

# 3-point bending short beam test of PEEK FDM printed at SMI 2

EDMS No. 3101991

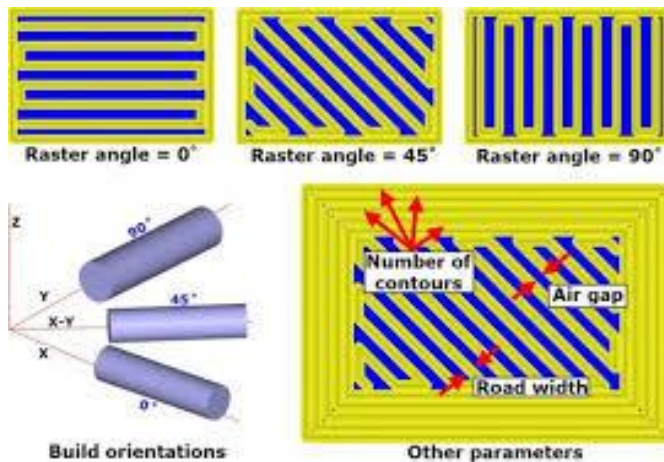
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Julia Vielhauer, Christian Scheuerlein, TE-MS-C-SMT

# Samples

## Printing parameters

- Layer height: 0.2mm
- Fill: 100%
- Number of contours: 2
- Top/bottom solid layer: 0
- Raster angle: 0°/90
- Nozzle diameter: 0.4mm



## Heat treatments during printing

- Samples 1-3 Heating during printing at 270 °C
- Sample 4 Heating during printing at 200 °C
- Sample 5 No heating

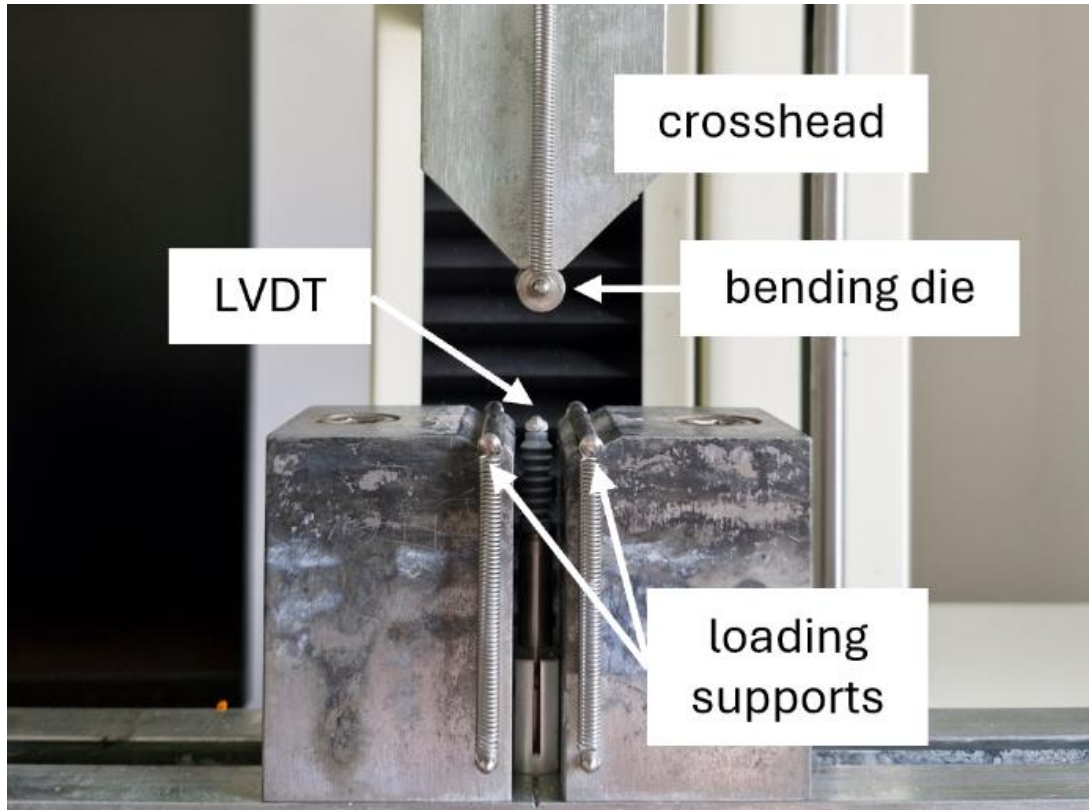


## Original sample size

3.5 mm x 10 mm x 80 mm

cut for increasing number of samples and performing short beam bending tests

# 3-point bending tests



## Measuring parameters

- Support span length 20.5 mm
- Crosshead speed 1 mm/min

## Calculations

Bending stress

$$\sigma = \frac{3FL}{2bh^2}$$

Bending strain

$$\varepsilon = \frac{600sh}{L^2} \%$$

F: force measured by FSB-5kN load cell

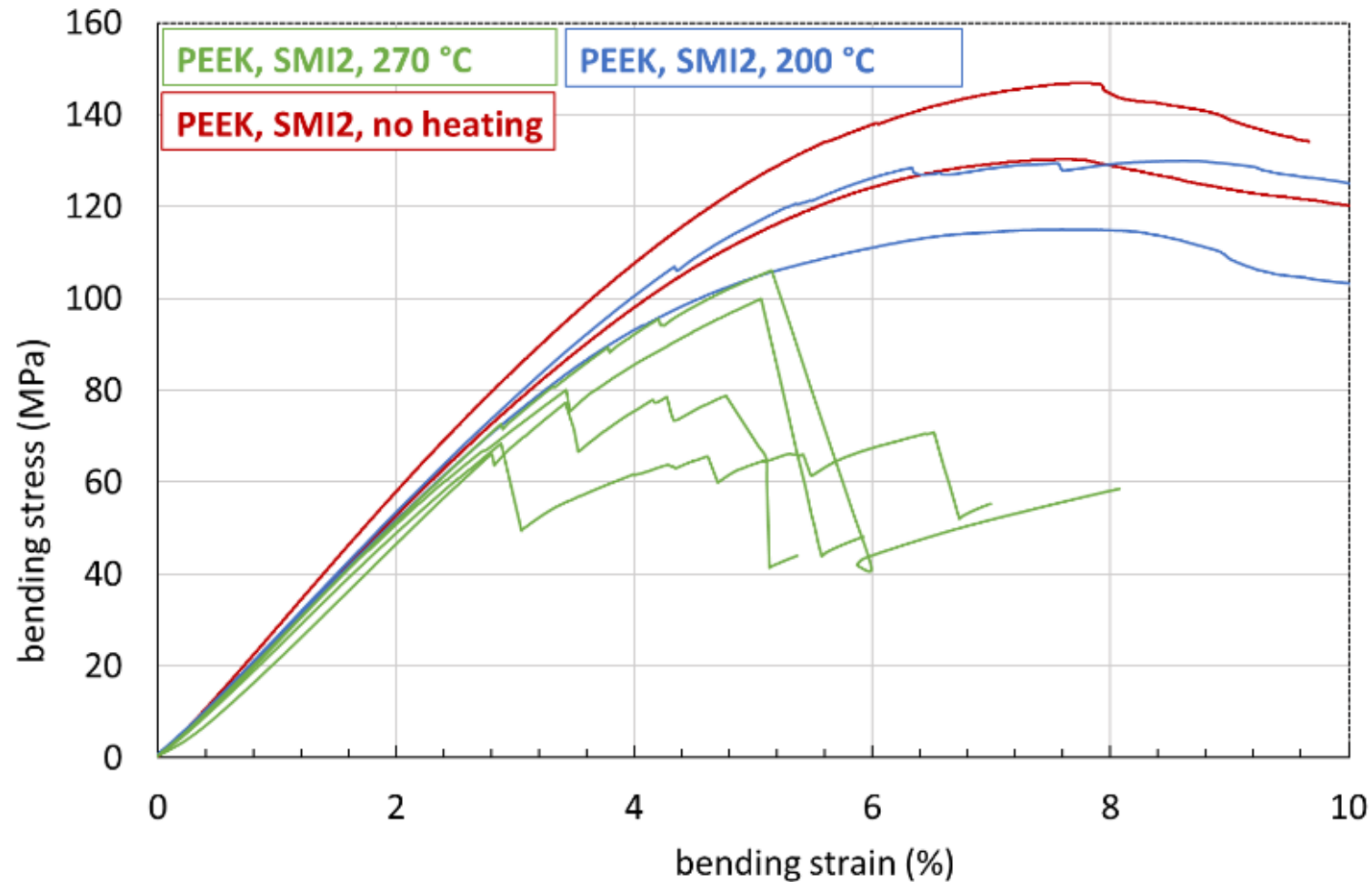
s: sample displacement measured by LVDT

L: span length

b: width

h: thickness

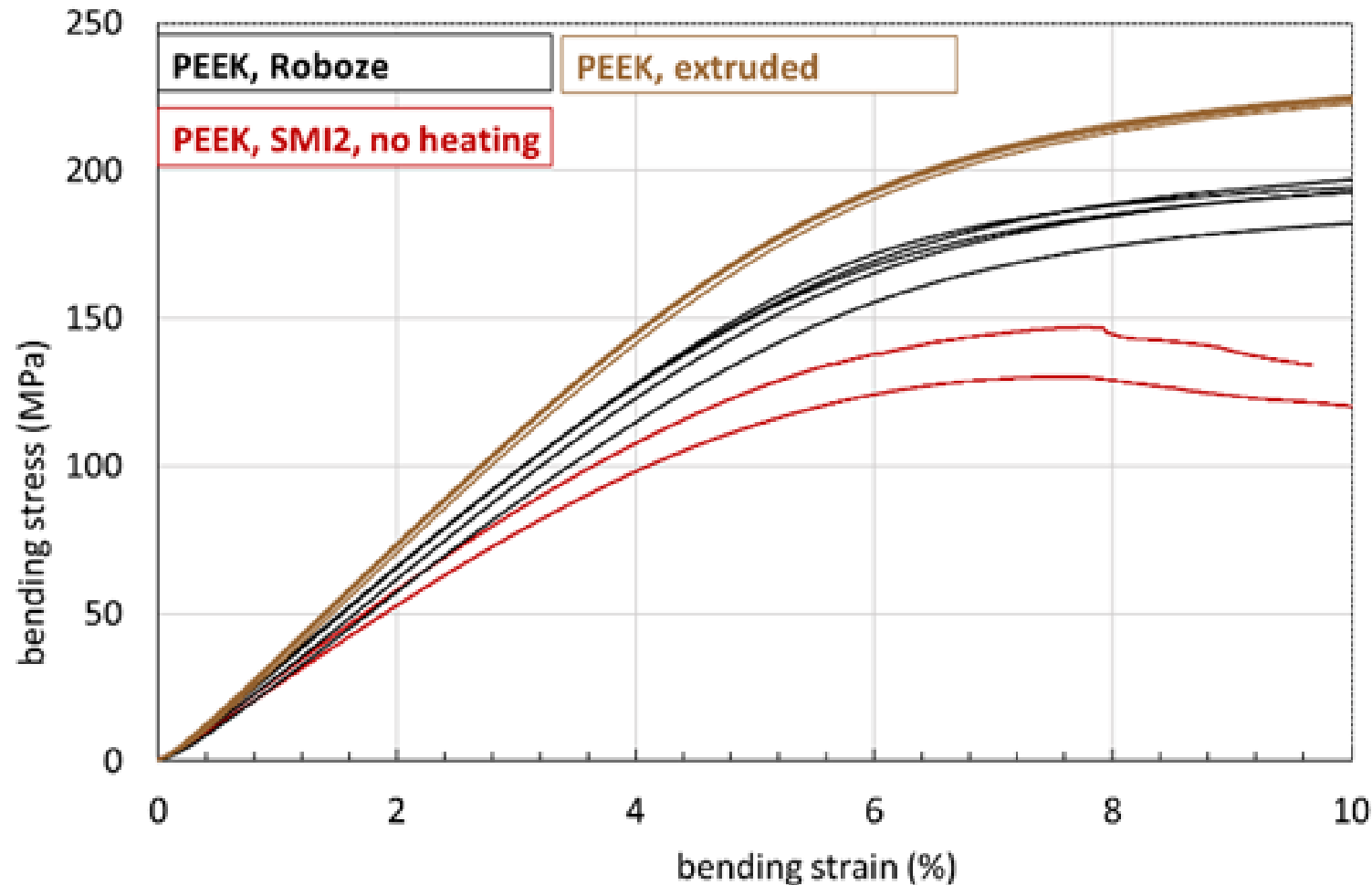
# Results



- Negative effect of heating on strength
- Cracking before maximum load

Sample	Maximum stress (MPa)
SMI2 FDM XY PEEK_270 °C	89 ± 16
SMI2 FDM XY PEEK_200 °C	115; 130
PEEK, SMI2, no additional heating	130; 147

# Results



- Maximum stress of strongest SMI 2 samples is lower than Roboze samples and extruded PEEK

Sample	Maximum stress (MPa)
Roboze FDM XY PEEK	195 ± 6
Extruded PEEK	228 ± 1
PEEK, SMI2, no additional heating	130; 147