Home Made Explosives (HME)
How to understand the threats and model the risk ?

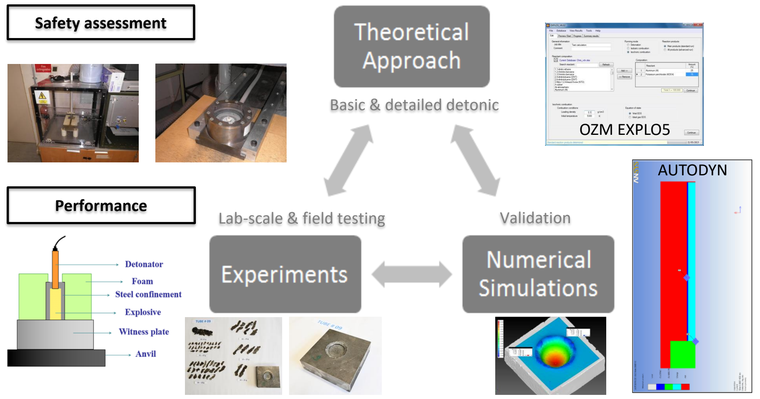
1. Context

- **HME** = major public security concern, requiring specific risk assessments for first responders
- Current Threat worldwide:
  - Mixing of highly energetic pyrotechnics
  - Synthesis of peroxide explosives
- 1st investigated HME: **Urea Hydrogen Peroxide (UHP)**
  - Availability of ingredients + Ease of manufacture
  - Lacking research data

2. Challenges and objectives

- HME vs Explosive performance and safety standards
  ➔ Extend the knowledge ➔ **understand the threat**
- HME vs standard (ideal) detonation theory
  ➔ Predicting the effects ➔ **model the risk**

3. General approach



4. Preliminary results

- Safety assessment
  - Lab scale sensitivity testing (impact, friction, ESD)
  - Thermal characterization (DSC, TGA-MS, ToI)
- Performance
  - Bomb calorimetry and Explo5 predictions
  - Preliminary detonation testing (brisance)
- Preliminary testings highlight that UHP is fairly **insensitive to handle** and has **non-ideal tertiary explosive** behaviour. Brisance has been demonstrated. A steady-state detonation regime will strongly depend on confinement, booster size and charge diameter.

5. What's next

- Detailed Detonic investigation & numerical validation
  - Detonation velocity, Detonation pressure
  - Shock sensitivity
  - Blast measurements
  - Fragmentation analysis and Post-blast residues
  - UHP with additional energetics
  - Cylinder expansion testing – JWL Equation of state

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