

## Eddy-current array inspection system for carbon fiber materials

The high-frequency eddy current array system from the EddyCus<sup>®</sup> Pro-II series can solve many unconventional NDT problems. This powerful and modular system is suitable for integration into a production line for automated inline non-destructive testing of flat materials. The system characterizes the material in a non-contact manner without damaging it and integrally captures conductivity information in real time, achieving high resolution with freely configurable sensor orientations and measurement frequencies. This performance is made possible by combining multiple discrete eddy-current channels with sensor-integrated multiplexers and a powerful edge server for data analysis.

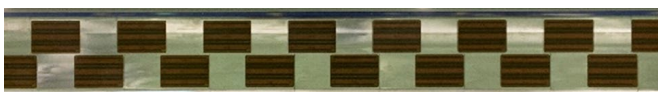
The system can be used to characterize individual carbon fiber layers and thin films in terms of layer thickness, sheet resistance, impurities, delamination and other conductivity-based defects..

### Applications

- Inline production monitoring up to 101" width during the production of NCF plies (gaps, undulations, ply build-up, inclusion of foreign material) especially in hidden and non-visible layers
- Inline monitoring of layer and wall thicknesses and electrical layer resistance of high and low conductive layers on wafers, battery-foils, conductive coatings on glass and plastic in nanometer resolution



Possible defects during NCF production: Gaps, overlapped tows, fringes.

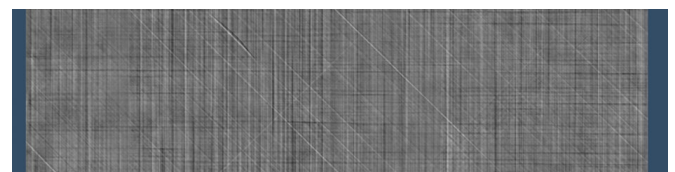


EddyCus<sup>®</sup> Pro II ECA measurement bar for 101" inspection width, stacked sensor arrays.



### Characteristics

- Cascadable system with channel multiplex rate of up to 100 KS/s
- Consisting of 4 EddyCus<sup>®</sup> Pro-II devices and 12 array sensors
- Up to 30 MHz eddy-current excitation frequency with integrated multiplexer
- Maximum pixel resolution: 0.85 mm
- ATEX-compliant for zone 21
- Temperature compensation
- Data analysis and system control through included edge server
- Optional Ethernet-based OPC-UA for smart factory applications
- Analogue and digital I/O for communication with production line
- Algorithms for automated calibrations especially for inhomogeneous and anisotropic materials like NCF (Non-Crimp-Fabrics)



101" width eddy-current C scan..

## EddyCus® Pro II ECA Details

Category	Characteristics	Value
General	Dimensions (L, W, H)	5500 x 2220 x 300 mm
	Weight	270 kg
	Operating temperature and humidity range	5...50 °C @ 75 % relative humidity (non-condensing)
	Maintenance	sensor detachable from stand
Interface	Power supply	230 V AC, max 500 W
	Pressured air requirement	4 bar – 10 bar
Measurement system  patented sensor technology: DE 10 2010 048 917 B4 2016.12.01	Eddy-current channels	4*
	Signal frequency	up to 30 MHz
	Analog gain	20 dB to 60 dB
	Array sensors	12 @ 101" inspection width*
	Vertical sensor channels	256 per array, 3072 in total*
	Horizontal sensor channels	64 per array, 768 in total*
	Image resolution	0.85 mm in width
	Inspection speed	6 m/min at max. resolution, higher speeds possible if lower resolution suffices*
Testing capabilities	Gaps / overlaps of NCF plies	+/- 0.25 mm accuracy
	Angular orientation of NCF plies	+/- 0.1 ° accuracy
	Undulations, plie build-ups and other anomalies in NCF plies	detectable above 1 cm <sup>2</sup>
	Foreign object (metallic) in low conductive materials	detectable above 0.25 mm <sup>2</sup>
	Layer and wall thickness of thin films	10 nm – 10 µm accuracy, depending on conductivity of material
	Additional inspection tasks	can be developed on customer request
Edge server	Dimensions (L, W, H)	600 x 800 x 2000 mm standard control cabinet
	Hardware	High performance 8-core industry PC, 32 GiB RAM, SSD drive*
	Connection to measurement system	Ethernet, +24 V DC
	Storage for measured data	network drive, S3*
	Interface for factory integration (optional)	OPC-UA
	Options for communication with production line	digital I/O, OPC-UA, Ethernet-based communication*
Software	Windows-based software which controls the system, runs data analysis and stores results, can also be used for offline analysis	
	Support for different measurement profiles from which up to 4 can be used at the same time	
	Creation of analysis PDF reports	
	Managed .NET SDK based on .NET 4.8 available which may be used for custom applications	
System conformity	The EddyCus® PRO-II system meets all relevant requirements of DIRECTIVE 2014/34/EU	
	ATEX Zone 21 compliant	

\* The given values can be tailored to meet the customers' requirements. Distribution and copying of this document, utilization and reporting of its contents are prohibited – even in parts – if not explicitly allowed.

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