Newsletter 2023/2

Crossing the Atlantic

Our shift from the startup to the scaleup stage has recently taken a giant leap via the incorporation of our second subsidiary, MatchID US Inc. The commercial strategy is clear: it allows us to establish a larger footprint in this considerable DIC market. The physical presence of a local representative who combines technical knowledge with business development skills, however, is a clear prerequisite to make this adventure a success story. The hunt for this white bird is definitely the most critical step in this growing trajectory.

In that aspect, we are very excited that Isabella Mendoza will join this adventure as president. Isabella has a profound knowledge of digital image correlation, but also a thorough understanding of our unique selling points as the Virtual Fields Method for seamless material identification. Hence, this will additionally enable us to provide high-level application support to our already established US customer base and the new leads wanting to join the MatchID community.

US-based and interested in our products and solutions? From now on, Isabella will be your first contact point.

Apart from this exciting news, the past few months have been quite intense for the MatchID team. The growth of our development team translates into a plethora of novel features, amongst which the auto masking tool and the Equilibrium Gap Indicator are two prominent ones. These features are the result of dedicated user feedback and were introduced and intensively discussed at our second user meeting, hosted at our new UK premises. A very successful event where we welcomed more than 60 MatchID adopters from all over the world!

Finally, a warm thank you to the CertTest team of the University of Bristol and the NIL team of the University of Southampton, led by Prof. J. Barton and Prof. O. Thomsen for sharing us insights on how they adopt MatchID's multicamera solution and IR-integration for model validation on large structures. Enjoy the reading!

-The MatchID Team

In this issue

- Crossing the Atlantic
- Auto Mask Tool, a new MatchID feature
- Application in the picture
- MatchID expands to the USA
- User meeting
- Meet the team



We are expanding globally! Apart from our distributors indicated in blue, MatchID US inc. & MatchID UK Ltd. were recently founded.

MatchID 2023.2

What's new?

MatchID 2023.2 is out now! We are thrilled to present you the efforts of 6 months of work resulting into a set of versatile new features, amongst which:

Extension of supported cameras:

Our grabbers now additionally support Basler and Photron cameras.

Auto masking:

Flexible and fast extraction of the region of interest. More information in this newsletter.

FEA Validation fully integrated in results:

All post-processing options can now be directly invoked for your simulation validation.

Equilibrium Gap Indicator:

This unique feature allows to check for local stress equilibrium. Hence, one can rank constitutive model performances.

<u>New optimizer in the</u> <u>VFM:</u>

A Levenberg-Marquardt optimizer has been integrated providing faster convergence of material model identification.

Image averaging:

A separate and more flexible module to average images is integrated in order to reduce the noise floor when applicable.



Example of auto mask in a lattice structure. Auto mask can save several minutes of ROI editing!

Auto Mask Tool, a new MatchID feature

There is no doubt that some experimental applications require the use of complex-shaped specimens. Due to complex geometries and discontinuities, the construction of the Region of Interest (ROI) can be a time-consuming task. For instance, let us take a lattice structure, where multiple unspeckled areas should be cropped out of the ROI. Such procedure can take up to 20 minutes of ROI editing. To overcome this problem, MatchID has recently implemented an Auto Mask Tool to automatically detect the



ROI based on the speckled region of the specimen, avoiding time-consuming ROI construction. In addition, the user can set the level of masking by using an intuitive interface. Back to the lattice structure example, **ROI can now be detected in seconds using the Auto Mask Tool**. More details on how to use this tool can be found on our Wiki page and on <u>YouTube</u>. The feature is accessible via the UI and in batch mode. *MatchID is actively working to improve our customer experience!*

How does it work?

The Auto Mask Tool is based on **image gradients**. We use a combination of functions to **calculate the mask** and a **threshold algorithm** to identify the optimal mask. The threshold value can be easily adjusted by the user. Another advantage is that the auto masking does not necessarily operate on the entire image, but on **separate regions** in the field of view that can each have **different speckle pattern properties**.







Via Digital Image Correlation (DIC) and Thermoelastic Stress Analysis (TSA), the combined effect of web shear loading and local cross-section deformation on the mechanical response and failure behaviour of a composite wind turbine blade spar cap to web T-joint was investigated.

Application in the picture: Multiaxial testing and imaging of wind turbine blade spar cap to web T-joint

Research led by the University of Bristol in collaboration with the University of Southampton has developed and commissioned a new modular, multiaxial testing rig kit called **Structures 2025 (SS25)** funded by the Engineering and Physical Sciences Research Council (EPSRC) Strategic Equipment Grant Scheme (EP/R008787/1). SS25 enables full-field imaging techniques to be applied to structures through multi camera techniques. In that aspect, SS25 adopts MatchID's DIC system, as well as thermal imaging for Thermoelastic Stress Analysis (TSA), and hybrid testing capability. SS25 is currently being used in an EPSRC Programme Grant led by University of Bristol called "Certification for design: reshaping the testing pyramid (CerTest EP/S017038/1)". A new **three-axis subcomponent test** investigates the combined effect of web shear loading and local cross section deformation on the me-

"We are looking forward to using MatchID's FEDEF and FEVAL tools for the fusion of experimental and modelling data from large structures."

Professor Janice Barton - University of Southampton and University of Bristol

chanical response and failure behaviour of a **composite wind turbine blade** spar cap to web T-joint. The representative subcomponent load case was extracted from a **Finite Element (FE) model** of the full blade subjected to inservice loading. Digital Image Correlation (DIC) and Thermoelastic Stress Analysis (TSA) were employed to capture the complex deformation of the T-joint specimen. MatchID's **multicamera DIC system** was selected to overcome limitations of a single stereo DIC system in imaging the threedimensional structure. The novel loading and imaging procedures were developed and demonstrated on a "dummy"



steel T-joint specimen before application to the composite specimen. MatchID's FEDEF procedure relying on synthetic image deformation and virtual test setups has turned out to be a crucial step in understanding and disentangling the uncertainties in the DIC measurement chain, including but not limited to speckle quality assessment, quantification of heat waves and overexposed pixels. In a next step, the levelling approach of MatchID will be adopted to fuse experimental and modelling data from large structures.

Investigator team: Professor Janice Barton (PI Structures 2025), Professor Ole Thomsen (PI CerTest), University of Bristol, Dr Steve Boyd (CI Structures 2025), University of Southampton. The CerTest research team: Dr Tobias Laux, Dr Jack Callaghan, Dr Riccardo Cappello, Dr Geir Olafsson, University of Bristol. NIL technical team: Dr Andrew Robinson NIL Facility Manager, Dr Duncan Crump LSTL Principal Experimental Officer, University of Southampton.









MatchID expands to the USA

Truly thrilled to announce that MatchID US Inc. has been incorporated! On top, we are very excited that Isabella Mendoza will join this adventure as president. She will be entering MatchID upon completing her PhD in Mechanical Engineering at the Colorado School of Mines (USA). Her research heavily utilizes 2D and 3D digital image correlation (DIC) to characterize the dynamic behavior of anisotropic materials. More recently, her work has been focusing on characterizing impact fatigue damage in carbon fiberreinforced polymers for naval applications using the Virtual Fields Method (VFM) and Equilibrium Gap Indicator (EGI).



Isabella will be California based, but you will be able to find her at numerous exhibitions and conferences all over the US. She will be happy to help you composing the software and hardware stack you need, based on your application and objectives.

We are proud to welcome her into the MatchID family!

User meeting

Last February, we successfully hosted our second global user meeting. Over 60 MatchID users from around the world gathered in Southampton to be trained and share their expierences. We took the opportunity to share our vision, listen to our customers and learn how they apply MatchID in their various applications. On top of that, we officially inaugurated our UK office during the event.



Meet MatchID at:

- T&T sessions: short 20 min sessions to improve your MatchID product knowledge:
 - \Rightarrow 13/09/2023 T&T 2 - Model validation integrated in a results analysis.
- Webinars: a 45 min-journey to a specific MatchID product illustrating its capacities towards a large range of applications
 - 8/11/2023 Webinar 2 Light, filtering and myths \Rightarrow
- Conferences and expositions:
 - ESB Maastricht, The Netherlands 09/07/2023 \Rightarrow
 - EMex23 Glasgow, UK 30/08/2023 \Rightarrow
 - ICTP Nice, France 24/09/2023 \Rightarrow
 - IDICS Fukui, Japan 09/10/2023 \Rightarrow
 - \Rightarrow DYMAT Colmar, France - 27/11/2023

Metrology Beyond Colors Newsletter 2023/2

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