B2514a: A NOVEL ENHANCED BLAST EXPLOSIVE

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During last years, great efforts have focused on the development of new kinds of weapons able to generate high blast and temperature effects. These weapons are commonly called Thermobaric weapons. Thus, a lot of research studies have focused on the comprehension of thermobaric effects, in order to enhance or prevent it.

The blast effect is mainly due to the ability of the detonation products to react with the oxygen of air. This phenomenon called afterburning strongly contributes to generate high pressure impulses, especially in confined spaces. This is why metallic particles, mainly aluminium particles, are commonly used in thermobaric explosive compositions (TBX).

In the frame of recent studies, the SNPE Research Centre has been developing a novel Enhanced Blast Plastic Bonded eXplosive (EB-PBX) able to generate enhanced blast effects. This new composition has been called B2514A.

The development of such a composition was performed through different phases, from small scale trials to large scale ones. We have used a specific methodology to examine and classify a large number of candidates. The most promising composition has been tested at large scale to characterize its ability to generate blast effects in comparison with PBX references known for their blast effects. We also examined the peculiar way this composition transits in detonation.

A great effort has been made in parallel in numerical simulations. We developed a specific model able to reproduce the experimental blast effects. This model can reproduce the expansion of the detonation products in a room, the shock wave reflexions and the interaction between detonation products and air leading to the formation of afterburning products. This model has been called DECO (DEtonation COmbustion). In order to being able to simulate large scale trials, we associated DECO with an Adaptive Mesh Refinement (AMR) software. This coupling enables us to simulate the behaviour of detonation products generated by 1 kg of explosive in 8 x 8 x 8 m^3 room with a minimum mesh size of 16 mm, and a reasonable number of nodes (4.10^6).