



Your partner for magnetism and twist testing

From Measurement Data to Insights

Modern stray field analysis for permanent magnet rotors

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Matesy GmbH - Magnetic Technologies & Systems

Jena | Germany



The Matesy GmbH

Quality – Made in Jena

- Is an innovative technology company located in the center of the university town of Jena
- The company was founded in 2008 as a spin-off of the R&D institution “INNOVENT Technology Development”
- Specializes in visualization, characterization and generation of magnetic fields and optical shaft twist testing



The Matesy GmbH

Quality – Made in Jena

- We develop and produce customized systems and technologies of the highest application standards
- We are service providers (consulting and measurements) for all aspects around magnetism
- We work together with INNOVENT and the National Metrology Institute of Germany - the PTB - for calibration, reference magnets and the development of new standard measurement methods

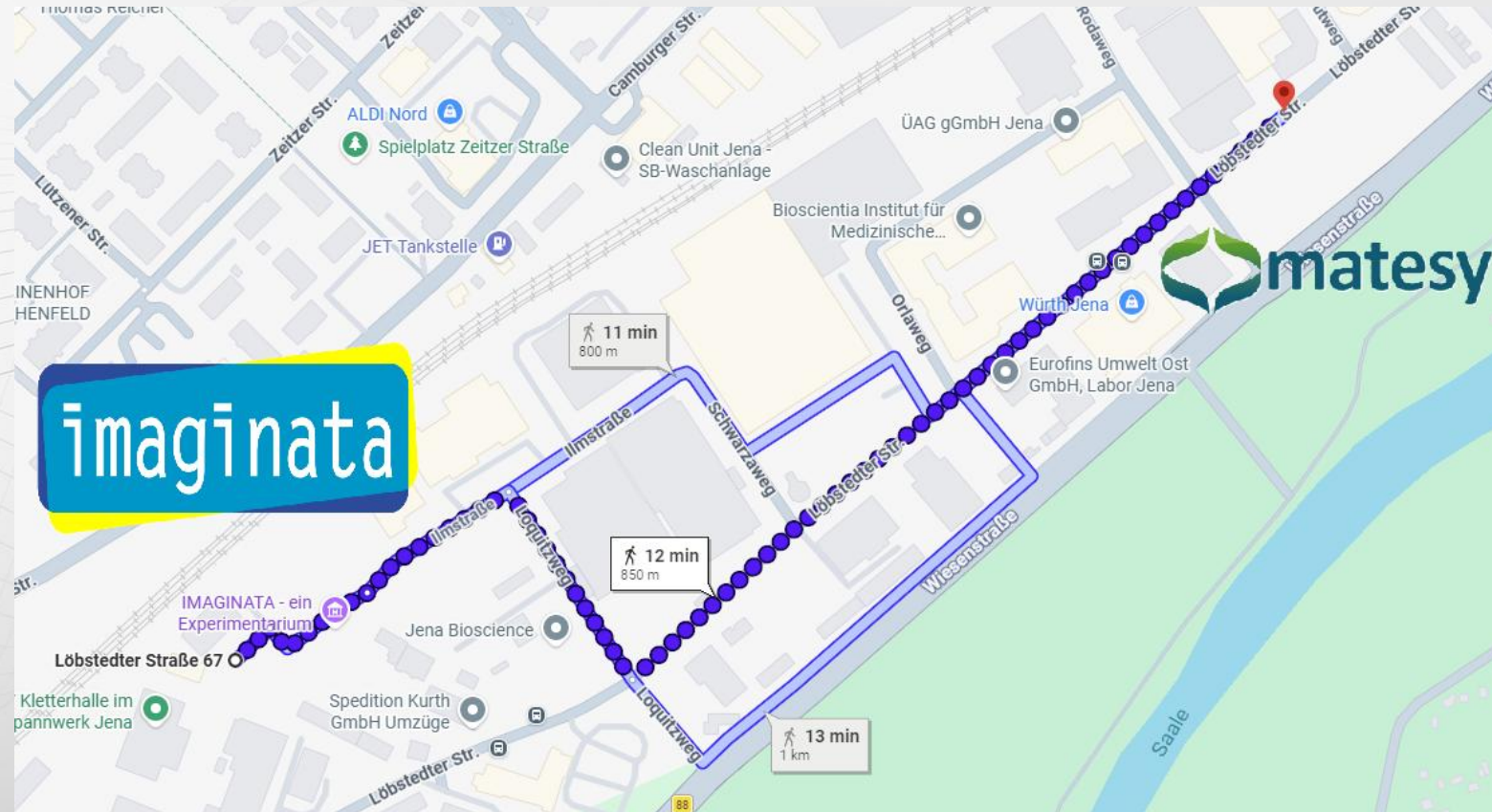


The Matesy GmbH

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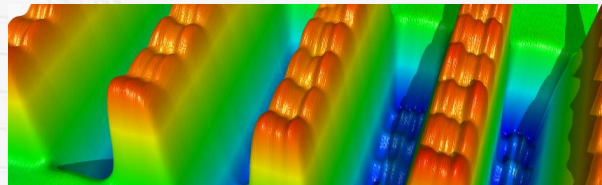
Walking distance from
imaginata

Visitors welcome anytime!



The Matesy GmbH

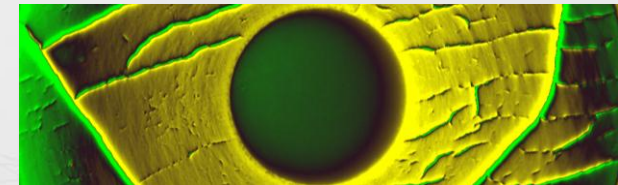
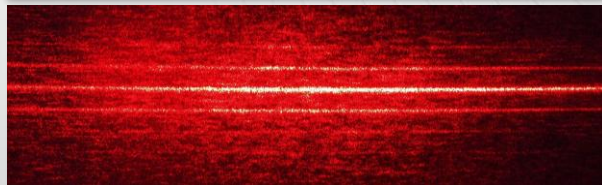
Quality – Made in Jena



Magnet measurement
and calibration systems



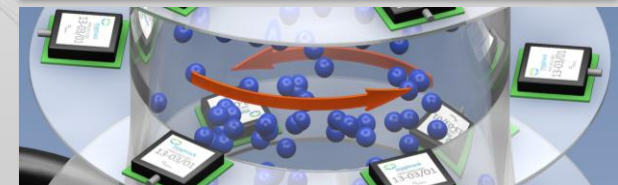
Optical twist / lead test
STT-shaft twist tester



Magneto-optical
visualization systems



Materials
magnets, sensors, YIG

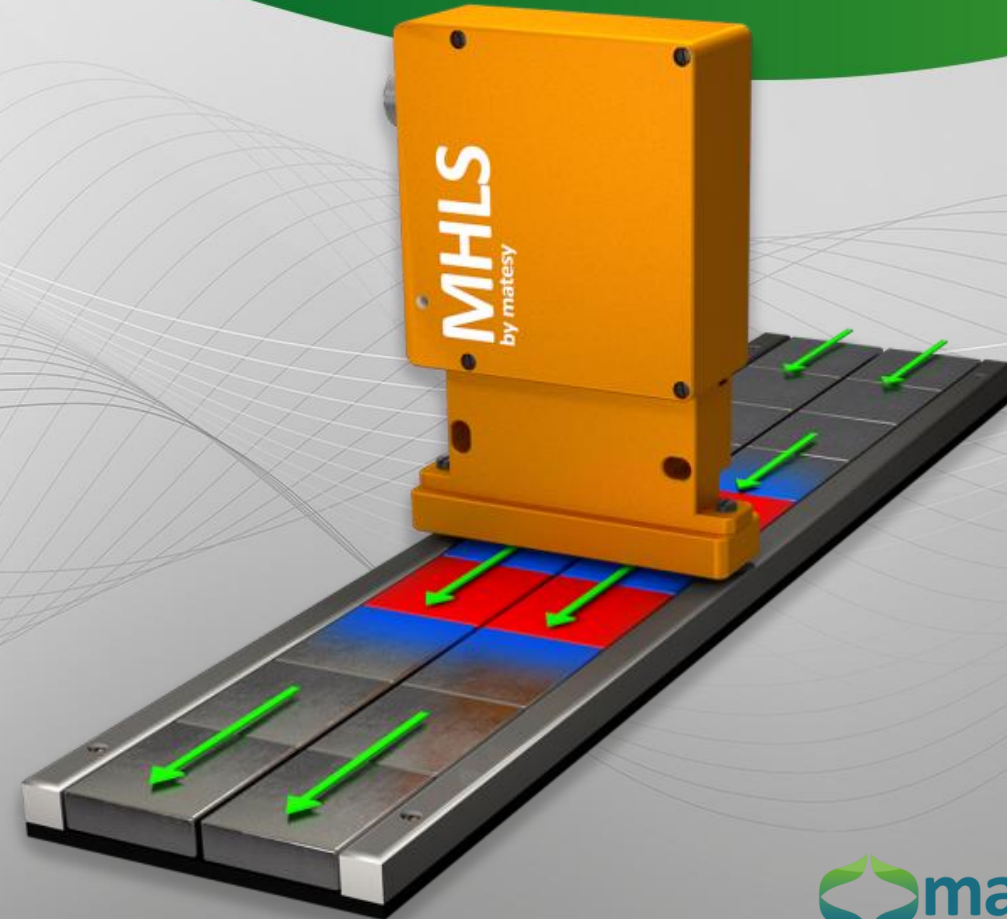


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Magnet testing at the highest level

Technologies, systems and devices



Magnet measurement and calibration systems

Characterization of permanent magnets & magnetic assemblies

Calibration systems for magnetic sensors



Real-time characterization of magnets



Scan of multipole magnetic assemblies and structures, and visual presentation



Software analyses based on real 3D sensors



Customized Helmholtz coils for calibrations

Your partner for magnetism and twist testing

MHLS - Matesy Hall Line Sensor

Application areas



Automotive industry



Aerospace & Aviation



Medical Technology



Drive engineering



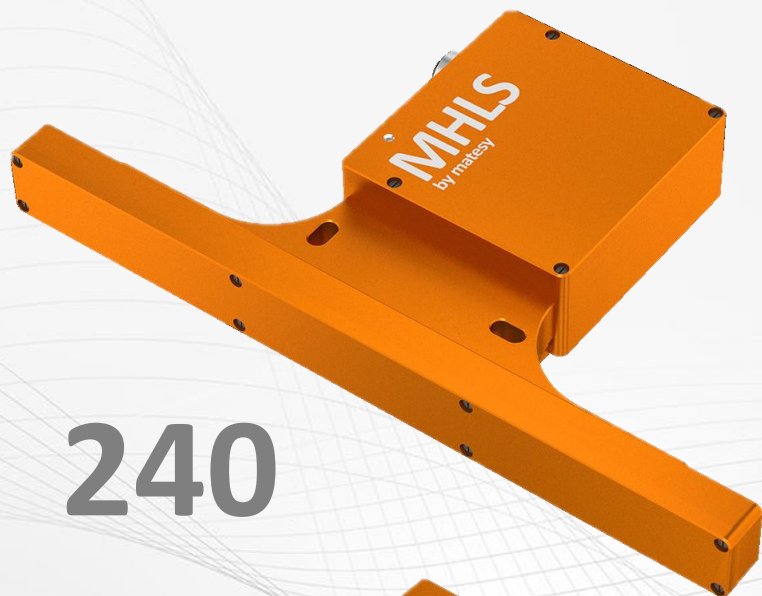
MHLS - Matesy Hall Line Sensor

Technical data

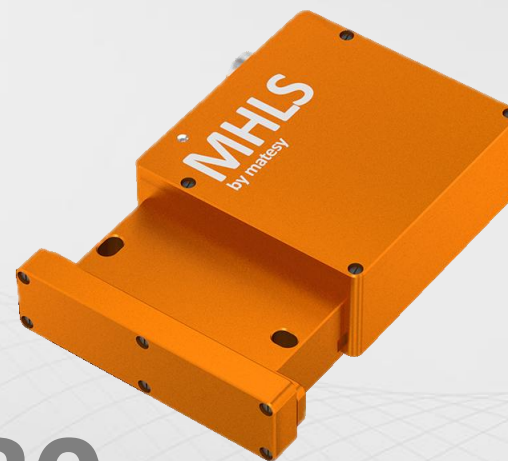
- 3-axis Hall sensor system
- Cascaded version in steps 80, 160, 240, 320
- Sensor pitch: 2.5mm
- Measurement accuracy 3D: 0.5% to ± 800 mT
- Minimum measurement distance*: 0.9 mm
- Measuring frequency (3D): 200 S/s
- Interface: USB, UART (RS422)
- Digital data output
- Trigger - input / output
- Integrated sensor monitoring

*Z-sensor to housing surface

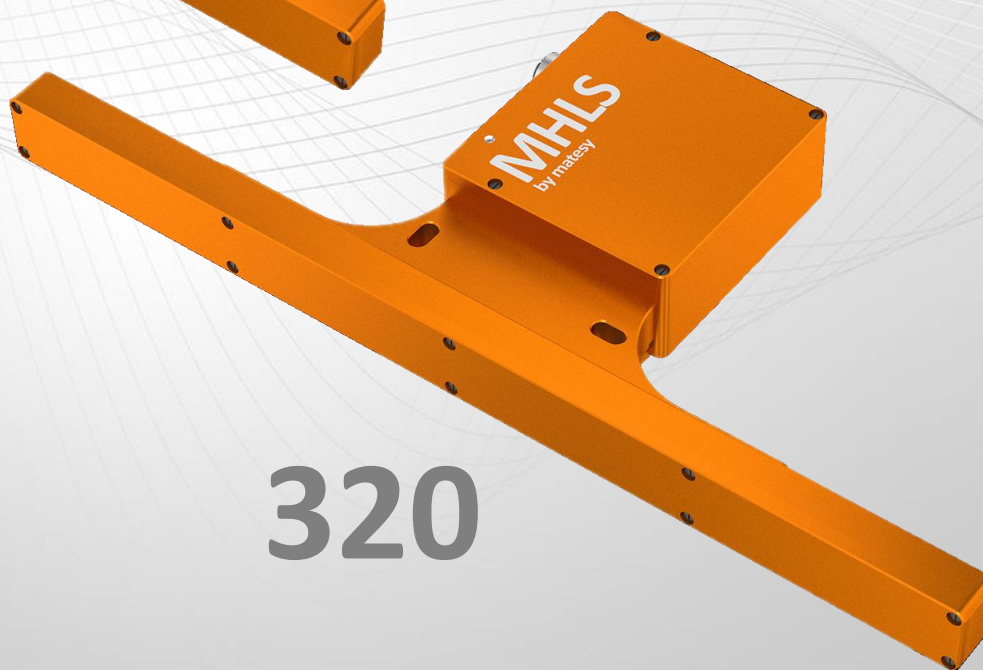




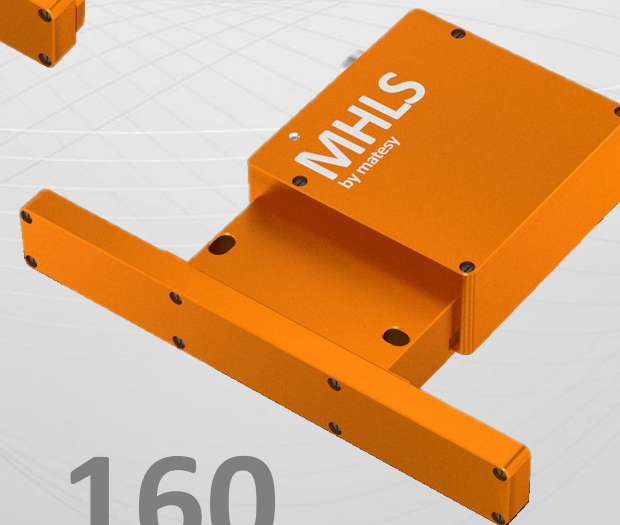
240



80



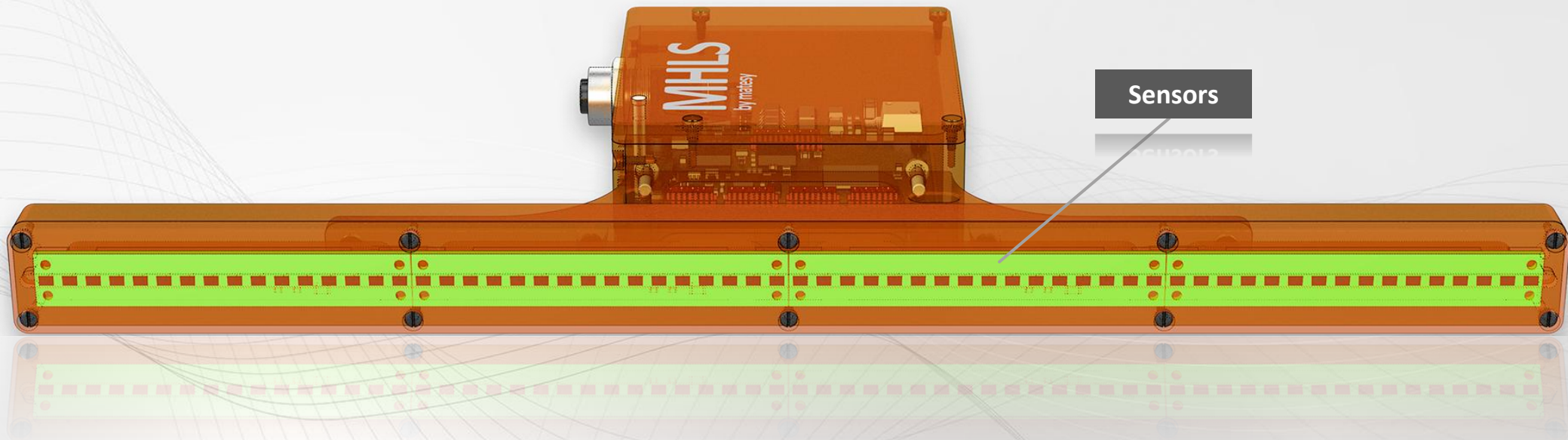
320



160

MHLS - Matesy Hall Line Sensor

Structure and functionality



Sensor arrangement :

0.9 mm below the housing cover, 16 to 64 high-precision Hall sensor ICs are located at a distance of 2.5 mm. Each sensor has its own temperature sensor and is therefore temperature compensated in addition to the magnetic field calibration. Up to 317.5 mm measuring length.

MHLS - Matesy Hall Line Sensor

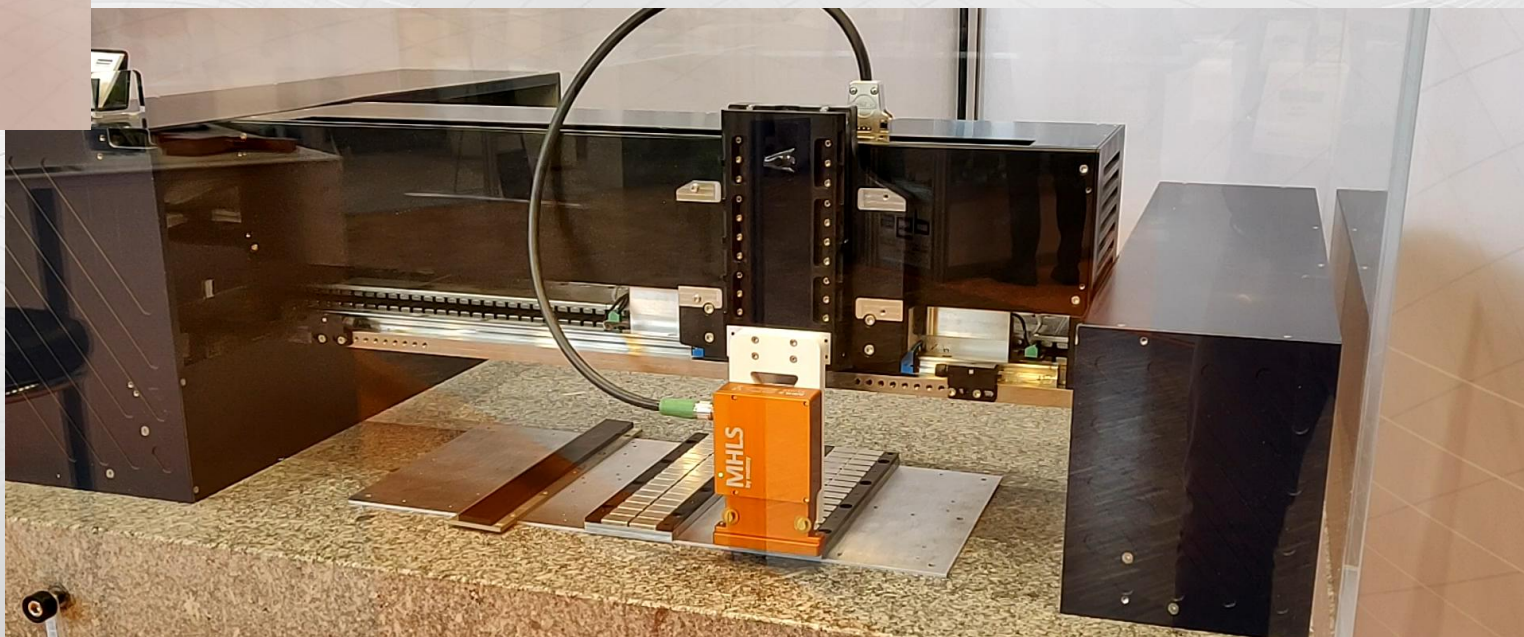
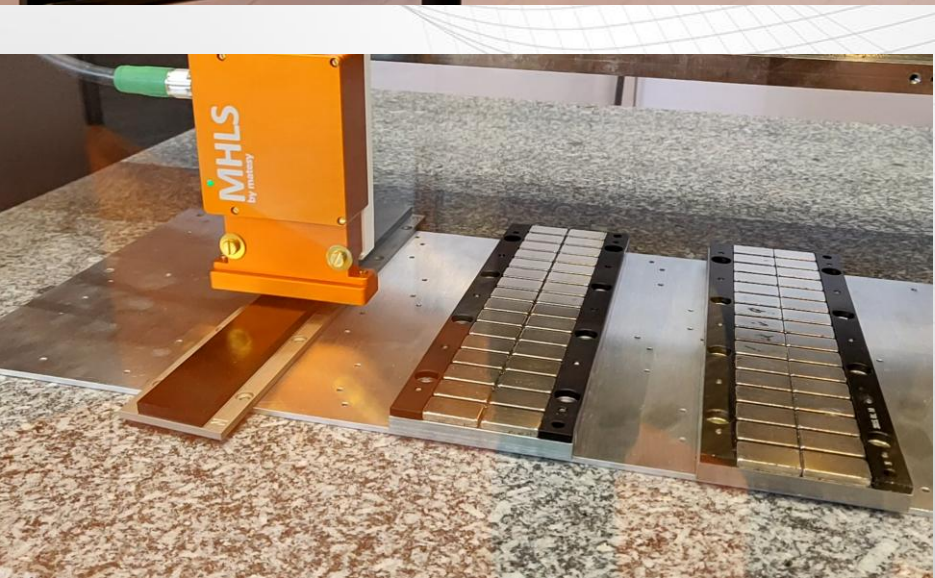
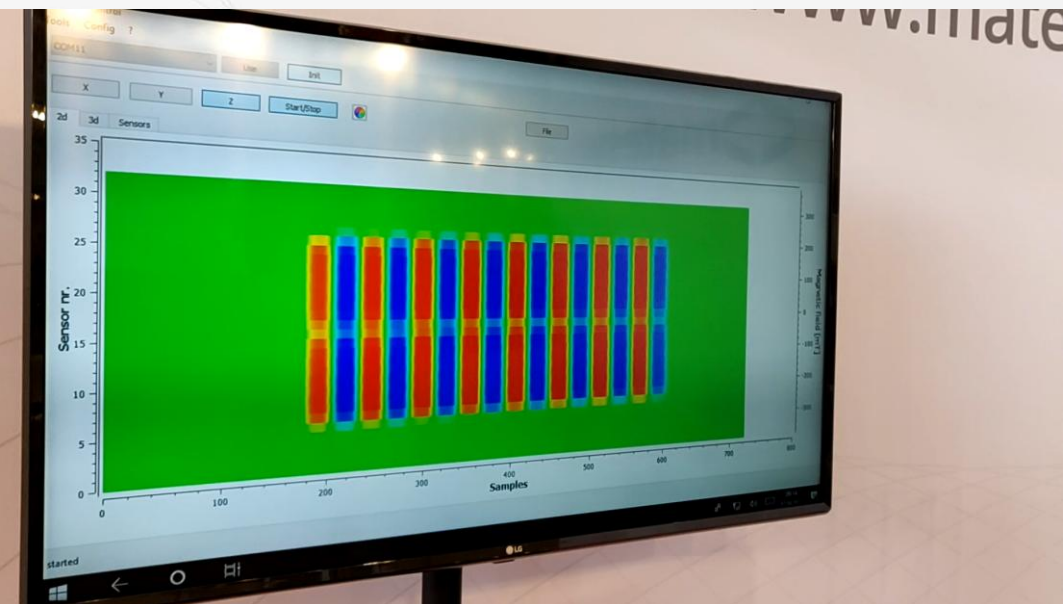
Magnetic measurement mounted on a robot



m-apper - MHLS + 3-axis Gantry

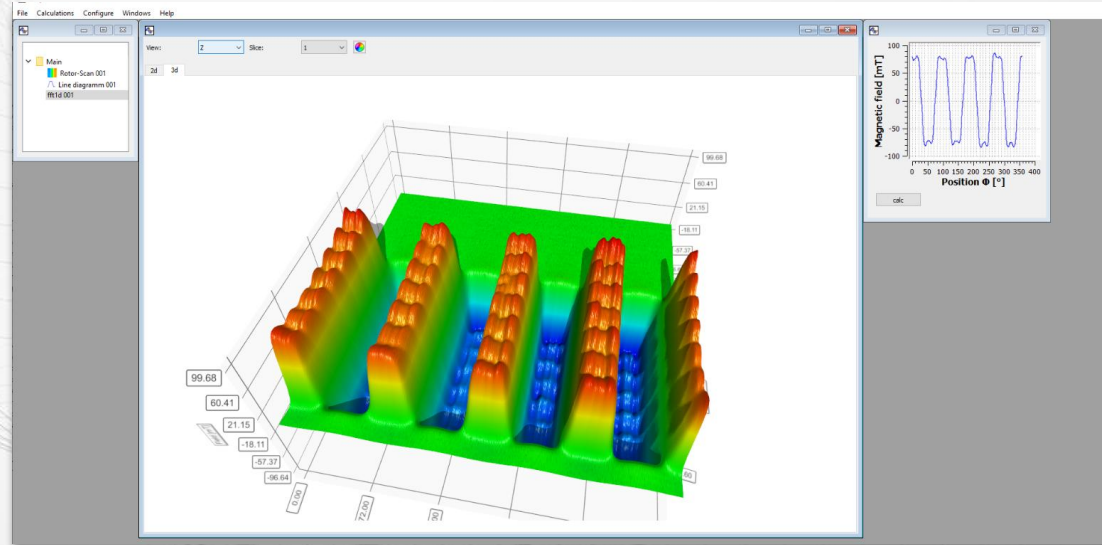
High speed large area magnetic field mapper

- 500 mm x 500 mm x 100 mm



MHLS - Matesy Hall Line Sensor

Rotor measurement



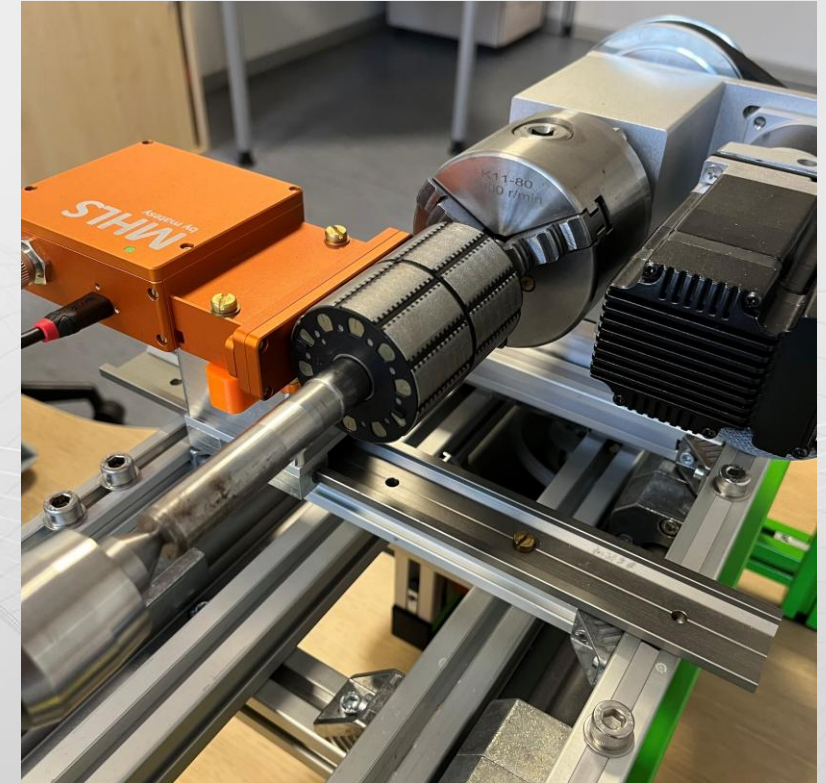
- Easy integration to our rotor mapping system and industrial production lines
- Fast and precise measurements for 100% control
- Triggered measurements via hardware or software



MHLS - Matesy Hall Line Sensor

Rotor measurement

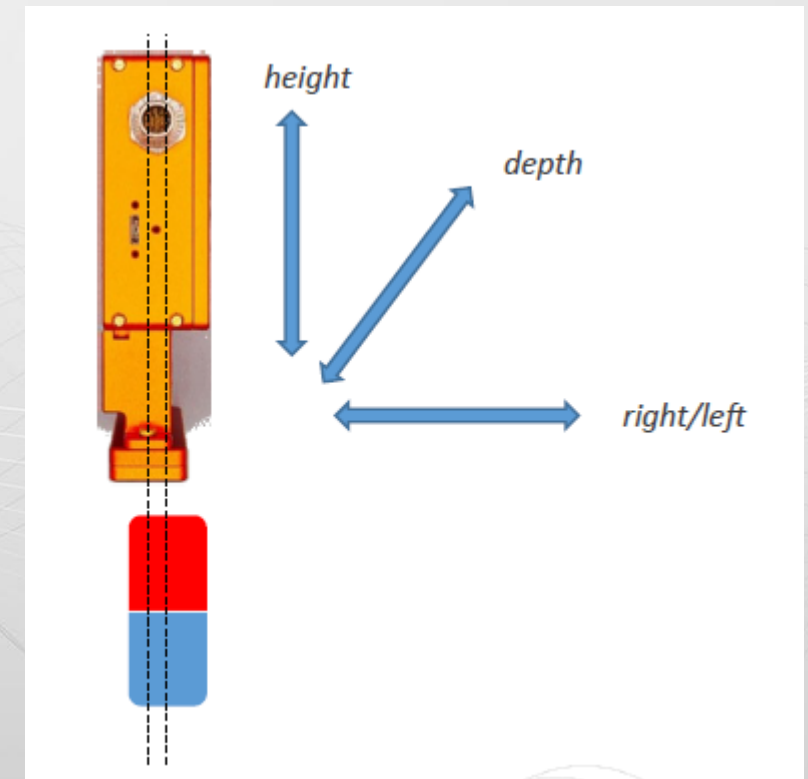
- Both vertical and horizontal fixtures for rotors workable
- Positioning is key – alignment of rotation axis with Hall line array of utmost importance
- Externally triggered measurements don't require a fixed starting point - but rough orientation often easy to achieve
- MHLS speed allows better than 1° resolution in 2 seconds measurement time



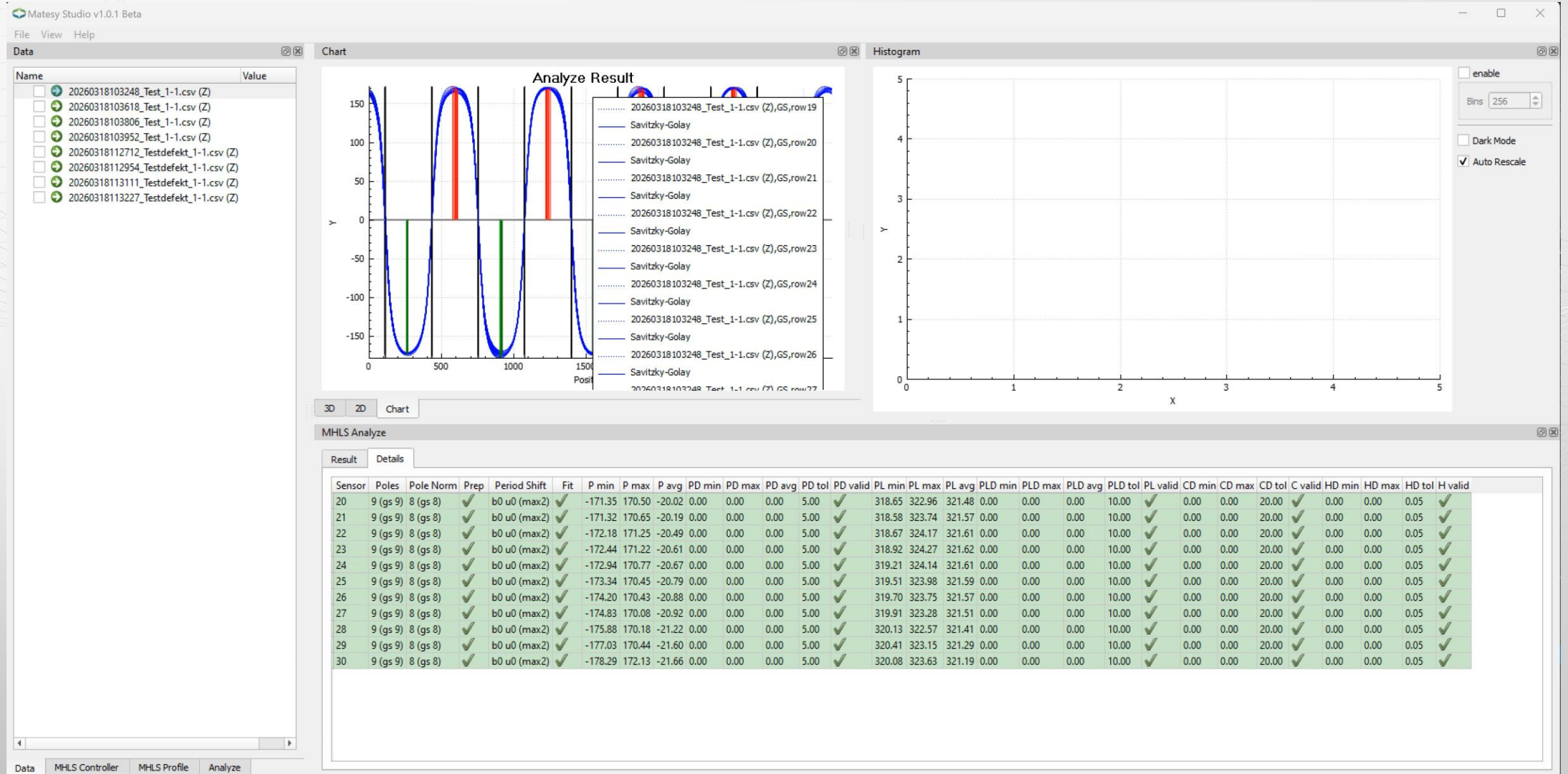
MHLS - Matesy Hall Line Sensor

Rotor measurement

- Measuring the right data – avoiding positioning errors:
 - Aligning the sensor (line) with the rotation axis
 - Tangential orientation – make sure the sensor is parallel to the rotor surface
 - Check the airgap – the magnetic fields decreases with the third order
 - Control the mechanical stability during each measurement

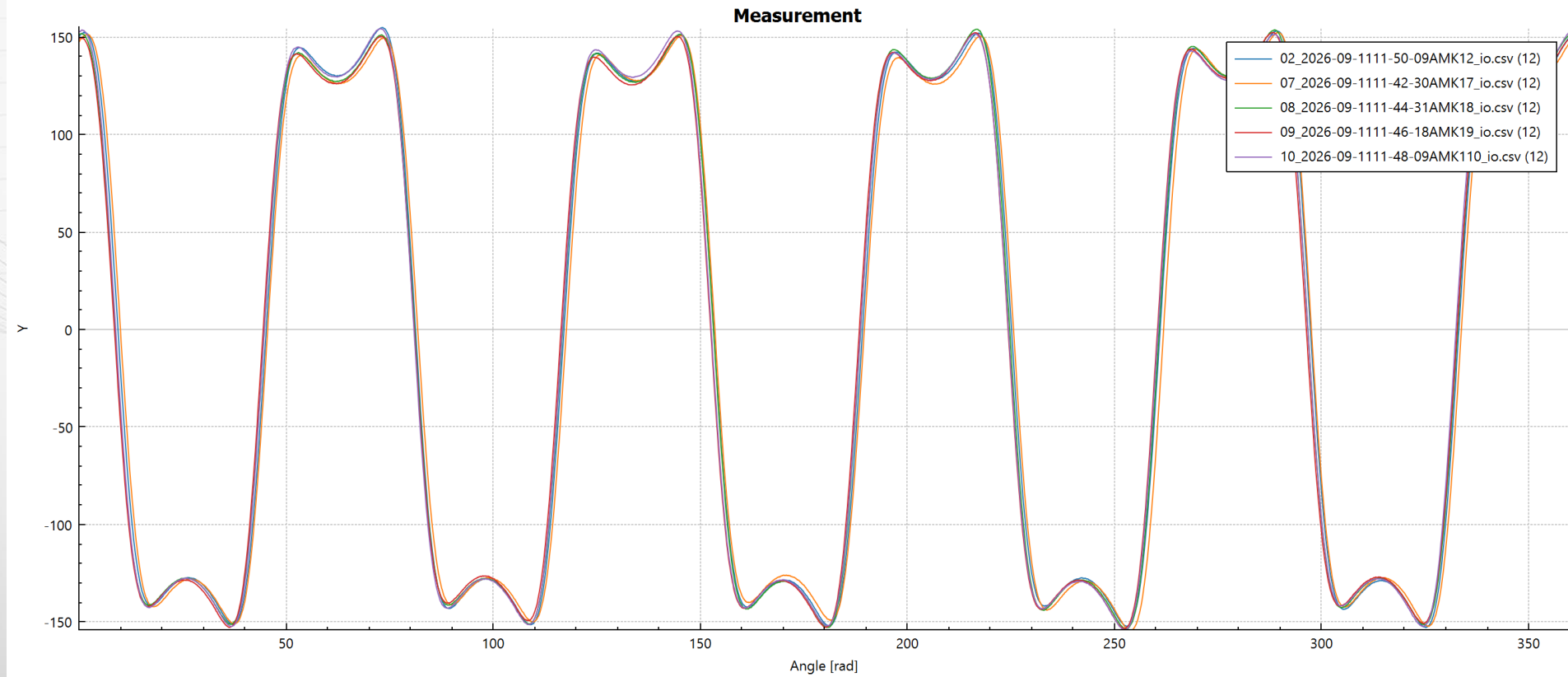


MHLS – Software Analysis



MHLS | new analysis software development

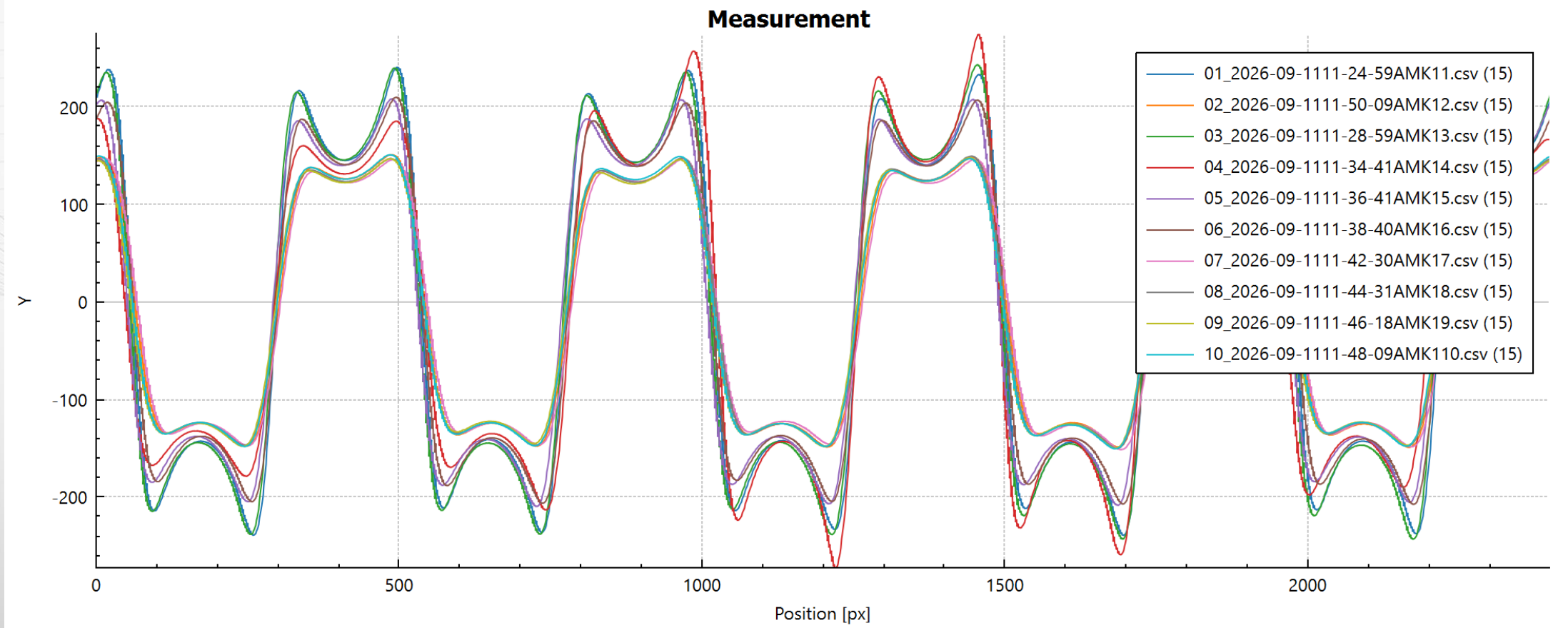
Shifting the lines – preparation for comparisons



- Comparable samples often show slight deviations – zero crossings and pole-shapes can be automatically compared by the software algorithm
- Software allows all selected data files to be shifted to the same assumed starting point – shifted number of lines explicitly stated

MHLS | new analysis software development

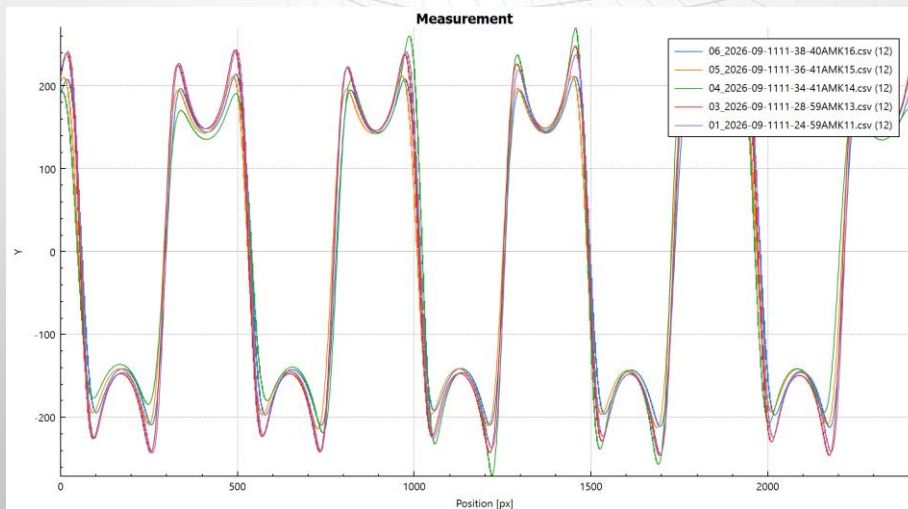
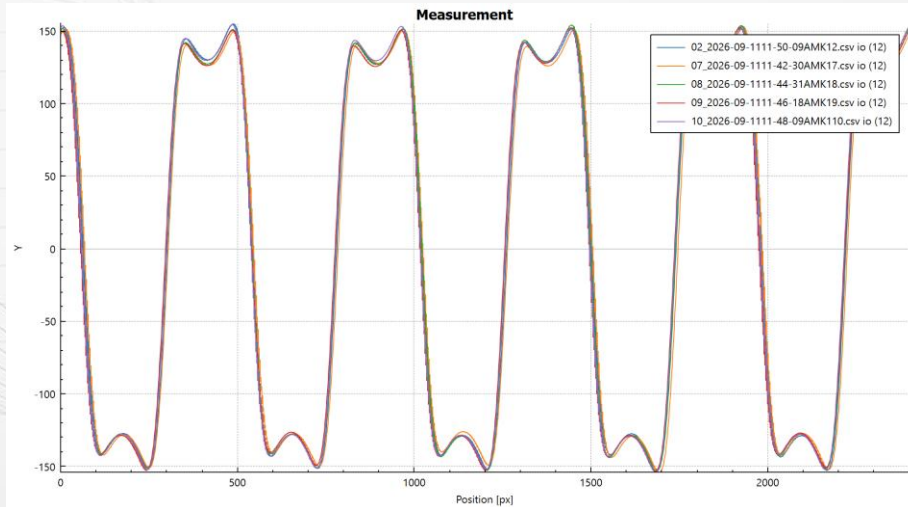
Comparison of 10 rotor samples – 5 OK parts, 5 nOK parts



2400 measurement points for 360° rotation – 0.15° resolution around the diameter

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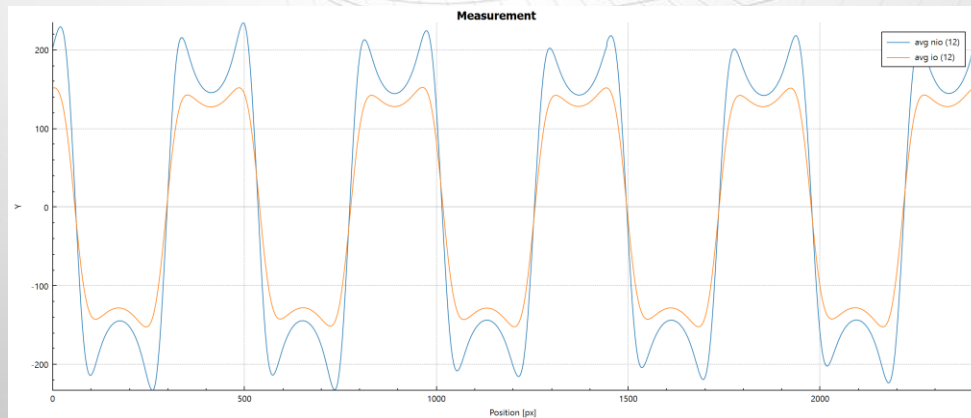
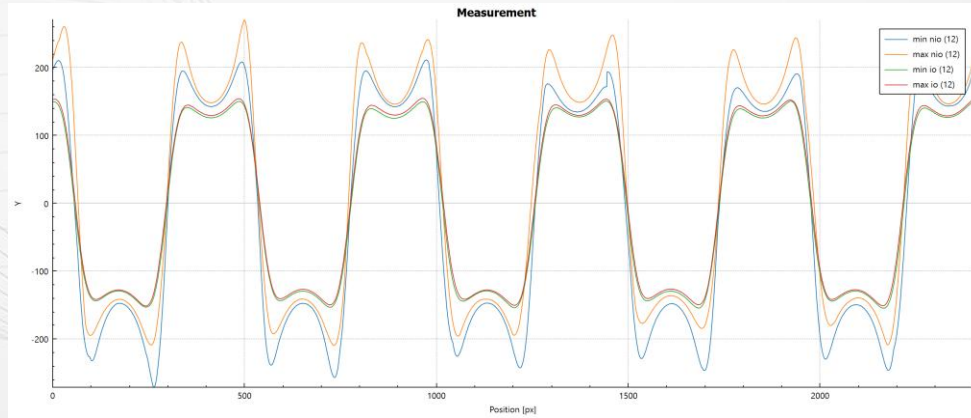
Comparison of 10 rotor samples – 5 OK parts, 5 nOK parts



- OK parts with very close grouping – used for average as sample reference!
- nOK parts with wide variety and differences in shape of the measured data curve
- Even pole widths slightly deviating for nOK parts
- Stronger magnetization for nOK parts

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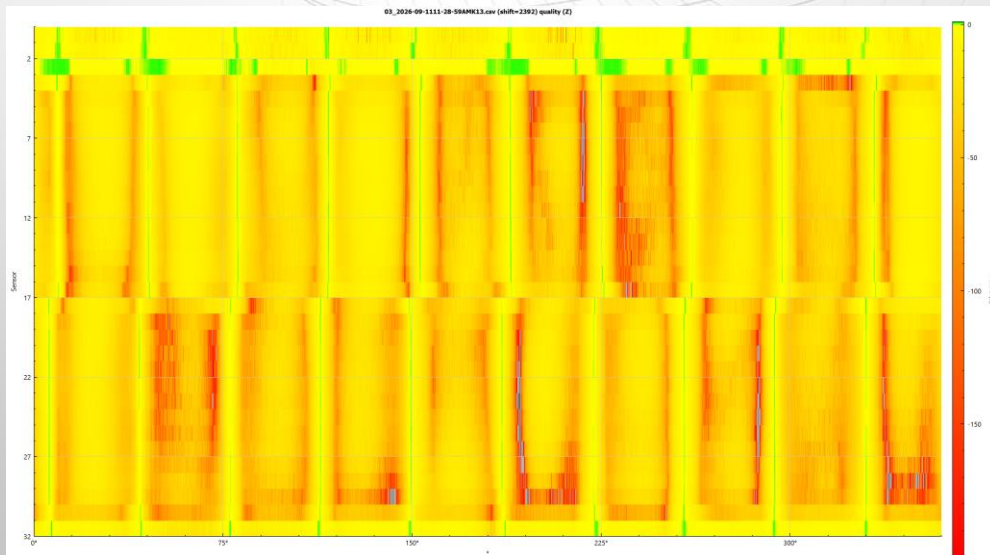
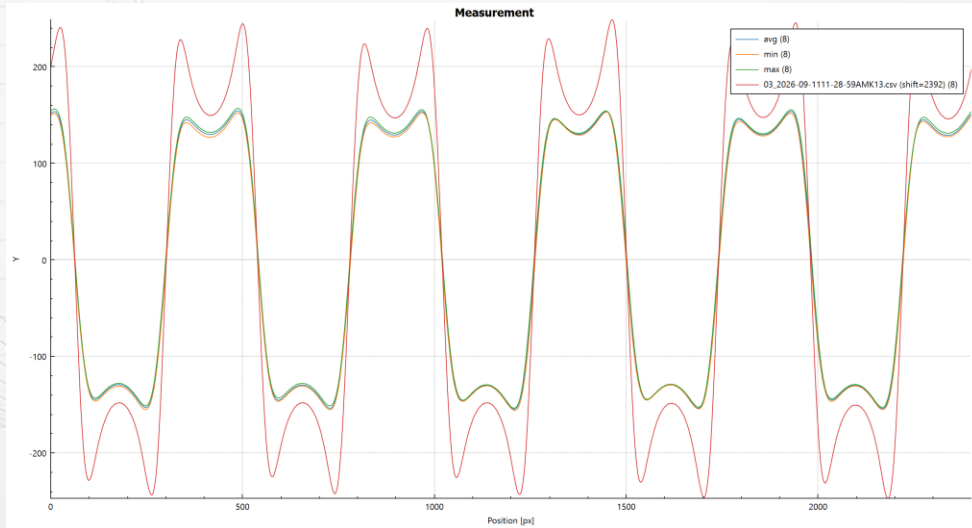
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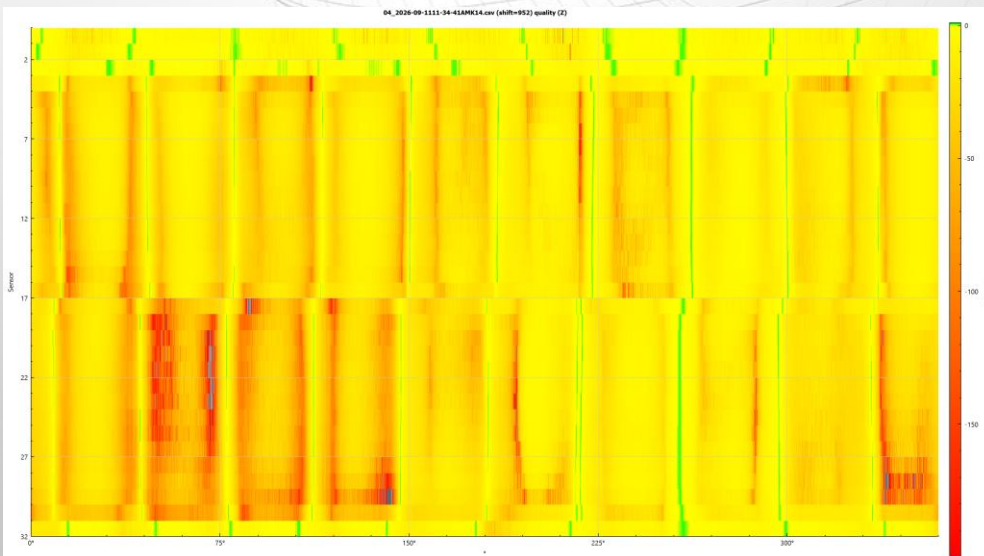
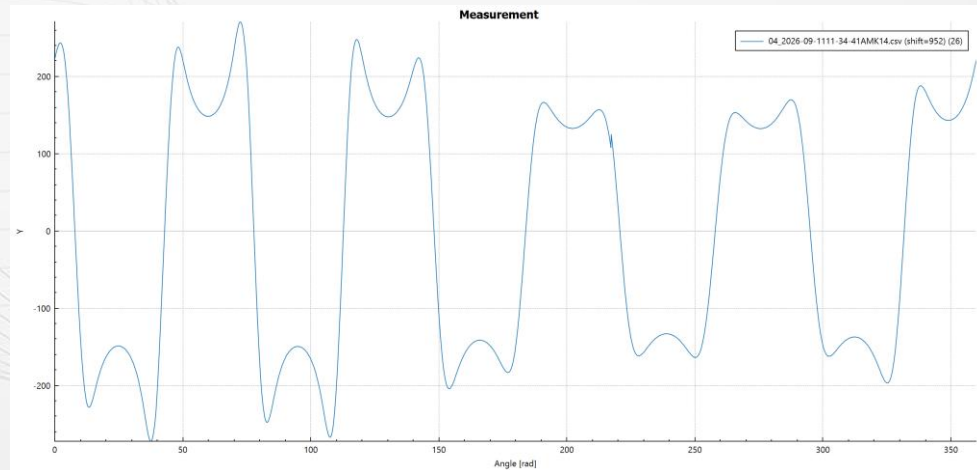
Comparison of rotor sample against reference



- Individual sensor lines choosable
- Grouping of neighboring sensors into one measurement profile with one click
- Visualization of deviation from reference for each sample directly available – color coding can be customized
- Areas of significant deviation easily spotted

MHLS | new analysis software development

Comparison of rotor sample against reference



- Software algorithm will detect clear outliers and mark those
- Sample is showing both high- and low-magnetized poles, highly inconsistent assembly
- Visualization of deviation from reference for each sample directly available – lower magnetization with smaller deviation from stated reference
- Areas of significant deviation inconsistently distributed

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Comparison of rotor sample against reference

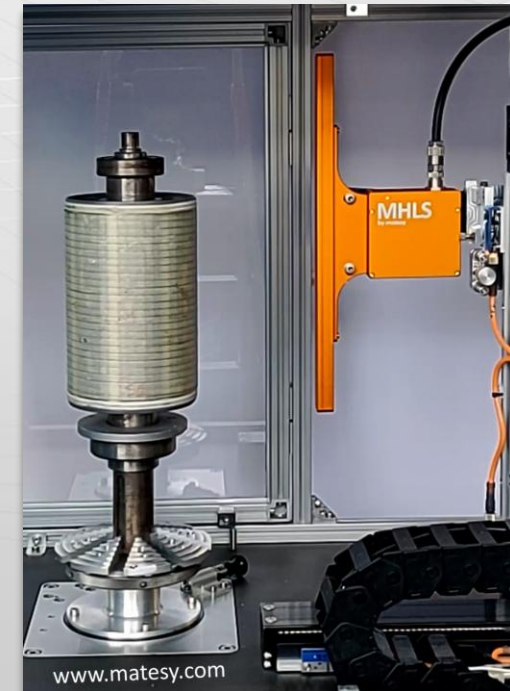
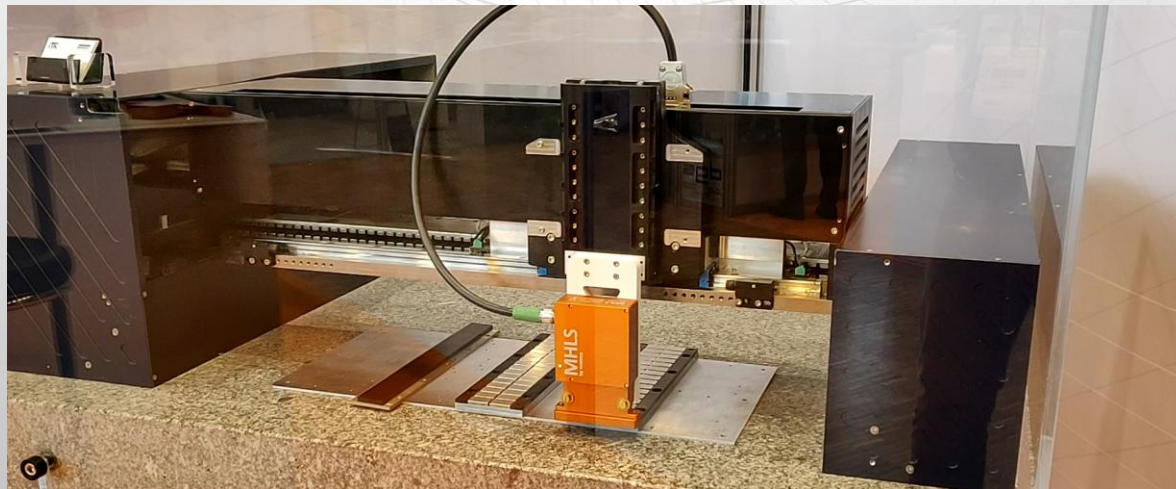
	Shift	Pole [%]	Avg Q [%]	StdDev Q [%]	Min Q [%]	Max Q [%]	Outside [%]	Mean Violation [%]	Max Violation [%]
01_2026-09-1111-24-59AMK11.csv	2395	48,5938	-3063,72	3011,39	-77639,4	100	97,4115	3146,41	77639,4
02_2026-09-1111-50-09AMK12.csv io	0	100	42,629	36,5499	0	100	0	0	0
03_2026-09-1111-28-59AMK13.csv	2392	49,6875	-3223,13	3148,04	-80236,5	100	97,4401	3309,13	80236,5
04_2026-09-1111-34-41AMK14.csv	952	19,6875	-2497,76	2656,26	-56220,1	100	97,6563	2558,82	56220,1
05_2026-09-1111-36-41AMK15.csv	469	52,0313	-2149,2	2152,63	-55491,2	100	94,7839	2270,26	55491,2
06_2026-09-1111-38-40AMK16.csv	2397	51,25	-2210,99	2151,3	-55084,6	100	95,8646	2308,56	55084,6
07_2026-09-1111-42-30AMK17.csv io	483	100	35,0687	35,6637	0	100	0	0	0
08_2026-09-1111-44-31AMK18.csv io	958	100	29,4539	34,2917	0	100	0	0	0
09_2026-09-1111-46-18AMK19.csv io	476	100	35,9027	36,8177	0	100	0	0	0
10_2026-09-1111-48-09AMK110.csv io	476	100	34,0422	35,1966	0	100	0	0	0

- Overview of agreement of measurement data with reference directly available
- Max & Min defined by spread of OK parts here, can be set as target value with simulated references as well
- How much of the measured data is outside the specification?

MHLS | new analysis software development

Next steps:

- Automated object detection
 - Vector analysis tools
 - User-friendly pre-settings and result protocols
- Automated batch processing



The background features a light gray gradient with a series of thin, overlapping, wavy lines that create a sense of motion and depth. In the top right corner, there is a solid green curved shape that resembles a stylized arc or a portion of a circle.

Thank you!

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Matesy GmbH

Magnetic Technologies & Systems

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