

# Analysis of Neutral Axis Position in Thermally Modified Wood using DIC



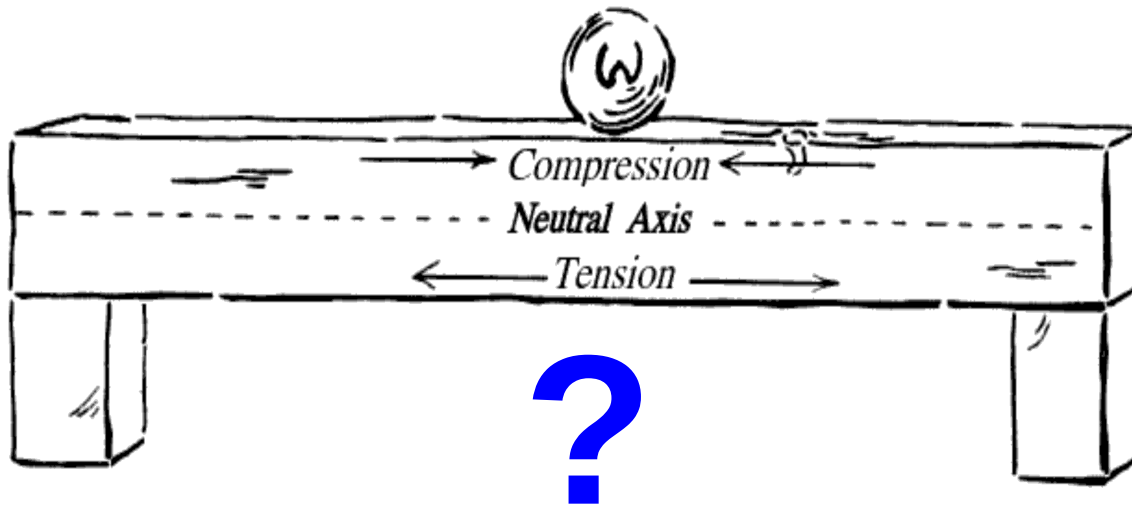
ModWoodLife



*Koper 2015, Slovenia*

# Introduction

- Thermally modified timber (TMT) is an important substituent of tropical species
- TMT exhibits changes in mechanical properties (MOR, MOE)
- What about change of location of a Neutral axis?



### Thermal modification

- spruce
- beech
- poplar

200 °C

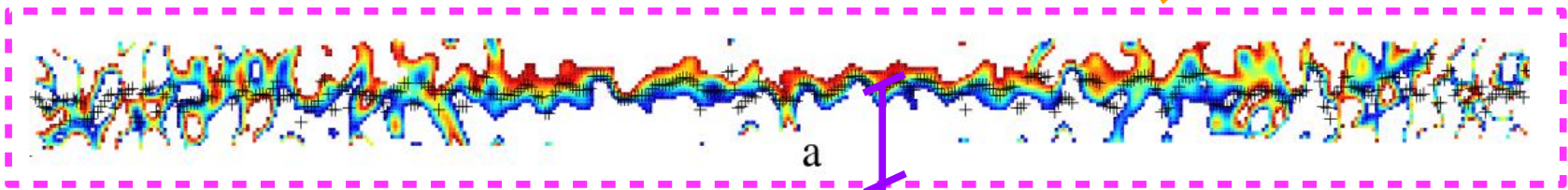
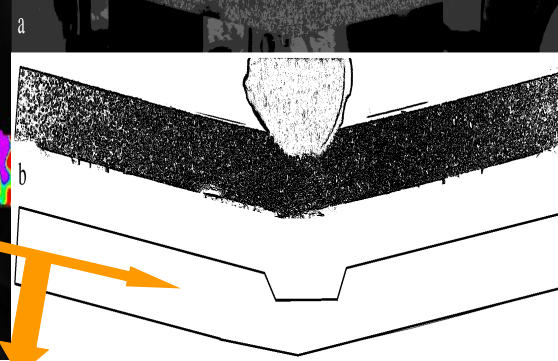
180 °C

Untreated

### Mechanical testing DIC

# Materials & Methods

Strain field  $\epsilon_{xx}$

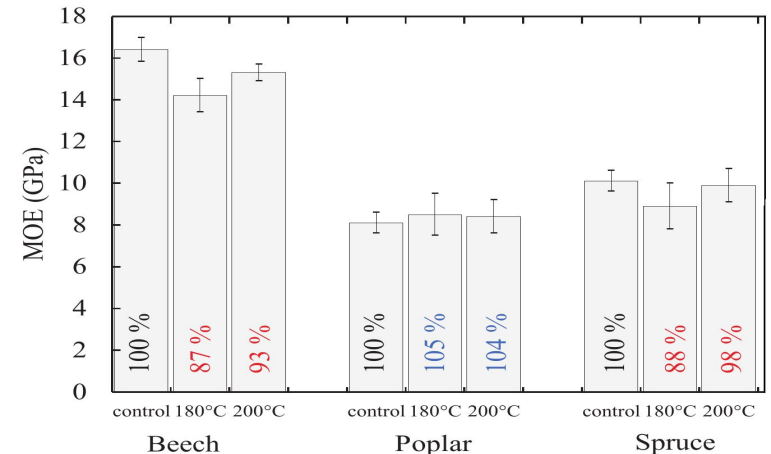
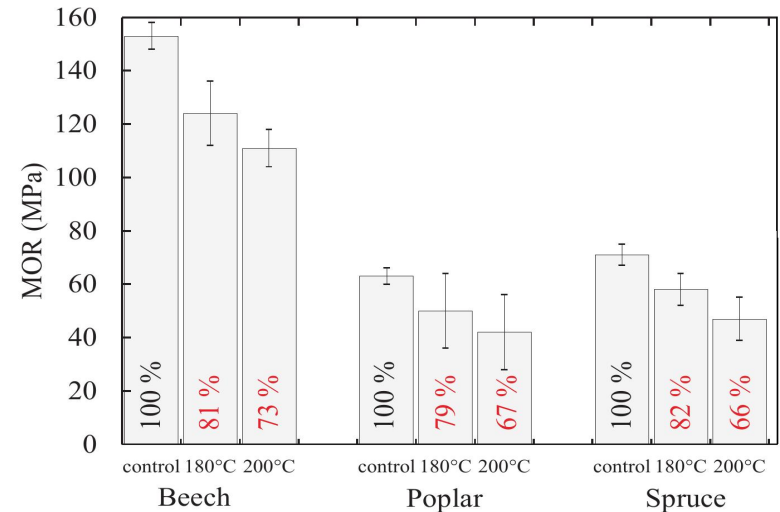
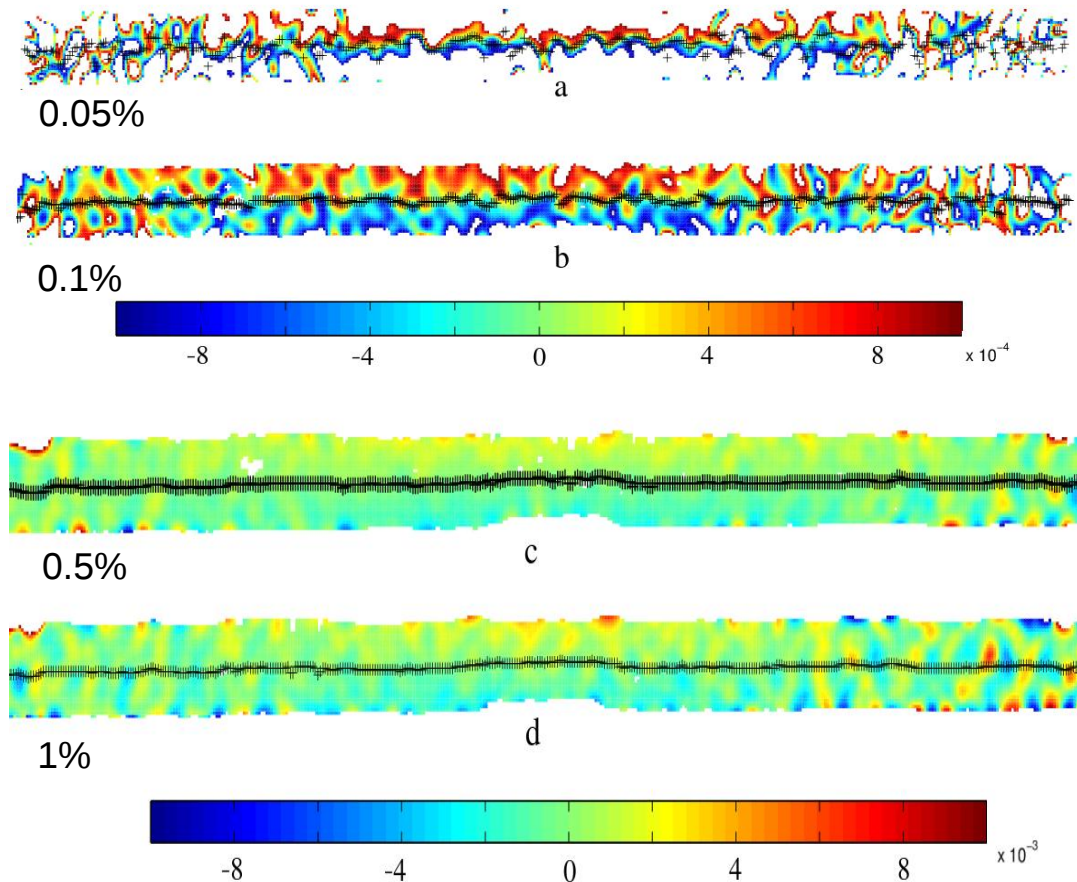


Determination of NA location based on strain and specimen contour in course of loading



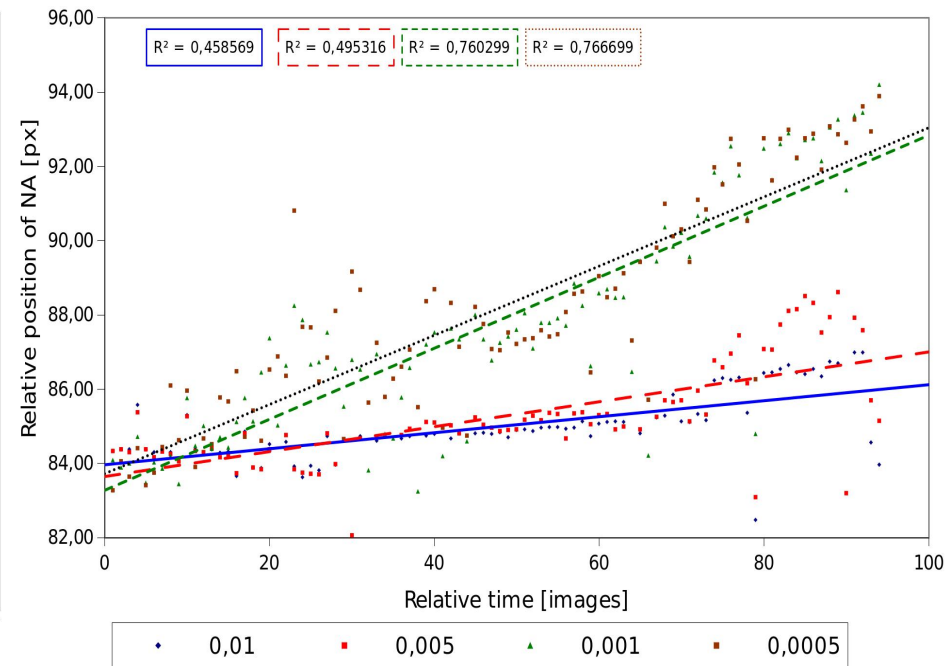
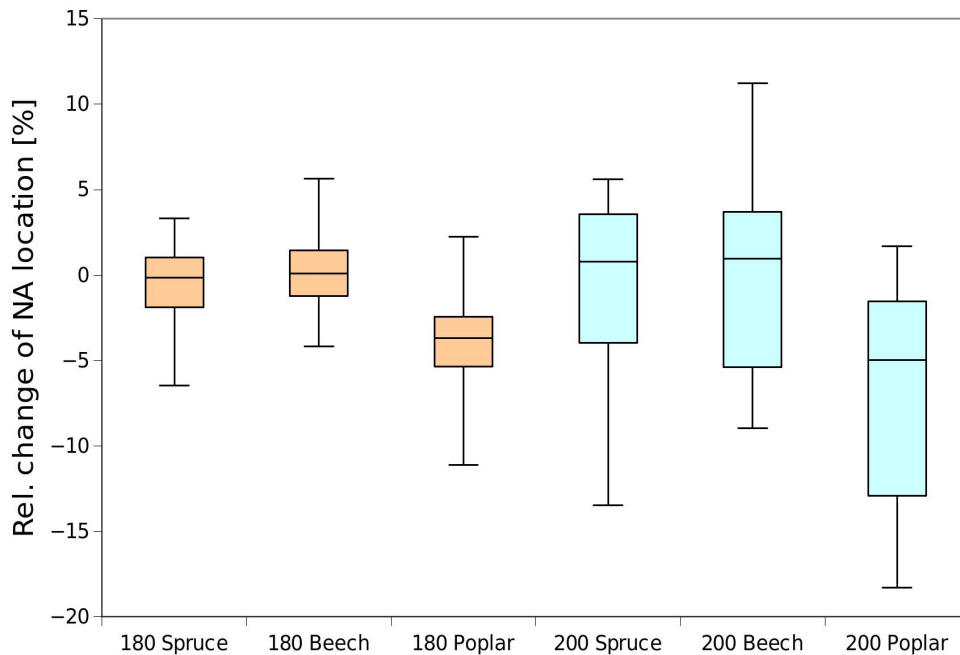
# Results

- Algorithm for NA determination was developed in Matlab
- Tests were performed for 4 zero-strained ranges  $\{|0.05\%|, |0.1\%|, |0.5\%|, |1\%|\}$
- Size of the range influences the results (variability)
- Strains  $> 0.1\%$  are recommended



# Results

- Mean NA position of Spruce and Beech was not affected by thermal treatment (variance yes)
- There was a statistical shift of NA location for poplar ( $p=0.05$ )
- From zero-to-strength, the NA position changes 1-3% towards tension side



# Thank you

## Acknowledgment

- Internal grant agency of FFWT at Mendel University in Brno, project “Combined procedures of modification of beech wood for flooring”
- COST action 1407 WoodModLife