

ALL ON EDGE

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

Work Package A

**„Mechanical and adhesion resistance“
Part „Impact“**

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

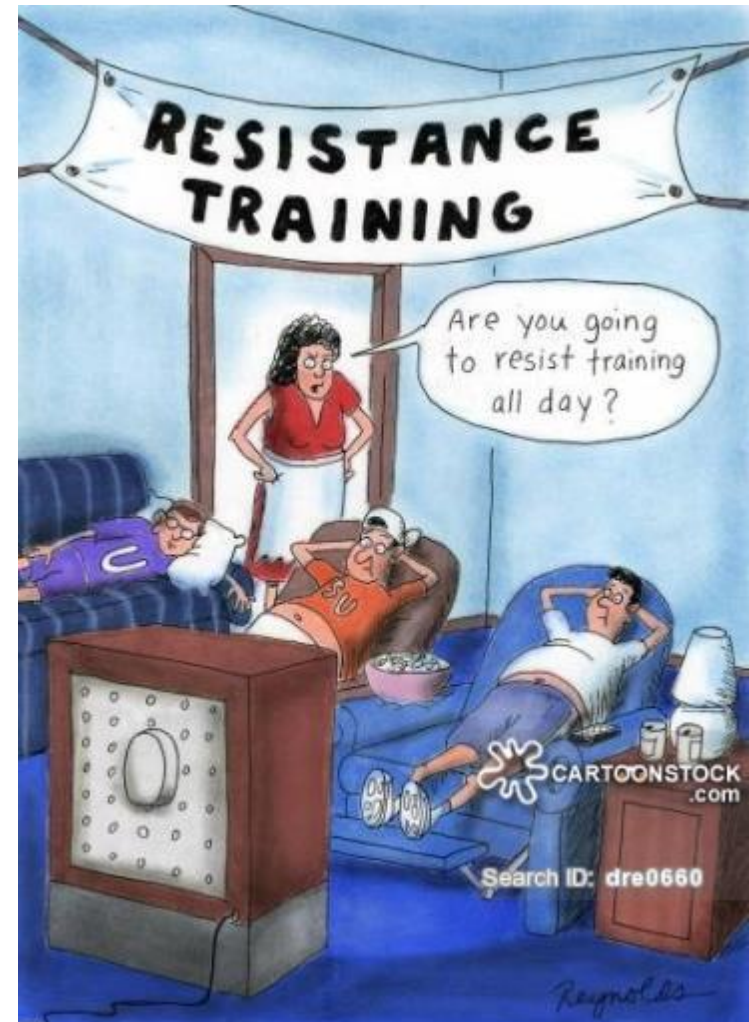
WP-B
Short-term methods

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.
- New test resistance device with different impact masses constructed.
- Comparative tests finished.
- RRT started, more participants needed.

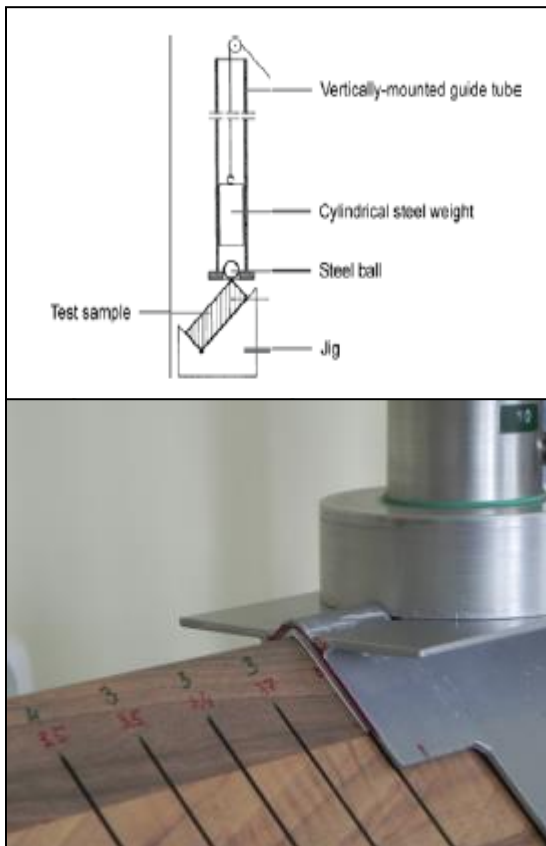


Background – IKEA impact method



- Applicability: finished fronts and worktops subjected to mechanical damage
- Impact test apparatus with a tube, cylindrical steel weight, steel ball (14 mm)
- Jig with milled groove which forms an angle of 45°

Background: IKEA impact method



- 5 measurement points with a spacing of 20 mm
- Ball **centered** and touching the edge
 - **Ball does not always touch the edge because of the different types of edge profiles.**
- Application of indicator to identify impact mark
- 45° (rim): **Only worktops**
- 90°: Top surface
- Results:
 - **rating 1-5 based on impact mark and damages** like cracks
 - **the largest impact mark diameter decides**
 - **problem: mark measurement**

Approach: a new method based on resistance to impact acc. to IHD works standard 470 (90 ° / 45 °) for indoor doors

- Testing of door edges with: edge band, HPL, CPL, coatings on wood.
- Free fall of a steel ball from a defined height on the tested edge or narrow surface.
- Evaluation of the realized impact footprint.
- Assessment of other errors (delamination, edge-peel-off etc.) not included anymore.
- **Only the criterion cracks / no cracks shall decide at the end!**

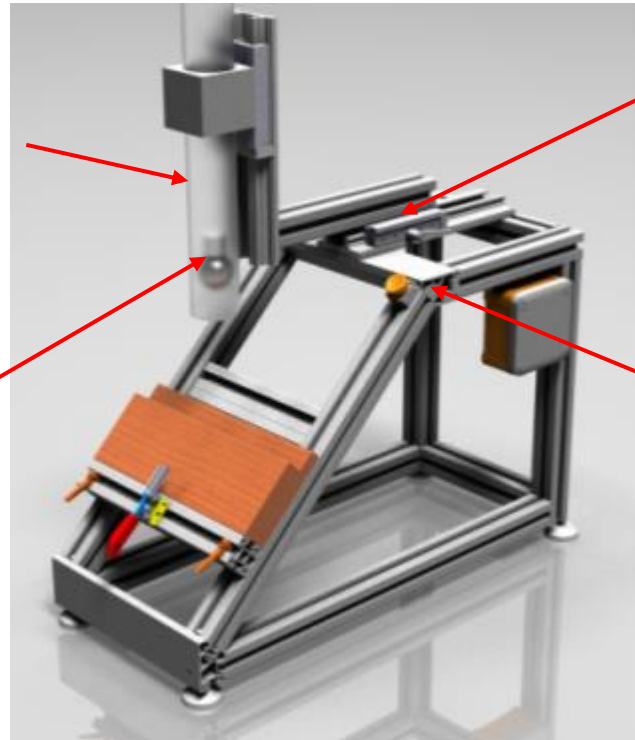
Appliance 1 (prototype):

Based on resistance to impact acc. to IHD work standard 470 (90°/ 45°)

Downpipe with adjustable height and measuring scale

Electromagnet with steel ball and adjustable height

Modification:
adjustable falling mass



Shifting appliance for the downpipe for positioning over the tested edge

Open question:
positioning of the ball

Optional hinge for change of impact angle between 45 ° and 90 °

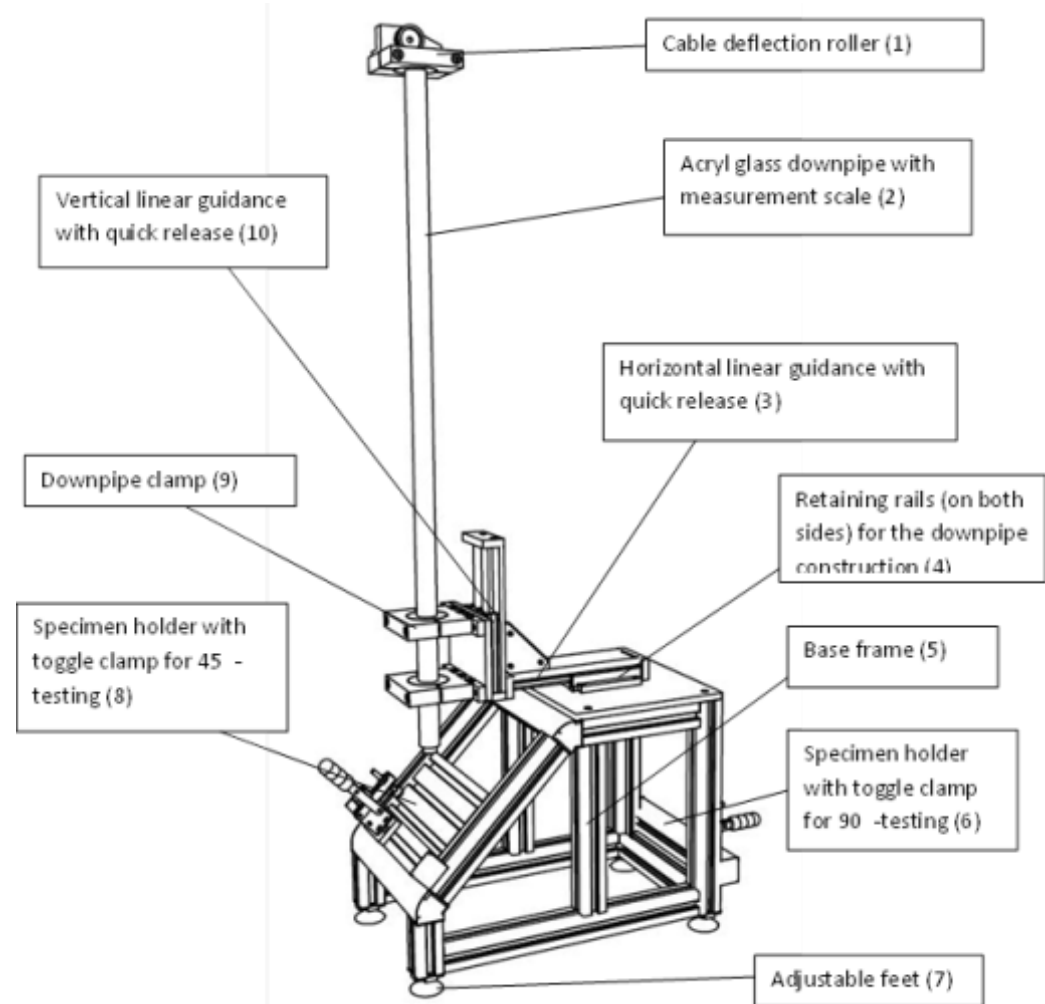
Modification:
testing at 90 °
at the rear side



Conclusions from the previous investigations

- Colouration of the cracks is helpful.
- Easy assessment also with patterned rims, if the rim is well formed.
- Accurate positioning of the ball is important.
- Differentiation between different types of cracks does not seem reasonable.
- For furniture parts, damages can occur at top surface and edge or on one of both – clear assessment method necessary.
 - The biggest damage decides.

Appliance 2: Finished testing device with different impactors



Appliance 2: Finished testing device with different impactors

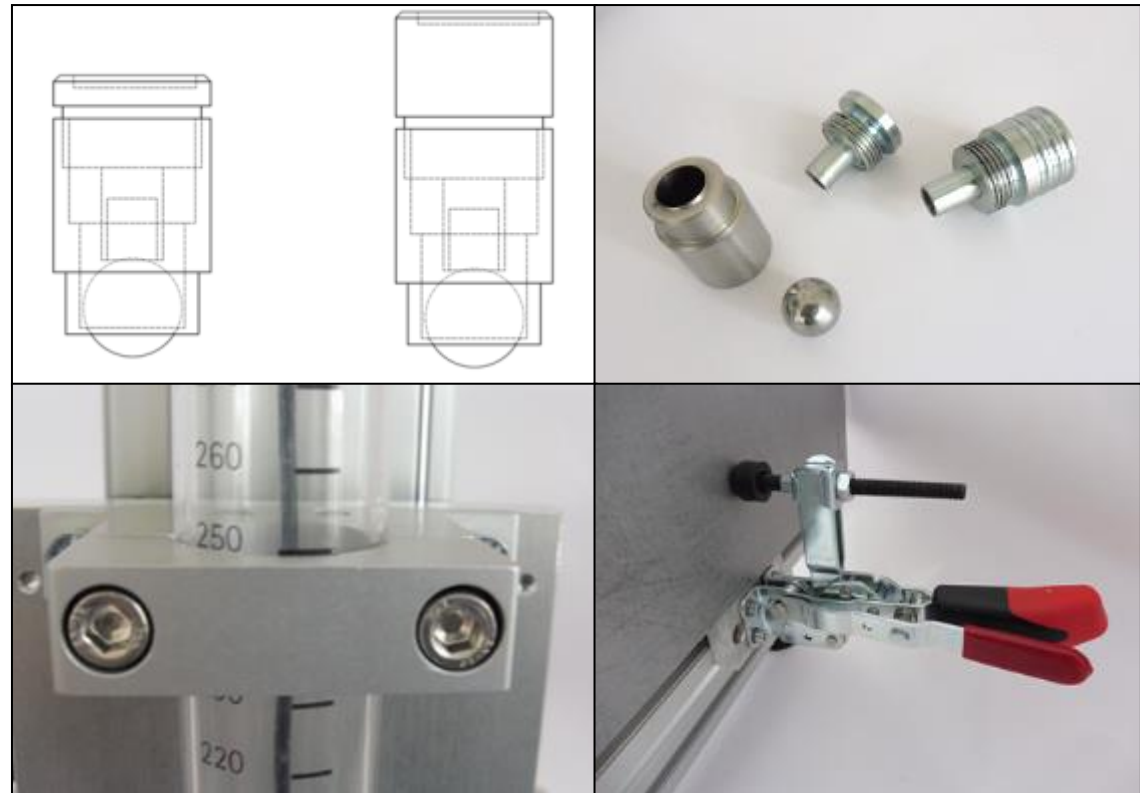
Mass change is realised through a defined weight of the upper part

100 g

150 g

100 g

150 g



Finished testing device for impact resistance

- + Suitable for all furniture fronts and worktops at both angles.
- + Clearly defined impact (falling mass and ball diameter).
- + Exchangeable ball with reasonable price (ca. 2-5 €).
- + Possibility of simple mass change – if necessary.
- + Good ability of positioning of the impact with two angles (45°, 90°).
- + Defined clamping of the sample.
- + Prevention of impact repetition possible.
- + Simple testing procedure, described in a draft Works Standard of IHD.
- + Test device will be commercially available at EPH Dresden after the project.



Works standard

INSTITUTE of WOOD TECHNOLOGY DRESDEN gemeinnützige GmbH

DRAFT - Determination of the impact
for Furniture parts
IHD-W-4xx

Issued by: at:
Reviewed by: at:
Approved by: at:



Material for the investigations of impact resistance

- Same type of adhesive per group and technology where other values vary
- Green – available material

Variant	Substrate	Edge-Material type	Profile type
A-I-1	Particleboard	HPL1	flat
A-I-2	Particleboard	HPL2	flat
A-I-3	MDF	Powdercoating (low bake)	Rounded
A-I-4	MDF	Powdercoating (UV)	Rounded
A-I-5	Melamine faced PB	ABS (1 mm, 2 mm thick)	flat
A-I-6	Melamine faced PB	ABS (3 mm thick)	flat
A-I-7	Particleboard	Postforming HPL	Rounded
A-I-8	Particleboard	Postforming CPL	Rounded
A-I-9.1	Wood soft	Wood lacquered	Ogee
A-I-9.2	Wood hard	Wood lacquered	Ogee
A-I-10.1	Wood soft	Wood lacquered	Roundover small
A-I-10.2	Wood hard	Wood lacquered	Roundover small
A-I-11	MDF + pigmented UV Coating	Pigmented 1K coating	Flat / other
A-I-12	Melamine faced with pigmented coating	Melamine edge, band and pigmented coating	Flat
A-I-13	Polyester with high gloss	Polyester (high gloss)	flat
A-I-14	MDF with UV laquer 1	Waterborne acrylic lacquer 1	flat
A-I-15	MDF with UV laquer 2	Waterborne acrylic lacquer 2	flat

Investigation parameters

- Falling heights: 50..600 mm, steps of 50 mm
- Falling masses: 100 and 150 g
 - Goal: one mass, different falling heights.
- Ball diameter: 16 mm
- Impact on the rim (45 °) and on the edge (90 °)
- Colouration of the marks

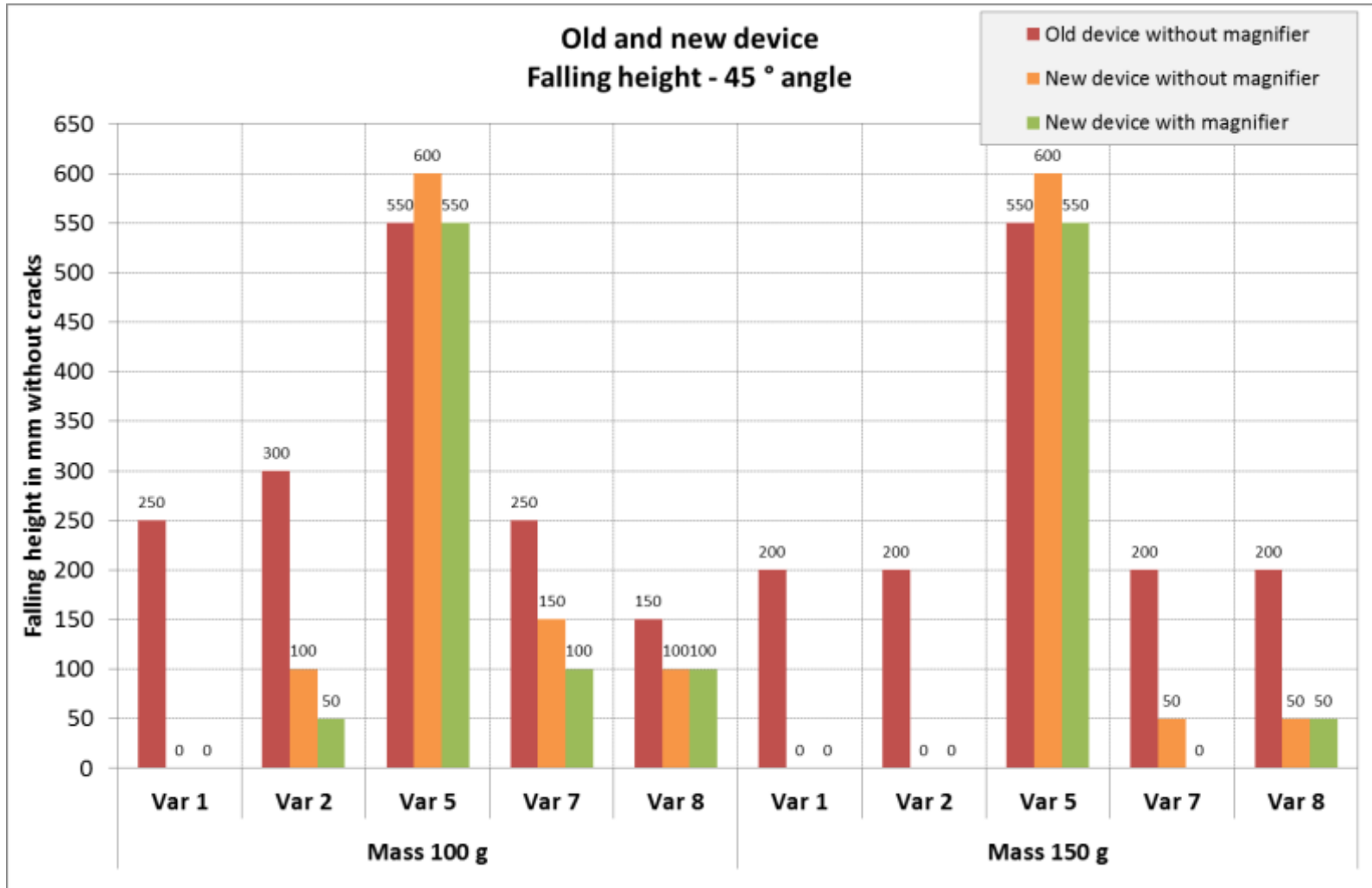


Assessment

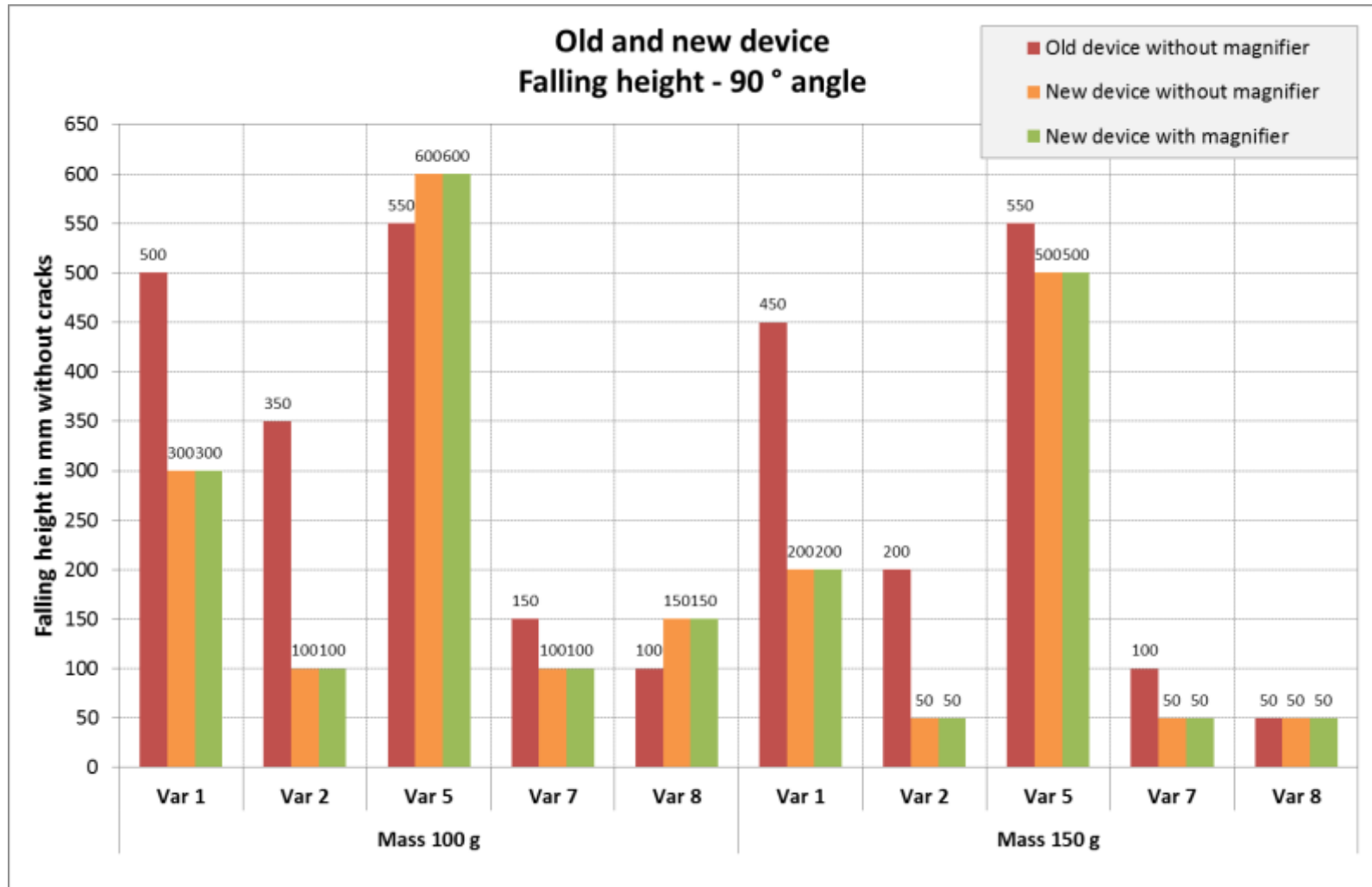
- Visual assessment using contrast powder (if necessary) and magnification glass (10x)
 - for comparison, also investigations without magnifier were carried out
- Assessment protocol:
 - “+” means “cracks spotted”
 - “-” means “no cracks”
- Result: The last falling height, at which no marks were spotted
 - “0” results possible!



Results: Old vs. new device, rim testing



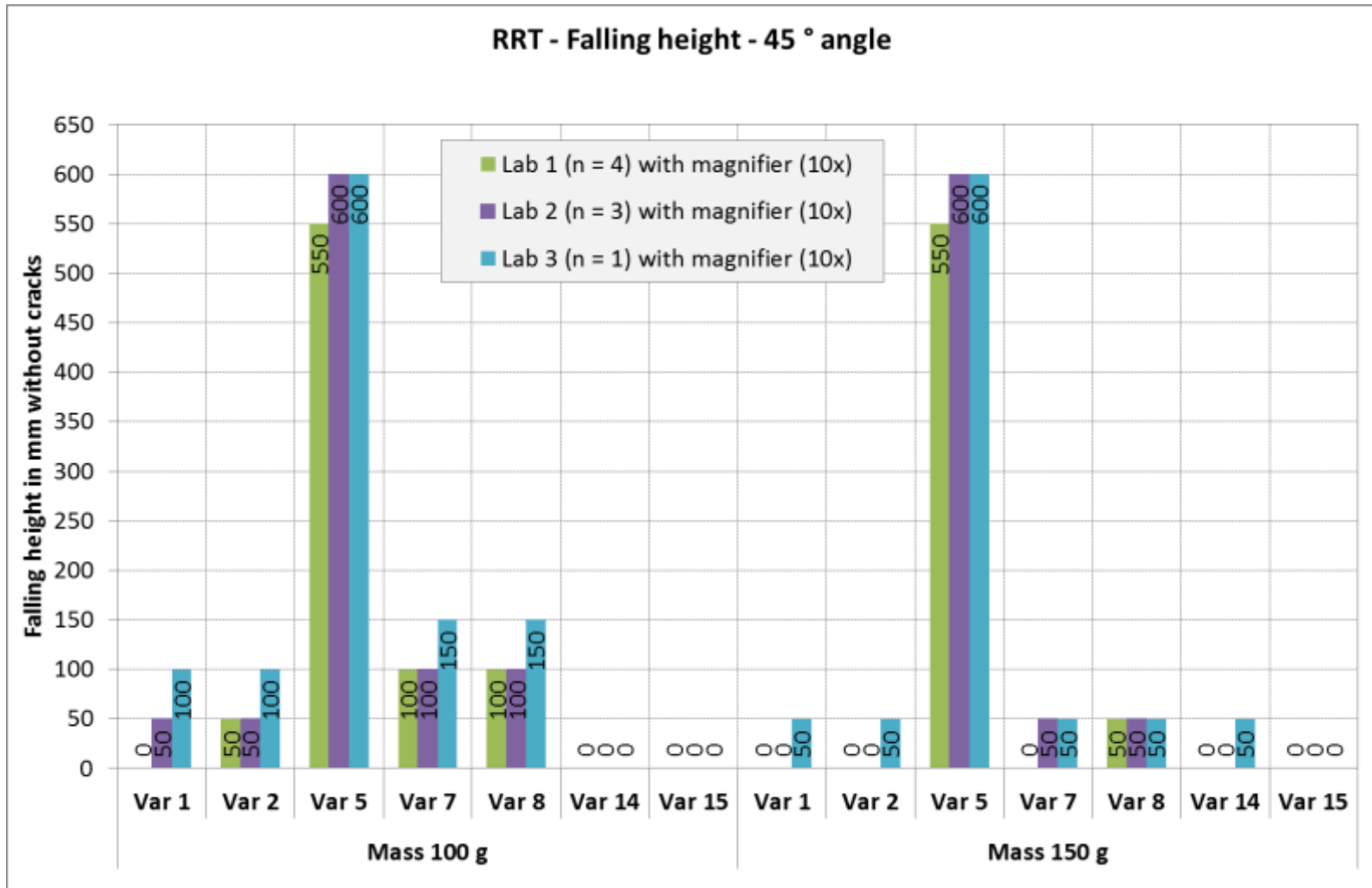
Results: Old vs. new device, edge testing



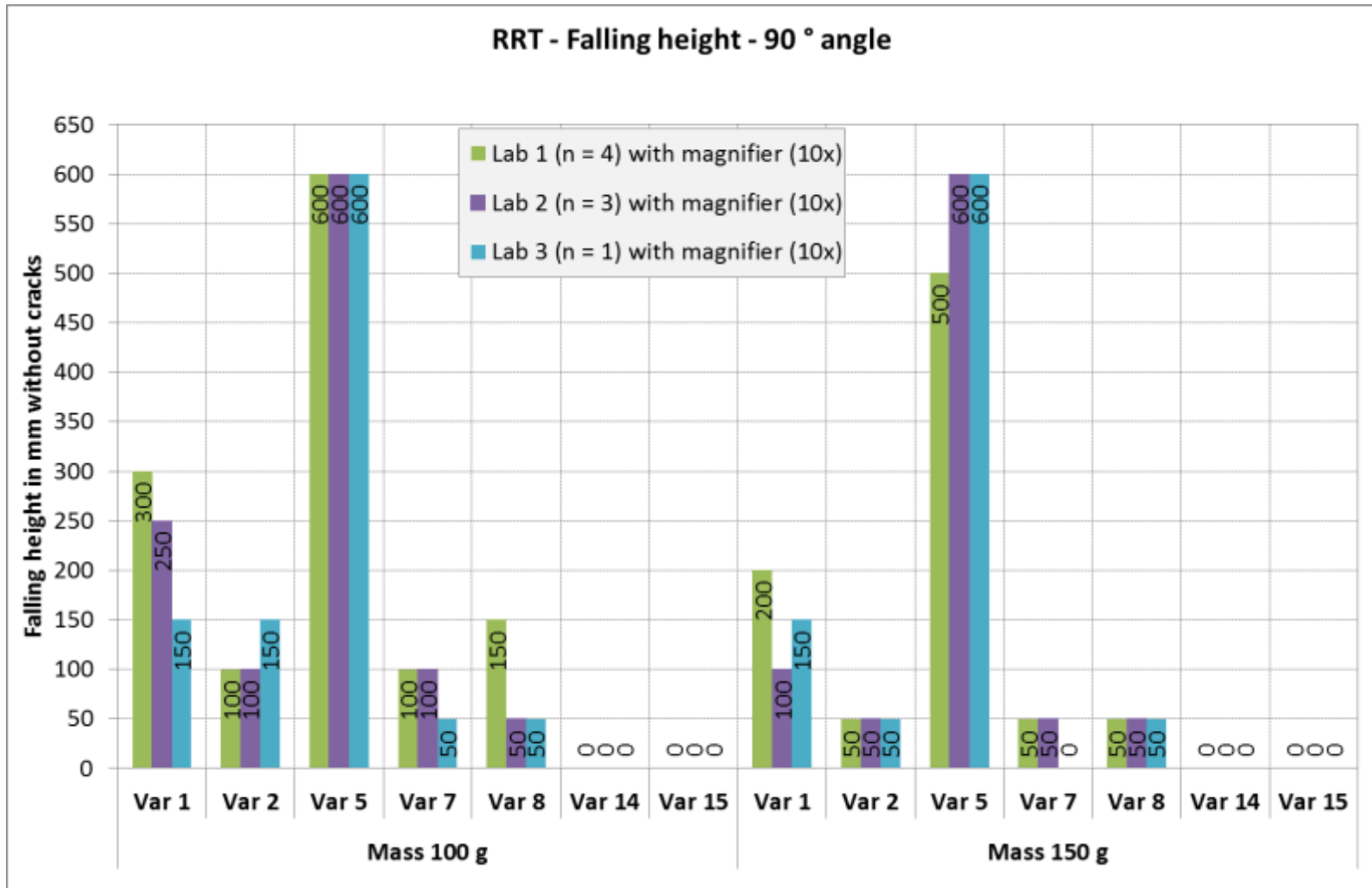
Results: Old vs. new device

- For the most materials, the falling heights without cracks are lower with the new device
 - For other cases, the height is the same or only one step higher
- Using magnifier lowers in some cases the result
- The new device allows a clear differentiation between the qualities
 - For lower mass, the differentiation possibility is higher

Preliminary results of the RRT (not finished yet!) – rim testing



Preliminary results of the RRT (not finished yet!) – edge testing

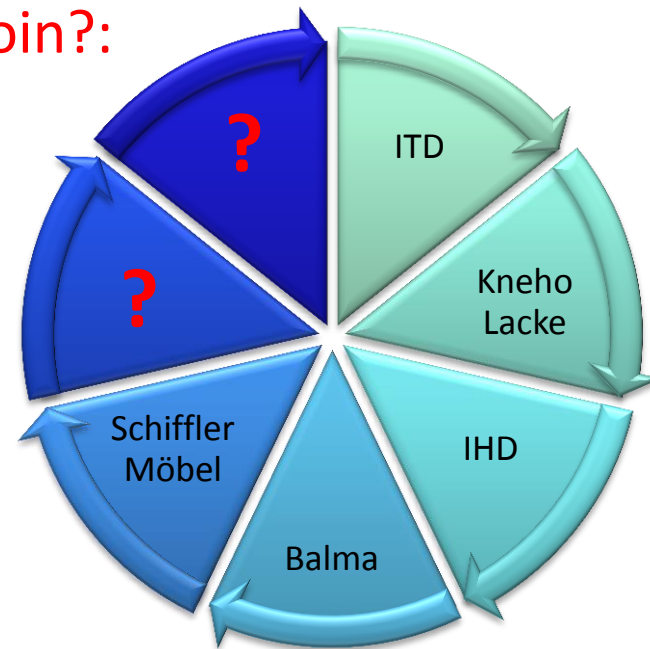


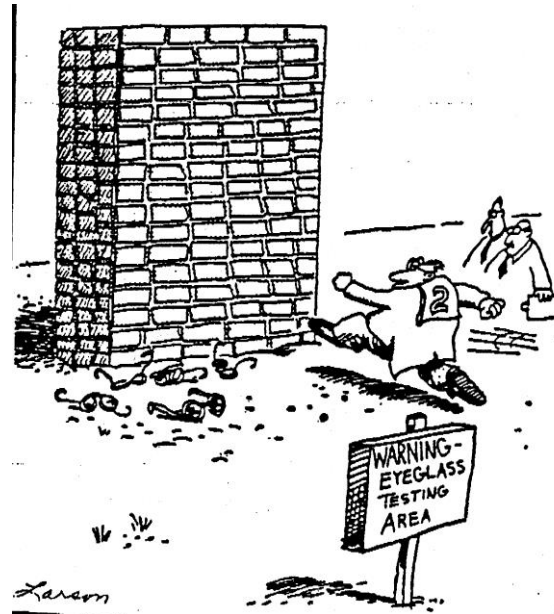
Preliminary results of the RRT

- The method seems to have a very good repeatability and reproducibility
 - this must be confirmed by further RRT participants
- Also the RRT has shown until now a clear differentiation between the qualities

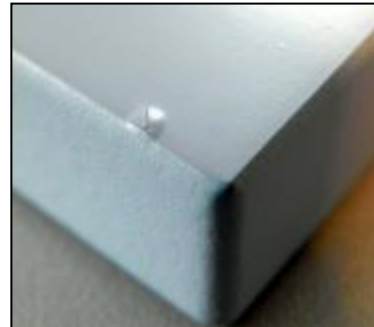
Summary and further work

- The proposed method and device are suitable for rim and edge testing.
- Best parameters need to be found in the RRT.
 - Proposal: 100 g and 150 g, different heights (5-60 cm).
- RRT participants – **who could join?:**
 - ITD
 - Kneho Lacke
 - IHD
 - Balma
 - Schiffler Möbel
 - ?
 - ?





Thank you!



Contact: Małgorzata Anna Adamska-Reiche, anna.reiche@ihd-dresden.de