



MUNITIONS SAFETY INFORMATION ANALYSIS CENTER

CENTRE D'INFORMATION ET D'ANALYSE SUR LA SECURITE DES MUNITIONS

# Lettre du



# Newsletter



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## Picatinny Inensitive Munitions (IM) Efforts Paying Dividends

Rene Kiebler and Paul Manz

**O**n Oct. 5, 2009, Picatinny Arsenal, NJ, was honored to host SPC Alan Ng, who was home on mid-tour leave from duty in Afghanistan. Ng, a son of a Picatinny employee, is a mortarman in the 10th Mountain Division. While at Picatinny, he spoke with leaders and engineers from Project Manager Combat Ammunition Systems (PM CAS) and the U.S. Army Armament Research, Development, and Engineering Center (ARDEC) about his experiences with Picatinny-developed munitions.

On Sept. 12, 2009, a Mine Resistant Ambush Protected (MRAP) vehicle in Ng's convoy was destroyed by a very powerful improvised explosive device (IED). The IED ruptured the vehicle's hull and fuel tank, which engulfed the vehicle interior in flames—to include 16 M768 60mm mortar cartridges that were carried inside the cabin with the 7-man crew. Although several soldiers were seriously injured in the ambush, all survived. Thanks to the IM features of the M768 cartridges, a much greater disaster was averted.



Shell bodies and separated M783 fuzes from M768 cartridges were recovered from SPC Alan Ng's vehicle after the Sept. 12, 2009, MRAP fire.

(Photo courtesy of PM CAS, Picatinny Arsenal.)

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### **M768**

The M768 incorporates several IM features, including new energetic materials in the fuze and shell body. It also contains a plastic fuze adaptor that melts in an accidental fire, allowing the fuze to separate from the cartridge. This relieves internal pressure and prevents detonation of the explosive fill. After the MRAP had stopped burning, Soldiers who examined the wreckage were amazed to find all of the rounds' shell bodies intact, proving that none of them had gone "high order" in the fire. They also found the remains of the fuzes that had separated from the cartridges as designed, which allowed the PAX-21 explosive fill to burn rather than explode. The team members who developed the M768 were gratified to hear that their hard work paid off for American Soldiers in such a real and dramatic way.

**The team members who developed the M768 were gratified to hear that their hard work paid off for American Soldiers in such a real and dramatic way.**

The M768 cartridge, which received Full Materiel Release in 2006, is one of the early success stories in a larger IM Strategic Plan that Program Executive Office Ammunition (PEO Ammo) is implementing to develop and produce safer ammunition throughout its portfolio. The PEO's PMs have instituted plans of action and milestones for improving IM characteristics for their assigned munitions through improvements in packaging, explosive fills, propellants, and fuzes for all calibers, up to and including 155mm.



PEO Ammo, under the direction of the Army Executive Agent for IM, has long recognized that IM enhances warfighter safety by preventing catastrophic accidents, such as the now-famous fire in Camp Doha, Kuwait, in July 1991 that resulted in 3 deaths and 56 wounded. This incident started with a small heater fire in an artillery resupply vehicle—loaded with propellants and projectiles—that exploded, spreading the fire from vehicle to vehicle. In all, 102 vehicles were destroyed or damaged before the fire was extinguished. In addition, IM promise to reduce the logistics burden imposed by the requirement for large separation distances between highly volatile munitions, both in transit and in storage.

### **IM Testing and Improvements**

Department of the Army Pamphlet 70-3, Army Acquisition Procedures, presents a total systems engineering approach to assist in meeting IM requirements, and specifies IM testing based on Military Standard 2105C, Hazard Assessment Tests for Non-Nuclear Munitions. This standard requires subjecting munitions to six very harsh tests:

- Fast cook-off—rapid exposure to a liquid fuel fire.
- Slow cook-off—gradually raising the temperature to above the ignition point.
- Bullet impact.
- Fragment impact.
- Sympathetic detonation—intentionally detonating one munition surrounded by several others.
- Shaped charge jet impact—similar to a rocket-propelled grenade.

Over the last decade, great strides have been made in shell design, propellant and explosive fill formulation, and packaging improvements. For example, the sympathetic detonation and shaped charge tests were once presumed to be impossible to pass, routinely requiring waivers before new munitions could be materiel released. In 2008,

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however, the Energetics Branch of PM CAS was nominated for the David Packard Excellence in Acquisition Award for design and explosive fill technology improvements to 155mm artillery projectiles, propellants, and packaging that finally passed all six of these difficult tests.

**IM promise to reduce the logistics burden imposed by the requirement for large separation distances between highly volatile munitions, both in transit and in storage.**

The maturation and transition of these technologies were dramatically accelerated through the infusion of enabling funds from the Office of the Secretary of Defense (OSD) Technology Transition Office. The Technology Transition Initiative (TTI), established by Congress in 2002, "is intended to accelerate the introduction of new technologies into operational capabilities for the armed forces." The PM CAS/ARDEC team proposed a new IM TNT-replacement explosive fill (called IMX-101) and changes to the M795 projectile to allow pressure relief from the projectile nose. In a highly competitive environment, these were selected by OSD and subsequently received TTI funding. These improvements to the projectile, when coupled with the IM features of the M231, M232, and M232A1 propelling charges and containers, would have almost certainly prevented the Camp Doha disaster.



SPC Alan Ng (third from left) explained his firsthand experience with the importance of IM to Picatinny M768 team members (left to right) Bill Kuhnle, Roger Wong, Scott Faluotico, Marty Moratz, Pam Ferlazzo, John Niles, Jeff Ranu, and Jeff Smith.

(Photo courtesy of PM CAS, Picatinny Arsenal.)

PM CAS and ARDEC are currently working on a Common Low-Cost IM Explosive Program. Along with support from OSD's TTI, they are leveraging support from the Joint IM Technical Program to accelerate transition of IM solutions to the field. The long-term objective of this program is to develop a single high-explosive fill that can replace TNT and Composition-B in 105mm and 155mm artillery projectiles and 60mm, 81mm, and 120mm mortar cartridges. The new fill must be at least as effective as the more volatile formulations it will be replacing, even though it will be less sensitive to unplanned stimuli. It must be affordable, producible by the current industrial base, and environmentally friendly. Although these requirements may seem insurmountable, in the past, Picatinny Arsenal personnel have risen to such challenges and passed tests once

considered impossible. Always focused on providing effective, safe, and reliable weapons to the warfighters they support, their motivation was further enhanced when they heard the aforementioned firsthand feedback from "one of the family" on the importance of providing IM.

**RENE KIEBLER** is the Deputy PM for PM CAS. He holds a B.S. in mechanical engineering from the Rochester Institute of Technology and an M.S. in engineering management from the Florida Institute of Technology. Kiebler is a graduate of the PM's Course from Defense Systems Management College and is Level III certified in program management and production, quality, and manufacturing.

**PAUL MANZ** is Chief of Advanced Systems in PM CAS. He holds a B.S. in electrical engineering from the New Jersey Institute of Technology and a master of public administration from Fairleigh Dickinson University. Manz is Level III certified in program management; life-cycle logistics; business, cost estimating, and financial management; systems planning, research, development, and engineering (SPRDE)-science and technology manager; and SPRDE-program systems engineer. He is a U.S. Army Acquisition Corps member.

**Many thanks to the USAASC for permission to reprint this article from the April-June 2010 issue of Army AL&T Magazine**

## FRAID V1.10 IS NOW AVAILABLE



One of the stimuli specified in NATO STANAG 4439 on Insensitive Munitions (IM) requirements, and in the national IM policy requirements of Australia, Canada, Denmark, France, Finland, Germany, Italy, Netherlands, Norway, the United Kingdom and the United States is an assessment against the fragment attack threat.

In order to achieve this all up round (AUR) tests are often required to assess the response of a munition to this threat and in general to IM threats. However, there is an increasing move towards using a methodology which combines small-scale testing, modelling, and expert analysis, with AUR testing being used to confirm predictions. This has emerged in recent years as best practice and can deliver benefits in confidence and reduce the burden of AUR testing when a prediction is made of failure through small-scale testing and modelling.

In 2001 MSIAC created a fragment impact database, which was developed electronically in Excel2000 and called the FRAGMENT IMPACT DATABASE (FRAID) (Figure 1) to assist the community in developing this methodology.

New results are regularly added and, as shown in Table 1, the number of compositions, tests and modelling results, and the number of references continue to increase. The large increase in the number of results of version 1.3 was mainly due to the release to the MSIAC member nations of previously classified data by DOSG, UK and DGA, France.

**FRAID**  
*Fragment Impact Database*  
*Version 1.10*

Problems/Questions: [MSIAC](#) or [Pierre-François Péron](#)

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2010

Neither MSIAC nor the participating Nations can guarantee nor warrant the adequacy, accuracy, currency or completeness of the Technical Information contained in this database.

MSIAC would like to acknowledge the contribution of the following organizations to the enrichment of the database

↓

[REFERENCES](#)  
[STANAG 4496 \(Edition 2\)](#)  
[USER GUIDE](#)  
 Select your Energetic Material or the Systems Sheet & Click on it  
[SYSTEMS](#)

Figure 1: FRAID Front Page

Table 1: Information available in FRAID  
(V1.2 and V1.4 are draft versions of V1.3 and V1.5 and are internal to MSIAC)

Version	Number of Compositions	Number of Results	Number of References
V1.0	34	708	38
V1.1	63	871	57
V1.3	66	1108	60
V1.5	66+ Systems	1317	99
V1.6	66+ Systems	1390	110
V1.8	88+ Systems	1716	136
V1.10	111+ Systems	2003	175

In version 1.10, 175 open publications (proceedings of symposia, unclassified reports, magazine, scientific reviews, etc.) have been used for over 2,000 results on 111 compositions and munition systems. A lot of detail (pictures, graphs, comments) has been added regarding test set-ups and results interpretation. Figure 2 gives an example of an explosive composition datasheet.

In order to answer a need for systems' response to fragment attack, relevant information has also been collected and a datasheet on Systems was implemented in version 1.5 and onwards. Figure 3 gives an example of the information available in this section.

FRAID V1.10 can be downloaded from the MSIAC secure website. For further information please contact Pierre-François Péron ([p-f.peron@msiac.nato.int](mailto:p-f.peron@msiac.nato.int)).

**PBXN-110 (88% HMX and 12% HTPB)**  
**Steel**

ENERGETIC MATERIAL			COVER/CASING				PROJECTILE					RESULTS (detonation no detonation type III, IV, V, XDT, ...)	COMMENTS	REFERENCES
density (g/cm <sup>3</sup> )	process	state	thickness (mm)	diameter (mm)	length (mm)	nature	shape	nature	obliquity (°)	velocity (m/s)	diameter or side (mm)			
99.8% TMD	cast- cured	solid	4.06	55.1	199.9	steel	conical 160° (16 g)	steel	0	1829	12.7	type IV	Test according to MIL-STD-2105 B (alternate test procedure #1) Target: UN steel pipe for EIDS bullet impact test Worst result over 2 tests Shaped charge application	46 47 48 (see below)
	cast- cured	solid	5.1	76		steel	conical 160° (16 g)	steel	0	2050 2266	12.7	type V type I		Test performed to replace the explosive composition of the HYDRA-70 rocket MIL-STD-2105 B (alternate test procedure #1)
	cast- cured	solid	9.5	203.2	406.2	steel	≤ 2 cubes (16 g)	steel	0	2530 ± 90	12.7	type III (x3) type I (x1)	Test conducted in accordance with MIL-STD-2105 B Modified Naturally Fragmenting Test Unit (NFTU) used as a target Fragments launched with an explosive charge Multiple random impacts of 12.7 mm steel cubes	123 (see below)
	cast- cured	solid	7 10 12 15 17 20 25 40	100 x 100	215	-	explosively formed projectile	copper	0	2530	14.5	detonation	EFP designed as an alternate projectile to MIL-STD-2105A fragment Copper EFP characteristics 14.5 ± 0.5 g 2530 ± 30 m/s Ø 14.5 mm and L 17 mm	156 157
		detonation												
		burning												
		burning												
		partial burning												
		no reaction												
		no reaction												
		no reaction												

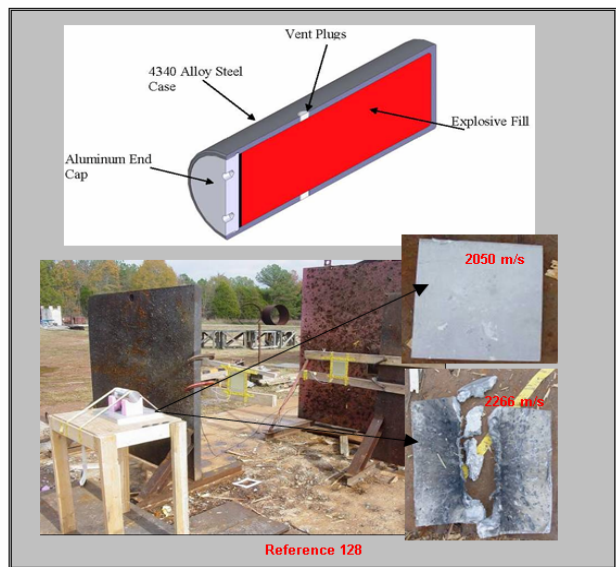
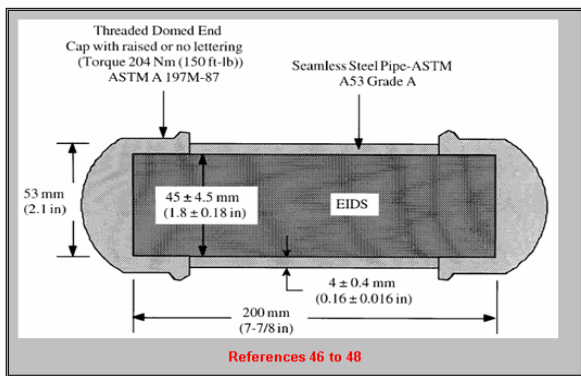


Figure 2: Datasheet for Tetryl covered with Steel

SYSTEM INFORMATION							THREAT	TEST		REACTION LEVEL							REFERENCES	
System Name	System Designation	Class	Tested Item	Tested Item Design.	Caliber (mm)	Energetic Material	Burst or Singl.	Proc.	Velocity (m/s)	Type I	Type II	Type III	Type IV	Type V	NP	Other	Ref.	Ref.
AMRAAM	AIM-120A	AAW	F	WDU-41/B Mk 80 Mod 0	127	PBXN 110 PBXW-11	B	2105B	2504 2540					2			100	
APOBS	-	BS	AUR	-	-	PBXN-10 PBXN-8 N5 propellant	S	2105B						2			89	
BLU-110 1000lb	-	GPW	W F	FMU-139B	356	PBXN-109 PBXN-7	-	-						1			63	
BLU-111 500lb	-	GPW	AUR	-	273	PBXN-109	-	-						1			63	
CBEMS 125 kg	-	P	AUR	-	-	B2214B ORA88B	S 250g	NFT T 70-512	2000					1			65	148
ESSM	RIM-162A	AAW	W	-	254	KS-33	B	2105B						1			74	
ESSM	RIM-162A	RSRM	RM S	-	254	HTPE/AP/AN HTPE/AP/AI	B	2105B					1				75	
Hellfire	Smokeless Large Insensitive Munitions	MSRM	RM	-	178	EMCDB propellant	S	2105B	1830 +/-60					1			85	
Hellfire	AGM-114B	SCW	W	M265	178	LX-14	B	US Navy 2105A		1							61,62 103	
Hellfire	AGM-114B	SCW	W	M265	178	PAX-2A	S	2105A		1							81	
Hellfire II	AGM-114K	SCW	W	M265	178	PBXN-9	B	US Navy 2105A		1							61,62 103	

Figure 3: Screenshot Example of a FRAID Datasheet on Systems

### LATEST PATENTS OF INTEREST



US 20100064926A1

(19) **United States**  
 (12) **Patent Application Publication** (10) **Pub. No.: US 2010/0064926 A1**  
 Melin et al. (43) **Pub. Date: Mar. 18, 2010**

(54) **APPARATUS AND METHOD FOR INHIBITING INADVERTENT INITIATION OF A MUNITION**

**Related U.S. Application Data**

(60) Provisional application No. 60/569,429, filed on May 7, 2004.

(76) Inventors: **Roger W. Melin**, Arlington, TX (US); **John S. Buchan**, Fort Worth, TX (US); **Joseph M. Wright**, Southlake, TX (US); **Chris E. Williams**, Mansfield, TX (US); **Daren C. Davis**, Granbury, TX (US)

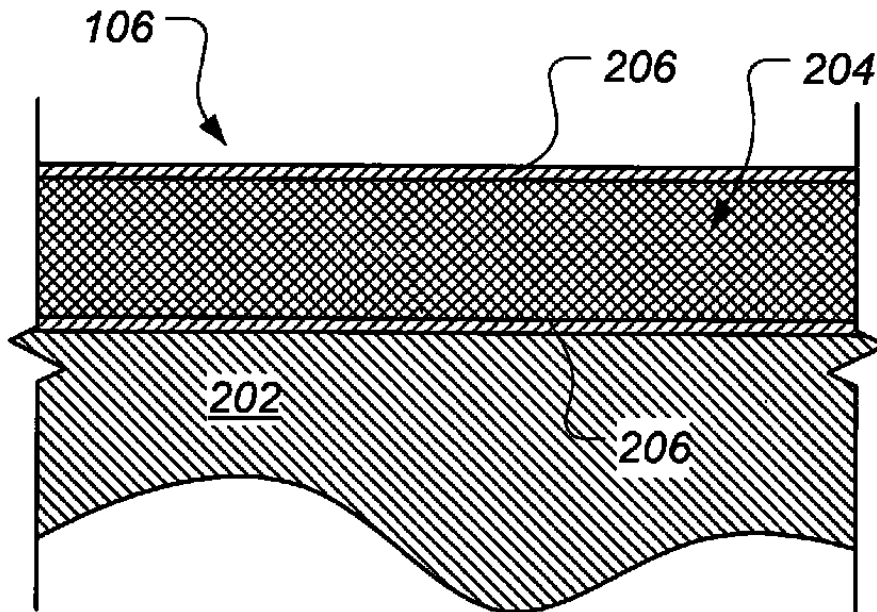
**Publication Classification**

(51) **Int. Cl.** *F42B 12/00* (2006.01)  
 (52) **U.S. Cl.** ..... 102/481  
 (57) **ABSTRACT**

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A device for inhibiting inadvertent initiation of a munition includes a sorbing refrigeration device adapted to at least partially surround an energetic material of the munition. A container includes an energetic material and a sorbing refrigeration device at least partially surrounding the energetic material. A method for inhibiting an inadvertent initiation of a munition includes cooling an energetic material of the munition by sorption refrigeration.

(21) Appl. No.: 11/123,292  
 (22) Filed: May 6, 2005



Provided by <http://www.patentstorm.us/patents/7472653/fulltext.html>

## ACCIDENTS REPORTING

22 April -29 June 2010

*(Re-printed with the permission of ility engineering ([www.saunalahti.fi/ility](http://www.saunalahti.fi/ility))  
from their Hazards Intelligence (Hint) Journal)*

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### 22 April - Bosnia

100422-05 Mount Igman, South of Sarajevo.

An explosion killed a land mine clearance expert and seriously wounded another. Police said that the two were clearing mines at Mt. Igman, south of Sarajevo. The injured man was hospitalized with several pieces of shrapnel in his neck and face, but the injuries were not life threatening.

According to official estimates, some 220,000 mines and other explosives are still hidden in the ground throughout Bosnia, covering about 600 square miles (1,550 square kilometres). That means some 3.5 per cent of Bosnia's territory remains mined, threatening the lives of almost one million people, or one-third of the population. Since the end of the 1992-95 war over 1,600 Bosnians – including almost 100 mine clearing experts – have been killed by mines.

### 24 April - Germany

100424-08 Urberach, near Rödermark, Hessen.

Ammunition from World War II probably blew up in a forest fire in Urberach. At first, the fire-fighters thought it was a conventional forest fire, but when they heard shots in the fire, they drew back and extinguished it from a distance. The water supply was ensured by a shuttle service from the fire trucks of Urberach and Ober-Roden. Because of the high water consumption, additional large water tankers were requested from Dreieich-Sprendlingen and Dietzenbach. The fire departments from Rödermark were on site with nine vehicles and 30 emergency services personnel. The fire was out by 19.30.

The cartridges exploded where some 3,000 square metres of forest floor were in flames. The fire departments immediately alerted the bomb disposal team, which ordered the fire-fighters to withdraw to a safe distance. No one was injured. The fire-fighters had been called to the fire in Urberach at 13:08. but due to inaccurate location information in the first alarm, the police helicopter was called in to search the place. A careful cyclist was faster. Several crews fought the fire from two sides until they heard shots in the flames.

An anonymous caller told local media that these were not munitions from the Second World War, but from the Rote Armee Fraktion (RAF – Red Army Faction), an urban terrorist group that operated between 1970 and 1998.

### 28 April - China

100428-02-A Tiemen Township, Xin'an County, Henan Province.

At least three were confirmed dead after a farmer's home exploded at around 18:30. According to the preliminary investigation by local police, the explosion was caused by illegal storage of explosives. The police were conducting further investigation into the case.

A resident of the county surnamed Huang rented the farmer's house to store explosives and planned to use them for illegal mining, said a spokesperson of the county government. Huang and the farmer's two family members were killed on the scene. The farmer and Huang's daughter and son-in-law were detained by the police.

### 28 April - Italy

100428-04 Piacenza, province of Piacenza (PC), Emilia-Romagna region.

A WWII bomb exploded prematurely during an operation to defuse it not far from the city of Piacenza in northern Italy. The bomb was US-made and contained 80 kg of phosphorus. It went off while being put on a truck to take it to a safer place for deactivation. The head of the sappers' team said: "It was a miracle that nobody suffered. It seemed like everything was under control, but had the bomb exploded several seconds earlier there might have been victims." It was later determined that only a small part of the explosive got burnt. After a thorough examination the operation was continued and the rest of the bomb was successfully deactivated in a remote place.

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#### 4 May - Portugal

100504-01-B Canidelo district, Vila do Conde. JMML.

At least one person died in an explosion at 13.10 in the JMML pyrotechnics factory located in a residential neighbourhood of Canidelo in Vila do Conde. Another person was injured seriously and one child, who was in a nursery near the unit, suffered minor injuries. The National Authority for Civil Protection confirmed on their website that it had registered one victim. According to SIC News, this was a factory worker who thrown by the violence of the explosion. Local media said the deceased was a Ukrainian citizen, who worked at the company that owns the lockers where the explosion occurred.

The force of the explosion caused damage to several homes near the factory, especially to windows and roofs, and fire officials asked residents to move away from the site due to the danger of further explosions.

On May 11, Jose Carneiro, manager of the technical pyrotechnics company, said that the company will not pay for any damages caused to the environment. He said the Board that licensed building construction and occupancy next to the plant is responsible, and admitted that he did not even have insurance. JMML believes that "the Board is responsible" for failing to enforce the protection radius around the plant, which will no longer be operating. Carneiro said: "Whoever licensed the buildings should pay the damages. The company has a radius of protection of 322 metres, where there can be no construction. That is the law. When we started the business here in 1959, there were no buildings here." Jose Carneiro explained that, when setting up the company, there was a notice published in the House and the Parish Council and "no one ever objected". With license No. 599, issued by what is now called the Department of Arms and Explosives of the National Directorate of PSP, JMML began operations, adding: "In 1987, we were forced to relocate the fuse area, due to the proximity of the school. At the time it was the only building that existed."

According to Carneiro, the plant moved away from the school, but to no avail: "The houses started to be built one after the other, getting closer. We always informed the National Directorate of the PSP that the houses were in the range of protection."

As for the 820 kg of gunpowder seized in the factory, which was only licensed to store 300 kg in its storerooms, Jose Carneiro admitted guilt, but said it was "non-compliant material waiting to be returned", which ensures that the company was working "so perfectly legal".

#### 4 May - USA

100504-17 Milan, TN. American Ordnance.

An explosion at the Milan Army Ammunition Plant sent two people to the hospital. The accident occurred at about 17:10, according to a Milan Arsenal news release. Neither Army officials nor employees of American Ordnance, which operates the facility, could be reached for comment. One of the employees was sent to Regional Medical Centre in Memphis for injuries to his left hand, the release stated. The other worker was taken to Humboldt General Hospital for evaluation, and was released.

#### 5 May - USA

100505-03-A Huntsville, AL. US Army. Amtech Corp.

Two contract workers died after being injured in an explosion while removing a propellant from rockets at Redstone Arsenal, where the Army conducts missile and weapons research. The public affairs office at the post in Huntsville said the two died after being flown to the burn unit at UAB Hospital in Birmingham. Base officials said both worked for a Redstone contractor, Amtech Corp., and were injured in an explosion at 08:45 while removing ammonium perchlorate, an oxidizer, from rockets at a test site. A third worker was nearby but escaped harm, and there was no environmental impact from the accident, the Army said.

A statement from Deputy Public Affairs Officer Kim Henry said the building recently passed safety inspections and was designed to minimize the impact of possible explosions, but "the work that we perform is inherently dangerous work".



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On May 10, Maj. Gen. James Myles, commanding general of Redstone Arsenal and also commander of the Aviation and Missile Life Cycle Management Command, said a team of experts was being assembled for an exhaustive investigation into the explosion. He warned against expecting a quick report: "We are getting the best and brightest minds in this country to participate in this accident investigation. We're going to take our time. We're going to go through every element of what occurred at Building 7352 and we're going to understand all of it."

The victims were refining a new process to separate ammonium perchlorate from other elements in missile fuel, said Paul Turner, Amtec's associate director for Propulsion Technology. Their work was part of a program to determine whether a high grade of ammonium perchlorate could be removed from old or unneeded missiles for use in new systems.

### **8 May - Pakistan**

100508-04 Hangu, Northwest Frontier Province.

Four policemen were injured when a rocket launcher went off accidentally in Hangu. According to sources, a convoy of an oil and gas exploration company was travelling with a police escort when the police vehicle crossed a speed breaker at the Thal Road, due to which a rocket launcher fell from the hands of a policeman and went off. As a result, four policemen were injured. Police officials, however, said the blast occurred due to a remote controlled bomb, which had targeted the oil company.



A C-9 machine gun

### **11 May - New Zealand**

100511-01 Waiouru, North Island. New Zealand Defence Force.

A soldier was injured in a training accident at Waiouru when a round exploded in a machine gun he was firing. The NZ Defence Force said in a statement: "During a live firing field exercise the soldier received a shoulder injury when he was struck by a bullet casing while operating his weapon." He was in a stable condition and has been transferred to hospital for further treatment. Major Kristian Dunne said the soldier was using a C-9 machine gun, a weapon used widely across the Defence Force. Major Dunne said the soldier's unit had responded quickly, getting the man back to base before he was transferred to hospital. The soldier, a member of the Royal New Zealand Engineer Regiment, was recovering in Palmerston North hospital with moderate injuries to his shoulder. Major Dunne said he could not recall a similar incident. An inquiry would now look in to the possible causes.

### **12 May - Lebanon**

100512-10 Tiri, near Sidon.

Eleven French soldiers serving with the UN peacekeeping force in southern Lebanon were injured, one of them seriously, when a rocket accidentally exploded inside their camp. Lieutenant Sylvain Bedouet, spokesman for the French battalion, said: "The incident happened when soldiers handling an anti-tank rocket accidentally set off the firing mechanism." He said one soldier suffered serious wounds to his face and was immediately flown by helicopter to a hospital in the nearby coastal city of Sidon. He said four other soldiers suffered minor shrapnel wounds and seven damage to their hearing. The 1,500-strong French battalion serving with the United Nations Interim Force in Lebanon (UNIFIL) is based in the village of Tiri, some eight kilometres (five miles) from the Israeli border.

### **12 May - India**

100512-12 Bamhori, Sagar, Madhya Pradesh.

Nine soldiers were injured, two of them critically, when a mortar exploded accidentally at an Army firing range near Bamhori. A mortar being test fired exploded midway, injuring nine soldiers. A senior army officer said on condition of anonymity that the two critically injured soldiers were airlifted to Delhi, while the rest of the injured were admitted to Sagar district hospital.

### **13 May - China**

100513-09 Anping county, Hebei province.

Five people were killed and two injured in an explosion after a truck transporting black powder caught fire. According to the local government, the truck carrying black powder caught fire and blew up after it was "exposed to a stretch of electrical wire during transportation". Local government officials rushed to the scene and began their

*(Continued on page 10)*

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rescue work. The two injured were in stable condition and the cause of the explosion is under investigation.

#### 14 May - USA

100514-03-A Colebrook, NH. Black Mag Industries, a subsidiary of Millennium Muzzleloaders (MDM).

At least two people were killed in an explosion at an ammunition plant. The factory reportedly employed six people, but officials have not said how many were in the building at the time of the explosion, which happened just before 13:30. The plant makes "synthetic gunpowder for certain types of firearms". The material is said to be "less explosive than regular gunpowder".

An eyewitness reported that there were two explosions, with a second one occurring minutes later. She said the first one shook her house, and she got up to see smoke coming out of the plant. She said that after the second explosion she could hear "a hissing and whizzing sound" followed by pops. Ammunition could be heard exploding until 15:00, making it impossible for fire-fighters to get close.

Owned by Craig Sanborn of Maidstone, Vermont, MDM opened the plant in Colebrook Industrial Park early in 2009, and got a \$170,000 Economic Development Administration grant in July. At that time, it was reported that Sanborn said employees would travel to Florida to learn how to make BlackMag, a "safe" black powder that uses a citrus-based formula instead of sulphur. In January, a sub-contractor suffered burns at the plant while working on a piece of machinery that processes gunpowder. That incident "is of interest" to investigators.



#### 17 May - USA

100517-06 Point Pleasant, Mason County, WV. Division of Natural Resources (DNR).

High Performance Ammunitions. The Division of Natural Resources' wildlife office reported an explosion at 01:13 in the McClintic Wildlife Management Area just north of Point Pleasant. Mason County emergency officials said no injuries were reported.

The DNR owns several concrete bunkers that are covered with earth and grass, and were once used for storing explosives during World War II. Spokesman Hoy Murphy said the bunkers are leased out to businesses for legal storage. Paul Cross, an agent with the Bureau of Alcohol, Tobacco, Firearms and Explosives in Charleston, said a businessman was storing different types of gunpowder for resale in the bunker that blew up, adding: "Over time and with heat it deteriorates and it can become unstable. We're pretty sure that's what happened. It got warm and it's been in there several years." Cross said the businessman estimates the powder's value at \$100,000. A fire caused by the explosion was out by the time Point Pleasant fire-fighters arrived, Fire Chief Jeremy Bryant said.

According to local media, the bunker was leased by Richard King, of High Performance Ammunitions, which is based in Pittsburgh. King lives in Point Pleasant. King said he was storing military issued propellant or gunpowder that he bought in surplus and then broke apart and sold. He reportedly said it is not as highly explosive as dynamite but, when heated, can build up a lot of pressure until it eventually explodes. King also said that at one time he was storing as much as 100,000 pounds of gunpowder, but at the time of the explosion there was only about 15,000 to 20,000 pounds.

#### 24 May - USA

100524-05 Rocket Center, WV. Allegany Ballistics Laboratory. Alliant Technical Systems (ATK).



Two Alliant workers reportedly received minor injuries in an explosion around 16:40 at the 1,628-acre facility located in Mineral County. Gary Geiger, communications manager for ATK's missile products group, said in a news release: "The explosion occurred in a remotely operated production mix facility in the energetics portion of the plant. No one was in the building at the time of the explosion. Two employees who were working in a nearby building (were) being treated for minor injuries at a local hospital and are expected to be released today. Other employees were treated on-site by the facility's medical staff."

The Allegany Ballistics Laboratory, situated on the site of a former ammunitions plant and employs about 1,000 people from the tri-state area. The facility is under contract with the Naval Sea Systems Command and operated by ATK. The last major explosion at the facility occurred in 1981, killing two

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workers and leaving a crater where a building had once stood. There had been two prior explosions between ABL's founding in 1944 and that time.

#### **24 May - Pakistan**

100524-06 Bara Tehsil, Khyber Agency.

An explosion occurred at an ammunition store in a fort of the Frontier Corps (FC) in the Bara tehsil [sub-district], causing no loss of life. Security sources said that the explosion occurred due to the hot weather, and although the structure was damaged, there were no casualties.

#### **25 May - Pakistan**

100525-09 Islamabad.

A police official detected smoke coming out of an explosives container in the Bhara Kahu police station. The container had some 620 kilograms of explosives material that had been seized by the police in February 2010. The police officials acted in a timely manner to prevent the explosives from catching fire. On the directions of the bomb disposal squad and the fire brigade officials, the stacks of explosives giving smoke were pulled out and buried under sand. The Bhara Kahu Police claimed that the explosives were heating up due to extremely hot weather and could have easily caught fire within a few minutes if the smoke had not be detected.

Major Tabassum, head of the Bomb Disposal Squad, said that 600-700 kg of explosives was a huge amount. However, he ruled out the possibility of high explosives catching fire due to intense heat, saying high explosives always need detonation, but this could be provided if low explosives caught fire. The explosives in the Bhara Kahu police station could not only destroy the whole police station, the resulting explosion could also damage the nearby public property since the police station is located in a populated area.

#### **2 June - Indonesia**

100602-02 Turen area, Malang district, East Java. PT Pindad.

Three people were killed in an explosion at a detonator-making plant owned by state arms maker PT Pindad. Three people sustained light injuries in the explosion. Several military officials are scheduled to inspect the scene of explosion, and a forensic team from the East Java provincial police will look into the cause of the explosion which also destroyed the building. The detonator-making plant is jointly operated by PT Pindad and state-owned explosives maker PT Dahana. The three were making detonators when the explosion occurred.

#### **2 June - USA**

100602-05 Bend, OR. Nosler Inc.

No injuries were reported from a fire and explosion at the Nosler bullet plant in Southwest Bend. Bend Fire crews were dispatched to a pull station alarm at the Nosler facility at 14:05. There were reports of smoke in the building. Minutes later there was an explosion, according to Bend Deputy Fire Marshall Jeff Bond. Witnesses said the explosion occurred in an ammunition testing area, but authorities were still investigating its cause.

Bond said about 10 percent of the 80,000-square-foot building collapsed. The one-floor structure has a test shooting range in the basement, but Bond said he did not know where the fire began. He said an extensive investigation will be conducted by the fire department, law enforcement agencies, and the federal Bureau of Alcohol, Tobacco, Firearms and Explosives. Witnesses said work was underway in the ballistics tunnel, a testing area for ammunition, when there was a flash, followed by an explosion. The plant manufactures hunting ammunition.



#### **5 June - Mexico**

100605-01 Huajuapán de León, Oaxaca state.

A loud explosion and a smell of gunpowder caused dozens of local people to flee in panic. Law enforcement and national emergency committee, state police, municipal police, and fire brigade were alerted and arrived at the place, immediately cordoned-off the area, noticing that the explosion took place in a private home. Early reports are that the explosion was occurred at approximately 03:55 and was due to gunpowder that was stored secretly, and which the intense heat caused the explosion, generating a blast wave which damaged several nearby houses.

*(Continued on page 12)*

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### **6 June - Russia**

100606-06 Tambov, Tambov Oblast.

An investigation is underway after an accident at a Tambov gunpowder plant killed one worker and injured another. Preliminary reports suggest that an explosion occurred within an acid extraction centrifuge, but a police spokesman said: "Powder pressing equipment got depressurized at 4:30 a.m. There was no explosion or fire." The injured worker was taken to an intensive unit at the local hospital, with a serious hand injury.

The Tambov gunpowder plant specializes in nitro-cellulose powder and propellants for small arms, aviation, marine, artillery, tank armament systems, gunpowder for sporting and hunting ammunition.

### **8 June - USA**

100608-09 Saratoga Springs, UT. Dyno Nobel.

A building at the Dyno Nobel complex in Saratoga Springs was destroyed by fire. The administrative building at the explosives plant houses a laboratory, where a fire apparently started shortly after 18:00. The building contained several chemicals, which made it too dangerous for fire-fighters to combat the flames. Saratoga Springs Fire Chief Tim Hay said: "There was no life in danger and no residences, so we let the structure burn." Fire-fighters entered about 02:00, and planned to stay on scene throughout the day putting out hot spots and monitoring the building.

### **10 June - Russia**

100610-06 Buryatia region, Siberian Military District (SIBVO).

Three Russian soldiers were killed when ammunition inside their T-72 tank exploded in the gun turret during exercises on a Siberian firing range. Valery Sheblanin, a spokesman for the Siberian Military District, said a high-level investigation was underway into the cause of the explosion, adding: "The head of the Siberian Military District, Lieutenant General Vladimir Chirkin, is personally overseeing an investigation on the scene."



### **11 June - Denmark**

100611-01 Varde, 20km north of Esbjerg, Jutland.

Two Danish soldiers were killed in a mortar explosion while taking part in a shooting drill before their deployment to Afghanistan. Brig. Gen. Michael Lollesgaard said two more soldiers were slightly injured as troops were training to fire mortars. Later, the army said it had decided to suspend the use of 60mm mortars, both at home and in Afghanistan, where Denmark's 700 service members use them. The accident occurred at the Oxboell camp near Varde.

The two dead soldiers were part of the Royal Life Guards and were preparing for the infantry unit's deployment to southern Afghanistan in August. The troops died during a shooting exercise, Lollesgaard said, but would not elaborate on the cause of the explosion that killed them.

### **13 June - USA**

100613-09 Poteet, TX.

A fire broke out in an ammunition warehouse. Inside the warehouse, fire-fighters said they found 50 pounds of gunpowder, along with ammunition and "chemicals, like propane, and a mix of tanks and gas". It took fire-fighters several hours to contain the fire. No injuries were reported, but two fire-fighters were treated for smoke inhalation.

### **13 June - Colombia**

100613-11 Los Patios Cúcuta, a town in the metropolitan area of Cúcuta, North Santander Department.

A man was killed and eight others injured around 09:45 when gunpowder he was carrying exploded as he rode on a motorcycle of low cylinder capacity. Witnesses said several passers-by were injured by the blast, which caused the immediate death of the motorcyclist, who apparently carried a jar of gunpowder fuses between his legs.

However, witnesses who knew the deceased said he came on foot and had the fuses in a sack, which he dumped on the sidewalk, causing the explosion, wounding bystanders, and causing considerable damage to the bike parked on the road.

Colonel Jorge Iván Flórez, Metropolitan Police Commander of Cucuta, said the accident could have been caused by the friction of the fuses, "which consist of black powder and red phosphorus". Colonel Flórez said: "We have

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found that the man was a resident of the barrio La Cumbre, Los Patios, and was known because he was dedicated to the development of fuses for establishments where they practice shuffleboard." He denied that it was an attack on a group of soldiers who at that time conducting a checkpoint near the site of the explosion.

#### 14 June - Poland

100614-07 Warsaw. Military University of Technology.

Two people were injured as a result of an explosion at the Military University of Technology in Warsaw during an explosives lesson. Jerzy Markowski, spokesman from the Military University of Technology, said: "The blast happened at 8.45 CET during a class on explosives." A student and a lecturer who were injured as a result of the explosion were taken to hospital. They were conscious, but it has not been revealed whether their injuries were life threatening. The main building remained intact, as the class was being run in a concrete bunker. A special commission is investigating the cause of the accident.

#### 17 June - China

100617-07 Donghu Town, Jilin Province.

At least seven people were killed in a lightning-triggered explosion at a quarry in northeast China. The explosion happened at the Yongxin Quarry in Donghu Town when lightning hit detonators arranged for quarrying operations. The explosion buried eight workers under debris. Only one survived. He was injured and has been hospitalized. There were still detonators buried at the private quarry, which was ordered to suspend operations pending a safety overhaul, rescuers said.



#### 23 June - Russia

100623-03 Ryazan, Ryazan province.

One person was killed and at least 24 injured when ammunition exploded at a military training facility in central Russia. The accident occurred around 13:00 Moscow time as two Kamaz trucks with old ammunition were being unloaded. Col. Alexei Kuznetsov said the explosion at the Ryazan artillery school, about 200 km southwest of Moscow, could have been caused by the spontaneous combustion of gunpowder.

A similar incident occurred on November 13, 2009, at an arms depot in the city of Ulyanovsk, in Russia's Volga region. [See HInt 09-11, 091113-01.] Two people were killed and dozens injured in an explosion and subsequent fire at the depot. Just 10 days later a new explosion occurred at the same depot, when military servicemen were loading burnt ammunition into trucks. Eight servicemen were killed and two were injured in the blast. [See HInt 09-11, 091123-04.]

#### 29 June - Spain

100629-05 Valdemoro (Madrid). Duque de Ahumada Guardia Civil College.

A Guardia Civil officer lost his life whilst teaching trainee officers how to handle explosives. He was in the basement of the Duque de Ahumada Guardia Civil College when an explosion occurred and the building went up in flames. 2nd Lt. Francisco [M] had worked in the Bomb Deactivation Service since 1973. The officer was with six students and two instructors at the time, who attempted to put the flames out with fire extinguishers. When they were unable to do so, they decided to make their escape. The deceased was a reservist with the Guardia Civil, Spain's national militarized police force.



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## IM Technology Gaps Workshop

### “Reducing Munition Response to Shaped Charge Jets, Fragments and Explosively Formed Projectiles”



June 2011 (3 ½ days)  
Europe  
Open to Government Agencies and Industry  
**MSIAC CONFIDENTIAL**



#### INTRODUCTION

Insensitive Munitions (IM) are now recognized as one of the key considerations when designing and/or procuring munitions. The IM goals defined in STANAG 4439 and AOP 39 have provided much of the drive behind the progress made. There is now a wide range of technologies and techniques that can be employed to improve the response of munitions to unplanned stimuli.

However, some IM shortfalls still remain. An MSIAC workshop was held in May 2009 to identify and prioritize them, with emphasis on the end user's, i.e. the warfighter's, experience and needs.

It has been established during this workshop that some munitions currently in use in operations are vulnerable to attack by fragments, shaped charge jet weapons and explosively formed projectiles. Priority munition components have been identified and include gun propellant charge systems; high performance rocket motors; minimum signature rocket motors; anti-armour warheads; and blast/fragment and general purpose warheads.

These priority IM technology gaps will be the subject of an MSIAC-sponsored workshop in June 2011.

#### IM TECHNOLOGY GAPS WORKSHOP OVERVIEW

The workshop will address how to reduce the vulnerability of key munitions, packaged and unpackaged, against fragments, shaped charge jets (SCJ) and explosively formed projectiles (EFP).

Discussion will include both existing munitions and new/upgraded munitions in development and will focus on reducing the response of munitions to these threats in operational theatres, related mitigation shortfalls based on credible aggression scenarios and potential remediation options.

Three categories of munition components will be considered: gun propellant charge systems; rocket motor; and warheads. For each of these categories, the workshop will aim to:

- provide an IM state-of-the-art analysis covering reaction mechanisms (from type I to type V) to the selected threats and available IM mitigations;
- identify shortfalls in technology (munition components including initiation/ignition systems) and potential remediation options;
- identify non-technical hindrances to IM devices implementation such as cost, manufacturing, toxicity, logistics and impact on the environment and potential remediation options;
- identify systems level mitigation methods that could be applied to munitions in operations;
- identify areas for multi-national collaboration.

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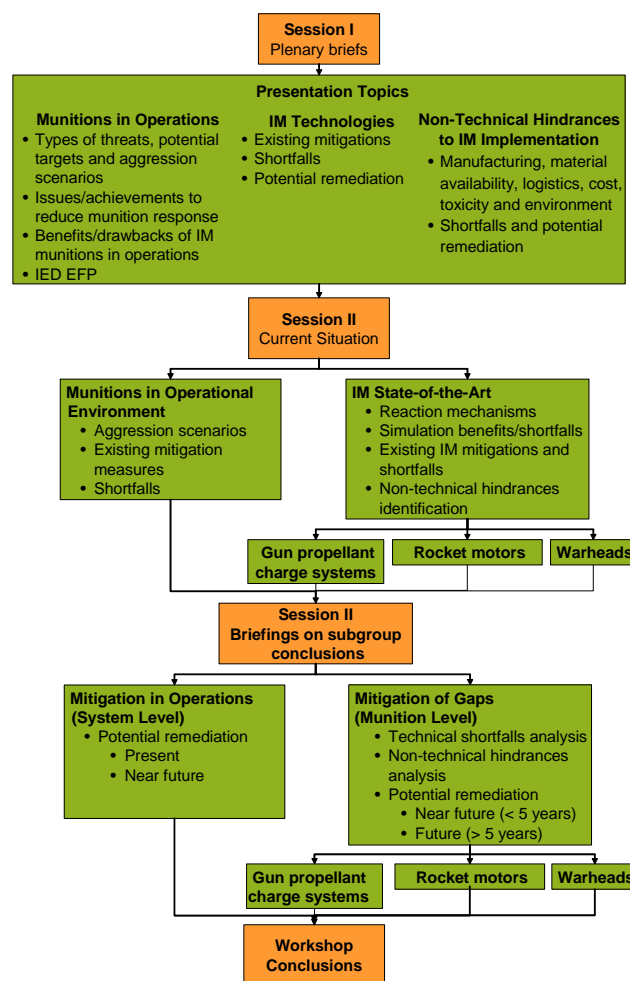
## STRUCTURE

The workshop structure is shown below.

Session I will be a plenary session. The presentations will cover munitions in operations, IM technologies and non-technical hindrances to IM technology implementation in relation with fragment, SCJ and EFP threats. This session should give the audience an overview of the different workshop topics and highlight the issues raised by the mitigation of these three threats. Details on the presentation subjects and goals are given on the MSIAC website.

During Session II, participants will be divided in two main groups, one focusing on munitions potential aggression scenarios and existing mitigation in the current operational environment and another on the IM state-of-the-art, both against the three selected threats. The second group will be sub-divided into three sub-groups to cover the different munition components. The objective of this session is to draw an accurate picture of the current situation.

During Session III, participants will discuss what solutions could be applied now or considered in the future to reduce the reaction violence of either existing munitions in operations or new/upgraded munitions in development to the three selected threats.



## CLASSIFICATION

To facilitate the provision of technical data, the classification of the workshop will be **MSIAC CONFIDENTIAL**. Papers or presentations can be accepted up to this classification level.

## DATE, VENUE, PARTICIPANTS

The workshop is open to representatives of government and industry from MSIAC member nations (Australia, Canada, Finland, France, Germany, Italy, Netherlands, Norway, Spain, Sweden, UK and US).

The IM Technology Gaps Workshop will be held in June 2011 in Europe. The precise location should be decided by mid-August but should be in one of the following countries: France, the Netherlands or UK. More information will be available on the MSIAC open website ([www.msiac.nato.int](http://www.msiac.nato.int)) over the next few weeks.

## PROCUREMENT ISSUES PRESS REVIEW

*If you have information you consider of relevance to this section please do not hesitate to contact MSIAC at [info@msiac.nato.int](mailto:info@msiac.nato.int)*

### ATK RECEIVES \$52 MILLION TRAINING TANK AMMUNITION ORDER FROM U.S. ARMY

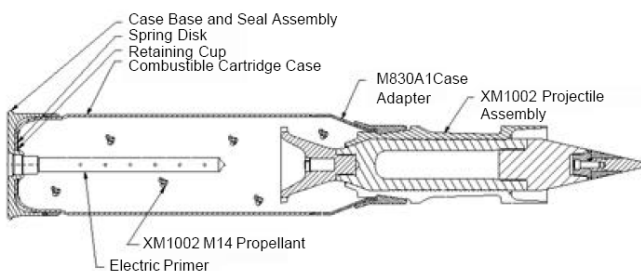
([www.atk.mediaroom.com](http://www.atk.mediaroom.com) – 4 May 2010)

Alliant Techsystems (NYSE: ATK) has received a \$52 million order for 120mm training tank ammunition from the U.S. Army. The award is for the third year of a four-year contract.

The 120mm training ammunition, used by the M1A1/A2 Abrams main battle tank, include the M865 kinetic energy and the M1002 multi-purpose anti-tank training rounds. These training rounds closely replicate tactical ammunition in appearance and ballistic performance to provide the warfighter with an affordable, yet realistic training experience.

The M1002 has a combustible cartridge and M14 propellant charge. The round is packed in a PA171 container. This container is made of a metal can with two single pane windows in Polyethylene Ionomer that have been designed to rupture in case of propellant combustion and prevent pressure build-up. This concept enabled to keep the container intact in IM tests and avoid container metal projections.

120 mm M1002 training ammunition is fully IM compliant and has been assigned a hazard division HD 1.3C.



M1002 Cartridge Layout



PA-171 Container

M1002

FCO	SCO	BI	FI	SR	SCJ
V	V	V	V	P	P

120 mm M1002 IM Signature



## GENERAL DYNAMICS ACQUIRES EBV EXPLOSIVES ENVIRONMENTAL COMPANY

([www.defenseprocurementnews.com](http://www.defenseprocurementnews.com) – 25 May 2010)

General Dynamics announced that it has acquired EBV Explosives Environmental Company, an industry leader in demilitarization, incineration and disposal of munitions, explosives and explosive wastes. Terms of the cash transaction have not been disclosed; the acquisition will be accretive to General Dynamics' earnings in 2010.

The organization will become part of General Dynamics Ordnance and Tactical Systems, a business unit of General Dynamics, and will be known as General Dynamics Ordnance and Tactical Systems - Munition Services. It is based outside of Joplin, Missouri, and has approximately 130 employees.

The company has extensive knowledge and experience in a wide variety of Munitions Demil Technologies (see table below). It claims to be the world-wide leader in cluster munition demilitarization and disposal and to be the first and only company experienced with automated disposal of Improved Conventional Munitions (ICM).

It has safely disassembled and destroyed more than 400,000 rounds containing over 40,000,000 submunitions as well as more than 16,000 CBU dispensers and Multiple Launch Rocket System (MLRS) warheads have been safely disassembled and their submunitions destroyed.

<u>Types of Demilitarized Munitions</u>	<u>Technologies</u>
Small, medium & Large Cal Ammo	Pull Apart
Grenades & Mines	Defuze
Cluster Munitions and Submunitions	Deprime
Bombs	Delink
Missiles & Rockets	Sawing & Waterjet cutting
Smokes & Dyes	Disassembly
Pyrotechnics & Illumination Devices	



## MSIAC NEWS

### FAREWELL TO PATRICK

As the last Steering Committee was cancelled due to the volcanic ash fallout, Jerry Ward took advantage of an AC/326 (CNAD Ammunition Safety Group) meeting he was attending at NATO HQ in Brussels to pass by the MSIAC offices to officially toast Patrick Touzé's departure and present him with the traditional clock.



### REBECCA CRITICS INTERNSHIP

Rebecca spent three weeks with us from 21 June to 16 July as a summer intern to complete her second year of engineering at the US Merchant Marine Academy.

We wish her luck in her future career.



PROMOTING NATIONAL SECURITY SINCE 1919



# 2010 Insensitive Munitions and Energetic Materials Technology Symposium

International Progress in Inensitive Munitions and Energetic Materials

OCTOBER 11-14, 2010

[WWW.NDIA.ORG/MEETINGS/1550](http://WWW.NDIA.ORG/MEETINGS/1550)

MUNICH, GERMANY

EVENT #1550

## LATEST PUBLICATIONS

*(Available on the MSIAC secure website <https://sw.msiac.nato.int/SecureWeb/> or on request at [info@msiac.nato.int](mailto:info@msiac.nato.int))*

### LIMITED PUBLICATIONS

- L164 Calculated Detonation Performance of Nitro- and Nitro-Amino-Substituted Borazene, Borazine and Iminoborane by Dr Ernst-Christian Koch, June 2010
- L165 Volumetric Explosive, Part 1: Fuel/Air Explosives by Dr Ernst-Christian Koch, June 2010
- L166 Review on Expendable Infrared Countermeasures by Dr Ernst-Christian Koch, July 2010
- L167 Fragment Impact Database (FRAID) Version 1.10 User Guide by Dr Pierre-François Péron, July 2010
- L168 Recent Developments in IM Bombs by Dr Pierre-François Péron, August 2010

### OPEN PUBLICATIONS

- O129 Changes to United Nations Test Series 7 for Hazard Division 1.6 Explosive by Dr Michael W. Sharp, June 2010
- O130 QD Hazard Analysis on Deployed Mission by Thomas N. Taylor, June 2010
- O131 MSIAC and its Contributions to Munitions Safety by Roger L. Swanson, June 2010

## NEW ON OUR WEBSITE

Poster on Detonation Performance of Nitro- and Amino-Nitro Substituted Borazines and Borazenes by Dr Ernst-Christian Koch displayed at the 2010 ICT Symposium on Energetic Materials in Karlsruhe, Germany on June 29-2 July 2010.

## REMINDER

### CALL FOR NOMINATIONS FOR THE 2010 MSIAC IM AWARDS

In order to acknowledge and encourage progress and achievements in Insensitive Munitions technology, MSIAC has been presenting Awards for IM excellence at all NDIA IM/EM Technology Symposia since 1997.

The next MSIAC IM Awards will be presented at the 2010 NDIA IM/EM Technology Symposium (12-14 October, München, Germany).

Please submit nominations via your National Focal Point Officers, your MSIAC Steering Committee representative or directly to MSIAC.