BCE Special Ceramics

WP 3.4.1

Ceramic possibilities other components

Rupture Discs & Buckling Test Rods

General considerations and Objectives:

- why ceramic rupture discs ?
- feasibility
- economic aspects
- real technical improvement
- ceramic rupture discs
  would be above state of the art
  as long as standard is metall

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General considerations concerning Rupture Discs:

- Ceramic should show no fatigue effects
- Highstrength material like ZrO2 Y-TZP
- Longterm durability and stability
- Loads must be in the region of subcritical crack growth
- Surface quality might be critical for exact burst pressures

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Samples of Discs

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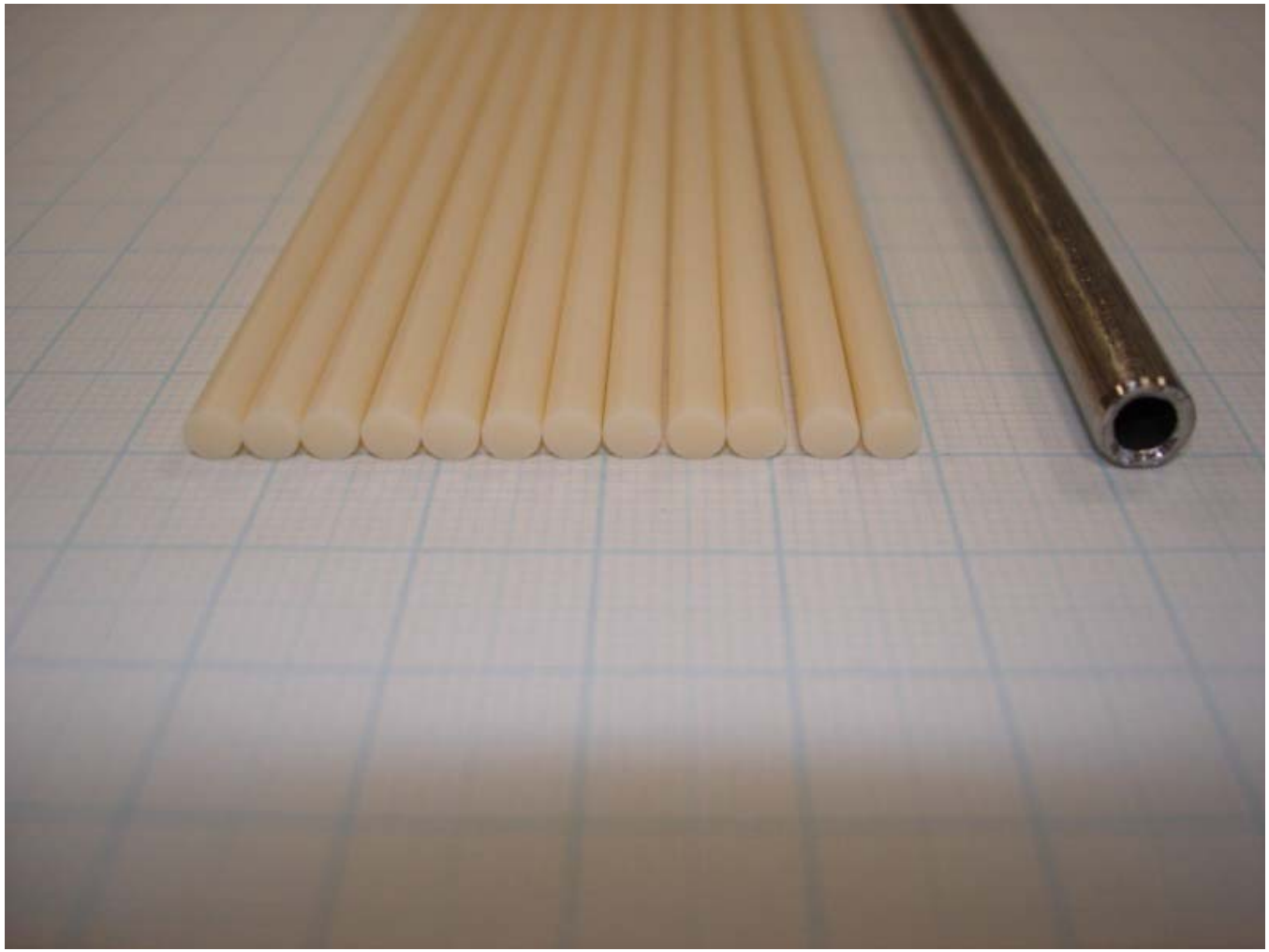
Rods 3,5 and steel tubes

for buckling tests / modelling



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Research performed

- Samples provided to partners for testing:

- 9 completely coated cylinders (5 coatings)
- 5 Samples for Oiltesting (5 diff. coatings)
- 10 Samples for corrosion testing
- Matrix for surface grinding / finishing testing (12 samples, 3 diff. coatings)
- Continous grinding / finishing optimisation

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General considerations:

- feasibility
- economic aspects
- environmental impact
- real technical improvement

Samples with different layers shall be

- prepared
- studied under material aspects
- tested in varying conditions

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Rods and cylinders:
ceramic based coating on TiO_2 particles

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Results with coating Nr II (WC + PTFE a)

- coated cylinder performed 250.000 doublestrokes with 300 mm way
- no noticible oil leakage with L-Cup PU Z20
- sealing showed only 0,01 g mass loss
- sealing showed only 5 % geometry deviation

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Results with coating Type 3 (TiO_2)

- dramatic leakage after 1500 double-strokes
- wear of sealing
- lack of adherence of the coating
- corrosion in salt water

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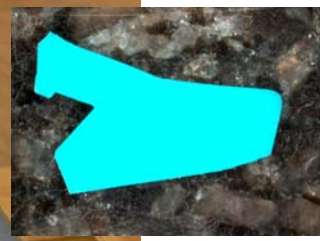
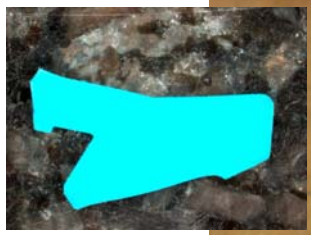
Testing on Ceramic Coated Rods



Loss of about 12% of pretension (-0,002 Gr.)



Loss of more than 50% of pretension (-0,3 Gr.)

R_z = 15,2 µm

R_z = 5,13 µm

Test to be stopped after 1500 doublestrokes

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