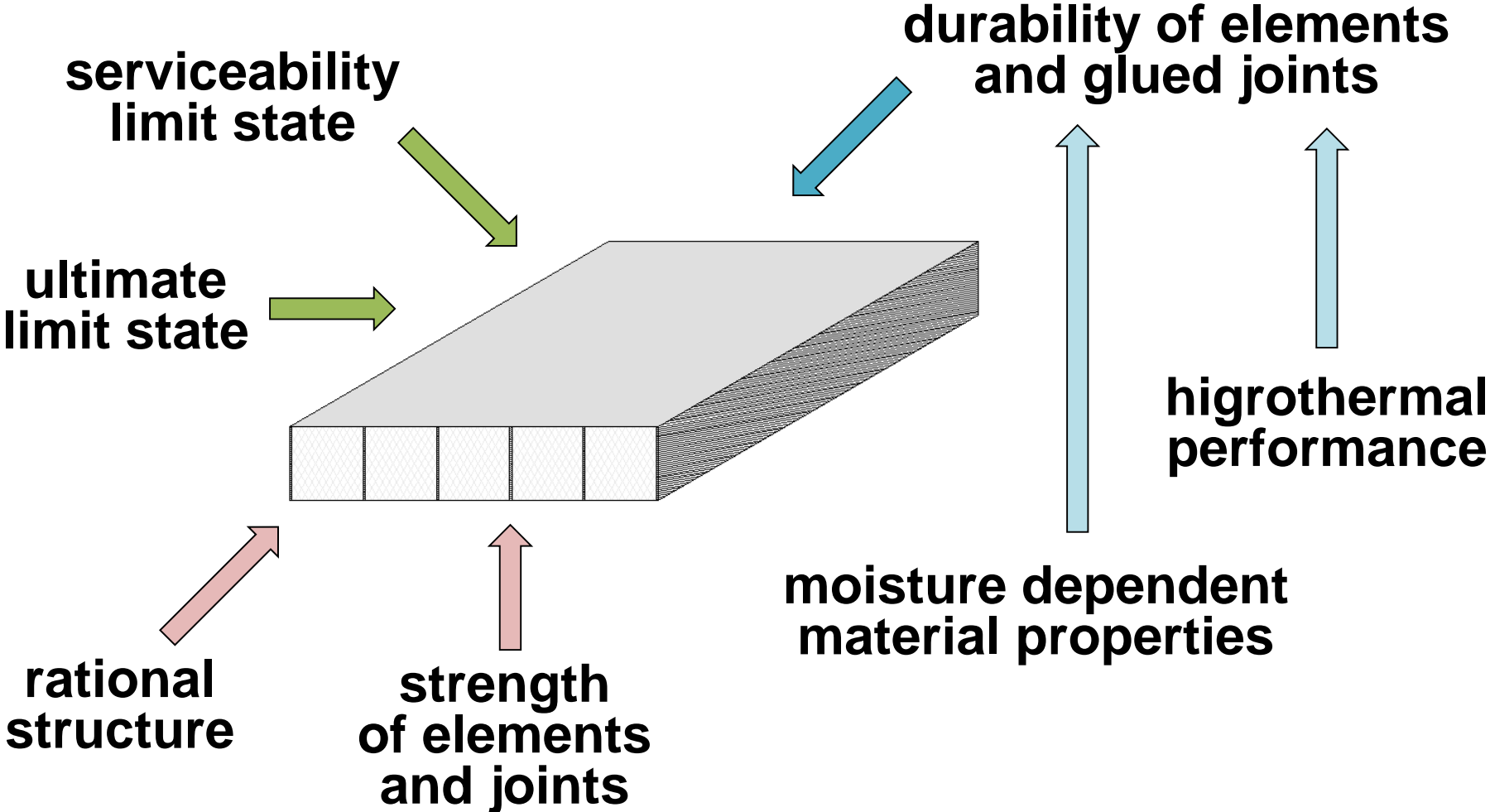
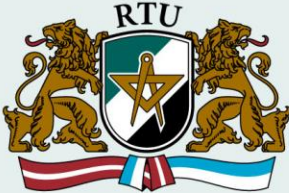


***Effects of hygrothermal
performance on behavior of
glued ribbed plywood panels***

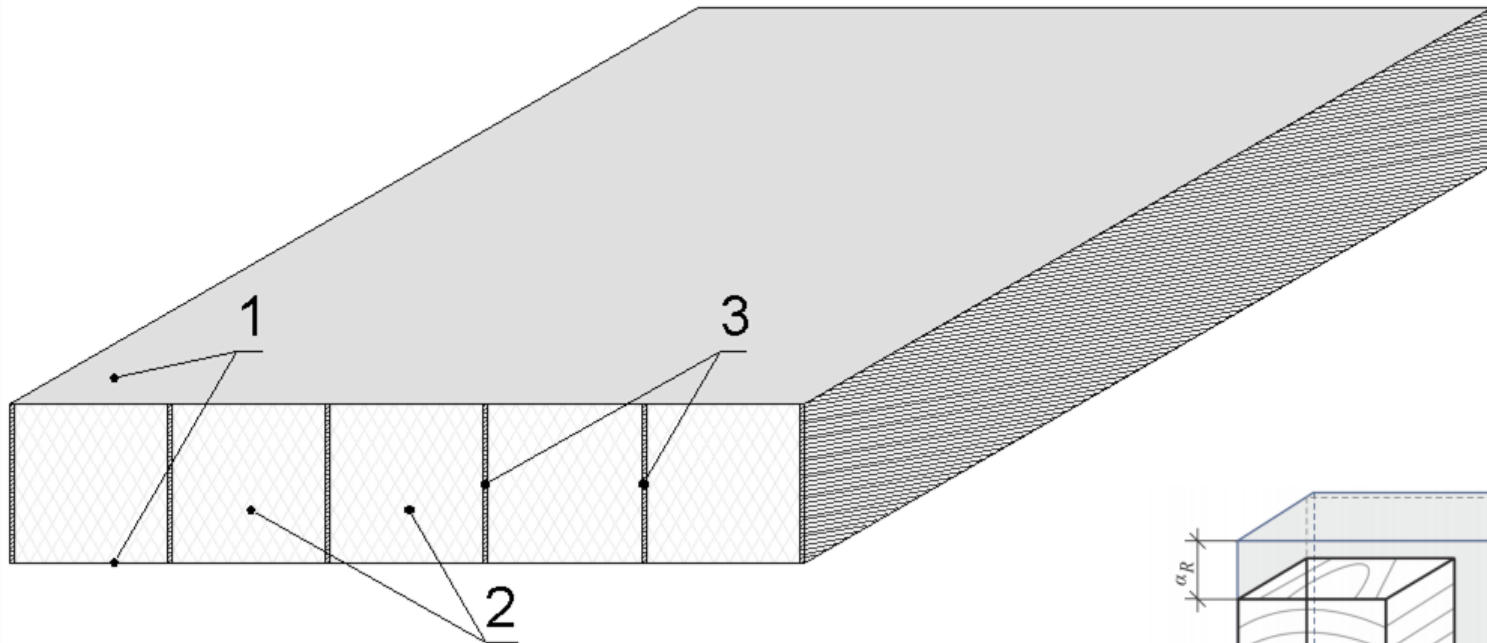
A. Kukule, K. Rocens

Riga 2015

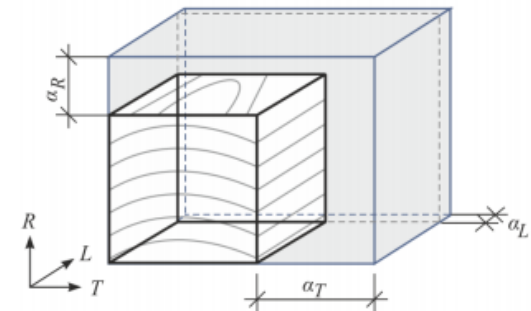
Introduction



Ribbed sandwich panel



- 1 – steel sheeting ($t = 0.5$ mm)
- 2 – polystyrene (EPS) insulation
- 3 – birch plywood ribs ($t = 6.5$ mm)

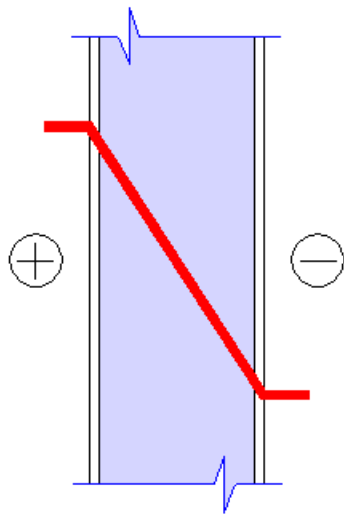


Prediction of moisture distribution in closed ribbed panel

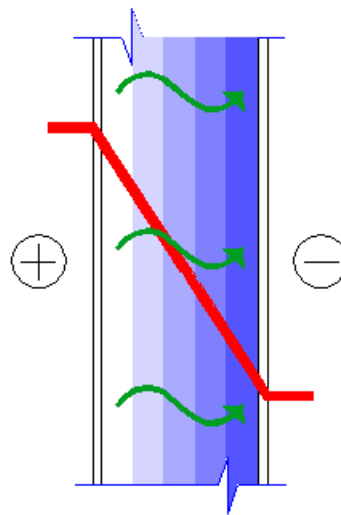


Assumptions:

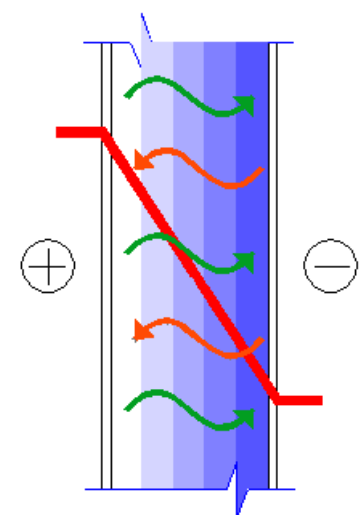
- no moisture from environment air;
- one-dimensional flux of built-in moisture;
- initially moisture is evenly distributed.



temperature
gradient

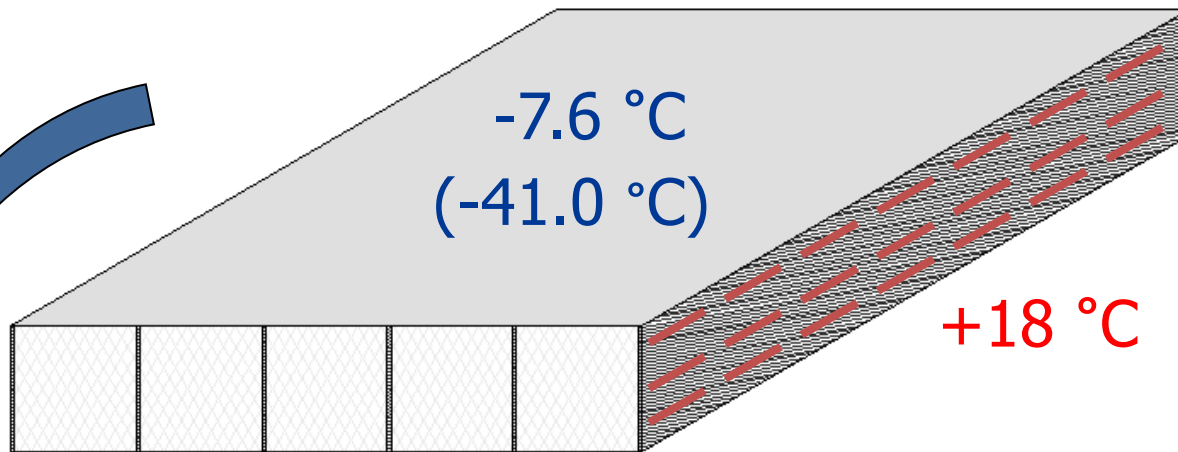


moisture flux due the
temperature gradient



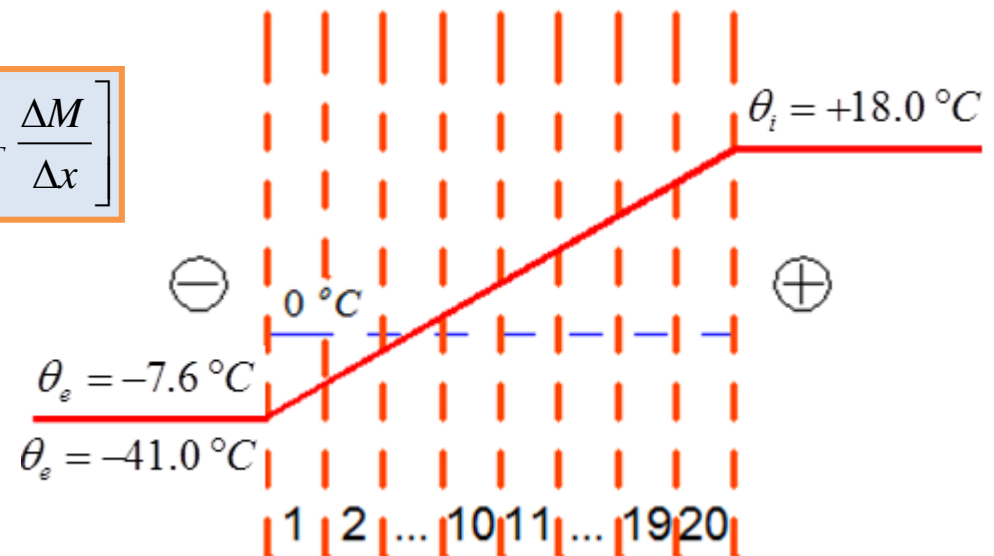
moisture flux due the
moisture gradient

Hygrothermal performance



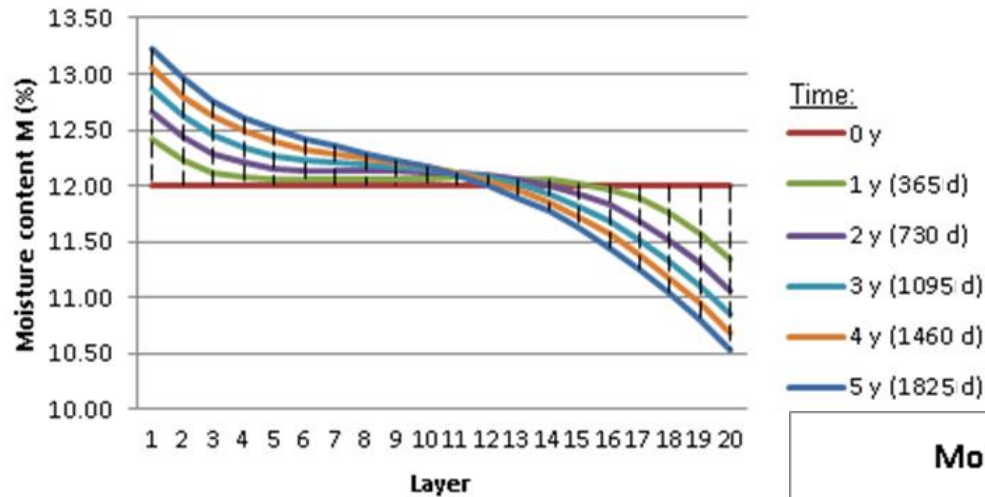
No. 1
...
...
No. 20

$$J = -\frac{G\rho_w}{100} \left[D_T \left(\frac{M}{RT_K + 70M} \right) \left(\frac{E_b}{T_K} \right) \frac{\Delta T_K}{\Delta x} + D_T \frac{\Delta M}{\Delta x} \right]$$

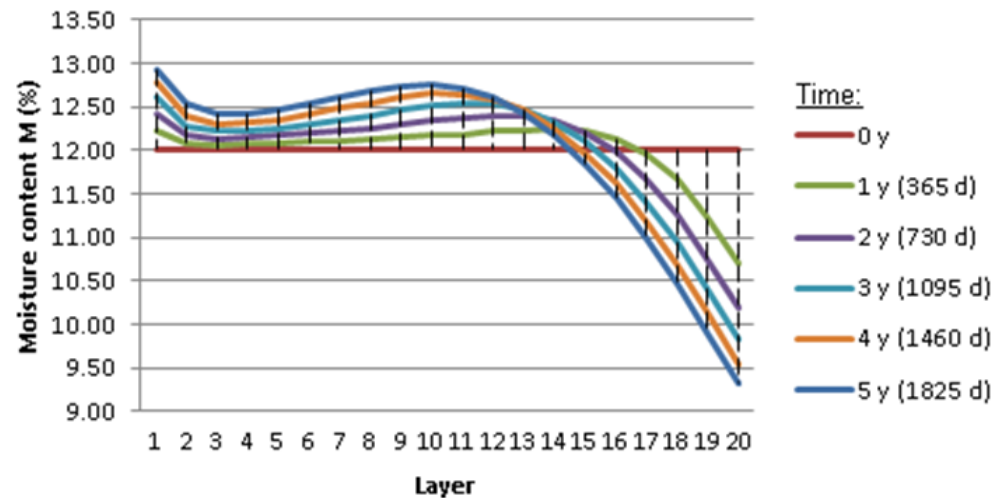


Moisture distribution

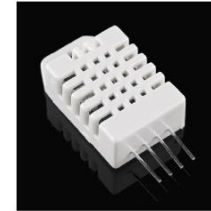
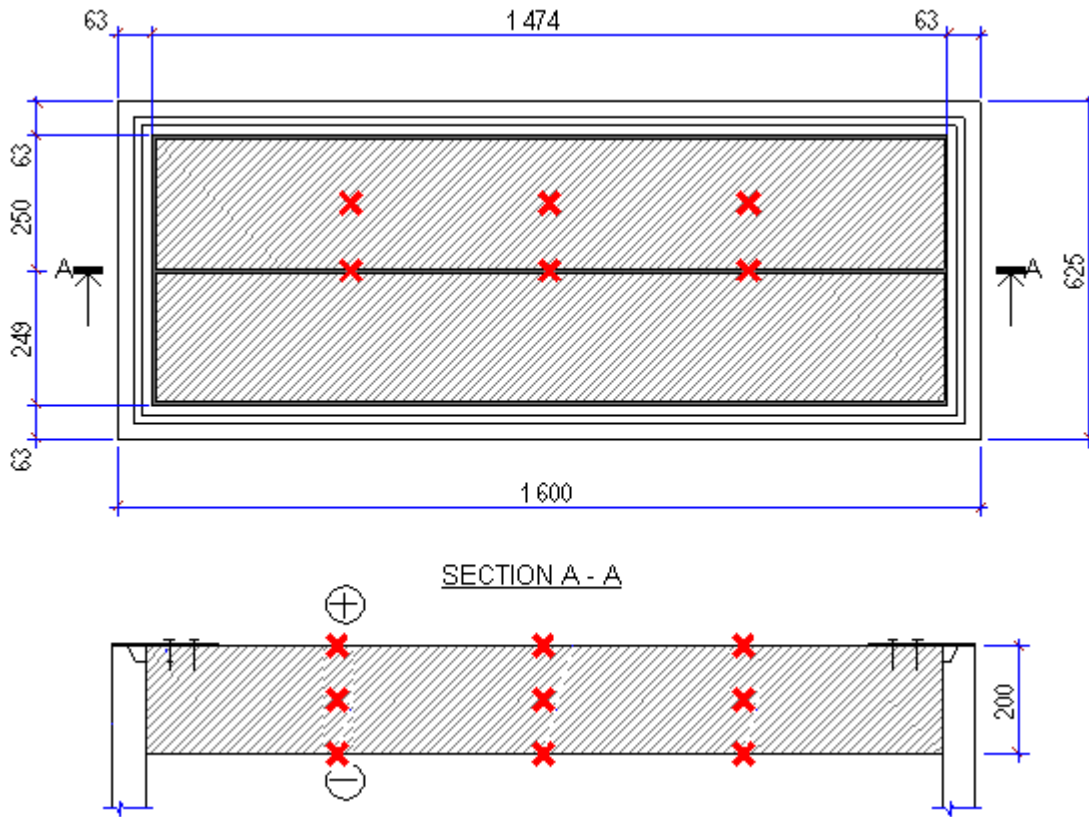
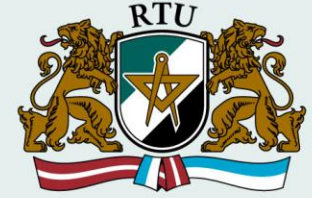
Moisture distribution in plywood rib ($T_e = -7.6\text{ }^\circ\text{C}$)



Moisture distribution in plywood rib ($T_e = -41.0\text{ }^\circ\text{C}$)



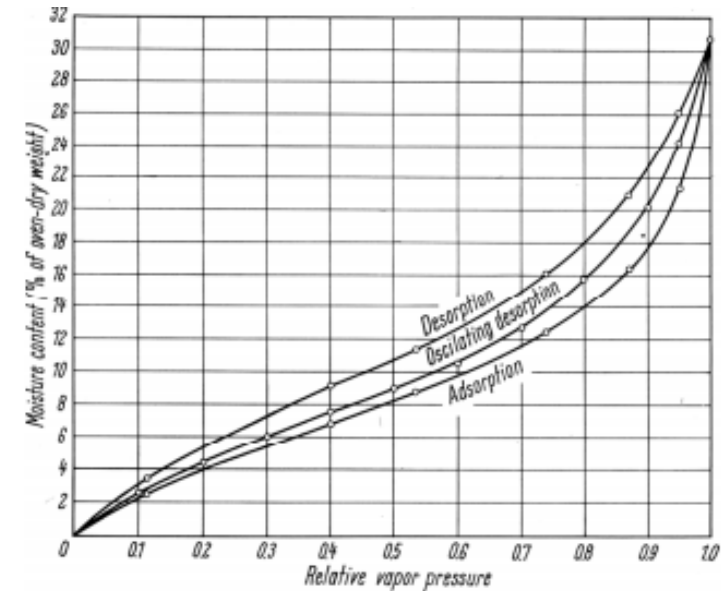
Experimental testing. Moisture performance



AM2302/DHT22

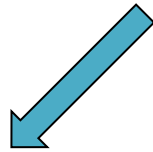
$\pm 0.1\% RH$

$\pm 0.1^\circ C$



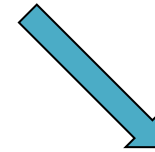
Experimental testing.

Quality of glued connection



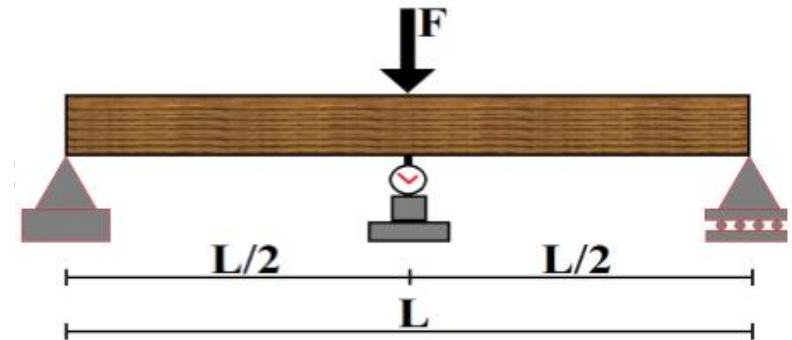
ultrasound (US)

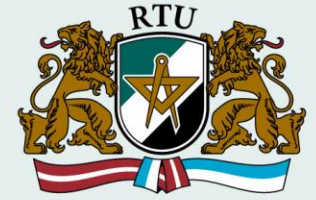
determination of
delamination



3-point bending

deflection measurements
at constant load





Thank You for attention!