X-SIGHT

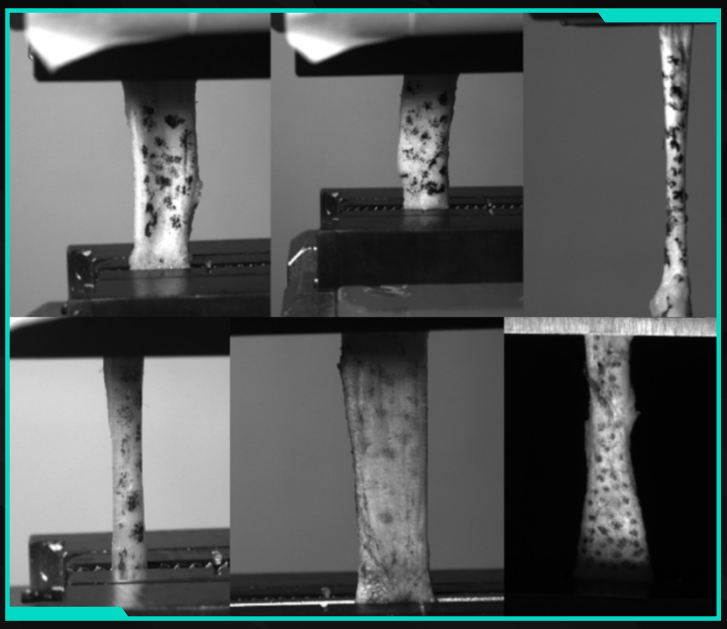
APPLICATION REPORT

BIOMECHANICS: UNIAXIAL TENSILE TEST OF TENDON

APPLICATION SPECIFICATION

The X-Sight ONE1-M5 system was used to measure pig tendon samples. To perform the uniaxial tensile test, firstly, it was necessary to prepare the samples. Specimens were obtained from a pig limb, from which the tendons were dissected. Samples were trimmed to a symmetrical shape from the irregularly segmented tendons, and a pattern was applied to the samples with a marker.

The measurement was performed at room temperature of the surrounding air. These conditions were chosen intentionally for easier manipulation with the samples and, therefore, easier measurement.



Tendon samples placed in the grips of a universal testing machine

KEYWORDS

- Biomechanics
- Low-cycle test
- Tensile test
- Constitutive material model
- Tendon

TEST SETUP

- ONE1-M5 measuring system
- Alpha DIC SW modules: Axial Strain (A), DIC Area, Post Process (PP)
- Measuring tools:
  - Line probe
  - DIC Area probe
- Pig tendon specimen

OUTPUT

- Elongation cyclic curve
- Stress-strain curve
- Material model definition
- Full-field strain analysis

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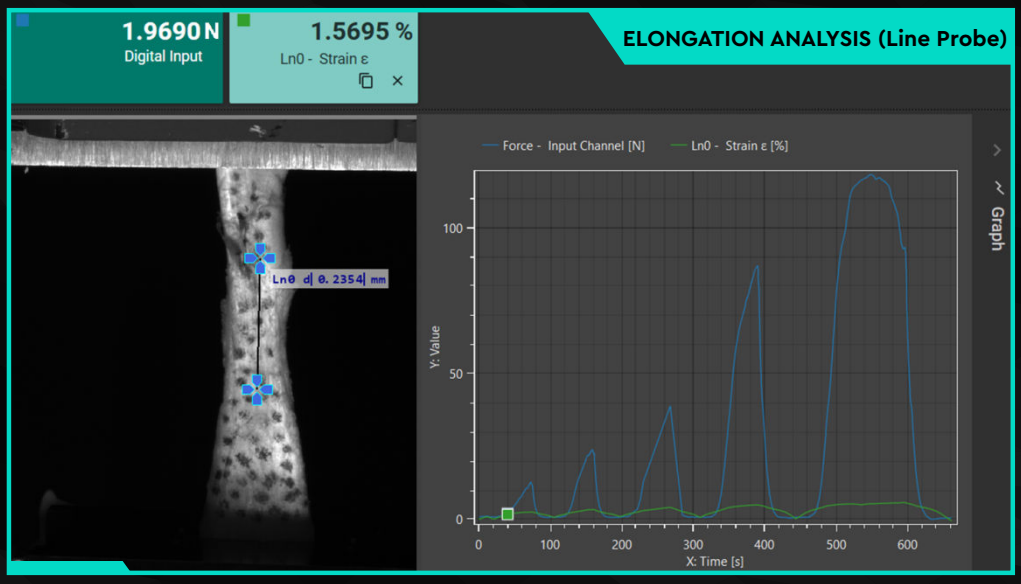
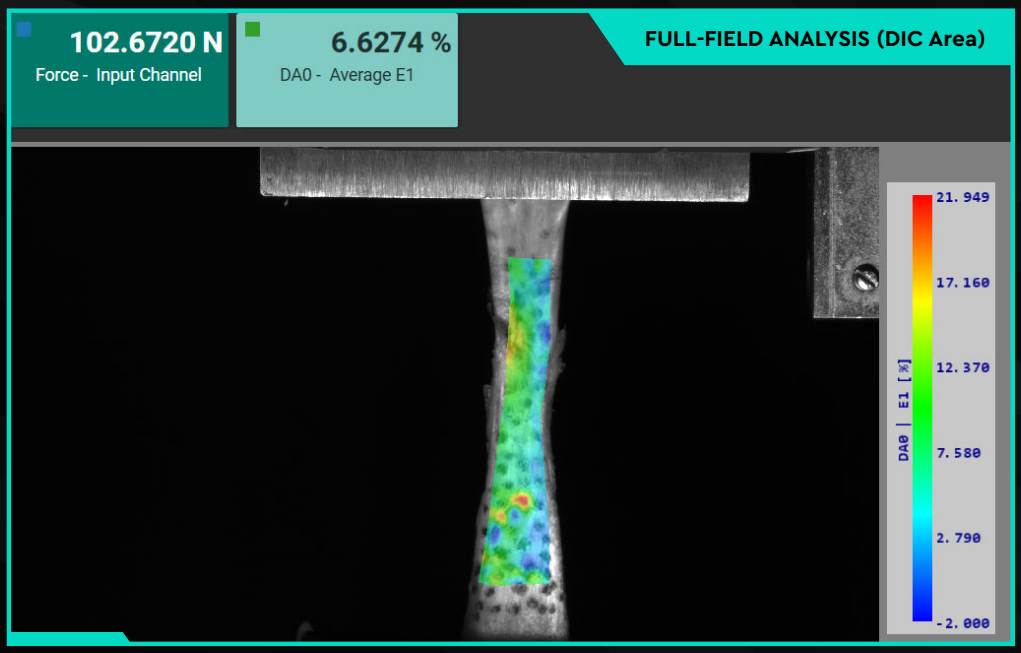
MEASUREMENT PROCESS AND TOOLS



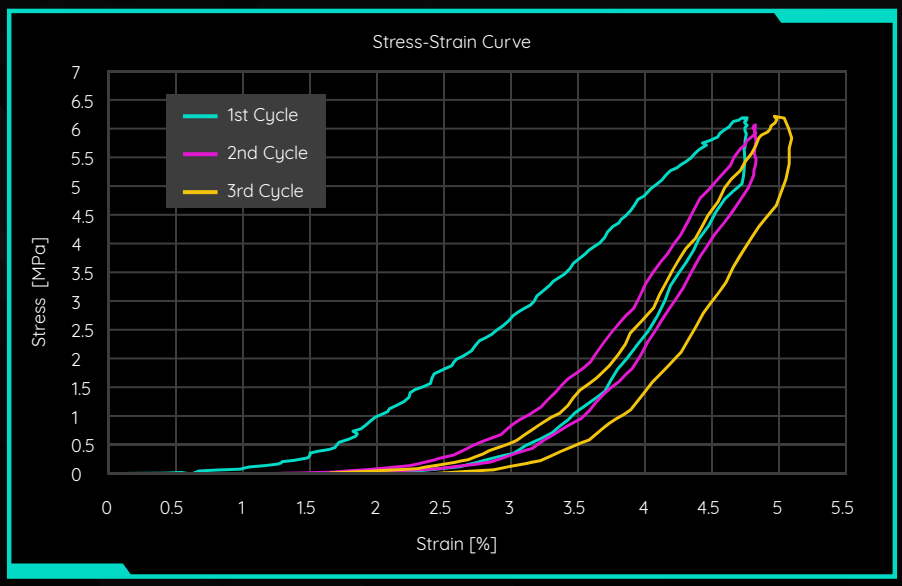


The pig tendon specimen was loaded by cyclic force. The Line probe was used to measure strain or length change in the specified direction.

Intelligent features allow for precise setup of gauge length and aligning the Line probe according to the direction of the selected axis.

Full-field analysis can be performed using the DIC Area probe to obtain a strain distribution map over a user-defined area.

MEASUREMENT EVALUATION



The measurement results were used for the definition of the constitutive material model. The model would be used in computational modelling using the finite element method (FEM).

The experimental data would be fitted to the corresponding model (Ogden-Roxburgh, Yeoh 3rd) in Hyperfit software. [1]

[1] Skacel, P. (n.d.). HYPERFIT. HYPERFIT software. Obtained January 24, 2023, from: http://hyperfit.wz.cz