EASI-STRESS - EUROPEAN ACTIVITY FOR STANDARDISATION OF INDUSTRIAL RESIDUAL STRESS CHARACTERISATION

Mar 16, 2021 – OntoTrans

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This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 953219.

EASI-STRESS

Residual stresses influence many properties of a component, such as e.g.

- strength,
- fatigue behaviour,
- corrosion resistance.

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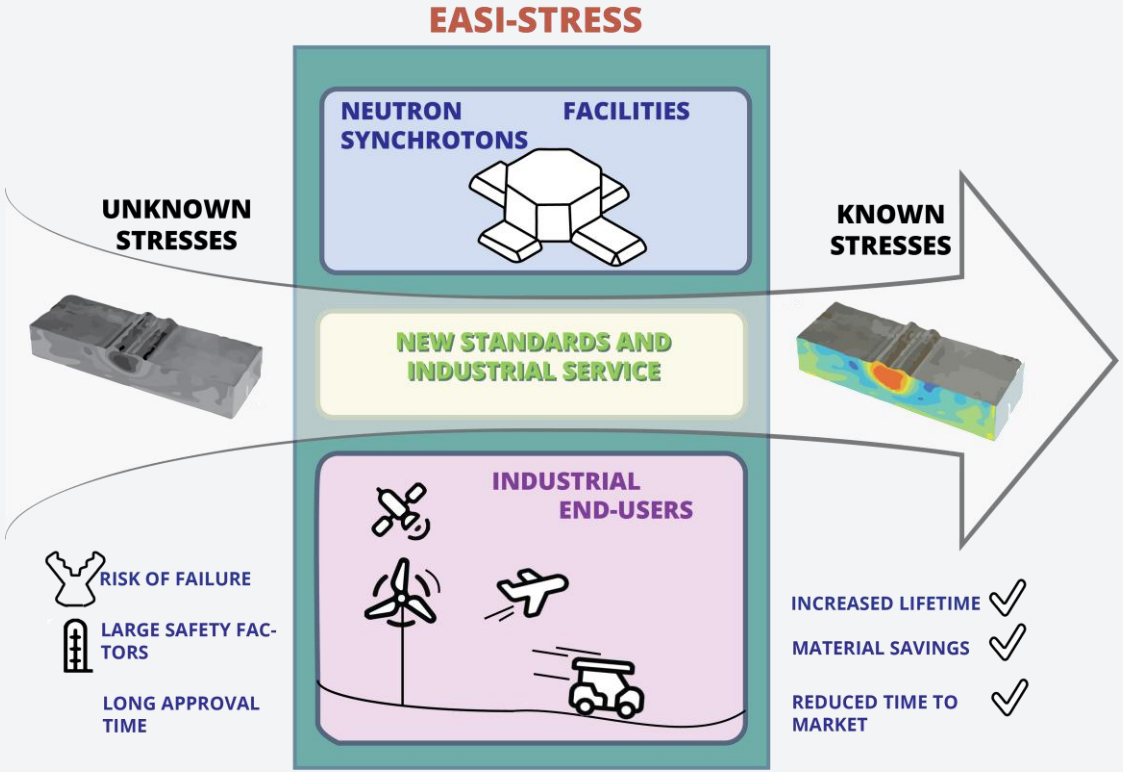
EASI-STRESS: PROJECT GOALS

- Start date: Jan 1st, 2021
- Duration: 36 months
- Budget: EUR 4.5 million



EASI-STRESS: CONSORTIUM

RTOs and Universities

DANISH TECHNOLOGICAL INSTITUTE (Coordinator)

The University of Manchester

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Advanced Research Facilities

Helmholtz-Zentrum hereon

ESRF

NEUTRONS FOR SOCIETY

Centre for Energy Research

Standardisation Body

DS DANSK STANDARD

Industry

VOLUM-e 3DComplexProduction

ArcelorMittal

OHB

Nemak Innovative Lightweighting

Rolls Royce PLC

EDF

SIEMENS Gamesa RENEWABLE ENERGY

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EASI-STRESS: CONSORTIUM

RTOs and Universities

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The University of Manches

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SIEMENS Gamesa
RENEWABLE ENERGY

MEASURING RESIDUAL STRESSES IN METALS

Choosing the right method

Destructive or non-destructive?

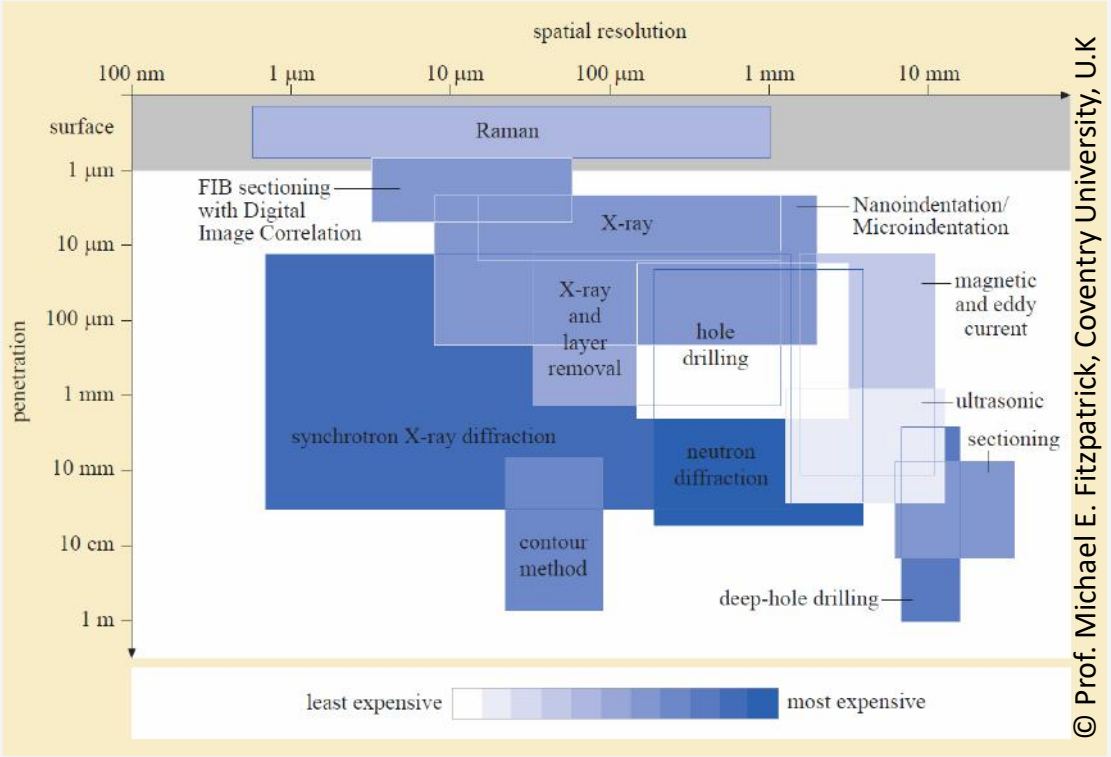
- Diffraction
- Mechanical

Relevant geometry?

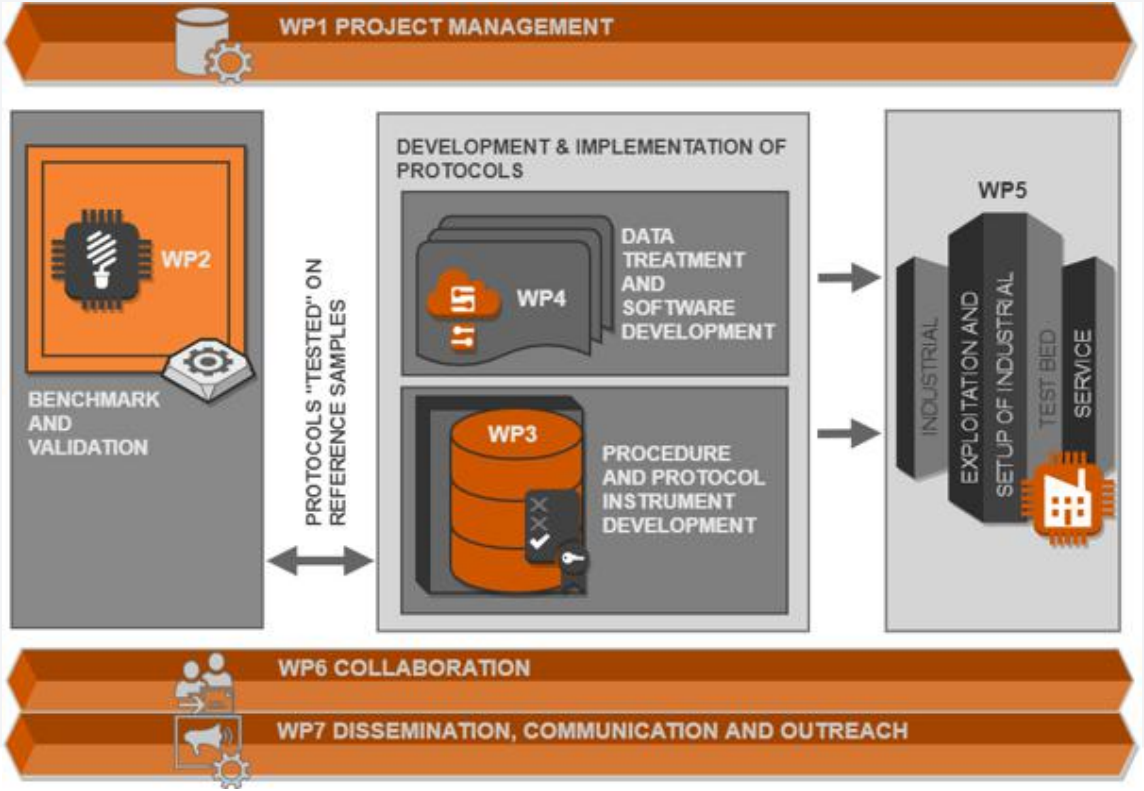
- Resolution
- Gauge depth
- Number of stress orientations

Delivery?

- Measurement time
- Cost
- Expertise/consultancy
- Material handling



EASI-STRESS: PROJECT STRUCTURE



Industry specifies output (WP5)

Language barriers and ontologies

Facilities develop methods (WP3-4)

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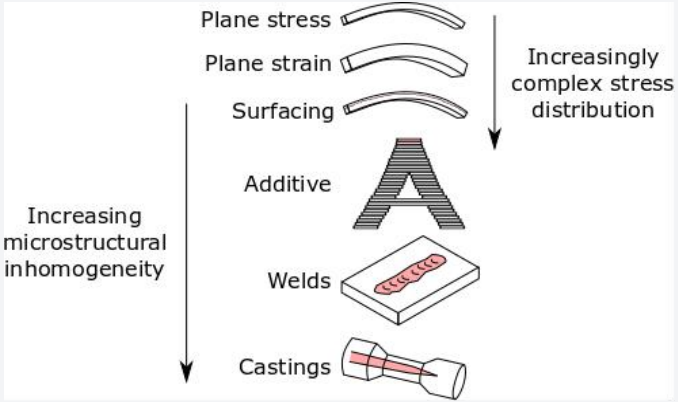
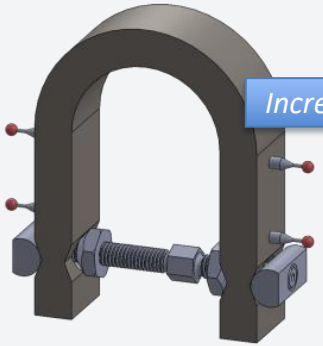
BENCHMARK SAMPLES

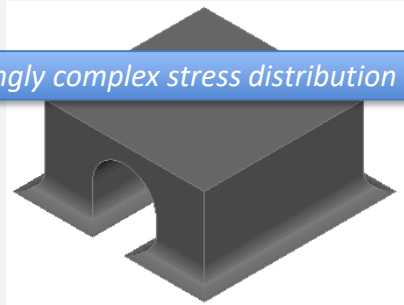
Reference samples defined:

- Benchmark different techniques (round robin samples)
- Illuminate range of challenges
- Validate applicability for standards



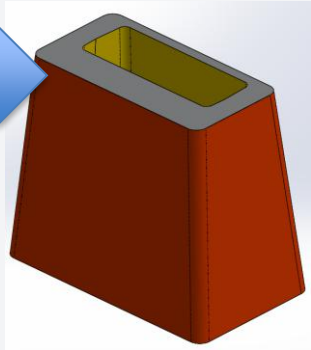


U-flexures/ U-bends (S355 stainless steel)



Additively manufactured arches (316 steel)

Inconel GTAW welded plates *(NeT project)*



Cast wedge (AlSiMg)

Increasingly complex stress distribution and microstructure inhomogeneity

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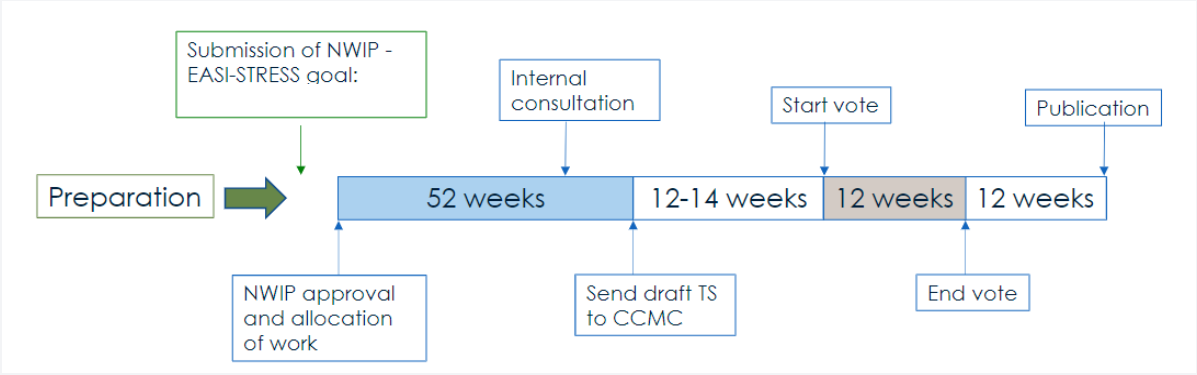
EASI-STRESS: STANDARDISATION EFFORT

EASI-STRESS will develop and implement protocols/good practice guides for neutron and synchrotron x-ray stress measurement, e.g.:

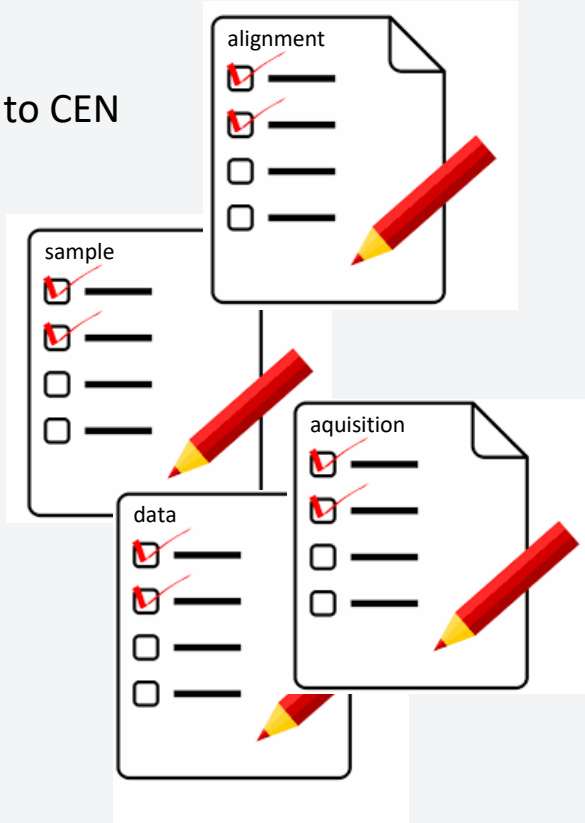
- Calibration procedure and reference samples
- Definition of sample preparation
- Homogenise data acquisition
- Guidelines for data reduction and analysis

Standards are the language of industry



EASI-STRESS: STANDARDISATION EFFORT

May 2022: EASI-STRESS will submit New Work Item Proposal to CEN WG10 on diffraction in TC 138 (Non-Destructive Testing)



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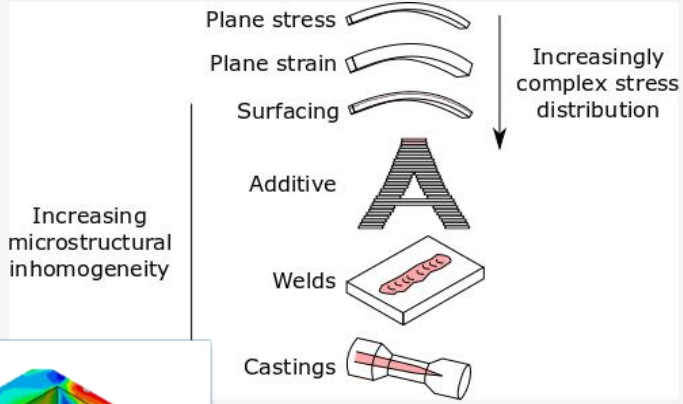
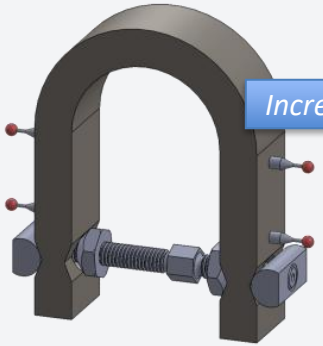
BENCHMARK SAMPLES

Reference samples defined:

- Compare results from different techniques (round robin samples)
- Illuminate range of challenges
- Validate appli

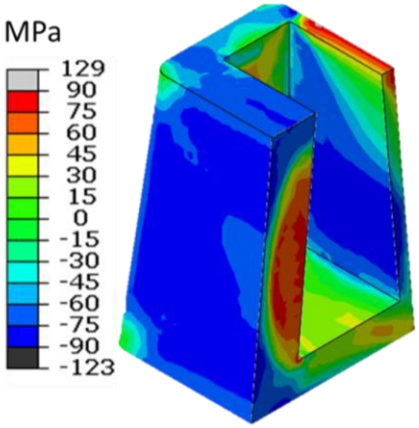




U-flexures/ U-bends
(S355 stainless steel)

Increas

…and compared with FEM modelling data



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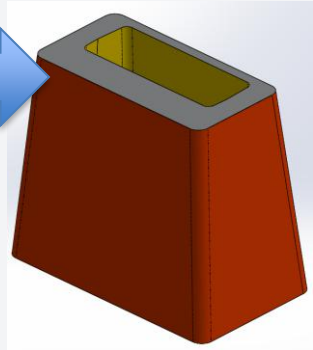


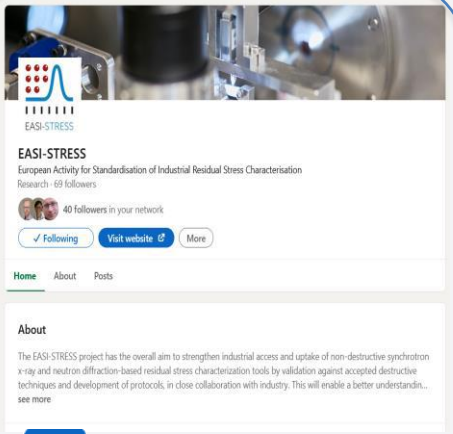
Cast wedge (AlSiMg)

ENGAGING INDUSTRIAL STAKEHOLDERS

Ensure broad industrial adaptation of the new techniques AND recruit support for standardisation effort.

Homepage: www.easi-stress.eu

Form for registration of interest



LinkedIn Showcase

Public webinars to share technical insights

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EASI-STRESS PUBLIC WEBINAR SERIES 2022

March 25, 2022:

How reliable are residual stress measurements and modelling?
- The work of the NeT network

Mike Smith
Professor of Welding Technology
EPSRC Manufacturing Fellow
Dalton Nuclear Institute
The University of Manchester

April 25, 2022:

In-situ diffraction experiments at the Hereon beamlines at PETRA III

Peter Staron
Head of department
X-ray Diffraction with Synchrotron Radiation
Institute of Materials Physics
GEMS Helmholtz-Zentrum Hereon

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THANK YOU!

Please contact us, if you would like to stay informed about the project activities and events.

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