

# Industry Fields

## Transport

Developing green, safe, efficient and accessible transport networks



NDT of composites and GLARE

➔ Advanced measurement techniques for materials and structures in structural design, composite manufacturing and aircraft maintenance and repair

## Energy

Developing green energy solutions and improving energy efficiency

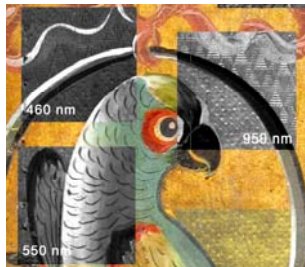


Strain and vibration monitoring

➔ Structural health monitoring and sensor networks for oil/gas pipelines, wind turbines

## Cultural Heritage

Preservation of cultural heritage for education and future generations



Hyperspectral imaging

➔ Developing sensor systems and classification algorithms for movable cultural heritage

## Task? The solution!

If you are interested in cooperation, please contact

Dr. Roger Groves

T +31 15 278 8230

R.M.Groves@TUDelft.nl

TU Delft

Aerospace NDT Laboratory

Structural Integrity & Composites (SI&C) Group

Faculty of Aerospace Engineering

Kluyverweg 1 (building 62)  
2629 HS Delft

T +31 15 278 8230

R.M.Groves@TUDelft.nl

www.aerondt.tudelft.nl

Delft University of Technology

# Aerospace NDT



TU Delft

# Aerospace NDT Laboratory

## Objective

Research and innovation of instrumentation and algorithms for characterisation of materials and structures

## Vision

To develop the next generation of advanced optical and ultrasonic sensors and sensor systems which can measure more accurately, faster and with better resolution

## Who are we?

- Established in 2008 in the Faculty of Aerospace Engineering at TU Delft
- 20+ researchers and project students developing instrumentation, algorithms and applications
- Interdisciplinary and international research team

## Capabilities

- Advanced research in optics and ultrasonics
- Custom measurement solutions
- Pre-industrial prototyping
- Development of control and data processing algorithms
- Experimental design
- Data fusion and visualisation
- Prototypes environmental testing

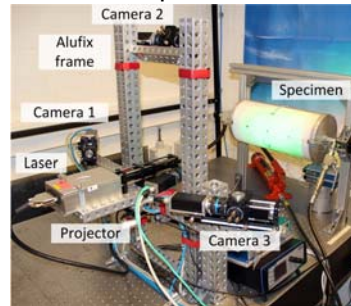
## Main Current Projects

- H2020 EXTREME Project
- DTP Bonded Repair Project
- World Class Composites Solutions (WCCS)
- Dutch Aerospace TAPAS2 Project
- Dutch NICAS Gilt Leather and Rembrandt Projects
- Dutch NWO Climate4Wood Project

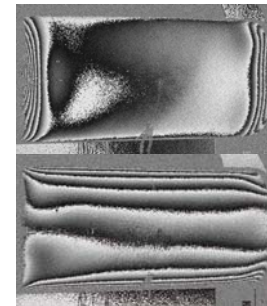
# Optical Metrology

Research of optical measuring techniques for experimental mechanics and non-destructive testing:

- Shearography
  - Non-destructive testing and defect detection
  - Strain characterisation
  - Vibration characterisation (full-field)
- Fringe projection and structured light
  - 3D shape measurement
- Line scan and point shape sensors
  - Shape measurement and fusion with strain data



3D shape shearography setup with structured light projector

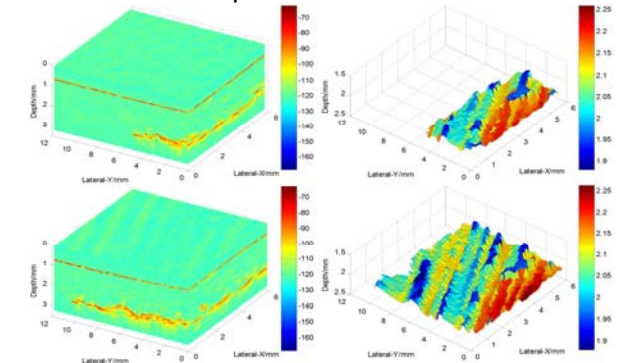


X- and Y-shear phase maps during inner pressure loading

# Fibre Optic Sensing

Research of fibre optics sensors and applications:

- Optical Coherence Tomography (OCT)
  - 3D materials characterisation
  - Coating thickness measurement
- Fibre Bragg Gratings (FBGs)
  - Strain and temperature sensors
- Structural Health Monitoring (SHM)
  - During manufacturing, assembly, use and service of composites structures

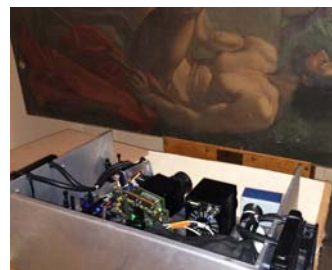


OCT measurement of crack propagation in a glass fibre composite plate

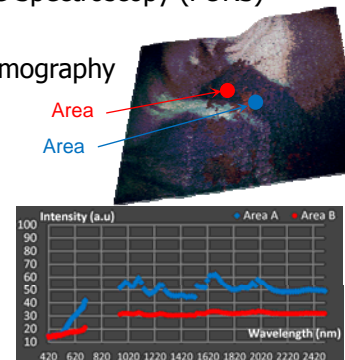
# Spectral Imaging

Research of multi and hyperspectral imaging systems:

- Spectral imaging: VIS, NIR and SWIR
  - Imaging spectrographs and tunable filters
- Spectral processing
  - Principal Component Analysis (PCA)
- Fibre Optic Reflectance Spectroscopy (FORS)
- Terahertz imaging
  - LWIR/microwave tomography



SYDDARTA prototype in use

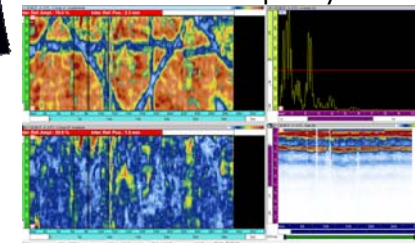


Relative (areas A and B) VIS and IR reflection spectrum

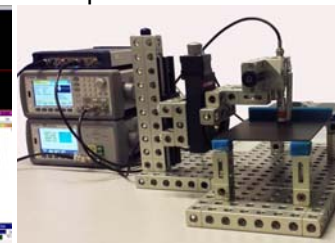
# Ultrasonics

Research of ultrasonics and guided waves:

- Lamb wave ultrasonics
  - NDT/SHM of composite plates
  - Time-reversal Lamb waves
  - Air-coupled ultrasonics
- C-scan ultrasonics: including data fusion from different sources (e.g. C-scan + shape)
  - Multi-frequency ultrasonic inspection



C-scan of a carbon plate with complex structure



Setup for air-coupled ultrasonics flaw detection