MatchID
Metrology beyond colors

January 2021

Newsletter 2021/1

A year to remember

2020 was one of a kind. Who would have thought that our first successful participation to the IMAC conference in Houston also would be our last live interaction with potential leads and customers for a very long period. Strange times indeed, as much as they have showered us with opportunities, many conferences went for a virtual format (ESAFORM, SEM, IDICS, …) that taught us the possibility to watch and interact at custom time slots, avoid difficult parallel sessions choices, etc. We hope that these organizations will continue to integrate these online possibilities by default for future events when normality is brought back to the world. Notwithstanding we miss the social interactions and hope the dust will settle soon enough.

Despite the COVID-crisis, MatchID as a company was gifted with an exceptional 2020 knowing a substantial growth of 38% in turnover, margins and licenses. It goes without saying that we owe it to the confidence and support shown by all of our loyal and new customers. This extra financial leeway will be fully invested into MatchID, our products and extra personnel.

This already led us to introduce our new 2021.1 release with substantial algorithmic performance improvements and two brand-new modules for crack opening and operational deflection shapes determination. Both are freely provided within a standard MatchID license. More new features are summarized further on.

Finally, we are very proud to officially announce the inauguration of our OEM partnership with Siemens Digital Industry Software. Our solutions for optical measurements, material identification and FEA validation are seamlessly integrated with the Simcenter platform. In this scope, MatchID will be worldwide offered and supported via the broad and qualified Siemens network to both academics and industry. This will not only give us the opportunity to broaden our horizons commercially, but also to improve within a plethora of unexplored and challenging application areas. Moreover, it underlines our ambition of bridging the gap between test and simulation.

With this hopeful message we are looking forward to a more enjoyable 2021!

-The MatchID Team

MatchID now officially partners globally with Siemens Digital Industry Software. From left to right: P. Lava, B. Peeters and M. Tartaruga

In This Issue

MatchID 2021.1

What's new?

MatchID 2021.1 is out now! Considerable performance optimization reduces processing time by a factor of four. Next, we offer you the following new features:

Free ODS-module

Standard integrated operational deflection shape module enabling quick FFT analysis of your DIC results.

Calibration

Full batch-mode detection and calibration: calibrate over 100 images in several seconds.

Exporting

Geometry: *.stl export to directly import into CAD/ CAE environments.

Simcenter Testlab: *.ldsf, *.map and *.unv

Free crack module

Crack opening displacement quantification.

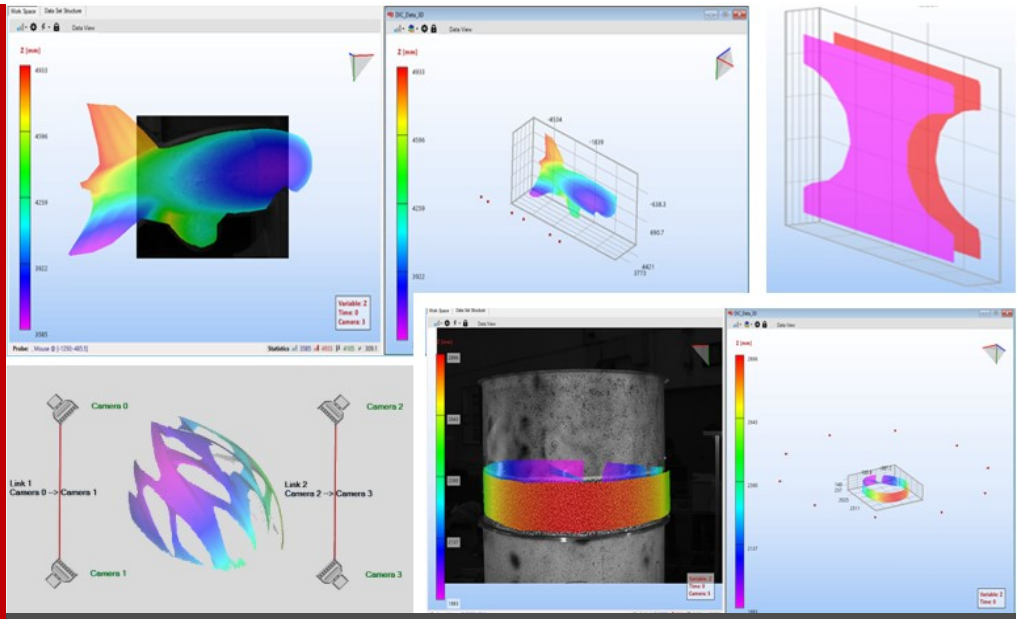
Stress models

Integration of anisotropic hyperelastic material models for stress reconstruction and VFM: generalized Fung, Anisotropic HGO, Eight-Chain and Bisschoff.

Image Grabbing

Biaxial extensometers for real-time DIC cross correlation and calibration.

Sawtooth and hysteresis strategy to improve vibration and fatigue triggering.



Our multi-camera solution can be adopted when 2 cameras are insufficient: (1) to extend the field of view (zeppelin) (2) to cover 360° (pressure vessel and helmet) (3) for back to back strain measurements

Module in the picture: Multi-Camera DIC

Often, experimental conditions require the usage of more than two cameras, e.g. when large objects need to be monitored or a 360° data coverage is imposed. This is a so-called multi-camera approach which is basically an extension of a standard stereo correlation process.

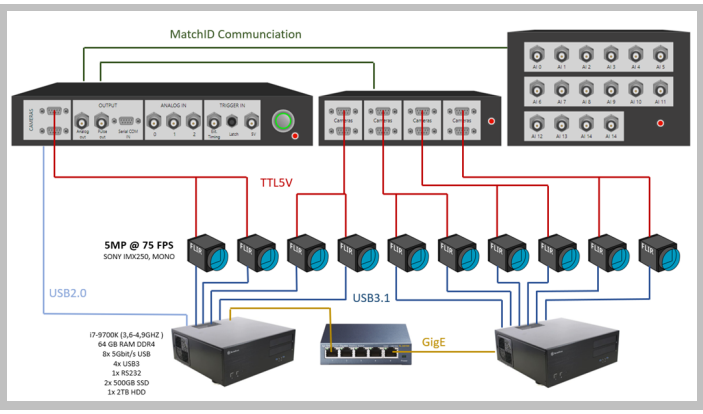
Via our multi-camera module, **we succeed to combine data from an infinite amount of cameras within one global coordinate frame** and upgrade the applicability of stereo DIC to more demanding applications. Our custom made trigger box guarantees an optimum synchronization and allows each camera to operate at its maximum performance.

How does it work?

Every camera is calibrated individually to compensate for intrinsic artefacts (lens distortions, focal lengths, …) and relative w.r.t. one master camera to arrive at a global world coordinate frame. Next, multiple stereo correlation processes determine shape and displacements expressed in this global frame. Hereby, camera's can be linked via a chain, a ring or a 2 by 2 configuration depending on your specific application.

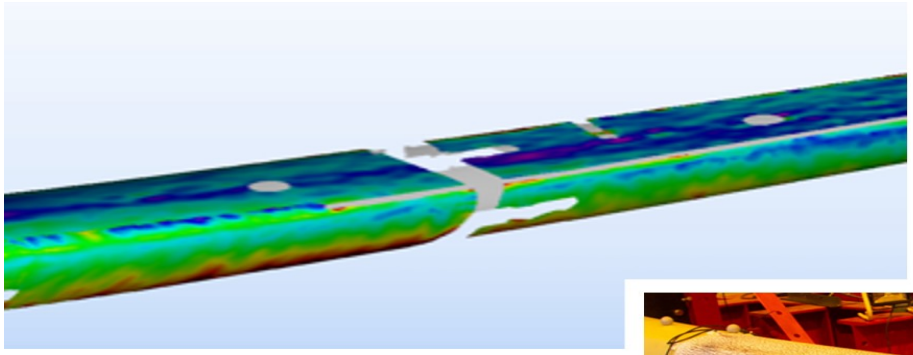
What are the benefits?

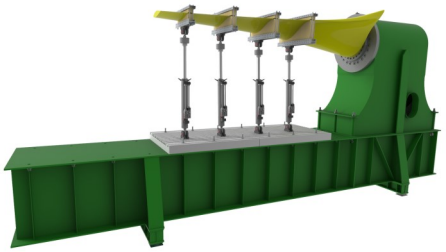
- **No overlapping speckled regions needed:** full flexibility in regions of interest selections and camera setup
- **No identical cameras needed**: various camera protocols and resolutions can be combined within one system setup.
- Direct integration within our modular structure for modal analysis and FEA validation.

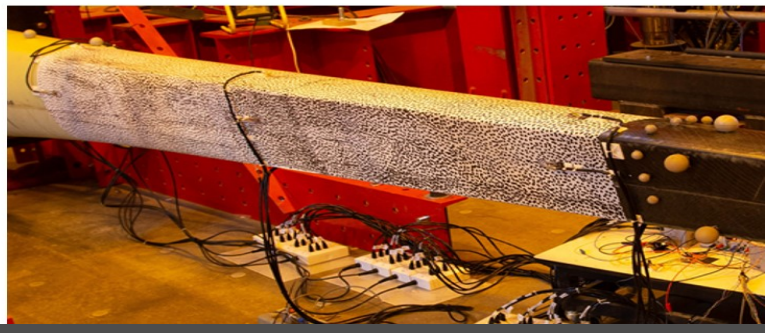


Our custom made trigger box, camera and signal break-out units guarantee an optimum camera and signal synchronization.

Multiple work stations operating in a master-slave configuration can be invoked to facilitate image flushing and data storage to a maximum extent.







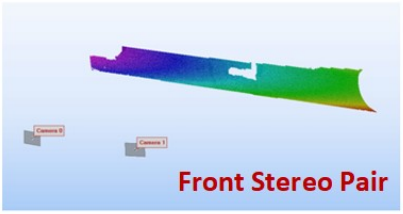
The FASTBLADE team at the University of Edinburgh tested a sample section of a torsion box from a prototype scaled wind turbine blade. The test was recorded by 6 cameras over its entire perimeter at various loading conditions.

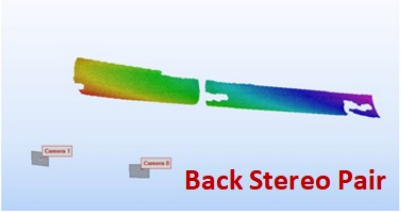
Application in the picture: A 6m wind turbine blade

The FASTBLADE team at the University of Edinburgh has successfully trialed and will adopt our Multi-Camera DIC solution for structural testing. FASTBLADE is the world's first test facility that uses regenerative hydraulic technology to offer high-quality, low-cost fatigue testing of tidal blades and other composites structures for research and product development.

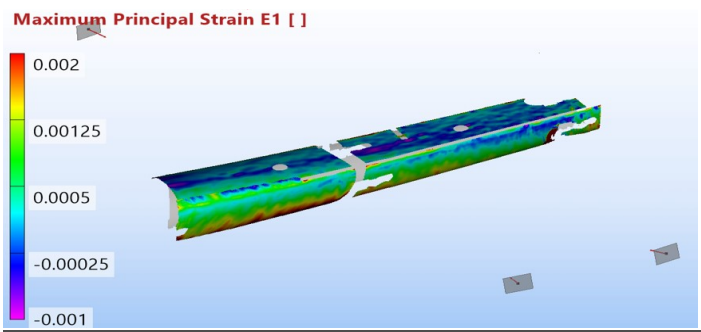
The turbine prototype is placed in a test bench. The root is clamped with a special designed fixture to guarantee minimum slippage. The loading is imposed by using a double-acting hydraulic actuator from a location close to blade tip. The actual force is recorded via a load cell. Strain gauges are placed at various locations in both the longitudinal and radial direction. **6 DIC cameras** record a 2.5m sample section of the blade to extract full-field shape and deformation data during the entire event. This corresponds to 3 different stereo systems that observe different sides of the turbine blade. No overlapping prerequisites are put onto the various stereo pairs. They can be completely disentangled in space. To reconstruct the 3D shape, all cameras are simultaneously calibrated. Finally, the geometric data of the stereo systems are combined into one general frame containing the actual shape at various load steps. **All signals are synchronized** with the DIC images via a dedicated hardware protocol.

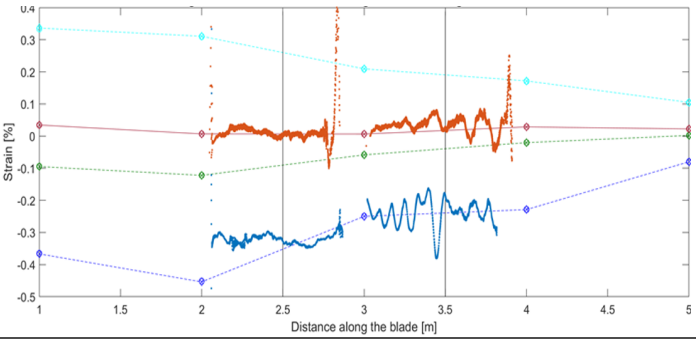
More information: https://www.fastblade.eng.ed.ac.uk/





"MatchID's support and unique multi-camera solution is a game changer for FASTBLADE and will be critical to our testing service as it enables us to offer large scale contactless strain monitoring in full 3D. "
Dr. J. Steynor - The University of Edinburgh





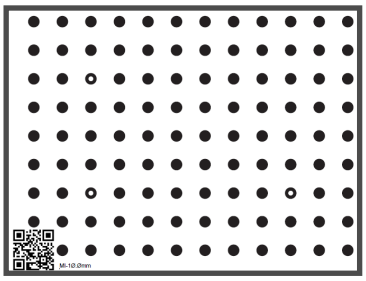
First principal strain of the blade section. A successful comparison between the strain gauge data (diamonds) and DIC strain along an extracted line is made. Thanks to DIC, the irregularities and non-linearities in strain are clearly revealed. This gives the engineer more profound insights on how to optimize the overall construction without the need of pre-knowledge where to inspect.

NEW Calibration targets:

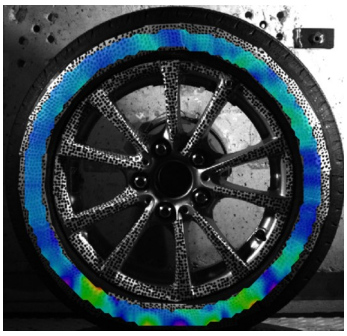
Our new ceramic calibration targets come with a higher accuracy, flatness and temperature resistance and embed a QR-code for automatic configuration detection.

Available in various sizes and double-sided.

Contact info@matchid.eu for more information.



TireNVH project



The goal of this recently approved 1.5M euro Flemish funded project is to improve both structure-borne and airborne tire noise prediction capabilities by creating novel test and simulation solutions and as such, support automotive OEMs and tire manufacturers for their vehicle NVH assessment and design, particularly in response to increasing importance of rolling noise in the electrification era. A hybrid approach will be adopted via integration of test and CAE tools for the capture of various stages of the rolling noise transfer chain. In this project, our main objective is twofold: (1) benchmark our multicamera DIC solution for sidewall 3D vibration measurements of rotating tires (2) make profound FEA validation studies via our FEVAL module.

www.vlaio.be - HBC.2018.2266

Announcements

- ***Virtual DIC Course,*** 25th-29th January 2021. The entire program and concept remains valid with dedicated online Q&A sessions. Lab sessions will be organised in groups of two with real-time support and guidance. Completely filled.

- **Webinars and T&T sessions:** also in 2021 we will organize various webinars and dedicated tips and tricks sessions. Please keep an eye at our website or send an email to info@matchid.eu to subscribe to our news channel.

- **Vacancy!** Given our continuous growth, we are currently looking for a motivated technical sales engineer to join our young team. Do you have a master's degree in engineering (mechanical, construction, biomechanical, science…) with a commercial mindset who wants to be the direct link between customers, our partners and our technical division - Apply now!

- **Published!** *Validation of finite-element models using full-field experimental data: Levelling finite-element analysis data through a digital image correlation engine. .P. Lava, E. Jones, L. Wittevrongel, F. Pierron (2020). Strain, 56 (4)*

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