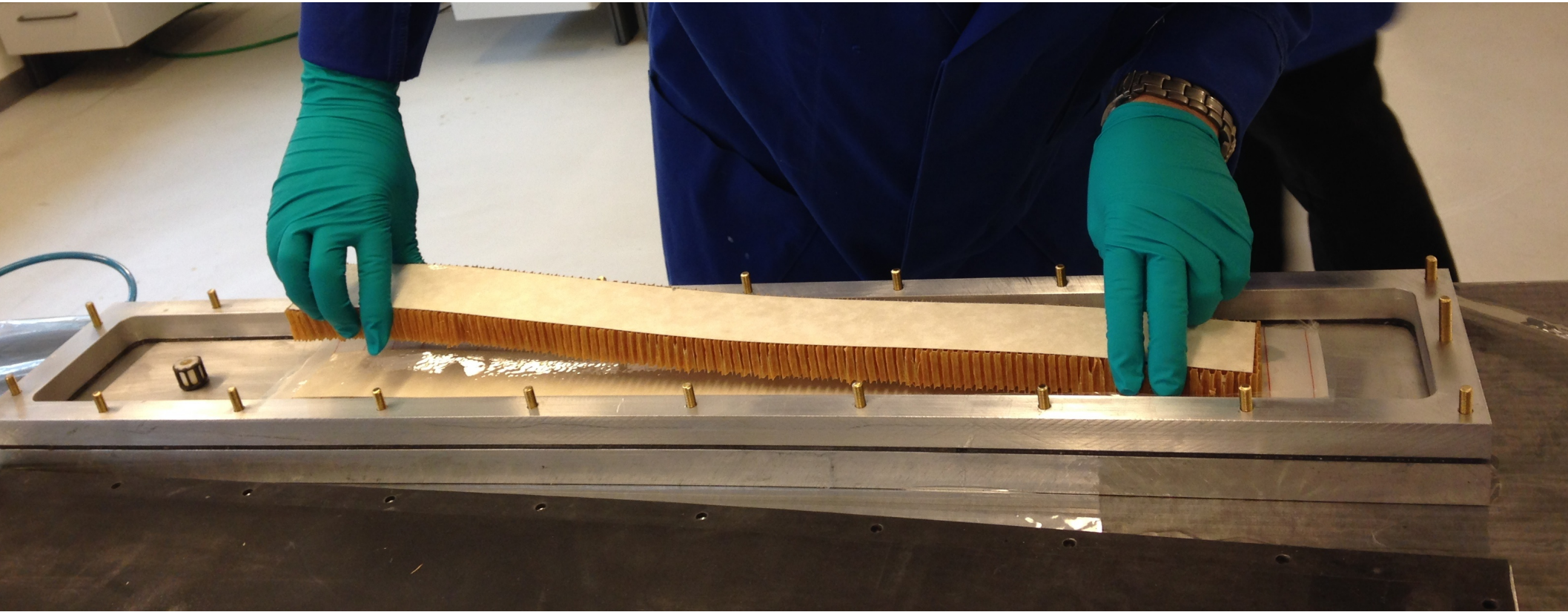
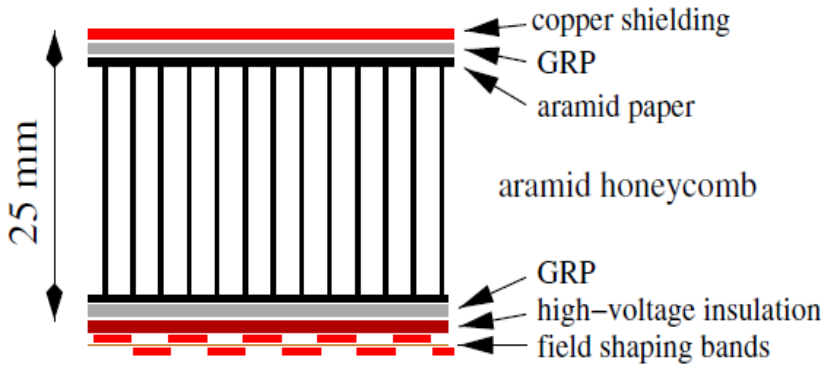
Towards A New Field Cage



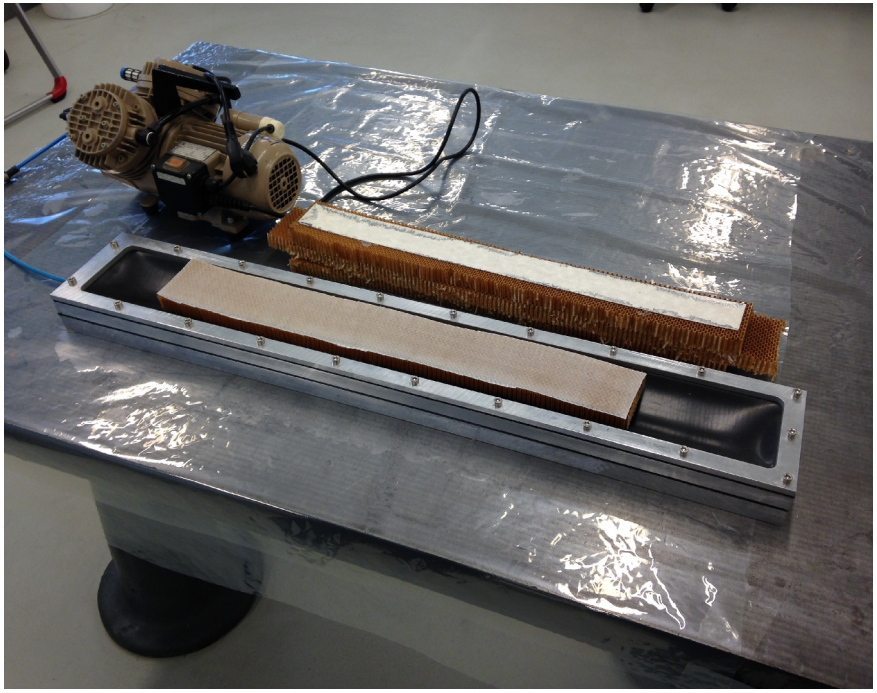
WPM 212 – 22.01.2015

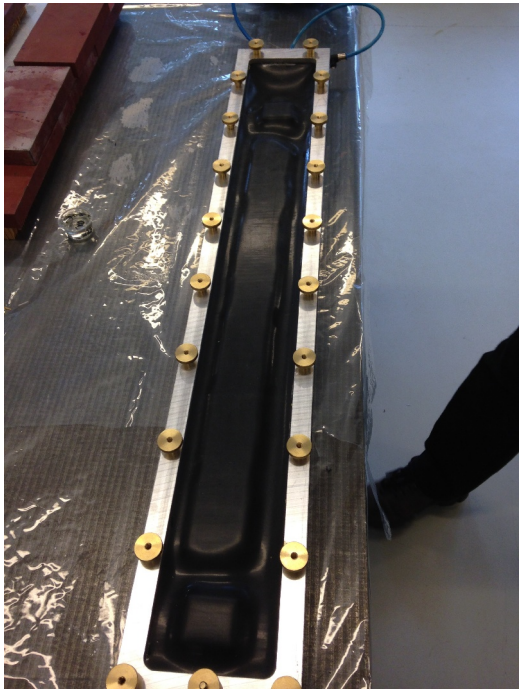
Wall Structure Test Pieces

- Dimensions as for previous test pieces from LP 1
  - Size 50 x 600 mm²
  - Honeycomb thickness 22.5 mm



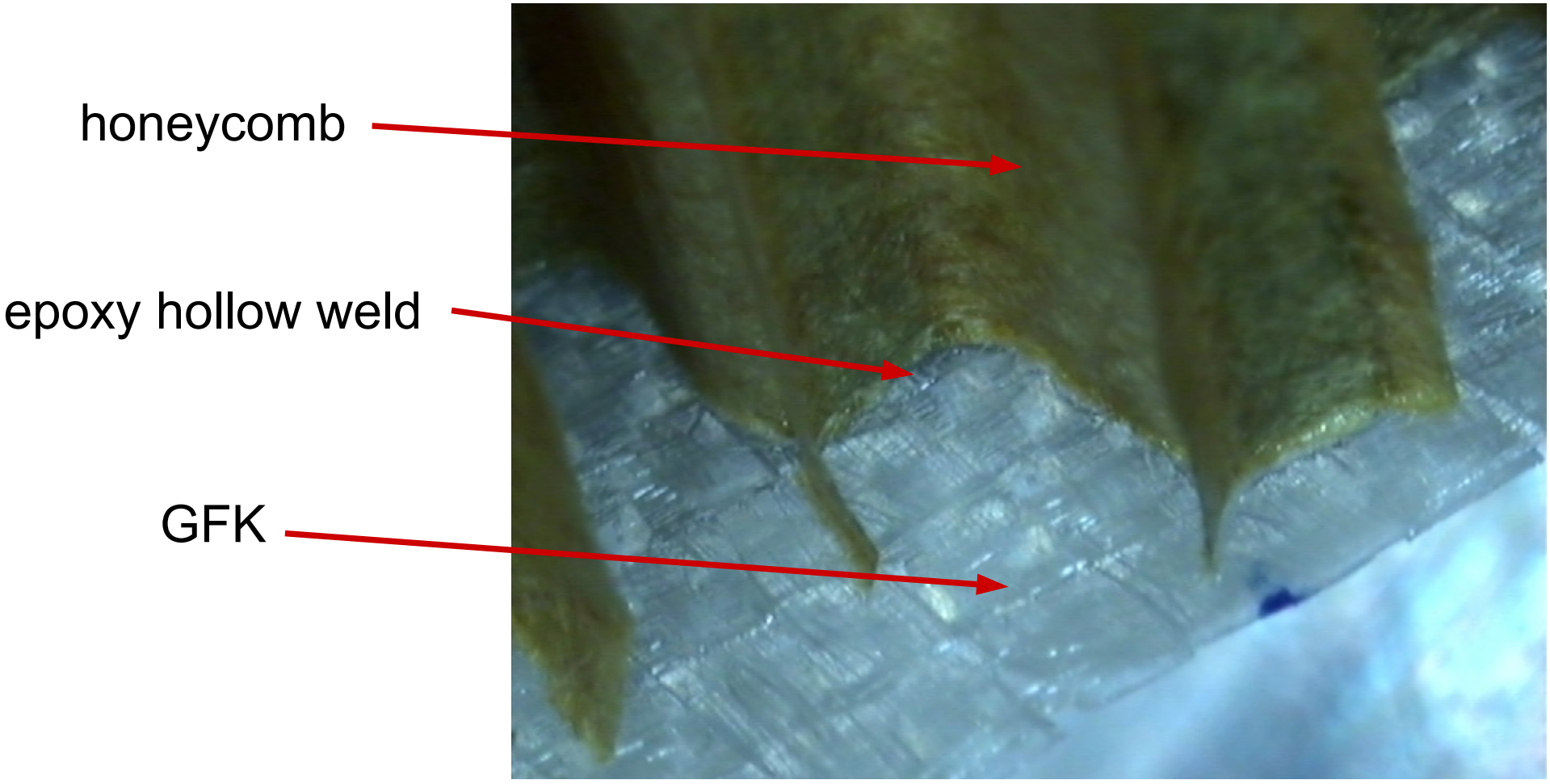
- First tries only to test glues and procedures:
  - Epoxid (hardener) L choosen (search ongoing)
- Different wall structures:
  - Different combinations of GFK, Nomex and honeycomb
  - Glue thickness
  - 11 sample pieces





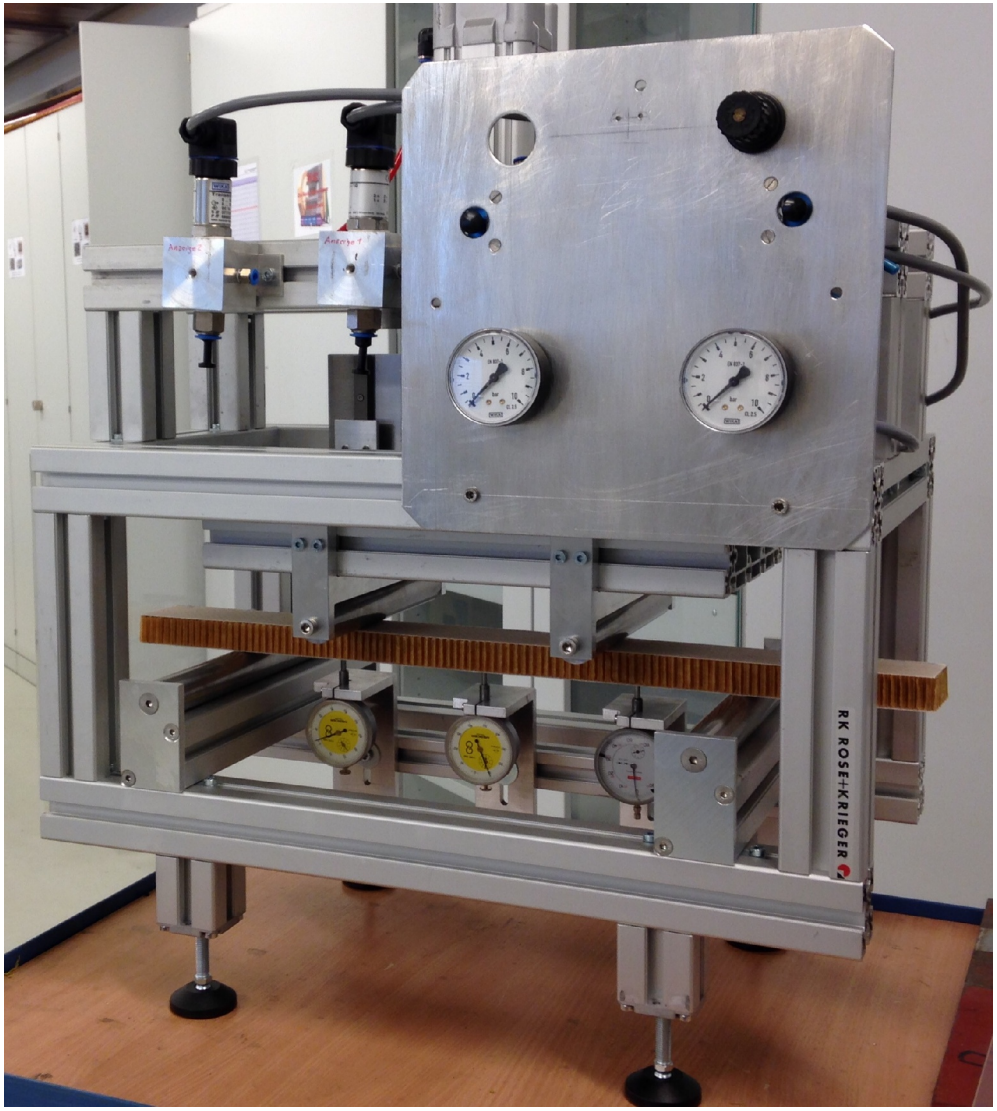
Glue Thickness

- Mechanical strength depends strongly on the hollow weld at the GFK/Nomex - Honeycomb boundary
- Amount of glue needed for nice hollow welds larger than expected from documentation of LP 1 field cage



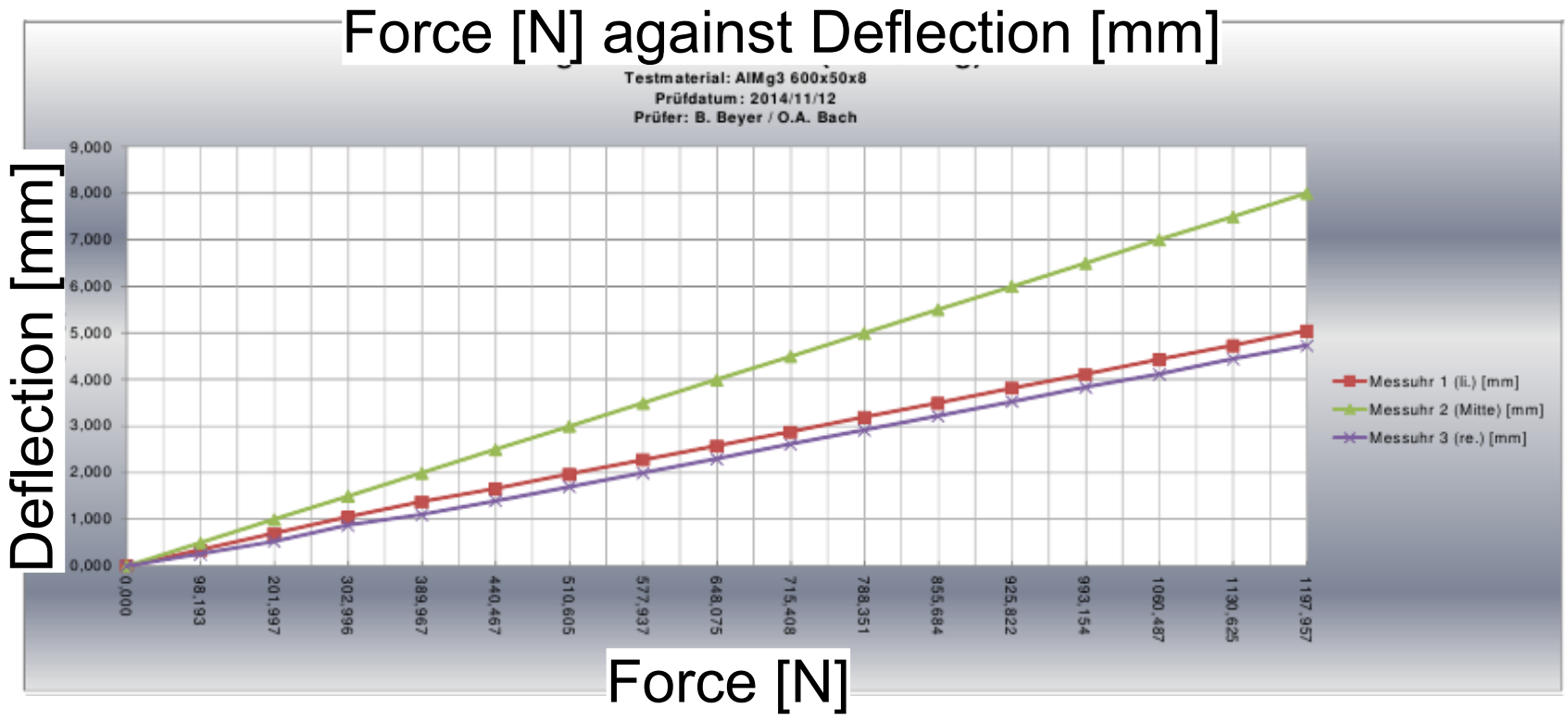
Bending Test

- Device constructed with same working principle as the one used for bending test for LP 1 sample pieces
- Pressure measured and converted to force
- Several micrometer gauges to measure bending
- Test until maximum force of ~ 1200N or delamination



Bending Test Results

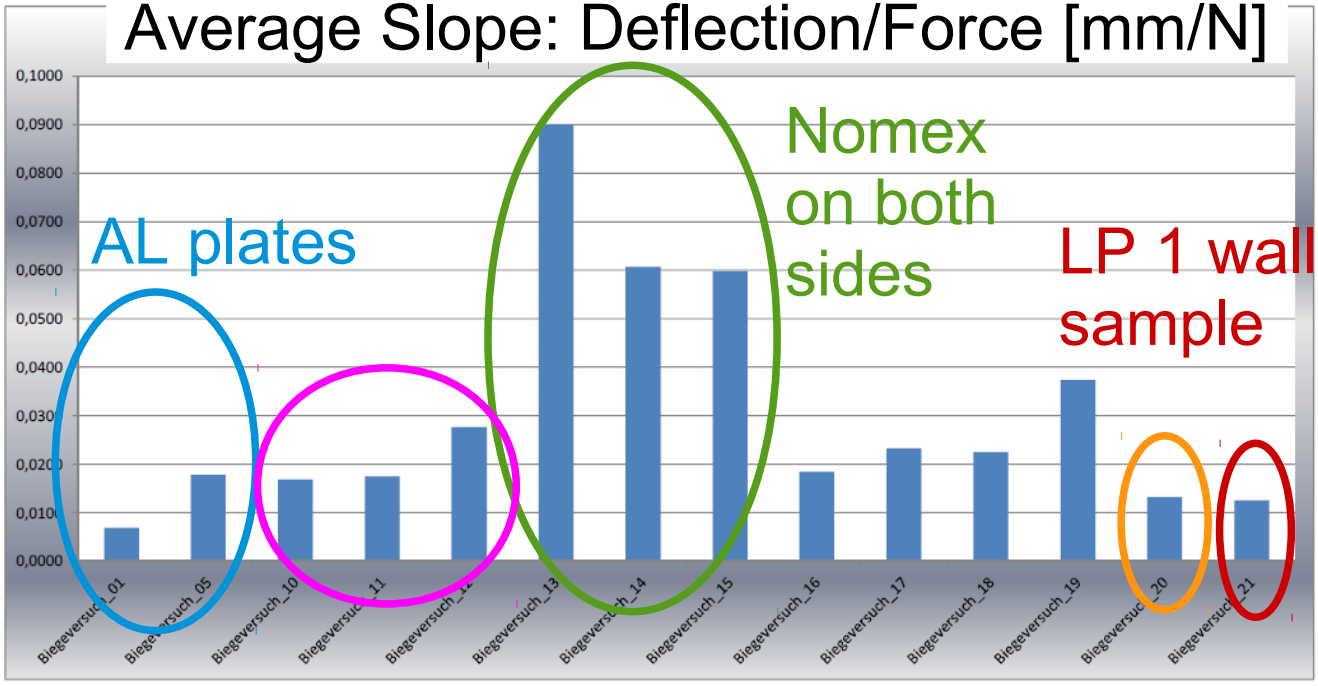
- Example for one test piece

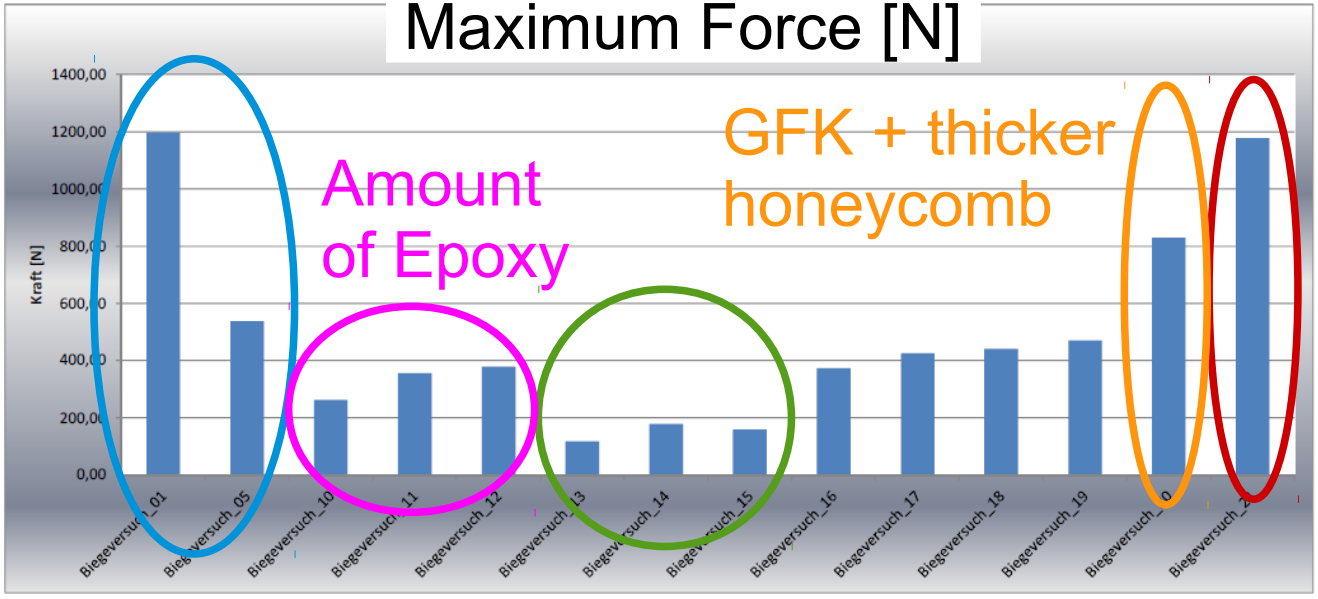


- Two Aluminum plates tested for reference
- One old sample piece from LP 1 for reference

Bending Test Results

- Piece with stronger honecomb comparable tp LP 1 reference (but delamination)
- Pieces with Nomex paper on both sides weakest
- Amount of glue:
  Not so large impact on strength but on delamination





Bending Test Outlook

- Ongoing:
  - Search for glues
  - Material tests (honeycomb, Nomex thickness)
  - Improvement of procedures
- 2nd batch of test pieces in preparation
- Strenght and stability needed for ILD TPC and LP 2 field cage currently being simulated/calculated
  (simulation model with Aluminum walls → bending tests give relation to composite wall structure)

Screw Inserts in Field Cage End Ring

- Idea: replace metal screw inserts and screws by ones made of Torlon to minimize material budget
- Strength test with Torlon test pieces finished
  - 2 kg force are applied in LP
  - At 25 kg: negligible lengthening
  - Tested up to 50 kg (creep behavior)
- Conclusion: Torlon fulfils requirements