



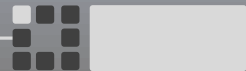
## Experimental methods

# Measurement of a rubber part stiffness

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- **Theoretical analysis of the experiment**
- **Experiment procedure**
- **Results**
- **Conclusion**





### **Task:**

Measure the stiffness (i.e. dependence of the force on the compression) of the rubber part – silent block at three different compression speeds: 2 mm/s, 10 mm/s and 50 mm/s.

The compression value will be determined according to the dimensions of the silent block specimen (about 5 to 10 mm).

### **Theoretical analysis of the experiment:**

#### Definition of stiffness

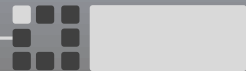
Stiffness is a physical quantity that indicates the dependence of the compression of a compressed body on the acting force.

It represents a characteristic of each compressible body. Unlike the elasticity modulus, it applies to the whole body, not just the material it is made of.

Its value is determined based on the used material and the shape of the body.

Stiffness is defined by the equation:  $k = \Delta F / \Delta l$  [ $Nm^{-1}$ ]

where  $\Delta F$  is the increment of the force acting on the body  
 $\Delta l$  is the body compression increment

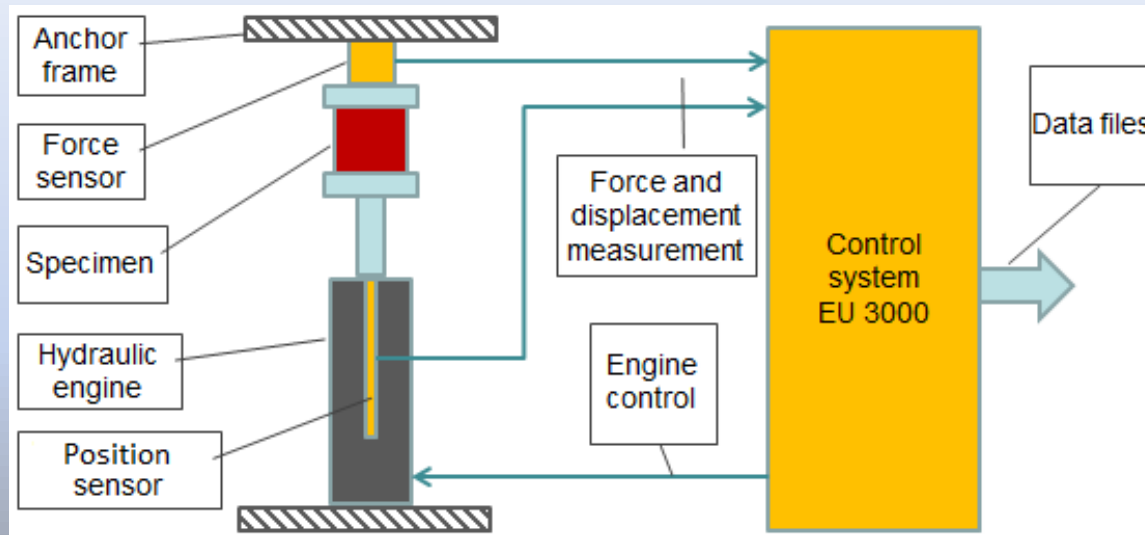


## Experiment procedure

Equipment used:

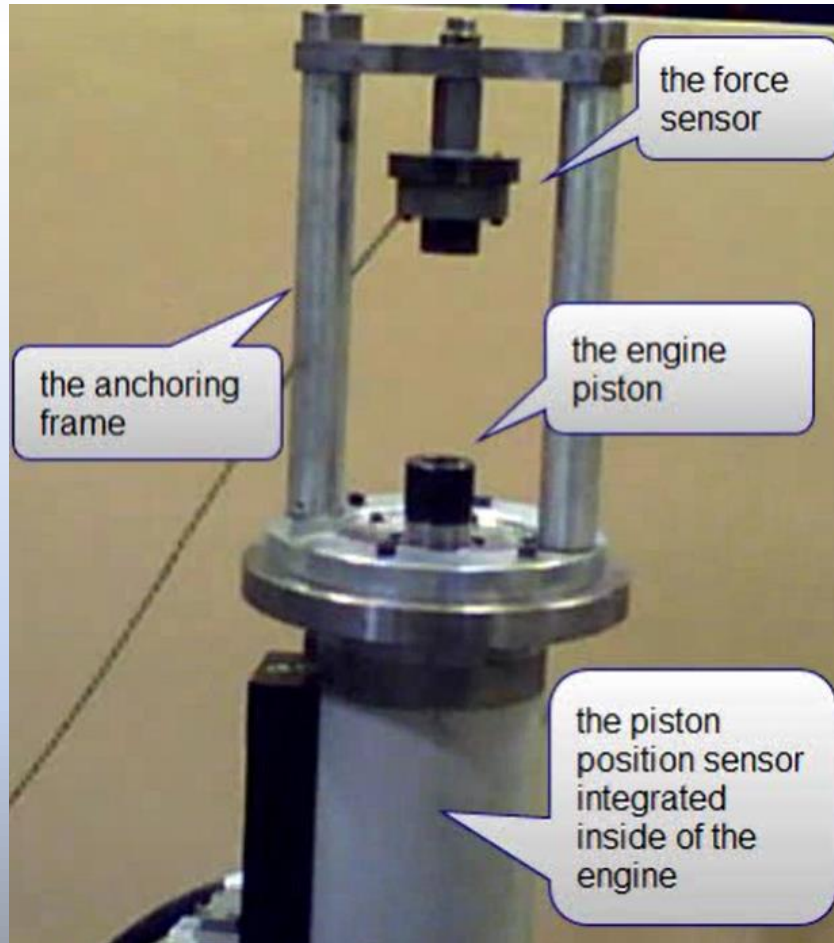
- Hydraulic engine Inova AH 25-250 (max.: 25kN, 250mm, 1m/s)
- Anchoring frame
- Inova EU 3000 control system to the hydraulic engine control and data measuring and recording
- Position sensor integrated in the hydraulic engine
- Force sensor GTM

Block diagram of the experiment:

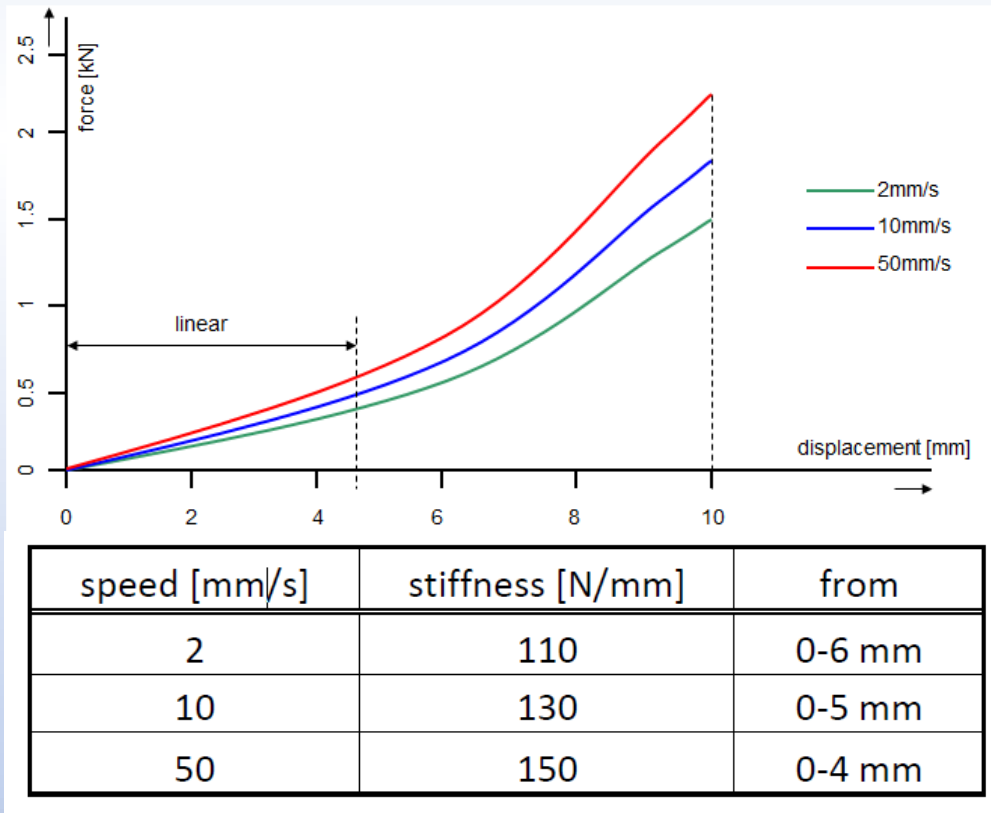




The real experimental equipment:



## Results:



## Conclusions:

- stiffness is different for different speeds
- stiffness is only partially linear, with greater compression the nonlinearity increases