



Bulletin

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June 2018

CONTACT INFORMATION

☎ 32-2-707.54.16
☎ 32-2-707.53.63

🌐 <http://www.msiac.nato.int>
✉ info@msiac.nato.int

WE'VE MOVED



New NATO HQ - Brussels, Belgium

At the end of March 2018 MSIAC moved across the road to the new NATO Headquarters (NNHQ). Since then an increasing number of services and offices have moved across. More than half of the employees have now moved over. The design resembles eight interlaced fingers and covers an area of around 25 football fields. Note that our contact telephone numbers and email addresses have not changed. The address remains:

MSIAC - NATO HQ
Boulevard Leopold III
B-1110 Brussels
BELGIUM

FEATURED SYMPOSIUM

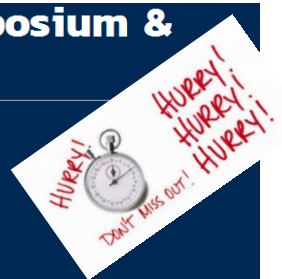
International Explosives Safety Symposium & Exposition



🕒 8/6/2018 - 8/9/2018

📍 Sheraton San Diego Hotel & Marina
1380 Harbor Island Drive
San Diego, CA 92101
Tel: 619-291-2900

📄 **Theme** : Explosives Safety and Munitions Risk Management



Don't miss your chance to submit a paper for the International Explosives Safety Symposium & Exposition. This is the 1st of its kind since 2010. The official deadline for abstracts has passed, but we believe there are still a few slots available. Please upload your abstract via the NDIA website at the following web link and complete ALL required information.

<http://application.ndia.org/abstracts/8651/>.

For attendance, online registration closes on Monday, July 30, 2018





PM's PERSPECTIVE



I first want to welcome the Republic of Korea (ROK) as the latest member of MSIAC. It is an exciting time for staff at MSIAC and offers us all an opportunity to work more closely with ROK. Having another member adds to the shared experience and knowledge for the benefit of the munitions safety community. MSIAC staff plan to meet ROK staff later in the year to inform and encourage involvement in the MSIAC programme of work. Note: Point of contact information for ROK is available on the website as are access forms for MSIAC products and services.

Major activities for the MSIAC staff since the last newsletter include attending and supporting the 2018 Insensitive Munitions and Energetic Materials Technology Symposium (MEMTS) in Portland in April (see later article for more details). The meeting was organised by the National Defense Industrial Association (NDIA) who did a great job. Congratulations to all the authors, the presentations were of an excellent standard.

The meeting provided the opportunity to recognise excellence in Munitions Safety (MS) with MSIAC awards for Technical and Career achievements being given. MSIAC has been presenting Awards at NDIA IM/EM Technology Symposia since 1997. The winners are chosen by the Steering Committee on the basis of proposals made by MSIAC and by Steering Committee Members, NFPOs, or any other interested parties.

A reminder on the two award types:

MSIAC MS Award for Technical Achievements - Individuals or teams who have made significant contributions in research and/or engineering related to the field of munitions safety.

MSIAC MS Award for Career Achievements - Individuals who have made consistent contributions in research, engineering, production, procurement, fielding, standardisation, policy, etc. related to MS, over an extended period.

This year I had the honour to present a Technical Achievement award and a Career Achievement award.

MSIAC AWARD FOR TECHNICAL ACHIEVEMENT

ADVANCEMENTS IN FAST HEATING TEST METHODS (TEAM)



The first award presented was to the team working under NATO AC326 SGB to review and update the fast heating test standard STANAG 4240. This was not an easy task, taking 10 years to research and develop alternate environmentally friendly heating tests that could comply with the requirements of STANAG 4240. The effort was truly international, involving the collaboration of five member nations: FRA, GER, NLD, SWE, and USA. It involved a large number of personnel and test organisations who worked first to characterise the current test and set parameters which were used to govern the design of new tests setups. The work was well documented and has resulted in a new edition of STANAG 4240 and its AOP. The result is that nations can now use cost effective gas burners with reduced environmental impact whilst still meeting the test requirements. Members of the team which contributed to this impressive effort include:

Alice Atwood (USA), Alexander Blumenberg (GER), Albert Bouma (NLD), Per Cederberg (SWE), Fabien Chassagne (FRA), Kevin Ford (USA), Dave Hubble (USA), Rickard Lindstrom (SWE), Pierre-François Péron (FRA), J.H.G. (Gert) Scholtes (NLD), Tom Swierk (USA), Jon Toreheim (SWE), Ephraim Washburn (USA), Jon Yagla (USA)



Advancements in Fast Heating Test Methodology Team Members receiving their MSIAC Award



THE CAREER ACHIEVEMENT AWARDS

THOMAS SWIERK

It was a privilege to be able to present the career achievement to Tom whom many have worked with during part of his 44 years of service in the US Navy and latterly as a consultant. During this time he has undertaken a wide range of activities supporting munition safety efforts, particularly advancing IM technology through the US DoD and NATO communities. He has provided technical expertise and leadership in IM to both the US Navy and the wider international community. Tom lead IM programmes and initiatives for the Navy and has been active in leading technical panels and workshops nationally and internationally. His efforts promoting Insensitive Munitions have helped make a real difference in reducing the risks faced by those handling and using our munitions today.



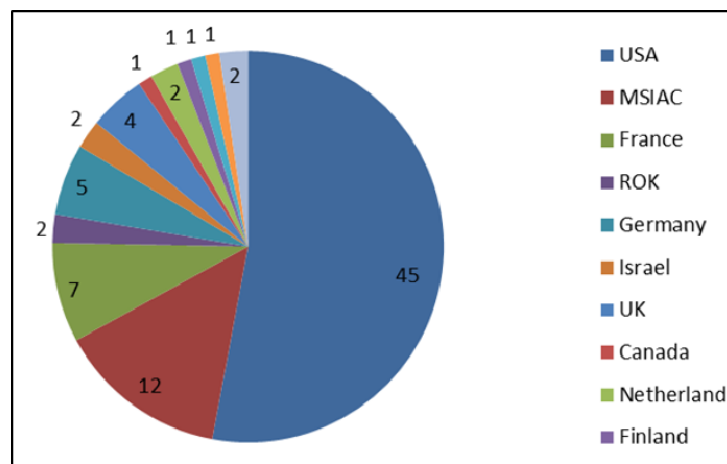
Dr. Michael Sharp (MSIAC Project Manager), Thomas Swierk (US Navy, Formerly)

Finally, I would like to congratulate each of the winners again for the important work that they have undertaken over the years to support Munition Safety efforts. Further, MSIAC and the Steering Committee would like to thank all those that took the effort to recognize the hard work and commitment of others by submitting nominations, and in particular all those who were the subject of a nomination.

MSIAC AT IMEMTS

INNOVATIVE INSENSITIVE MUNITION SOLUTIONS FOR ENHANCED WARFIGHTER EFFECTIVENESS

This year's Insensitive Munition & Energetic Materials Technology Symposium (IMEMTS) was held in Portland, Oregon, USA, which is situated on the west coast of America and overlooked by two large active volcanoes of Mount Hood and Mount St Helens. The symposium was held over three days from 24th to 26th April 2018, and was very well attended with over 238 registered attendees. In total 85 presentations were delivered from 11 different countries, a similar number to the last meeting. However, due to a lack of abstract submissions, there were no poster papers or session this year.



Countries Presenting at IMEMTS



The focus of the symposium was solutions for enhanced warfighter effectiveness which generated presentations covering all aspects of munitions design, explosive manufacture, sub-scale testing, propellants, and IM requirements. Paper topics included experience with fielded IM technologies; performance advances with IM/EM technologies, demonstrated examples and benefits of IM to our Warfighters; new and insensitive energetic compounds and formulations, IM and performance modeling, verification, and validation; advances in initiation systems for IM; IM testing and threat analysis methodologies with lessons learnt; life cycle assessment and aging characteristics of IM and EM systems; novel energetic materials advances in nano material, reactive materials, enhanced blast explosives, oxidizers, and high density ingredients; national policies, strategies, and standardization for IM/EM; international collaboration on IM/EM technology implementation; novel IM/EM processing techniques and manufacturing challenges within the industrial base; and advances in affordable, robust manufacturing technologies for IM/EM.

MSIAC, as well as being involved in the organisation of the symposium and chairing sessions, provided a total of 11 technical presentations, a plenary brief and the Insensitive Munitions Awards.

- MSIAC – Highlights and Future Priorities *Sharp*
- MSIAC Workshop 2018: Improved Explosives and Munitions Risk Management *Sharp & Van der Voort*
- Gun Launch and Setback Actuators *Baker*
- Slow Heating Testing Survey and Historical Events Review *Baker*
- Property-Processing Implications in Additive Manufactured Materials for Munitions *Babcock*
- Insensitive Munitions Explosive Ordnance Disposal Challenges *Baker & Pope*
- Mitigation Technologies for Propulsion Applications *Collet*
- Gap Test Calculations and Correlations *Baker*
- Reaction Mechanisms for Rocket Motors *Collet*
- International Sympathetic Reactions Testing Survey *Baker*
- Age-Related Mechanical Damage and Ageing of Munitions Materials *Babcock*
- Qualification and Energetic Materials Challenges *Andrews*

The technical content of this year's IMEMTS was typically broad covering energetic materials synthesis to full scale tests, and policy to standardisation.

IMEMTS Awards

Two awards were presented, the first was the people's choice and the second was the committee's choice. The people's choice award went to Christophe Jacq (DGA) for his presentation on the review and update of STANAG 4496 – Fragment Impact. The committee's choice award went to Sarah Headrick (BAe Systems) for her presentation on the Synthesis Development of Novel Energetic Ingredients.

 **The agenda, papers and presentations can be found on the MSIAC secure document service – [here](#).**



Team MSIAC at the booth, IMEMTS, Portland

RAM WORKING GROUP MEETING

Impact of Resonant Acoustic Mixing (RAM) on Munitions Safety and Suitability for Service

The first MSIAC led technical meeting on the impact of RAM was held on 27th April 2018 at the Hilton Doubletree Hotel in Portland, OR, USA. The rationale for the meeting was to address the potential qualification challenges that come with the use of new manufacturing technologies and a need to engage in discussion between RAM practitioners and National Authorities. The meeting was attended by 22 persons from Canada, France, the UK and the USA, who represented industry, DoE and government. Expertise ranged from users and practitioners of RAM to those involved with qualification and testing of energetic materials. MSIAC provided a pre-meeting survey, chaired and supported the meeting through Dr Matthew Andrews, Christelle Collet and Wade Babcock.

The meeting included presentations from the four nations, which helped to set the scene, highlight the technical challenges and provide points for discussion during the technical debate. Topics for discussion included batch, continuous and in-case mixing; requirements for quality assurance; risk-based approach to qualification; suitability of current standards; and lessons learnt from other manufacturing techniques.

The output from the first meeting will be reviewed at the second European meeting; to be held in the UK on 4th-5th July 2018. Further details on registration for this meeting can be found at the MSIAC website (link: <https://www.msiac.nato.int/workshop>)

Output from both meetings will be gathered and published as a Limited report to aid discussion on qualification.

Matthew Andrews
MSIAC Energetic Materials Specialist



TECHNICAL QUESTIONS ABOUT QUANTITY DISTANCES (QD) AND QUANTITATIVE RISK ANALYSIS (QRA)

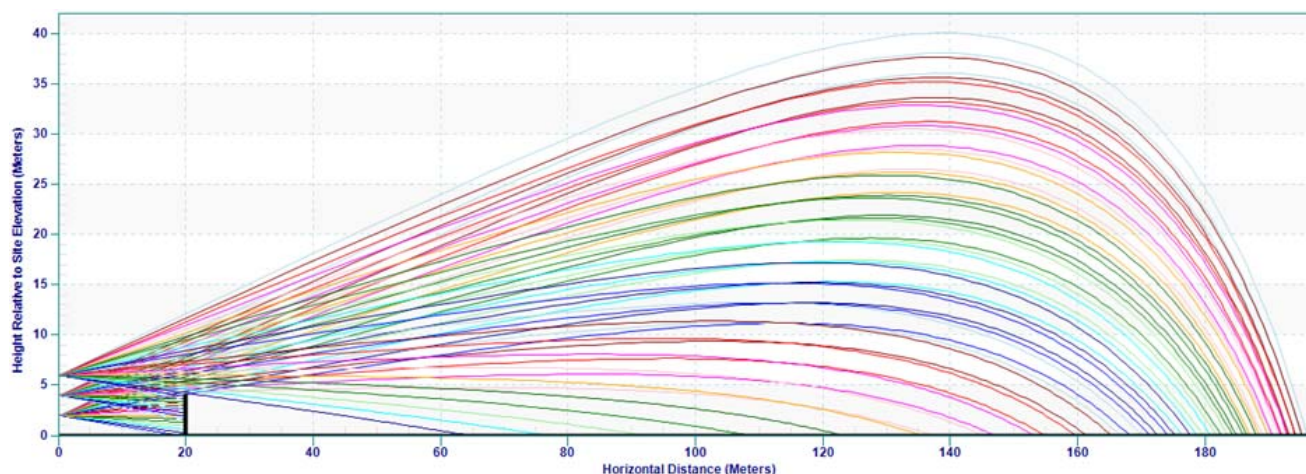
MSIAC regularly receives questions that are related to the siting of ammunition storage facilities. These questions can be categorized as follows:

- Clarification of the theoretical and experimental background of QDs
- Support for future development of QDs in NATO standards AASTP-1 and AASTP-5
- Support for transition from national regulations to NATO standards and impact on storage facilities.
- Support for consequence analysis and risk analysis in case of non-compliant situations.

A recent question from Capt. Ruben Ryckaert (Belgium) dealt with the last category. A domestic house is located within the prescribed Inhabited Building Distance (IBD) from an explosives workshop. The workshop has a robust construction with thick reinforced concrete columns, walls and roof, a large internal volume and large lightweight vent panels. This construction is very different from those used in tests on which the IBD has been based. Furthermore a major barricade and forest are present in the direction of the inhabited building. The question was therefore to perform a more detailed study, taking into account the specific workshop structure, and to analyze if explosives safety criteria are met at the location of the domestic house in the event of an accidental detonation.

In a cooperation between MSIAC and the Belgian Royal Military Academy (KMS) the explosives effects and consequences were quantified at the domestic house. For scenarios with a detonation of 500 and 1,000 kg HD1.1 it appeared that a worst-case undisturbed blast wave propagation would lead to overpressure levels below the IBD criterion. Application of engineering models for the mitigating influence of the storage structure and the barricade led to further significant reductions.

High launch velocities were predicted for debris from the light weight panels. The US code TRAJCAN was applied to analyze trajectories, and it appeared that due to high drag loads this debris is unlikely to reach the domestic house. It depends on the location of the detonation inside the workshop whether concrete columns or walls would fail but with worst-case assumptions it was concluded that also concrete debris would not reach the house.



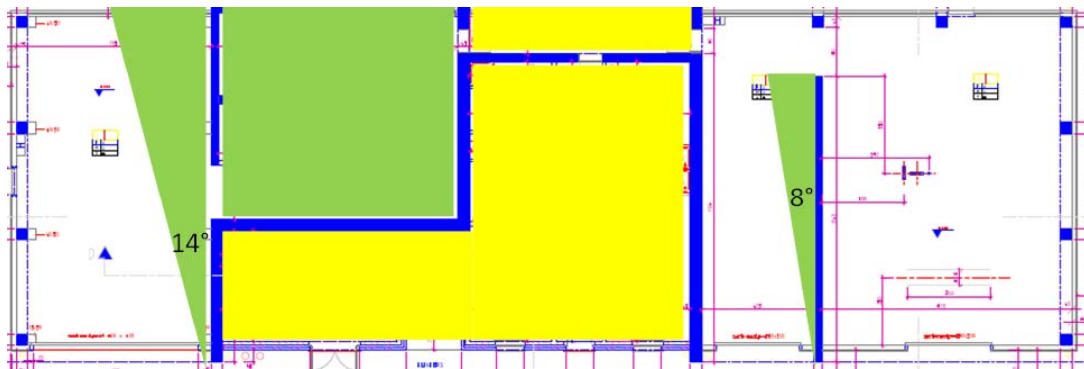
Relative Height of Debris Against Horizontal Distance

Dependent on the type of munitions, primary fragments could easily perforate the light panels and present a significant hazard. A number of mitigating measures were then presented to exclude the fragmentation hazard at the domestic house. These are the placement of barriers (based on e.g. sand or concrete block) inside the workshop, or limitation of the presence of ammunition within the green zones in the figure below. This last option ensures that fragments will always be blocked by one or more reinforced concrete walls in the direction of the domestic house (located downwards in the figure).

In another study, Polyris (a spin-off of the University of Mons in the field of major accidents assessment, prevention and management) conducted a Quantitative Risk Analysis (QRA) using the QRA software IMESA FR. In a QRA not only the consequences but also the probability of various scenarios is quantified. This was done by analyzing the presence of various types of ammunition and the handling in the workshop during the year. IMESA FR allows the choice of different structures and the one that resembles the specific workshop structure closest was chosen. Even



though the analysis was based on conservative assumptions, the QRA led to Individual Risk values that are acceptable when compared to risk criteria from the nations that contribute to the NATO risk analysis manual AASTP-4.



Mitigation Against Primary Fragments

In conclusion, both the consequence analysis and the risk analysis approach lead to an acceptable situation when compared with relevant criteria. This study helped the risk owners at the Belgian MoD to accept or not the residual risk for this situation that was not compliant based upon the deterministic approach within AASTP-1.

Martijn van der Voort (MSIAC)
Cdt. Stéphane Suleau (KMS)
Damien Beaudoint (Polyris)
Capt. Ruben Ryckaert (Belgian MoD)
Maj. Gunnar Plovie (Belgian MoD)

 **All PUBLICATIONS** on can be found in the **Technical Reports** section on our Website via **this [hyperlink](#)**.

 You can find the **LATEST PATENTS OF INTEREST** on our MSIAC Website via **this [hyperlink](#)**.

AC/326 SUPPORT

Gun Launch Setback Ignition Study Working Group

The first Gun Launch Setback Ignition Study Working Group Meeting was held on 27 April 2018 at the Hilton Doubletree Hotel in Portland, OR, USA. The working group was initiated by the NATO AC/326 SG/A – Energetic Materials and is being led by the USA, with Sean Swaszek from the US Army ARDEC overseeing the process. The meeting attendees consisted of 12 subject matter experts from the USA, UK, France, Netherlands and Norway. Drs. Ernie Baker and Michael Sharp provided MSIAC support for the meeting. The goal of the working group is to develop a new AOP (Allied Ordnance Publication) document for standardizing the approach to test and evaluate the safety of energetic materials & munitions to setback loading. The meeting included presentations regarding the design of existing laboratory setback actuators and associated data. Additional discussion topics included existing gun launch setback testing, defect types associated with formulations, inspection of munitions, laboratory testing of energetic materials mechanical properties, mechanical response and ignition models, and developing the standardization for future guidance. It was decided that Dr. Baker will work with Sean Swaszek and the working group to develop and distribute a survey related to gun launch setback ignition. The survey will be available in mid-June and will be completed by mid-July.

The next Gun Launch Setback Ignition Study Working Group Meeting is planned to take advantage of the occasion of the Fall Subgroup A meeting where some of the national representatives can participate in both meetings. This next Working Group Meeting is planned for 9 October 2018 at the NATO Headquarters in Brussels, Belgium.

Ernie Baker
MSIAC Warheads Technology Specialist



Resulting Gun Barrels from Catastrophic In-Bore Prematures



Sympathetic Reaction Custodial Working Group

The STANAG 4396 Sympathetic Reaction (SR CWG) Meeting was held on 10-11 April 2018 at the Helderberg Conference Facility, Rheinmetall Denel Munition (RDM) in Somerset West, South Africa. France is the custodian, with Christophe Jacq taking over the process from Florian Pechoux. This was the first meeting of the group held in order to review STANAG 4396, make recommendations and provide a draft STANAG update for review by the NATO AC326 CNAD Ammunition Safety Group. The meeting was attended by 20 subject matter experts representing USA, Norway, Sweden, France, Netherlands, Turkey, South Africa, and Germany. Dr. Ernie Baker from MSIAC has been providing technical support to the group, and he provided a presentation of results from the recent MSIAC Sympathetic Reaction Survey. It was distributed to member nations and 33 responses were received from government (59%) and commercial (41%) test centers from 10 nations. The major items listed in the survey were the principal topics for discussion. They included, test purpose, test harmonization, IM & HC, test procedure, test configuration, required number of tests, live vs. inert items, preconditioning, restraining devices, donor initiation, instrumentation, fragments characterization, and annual number of tests. National positions were presented by the national representatives. Lively technical discussions resulted in significant consensus.

The next SR CWG meeting was planned to take advantage of the occasion of the Fall Subgroup B meeting where many of the national representatives participate in both meetings. The follow-up meeting for this Working Group is planned for 18-19 September 2018 at the Kromhout Kazerne, Utrecht, Netherlands

Ernie Baker
MSIAC Warheads Technology Specialist

Slow Heating Custodial Working Group

The STANAG 4382 Slow Heating Custodial Working Group (SH CWG) Meeting was held on 9-10 April 2018 at the Helderberg Conference Facility, Rheinmetall Denel Munition (RDM) in Somerset West, South Africa. The USA is the custodian, with Struck, Stephen overseeing the process. This was the third meeting of the group held in order to review STANAG 4382, make recommendations and provide a draft STANAG update for review by the NATO AC326 CNAD Ammunition Safety Group. The meeting was attended by 20 subject matter experts representing USA, Norway, Sweden, France, Netherlands, Turkey, South Africa, and Germany. Ernie Baker from MSIAC has been providing technical support to the group. Dr. David Hubble of the US Naval Surface Warfare Center Dahlgren Division provided a presentation of an updated study on estimated durations and modeled heating rates based on actual fire events. Based on the previous working group meeting discussions and updated information, national positions were presented and discussed. Lively technical discussions resulted in significant consensus. It was agreed that dialog among nations present & others interested in this subject matter must continue. It was recognized that there was a need for a future meeting to resolve all technical issues associated with slow heating testing described in STANAG 4382 and AOP-4382 for IM and HC assessments.

The next SH CWG meeting was planned to take advantage of the occasion of the Fall Subgroup B meeting where many of the national representatives participate in both meetings. The follow-up meeting for this Working Group is planned for 17-18 September 2018 at the Kromhout Kazerne, Utrecht, Netherlands

Ernie Baker
MSIAC Warheads Technology Specialist

IM/HC Harmonization Technical Meeting

Since the setting up of MSIAC, the project has been involved in supporting the development of Insensitive Munitions (IM) policy. MSIAC's most recent efforts have been directed at assisting in the harmonization of IM and Hazard Classification (HC). The objective of the effort being to standardize, harmonise and streamline IM and HC requirements and assessment and enshrine this in UN international policy (legislated). This is why a working group was constituted in 2016 and co-chaired by Brent Knoblett (US DDESB) and Phil Cheese (UK DOSG), with the support of MSIAC and government representatives. The objectives of this working group are to:

- Standardise NATO HC assignment procedures and further institutionalise HC/IM harmonisation;
- Ultimately migrate NATO's new standardized HC assignment procedures for "military-unique munitions" into United Nations (UN) as an update to UN TS 7;
- Embrace a whole body of evidence approach as part of the methodology for IM and HC assessment;
- Generate a single, minimum dataset sufficient to assign HC and IM signatures and to inform risk assessments, within an integrated end to end process.

A technical working group meeting was held on the 23rd of April, prior to IMEMTS, with the purpose of:

- Reviewing the preliminary analysis of the results received from the survey sent to the MSIAC community. Note: this survey is still active and the more answers we receive, the more accurately the results will reflect the communities views. Therefore we would like to encourage you to take time to respond using the following link: <https://www.msiac.nato.int/surveys/imhc-survey>;
- Involving a wider group of participants to review 'strawman' working documents;
- The structure and organization of the final documents was debated and options will be assessed and presented to help the community come to a decision .

The output from this last meeting will help direct further discussion on this topic during the MSIAC workshop on Improved Explosives and Munitions Risk Management in September, in Granada, Spain. We look forward to seeing you there.

Christelle Collet and Michael Sharp
MSIAC Propulsion Technology Specialist and MSIAC Project Manager



AASTP-1 AND AASTP-5 LECTURE SERIES

The course program for 2018 is ambitious with 6 courses in Germany, France, Spain, Belgium, Finland and Canada, and 22 visiting students from the Netherlands, Sweden, Italy, Poland, US, Estonia, Latvia and Croatia.

Date	Nation	Location	PoC
19-23 February	Germany	Berlin	Lt. Col Sascha DECKER
19-23 March	France	Versailles	Cmmdt Johanès LAMIRÉ
16-20 April	Spain	Madrid	Lt. Col Emilio LARRIBA DE LA RUBIA
28 May – 1 June	Belgium	Brussels	Maj. Gunnar PLOVIE
20-24 August	Finland	Helsinki	Mr. Kosti NEVALA
22-26 October	Canada	Ottawa	Maj. Kim BROOKS

In the mean time, the first four courses of the year have been completed while the planning of the remaining two has progressed well. Unfortunately there are no more seats available for this year. Nations are invited to make their requests for a 2019 course or for sending students abroad known as soon as possible.

Johnny de Roos (Belgium, ex MoD) and Eric Deschambault (US, ex DDESB) are doing an excellent job as instructors. This year they are accompanied by Matt Wingrave (UK, DOSR) in Berlin, Brussels and Helsinki. Matt is preparing himself to start teaching the course in a few locations next year. The MSIAC steering committee has expressed a wish to find additional instructors in various nations. This will ensure long term availability of the course and a larger flexibility for teaching in the nations. Please let us know if you have such aspirations!

For the course in Spain we asked Mr. Edwin van der Ven (NL, Transport and Dangerous Goods vice chair) as an invited speaker. He provided a few extra presentations about the transport publication AMoVP-6, and joined the rest of the course. Nations can also make requests for additional topics or presentations.

During the course in Brussels the three instructors were handed an official “AASTP tour 2018” t-shirt at the NNHQ to thank them for their outstanding efforts in this busy course year.



AASTP-1 and AASTP-5 Lecturers receiving their t-shirts

The AASTP-1 and AASTP-5 are developed within the AC/326 SGC. In the last two years some members reviewed the course material and provided feedback. During their spring meeting (16-20 April 2018) it was decided that the following statement can be placed on the course material:

“The MSIAC AASTP-1 and AASTP-5 lecture series has been reviewed and validated by NATO Conference of National Armaments Directors (CNAD) Ammunition Safety Group (CASG), AC/326 SGC, as per April 2018. The course material is aimed to reflect the NATO standards for safe storage and transport of ammunition (AASTP-1 and AASTP-5) as closely as possible. MSIAC nor its contractors are liable for any errors or misinterpretations in or arising from the course material. It is the responsibility of the participating nations to appoint competent personnel responsible for explosives safety and to keep their knowledge current.”

The review and validation by SGC also opens the door to NATO certification of the course. In January we presented the course at the Logistics Education and Training Forum (LETF), chaired by Col. Roman Dufek. We expect certification will happen before the summer this year.

**Martijn van der Voort
MSIAC Safety of Storage and Transport Specialist**



Madrid, 16-20 April



ACCIDENT REPORTING AND MADx

The MSIAC Accident Database (MADx) allows easy searching in over 13,200 accident reports from US, UK, France, Germany, Australia and Canada. The most recent update was provided by Australia with accidents up until January 2018. We invite other nations to contribute to MADx and gain access to the database.

MADx is available through the MSIAC secure website: <https://portal.msiac.nato.int/madx/>

MSIAC also regularly updates a series of open accident reports based on information in the media. In conjunction with this newsletter a new update has been added to the website, covering the period between September 2017 and April 2018.

Explosion at ammunition depot and major evacuations (Kalynivka Ukraine 26 September 2017)

A series of explosions occurred at a military base near Kalynivka, Vinnytsa at 10pm (local time) on Tuesday 26th September 2017. Two people were reported as injured. More than 30,000 people were evacuated within a radius of 30 miles. Several houses and vehicles have been destroyed.

The military base stores artillery shells, bullets and rockets. Approximately 40 % (33,600 to. gross weight) of the stored ammunition was destroyed.

Initial reports from the Ukrainian government considered sabotage as the reason, blaming the incident on Russia or separatist forces. Drones could have been used like in a similar event in Balaklija, December 2015. A drone carrying an incendiary device was found within the ammunition depot surrounding fences. Two other cases were reported in 2015 (at Balaklija) and 2016 (at Kuibyshevsky). A further explosion at the Balaklija Ammunition depot happened on 23rd March 2017. General insufficient storage conditions and decreasing condition of the ammunition also needs to be taken into consideration. MSIAC have provided assistance to Ukraine by hosting presentations to delegates on the relevant NATO standards and best practice in safety management systems.



Explosion at ammunition depot near Kalynivka, Ukraine

<https://www.telegraph.co.uk/news/2017/09/27/fire-ukraine-ammunition-depot-prompts-mass-evacuation/>

High explosive pellet pressing incident (US 4 February 2018)



Damage following pressing operation

An accidental initiation of PBX9501 was reported at the 2018 IM/EM Technical Symposium. The incident occurred at Los Alamos National Laboratory in March, during a routine pellet pressing operation. Los Alamos personnel stressed that the 9501 material in question has been used to press hundreds-of-thousands of pellets over the past 20+ years with no similar incidents. An operator was preparing to press 1" x 1" PBX 9501 (23.6 g) pellets when a metal fatigue sound was heard and the sample exploded. The operator and an escort were in the laboratory, 10-12 feet from the press. Both were behind a shield consisting of ½" Lexan, ¼" air gap and another ½" Lexan plate. Both were unharmed. Three hypotheses were put forward for the root cause, none of which have yet been ruled out:

- The PBX 9501 was at fault in some way.
- The stemple was cocked in the die, gouging the die polish and creating friction heating.
- The die body or stemple cracked and failed.

Improvements are being investigated into shielding; formalising non-destructive testing and die maintenance; as well as hearing protection.

<https://weblink.msiac.nato.int/WebLink/ElectronicFile.aspx?docid=631396&dbid=0>

 [Click here to access full list.](#)

**Rebecca Millar
MSIAC Stokes Fellow**



FUTURE STUDENT PROJECTS

Gathering Energetic Material Properties

Anne-Laure Vialette

Anne-Laure will be joining us from ENSMA, Poitiers from June to September. She will be working with Wade Babock on gathering energetic material properties. MSIAC has prepared a reference for the IM modeling community which lists the characterization parameters needed for materials which are included in typical munition response computational simulations. The guide defines these parameters and provides example testing/analysis methods to obtain the parameters.

Anne-Laure will begin the process of populating a database of these parameters for primary materials of interest. The project is divided into two tasks. The first will be to identify the materials (on the order of 10 to 20 materials) for which parameters would be most useful within the community. The second task will be to scour resources at MSIAC, within national communities, technical literature, and other resources, for information on these selected materials, and populate the required parameters with values gleaned from vetted data.

If you have any information pertinent to this study, please contact Wade Babock—W.Babcock@msiac.nato.int

Mitigation Technologies for Warheads

Pierre-Antoine Prevot

Pierre-Antoine will be joining us from ENSTA Bretagne from June to September. He will be working with Christelle Collet and Ernest Baker on mitigation technologies for warheads. To reduce the explosive response of munitions to Insensitive Munitions threats, several mitigation technologies are used. The topic will focus on mitigation technologies available for warheads: passive venting device, active venting device, coatings etc.

The project will focus on searching technologies and reviewing the policy on active and passive mitigation technologies.

Output will be a report providing:

- An overview of the technologies with their detail description and their current use.
- Recommendations on design safety and safety testing related to active and passive mitigation device.

In addition, new technologies will be entered in the MSIAC database dedicated to mitigation techniques.

If you have any information pertinent to this study, please contact Ernest Baker — E.Baker@msiac.nato.int

Novel Properties Enabled by Innovative Processing Techniques


Aurihona Wolff

Aurihona will be joining us from ENSTA Bretagne from August 2018 to January 2019. She will be working with Wade Babock on novel properties enabled by innovative processing techniques.

Common and well-known processing technologies used for decades to manufacture energetic materials include the following: mixer, extruder, press, and twin-screw extruder. In the recent past, innovative processing technologies have emerged, such as single screw extruders, co-extrusion, Resonant Acoustic Mixing or additive manufacturing (3D printing). Different properties are then expected for the energetic compounds manufactured by these novel processing techniques.

Aurihona will first have to collect up to date information and data about innovative processing technology and their consecutive influence on energetic materials properties. The second task will be to extrapolate the possible gains in materials properties thanks to these techniques and how they could benefit the IM and munitions safety communities.



 **Further information about MSIAC interns and trainees can be found on our website via [this hyperlink](#).**

 **Do you have an article you want published in our newsletter? Send it to: info@msiac.nato.int**



SYMPOSIA

Ordnance, Munitions and Explosives Symposium

Next date:

06 - 07 Nov 2018

Type: Symposia

Time: 8:30 - 17:00

Location: External

With an increasing trend towards leaner, just in time manufacturing, stock reduction, and efficient turnaround of inventory, the 2018 OME Symposium will explore how suppliers are meeting their customers' needs, and how customers monitor their stock in accordance with supplier's recommendations.

The 2018 OME Symposium will delve into all parts of the OME life cycle through to timely disposal. Find more information here: <https://www.cranfield.ac.uk/events/symposia/sym-ome>



Europyro June, 3 – 7th 2019

44th International Pyrotechnics Seminar
Announcement & Call for papers

Tours - FRANCE

The Af3P, with the support of IPS, organizes the EUROPYRO 2019/44th IPS conference in Tours (France). Abstract must be uploaded on the dedicated website. Booths for exhibition will be available within conference centre during seminar. Find more information here: <http://www.europyro2019.org/>

Dead line for abstracts:01/11/2018

Notifications to authors:05/01/2019

Preliminary program:31/01/2019

Dead line for full papers:30/04/2019

International Explosives Safety Symposium & Exposition



8/6/2018 - 8/9/2018

Sheraton San Diego Hotel & Marina
1380 Harbor Island Drive
San Diego, CA 92101
Tel: 619-291-2900

Theme : Explosives Safety and Munitions Risk Management

The deadline for abstracts for the International Explosives Safety Symposium & Exposition has now passed but we believe there are still a few slots available. Please upload your abstract via the NDIA website at the following web link and complete ALL required information. Submission website: <http://application.ndia.org/abstracts/8651/>.

For attendance , online registration closes on Monday, July 30, 2018



ON THE AGENDA FOR 2018...

Mid-June—Gun Launch Ammunition Setback Survey

MSIAC will be conducting a gun launch ammunition setback survey, starting mid-June that will be completed by mid-July. This survey will be available on the MSIAC web site. A notice will go out when the survey is initiated.

Participation from all of the MSIAC nations is encouraged.

4-5th July—RAM Working Group Meeting

The next RAM working group meeting will be an update from RAM users, managers and national authorities for qualification. It will also include discussions on process controls and speed of uptake of the technology in Europe. Day 1 will be held at Cranfield University, Defence Academy, SN6 8LA, UK. Day 2 will be held at Falcon Project, Westcott, HP18 0XB, UK.

Further details on registration for this meeting can be found at the MSIAC website (link: <https://www.msiac.nato.int/workshop>)

10-14th September—Improved Explosives and Munitions Risk Management Workshop

The preparations for the Improved Explosives and Munitions Risk Management (IEMRM) workshop are progressing well. In the mean time we have received many abstracts, thanks for your efforts!

There will be a good representation from the Insensitive Munitions, Hazard Classification and Storage Safety communities - 54 people have registered so far.

A 2-day reconnaissance mission to Granada was made to check the conference center and venues. A detailed agenda was presented to participants and chairpersons during a webinar held on 24 May.

 [Click here to read more.](#)



Improved Explosives and Munitions Risk Management

Granada, Spain | 10 - 14 September 2018

AND IN OTHER NEWS...

Some members of the MSIAC team (Michael Sharp, Matt Andrews, Christelle Collet and Rebecca Millar) ran the Brussels 20km on 27th May. All completed within a great time. Congratulations!



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