MSIAC

Munitions Safety Information Analysis Center

Supporting Member Nations in the Enhancement of their Munitions Life Cycle Safety

Bulletin

IN THIS ISSUE

Issue 1 - 2020

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2020 Workshop !

REGISTER NOW!

We are pleased to announce that registration is now open for our 2020 workshop "Defects – Causes, Classification and Criticality", which will take place in The Hague, The Netherlands, from 15th – 19th June.

Registration for the workshop can be completed at the following website: ***https://www.msiac.nato.int/defects***

In addition, we are now accepting abstract submissions for presentations and / or technical papers to be delivered at the workshop. Participation of attendees through the exchange of information is key to the success of the workshop, and we therefore encourage the early submission of abstracts and technical information prior to your formal approval to attend the workshop. Please submit abstracts by emailing them to: ***defects@msiac.nato.int***.

The workshop is free of charge to MSIAC member nations, and includes a hosted reception and dinner. Please note that delegates will be responsible for meeting the cost of their own travel, accommodation and expenses for the workshop.

Please note that the MSIAC Steering Committee members and / or National Focal Point Officers will make the final decision on attendance for their respective nations. Please do not make any travel arrangements until your attendance has been confirmed.
A detailed discussion of the workshop goals, structure and background work can be found in ***MSIAC Open Report O-214***.

For your information, there are still some rooms available in the Leonardo Royal Hotel Den Haag Promenade (former Crown Plaza), at the agreed rate of €132 per night, BF not included. To book a room, please contact Mrs Simone Robbers via telephone +31(0)70 3511711 or at s.robbers@crowneplazadenhaag.nl and use the reference "**NATO-MSIAC June 2020**".

Matt Ferran
Munition Systems TSO

Survey on In-Service Surveillance and Stability Testing !

We request your assistance to better know how MSIAC nations manage In-Service Surveillance (ISS) activities as well as stability testing. A new survey has been set up since November last year, and you are kindly invited to fill it in at the following link:
https://www.msiac.nato.int/survey-on-in-service-surveillance-and-stability-tests

The purposes of this survey are to:

- Compile activities on how MSIAC nations schedule and conduct routine inspections of various types of ammunition and energetic materials (explosive ordnance; munitions, propellants) – see first section on in-service surveillance;
- Compile activities on how MSIAC nations conduct Heat Flow Calorimetry (HFC) tests to assess the stability of NC-based propellants during their life cycle – see second section on stability tests;
- Identify opportunities for sharing of experience and/or best practices.

A first compilation has already been done thanks to the first 13 contributions received from 10 MSIAC member nations. This first analysis will be soon shared amongst the contributors to the survey.

Ultimately, the results will be gathered in a limited report available to MSIAC member nations. Do not hesitate to contribute, there is still time: the deadline was postponed until the end of August!

Christelle Collet
Propulsion Technology TSO

Australia Country Visit & PARARI 2019

In late October and early November 2019, MSIAC went on its biennial visit "down under" to attend the PARARI Explosive Ordnance Safety Symposium, and to carry out a Country Visit in the most distant MSIAC member nation from NATO HQ.

Having left grey and rainy Europe, after a grueling 24 hour flight Matt Ferran (TSO Munition Systems) and Martijn van der Voort (TSO Munitions Transport & Storage Safety) arrived in Sydney to try and acclimatize to the 31 °C heat. After a quick visit to the world famous Bondi Beach, it was straight to work.

On Day 1 our hosts from the Directorate of Ordnance Safety (Nathan White and LT CDR James Robertson) joined us in Sydney, where we visited LT CDR Eggins and LT Sellick at Royal Australian Navy Fleet Base East. There we discussed the challenges of explosive risk management in harbours, especially in locations such as Fleet Base East which is less than 1 km from downtown Sydney.

That afternoon we travelled to Defence Establishment Orchard Hills in the western suburbs of Sydney, hosted by Lachlan O'Donohoe. Orchard Hills is a major munitions storage depot, and so MSIAC gave presentations on NATO standards for storage and transport of ammunition, and explosives safety risk analysis.

After a short 3 hour drive to Canberra, Day 2 began with a visit to the Directorate of Ordnance Safety where CAPT Jacqui King (RAN) and Dave Gibb presented their progress on development of the Australian EO Safety Principles and Regulations. In the afternoon we visited the Explosive Materiel Branch at Brindabella Park, hosted by SQN LDR Tim White, where we presented on a number of topics relevant to defence procurement including ageing and life extension challenges, and the safety management systems of other MSIAC nations.

On Day 3, after another short 5 hour drive, we visited the Australian Munitions factory at Mulwala, where we were hosted by MSIAC alumnus Dr. Ian Powell. After presenting on the topics of technology trends in gun propellants and blast equivalence calculation, we toured their state-of-the-art propellant manufacturing plant. That afternoon, after another very short 1 hour drive, we visited the second Australian Munitions facility at Benalla, where we toured their TNT filling and small arms ammunition manufacturing plants. We then delivered

presentations on the topics of Resonant Acoustic Mixing and additive manufacture as applied to energetic materials.

On Day 4 we visited Adelaide (which this time involved a 3 hour flight), where we were hosted by Craig Wall and Dr. Ian Lochert at the Defence Science and Technology Edinburgh site. After delivering presentations on energetic ionic liquids and energetic materials research, we were given a tour of their laboratories and detonation chambers.

Day 5 – the final day of the country visit –started with a 1 hour drive north to Joint Proof and Experimental Unit (JPEU) Port Wakefield. After presenting on topics including the updates to IM testing standards, and the risk from dropping explosives, our host Pete Downey gave us a tour of the environmental test and proofing capabilities offered by JPEU. The day ended with a drive back to Adelaide airport and a flight back to Canberra for the PARARI conference the following week.

We would like to thank all of our hosts throughout the country visit, and also extend a special thank you to Nathan White, Lt CDR James Robertson and SQN LDR Alex Li for all their hard work in organizing the itinerary and being such excellent tour guides for the week.




PARARI 2019

The following week was the PARARI Explosive Ordnance Safety Symposium, held at the Australian Defence Force Academy (ADFA) in Canberra. In three days, over 400 delegates attended more than 50 presentations and workshops on a variety of topics related to energetic material science, Safety and Suitability for Service (S3), risk management, EO storage and transport, insensitive munitions, in-service surveillance among many others. MSIAC delivered presentations on the use of data loggers in MHM, TNT and Blast Equivalency Characterization of Energetic Materials, and fragmentations from detonations and less violent munition responses.

Keynote speeches were delivered by speakers from Australia and the US, and the first day was punctuated by a unique performance of “industrial theatre”, hoping to draw parallels between safety failings in the space shuttle program with challenges that may be faced by the munitions industry.

The highlight of the event was the conference dinner, held at the Australian War Memorial and with tables set in and around the wingspan of the Lancaster bomber “G for George”.
Once again, we would like to extend our thanks to the Australian Directorate of Ordnance Safety for inviting MSIAC to participate in the symposium.
Proceedings from PARARI 2019 are available online https://www.unsw.adfa.edu.au/conferences/parari/previous-conferences/parari-2019-proceedings

AASTP-1 AND 5

The week after PARARI MSIAC went on to provide another AASTP -1 and 5 lecture series in Canberra, highlighting some upcoming changes to AASTP-1 EdC V1.

Johnny de Roos and Eric Deschambault then continued their gentle art of teaching the NATO standards for siting of ammunition storage and risk analysis in Wellington, New Zealand. This closed four weeks of MSIAC activities on the southern hemisphere.

Matthew Ferran & Martijn van der Voort
Munition Systems & Munitions Transport and Storage Safety TSOs

16TH UK MARITIME EXPLOSIVE SAFETY FORUM

Dr Ernest Baker represented MSIAC at the 16th Maritime Explosives Safety Seminar (MESF) held at MOD Abbey Wood, UK on 6th February 2020. He provided an invited briefing entitled “Sub-detonative Fragmentation and Risk”. This presentation highlighted MSIAC’s ongoing work in the identification, characterization and risk quantification associated with sub-detonative events. P. Locking from BAE Land Systems provided a presentation entitled “TNT Equivalence, Theory, Solutions and Issues”. He provided an overall review including TNT equivalence for blast (high volume work output) and metal pushing (Gurney), an overview of analytic calculations and the EXP-5 database and thermochemical calculations and explained the issues with TNT equivalence for blast, particularly for non-ideal explosives due to confinement reaction effects. In the end, actual testing of munitions, or very similar, are required to provide accurate equivalencies. With the increasing acquisition of safer Insensitive Munitions, non-ideal and sub-detonative reaction events are increasingly relevant to the safe transport and storage of munitions.

Dr Ernie Baker
TSO Warheads Technology

Insensitive Munitions and Energetic Materials Technology Symposium (IMEMTS), 21-24 October 2019

MSIAC was present at the last IMEMTS which was held in Europe, in Seville, Spain, in October 21-24, 2019. As usual, the conference was organized in one first plenary session followed by parallel sessions on Insensitive Munitions (IM) and Energetic Materials (EM).

MSIAC strongly contributed to the conference, by helping in the organization, chairing sessions, holding a booth, and presenting and/or contributing to 14 papers on different topics covering processing techniques (RAM), IM test procedures (Probabilistic Modeling of Initiation due to Fragment Impact, Slow Heating Test Thermal Equilibrium and Maximum Reaction Temperature), past and future workshops (IEMRM, Defects – Causes, Classification and Criticality) and a few others.

In the plenary session, Michael Sharp gave his last presentation in this forum as the Project Manager of MSIAC. He presented the Munition Safety (MS) awards (see a more detailed article on this in the Issue 3 - 2019 of the MSIAC Newsletter) and highlighted the MSIAC vision concerning the future challenges in munitions safety.

Dr Michael Sharp presenting the MS Awards to Wade Babcock (USA, Indian Head Div., and MSIAC Steering Committee member) and Christelle Songy (EURENCO) on behalf of the career achievement winners: Michael Swisdak, Dr Jerry Ward, Edward Daugherty and on behalf of the French NAVAL Group / EURENCO team for their technical achievement on the F21 IM Heavyweight Torpedo Warhead Development.

The big change in the community emanated from the US, with the change from Joint IM Technology Program (JIMTP) to Joint Enhanced Munitions Technology Program (JEMTP). Beyond the change in the acronym, this reflects a change in the way the US want to orientate the current and future munition developments: the aim is to focus more on performance while maintaining insensitivity. This was presented in detail by Anthony Di Stasio (USA, JEMTP Program Manager) in his plenary presentation.

Brian Fuchs (US Army and chairman of the MSIAC Steering Committee) supported Anthony Di Stasio's statement by presenting examples of successful developments of performance and insensitivity. All these examples showed that it is possible to **improve performance while maintaining or improving safety**. This is perfectly in line with the MSIAC position: munitions performance should not be increased at the expense of munitions safety. During the parallel sessions, the latest progress on insensitive munitions and energetic materials were presented. As usual, the MSIAC staff tried to make all this valuable and up-to-date material swiftly available to the MSIAC community by sharing the proceedings through the Weblink portal (accessible via https://weblink.msiac.nato.int/weblink/Welcome.aspx?cr=1) and by populating the online databases accessible in the secure MSIAC environment (https://portal.msiac.nato.int/).

The 2019 edition of the IMEMTS conference ended on the Thursday evening with the awards presentation for the best papers and technical presentations. The IMEMTS organizing committee dedicated the best IM paper to Dr David Hubble (NSWC, USA) for his work on "Results and Analysis of Slow Cook-off Testing Performed at 15°C/hr". The best EM paper was presented to Ms Rosie J. Davey (BAE Systems Land, UK) for her study on "Processing Studies of Energetic Materials using Resonant Acoustic Technology". Finally, the best (tied) presentations were designated by the people's choice thanks to a smartphone application. The award was given to Christelle Collet (MSIAC) for her two presentations on "Non-HERO Microwave Hazards to Munitions" and on "Fragmentation from Detonations and Less Violent Munition Responses".

The MSIAC team (from left to right: Dr Ernest Baker, Christelle Collet, Dr Michael Sharp, Dr Matthew Andrews) in front of the MSIAC booth at the last IMEMTS.

Dr Matthew Andrews (Energetic Materials TSO), Dr Ernie Baker (Warheads Tech. TSO), Christelle Collet (Propulsion Tech. TSO) and Dr Michael Sharp (outgoing Project Manager)

You can find all Technical PUBLICATIONS via this hyperlink .

Do you want to know what's going on in AC/326 and its SUB-GROUPS? Check it out here!

Country Visit to the Netherlands

MSIAC paid a visit to the Netherlands with a delegation consisting of the new PM Chuck Denham, and TSOs Martijn van der Voort, Christelle Collet, Matt Ferran, and Kevin Jaansalu. On 3 December various presentations were delivered at the TNO facilities in Rijswijk, and 4 December three parallel workshops were held at the Van Braam Houckgeest kazerne in Doorn. The visit focused around three main topics: Munition Health Management (MHM), the development of an IM Policy, and Electro Magnetic Radiation Hazards. The workshop structure was very suitable for discussions among the 40 participants and MSIAC staff. Patrick den Engelsman will use the results of the workshop to define further actions.

We would like to especially thank the following persons for the organisation and excellent contributions: Patrick den Engelsman and Albert Bouma from the Dutch MoD, Knowledge Center Weapons and Munitions (KCW&M), and Wim de Klerk, Richard Bouma, Peter Hooijmeijer, and Antoine van der Heijden from TNO.

Martijn van der Voort
Munitions Transport and Storage Safety TSO

Demonstration on Innovative Solutions for Munition Health Management (MHM)

From 7th to 11th October, NATO HQ was the site of the AVT-292 panel Collaborative Demonstration of Technology on "Innovative Solutions for Munition Health Management (MHM)". There were 10 groups participating across government and industry, including MSIAC participation by Christelle Collet and Kevin Jaansalu.

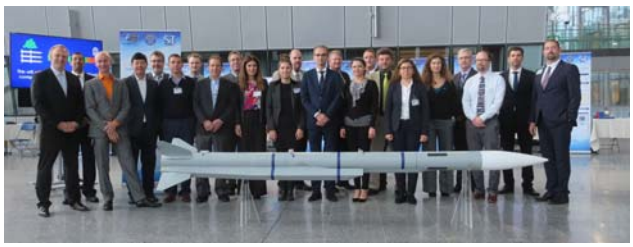
Keynote speakers were the Deputy Associate Secretary General for Defence Investment, Mr Gordon 'Skip' Davis and the NATO Chief Scientist, Dr Bryan Wells. Introducing the activity to members of the Council of National Armament Directors, Mr Davis was "very excited to introduce an impressive piece of research that directly supports our NATO objectives for military capability development and that makes a great contribution to preserve NATO's technological edge." In his address, Dr Wells particularly emphasized that "the technology featured on display is actually in use in the nations. It is not scientists promising future improvements if they are given more time and more money. This is here and now."

The focal points of the activity were the use of sensors and internet-of-things technologies displayed by some of the world's leading MHM experts, including live hardware and augmented reality demonstrations. MHM can vary from integrated sensor and life cycle tracking, as applied by MBDA on the Meteor missile, to the simple application of sophisticated sensors and data loggers as developed and fielded by Micron Instruments, TNO, and the US Army. This must be supported by validated models and life prediction strategies, which were underscored by presentations from Roketsan, Tübitak SAGE and a collaborative presentation from Northrop-Grumman and US Air Force.

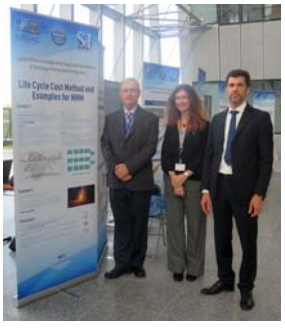
MSIAC's participation was in the analysis of the life cycle costs which were presented by Christelle, Kevin, and AVT 292 co-Chair Dr Giuseppe Tussiwand. There were three examples of the application of MHM, based on real situations and munitions, where there were demonstrated cost benefits with the appropriate use of MHM technology. Such detail would not have been possible without the contributions of Ms. Rada Feraco, Canada, and Mr. Wade Babcock, USN. MHM is not cost effective in all situations. For example, where safety is provided through engineering design, item cost is small, and the cost and consequences of failure are low, MHM will likely not be beneficial. The life cycle cost exercise also provides a sound framework where areas of risk and liability are identified and can thus be mitigated. The life cycle cost and benefit analysis will be documented in a forthcoming MSIAC limited report.

Guidance on how to implement MHM is the focus of a task force under AC/326 Subgroup B, co-chaired by Mr Edward Hoole and Mr Grant Milne from the UK DOSG. These posters on guidance led the display. The issues in the system design and flow of information were presented by representatives from Fraser-Nash. The draft guidance document is underway, with an aim to have it complete and released to NATO members and allies by November 2020. Mr. Davis reflected that the excellent cooperation between the many organizations "is a concrete example of NATO bodies working together to deliver innovative solutions for the Nations."

Dr Bob Mueller, co-Chair of AVT-292, reflected that the implementation of MHM is driven by two compelling benefits: improved safety and reduced life cycle costs. Much has changed since the last demonstration of MHM in 2014 and this was clear through the excellent contributions of the participants.



AVT 292 Panel Presenting Authors



Kevin Jaansalu, Christelle Collet, and Giuseppe Tussiwand presenting results of their life cycle cost analysis.

Christelle Collet
Propulsion Tech.
&
Dr Kevin Jaansalu
Materials Tech. TSOs

Country Visit to Finland & Sweden

When MSIAC travels to the Nordic countries there are opportunities to visit several facilities. MSIAC were represented by Dr Kevin Jaansalu, Martijn van der Voort and Dr Matthew Andrews.

Starting in Finland, on 25th November 2019, we were hosted by the Finnish Defence & Research Agency (FDRA). It was an opportunity for us to update Finnish scientists on MSIAC's Program of Work and to tour their facilities. On 26th November we remained in Finland where, in Tampere, we provided a day seminar to both Finnish MoD and industry representatives. MSIAC covered topics such as energetic materials research, new processing technology, explosives risk management and ageing & life extension challenges.

MSIAC Finnish Country Visit hosted by Kosti Nevala, Finnish MoD

We then travelled to Stockholm, Sweden where, on 27th November, we visited the Swedish MoD. Again this was an opportunity to update them on MSIAC's program of work and provided some focused presentations on energetic materials research, gun launch setback and explosives risk management.
Our final location was Karlskoga, Sweden, where we were hosted by Jon Toreheim of the Bofors Test Centre. The seminar was attended by Swedish industry. We provided an update on MSIAC activities, a focus on MSIAC products, tools and services, IM state of the art and updates to IM STANAGs.

MSIAC Sweden Country Visit hosted by Jon Toreheim, Bofors

MSIAC was received well at all locations, and it provided us with an opportunity to discuss technical matters face-to-face.

Next time, we look forward to visiting these countries during the summer months!

Dr Matthew Andrews (Energetic Materials TSO), Dr Kevin Jaansalu (Materials Technology TSO) & Martijn van der Voort (Munitions Transport and Storage Safety TSO)

Institute of Makers of Explosives Safety Analysis for Risk (IMESAFR) course

TSOs Martijn van der Voort and Ernie Baker attended the IMESAFR course in Mons (Belgium), 17-20 December 2019. IMESAFR is a commercially available quantitative risk analysis (QRA) software package for siting of civil explosives storage and related activities. The software has been developed by APT Research (Huntsville, AL) since the nineties as a spin-off of the Safety Assessment for Explosives Risk (SAFER) software package which is aimed at military applications. John Tatom has been involved since the beginning, and together with Brandon Fryman, he was at the University of Mons to teach a group of about 20 students.

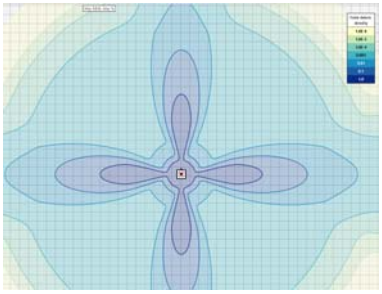
The Institute of Makers of Explosives (IME) requires that potential users take the course and pass an exam before allowing access to the software. IMESAFR and the course are available to anyone except parties denied US exports.

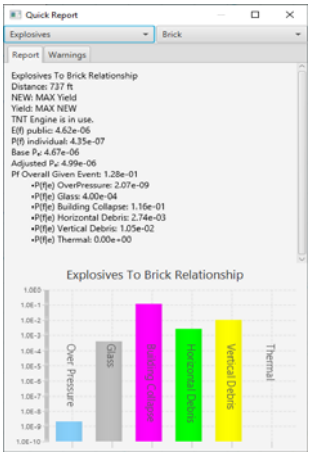
APT Research has participated in large test programs such as ESKIMORE and SPIDER, which were sponsored by the US DoD Explosives Safety Board. They also contribute to international expert groups on explosion effects modelling such as the Klotz Group and play an important role in the development of the NATO explosives safety risk analysis manual AASTP-4. This combined experience and knowledge has helped the development and validation of IMESAFR through the years.

When quantity distance (QD) regulations cannot be met, most national and international standards prescribe that a

risk assessment be carried out in which individual risk and group risk are compared to risk criteria. A risk assessment considers many more aspects than a relatively simple QD approach. It also includes the probability of an accidental initiation, the exposure of personnel and third parties, as well as a detailed analysis of a multitude of physical effects and consequences. In fact, one exercise during the course highlighted that the risk at the QD can vary by many orders of magnitude due to differences in type of munition, activity, structural properties of the Potential Explosion Site (PES) and protection at the Exposed Site (ES). IMESAFR visualizes the contribution of each of the effects and gives insight into the most efficient ways to reduce risk.

IMESAFR is relatively easy to use and has an intuitive graphical interface. The course presented in detail the steps and calculations in an IMESAFR analysis. It highlighted the many benefits of QRA, and the advances that have been made over the years by including new models on e.g. PES debris and fragmentation including azimuthal variation, as well as ES blast damage and penetration. A number of screen shots are given below.





Debris contours (left) and Quick report (right)

Risk at ES indicated by colors

Possible modelling advancements were discussed, such as an assessment of the probability of propagation between PES, and the possibility to perform calculations for an extended number of Hazard Divisions. It was also discussed how to treat scenarios where combustion of propellant in confined structures may lead to over pressurization and the generation of debris.
We found the course to be very educational and interesting, a good course just before our Christmas break. Many thanks to John and Brandon!

Some information about the next IMESAFR course in Europe:

IMESAFR v2.1 Training with AN Module prior to the SAFEX Congress, IMLAUER HOTEL, Salzburg, AUSTRIA, May 19 – 22.
Link: https://www.apt-research.com/product/safex-imesafr/

Martijn van der Voort & Dr Ernest Baker
Safety of Transport and Storage TSOs & Warheads Technology

Visit to FN Herstal, Belgium

FN HERSTAL

The industry of small arms ammunition represents a huge activity in Europe and especially in Belgium with the FN Herstal company which designs, develops and manufactures small caliber weapons, small caliber ammunitions and integrated weapon systems and sells to many NATO nations. Belgium joined the MSIAC member nations in 2015 but MSIAC staff have never visited this company until the end of 2019 and the beginning of 2020.

For our first visit to FN Herstal, the MSIAC team spent two full days in both Belgian sites of this company: on the 11th of December, 2019, Matt Andrews and Christelle Collet visited the firing range in Zutendaal and on the 14th of January, 2020, Martijn van der Voort, Kevin Jaansalu and Chuck Denham went to FN Herstal's headquarters in Herstal. On the second day, members of the Belgian MoD were also present.

These two days of visit also provided the opportunity for the MSIAC team to be toured around FN Herstal production and testing facilities, which could not have been done without the greatly appreciated support of our host, Mr Bernard Baps (R&D Project Manager Pyrotechnics). The feedback from the FN Herstal team was enthusiastic.

Christelle Collet
Propulsion Technology TSO

First 2020 Student

Early February 2020, MSIAC welcomed its first student of the year, Paul SCHRAMA and now has the pleasure to let him introduce himself.

I am a Dutch fourth year Officer-Cadet at The Netherlands Royal Military Academy and senior year Military Engineering student at The Netherlands Defense

Academy. After finishing the study and the military training, I hope to become an Engineering officer in the Netherlands army.
Currently I am working at MSIAC on my BSc thesis 'Property mixing rules for energetic material formulations', under the supervision of Dr Kevin Jaansalu, TSO in Materials Technology. The aim of my project is to find the best working mixing rules to estimate the properties of energetic composite materials. To accomplish this, I will test the mixing rules with experimental data of several composites, which can be a difficult task as not all properties of the materials are known. But with the help of the TSO's and the MSIAC database I am able to find the relevant information. The results of this research will be assembled in a report.

This internship at MSIAC is a very educational and great experience, which will definitely help me in my future career.

Paul Schrama
MSIAC Trainee

31ST INTERNATIONAL SYMPOSIUM ON BALLISTICS

The 31st International Symposium on Ballistics (ISB) was held in Hyderabad, India on 4-8 November 2019. The ISB brings together international subject matter experts that present their work on the subject areas of Interior Ballistics, Launch Dynamics, Exterior Ballistics, Terminal Ballistics, Explosion Mechanics, and Vulnerability and Survivability. Dr. E. Baker from MSIAC provided the ISB keynote address for the symposium and one technical presentation. The 30 minute keynote address, "Insensitive Munitions Technology: Career Reflections and International Perspective", provided a description of his career, an overview of MSIAC, an overview of Insensitive Munitions (IM) requirements and standards, an overview of the recent NATO IM STANAG updates, examples of IM successes and finally a description of technology gaps. Dr. Baker was the co-chair for the Explosion Mechanics oral session and also provided his technical presentation entitled "Fragmentation from Detonations and Less Violent Munition Response". Near the end of the ISB, Dr. Baker presented the Zernow best paper award that went to N. Shapira et al. (Israel), "Oblique Penetration of 25mm APDS-T Projectile into Metal Plates – Modeling and Verification". The 32nd ISB will be held 10-14 May 2021 in Reno, NV, USA.

31st International Symposium on Ballistics—Zernow Best Paper Award

Dr Ernie Baker
Warheads Technology TSO

THE FRENCH CHRONICLE

At the beginning of the year, a massively followed tradition in France is to celebrate the Epiphany on the 6th of January, which is a Christian holiday celebrating the revelation of God the Son as a human being in Jesus Christ. However, even if most French people are unaware of this religious reference, they all know very well what to eat during this period of time: a king cake. But not just any king cake, a "galette des rois"! When I suggested we celebrate Epiphany in the MSIAC office, I was surprised to get only questioning looks from my international colleagues. So I did my homework and conducted some research on the galette des rois. It turns out that it only exists in northern France, Quebec, and Belgium; but neither my Canadian colleague Kevin, nor my Belgian colleagues Diane and Angeline, have ever heard of this cake. It consists of flaky puff pastry layers with a dense center of frangipane or apple, see picture. And it is just perfect to progressively slow down the calorie intake after the excesses of Christmas! Another thing to know about this tradition is that a figurine, the "fève", is hidden in the cake. Originally the "fève" was literally a broad bean (fève in French), but it was replaced in 1870 by a variety of figurines made out of porcelain or ceramic. In addition to losing his/her teeth when biting it, the person who finds the figurine in his or her slice becomes king for the day and will have to go to the dentist… no sorry, … buy the next cake. So it is a never ending story…

Funny enough, the word "epiphany" also refers to "an experience of a sudden and striking realization". Like in "I had an epiphany and decided to write this article on the king cake"!

Christelle Collet
Propulsion Technology TSO

CANCELLED MEETINGS!!!

1. **The forthcoming 23rd international seminar of New Trends in Research of Energetic Materials (NTREM), 1st – 3rd April 2020, has been officially cancelled by the University of Pardubice. Please visit the official site for further updates and information: https://www.ntrem.com/ .**
2. **Also the AC/326 SGA EMT meeting scheduled for 25-26 March 2020 at NATO HQ has now been cancelled. More information on the new schedule will follow.**
3. **And these are not the only ones. More and more meeting are currently being cancelled because of the Covid-19 virus. The list is too long to mention them all here, so please check with the organisers of each meeting you were planning to attend before making any arrangements.**

***Check out the updated reported ACCIDENTS** via this **hyperlink** and our series of **ACCIDENT POSTERS** on our **website**.*