



# Image processing and mould powder monitoring

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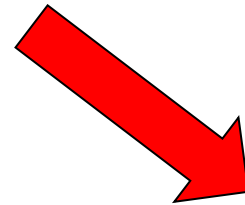
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## Causes for insufficient mould powder coverage

- Temporal and spatial irregularity in addition of mould powder
- Insufficient view over the mould surface area



## Consequences are reductions in quality

- Reoxidation
- Surface failures
- Strand breakthrough

Damage of expansive  
IR cameras



Cost-saving miniature  
camera technique

Online  
Monitoring  
of  
mould powder coverage



Flame  
interferences

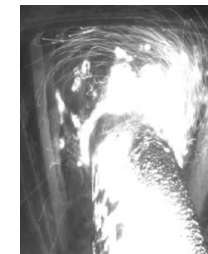


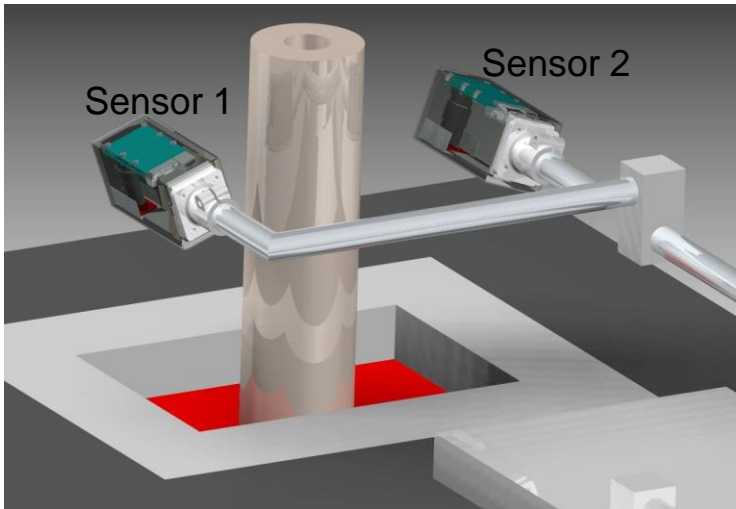
Image  
processing

CCD/Filter  
combination



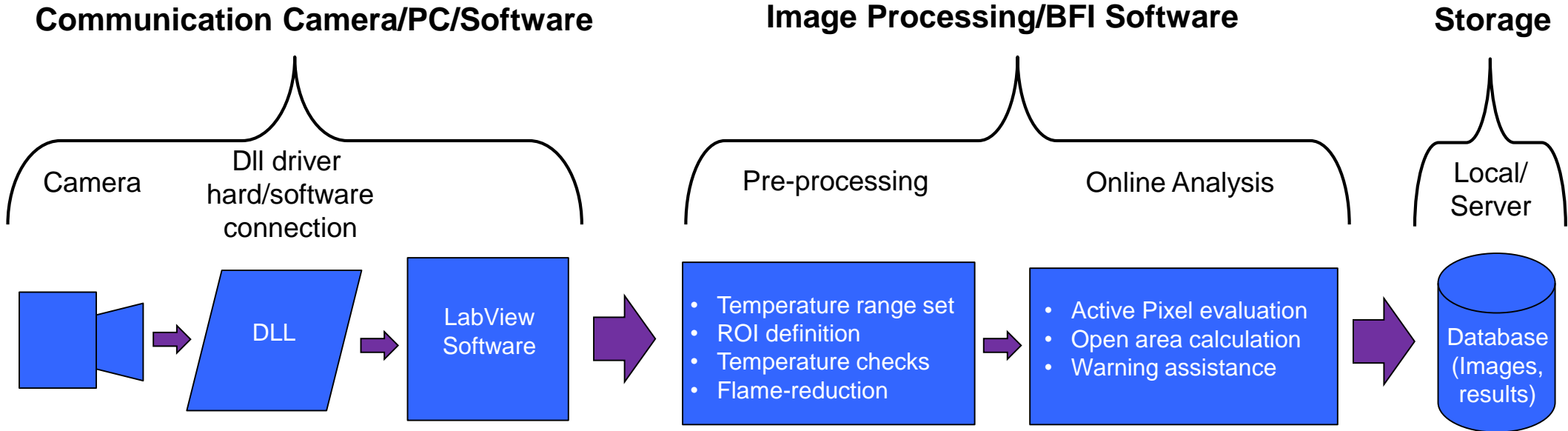
Smoke and dust  
interferences

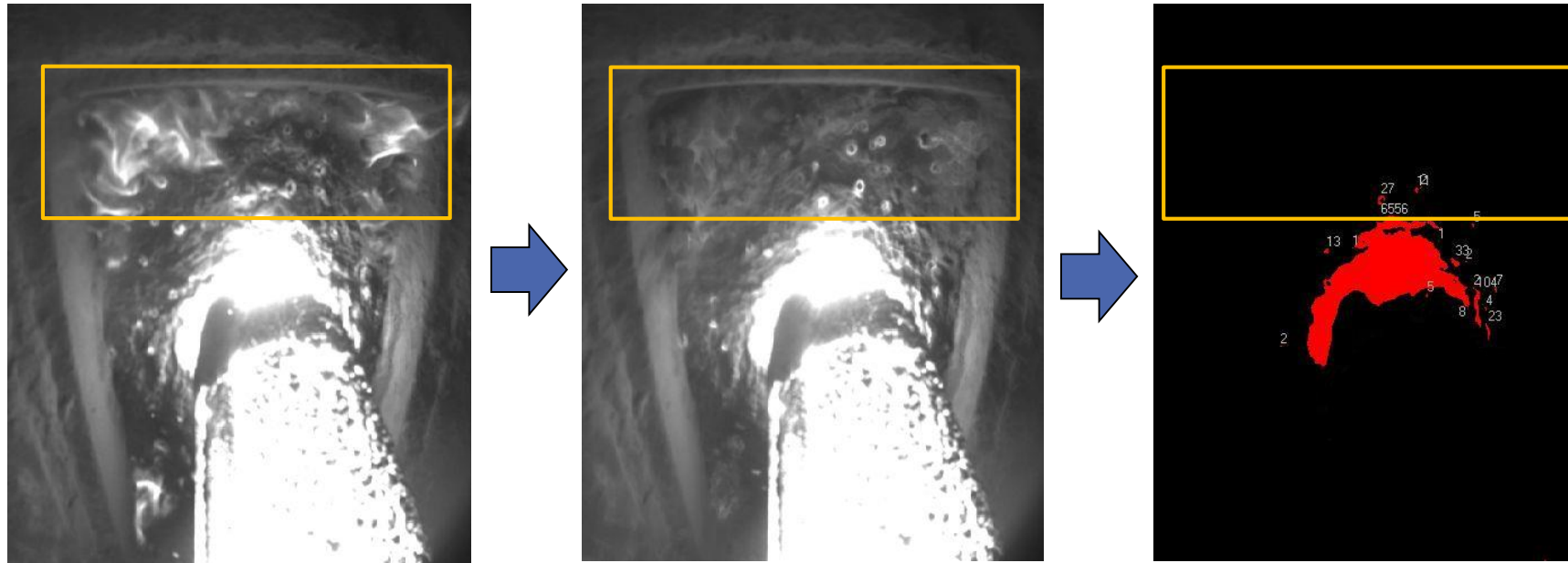




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- Compact housing
- Effective air-cooling prevents heat accumulation in the housing (max. 40°C)
- Cooling air outlet vertical to the field of view  
→ frees the window from dust
- Positioning close to SEN possible, for an optimal view onto the melt/powder surface
- Dust prevention for lens/circuit board
  - Filter installed in front of the lens area
  - Cooling air flow creates slight overpressure in the housing
- Mobile and stationary installations possible



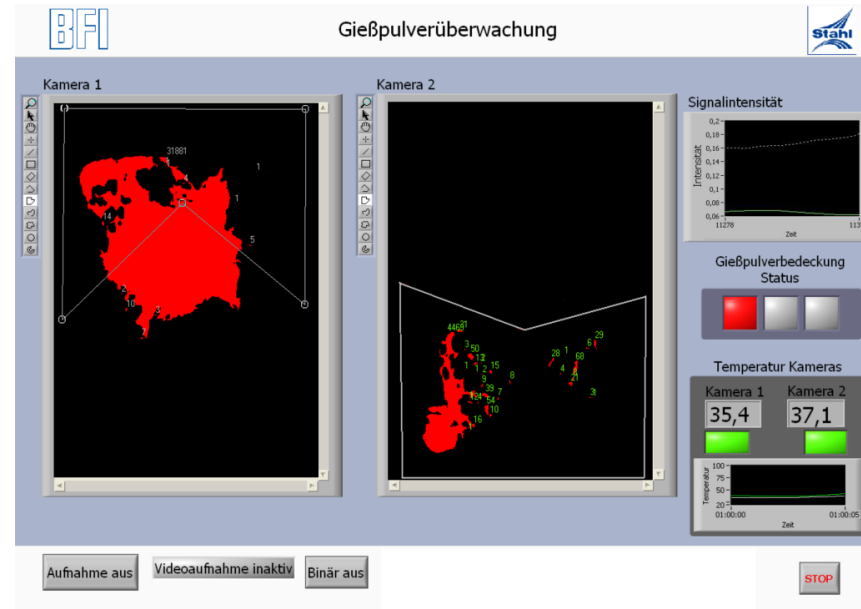
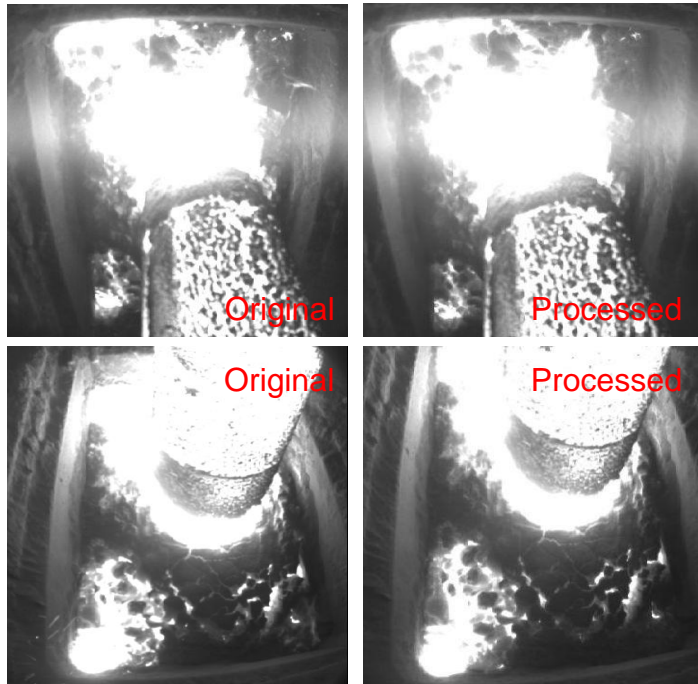


Original

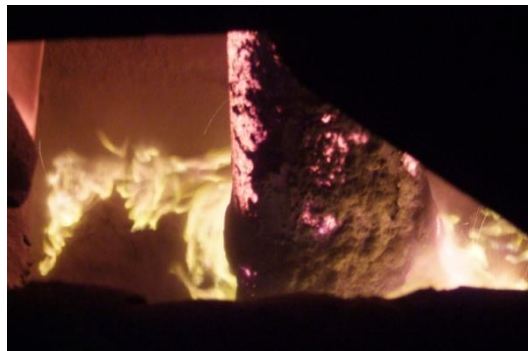
Processing step 1

Processing step 2

- Frequent problems: Flames prevent clear view onto the surface
- Solution image processing: Distracting factors (like flames, rising dust clouds or sparks) can be removed
- In further steps other factors like SEN can be removed
- Despite poor surrounding conditions, break-up events can now be earlier detected

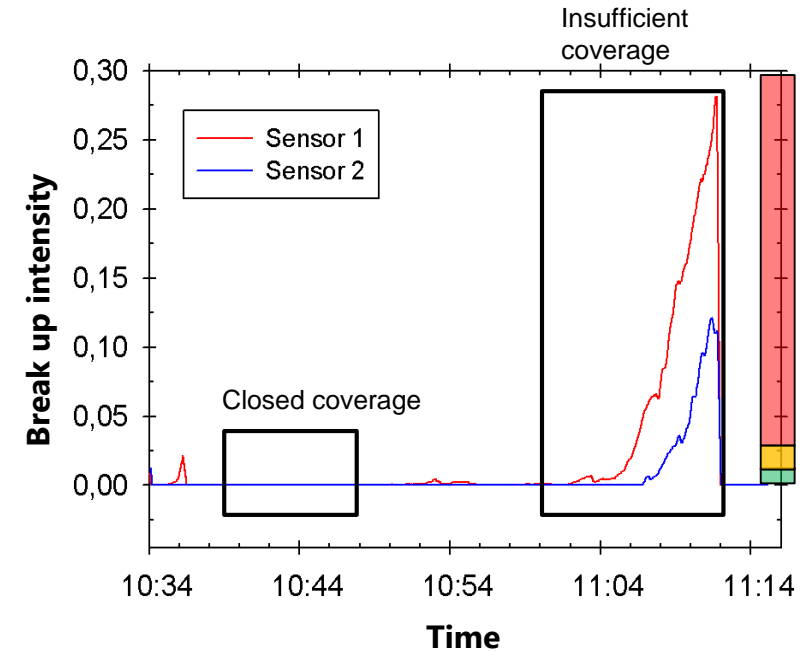


Traffic light shows red: Insufficient mould powder in the observed area



- Traffic light as an online decision support for user
- System reaction time: 1s to 2s
- Documentation of red phases and amount of open mould powder area is implemented

- Findings of the camera monitoring
  - Differentiation between closed mould powder coverage and (upcoming) break-up events
  - Frequency of break-up events
  - Intensity and location of break-up events (and gas flow)
  - Detection of asymmetrical mould powder addition
  - Time interval between mould powder addition and start of break-up events





- This novel technique to detect mould powder break-up events is characterised by the following points
  - Ability for online monitoring and documentation
  - Cost-efficient alternative to expensive IR camera systems
  - Traffic light as warning system signals early break-up events over the whole mould area and works as an decision support for the users
  - Suitable for mould powder and granulate
  - Quality of the mould powder coverage is measurable



Thank you for your attention!

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