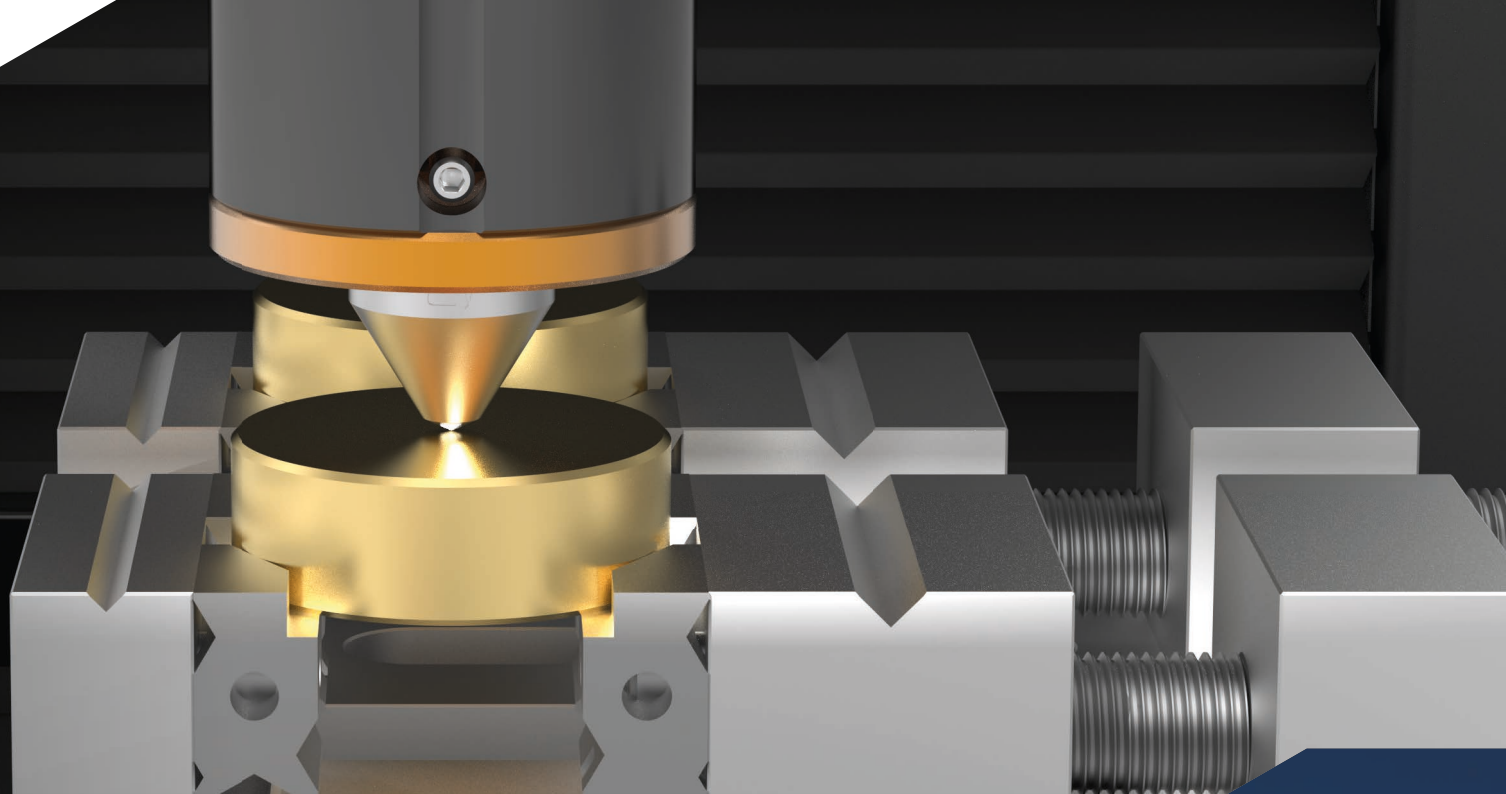
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**ENABLING
PROGRESS**

