

Marcus HERING – Doctoral Project A5/I

## STRENGTHENING OF PLANE REINFORCED CONCRETE ELEMENTS AGAINST IMPACT ON THE IMPACT-FAR SIDE

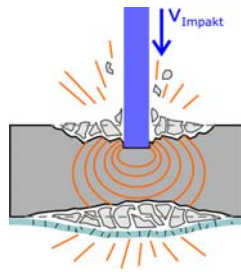


### 1 OBJECTIVES

- Investigation of strengthening of the rear side using thin strengthening layers
- Materials: steel and carbon reinforced concrete, SHCC, TRC, etc.
- Systematic experimental investigations
- Description of a damage characterization
- Development of an engineering model

Subgoals:

- Investigation of materials suitable for strengthening against impact
- Comparison of RC plates with/without strengthening
- Quantification of damage
- Assessment of structural damage and of impact resistance



Rear side after impact  
Graphics: GRK 2250

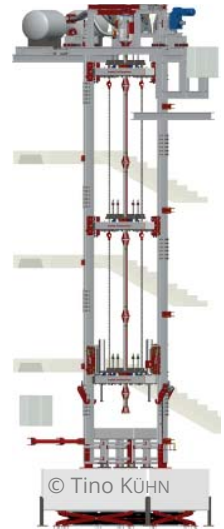
### 2 METHODS



Small scale experiments: thin plates of pure strengthening layer

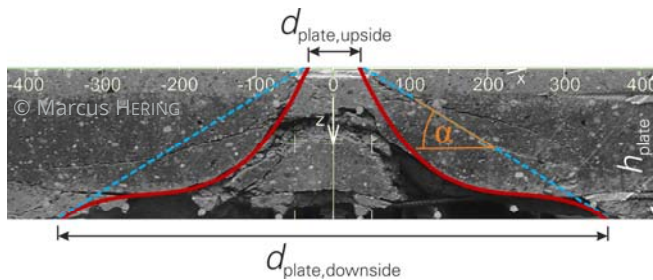


Large scale experiments: RC-plates

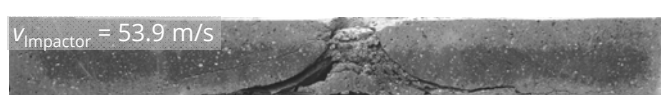
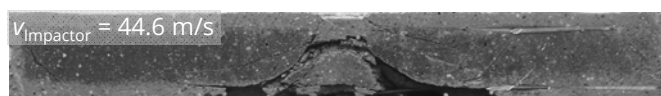
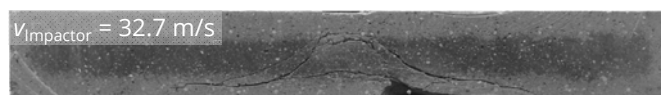
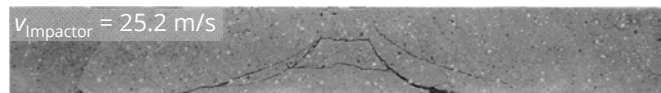


Drop tower facility

### 3 RESULTS

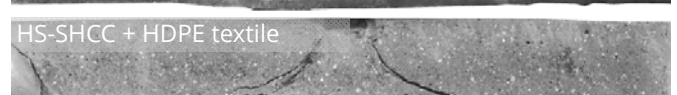
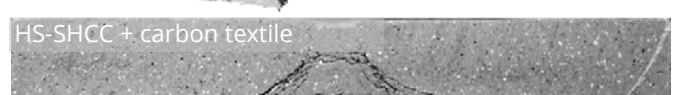


Damage of the plates due to impact load and mathematical description of the breakout body



### 4 COLLABORATIONS

- I. CUROSU (Postdoc): strengthening layers with hybrid fiber reinforcement  
CUROSU et al. FraMCoS-X (2019)
- I. CUROSU, D. M. P. VO (A1/I), A. QINAMI (B3/I), A. FUCHS (B4/I), F. LIEBOLD (C1/I): experimental study on structural impact safety based on mineral composites  
HERING et al. Beton- und Stahlbetonbau (2021)
- F. BRACKLOW (A5/II), L. LEICHT (A6/II): knowledge transfer for impact testing of RC plates  
HERING et al. Materials (2020); LEICHT et al. AMCM2020



Damage of unstrengthened (left) and strengthened (right) plates due to impact load under varying impactor velocities

All pictures: © Marcus HERING