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

Bulletin

IN THIS ISSUE

SCJ Workshop	1
PM's Perspective	3
Nitrocellulose Workshop	4
Industry & Techn. Press Review	5
Welcome to our Trainees	5
Did you know that?	6
Accidents, Patents & Publications & other news	6
IMEMTS Call for Papers	7

July 2014

CONTACT INFORMATION
☎ 32-2-707.54.16
🖷 32-2-707.53.63
http://www.msiac.nato.int
info@msiac.nato.int

THE SHAPED CHARGE JET WORKSHOP

It has been almost two months since MSIAC hosted the Shaped Charge Jet (SCJ) workshop at the ENSTA Bretagne campus in Brest, France, 12th -15th May 2014. This 3 ½ day workshop involved 61 participants from 8 Nations to focus on the threat posed by SCJs on our munitions. The workshop was designed with dual complementary objectives: to increase participants' scientific understanding and to propose improvement to the standard test requirement, STANAG 4526.

From a National perspective, we had participation from 8 of 13 MSIAC nations, including Australia, France, Germany, The Netherlands, Norway, Sweden, United Kingdom and the United States. Presumably due to the location, approximately ½ of the workshop participants were from France and Great Britain. Overall, MSIAC was very pleased with the level of participation. It was the groups' experiences, talents and expertise that when combined throughout the week fundamentally supported the multiple successes of the workshop.

The majority of participants arrived Monday afternoon to register and receive their welcome package. The bright orange bag, selected to indicate a Type III IM reaction – of course, contained, amongst other pertinent items, an umbrella which was mostly effective at holding off the rain for the week. It also contained a CD with copies of the presentations and a variety of reference materials.

Tuesday was organized with presentations in a plenary format. The day began with welcomes from: our MSIAC PM, Dr Michael W. Sharp; our French representative,

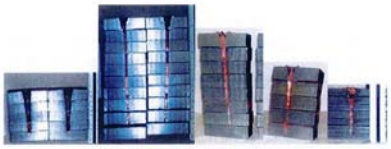
(Continued on page 2)

Dr Pierre-Francois Peron on behalf of Patrick Lamy; and our ENSTA host, giving a short overview on the campus. Following this, Dr Peron began the technical presentations with a review of the MSIAC report (O-151). This report identified shortfalls of the existing STANAG and made some initial recommendations for improvement. Following this, Yves Guengant provided a review and recommendations as compiled by IMEMG. These two presentations provided a good foundation for discussions, based on extensive work already completed by MSIAC and our industry partners.

After a break, Dr Hartmann provided a synopsis of SCJ Initiation Phenomena work he and Dr Arnold have completed. The presentation was enlightening, it highlighted through the test results and analysis presented that there remain some unanswered fundamental scientific questions. Drs Baker and Baudry provided overviews of the US and French test configurations, respectively. Phil Pitcher provided the workshop with a presentation on the effects of SCJs at extended ranges, and reminded us that our workshop topic directly relates to the threats our troops are facing.

Dr Michienzi provided a technical overview of the efforts being done in the US to characterize and model SCJ initiation. Dr Malcom Cook followed this with a presentation on modeling efforts for SC initiation. Dr Michael Sharp concluded this session with a review of the AOP-39 and TTCP protocols. These presentations reminded us of some of the critical linkages we need to consider as we move forward in making recommendations for improvement.

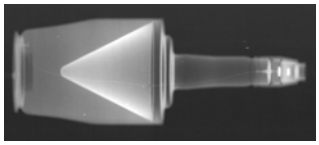
US and UK perspectives were presented by Brian Fuchs and Phil Cheese, respectively. These presentations both highlighted the interest and need for improvement along with relevant questions that need to be addressed by our workshop recommendations. Ken Tomasello closed out the day with an overview of the future STANAG format, as directed by AAP-03(J), which will consist of the STANAG 4526 with an associated AOP containing the pertinent technical details.



Wednesday and part of Thursday was set aside for breakout sessions to delve into 4 topic areas of interest. Dr Baker led a group on Detonics and Response Mechanisms, Gert Scholtes chaired the Modelling group, Dr William "Bill" Proud chaired the Small Scale Testing group, and Hervé Benard led the group on AUR Test Set up. Each of these groups addressed their topic areas using a discussion plan developed with the chairs prior to the workshop. The consolidated output from each group was presented to the entire workshop on the Thursday.

MSIAC has now posted copies of all the Presentations from the workshop, the plenary session as well as the reports from each of the break out groups, on the Forum page. This can be linked from the MSIAC web page, click the "**Shaped Charge Jet Workshop"** tab http://www.msiac.nato.int/forum/index?view=category&layout=list. Anyone with access to MSIAC services should be able to access this forum with their normal user name and password. Any difficulties, don't hesitate to send an email to Mike Longie (m.longie@msiac.nato.int) requesting assistance.

By the conclusion of Thursday, discussion relevant to the SCJ test STANAG 4526 was summarized in a presentation by Dr Fuchs. It detailed the participants recommendation that the threats currently in the STANAG, and the inaccurate v2d table, should be removed. Further, it reported consensus to use the RPG-7 as a representative threat. To assist in this approach, it was proposed to provide well defined descriptions of the current German, French, US and possibly Australian jet characteristics and test configuration as examples in the STANAG/AOP. There should be a provision to maintain the use of actual RPG-7 warheads as well as THA based variations.



The output from the workshop was immediately fed into an AC 326 SG/B Custodial Working Group that met the day after the workshop concluded. They have been tasked to develop the draft STANAG/AOP, which are being based on the workshop recommendations. They plan to circulate a draft of the updated documentation to the community and then submit the documents for promulgation early next year.

The workshop was greatly successful. There was general consensus from attendees we met our two primary objectives. Further, the output was immediately used to effect change to the existing standard. In addition to the good work, some of us also managed to have some fun and eat some fantastic French food. We hope that those attending the conference dinner on the Wednesday enjoyed the occasion (perhaps not the MSIAC PM's jokes though!).

The SCJ Workshop final report is being compiled at this time. It is planned to publish as a MSIAC limited report in Sep 2014.

Manfred Becker

(Continued on page 3)

THE PM'S PERSPECTIVE

Since the last newsletter the MSIAC staff have been particularly busy working on the SCJ workshop which is described in the lead article. Feedback from participants has been very positive and we intend to maintain the momentum by facilitating the recommendations for further work in this area.

I have a few announcements that I want to bring to the attention of our readers in this quarters' newsletter.

ROK – Will Join MSIAC

I can report that we are expecting the Republic of Korea (ROK) to join the MSIAC project in August this year. The team here is excited by the prospect of working with new members of the munitions safety community, involving them in our efforts. The community as a whole stands to benefit from adding new members through increasing the expertise pool and resources available to help develop and share underpinning knowledge and understanding. Dr Matt Andrews will undertake the first visit to Korea when he attends the 3rd Korean International Symposium of High Energy Materials on August 25th-29th. Expect to hear about this meeting in the next newsletter. For more on KISHEM, visit their website http://www.kishem.co.kr/home.

Job Announcements

MSIAC will soon be advertising for two new technical specialist Officers (TSOs) to join our team here at NATO HQ. The first post is a new position being created to address munition lifeing issues and the impact of materials properties in general on munition safety. This Munition Material Technology post should be available from early 2015. The second is to recruit a replacement for the Munitions Storage and Transport post which is due to be vacated in June 2015. Expect to see announcements on the website with more details on the roles and required competences in the coming months. MSIAC is a very rewarding place to work and seeks to be a focal point for munition safety efforts and expertise. Feel free to contact the staff for more details on working at MSIAC.

Steering Committee Members

There have been a number of changes to SC members in the last few months. For the US we are loosing Dr Jo Covino from the US DDESB. Dr Covino was a proactive member of the SC, her extensive experience in munition safety was always appreciated in discussions in SC meetings and in supporting the work of the MSIAC TSOs. She will be missed by the MSIAC team and by the SC. Dr Covino is replaced by Ms. Mary Ellen Caro from the US Naval Ordnance Safety and Security Activity (NOSSA). Ms. Caro is no stranger to MSIAC having been the previous US MSIAC SC member.

The Spanish SC member Capt Alfonso Franco has also stepped down after spending a couple of years as SC member. He will likewise be missed. MSIAC and the SC appreciate the support provided during these years, which included hosting a SC meeting in 2012, excellent visit to the Technical Institute of La Marañosa. The new spanish SC member is LTCOL. Emilio Larriba de la Rubia who we very much look forward to working with.

Survey Of Web Based Products and Services

Over the last year and a half we have introduced a number of changes to the products and services. To help us evaluate how we are doing I would be very grateful if you could spent a little of your time to complete an online questionnaire. It should take no more than 5 minutes. The feedback that you provide will be very valuable to us, helping us to tailor our products and services to better meet you needs.

Click here to access the survey

Break of Service - Weblink

Some of our customers may have noted a problem accessing Weblink over a 3 week period during June and early July. MSIAC apologies for any inconvenience caused by this break of service. Unfortunately, a routine software update blocked users from opening some files in the Weblink database. We are currently looking at the update process and are evaluating options to prevent this happening again. Should you experience any problems accessing Weblink the MSIAC team are always happy to help (contact: Mike Longie m.longie@msiac.nato.int for technical difficulties).

IMEMTS

MSIAC as a supporter of the Insensitive and Energetic Materials Technology Symposium (IMEMTS) has the pleasure of bringing to your attention the announcement of the next symposium (attached to the newsletter). The next meet is to be held in Rome, Italy, 18th-21st May 2015. The call for papers has just been issued with abstracts requested no later than 30th September 2014.

More details are attached or available on the IMEMG website, which includes details on submission of papers: http://www.imemts2015.com/

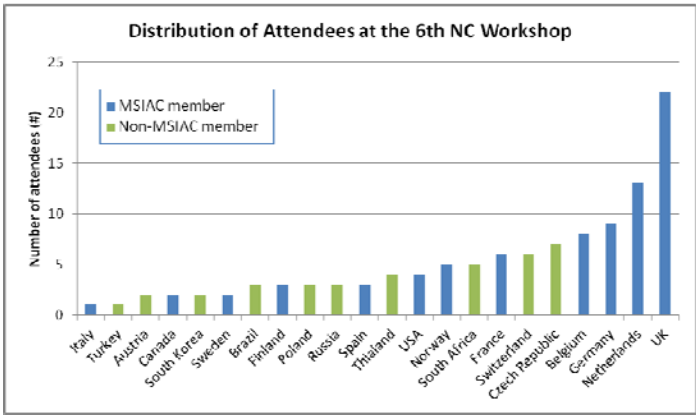
Finally, it just remains for me to wish you a good holiday (for those in the northern hemisphere)! However, don't feel you need to stop sending us your technical questions; we can be working on your latest technical issue whilst you are relaxing by the pool!

Dr Michael W. Sharp

HIGHLIGHTS FROM THE 2014 NITROCELLULOSE WORKSHOP

This year's Nitrocellulose Workshop (23rd – 24th April 2014) was held at the Grand Winston Hotel, Rijswijk in The Netherlands and hosted by TNO.

The 6th Nitrocellulose workshop had the largest attendance since the start of the series with 110 attendees, highlighting a continued interest and research within the field. The attendees represented 22 nations and looking specifically at the MSIAC nations, only Australia did not have a representative (Figure 1).



The workshop was opened by Wim de Klerk (TNO) who gave an historical perspective on nitrocellulose from its origins in 1865 to modern research into cellulose such as microcrystalline and bacterial growth. He also highlighted that in 1965 a 100th anniversary conference for nitrocellulose was held in Paris, which would make 2015 the 150th anniversary of nitrocellulose.

A number of presentations were given by nitrocellulose producers (BAe, Tembec, General Dynamics, Rheinmetall Nitrochemie) and they highlighted the complexity of working with a natural product, and the continuing process of understanding the characterisation of cellulose prior to nitration.

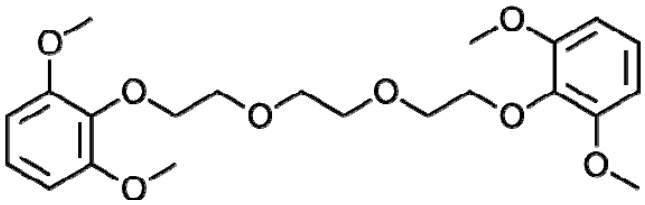
It was discussed several times that the quality and fibre size of the cellulose is critical to producing a quality nitrocellulose. The various sources of cellulose (wood, linters etc) have to undergo different treatments prior to nitration, to remove impurities and bring the cellulose to the correct specification. One company (Tembec) highlighted that for them the cellulose supply for nitrocellulose was 150KT/annum which represented only 0.05% of global demand for cellulose. Speciality cellulose demand is 1.5MT/annum of which NC is only 10% (150KT/annum).

STANAG 4178 was discussed mainly due to an imminent change to the US MIL-DTL-244B for nitrocellulose therefore STANAG 4178 (Ed 2) would no longer be aligned. The test procedures to be removed from the US specification include ionic impurities, molecular mass distribution and fibre length. Further work would have to be done to bring the two standards in-line if the NATO community agreed with the US changes. The nitrocellulose community acknowledges this requirement but a consensus must be generated with the NATO community.

New methods for determination of nitrating acid composition and nitrocellulose nitrogen percentage (N%) using near infrared (NIR) spectroscopy was presented by several companies (Rheinmetall Nitrochemie, Büchi, Manuco; developed separately). In both cases accuracy of the original methods, e.g. Ferrous Ion Titration, and the time to carry out analysis were cited as reasons for developing new methods.
There were calls for its inclusion into the next STANAG revision. Nations will need to be fully aware of Chemometrics in order to use and understand the technique and the large number of samples (150+) required to calibrate the NIR against a primary reference (e.g. acid titration). Once calibrated and the software understands the effect of all variables (temperature, concentration, operator) the reported reproducibility and accuracy was high.

A promising new stabiliser, referred to as Stab-5, was presented by FOI that passed STANAG 4178 (Heat Flow Calorimetry). It exhibited good stabilising effects and plasticisation with nitrocellulose at <1 wt%. The work was still in its infancy and the community were keen to know more about the percentage of Stab-5 consumed within the ageing experiments and effect on the residual molecular weight distribution of the nitrocellulose.

Also of interest will be to determine whether the by-products of the stabiliser are less toxic than the nitrosamines of diphenylamine. The chemical structure and systematic name is shown here.



Stab-5: *1,1'-{1,2-Ethanediylbis (oxy-2, 1-ethanediyloxy)} bis(2,6-dimethoxybenzene)*

AWE discussed briefly their accident with nitrocellulose that occurred during the manufacture of a nitrocellulose lacquer (into butanone). This incident should be a reminder and a warning to the community that dry nitrocellulose has the capacity to hold a charge. Grounding or moving the charged nitrocellulose through solvent vapour can cause a discharge leading to ignition of the solvent.

Overall the workshop was a good success bringing together old and new researchers, manufactures, industry and academia and allowing fruitful discussions in a product that is still required and yet still not fully understood. The provisional location for next year's meeting (2015) was Canada. Further information and confirmation of dates and location will be disseminated via the nitrocellulose working group.

Dr Matthew R. Andrews

INDUSTRY & TECHNOLOGY PRESS REVIEW

If you have information that you consider of relevance to this section, please do not hesitate to contact ***Manfred Becker*** *at MSIAC m.becker@msiac.nato.int.*

This issue of Science, Technology and Procurement covers the spectrum of breaking news. Through this season, a number of conventions, conferences, trade and air shows will be hosted. MSIAC had the opportunity to attend Eurosatory 2014. 1,504 exhibitors from 58 countries showed off their wares in an exhibition area of over 43 acres! Impressive in scope, capabilities, technologies and international presence. In addition to new contracts, this season also announced a number of new business arrangements and joint ventures, including Saabs' acquisition of ThyssenKrupp Marine Systems and the German / French alliance planned by Nexter and Krauss-Maffei Wegmann (KMW).

For more on Industry & Technology, use this hyperlink .

WELCOME TO TRAINEES JULIEN HUEBER & FLORIAN AUDIGIER!

MSIAC is happy to welcome 2 French students from post-graduate state engineering school ENSTA Bretagne, based in Brest (France), which belongs to the DGA (Direction Générale de l'Armement).
The school gathers military and civilian students from all parts of France, upon results on a national entrance examination. Military students are intended to become IETA (national engineers for armament). Julien and Florian are in the 2nd year of engineering classes and at the end of the 3rd year, they will graduate with a Master degree of Engineering diploma in Mechanics, with specialty in Detonics. They are attending an 8-week internship within the MSIAC division, of which the main field of expertise perfectly matches their specialty.

Florian Audigier will work on HD 1.3 materials:

Florian's contribution to the MSIAC division will be to develop a semi-empirical model and guidance to help determine safe storage quantities for HD 1.3 materials. These materials include propellants, powders, and some categories of ammunition. They have demonstrated, under certain storage configurations, responses far more violent than expected for HD 1.3, as they behaved like high -explosive HD 1.1 materials (see Cyprus incident in July 2011).

Working with the latest experimental data derived from burning of HD 1.3 materials in experiments, the goal will be to identify the main parameters from storage conditions (e.g. storage structure, loading density, packaging configurations, storage layout, package shape and volume) that may influence the behavior of such materials. Then, the development of a methodology to assess their relative influence will be undertaken with the assistance of international experts from MSIAC, and could result in a recommendation on storage policy.

Julien Hueber will work on a catalogue of environmental testing facilities:

Each ammunition needs to comply with the NATO specifications. Specifications mean criteria of performance but, at the same time, robustness to the environment. During their life cycle, ammunitions might be exposed to more or less severe environments. For instance, high temperatures, dust, salt, vibrations, shocks or electromagnetic aggressions could damage the munition or worse, trigger elements of the pyrotechnical chain. This would result in an unfortunate malfunction. Therefore, in order to qualify munitions against these environments, many tests ought to be performed. Julien will review the STANAGs to identify all the environmental tests and their specificities. He will then contact the test facilities to obtain a comprehensive description of their capabilities, in accordance with a relevant analysis of the external stimulus. The main objective is to create a catalogue of facilities able to perform environmental tests on munitions.

If you are interested in these 2 topics and/or would like to contribute, please feel free to contact:

Emmanuel Schultz (e.schultz@msiac.nato.int).

AC/326 Workshop - AOP 39 IM Response Descriptors

A workshop is being planned to review the IM Response Descriptors within AOP 39. Originally planned for late 2014, other NATO meetings have made this unachievable and the workshop is now being rescheduled for early 2015. Dates will be promulgated separately and in the next MSIAC Newsletter.

If you have an interest in attending this Workshop, this can be registered with MSIAC (m.pope@msiac.nato.int) on behalf of the Custodian and you will be contacted directly with the workshop details.

Good To Know That…

The cooperative Demonstrations of Technology (CDT) on Integrated Health Management of Munitions (AVT-212) will take place on October 15th and 16th on the press area of NATO HQ.

To attend, please register online before the 12th September. Register as a guest, preferably for the session on the afternoon of the Thursday 16th.

Enrolment for the AVT Fall 2014 Panel Meeting Week is now open on the CSO website www.cso.nato.int

Once you have accessed the home page, please scroll down the page to Upcoming STO Events and select Cooperative Demonstrations of Technology (CDT) - Application of Integrated Munition Health Management (IMHM): Developing Methodologies for Implementation
Once you have opened the enrolment page – you have two options to enroll either USER LOGON (and if you have a password and login you can use this option)
OR
please select the option – I do not have a login/password and follow the instructions.

Once you have finished your enrolment – your request will be automatically sent to your National Coordinator who can approve your attendance which will generate the mailing of the General Information Package (GIP).

And That…

The 23rd International Symposium on Military Aspects of Blast and Shock (MABS 23) will be held at Pembroke College in Oxford, UK from 7-12 September 2014.

Scientists, engineers, consultants and others who are interested in or work in the fields of blast and shock wave research and associated thermal effects are invited to contribute to and participate in MABS Symposia.

The MABS Symposia are held every second year in one of the representative countries with a MABS Executive Committee (Canada, France, Germany, Israel, The Netherlands, Norway, Sweden, Switzerland, UK, and USA). All symposium presentations are unclassified and may be oral or poster presentations.

In addition to a customary half-day excursion and a Gala Dinner for all participants and accompanying persons, a comprehensive Accompanying Persons' Programme will be available.

For further information click here:
http://www.cranfield.ac.uk/about/events/listings/events-2013/cds-events/mabs.html

Latest Publications

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

Open Publications

O-156 **AIMS: Advanced Insensitive Munitions Search**

Click here to find other Publications in the Technical Reports section on our website.

You can access all Reported Accidents via this hyperlink.
(Re-printed on our Website with permission of ility engineering)

You can find the Latest Patents of Interest on our MSIAC Website via this hyperlink .

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

IMEMTS

Insentive Munitions & Energetic Materials Technology Symposium

18-21 May 2015 - Rome, Italy

NDIA MSIAC IMEMG MURAT

CALL FOR PAPERS

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

ANNOUNCEMENT

The Insensitive Munitions European Manufacturers Group (IMEMG), the US National Defence Industrial Association (NDIA) and the Munitions Safety Information and Analysis Centre (MSIAC), are sponsoring a joint industry/government symposium on Insensitive Munitions (IM) and Energetic Materials (EM) at the Sheraton Roma hotel and conference centre in Rome, Italy on 18 – 21 May 2015. The theme is IM&EM: Real Warfighter Advantage and Cost-Effective Solutions Throughout the Lifecycle.

New IM & EM technologies are finding increasing application to meet warfighter requirements in a variety of challenging in service environments. This symposium will address innovative IM and EM solutions being developed for deployment through all stages of the lifecycle. The 2015 IM and EM Technology Symposium is a major international forum for exchange and dissemination of information on the latest IM and EM advances. 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.

SYMPOSIUM

This UNCLASSIFIED Program will feature presentations of technical papers that provide an overview of the technology advances from multiple national and international government services and agencies, private industry and academia. We are interested in papers related to technologies and approaches for development, implementation and fielding of EM and IM solutions. Acceptable papers will include aspects of technology related to explosives, gun or rocket propellants and their application to weapon systems.

ABSTRACTS

Individuals desiring to present a paper are required to submit a 250-300 word abstract no later than 30 September 2014. Please file your UNCLASSIFIED abstract on-line at the following web link and complete ALL required information:

http://application.ndia.org/abstracts/5550

The site is currently open and will close for further submissions at 21:00 GMT (23:00 West Europe / 5pm US EST) on 30 September 2014. Abstracts will ONLY be accepted through the above site. Receipts of abstracts will be confirmed electronically and the appropriate web site information will accompany the author notifications.

PAPER TOPICS

- National & international experience with fielded IM technologies.
- International standardization and harmonisation developments – interoperability issues
- National IM & EM programmes and policies overviews
- New and insensitive explosives, propellants and pyrotechnics – formulation, processing, properties, performance
- Novel energetic materials solutions: nano materials, reactive materials, enhanced blast, oxidizers, high density, …
- Applications and implementation of IM technologies – system design and integration: mitigation, packaging, initiation
- Application of less sensitive energetics and formulations in munitions
- Threat Hazard Analysis methodology.
- Sensitivity and performance testing for IM systems and EM materials
- Applied IM modelling, verification and validation
- Whole life assessment and ageing of Insensitive Munitions
- EM Health, Safety and Environmental issues - obsolescence and replacement strategies
- Logistic and storage benefits from IM introduction
- Novel Processing techniques and manufacturing challenges within the IM/EM industrial base

OTHER REQUIREMENTS FOR PAPERS/ PRESENTATIONS

Oral presentations will be limited to 15 minutes plus 5 minutes for questions. This symposium will feature an international audience. Abstracts, papers and presentations must be UNCLASSIFIED and CLEARED FOR PUBLIC RELEASE. Full, unclassified written papers, cleared for public release, are required in order to present at the symposium. Papers not submitted by 30 April, 2015 are subject to withdrawal from the program.

Acceptable formats are MS Word or Adobe Acrobat (pdf).

AUDIO VISUAL REQUIREMENTS

Appropriate computer and LCD projector support will be provided. Presentations must be created in MS PowerPoint.

SPONSORSHIP OPPORTUNITIES

Please contact Fabio SGARZI, IMEMG VP for Italy, at alessandra.carraresi@rheinmetall.com or +39 030 90 43 420 for more information about becoming a sponsor for this event.

GENERAL INFORMATION

Event Dates:	18-21 May, 2015
Location:	Sheraton Roma Hotel and Conference Centre, Rome, Italy
Meeting information :	www.imemts2015.com

Schedule

Deadline for Abstracts	Tuesday 30 September, 2014
Authors Notified	Friday 31 October, 2014
Program Agenda Released	Thursday 15 January, 2014
Final Presentations due to IMEMG	Thursday 30 April, 2015