

Preparing advanced energetic materials & insensitive munitions for high intensity warfare

EMTWG'24

[Formerly IMEMTS]

13-16 May 2024 - Oslo, Norway

Energetic Materials Technology Working Group

IMEMG



MSIAC

AGENDA

MONDAY 13th May 2024

16:00 - 20:00	On-site Registration <i>Mingle area</i>
18:00 - 20:00	Welcome Reception Roof Top Calmeyers Hage -13th floor <i>Sponsored by KNDS Ammo France</i>

TUESDAY 14th May 2024

07:00 - 08:30	Continental Breakfast Restaurant Late On-Site Registration <i>Mingle area</i>
08:00 - 08:15	PLENARY SESSION I Loïc Minguet, IMEMG President - France <i>Hyde Park ABC & Central Park AB</i>
08:15 - 08:30	Welcome Address & Intro - Mr Vegard Sande , President of NAMMO Raufoss AS / EVP Large Caliber Systems
08:30 - 09:00	Keynote Address #1/ Mr Anthony Di Stasio , Director of the Manufacturing, Capability Expansion, and Investment Prioritization Directorate (McEip), OUSD A&S - <i>The New Industrial Base Policy Office and McEip Investment Strategy</i>
09:00 - 09:30	Keynote Address #2/ ICA (Col.) Serge Bordachar , Delegated Chief Inspector for Propellants and Explosives, DGA, FRA/ MoD - <i>What level of safety for our munitions in a wartime economy context ?</i>
09:30 - 10:00	Highlights and Future Priorities Ms Christelle Collet, Technical Special Officer / Propulsion Technology - MSIAC
10:00 - 10:30	Networking Coffee Break <i>Mingle area</i> <i>Sponsored by Bofors Test Center</i>

Session 2A - IM Policy & Requirements

Jesus O. Mares Jr, US AirForce, AFMC AFRL/RWTEC
Hervé Bénard, DGA/IPE, France
Hyde Park AB

10:30 - 10:50	<i>Status on implementation of IM-policy in the Norwegian defence sector</i> Mr Hans Øiom, FMA, Norway 24010
10:50 - 11:10	<i>NATO IM Portfolio Update w/ Focus on IM-HC Harmonization</i> Mr Daniel J. Pudlak, US ARMY, DEVCOM AC, Armaments Center, USA 24069
11:10 - 11:30	<i>IM Industry Contribution: How to benefit from IM munitions during manufacturing and storage phases.</i> Ms Carole Fournier, IMEMG 24113
11:30 - 11:50	<i>Cost and Benefit Analysis: a necessary approach to support massive ammunition resupply in current geopolitical context</i> Mr Rémi Boulanger, IMEMG 24035

Session 2B - Propellants: Formulations & Performance

Paul Braithwaite, Northrop Grumman, USA
Eirik André Løkke, NAMMO Raufoss AS, Norway
Central Park AB

<i>Improved performance of LOVA-propellants with maintained production safety</i> Mr Erik Tunestål, Eurenco Bofors 24024
<i>Partial Burn Testing of New High Energy Extruded Double Base Rocket Propellants and Associated Self-Extinguishment Properties</i> Mr Joseph O. Bellotte, BAE Systems, Ordnance Systems Inc. USA 24025
<i>Ageing Characteristics of Solid Composite Propellants</i> Mr Eirik Østbye Pedersen, NAMMO Raufoss AS, Norway 24031
<i>Solid Fuel Ramjet Technology at Nammo Raufoss AS</i> Ms Camilla Alm, NAMMO Raufoss AS, Norway 24032

12:00 - 13:30 Sit-down Lunch **Restaurant**
Sponsored by Chemring Nobel

Session 3A - IM Test Methodology I

Tom Swierk, Hart Technologies, USA
Jon Toreheim, Bofors Test Center, Sweden
Hyde Park AB

13:30 - 13:50	<i>AOP-4240 FCO test: Feedback from Euro industry</i> Mr Alessandro Liberatore, Gruppo Esea, Italy 24039
13:50 - 14:10	<i>Heat flux measurements with CALIFLUX in Fast Heating tests</i> Ms Marie De Bats / Mr Frédéric Saulnier, IMEMG 24076
14:10 - 14:30	<i>Guidance on Temperature and Heat Flux Measurement Techniques Used in IM and HC Testing</i> Ms Christelle Collet, MSIAC 24079
14:30 - 14:50	<i>Slow heating: First lessons learnt from heating rate standard test change on composite RM response.</i> Mr Laurent Bonhomme, ROXEL France 24056

Session 3B - EM Processing

Tomislav Kosta, US Air Force, RWTEC, USA
Gert Scholtes, TNO, The Netherlands
Central Park AB

<i>Qualification of Energetic Materials with Advanced Manufacturing Methods.</i> Mr Matt Paesch, Energetics Technology Center, Indian Head, USA 24064
<i>Advancements in ResonantAcoustic® Continuous Flow Technology for Surrogate Energetic Material Synthesis and Crystallization</i> Mr Joseph Mayne, Resodyn Corporation, USA 24003
<i>Assessment of RAM technology applied to TDW cast cured formulations</i> Mr Quirin Axthammer, TDW, Germany 24118
<i>CL-20 in the Beginning: Perspectives from Eyewitnesses to the Early Days</i> Mr Bob Wardle, ETC & Wardle Enterprises, Energetics, Services & Technology, USA 24112

14h50 - 15:20	Networking Coffee Break Mingle area Sponsored by VJ Technologies																				
	<table border="1"> <tr> <td style="background-color: #f4a460;">4A - IM Test Methodology II</td> <td style="background-color: #002060; color: white;">Ken Graham, Judson Consulting Service, USA Gianluca Bersano, Leonardo, Italy Hyde Park AB</td> </tr> <tr> <td>15:20 - 15:40</td> <td><i>Novel Rocket Motor Impact Threat Protection</i> Mr Dan Turner, ROXEL UK Ltd, UK 24098</td> </tr> <tr> <td>15:40 - 16:00</td> <td><i>IM Industry Contribution: Review of Recent Modifications and Type V Criterion required for both Slow Cook-Off and Fragment Impact Tests</i> Ms Carole Fournier, IMEMG 24110</td> </tr> <tr> <td>16:00 - 16:20</td> <td><i>Successful Transition of Insensitive Munitions Technologies to LAW FFE</i> Mr Daniel J. Pudlak, US ARMY, DEVCOM Armaments Center, USA 24068</td> </tr> <tr> <td>16:20 - 16:40</td> <td><i>A Review of the Likelihood of Bullets Impacts on Munitions During Domestic Transport</i> Dr Brian E. Fuchs, US ARMY, DEVCOM Armaments Center, USA 24062</td> </tr> </table> <table border="1"> <tr> <td style="background-color: #f4a460;">4B - EM Formulations & Synthesis I</td> <td style="background-color: #002060; color: white;">Phil Samuels, US ARMY, DEVCOM AC, USA Phil Gill, ROXEL UK Ltd, UK Central Park AB</td> </tr> <tr> <td></td> <td><i>Continuous crystallization of energetic materials using continuous oscillatory baffled crystalliser</i> Mr Ruairaidh Wells, NiTech Solutions Ltd, UK 24007</td> </tr> <tr> <td></td> <td><i>Use of soluble desensitizer to pilot terminal performance and IM response for a TNT based melt-cast composition</i> Mr Teddy Gilloux, THALES LAS, France 24015</td> </tr> <tr> <td></td> <td><i>A rocky road toward a suitable TNT replacement</i> Mr Arthur Delage, Eurencos, France 24023</td> </tr> <tr> <td></td> <td><i>Optimized Lab and Pilot Scale Synthesis of 2,4-Dinitroanisole (DNAN) from Anisole</i> Mr Tomasz Modzelewski, BAE Systems, USA 24049</td> </tr> </table>	4A - IM Test Methodology II	Ken Graham , Judson Consulting Service, USA Gianluca Bersano , Leonardo, Italy Hyde Park AB	15:20 - 15:40	<i>Novel Rocket Motor Impact Threat Protection</i> Mr Dan Turner, ROXEL UK Ltd, UK 24098	15:40 - 16:00	<i>IM Industry Contribution: Review of Recent Modifications and Type V Criterion required for both Slow Cook-Off and Fragment Impact Tests</i> Ms Carole Fournier, IMEMG 24110	16:00 - 16:20	<i>Successful Transition of Insensitive Munitions Technologies to LAW FFE</i> Mr Daniel J. Pudlak, US ARMY, DEVCOM Armaments Center, USA 24068	16:20 - 16:40	<i>A Review of the Likelihood of Bullets Impacts on Munitions During Domestic Transport</i> Dr Brian E. Fuchs, US ARMY, DEVCOM Armaments Center, USA 24062	4B - EM Formulations & Synthesis I	Phil Samuels , US ARMY, DEVCOM AC, USA Phil Gill , ROXEL UK Ltd, UK Central Park AB		<i>Continuous crystallization of energetic materials using continuous oscillatory baffled crystalliser</i> Mr Ruairaidh Wells, NiTech Solutions Ltd, UK 24007		<i>Use of soluble desensitizer to pilot terminal performance and IM response for a TNT based melt-cast composition</i> Mr Teddy Gilloux, THALES LAS, France 24015		<i>A rocky road toward a suitable TNT replacement</i> Mr Arthur Delage, Eurencos, France 24023		<i>Optimized Lab and Pilot Scale Synthesis of 2,4-Dinitroanisole (DNAN) from Anisole</i> Mr Tomasz Modzelewski, BAE Systems, USA 24049
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WEDNESDAY 15th May 2024

08:00 - 08:15	PLENARY SESSION II Christelle Collet, NATO MSIAC Hyde Park ABC & Central Park AB
08:15 - 08:45	Keynote Address #3/ Ms Holly Pennington , Weapons Technical Service Team Leader /DE&S, UK - <i>Preparing for High Intensity Warfare through Collaboration and Standardisation</i>
08:45 - 09:15	Keynote Address #4/ Dr Chris Michienzi , MMR Defense Solutions, LLC, USA - <i>EM in DOD Systems: Transition, Production & Availability</i>
09:15 - 09:35	Discussion point/ Mr Christopher Zember , Office of the Assistant Secretary of Defense for Industrial Base Policy, U.S. DOD <i>Expanding Industrial Base Capacity for Munitions Manufacturing -24104</i>
09:35 - 10:00	MSIAC – Munitions Safety Awards
10:00 - 10:30	Networking Coffee Break Mingle area Sponsored by EMTWG'24

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12:00 - 13:30	POSTERS SESSION Sponsored by SAAB Dynamics
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Poster session A: Insensitive Munitions	Jon Toreheim , Bofors Test Center, Sweden Christelle Collet , TSO, NATO MSIAC Frognerparken room
	<i>Drop test: Model of rocket Motor ignition probability</i> Mr Johan Herault, ROXEL France 24097
	<i>Improved testing capabilities for characterization of carbon composite materials</i> Mr Vincent Vilamosa, NAMMO Raufoss AS, Norway 24037
Poster session B: Energetic Materials	Wendy Hummers , Hanwha Defense USA, Inc. Kathleen Bubniak , US ARMY, DEVCOM AC, USA Ueno Area
	<i>Best Practice for the Development and Manufacture of Energetic Materials</i> Mr Lawrence C Farrar, Resodyn Acoustic® Mixers, USA 24022
	<i>Combustion and mechanical properties of co(glycidyl nitrate-glycidyl azide) polymer energetic binders</i> Mr Charles Dubois, Polytechnique Montréal, Canada 24102

Representation of RDX Thermal Response for Use in Digital IM Engineering Tools
Mr Keith Clutter, Science & Risk (SciRisk).USA 24047

Employing New Technologies & Methods for IM-Testing at the WTD 91
Mr Philipp Hamhuis, Technical Center WTD 91, Bundeswehr, Germany 24106

A numerical and experimental study of output of M55 and M100 igniters
Mr John Moxnes, Norwegian Defence Research Establishment, Norway 24122

Successful Insensitive Munitions Technology Development, Demonstration, Integration & Transition
Mr Daniel J. Pudlak, US ARMY, DEVCOM Armaments Center, USA 24123

Energetic Materials for cutting-edge nanotechnology
Mr Yash, Beacon Industries Inc. USA 24054

Characterization of HVRB Model of ERA Explosive by Gap Tests and Correlation with 20mm FSP Tests
Mr Tuğçe Tekin Başer, Roketsan, Türkiye 24115

Qualification of Australian Munitions Composition B
Mr Philip Samuels, US ARMY, DEVCOM Armaments Center, USA 24030

Inherently Safer continuous Nitration's at large scale
Mr Marc Winter, CORNING Inc. France 24125

13:30	Sessions adjourn
13:30 - 15:00	Sit-down Lunch Restaurant sponsored by MBDA
15:00 - 16:00	Free time
16:00 - 18:00	Fjords Cruise

THURSDAY 16th May 2024

Session 7A - IM Modelling

Nausheen Al-Shehab, US ARMY, DEVCOM AC, USA
Yves Guengant, ArianeGroup, France
Hyde Park AB

08:00 - 08:20	<i>Simulating the Nammo 155 mm Artillery Projectile Sympathetic Reaction with IMPETUS Solver</i> Mr Lars Olovsson, IMPETUS Afea, Norway 24021
08:20 - 08:40	<i>A model to determine the response of munitions for lower order reactions</i> Mr Gert Scholtes, TNO, The Netherlands 24027
08:40 - 09:00	<i>Modeling and simulation of Cook-Off scenarios of DEM-based three-dimensional propellant beds in cased munitions</i> Mr Daniel Tomaszewski, Fraunhofer Institute for Chemical Technology, ICT Germany 24059
09:00 - 09:20	<i>Demonstrating munitions insensitivity through simulation: the IMEMG compendium dedicated to cook-off scenarios</i> Mr Didier Picart, IMEMG 24074

session 7B - EM Qualification & Technology

Stephen Struck, US Air Force, AFMC AFRL, USA
Stefan De Koster, TNO, The Netherlands
Central Park AB

	<i>Large Scale Production and Material Qualification of a Less Sensitive PBXN-9 Variant</i> Mr Virgil Fung, BAE Systems, USA 24053
	<i>Status of NATO Energetic Material Qualification Requirements</i> Mr Philip Samuels, US ARMY, DEVCOM Armaments Center, USA 24006
	<i>A Method to Extend the Qualification of a PBXN-109 loaded Aircraft Bomb using an Inert Surrogate Material</i> Ms Carole Fournier, Eurenco, France 24094
	<i>Pilot Scale Evaluation of Modified 3,4-Dinitropyrazole (DNP) Synthesis Process</i> Mr Tomasz Modzelewski, BAE Systems, USA 24051

09:20 - 09:50	Networking Coffee Break Mingle area Sponsored by IMPETUS
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Session 8A - IM Mitigation & Testing

Dr David Hubble, NSWC Dahlgren Division, USA
Gareth Flegg, AWE Plc, UK
Hyde Park AB

09:50 - 10:10	<i>M Tests on Vulcano Guided ammunitions</i> Mr. Gianluca Bersano, Leonardo, Italy 24026
10:10 - 10:30	<i>Mitigation of sympathetic detonation of navy munitions</i> Mr Stefan De Koster, TNO, The Netherlands 24082
10:30 - 10:50	<i>Higher Lethality Medium Caliber Munition Classification and Criticality</i> Ms Nausheen Al-Shehab, US ARMY, DEVCOM Armaments Center, USA 24101

Session 8B - EM Formulations & Synthesis II

Dr Paritosh Dave, Leidos, USA
Erik Tunestål, Eurenco, Sweden
Central Parl AB

	<i>New low cost melt-cast composition for IM mortar ammunition - Theoretical approach to experimental aspect</i> Mr Teddy Gilloux, THALES LAS, France 24016
	<i>Characterization and evaluation of alternative plasticizers to mitigate exudation from pressed PBX</i> Mr Quirin Axthammer, TDW, Germany & MSIAC 24117
	<i>SHS Synthesis of Micrometer-sized boron particles with increased surface area and higher reactivity for energetic applications</i> Dr.-Ing. Sebastian Wurster, Fraunhofer Institute for Chemical Technology, ICT Germany 24072

11h30 - 13:00	Sit-down lunch Restaurant Sponsored by IMEMG
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Session 9A - IM System Technology

Joe LiVolsi, NOSSA, USA
Quirin Axthammer, TDW, Germany
Hyde Park AB

13:00 - 13:20	<i>Advantages of Modular Development for Electronic Initiation Systems</i> Mr Lars Christian Lund, NAMMO Raufoss AS, Norway 24040
13:20 - 13:40	<i>Shock initiation of explosives using a plane wave booster driven flyer plate</i> Ms Anne Haslam, NSWC, Indian Head, USA 24060

Session 9B - EM Lab-scale Testing

Melissa Mileham, Northrop Grumman, USA
Marie De Bats, MBDA France, Central Park AB

	<i>Energetic Defect Characterization (EDC) - A Multi-Disciplined, Multi-Faceted, US Joint-Service Approach for Identifying & Determining Defect Criticality for specific Munitions and their Respective Energetics</i> Mr Daniel J. Pudlak, US ARMY, DEVCOM Armaments Center USA 24071
	<i>Feature Extraction using Machine Learning for Defect Characterization</i> Mr Benjamin L. Ung, US ARMY, DEVCOM Armaments Center, USA 24038

13:40 - 14:00	<p><i>Slow Cook-Off Soak Temperature Effect on Munition Response</i> Ms Nausheen Al-Shehab, US ARMY, DEVCOM Armaments Center, USA 24065</p>	<p><i>Characterization of the Impact-Induced Reaction of Multiple Explosives Using the AFRL High Explosive Survivability Test (HEST)</i> Dr Jesus Mares Jr., US Air Force Research Laboratory, USA 24099</p>
14:00 - 14:20	<p><i>AFRL Advanced Munitions Technology Complex</i> Dr Jacob Morris, US Air Force Research Laboratory, USA 24100</p>	<p><i>Utilization of the Focus Beam Reflectance Measurement (FBRM) Probe in Explosive Processing</i> Mr Kyle J. Ramos, Los Alamos National Laboratory, USA 24066</p>
14:30 - 14:50	<p><i>Networking Coffee Break Mingle area</i> Sponsored by EMTWG'24</p>	
	<p>10A - IM Modelling & Materials</p> <p>Mike Ervin, BAE Systems Inc. USA Didier Picart, CEA France, Hyde Park AB</p>	<p>10B - EM Subscale Testing</p> <p>Kathryn Brown, NSWC, Indian Head, USA Philipp Hamhuis, WTD 91, Germany Central Park AB</p>
14:50 - 15:10	<p>24105- An innovative methodology to predict reaction of complex warhead to fragment impacts Mr Karol Woirin, MBDA France 24105</p>	<p><i>Subscale testing of nanocomposite-modified solid fuels & propellants</i> Mr Michael Fisher, Helicon Chemical Company, USA 24002</p>
15:10 - 15:30	<p><i>Void collapse-initiated deflagration: Progress towards predictive modeling for risk evaluation PT. 2</i> Mr Brandon L. Johnson, Applied Research Associates, Inc., USA 24114</p>	<p><i>Sensitivity Testing of Propellants in a Small-scale Experiment</i> Mr Claudius Zimmermann, Fraunhofer Institute for Chemical Technology, ICT Germany 24057</p>
15:30 - 15:50	<p><i>Small Scale Impact Sensitivity Testing of Energetic Materials under Temperature and Relative Humidity</i> Ms Christelle Collet, MSIAC 24078</p>	<p><i>Thermal Radiation in Interior Ballistics and Closed Bomb Testing</i> Dr Jon Yagla, Consultant 24080</p>
16:00	<p>Sessions adjourn</p>	
16:00 - 16:30	<p>Best Poster Award Mingle Area</p>	
16:30 - 18:00	<p><i>Farewell Reception</i> Sponsored by NAC Address by Wendy Hummers, NAC Board Member, chair of the EMTWG Steering Committee, -Hanwha Defense USA-</p>	
18:00	<p>Meeting concludes</p>	