

Abstract ID: 10229

Title: THE 155MM M795 ARTILLERY SHELL LOADED WITH IMX-101

Abstract Text: IMX-101 is the first melt-cast formulation ever to drastically improve the Insensitive Munitions (IM) response of the M795 projectile. These tests are Bullet Impact, Fragment Impact, Slow Cook-Off, Sympathetic Detonation, Shaped Charge Impact tests.

The superior insensitive properties of IMX-101 will enhance the war-fighter survivability by rendering HE-loaded munitions much less sensitive to unplanned stimuli.

The development of the M795 IM projectile, a 155mm artillery round is an exceptional engineering achievement that addresses the Insensitive Munitions (IM) compliance of munitions items IAW DOD 5000.2-R to improve the warfighter survivability. DOD 5000.2-R requires that munitions and weapons can withstand a certain unplanned stimuli criteria.

IMX-101 was developed to replace TNT, a widely used explosive due to its low cost and acceptable energy output to destroy enemy targets. To fully replace TNT, the objective also requires that IMX-101 must also possess the energy output equivalent to that of TNT in order to maintain equivalent lethality. Even though, IMX-101 was formulated to allow IM compliance of the M795 155mm artillery projectiles, it is equally applicable to any existing munition items, e.g., mortars, grenades, etc., requiring TNT as a high explosive fill or new munition items requiring TNT lethality. Furthermore, it may have applications in other services' munitions, i.e., bomb. The Air Force uses tritonal (80% TNT, 20% Aluminum) as an explosive fill in their 2,000lb general purpose bombs. It is conceivable that IMX-101 can replace the TNT in tritonal and render the modified tritonal formulation IM compliant.

IM testing demonstrated that the M795 155mm artillery projectiles loaded with IMX-101 successfully passed all IM engineering testing with bullet impact, fragment impact, and slow cook-off tests, all with type V reactions, sympathetic detonation (without barrier) with type III reaction, and shaped charge impact (50 & 81mm) with type III reaction when fired into the high explosive. As referenced in MIL-STD-2105C, bullet impact test gauges the capability of a munition to withstand a shot from a 0.50-caliber bullet. Likewise, fragment impact is used to simulate a hit by shrapnel. Slow and fast cook-off tests determine the degree of heat resistance under different heating conditions. The sympathetic detonation test verifies the resistance of the explosive loaded munition being tested to explode with the detonation of an adjacent munition. The shape charge jet impact test simulates attack by a rocket-propelled grenade.

The presentation will focus on the IM testing results as well as some live fire testing done to qualify the new round for fielding.