

**MSIAC****Munitions Safety Information Analysis Center***Supporting Member Nations in the Enhancement of their Munitions Life Cycle Safety*

# Bulletin

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November 2014

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## NATO AC/326 SG/B - CUSTODIAL WG MEETINGS ON SHAPED CHARGE JET AND FUEL FIRE EXPERTS

The meeting location was beautiful Karlskoga, Sweden in the shadow of the home of Alfred Nobel. From 3-5 September 2014 a group of subject matter experts from 8 Nations and MSIAC gathered to work on updating two NATO Standard Agreement (STANAG) documents. The host nation, Sweden, provided an excellent venue, the Bofors Hotel, for the meeting.

**The Shaped Charge Jet (SCJ) CWG** met on the first day. This meeting was added to the agenda as a meeting of opportunity. It was realized during the SCJ MSIAC workshop, and the inaugural CWG meeting in May 2014, that many of the same subject matter experts would be attending the fuel fire experts CWG. It was determined that the current SCJ STANAG 4526 is dated and has lost relevance. The objective is to create a new Allied Ordnance Procedure (AOP) which holds the technical information of the testing requirements per the new rules of AAP-03J. The technical information from STANAG 4526 will be updated and placed in the new AOP 4526 and the STANAG, per AAP-03J, will become just a covering document.

After the first meeting in May a draft AOP was created and circulated among NATO member nations which included recommendations from the MSIAC workshop.

This included removal of: the v<sup>2</sup>d table, the Bomblet, the Rockeye, the Anti-Tank Missile and removal of the Ballistic Pendulum as an option.

Recommendations also included: to use the RPG-7 as a representative threat, maintain current German, French and US test standards, allow the use of actual RPG-7 warheads, define jet characteristics and test configuration for future potential RPG-7 threat designs and allow a THA based variation.

This first draft was reviewed line by line at the meeting in Sweden. Annexes for the French and US test procedures have been created with the German test procedure soon to follow. The second draft will be made available to all participants for comment on the NATO DI portal.

The next meeting will be held in May 2015 in Rome, Italy.

**The 4th Fuel Fire Experts CWG** met on the second and third days of the meeting. Because of environmental concerns many countries would like to use propane instead of jet fuel or kerosene for the fast cook-off test. Propane offers many advantages such as: cleaner burning and combustion products, presumed advantage of being able to see the test item in the fire, presumed repeatable heating properties and presumed lower costs. The objective is very similar to the SCJ objective to create a new AOP containing the technical test information and a cover STANAG.

A review of the findings and draft AOP 4240 from the previous meeting was done and

*(Continued on page 2)*



updates on recent test activities were shared. Testing to evaluate and quantify a kerosene fire versus a propane fire was performed using newly developed instrumentation sensors and thermocouples at several national test sites. Heat flux and adiabatic flame temperature were determined to be the key factors in quantifying a liquid fuel fire. Determination of an acceptable fire requires calibration of any new test set-up which will use an alternate or a non-standard fuel. It is critical to assemble the various gauges in the fire such that the hearth (usable area) of the fire is completely determined. The alternate test method will be described in Annex C of the new AOP 4240.

A demonstration of two Swedish propane burners was performed on the last day of the meeting. A new sand bed burner was demonstrated. This burner was designed to diffuse the propane through the sand for a more uniform fire and offer added protection to the equipment when there is a violent reaction of the test item. A more typical propane burner was also demonstrated. As a control a third test using the traditional kerosene was demonstrated as well. All 3 tests were performed on 40mm mortar rounds. The time to reaction varied significantly from one test to the next, but the net violence of reaction result was the same for each test. The liquid fuel fire took the longest to react, followed by the sand bed burner and the typical propane burner had the shortest time to reaction.

The group agreed that continued dialog among nations present and others interested in this alternate test method must continue. Development of the new AOP 4240 and the Annex C describing the alternate test method and calibration requirements continues.

It was determined that the next meeting will be planned for May 2015 in Rome, Italy.

**Ken Tomasello**  
**Naval Ordnance Safety and Security Activity (NOSSA)**

## AN IM ROCKET MOTOR FOR THE BRIMSTONE 2 MISSILE

Since the 1990's Roxel UK has been developing a replacement to the legacy motor employed on the Brimstone/Hellfire missiles. Roxel UK's IM motor is designated "Vulcan"; it uses a low explosiveness propellant coupled with Steel Strip Laminate case, in a minimum-smoke motor suitable for both fast jet and rotary wing applications.

The Vulcan motor has a greatly improved IM response, as demonstrated in full scale testing of Brimstone 2. The UK MOD's IM Assessment Panel (IMAP) is satisfied that Brimstone 2 represents the state of the art for Insensitivity of tactical missiles.

	FH	SH	BI	SR	FI (1830 m/s)
V	☺		☺	☺	
IV		☺			☺
III					
II					
I					

The IM Brimstone rocket motor is now in full scale production at Roxel to supply the UK MoD with MBDA's advanced IM Brimstone missile for Tornado GR4.

In order to de-risk the restart to qualification, and provide very high confidence, a series of motor trials were conducted to demonstrate and measure the design margin. One such trial examined the integrity of the rocket motor charge and its capability to withstand cracking to a thermal shock trial. This involves exposing the motor to many successive cycles, where one cycle is defined as 24 hours at +71°C immediately followed by 24 hours at -46°C. The pre-qualification trials demonstrated the capability of the improved rocket motor to withstand at least 40 thermal shock cycles. Furthermore, a few rocket motors were statically fired afterwards at -46°C to further prove the robustness of the charge. This represents a world class achievement never previously demonstrated with a Minimum Smoke motor.

Further details on the above will be presented in two papers at the NDIA IMEMT Symposium in Rome in April 2015. The two papers will cover the following aspects....

⊕ **"Brimstone 2: IM technology and the benefits for UK MOD"**

- ◇ Authors: P Cheese, et al, UK MoD
- ◇ The IM Warhead & motor are both described

⊕ **"Development of IM Brimstone rocket motor; an IM, min. smoke, air-launched system"**

- ◇ Author: A Strickland, Roxel UK
- ◇ The paper describes the development story discussing how these challenges were overcome and discuss the lessons learnt that followed. These lessons learnt will cover design assessment, production process optimisation, strategies to test to failure and test techniques to replicate air launched environments.



Cooldown to Failure Inspection  
 (undertaken in Pre-Qual Testing).

**Jim Fleming**  
**Roxel UK Ltd.**



Static Testing following 98 days C2 Cycling and 40  
 Thermal Shocks (undertaken in Pre-Qual Testing).



IM Brimstone motors packaged  
 for delivery .

(Continued on page 3)





# SMART MANAGEMENT OF MUNITIONS

**AVT-212 Cooperative Demonstration of Technologies (CDT) for "Integrated Munitions Health Management" (IMHM) was held on October 15-16, 2014.**

On 15 and 16 October 2014 a Cooperative Demonstration of Technology (CDT) on Integrated Munitions Health Management (IMHM) was held at NATO Headquarters in Brussels sponsored by the NATO Science & Technology Organization (STO). The CDT was organised by the Applied Vehicle Technology (AVT) Panel and the Munitions Safety Information Analysis Centre (MSIAC) and supported by the NATO Chief Scientist, Major General Albert Husniaux.

It was a premiere, being the first Cooperative Demonstration of Technology organized at NATO Headquarters by the STO AVT Panel, with the aim of showcasing the benefits of various technologies to decision-makers and end-users. This cooperation between MSIAC and STO was highlighted by BGen Bo Engelbreth: *"I am very proud and happy to see, that NATO's Science and Technology Organisation and the Munitions Safety Information Analysis Centre cooperate so closely with CNAD Ammunition Safety Group. Ammunition safety is not a field of where specific individual programmes - with short term tangible returns - are to be expected, it is rather a discipline aiming at reducing the overall risk of accidents through constant technical development, lessons learned and multinational knowledge exchange."*

A mock-up of the beyond visual range air-to-air missile METEOR, together with an inert METEOR missile engine and the MINERVE missile system demonstrator were displayed. The hardware elements were fully instrumented with various sensors to monitor the health condition.



**Demonstration of the "Unique Challenges and an Approach to Underwater Munitions Health Management"**  
**Foreground: MBDA Meteor companion rocket motor**

After introductions from the NATO Chief Scientist, Major General Albert Husniaux, the Deputy Assistant Secretary General for Defence Investment, Mr Ernest J. Herold, and the Deputy Director of the Logistics and Resources Division of the International Military Staff, Brigadier General Bo Engelbreth, NATO Stakeholders and representatives from NATO nations were informed about the benefits of IMHM by the expert speakers from the AVT-212 team. The demonstration team represented eight organizations from seven member nations with the following expert speakers:

- ⊕ Wade Babcock (NSWC IHD, USA)
- ⊕ Dr. James Buswell (Micron Instruments, USA)
- ⊕ Grant Milne (DOSG, GBR)
- ⊕ Jean-Luc Moerel (TNO, NLD)
- ⊕ Dr. Robert Mueller (Co-Chair, BNet Corporation, USA)
- ⊕ Emmanuel Schultz (NATO MSIAC)

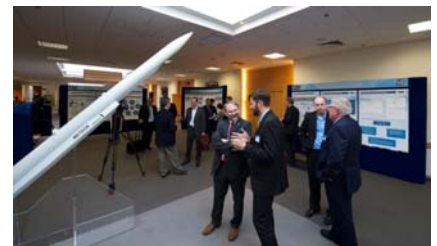
- ⊕ Roger Swanson (QED, USA)
- ⊕ Dr. Giuseppe Tussiwand (MBDA, DEU)
- ⊕ Dr. Steven Wagstaff (Co-Chair, Fraser Nash Consultancy, GBR)
- ⊕ Dr. Erik Weber (AFRL, USA).



**AVT-212 Demonstration Team: (left-to-right):**  
**Wade Babcock, Dr. Giuseppe Tussiwand, Emmanuel Schultz, Roger Swanson, Dr. Robert Mueller, NATO Chief Scientist MGen Albert Husniaux, Dr. Steven Wagstaff, Dr. James Buswell, Dr. Erik Weber and Jean-Luc Moerel**

The CDT presentations underscored five compelling IMHM benefits: **Safety**: The combination of technology and "In Service Surveillance" (process) to inform safety decisions; **Cost**: deferral of asset disposal and replacement (due to longer service life) and reduced expense (effort) for In-Service Surveillance; **Reliability**: Greater understanding of current and future asset condition to perform mission objectives; **Availability**: improved knowledge about the remaining safe life of munition systems; and **Interoperability** : supports collaboration within and across NATO countries, and enables SMART DEFENCE to create a shared capability stockpile.

**Partial view of the CDT area**



The key IMHM CDT messages were:

1. Improper Munitions Management compromises safety and masks catastrophic risk;
2. The lack of visibility in munitions' environmental exposure and accumulated degradation results in premature retirement and incurs cost;
3. IMHM is a proven approach to identifying accelerated aging and unsafe munitions;
4. Increasing the service accuracy and confidence extends the safe service life of munitions.
5. IMHM is ready and deployable today.

*"Integrated Munitions' Health Management (IMHM) is an approach to enhance the way munitions are managed in NATO. It is structured towards understanding relative risk and providing associated benefits which have impact on reducing cost, and improving safety and performance",* summarized the NATO Chief Scientist.

Overall 100 representatives from NATO and NATO nations attended one of the 3 sessions of the hardware demonstration. The CDT successfully demonstrated the important role of the NATO Science & Technology Organization and MSIAC as strategic enablers of the knowledge and technology advantage for the defence



and security posture of NATO, Nations and Partners. Currently a follow-on project is planned to integrate the IMHM achievements in a project related to the NATO Smart Defense Initiative.



Demonstration of "Munitions Health Management Sensing, Modelling, and Analysis", including a physical demonstration of the MINERVE system

**Emmanuel Schultz**  
**MSIAC Propulsion Technology Specialist**

## THE PM'S PERSPECTIVE

I have a couple of items that I want to bring to attention of readers in this quarters newsletter.

### Training and development Opportunities

The first is to remind the community of the Fellowship and training programme here at MSIAC. The Benjamin B. Stokes Fellowship program provides opportunities for junior to senior scientists and engineers to gain or share knowledge and experience on munition safety. Normally, fellows are expected to spend from 6 months up to 2 years working as a member of the MSIAC team whilst on secondment from the host nation.

Trainees are also welcome at MSIAC, each year we can accept a limited number of interns or students from member nation's. Generally, these are individuals who have completed or are completing a technical degree related to munitions science/engineering and safety. The later normally involve placements of 2-3 months but this can be tailored to suit needs.

Benefits of working at MSIAC include: learning from staff who have a deep interest in munition safety issues, furthering munition safety related efforts, and working with the international community and developing contacts.

For more information on these opportunities please visit the following page <http://www.msiac.nato.int/news/interns-fellow>. This page also details topics that could be worked on as a fellow or trainee, plus it also provides some additional details on potential funding. Applications for fellows and students will be considered throughout the year but bear in mind that it can take up to 6 month to make the necessary arrangements. Hence, the closing date is end of December 2014 for applications for Summer 2015 placement.

### 2015 Programme of Work

Towards the end of 2014 the MSIAC team have to agree the future year(s) work programme with the MSIAC Steering committee. This was achieved at the October SC meeting which was kindly hosted last month by Col. Mark Vincent, UK MOD, at the Armoury House home of the Honourable Artillery Company (HAC)



([http://en.wikipedia.org/wiki/Honourable\\_Artillery\\_Company](http://en.wikipedia.org/wiki/Honourable_Artillery_Company)).

Regarding the agreed 2015 work plan, next year we will introduce 5 new work elements, which includes:

#### Science of Cook-off

A programme of work which MSIAC proposes to develop into a workshop in 2016. MSIAC will undertake a literature review of topics related to cook-off which will be used to develop technical areas for the workshop to address. Support by the community is essential in turning this into a successful workshop and we particularly encourage those interested in this field to get in touch with MSIAC staff.

#### Materials Modelling Properties

A follow on activity from the MSIAC SCJ assessment workshop, to develop improved understanding of model parameters and to exchange data where available.

#### Effect of Ageing on Materials and Munitions Safety

A review the available literature on Ageing and IM will be undertaken. It is the intent to exploit and build on this work to support the wider munitions safety ageing community.

#### Explosive Testing of Protective Structures and Barricades

The purpose of this work element is to develop a repository of test data to support the quantity distance (AASTP1).

#### Benefits of IM

The goal of this effort is develop products and tools which increase user awareness of the benefits of IM and munition safety.



Finally, we look forward to involving you in the programme of work for 2015. Please feel free to contact us on any of the items mentioned above or in the wider newsletter.

**Dr Michael W. Sharp**  
**MSIAC Project Manager**

## INTERNATIONAL EXCHANGE OF HAZARD CLASSIFICATIONS

The Munitions Safety Information Analysis Center (MSIAC), pronounced as "M-ziac", operates an open website at [www.msiac.nato.int/](http://www.msiac.nato.int/) that provides general information about MSIAC, e.g., organization and staffing, Steering Committee Members, National Focal Points, an events calendar and a downloadable copy of the MSIAC Newsletter.

MSIAC also provides a secure website, which allows authorized users to download complete copies of MSIAC reports, software, presentations and workshop proceedings.

A specific section of this secure website is dedicated to hosting activities conducted in collaboration between MSIAC nations and NATO Cadre Groups such as AC/326 which is the CNAD Ammunition Safety Group commonly referred to as CASG. These activities include providing a library of NATO standards related to munitions safety (STANAGs, Allied Ordnance





Publications (AOPs)), Allied Ammunition Storage and Transportation Publications (AASTPs and national Informal Working Papers from the CNAD Community).

The Hazard Classification Database that shares storage and transportation data from 14 member nations (*Australia, Belgium, Canada, Czech Republic, Finland, Germany, Latvia, Netherlands, Norway, Poland, Slovakia, Ukraine, United Kingdom, and the United States*) is also located on the secure site. Participating nations provide their database to MSIAC to upload it onto the secure site. Nations that have contributed have access to all the national databases. However, only government (Ministry of Defense) users from the contributing nations have access after their national representative to CASG approves their access. This database is extremely valuable to users that need hazard data for items from other nations in situations where storage areas are co-located or shipment of foreign ammunition is necessary. The following six elements were considered essential for contributing nations to include in the database exchange: *Item Nomenclature, Catalog NSN, Hazard Classification, Storage Compatibility Group, Net Explosive Weight and Packaging Details*. The user can simply log into the database and search for the item to locate hazard class/division, and Net Explosive Quantity.

National Accident Databases are also available to participating Nations. Some of the databases have historical explosives incidents that date in excess of 100 years. The databases are listed by nation in an electronic format. Data can be searched from a variety of fields to retrieve the desired information. The National Accident Databases are currently only accessible to five participating Nations; Australia, Canada, France, the UK and the US. This data is useful during the planning stages when conducting Risk Assessments to gain lessons learned from similar operations that occurred previously.

To gain access to the International Exchange of Information open the website <http://www.msiac.nato.int/> and request a username and password using the form provided by MSIAC. Once on the website, select "Access" and then fill out the "AC/326 Access Request form". Once submitted, a request will be made on your behalf to your CASG Representative to gain secure website access. If you have any questions or if difficulties persist accessing the website, contact us at +32 2 707 5416 or email us at [info@msiac.nato.int](mailto:info@msiac.nato.int).

**Thomas N. Taylor**  
**MSIAC Transport & Storage Specialist**

## 45<sup>TH</sup> ICT AND 3<sup>RD</sup> KISHM

This quarter we briefly review the presentations and proceedings from two energetics conferences; International Annual Conference of the Fraunhofer ICT and the Korean International Symposium on Energetic Materials. Both conferences were well attended and covered a wide range of topics from synthesis of energetic compounds, particle morphology and characterisation to ageing, testing and modelling.

Both conferences had good representation from the host nation and attracted researchers from Europe, Asia and America.

### ICT

The theme of the conference was "Energetic Materials – Particles, Processing, Applications". The conference had 258 registrants from 26 countries with 11 out of 13 nations MSIAC present; Australia and Spain were the absent nations. 50% of the attendees came from Germany.



The conference was opened by the chairman, Thomas Heintz, who gave a brief welcome address and was followed by Dr Stephan Wilkes from the German BAAINBW (Bundesamt für Ausrüstung, Informationstechnik und Nutzung der Bundeswehr). He highlighted the need for the conference, the opportunity for networking and re-iterated that during current reduced budgets across all nations conferences such as ICT were essential in maintaining international networks. He also stated that the German Army was committed in securing funds for future research in energetic materials.

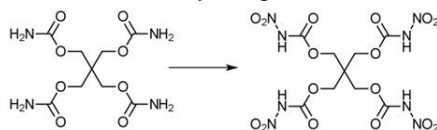
The highlights of this year's ICT program were the nano technology presentations, more specifically the presentation by A Gromov (Toms PU) which covered, from a Russian perspective, the history of nano aluminium and their application to energetic systems. It was a reminder that because of its high reactivity nano aluminium ages. The formation of Al<sub>2</sub>O<sub>3</sub> layer on each particle drastically reduces the available aluminium and hence its reactivity. Agglomeration and high viscosity of formulations were also side effects of working with nano aluminium. Another piece of research by K Woirin (ISL) observed that formulations containing *n*-RDX were less sensitive to shock initiation without affecting performance.

The inclusion of the EDA work on insensitive munitions ageing assessment was enlightening. This was the culmination of 4 years work and collaboration of 6 nations. The aim of the work was to determine whether an IM signature is still valid after 20 years of natural ageing with a focus on chemical, mechanical and sensitiveness tests. The table below covers the materials under investigation. The results of which mainly showed that there was no observable change. It was noted that many of the tests were carried out at the reduced scale. This work, along with other IM ageing projects, will be a focus for a MSIAC review in the near future.

Country	EM Type	Comments
CZ	Explosive	Semtex ® PI SE M – Semtex ® PI SE M1
	Rocket Propellant	ROP – ROP1
	Gun Propellant	D370
DEU	Explosives	GAP bonded I-RDX
	Component	I-RDX
FIN	Explosive	(FPX7) – FOXIT
FRA	Rocket Propellant	HTPB/AP/Al
	Explosive	B2214 – PBXN109
NLD	Explosive	KS32 – HU45 – HU51
SWE	Explosive	HMX/HTPB
	Gun Propellant	NL007
		NL008
		Uniflex 2 IM



The presentation by Q Axthammer (LMU) on the synthesis of nitrocarbamates, an innovative subgroup of energetic materials, showed the use of chlorosulphonyl isocyanate (CSI) instead of phosgene to produce carbamates prior to nitration. An example below shows the PETN analogue pentaerythritol tetranitrocarbamate; (PETNC; 1). When compared to PETN, PETNC has better sensitiveness, similar density, higher onset of decomposition but lower predicted detonation pressure and velocity.



A joint project funded by the EDA, and carried out in conjunction with Explosia, was presented by J Ritums (FOI) on 3(5),4-dinitropyrazol (DNP). This material has been investigated as a possible melt cast replacement for TNT. They were able to generate material for testing using an environmentally benign route. The current overall synthetic route was only 33% yield and a cost given at €150/kg. The positives for this material are its easily achievable melting point (88.5°C) and compatibility with standard energetics (RDX, FOX-7, HMX). Performance of the DNP formulations were calculated as having better performance than Comp B. The DNP/RDX (40/60) formulation was more sensitive to the GAP test than Comp B.

E-C Koch (Cranfield) presented on a novel fluorocarbon based oxidiser for pyrolants. A use for polyphosphazene with the trifluoroethoxy pendant groups. The energy output and temperature of reaction were not as great as MTV but significantly safer in production.

The posters were equally of interest with topics ranging from synthesis, particle production to propellants, testing and pyrotechnics; poster winners are highlighted below.

Author	Title
H Hacker (WTD 91)	Determination of Spatial Pressure Distribution and Weather Dependent Sound Propagation
M Liljedahl (FOI)	Co-crystallised ADN/GUDN
V Weiser (ICT)	Spectroscopy of pyrotechnic tracer compositions under different pressures
J Campos (LEDAP)	Detonation measurements using a single optical fibre



## KISHEM

The 3<sup>rd</sup> KISHEM was held at Yonsei University, Seoul and covered topics from synthesis and modelling, to toxicity and life-cycle management. There were 170 participants from 16 countries, with 131 abstract submissions and 52 presentations over 3 ½ days. Seven of the thirteen MSIAC member countries were present at the conference.



Several comprehensive reviews of energetic materials research were delivered highlighting that synthetic work is still of importance to the community.

The first was given by B Krumm (LMU) covering several series of materials including derivatives of trinitroethanol, nitromethanide, fluorodinitroethanol and azido compounds. Of the many compounds mentioned boron trinitroethanol was mooted as a possible replacement for boron nitrate, and trinitroethylnitrocarbamate (TNC-NO<sub>2</sub>) was mooted as a possible oxidiser (+15% OB).

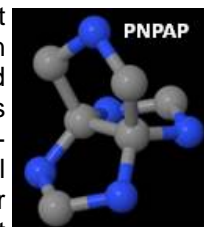
The second review was given by T-L Zhang (Beijing Institute of Technology) on recent progress of energetic co-ordination compounds as primary explosives. The large number of molecules investigated followed the structure: [M(L)<sub>x</sub>](A)<sub>y</sub> or [M(L)<sub>x</sub>(A)<sub>y</sub>], where M is metal cation, Mn (II), Fe (II), Co (II), Co (III), Ni (II), Cu (II), Zn (II), Cd (II), L is the high-nitrogen ligands of straight-chain such as hydrazine, ethylenediamine, carbohydrazide, and azole-ring such as imidazoles, triazoles, tetrazoles, and A is the counter ion of perchlorate, azide, nitrate and nitrophenols. They reported that zinc carbohydrazide perchlorate could have potential as a primary explosive with high thermal decomposition temperature (270°C) and good sensitivity.

There was also a review from P Goede (FOI) who gave a good review of formulation and production of new energetic materials as a concerted European effort. This included ETPE binders for rocket motors and melt cast alternatives – DNP, diethylene-triaminebis-dinitramide (Detra-D) and *N*-methyl-2,3,4-trinitropyrazole (*N*-Me-TNP).

Moving to modelling and prediction of energetic materials the presentation by S-G Cho (Agency for Defense Development [ADD], ROK) covered the progress of ROK modelling capabilities over the last 10 years. This included screening tools to determine the performance and sensitivity of new molecules using a combinatorial approach to designing high nitrogen species; an example given was substituted nitroimidazoles with a variety of functional groups in the 1 position. The team have collaborated with ARDEC in their research.

There were a number of good posters during the two poster sessions. One on vapour pressure measurements of DNAN, DNP and TNAZ was of good use to the community. Another research group was working on the synthetic route to pentanitropentaazapropellane (PNPAP).

The synthetic route was similar to that of CL-20 requiring a de-benzylation prior to any nitration, via a preferred leaving group. Progress to date has achieved the mono-trimethylacetotetrabenzyl compound. The potential properties of PNPAP would be similar to HMX/CL-20. Details of a recent patent can be found on the MSIAC website.



As well as a full program of presentations and posters the Korean's introduced the attendees to a number of cultural events and the opportunity to sample the wide range of culinary delights.

**Dr Matthew Andrews**  
MSIAC Energetic Materials Specialist

(Continued on page 7)





# INDUSTRY & TECHNOLOGY PRESS REVIEW

*If you have information that you consider of relevance to this section, contact **Manfred Becker** at MSIAC [m.becker@msiac.nato.int](mailto:m.becker@msiac.nato.int).*

This issue of Procurements, Science and Technology covers a wide range of news – all related to munitions and munitions safety. The world noticed the failure of a large rocket motor – and while we know it's not a weapon system – much of the public only sees front page news of the spectacular explosion and failure. I include reference to it in both sections of the newsletter – how it effects the business decisions between ATK and Orbital, as well as later to mention a few of the other large motor launches and tests that went exactly as planned. The awareness of such events may effect how we address munition safety for the systems under our responsibility. And maybe the recent landing of a ESA probe on a comet will remind and enamour the general public (once again) to the amazing things scientists and engineers accomplish.

There are business mergers and agreements noted herein and many interesting munition contracts. In the news was our new NATO SEC GEN, as well as munition related agreements signed by Turkey, Poland, and the US. The AUSA conference was held in October. It was a massive conference with endless display of products and services. I believe almost every aspect of munitions was addressed somewhere at this conference – with some newer technologies clearly trying to find an interested application or sponsor. If one was interested in amazingly large sheets of carbon nanotube “cloth”, a futuristic high-energy weapon, or a mini gun equipped VW bus, it was there on display, in a booth or brochure.

In the technology section, I mention a few of the recent laser/directed energy weapon accomplishments by Raytheon, Boeing and Lockheed Martin, in addition to Raytheon supplying components for Iron Dome covered in the procurements section. Guided rockets also are mentioned – with APKWS being tested with a FZ rocket in Australia and Talon being fired from a MD helicopter. The section mentions a recent cruise missile test by France as well as a SM-3 intercept test by the US. And I couldn't really miss not having something on additive manufacturing/3D printing, so I include some recent work by Aerojet Rocketdyne, as well as a 3-D printed car the “Strati” from Local Motors.

 [Click here to read more.](#)

**Manfred Becker**  
**MSIAC Warhead Technology Specialist**

# MSIAC TOOLS SURVEY

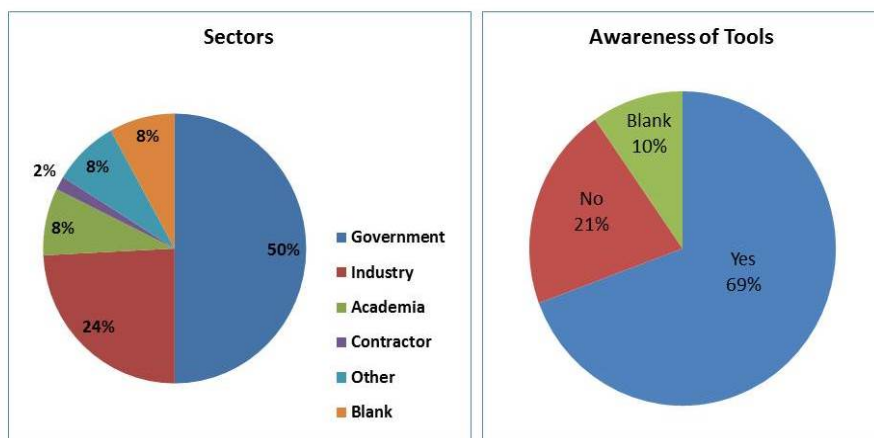
In the last newsletter the PM requested support for a Survey of the MSIAC Tools accessible on the MSIAC website. This article provides feedback on the responses received to date.

The purpose of the questionnaire was as follows: to gain more information on the use of the tools and to understand the users priorities and needs with respect to future development and continued support.

To date we have received 64 replies from the e-mails and Newsletter request. This was within expectations and is not considered unrepresentative. Understandably not all of these commented on all the Tools or completed all the fields which does explain the minor variations in some of the figures below.

The pie charts below show the responses from the various sectors and the overall level of awareness of the MSIAC tools.

## GENERAL ANALYSIS



A summary of the results are below. Some entries were left blank and these figures have not been included. The table shows the overall level of knowledge and use of the individual tools expressed as a percentage of the 64 responses.

Tool	Aware		Used
	No %	Yes %	
MSAS	36	60	37
SASO	32	61	22
AIMS	63	34	23
TEMPER	58	40	23
EMC	27	68	50
Weblink	19	66	48
Forum	40	57	21

A few immediate conclusions which can be drawn from the data presented above are:

- ⊕ The most exploited tools are EMC and Weblink with around 50% of those who responded continuing to access these tools.
- ⊕ Other tools have lower continued use rates, for example SASO. For this tool only 18 % have



continued to use the tool despite the high 73% supporting the concept. This points to the need to look more into the user experience, the ease of use, training, and benefits of use.

⊕ For some of the tools, 60 % of those who responded were unaware of its existence!

Tool	Yes
MSAS	10
SASO	7
EMC	15
AIMS	9
WEBLINK	9
FORUM	22

We also requested whether people were prepared to support MSIAC in developing these tools, there were a very useful number of volunteers, numbers detailed below, and they will be contacted by MSIAC TSOs as they develop the tools.

### Thank You

The PM and MSIAC team would like to thank all of those who responded to the Survey. We are aware these can be an imposition but without your contribution we are unable to confirm and demonstrate the need for these types of tools and how they should be improved.

### SURVEY CLOSES 31 DECEMBER 2014

The Survey will be kept available for anyone who intended to complete but has not yet found the opportunity.

 **Go ahead and fill out the survey now!**

**Martin Pope**  
MSIAC Munitions Specialist



## HITS THE MSIAC TEAM!

This November the TSO's and the PM are all growing moustaches to raise awareness of men's health as part of **Movember**.

On the 1<sup>st</sup> November we all became clean shaven, which for some had not been the case for many years, and started the long 30 day growth. For some, Michael and Martin, a fully formed moustache was in place by day 3, but for the rest it was difficult to discern whether we'd forgotten to wash properly.

Most of us are growing a classic Burt Reynold's "Magnum PI" moustache, but Fred is attempting the trucker "Hulk Hogan" moustache. Pictures of our efforts will be posted on the team website (see below) as the month progresses to show that we are actually growing moustaches and not just sticking them on.

### My Stache Is Against Cancer



By the time the newsletter reaches your inboxes we'll be fast approaching the end of November but there will still be time to support the team. You can do this by leaving words of encouragement on the website or should you wish a small donation towards the awareness of men's health.

You can find the team by

- ⊕ Following (<http://be.movember.com/team/1778357>) or by
- ⊕ typing in our team name "**My Stache Is Against Cancer**" into the search bar at the Belgian Movember site (<http://be.movember.com/>)

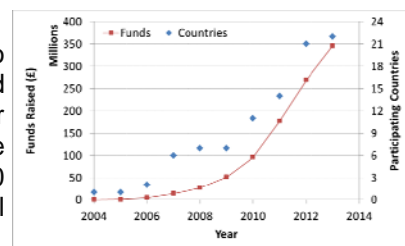
Please note that we are using the Belgian Movember site so any monies raised will be used within Belgium.

If you are not aware of what Movember is or wondered why there was a sudden increase in male facial hair at this time of the year, below is a short history of Movember. It is interesting to note that as of 2013 twelve of the MSIAC member countries have participated in growing moustaches and raising awareness of men's health.

We will include a picture of the team's moustaches and most importantly monies raised by the team in the next newsletter.

### Brief History

Movember originated in Australia in 2004 with 30 chaps growing a moustache to raise funds for prostate cancer. The concept was quickly adopted in Europe and North America (2007) with each country raising funds for a national prostate cancer charity. By 2013 the number of countries participating grew to 22 countries. Over the last 10 years the Movember campaign has raised over £350M and supported 770 men's health projects; this includes prostate cancer, testicular cancer and mental health programmes.



<sup>1</sup> Data obtained from <http://uk.movember.com/about/history>: Australia, Austria, Belgium, Canada, Czech Republic, Denmark, Finland, France, Hong Kong, Germany, Ireland, Netherlands, New Zealand, Norway, Singapore, South Africa, Spain, Sweden, Switzerland, UK and USA

**Dr Matthew Andrews**  
MSIAC Energetic Materials





# TRAINING TO NATO STANDARDS

MSIAC once again facilitated a training session on the NATO Ammunition Storage Standards AASTP-1 and AASTP-5.

The training was conducted on 22-26 September 2014 in Versailles, France for the French Military Forces. The positive feedback received on the course presented last year in Versailles prompted France to host the course a second time. Additional seating was available therefore MSIAC sent invitations to all MSIAC Member Nations interested to attend the course.

Twenty students participated in the training, 15 from France, one from the Netherlands, one from Belgium, one from Germany, one from Poland and one from the United States. The training was presented on MSIAC's behalf by a former Belgian MOD Ammunition Technical Officer, Mr. Johann DeRoos. The presentations thoroughly covered all aspects of the standards, but also included practical exercises on Hazard Class/Division, Barricades, Quantity Distance and Explosive Safety Munitions Risk Management.



All students succeeded and were awarded a signed certificate from MSIAC and a Command Memory Stick that included the week's presentations. The course slide presentations, exercises and instructor notes are posted on the MSIAC website for downloading by Member Nations.

**Thomas N. Taylor**  
**MSIAC Transport & Storage Specialist**



## Announcing the Call for Nominations for the MSIAC Munition Safety Awards



To acknowledge and encourage progress and achievements in Munitions Safety and Insensitive Munitions technology, MSIAC will again present Awards for MS and IM excellence at the 2015 IM/EM Technology Symposium.

The call for nomination is now open through 31 January, 2015.

Submissions and guidelines at

<http://www.msiac.nato.int/news/ms-awards>





## DID YOU KNOW THAT...



REGISTRATION OPEN

IM&EM: Real Warfighter Advantage and Cost Effective Solutions Throughout the Lifecycle

# IMEMTS

18-21 May 2015 Rome, Italy

*Insensitive Munitions & Energetic Materials  
Technology Symposium*





NOTE: Early Registration now open through 31 January, 2015 - <http://www.imemts2015.com/>

- ⊕ This symposium will address innovative IM and EM solutions being developed for deployment through all stages of the lifecycle. **This is only the fourth time the symposium has come to Europe and the first time it is to be held in Italy.** The European location reflects the greater international cooperation and collaboration which is taking place within the global defence community.  
For more information and to register, visit the website <http://www.imemts2015.com/> !
- ⊕ The Abstract Deadlines for the next ICT and NTREM meeting are as follows:
  - ◇ ICT: 6th December 2014
  - ◇ NTREM: 31st December 2014
  - ◇
- ⊕ Contrary to what we mentioned in our previous newsletter, the next **NITROCELLULOSE Conference** will be held in **2016!**
- ⊕ **Mrs Lori NOCK was presented the INVESTIGATOR OF THE YEAR 2014 AWARD** in the US for her excellence in IM Work.



The JIMTP commended Mrs Lori Nock for outstanding achievement in the area of insensitive munitions technology for Fiscal Year 2014. *"Lori's deep technical knowledge and outstanding project management skills in the area of energetics, formulation and processing paid huge benefits for several 6.2 projects. Lori's results are of the highest scientific quality and her achievements represent significant technical advancements towards providing safer munitions for the Department of Defense."*

## Latest Publications

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

### OPEN PUBLICATIONS

- O-150 Rev.1: Ammunition Accident at the Evangelos Florakis Naval Base, Cyprus**
- O-157 MSIAC Supporting Munitions Safety Community**

Click [here](#) to find other **Publications** in the **Technical Reports** section on our website.



**You can access all REPORTED ACCIDENTS via this [hyperlink](#).**

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