



INFLUENCE OF THE EMBEDDED POSITION FOR DAMAGES AND REACTIVE THRESHOLD INDUCED BY CONCRETE PENETRATION

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Objectives of concrete penetration studies

Depth penetration
Sensing challenge

Embedded position Damage characterization

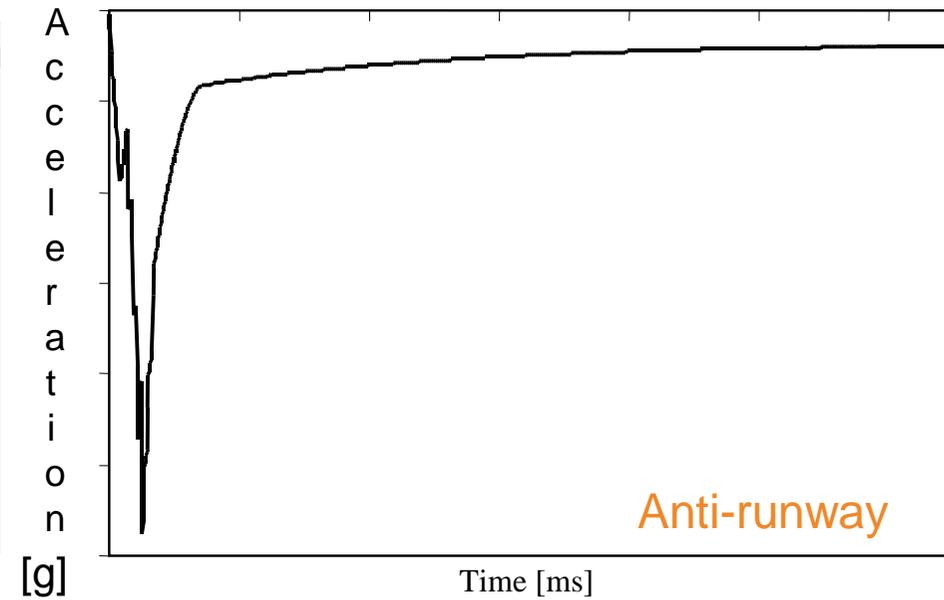
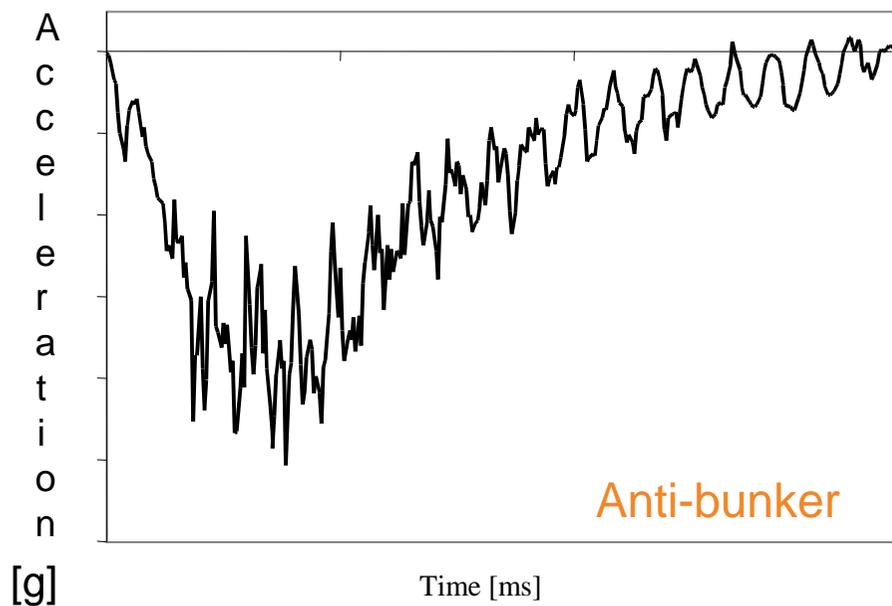
Microstructural analysis
Results and discussions

OBJECTIVES OF CONCRETE PENETRATION STUDIES

Several responses identified

Center of gravity deceleration for generic warheads

Influence on the components, on the embedded positions ?

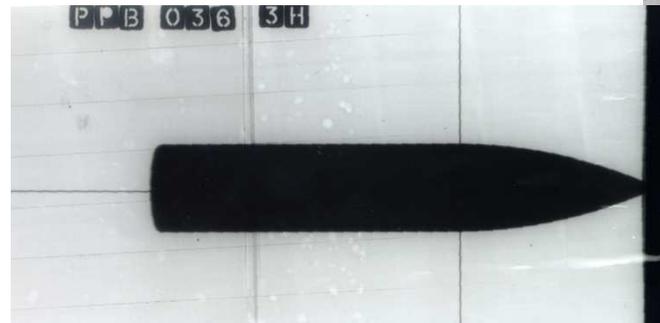
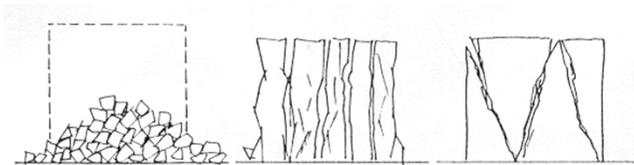


Develop a method for penetrator survivability

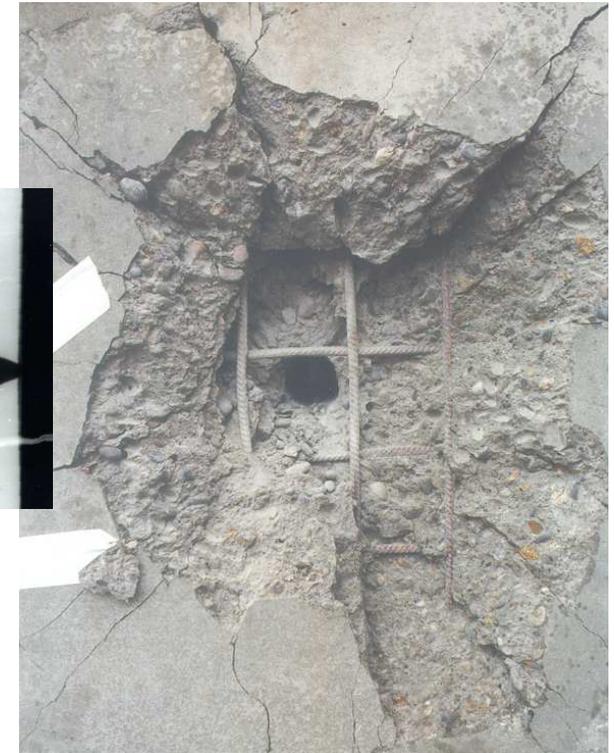
Concrete dynamic response

Fireset survival

HE survival



X-ray radiography



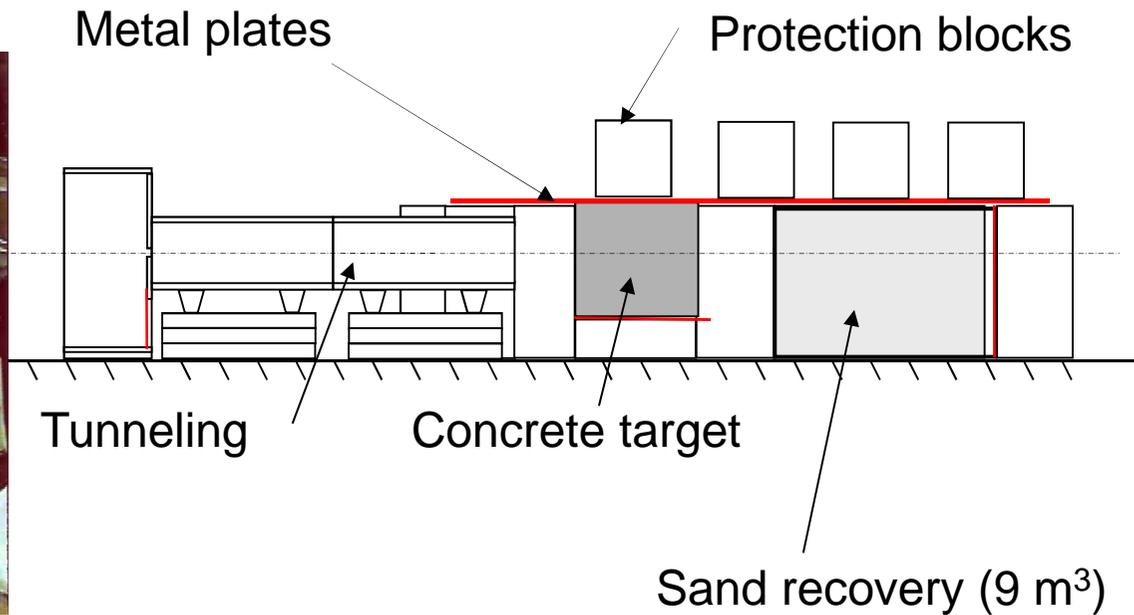
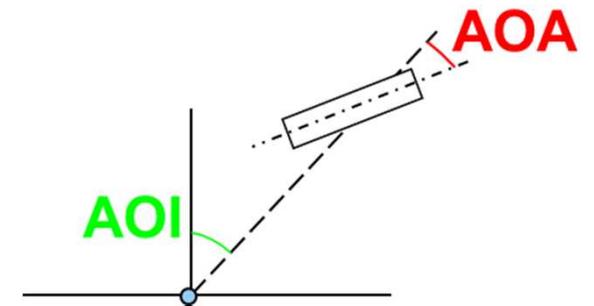
How ? → By numerical predictions and experimental validation

Small scale experiment developments

Angles AOI and AOA

Impact velocity

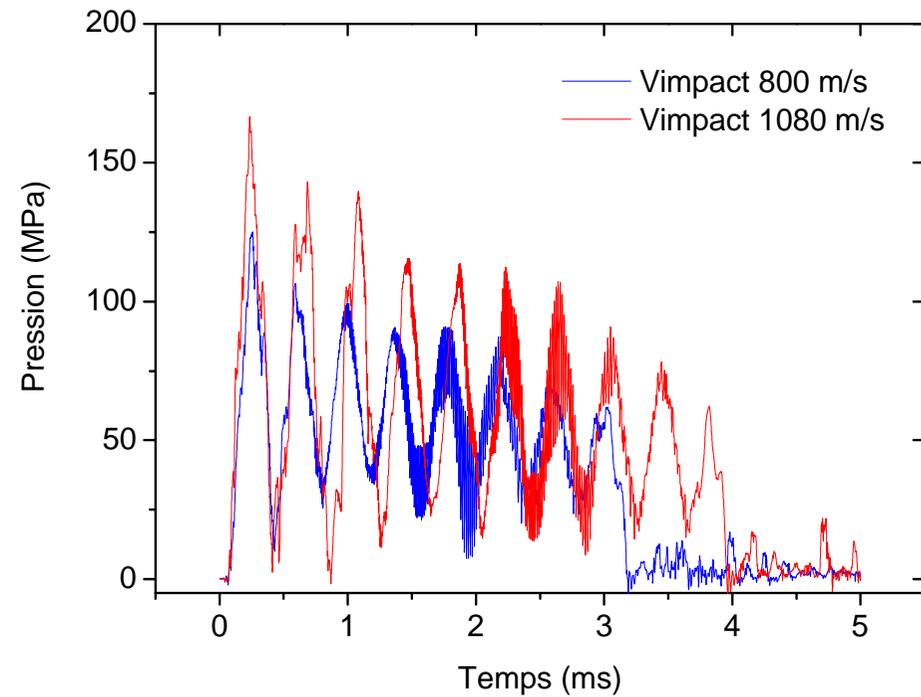
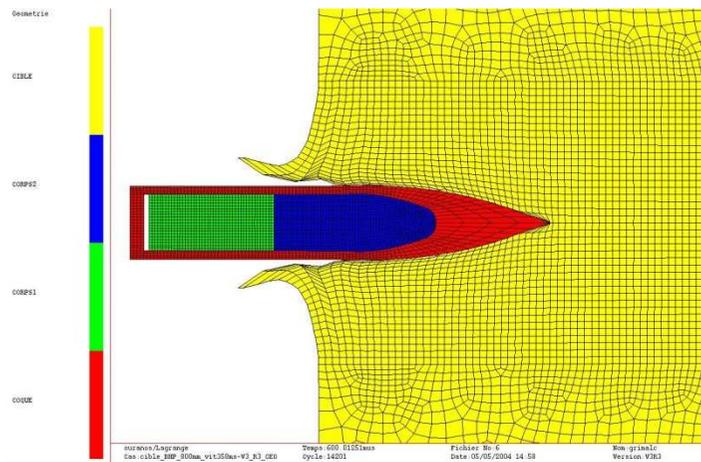
Concrete properties and dimensions



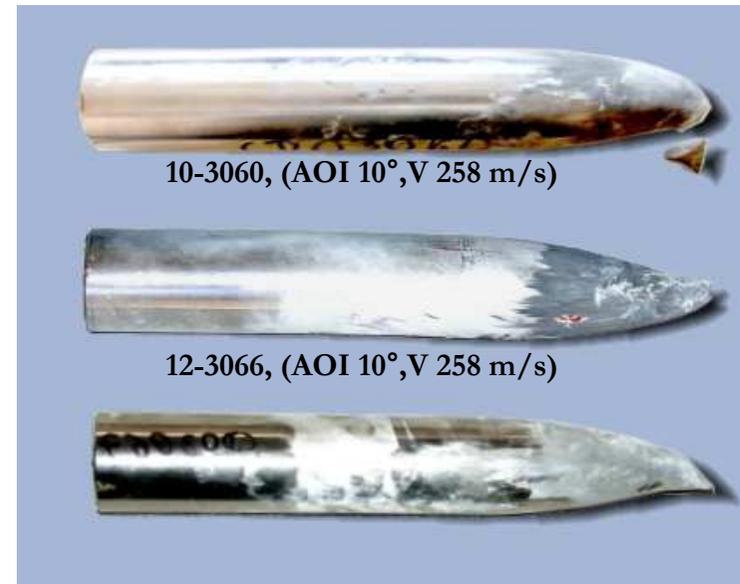
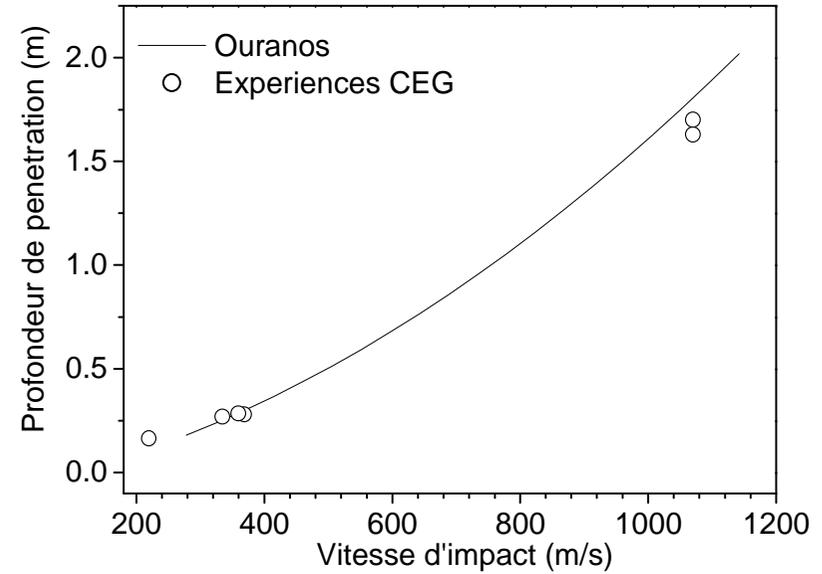
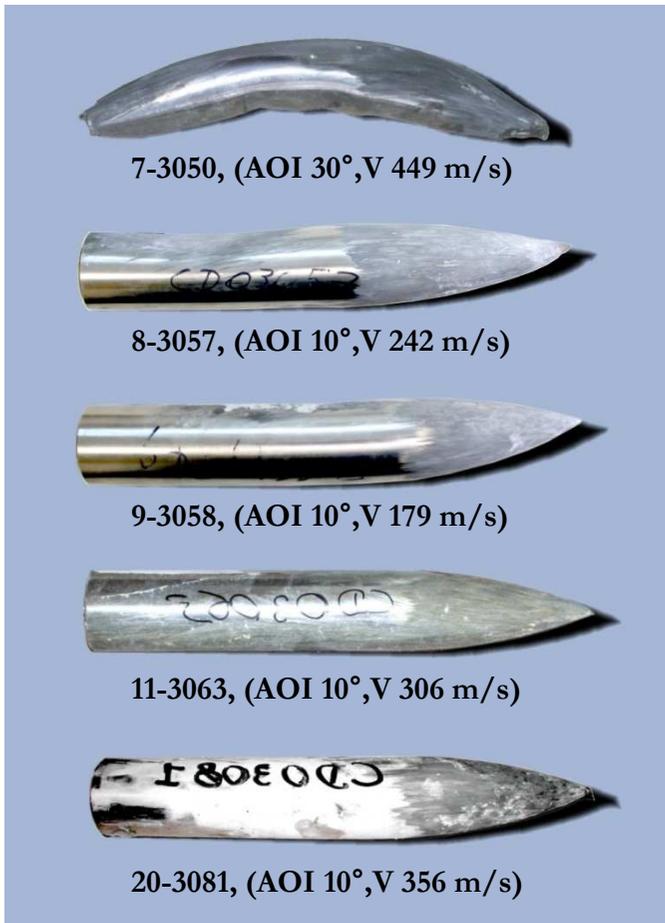
Hydrocodes benefit

Mechanical models

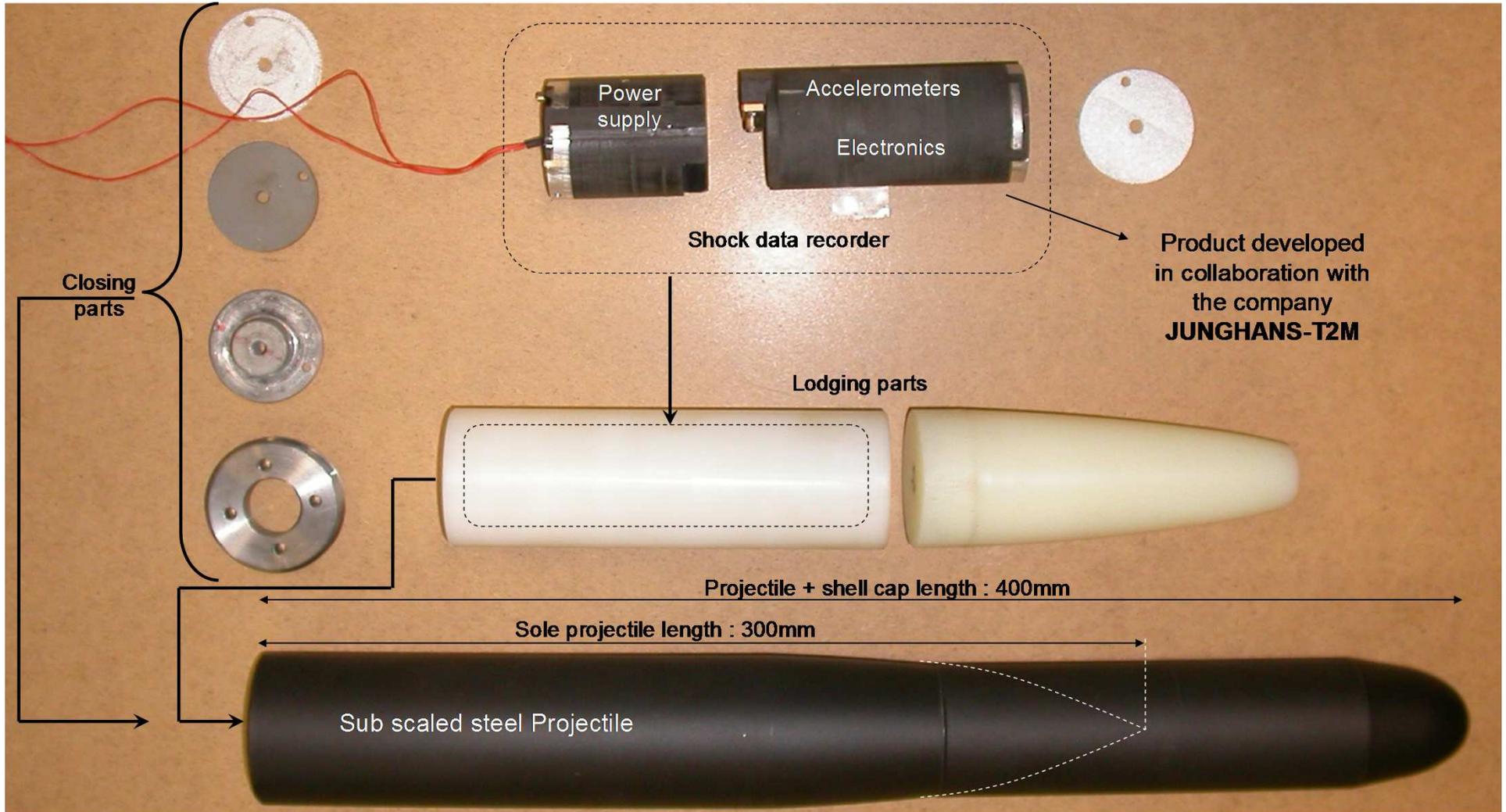
Viscoelastic response for HE



Controlled angles
Controlled Impact velocity



SENSING CHALLENGE



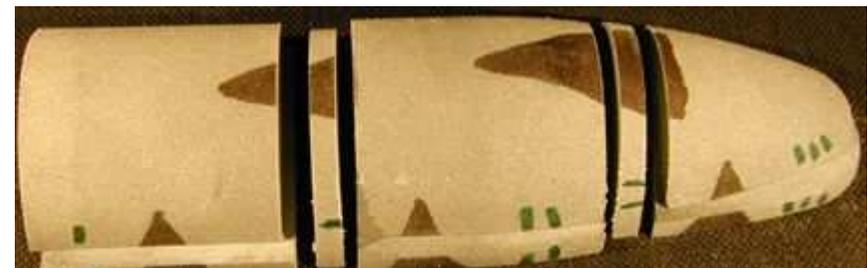
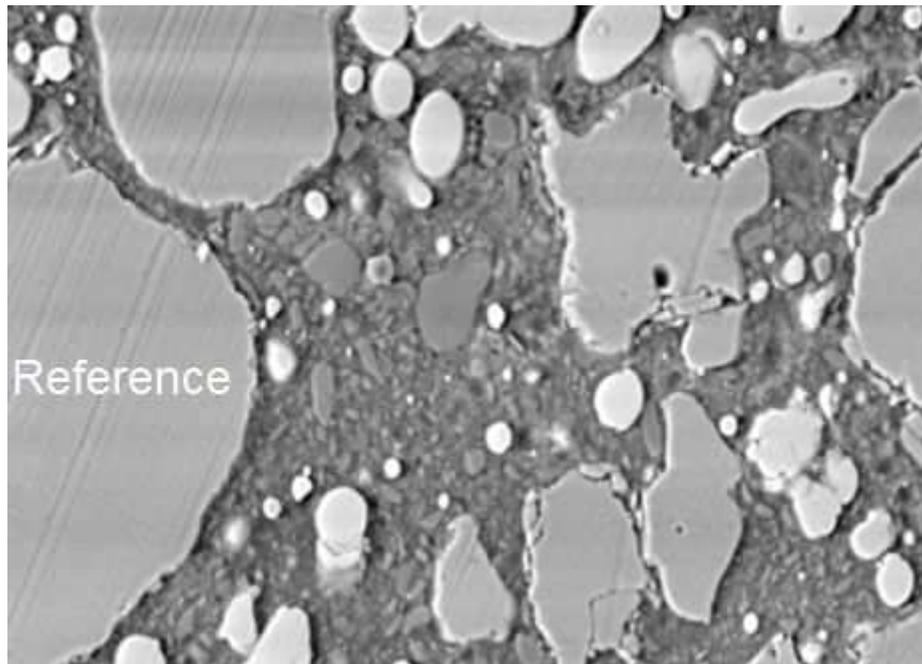
EMBEDDED POSITION DAMAGE CHARACTERIZATION

Analysis ability

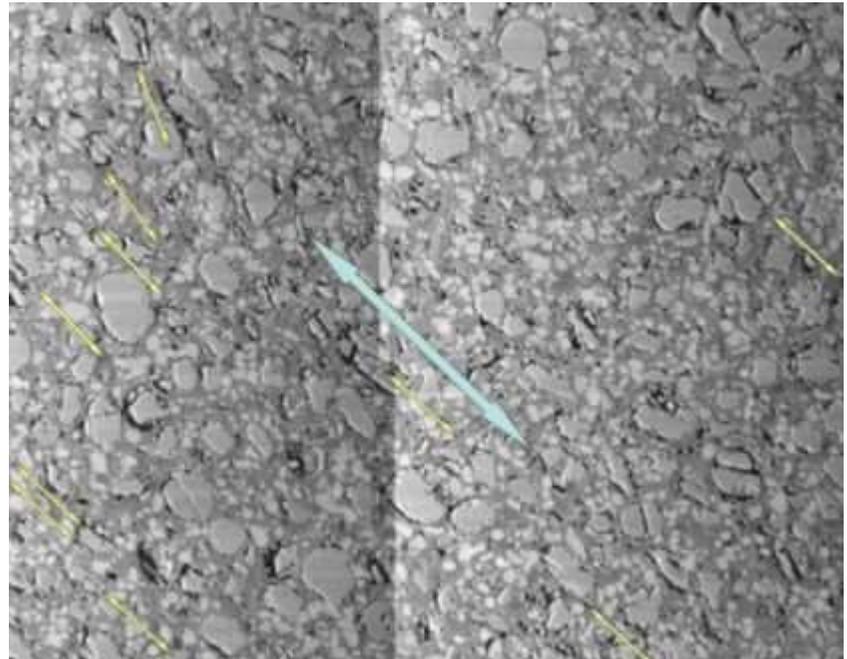
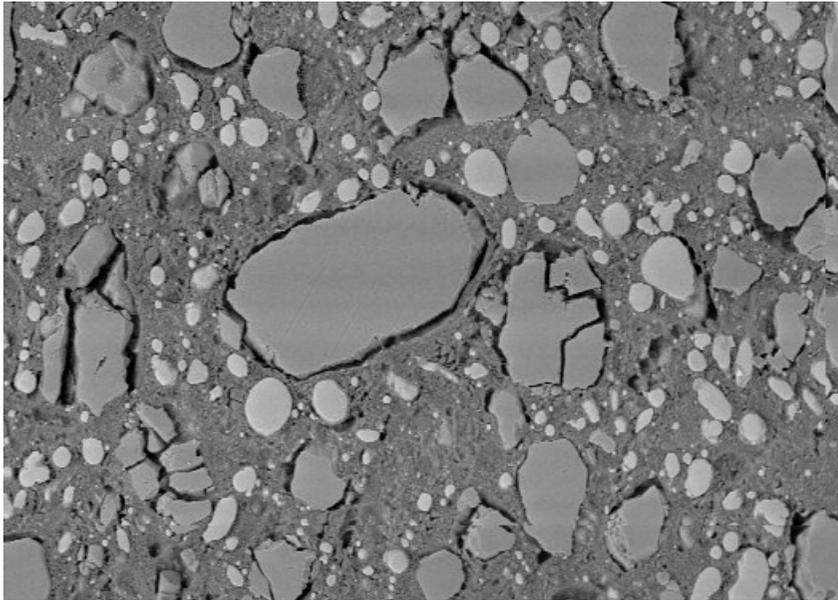
Sand recovery

Post-mortem preparation

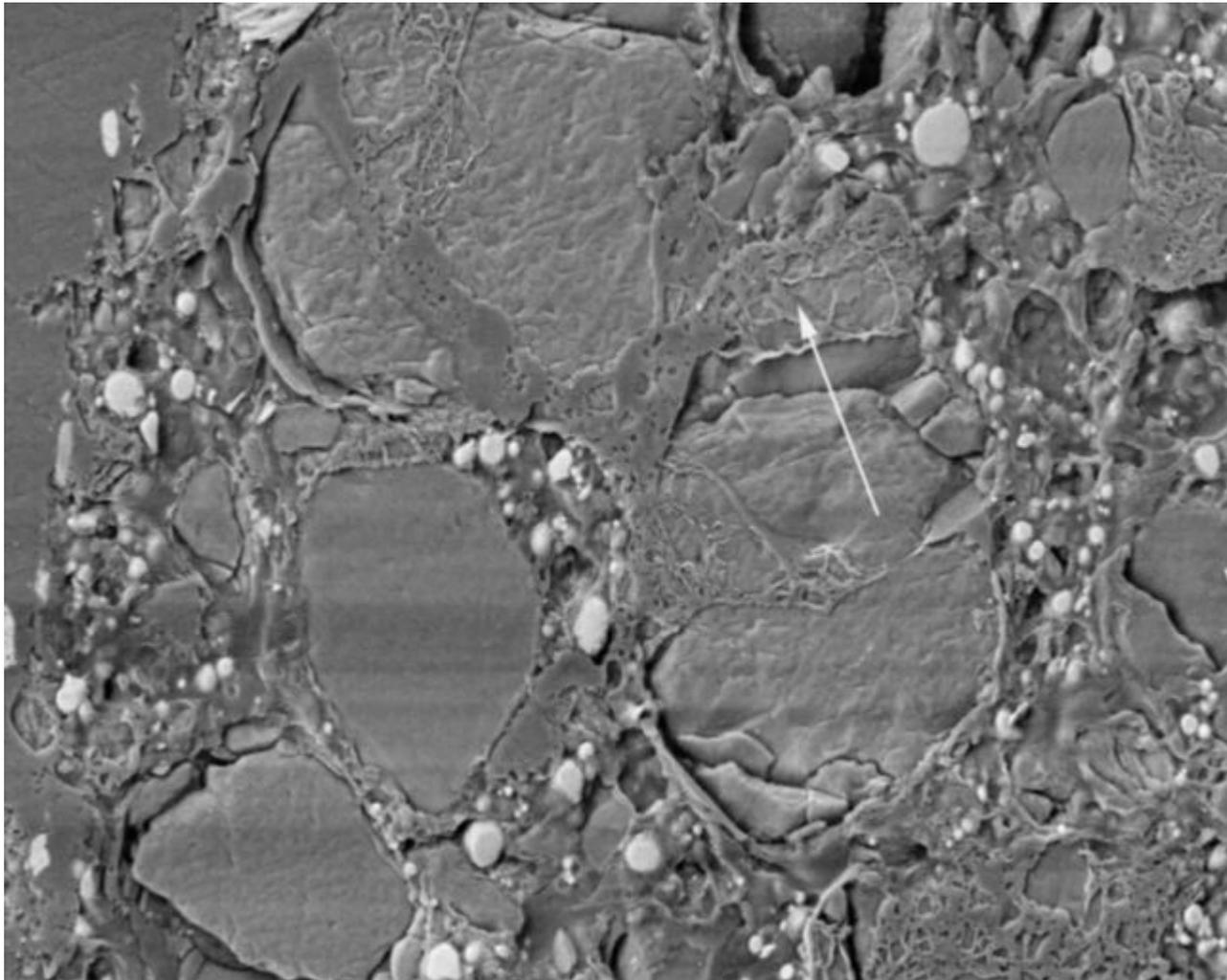
Wire saw and polishing techniques



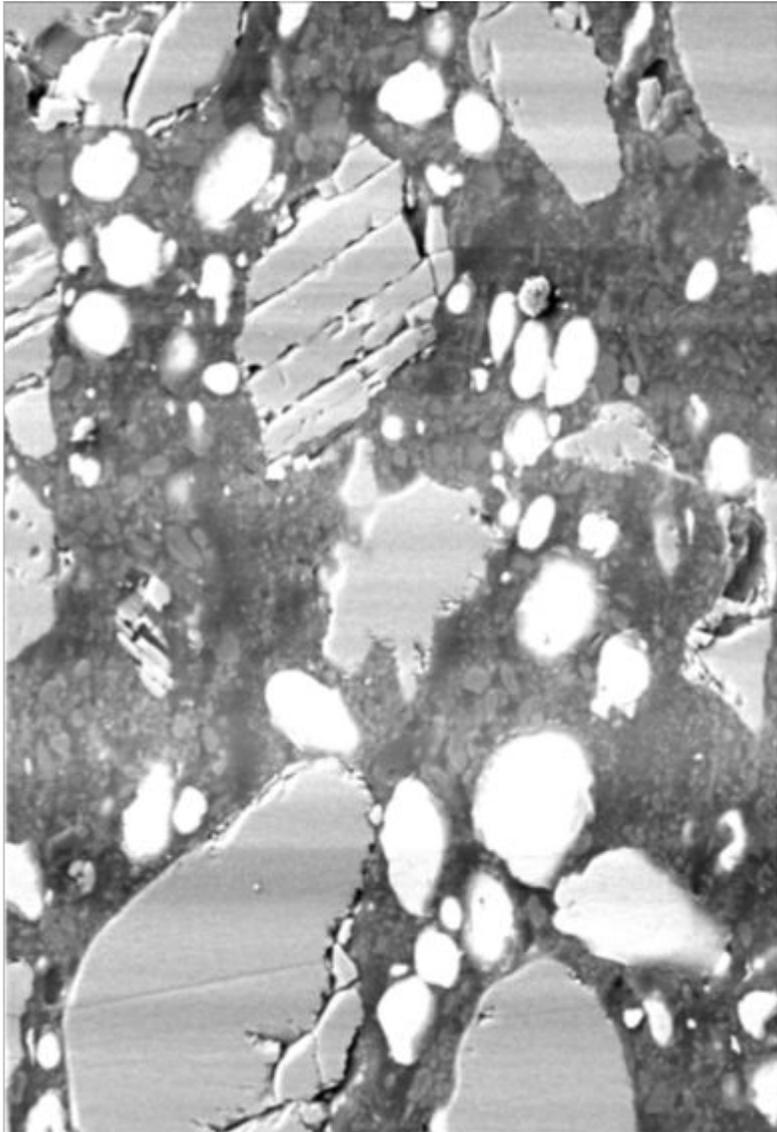
Debonding identification



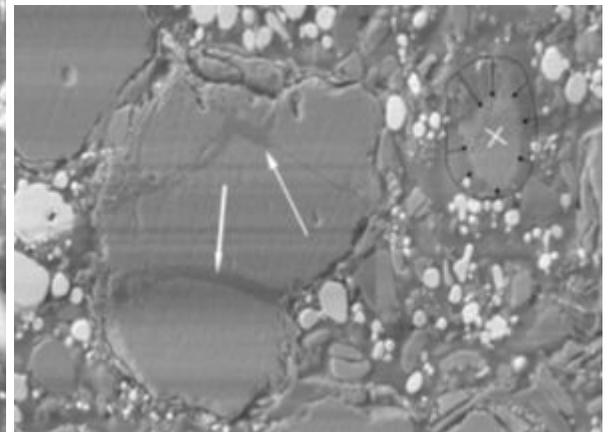
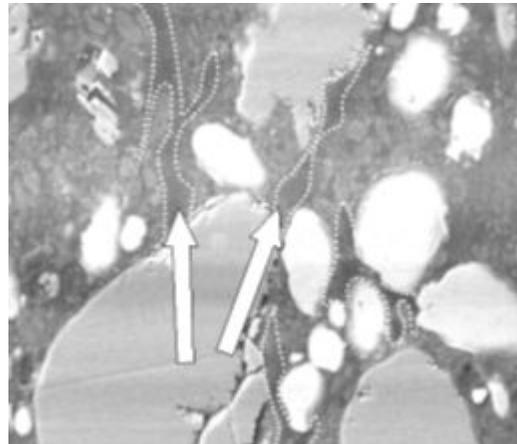
Amorphous phase



POST MORTEM ANALYSIS



Amorphous phase
Broken grains
Reactive cracks



Concrete applications

- Development of a method to assess fireset and HE survivability
- By numerical prediction and experimental validation
- Ability to recover and perform post-mortem analysis

Coming soon

- Correlation of embedded damages with numerical simulations
- Mechanical model improvements
- Increase launch capabilities
- Improve wireless sensing

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