MatchID
Metrology beyond colors

February 2023

Newsletter 2023/1

Our first abroad subsidiary

About a year ago, in our first newsletter of 2022, we announced to be ready to gradually shift from the startup to the scaleup stage. Since MatchID achieved significant growth of over 30% last year - four times in a row! - we could gradually start realizing that ambition.

First, our local team has been expanded with two bright and ambitious persons both having a PhD in our expertise field. João will assist to expand our supported camera branch range, develop novel DIC and analysis strategies, and improve our capacities w.r.t. fracture mechanics. Amar will become a very valuable team member supporting our unique material identification engine and facilitating the integration with third party finite-element analysis packages. Welcome to the family, guys!

Next, our hardware solutions have been considerably improved by turning them into a more modular and versatile structure. This will allow to address more flexibly our customer needs and budget. You can discover the steps we have taken in the next page.

On top, important initiatives have been undertaken from a business growth perspective. We are very proud to have setup our first abroad subsidiary, MatchID UK Ltd. The goal is of course to get a larger footprint in the UK market, but also to support R&D and research labs more actively. Via our close connection with the University of Southampton, we even hope to develop novel strategies in the field of high-speed imaging, deflectometry, etc.

The inauguration of MatchID UK Ltd will go hand in hand with our second user meeting. This two-day event, gathering more than 60 people from all over the world, will show our customers and potential leads how MatchID is adopted in various applications via key-customer testimonials. Listening to our audience will allow to fine-tune our development roadmap and brainstorm on collaborative R&D projects.

Finally, we are thrilled to announce our new distributor MECATEST. Stéphanie Sailly, brings a wealth of experience in material testing via her close connection to MTS test machines. Accordingly, we are confident to have found a very good and reliable partner to distribute our products in France and to convince the community about material testing 2.0!

-The MatchID Team

In this issue

A visit to our first abroad office, located in the Southampton Science Park, UK.

MatchID 2023.1 what's new?

MatchID 2023.1 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:

Integration of standards:

- VDI/VDE 2626 procedure for DIC precision quantification.
- ISO6892-1 for curve fitting and basic parameter identification of uniaxial tensile tests.

Both come with automatic report generation.

Consecutive transformations:

Coordinate transformations can be grouped together and imposed as one general transformation, resulting into only one new dataset.

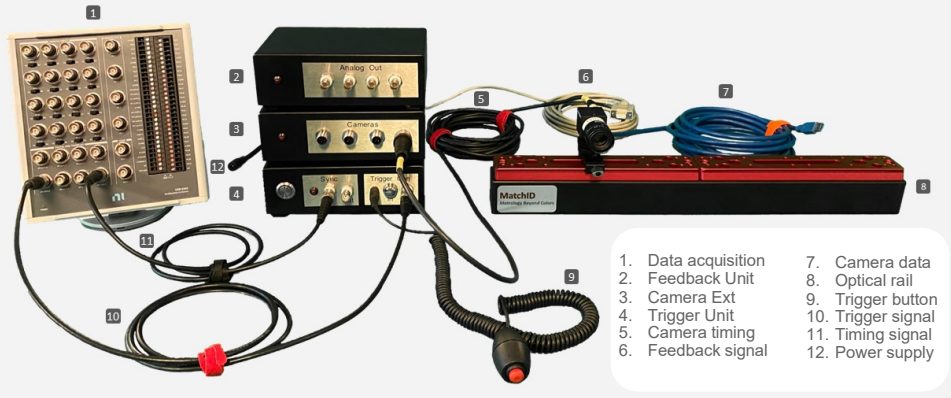
Temperature data procedure:

Improved **temperature data procedure** now coming with a dedicated calibration plate visible in both the visible and infrared spectra.

Data reduction functionality for all non-linear VFM procedures:

A coarse search followed by a refinement procedure considerably reduces computation time.

Data Acquisition **MatchID Units** **Imaging Hardware**



Our new hardware has a more modular structure and accordingly can be easily adjusted to your needs and budget.

New MatchID hardware in the picture

MatchID Units

The in-house developed MatchID Units are a central hub for a successful experiment. Accurate timing of the images during a DIC experiment is crucial. The units ensure synchronization of all involved cameras and analog signals with high accuracy.

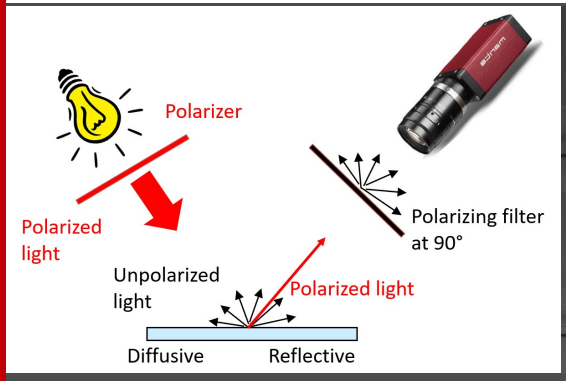
The MatchID Trigger Unit is used **to control the timing triggers**, originating from the timing device and fed into to the machine vision cameras. A generic interface is provided making the Trigger Unit compatible with all our supported machine vision camera brands. Currently Allied Vision, Teledyne Flir, Daheng Imaging are supported, with Bassler cameras to be added soon. Additionally, an output signal is provided to allow controlling an external device with the same timing accuracy.

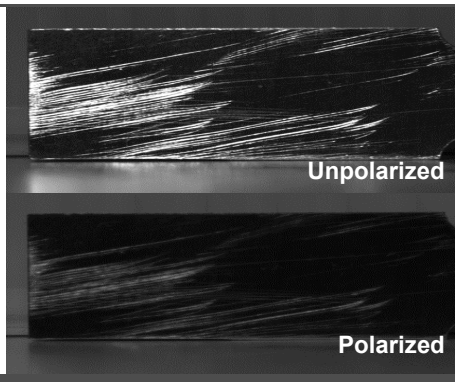
The default Trigger Unit can support up to four cameras simultaneously but can be easily extended when required for a more elaborate multicamera setup. The **number of cameras can be expanded** using MatchID Camera Extension Units.

With the MatchID Grabber, **real-time DIC data can be exported** to control your process using a digital communication channel. If an analog signal is preferred over a digital one, the Feedback Unit can be used to convert the digital signal to an analog one.

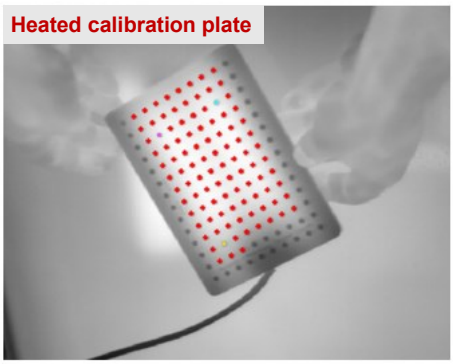
New LED lights with polarizers

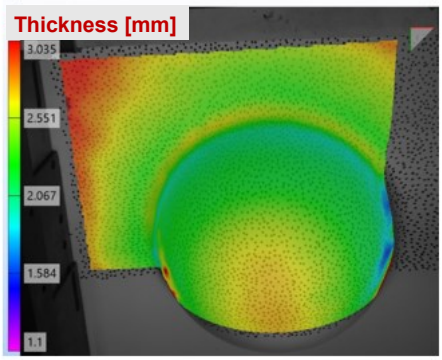
A set of LED lights are provided for optimal contrast in DIC experiments. The MatchID lighting system features two LED lights that each produce 3000 lumens. By changing the lenses, the beam angle can be adjusted from 15° to 60° to accommodate different specimen sizes. The lights are equipped with linear polarizers which, in combination with polarized lenses, **help to reduce specular reflection** yielding a flat, sharp image for optimal DIC results.

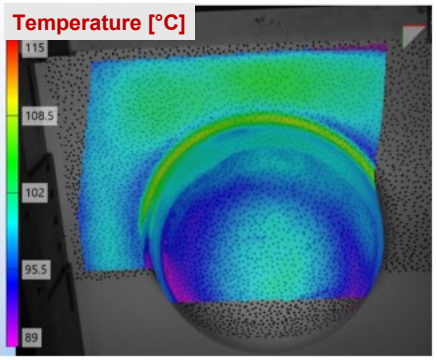




Polarizers help to reduce specular reflection in a DIC experiment.







Via a special heated calibration plate visible in both the visible and infrared spectra, DIC mechanical fields (thickness variation) and temperature data can be adequately aligned.

Application in the picture: Optimization of a thermoplastic vacuum forming process.

A two-fold procedure is adopted to optimize this manufacturing process. First, the induced full-field DIC strain fields are invoked **to determine the thickness variation** and reduction while vacuum forming, hereby relying on the principle of volume conservation. In the past, this used to be a labor-intensive manual procedure. Accurately determining the strains on a highly bulged shape is a challenging task, requiring not only a large depth of field but also a relatively large stereo angle. On top, the induced curved geometry makes the surface easily suffer from specular reflection hampering the correlation process. By using polarizers on both lenses and light, saturation could be reduced to a minimum.

Next to thickness reduction monitoring, the adequate **alignment of full-field DIC and temperature data** is a key objective to understand and optimize the forming process. Typically, visible and infrared (IR) cameras have completely different optical characteristics in terms of sensor resolution and optical distortion. In order to initiate the thermal mapping, one needs to link geometrically the IR camera and the two visible cameras. To this purpose, a procedure is used that is generally adopted to calibrate the DIC system, relying on a flat calibration plate with a regular grid of points. In this case a special heated glass calibration plate is employed that shows in both the visible and IR spectra. During the test, perfectly synchronized images are captured. The DIC algorithm reconstructs the geometrical shape hereby providing (X,Y,Z) and deformation info at every data point. Via the adopted calibration strategy, the (X,Y,Z) locations can be reprojected into the sensor plane of the IR camera. As such, full-field mechanical data (thickness reduction) and temperature data are automatically mapped. This will allow to accurately validate FEA models in a next phase of the project.

"DIC and temperature mapping has become an essential toolkit allowing us to quantitatively optimize the thermoplastic vacuum forming process."

Ir. Rasoul Varedi and Dr. Bart Buffel
KU Leuven Propolis - Bruges, Belgium

Research manager Dr. Bart Buffel, describes the role of MatchID in this project as:

"The DIC system is used to better understand the occurring deformations and deformation rates in the thermoplastic vacuum forming process. As the strains are largely dependent on the local heating, the link with IR camera temperature fields is very interesting in our research. In addition to the actual production process, the DIC system is also used in a newly developed test set-up with the aim of capturing the viscoelastic material response. When we link the DIC data to FE-modelling, we can determine material model parameters that allow us to predict the actual material behavior and final wall thickness of a vacuum formed part."

The work leading to this application has been funded by the ICON project "ProPeL", which fits in the MacroModelMat (M3) research program, coordinated by Siemens (Siemens Digital Industries Software, Belgium), and funded by SIM (Strategic Initiative Materials in Flanders) and VLAIO. Both MatchID and Propolis are project partners.

MatchID is expanding

We are proud to announce that recently Amar and João joined the MatchID family. João takes the role of control and hardware integration engineer at MatchID. Prior to this appointment, he conducted research focused on the material characterization of complex soft composites using DIC and the development of 2D- and Stereo-DIC systems, including hardware and software. On top, João also has expertise in experimental solid mechanics, fracture mechanics and hyperelastic materials.

Amar previously pursued a MatchID-supported PhD, studying DIC-based finite element model validation strategies at KU Leuven. He joined MatchID as an advanced application developer. His focus is on seamless communication with third-party applications as *e.g.* finite element packages. Secondly, Amar will contribute to the development and extension of our advanced and unique material identification platform.

A new partner

Lat but not least, we are partnering with a new distributor. Stéphanie Sailly, the CEO of Mecatest, brings a wealth of experience in material testing and DIC applications. We are confident to have found a very good and reliable partner to distribute our products in France.

Meet MatchID at:

- ***DIC Course:*** *5-day course on Digital Image Correlation In Colorado*
  - ⇒ 12th–16th June 2023 - Golden, Colorado, USA
- ***T&T sessions:*** *short 20 min sessions to improve your MatchID product knowledge:*
  - ⇒ 26/04/2023 T&T 1 - Application of standards in MatchID
- ***Webinars:*** *a 45 min-journey to a specific MatchID product illustrating its capacities towards a large range of applications*
  - ⇒ 22/03/2023 Webinar 1 - Strain convergence and PA
- ***Conferences and expositions:***
  - ⇒ ESAFORM Krakau, Poland - 19/04/2023
  - ⇒ CompTest Girona, Spain - 31/05/2023
  - ⇒ SEM Orlando, USA - 05/06/2023
  - ⇒ ESB Maastricht, The Netherlands - 09/07/2023
  - ⇒ EMex23 Glasgow, UK - 30/08/2023
  - ⇒ ICTP Nice, France - 24/09/2023
  - ⇒ IDICS Fukui, Japan - 09/10/2023
  - ⇒ DYMAT Colmar, France - 27/11/2023

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Poland: invenco.pl

India: HighTechEng Equipments

OEM: sw.siemens.com

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