

ALL ON EDGE

**Development of Objective
Test Methods for Furniture Edges and Rims**

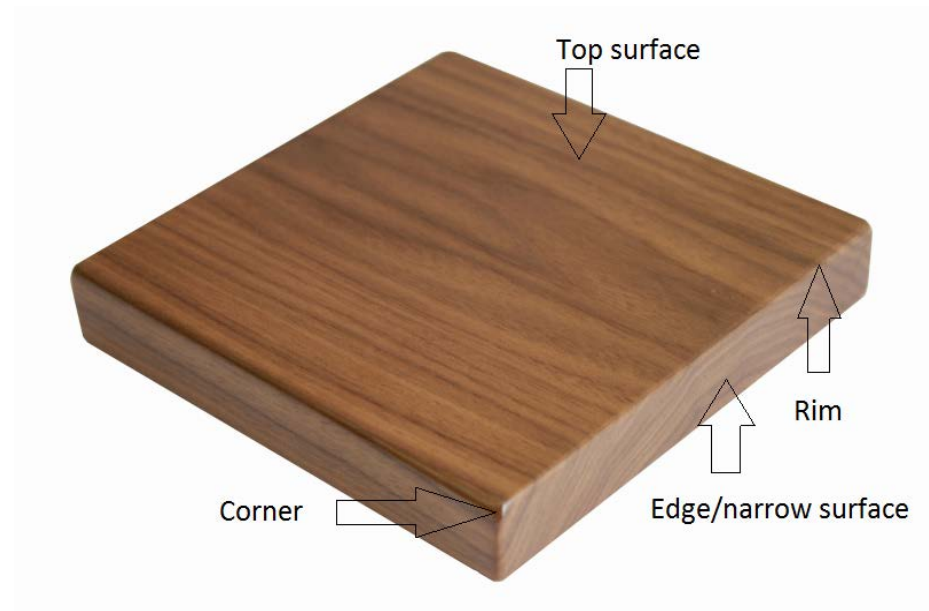
Work Package B

„Short-term methods“

– Part „Water and damp resistance“

Preliminary results

1. Work plan and time shift
2. Background
3. Material
4. Method and Equipment
5. Results
6. Outlook



Work Plan

WP-A
Mechanical and adhesion resistance

WP-B
Short-term methods

WP-C
Long-time prognosis

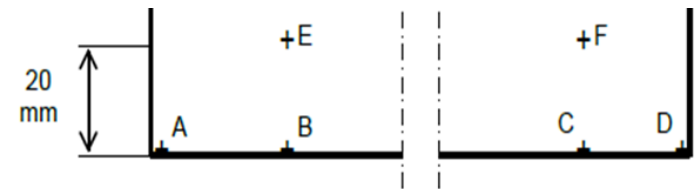
WP-D
Dissemination and Meetings

Work Package	Activity/Task
WP-A	Mechanical and adhesion resistance
Task-A1	Definition, production and providing of samples with different furniture edges
Task-A2	Methodological investigations on new test methods on impact on edges and rims
Task-A3	Methodological investigations on new test methods on adhesion resistance on rims
Task-A4	Comparative tests of the optimised methods on mechanical resistance
Task-A5	Round robin tests of optimized test methods on mechanical resistance
Task-A6	Final description of suitable methods for mechanical resistance
WP-B	Short-term methods
Task-B1	Definition, production and providing of samples with different furniture edges
Task-B2	Methodological investigations on new test methods on damp and water resistance
Task-B3	Methodological investigations on new test methods on contact heat and temperature resistance
Task-B4	Comparative tests of the optimised short-term test methods
Task-B5	Round robin tests of optimized short-term test methods
Task-B6	Final description of suitable short-term methods
WP-C	Long-time prognosis
Task-C1	Definition, production and providing of different coating/glue materials and furniture edges
Task-C2	Investigations on aging behaviour of coatings and glues under the influence of temperature and humidity
Task-C3	Methodological investigations on long-term prognosis
Task-C4	Comparative tests of the developed long-term methods
Task-C5	Round robin tests of optimized long-term methods
Task-C6	Final description of suitable long-time methods
WP-D	Dissemination and Meetings
Task-D1	Conference papers or articles
Task-D2	Technical reports and draft descriptions of test methods
Task-D3	User Committee Meetings
Task-D4	Project promotion - website, fairs, branch magazines etc.

- Time shift about 6 months (project prolonged)
- Problems with material delivery – method development with 6 materials only
- Status:
 - Methodological investigations on damp resistance finished
 - Comparative tests for damp resistance possible – problems with temperature distribution within the testing device
 - RRT postponed or change to water resistance RRT
 - Orientating methodological tests for water resistance finished

Background – IKEA IOS-TM-0002/5

- Applicability: finished kitchen and bathroom fronts
- Test tub with horizontal base, sponges and spaces (can be seen at ITD)
- Edge rests on the spacers
- Six measurement points A-F
- Time exposure: 1, 3, 6, 16, 24 h, 7 days
- Assessment: immediately after, 24 h and 7 days after the testing
- Results: rating 1 - 5 based on thickness swelling and visible damage like swelling, loose edgings, damage to glued joints, etc.
- **Need for: shorter testing time, simpler assessment and simpler rating (0-1)**

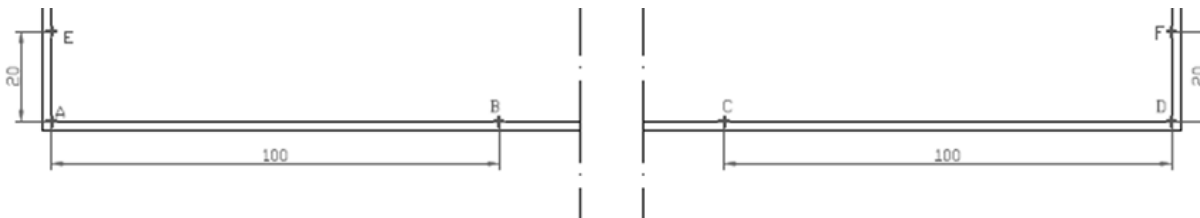
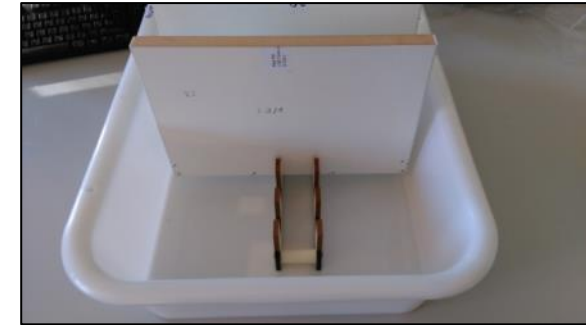


Rating	Criteria
5	No visible damage (see above). Thickness swelling shall be less than 0.05 mm.
4	Minor damage. Thickness swelling max. 0.1 mm. On wooden frame members an increase in width of max. 0.2 mm is permitted.
3	Moderate damage. Thickness swelling from 0.1 to 0.25 mm. Increase in front width of maximum 0.5 mm for frame constructions. The glue in the edging joint may have become soft but is still adhesive enough to keep the edging in place. The edging may loosen if it is exposed to mechanical strain (by pulling one hand over it). A few narrow cracks.
2	Significant damage. Thickness swelling from 0.25 to 1.0 mm. Increase in front width of 0.5-1.0 mm for frame constructions. Open glued joint or partly loose edging. Several narrow cracks.
1	Strong damage. Thickness swelling over 1 mm. Loose edging. Totally or partly damaged surface finish. Many narrow cracks or one or more broad cracks.



Method and Equipment

- Method: immersion of the tested edge in distilled water, 10 mm (IOS: 20 mm)
- Assessment: thickness swelling on 6 points along the edge of the tested specimen (IOS: two points in the middle of the sample), visual assessment
- Additionally for scientific purposes: measurement of weight gain
- Testing procedure:
 - 6 x [30 min water immersion and 30 min of drying]
 - 1 x 24 h of drying
 - drying occurs at 23 °C / 50 % RH



Method and Equipment

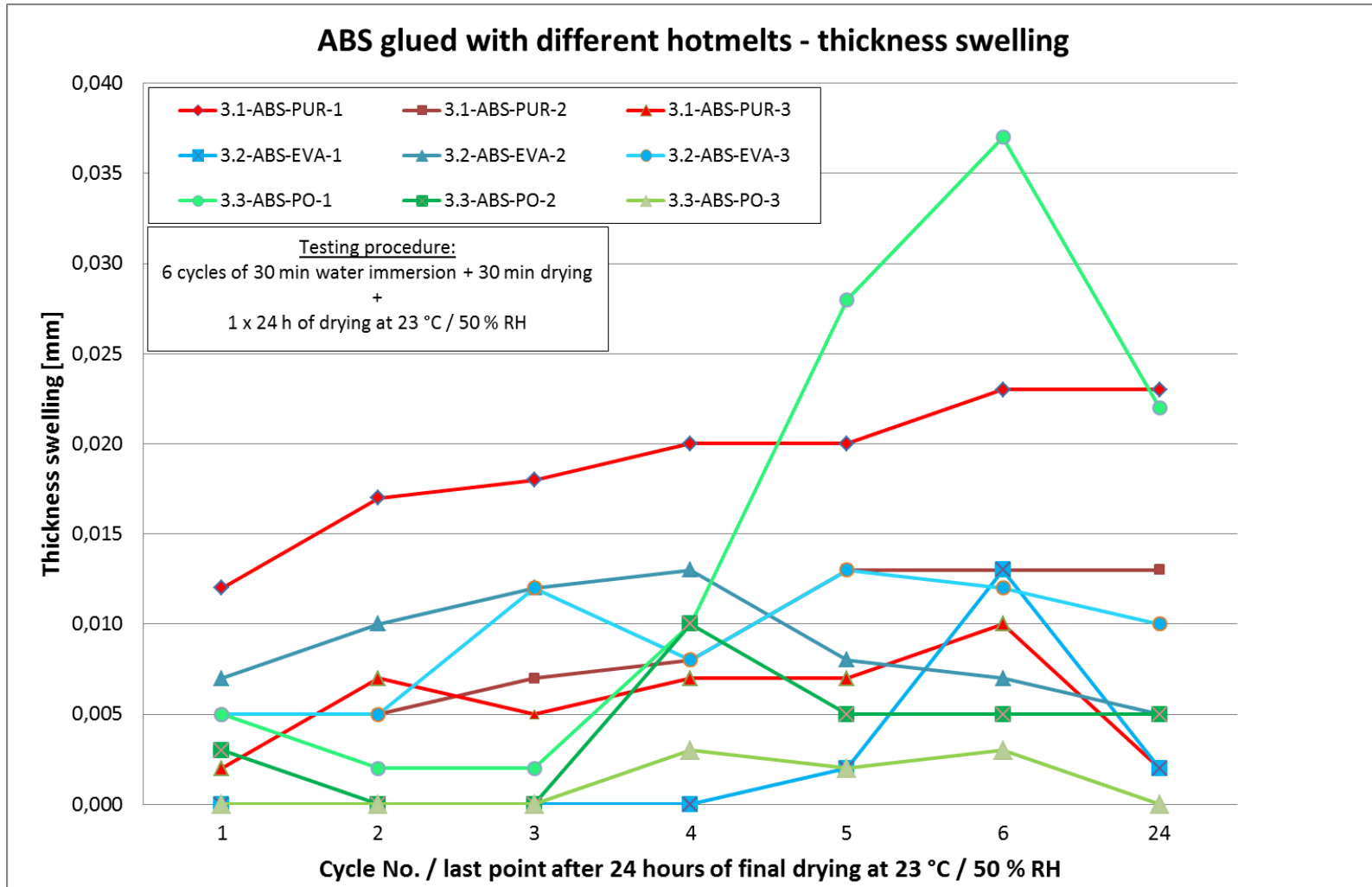
- Test pieces in their original dimensions (3 pieces per test)
- Pre-conditioning: 23 °C, 50 % RH, 7 days
- Immersion depth in distilled water: 10 ± 1.0 mm
- Room/water temperature: 23 ± 1 °C
- Six cycles 30 min immersion / 30 minutes drying
- In the end, 24 h of drying at 23 °C, 50 % RH
- No wiping off of the water droplets after each cycle

Material

- From the 19 materials agreed on, only 6 were delivered
- Green – available material

WP-B/C	Long-time prognosis				
Variant	Substrate	Material on the edge	Glue-Type for the edge	Material on the board surface	Profile-type
1.1	PB1	ABS1	PUR Hot melt	MF or HPL	flat
1.2	PB1	ABS1	EVA Hot melt	MF or HPL	flat
1.3	PB1	ABS1	PO Hot melt	MF or HPL	flat
2.1	PB1	PP1	PUR Hot melt	MF or HPL	flat
2.2	PB1	PP1	EVA Hot melt	MF or HPL	flat
3.1	MDF1	ABS2*	PUR Hot melt	MF or HPL	flat
3.2	MDF1	ABS2*	EVA Hot melt	MF or HPL	flat
3.3	MDF1	ABS2*	PO Hot melt	MF or HPL	flat
4.1	MDF1	PP2**	PUR Hot melt	MF or HPL	flat
4.2	MDF1	PP2**	EVA Hot melt	MF or HPL	flat
4.3	MDF1	PP2**	PO Hot melt	MF or HPL	flat
6.1	MDF	ABS	Polymer (laser)	MF or HPL	flat
6.2	MDF	PP	Polymer (laser)	MF or HPL	flat
7.1	MDF	Foils (PET or PVC)	Waterborne, 1K PUR dispersion	Foils (PVC)	3D PVC foil
7.2	MDF	PET	Waterborne, 2K - PUR dispersion	PET	3DPET
8.1	PB3	CPL	PUR Hot melt	HPL	flat
8.2	PB3	CPL	EVA Hot melt	HPL	flat
8.3	MDF2	HPL	PUR Hot melt	HPL	flat
8.4	MDF2	HPL	EVA Hot melt	HPL	flat

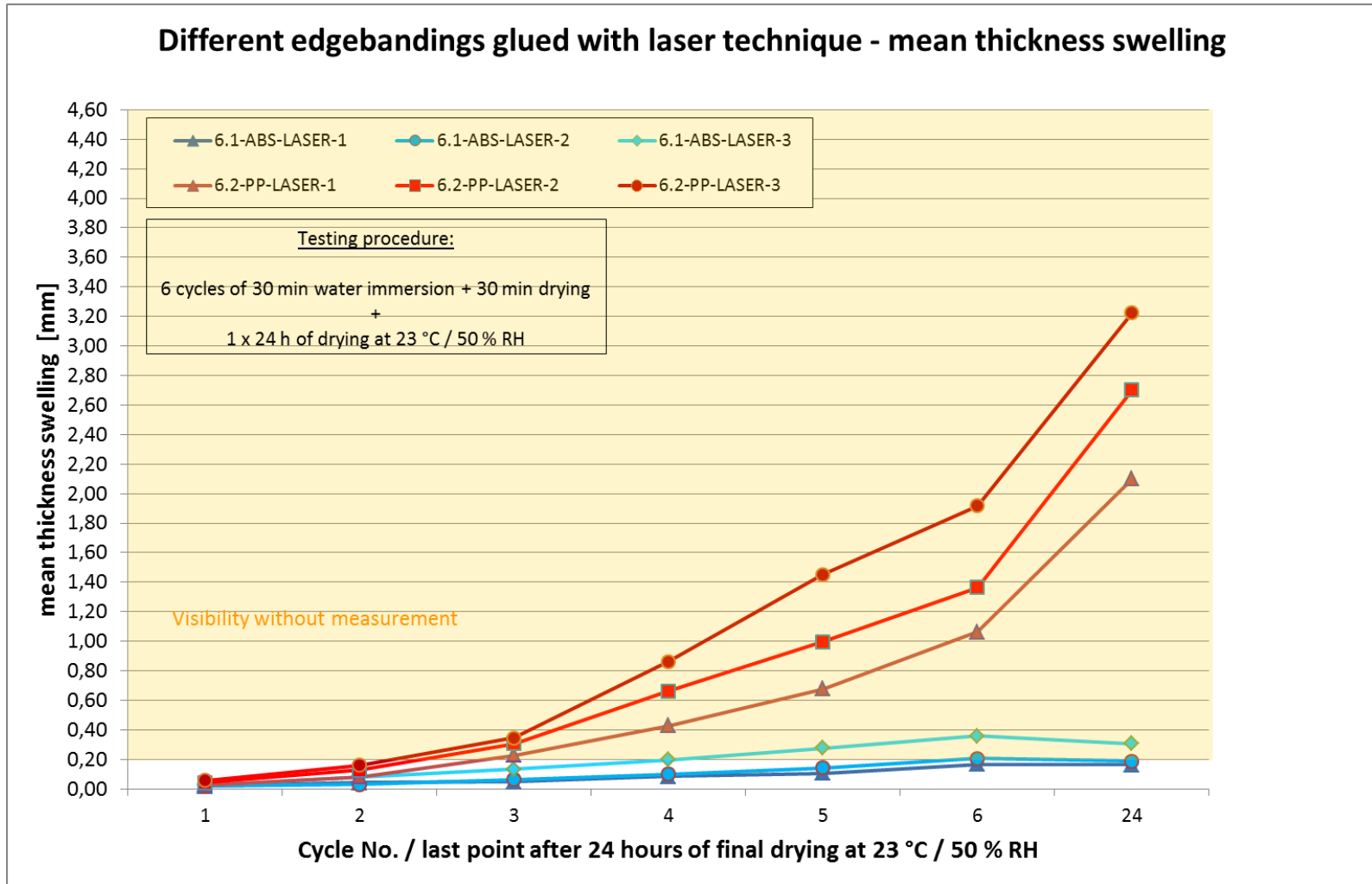
Results: Hotmelts



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- The current testing procedure did not allow any differentiation between the different hotmelts.
- For all cases, the final drying period leads to constancy or decrease of the swelling.
- Strong differences were observed between the specimens of the same variant.
- All results lie far below the value of **0.2 mm**, which is said to be the borderline value – up from 0.2 mm the human eye can see the damage.
- For hotmelts, a harder regime is needed to see any changes.
- Comparison with damp resistance test not possible at the moment, as the variants 3.1-3.3 were not available for the previous tests.

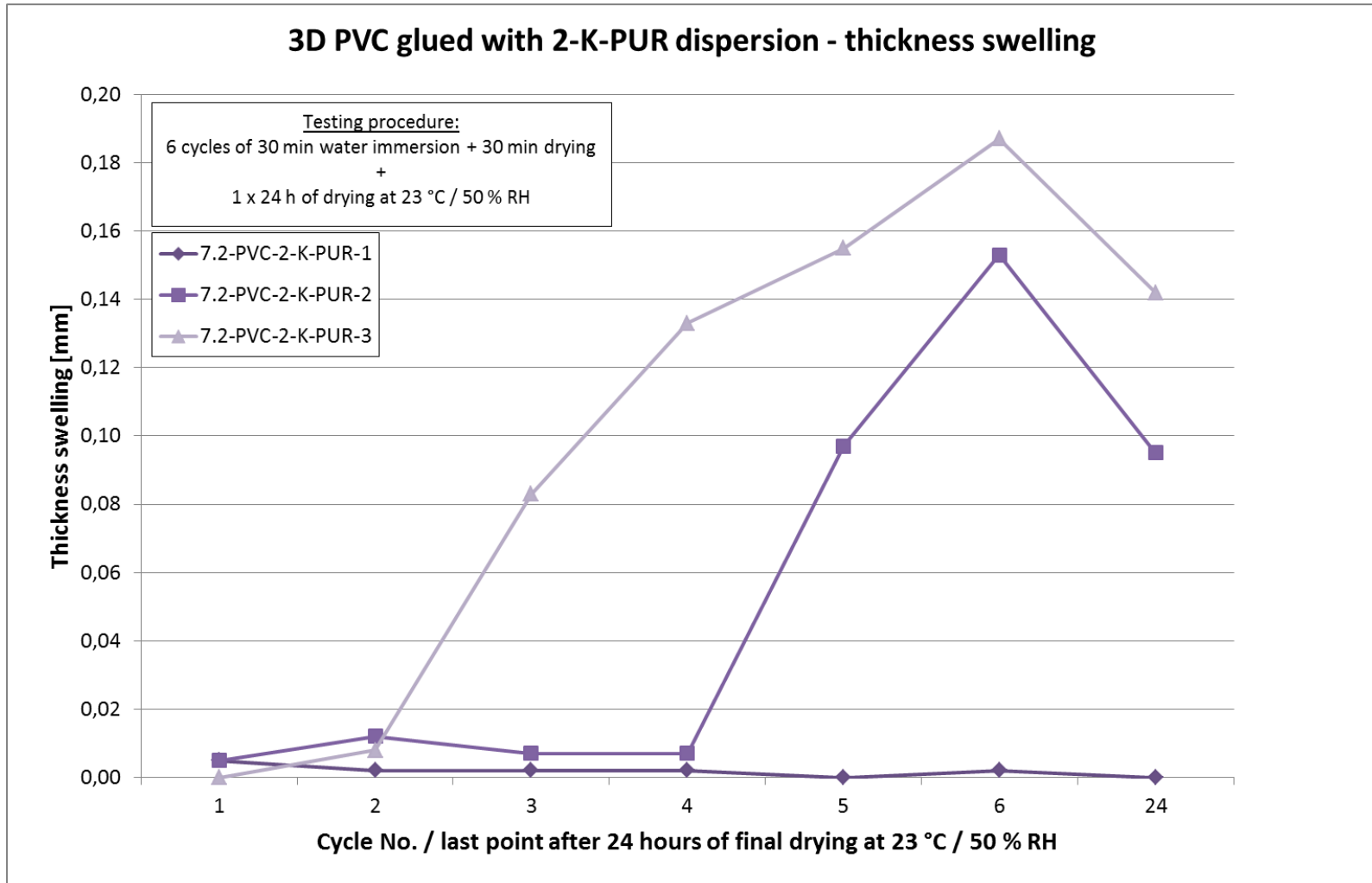
Results: ABS and PP, Laser Technique



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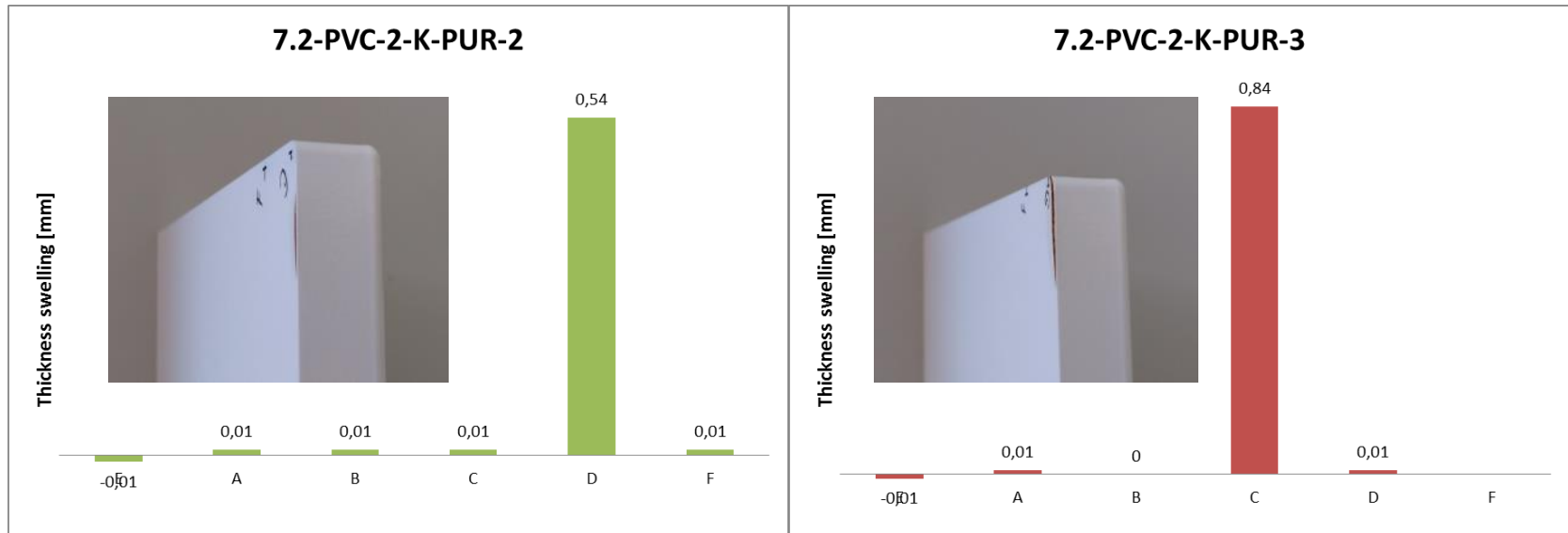
- Clear distinction between both groups possible.
- For PP, the problems begin always at the rim (connection PP-melamine).
- If the value of 0.2 mm shall be the limiting value, a differentiation can be done after 3 cycles.
- In case of samples 6.2 (PP), the final drying adds even more stress, for ABS samples (6.1), the swelling goes back. This could be due to the MDF quality rather than due to edge banding material.
- Also at the damp resistance testing, samples 6.2 were the weakest ones.

Results: 3D Front, 2-K-PUR Dispersion



Results: 3D Front, 2-K-PUR Dispersion

- Strong differences between single samples of the same type were observed – sample 1 underwent almost no changes at all, whereas samples 2 and 3 changed strongly.
- Nevertheless, all mean values lie underneath the threshold of 0.2 mm.
- Single values cross this borderline:



Results: **Mean** or **maximum** thickness swelling?

- Mean value is well comparable.
- On the other hand, if a furniture front is broken at one point, it shall be regarded as broken:

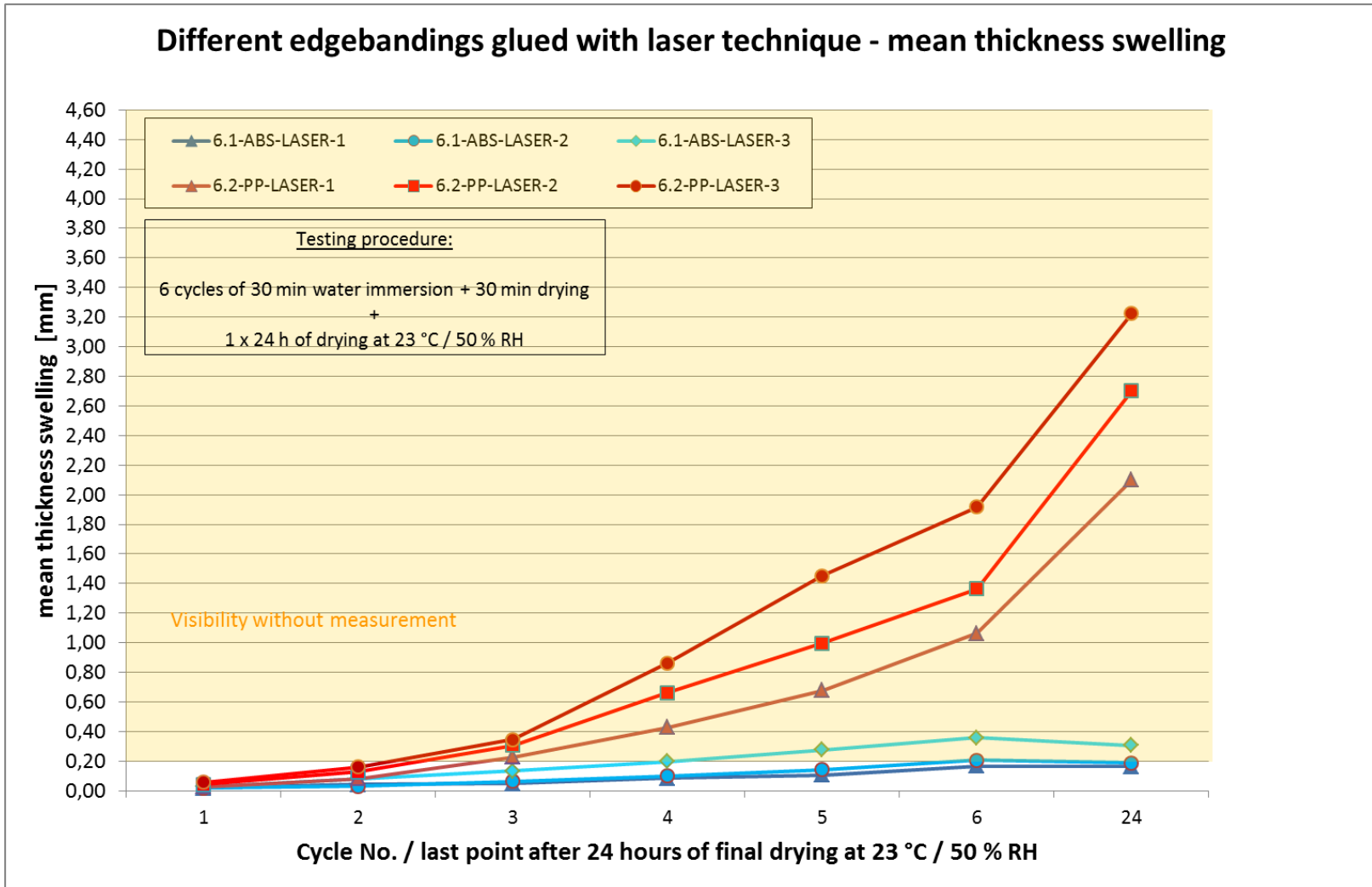


6.2

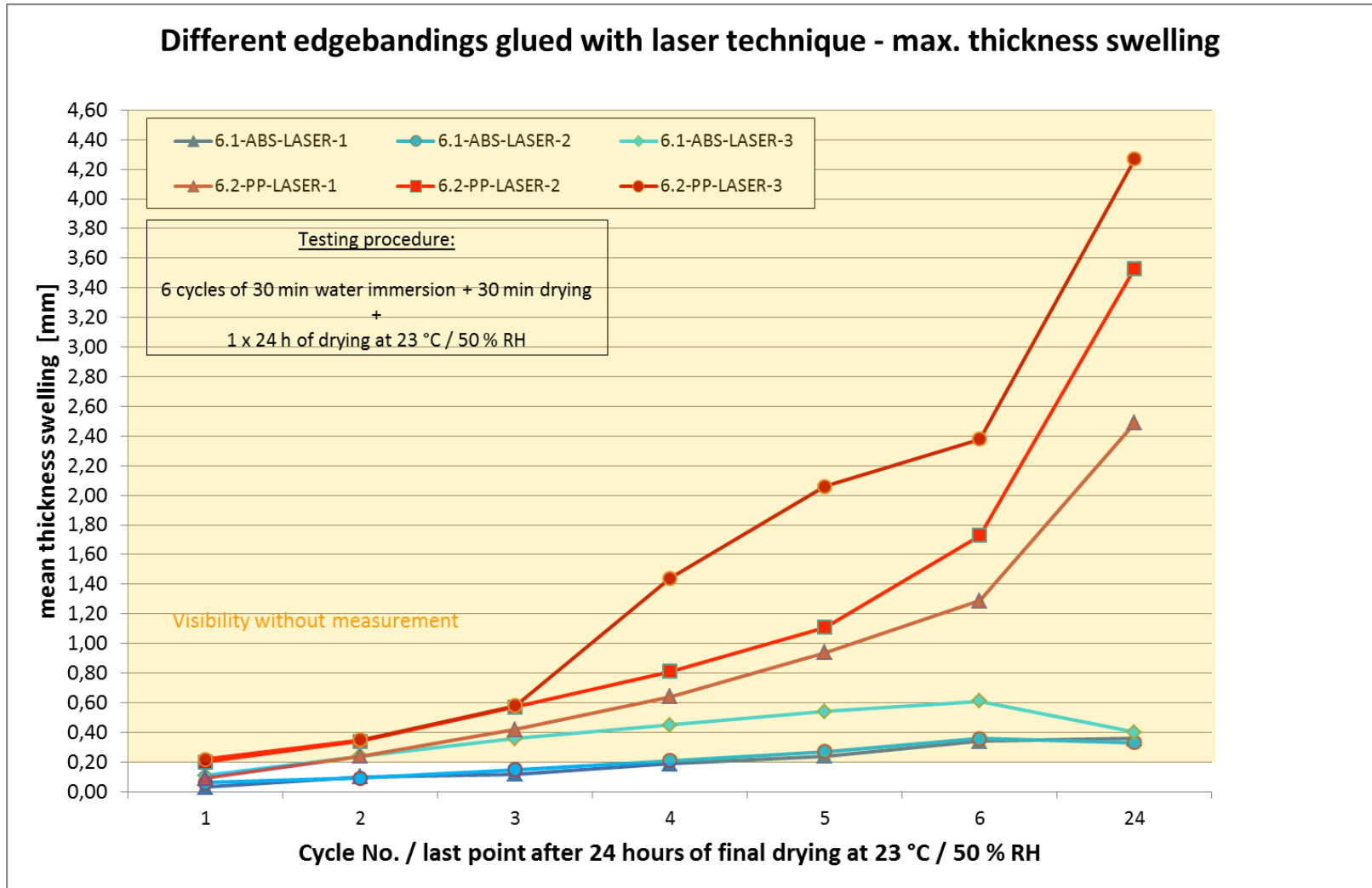


7.2/2

Results: Laser – mean thickness swelling

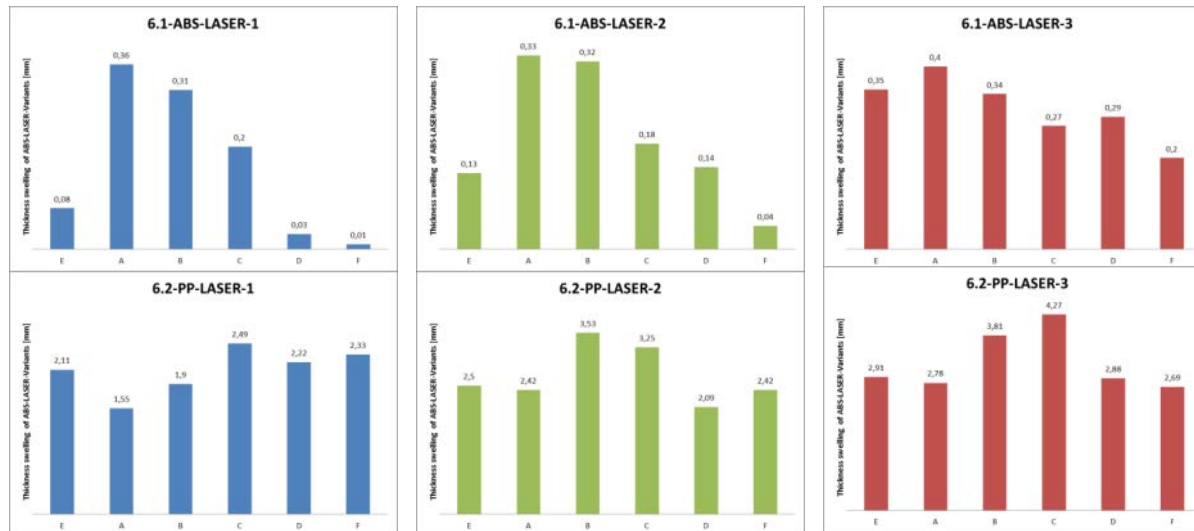
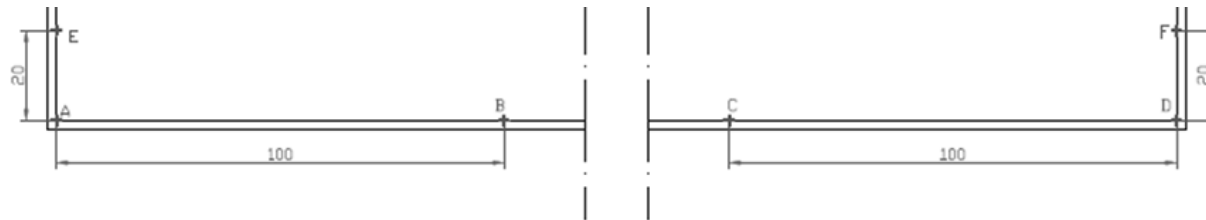


Results: Laser – **maximum** thickness swelling

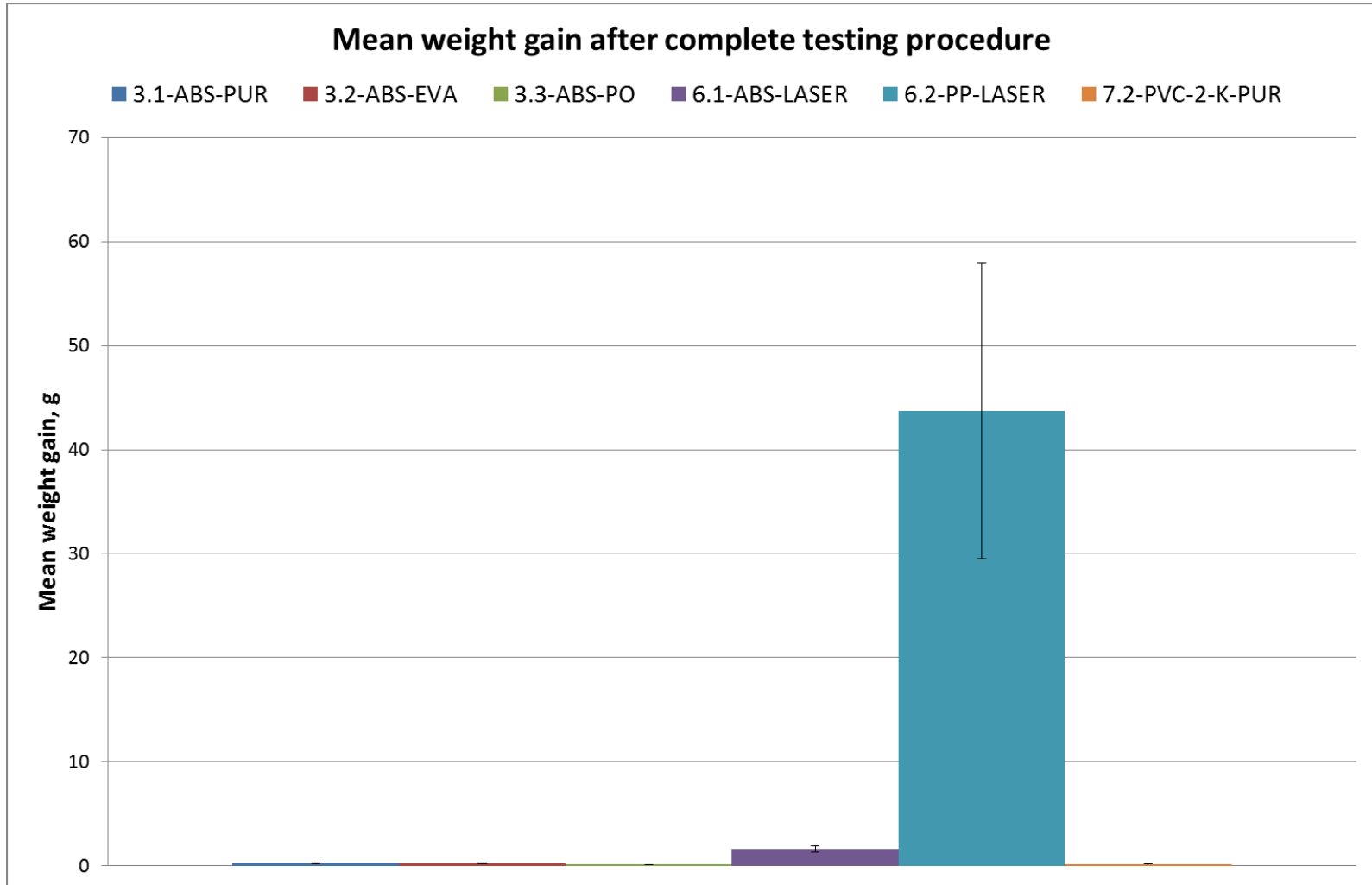


Results: **Mean** or **maximum** thickness swelling?

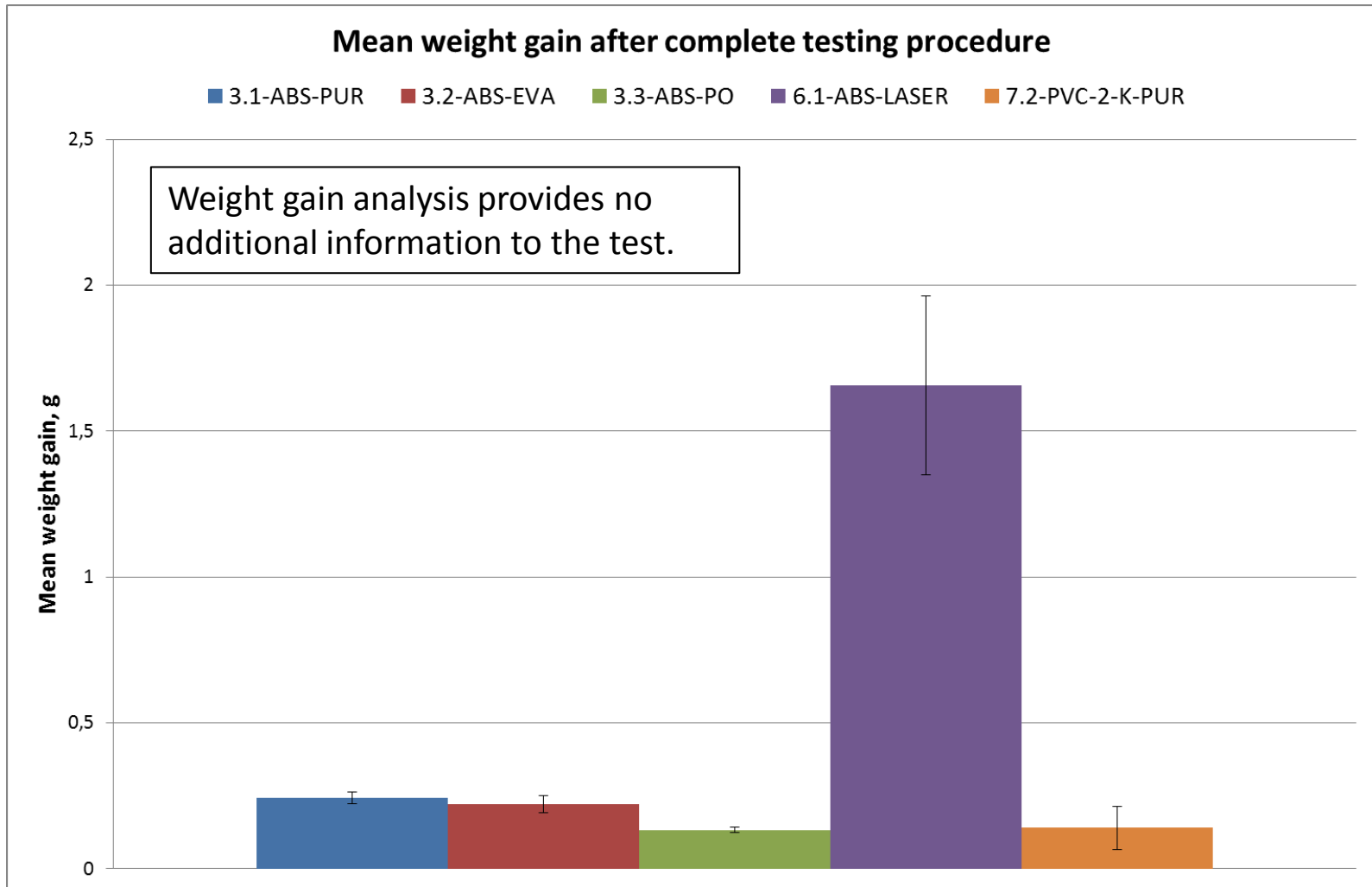
- The overall tendency is not disturbed when using max instead of mean, but the information is given sooner.
- Shall the maximum value be used instead of mean value?



Results: Weight Gain – complete results

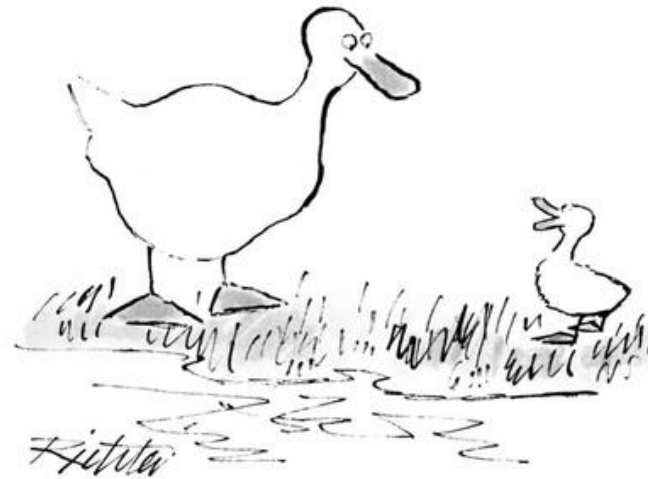


Results: Weight Gain – results without Variant 6.2



Summary and outlook

- The preliminary results do not allow a predicament of suitability of the procedure for further testing for all types of gluing, as a good differentiation does not seem to be possible at the moment
 - the procedure needs changing (harsher but shorter?)
- Weight gain analysis confirms the information from the test but gives no additional knowledge.
- It is crucial to pursue the tests with more samples of different qualities to develop a reliable and differentiating test method – **who can deliver some samples from the list?**
- RRT could start in Summer 2017 (July/August):
 - **Who would participate in a RRT on water and/or damp resistance?**
 - ITD
 - IHD
 - ...
 - ...
 - ...



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“Mom, are we waterproof or just water-resistant?”

Thank you!

