

# Strain Gauge Extensometers

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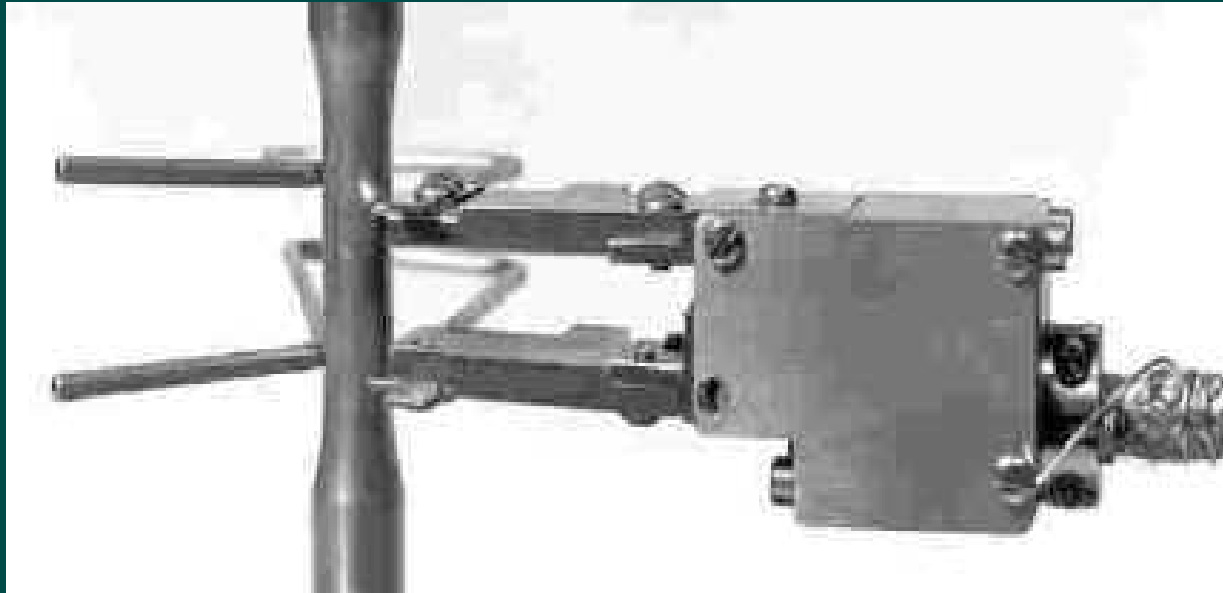
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# What is it?

- A device used to determine changes in linear dimensions
- Electronically measures extension of sample under load
- From load and extensometer data, stress vs. strain curve can be developed
  - Yield, tensile, ultimate strength
  - Modulus of elasticity

# How does it work?

- The basic principle for a resistance-type transducer: the resistance of a wire increases with increasing strain and decreases with decreasing strain



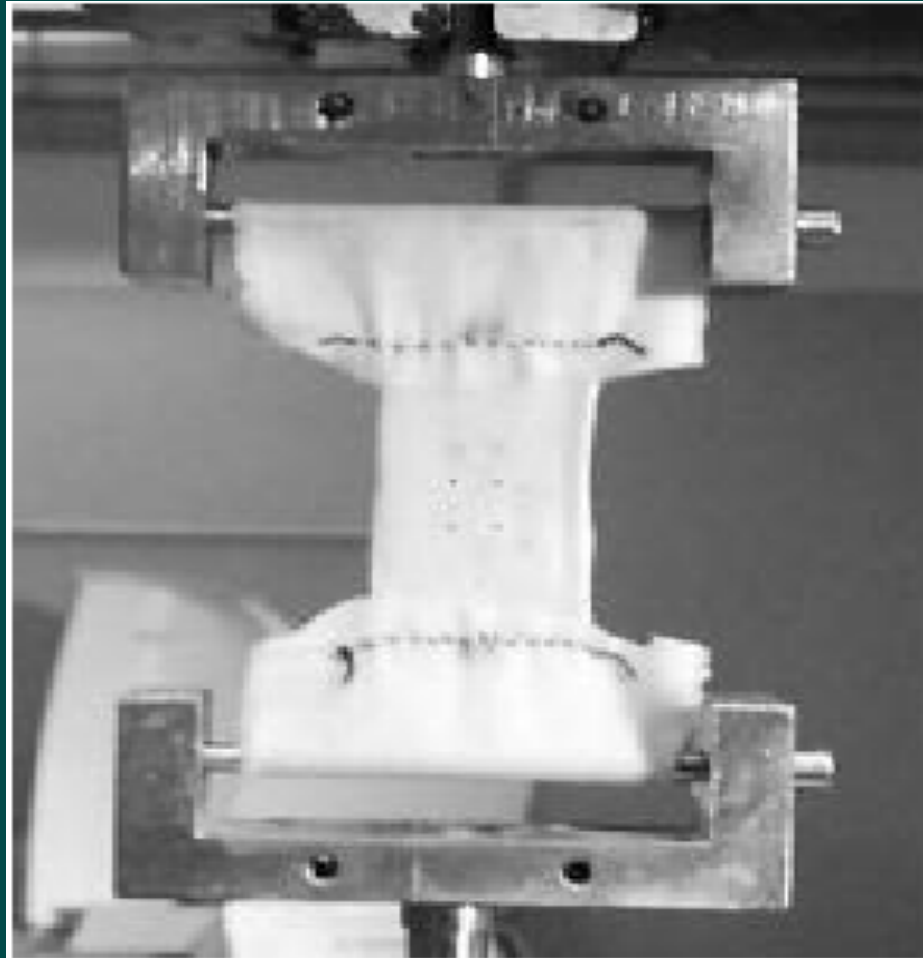
# Why use an extensometer?

- Measuring crosshead displacement measures more than wanted
  - Machine deflection
  - Grip deflection
  - Possible slippage and deflection of the part outside normal reduced area
- $\text{Strain} = \Delta L / L_0$ 
  - No initial length without extensometer
  - Not able to accurately measure change

# Use in Biomechanics

- Soft tissues: two main techniques
  - low-stiffness biomedical extensometers used for one-dimensional collagenous structures
  - optical methods based on video-extensometers and video cameras tracking target markers drawn on the specimen surface used for measuring plane states of strain on planar tissue membranes
- Hard tissues
  - Employ typical extensometers unless sample is compromised by knife edges of grips

# Video Extensometers



# References

- <http://wwwlabs.stru.polimi.it/the%20staff/Villa/exp%20meth.pdf>

*Experimental Methods in Biomechanics*

- <http://www.epsilontech.com/faq.htm>

*FAQ, Epsilon Extensometers*

- <http://www.tu-darmstadt.de/fb/ms/student/fs/german/lab/w5/mse5-1.htm>

*The Tensile Test, Extension Measurement Techniques*



Questions?