Investigation of strain localization of high strength steel with the help of DIC

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Topics of presentation

- Research interests
- Test equipment
- Measurements
- Data
- Results
- Acknowledgements
- Contact information
- Comments / Questions
Research interests:
- Possibilities of Aramis system?
- Connectivity of Aramis system to other testing systems?
- Additional information from DIC assisted measurements compared to conventional tensile test?
- Behaviour of different materials during tensile test?
Test equipment:
Tensile test machine
Aramis camera system + analysis software
Measurements:
- series of tensile tests provide basis for parameters and correct usage of equipment
- Things to consider before and during measurements:
  - subject of tests
  - testing environment and overall surroundings
  - format and quality of desired data
  - safety issues
Data:
- What to measure?
  - load cell data (tensile test machine)
  - extensometer data (tensile test machine)
  - surface deformation (DIC)

- Data acquired based on surface analysis:
  - deformation (xyz, primary data)
  - strains: $e_1(\varepsilon_1), e_2(\varepsilon_2)$, thickness reduction
  - strain rates, based on test time of Aramis
Data examples: point data

Major strain  Minor strain  Thickness reduction

Data examples:
- point data

Major strain

Minor strain

Thickness reduction

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Data examples:
- section data

![Graph showing strain data with section line and various strain stages.](image-url)
Data examples:
- section data

Thicknes reduction

Section 9
Results:
- surface deformation data (curve profile)
- approximated area from fitted data
- force data from tensile test machine
- (true) stress – strain curve based on DIC acquired area data
Results examples:
- surface deformation data (curve profile, momentary)
Results examples:

- approximated area from fitted data
Results examples:
- force - elongation data from tensile test machine
Results examples:

-(true) stress – strain curve based on DIC acquired area data
Results:

Comparison with other curves from same test:
- tensile test (from test machine)
- power law fit from tensile test data (K,n)
- Aramis macro driven curve
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Projects:
- Advanced Strain Analysis (ASA)
- Metnet network
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Questions / Comments ?