

AT THE HEART  
OF THE MISSION

**NDIA**



# 62<sup>ND</sup> ANNUAL **FUZE** CONFERENCE

Fuzing Innovations for Tomorrow's Weapons

May 13 – 15, 2019 | Buffalo, NY | [NDIA.org/Fuze19](http://NDIA.org/Fuze19)

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## WHO WE ARE

The National Defense Industrial Association is the trusted leader in defense and national security associations. As a 501(c)(3) corporate and individual membership association, NDIA engages thoughtful and innovative leaders to exchange ideas, information, and capabilities that lead to the development of the best policies, practices, products, and technologies to ensure the safety and security of our nation. NDIA's membership embodies the full spectrum of corporate, government, academic, and individual stakeholders who form a vigorous, responsive, and collaborative community in support of defense and national security. NDIA is proud to celebrate 100 years in support of our warfighters and national security. The technology used by today's modern warfighter was unimaginable 100 years ago. In 1919, BG Benedict Crowell's vision of a collaborative team working at the intersection of science, industry, government and defense began what was to become the National Defense Industrial Association. For the past century, NDIA and its predecessor organizations have been at the heart of the mission by dedicating their time, expertise and energy to ensuring our warfighters have the best training, equipment and support. For more information visit [NDIA.org](http://NDIA.org)



# FUZE MUNITIONS

## WHO WE ARE

The purpose of the Fuze Section shall be to promote an open exchange of technical information among government and industry technical personnel, and to identify and address changes in standards, guidance, policy, and organizational functions that impact the development, production, and performance of fuzes.

## LEADERSHIP

**Roy Streetz**

Fuze Committee Chair

**Thomas Harward**

Fuze Committee Vice Chair

**Nassir Alaboud**

Fuze Committee Secretary

# WELCOME TO THE 62<sup>ND</sup> ANNUAL FUZE CONFERENCE

On behalf of the NDIA Fuze Conference Steering Committee Members and the NDIA, I would like to welcome you to the 62<sup>nd</sup> Annual NDIA Fuze Conference. This international conference brings together the work of the top professionals in the fuzing industry from government, private industry, and academia; and provides an opportunity for the exchange of the latest research and development on fuzing, with the common goals of improving safety, capability, and reliability for our warfighters. While the

history of fuzing dates back several hundred years, and the advances in technology have been significant over that time, new challenges continue to emerge. Through the ongoing passionate work of the authors, presenters, sponsors, and attendees at this conference and across our worldwide defense industry, these challenges will be overcome, resulting in safer, more reliable fuzes being fielded to our warfighters.

**Roy Streetz**

*Chair*  
NDIA Fuze Committee

*Vice President Advanced Electronic Systems*  
Excelitas Technologies Corporation

## SCHEDULE AT A GLANCE

**MONDAY, MAY 13**

**Registration & Opening Reception**  
5:00 – 6:00 pm

**Networking Lunch**  
12:00 – 1:00 pm

**Concurrent Breakout Sessions**  
8:00 – 10:00 am

**TUESDAY, MAY 14**

**Registration**  
7:00 am – 5:00 pm

**Concurrent Breakout Sessions**  
1:00 – 3:00 pm

**Networking Break**  
10:00 – 10:20 am

**Networking Continental Breakfast**  
7:00 – 8:00 am

**Networking Break**  
3:00 – 3:20 pm

**Concurrent Breakout Sessions**  
10:20 am – 12:00 pm

**Welcome & Keynote Speaker**  
8:00 – 8:45 am

**Concurrent Breakout Sessions**  
3:20 – 5:00 pm

**Networking Lunch**  
12:00 – 1:00 pm

**General Session**  
8:45 – 11:45 am

**Grand Reception**  
Big Ditch Brewing Company  
5:30 – 7:00 pm

**Concurrent Breakout Sessions**  
1:00 – 3:00 pm

**Networking Break**  
10:00 – 10:30 am

**WEDNESDAY, MAY 15**

**Registration**  
7:00 am – 4:20 pm

**Networking Break**  
3:00 – 3:20 pm

**Harry Diamond Fuzing Excellence Award Presentation**  
11:45 am – 12:00 pm

**Networking Continental Breakfast**  
7:00 – 8:00 am

**Concurrent Breakout Sessions**  
3:20 – 4:20 pm

**THURSDAY, MAY 16**

**Tour of PCB Piezotronics, Inc.**  
PCB Piezotronics Headquarters  
8:30 – 10:30 am

# EVENT INFORMATION

## LOCATION

Hyatt Regency Buffalo Hotel  
Two Fountain Plaza  
Buffalo, NY 14202

Big Ditch Brewing Company  
55 E Huron St  
Buffalo, NY 14203

PCB Piezotronics, Inc.  
3425 Walden Avenue  
Depew, NY 14043

## EVENT WEBSITE

NDIA.org/Fuze19

## EVENT THEME

Fuzing Innovations for Tomorrow's Weapons

## WIFI

Network: Hyatt Meeting  
Password: NDIA

## INTERACTIVE KIOSK

We invite attendees to learn about NDIA's 100 year history through an interactive touchscreen.

## ATTIRE

Civilian: Business casual  
Military: Uniform of the day

## SURVEY AND PARTICIPANT LIST

You'll receive via email a survey and list of attendees (name and organization) after the conference. Please complete the survey, which helps make our event even more successful in the future.

## EVENT CONTACT

### General Event

**Reneé Despot**  
Manager, Meetings  
(703) 247-2599  
rdespot@ndia.org

### Agenda

**Loey Bleich**  
Program Manager  
(703) 247-2575  
lbleich@ndia.org

## PLANNING COMMITTEE

**Roy Streetz**  
Committee Chair

**Nassir Alaboud**  
**Ray Ash**  
**Ed Cooper**  
**Chris DeWitt**

**Mark Etheridge**  
**Frank Fairchild**  
**Lawrence Fan**  
**Doug Harms**  
**Thomas Harward**  
**Robert Hertlein**  
**Ken Kelly**

**Bill Kurtz**  
**Homesh Lalbahadur**  
**David Lawson**  
**Byron Lee**  
**Jim Lemister**  
**Telly Manolatos**  
**Bob Metz**

**Barry Neyer**  
**Eric Roach**  
**Perry Salyers**  
**James Sharp**  
**Don Shutt**  
**Martin Tanenhaus**

## SPEAKER GIFTS

In lieu of speaker gifts, a donation is being made to the Fisher House Foundation.

## HARASSMENT STATEMENT

NDIA is committed to providing a professional environment free from physical, psychological and verbal harassment. NDIA will not tolerate harassment of any kind, including but not limited to harassment based on ethnicity, religion, disability, physical appearance, gender, or sexual orientation. This policy applies to all participants and attendees at NDIA conferences, meetings and events. Harassment includes offensive gestures and verbal comments, deliberate intimidation, stalking, following, inappropriate photography and recording, sustained disruption of talks or other events, inappropriate physical contact, and unwelcome attention. Participants requested to cease harassing behavior are expected to comply immediately, and failure will serve as grounds for revoking access to the NDIA event.

## MONDAY, MAY 13

5:00 – 6:00 pm

**REGISTRATION**  
GRAND BALLROOM FOYER

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Defense Electronic Systems

5:00 – 6:00 pm

**NETWORKING OPENING RECEPTION**  
GRAND BALLROOM FOYER

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Defense Electronic Systems

## TUESDAY, MAY 14

7:00 am – 5:00 pm

**REGISTRATION**  
GRAND BALLROOM FOYER

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Defense Electronic Systems

7:00 – 8:00 am

**NETWORKING CONTINENTAL BREAKFAST**  
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## SESSION 1 – WELCOME, ADMIN REMARKS & KEYNOTE ADDRESS

8:00 – 8:05 am

**INTRODUCTION & ADMIN REMARKS**  
GRAND BALLROOM ABC

**Roy Streetz**

Chair, NDIA Fuze Committee; VP Advanced Electronic Systems, Excelitas Technologies Corporation

8:05 – 8:15 am

**NDIA OPENING REMARKS**  
GRAND BALLROOM ABC

**MG James Boozer, USA (Ret)**

Executive Vice President, National Defense Industrial Association

8:15 – 8:45 am

**KEYNOTE SPEAKER**  
GRAND BALLROOM ABC

**Col Gary R. Charlton II, USAF**

Commander 107th Attack Wing, New York Air National Guard

## SESSION 2 – U.S. GOVERNMENT SCIENCE, TECHNOLOGY & ACQUISITION

**Thomas Harward**  
Raytheon  
*Session Chair*

**Bob Metz**  
PCB Piezotronics, Inc.  
*Session Assistant*

8:45 – 9:10 am

### **ARMY S&T STRATEGY**

GRAND BALLROOM ABC

**Gene Henderson**  
U.S. Army CCDC Aviation & Missile Center

9:10 – 9:35 am

### **ARMY S&T STRATEGY**

GRAND BALLROOM ABC

**Charles Robinson**  
U.S. Army CCDC Armaments Center

9:35 – 10:00 am

### **NAVY S&T STRATEGY**

GRAND BALLROOM ABC

**Jason Koonts**  
NSWC Dahlgren

10:00 – 10:30 am

### **NETWORKING BREAK**

GRAND BALLROOM FOYER

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10:30 – 10:50 am

### **AIR FORCE S&T STRATEGY**

GRAND BALLROOM ABC

**George Jolly**  
Technical Advisor, Air Force Research Laboratory/RWMF

10:50 – 11:10 am

### **SANDIA NL CAPABILITIES & MISSION**

GRAND BALLROOM ABC

**Adam Church**  
Manager, 2627 Advanced Fuzing Technology, Sandia National Laboratories

11:10 – 11:30 am

### **OSD PERSPECTIVE/FUZE IPT**

GRAND BALLROOM ABC

**Lawrence Fan**  
JFTP Manager, Naval Surface Warfare Center - Indian Head Division

11:30 – 11:45 am

### **JOINT FUZE TECHNOLOGY PROGRAM (JFTP)**

GRAND BALLROOM ABC

**Tim Tobik**  
Air Force Research Laboratory



11:45 am – 12:00 pm

**HARRY DIAMOND FUZING EXCELLENCE AWARD PRESENTATION**

GRAND BALLROOM ABC

**Roy Streetz**

Chair, NDIA Fuze Committee; VP Advanced Electronic Systems, Excelitas Technologies Corporation

**Presented to:**

**Philip T. Gorman, Jr.**

Lead Associate, Booz Allen Hamilton

12:00 – 1:00 pm

**NETWORKING LUNCH**

GRAND BALLROOM FOYER

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TECHNOLOGIES®

**CONCURRENT BREAKOUT SESSIONS**

**SESSION 3A – OPEN SESSIONS**

GRAND BALLROOM EFG

**Bob Metz**

PCB Piezotronics, Inc.

*Session Chair*

**Mark Etheridge**

U.S. Army AMRDEC

*Session Assistant*

**SESSION 3B – CLOSED SESSIONS**

GRAND BALLROOM ABC

**Homesh Lalbahadur**

U.S. Army ARDEC

*Session Chair*

**Nassir Alaboud**

Lockheed Martin

*Session Assistant*

1:00 – 1:20 pm

**Guidelines for Implementing a Low Voltage Command Arm Distributed Fuzing System**

21801

**Mark Etheridge**

Electrical Engineer, U.S. Army CCDC Aviation & Missile Center

**Preparing EOD for Fuzing Innovations**

21766

**Justin Welling**

Lead Systems Engineer, USAF AFLCMC/EBDZ

1:20 – 1:40 pm

**Advanced Modeling and Analysis in the Design of Next Generation Accelerometers for Fuzing Applications**

21774

**David Ort**

R&D Engineer, PCB Piezotronics, Inc.

**Evaluation of Embedded Fuze Components in Explosives**

21848

**Tiffany Hatcher**

1st Lt, U.S. Air Force, AFRL/RWMF

1:40 – 2:00 pm

**Effectiveness of 40mm High Velocity Air Burst Ammunition**

21770

**Cemil Yilmaz**

Lead Engineer, ASELSAN, Inc.

**Fuzing Components in High-G Shock Regime**

21871

**Joshua Dye**

Electrical Engineer, Sandia National Laboratories

2:00 – 2:20 pm

**Calibration and Acceptance Tests for Accelerometers Used in Severe Shock Applications**

21783

**Jeffrey Dosch**

Technical Director, PCB Piezotronics, Inc.

**M1156 Precision Guidance Kit (PGK) Multi-Option Fuze Transition to Production**

21804

**Nathan Noble**

Senior Principal Manufacturing Engineer, Northrop Grumman Innovation Systems

2:20 – 2:40 pm

**Microwave Interferometry to Investigate Transition Phenomena Inside Detonators**

21895

**Alexandre Lefrancois**  
Engineer, CEA Gramat

**MEMSAD – Maturing the Technology**

21805

**Lynne Rider**  
U.S. Army CCDC Armaments Center

2:40 – 3:00 pm

**Close-Air-Support with <190 Rounds... A Practical Approach**

21776

**Lauren Schumacher**  
Self-Graduate Fellow, The University of Kansas

**Test Observed Considerations for Embedded Smart Fuzing of Penetrating Munitions**

21874

**Alma Oliphant**  
Principal Engineer, Applied Research Associates

3:00 – 3:20 pm

**NETWORKING BREAK**  
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**CONCURRENT BREAKOUT SESSIONS**

Continued

**SESSION 3A – OPEN SESSIONS**  
GRAND BALLROOM EFG

**SESSION 3B – CLOSED SESSIONS**  
GRAND BALLROOM ABC

3:20 – 3:40 pm

**Novel Approach for Fuze Safety Design and Requirements in Drone Based Weapon Systems**

21782

**Tal Leibovich**  
Head of Technology - Development Section, IDF

**Proximity Sensors For Hypersonic Applications**

21853

**Kristin DeWeese**  
Systems Engineering Manager, L3 Technology

3:40 – 4:00 pm

**Unmanned Systems Safety Precepts**

21838

**Jeffrey Fornoff**  
Senior Engineer, U.S. Army CCDC Armaments Center

**Tail Kit Impact Environment Analysis and Ground Test Design**

21873

**Alma Oliphant**  
Principal Engineer, Applied Research Associates

4:00 – 4:20 pm

**Lithium Battery Innovations for Projectile Munitions**

21767

**Paul Schisselbauer**  
Director of Engineering, EnerSys Advanced Systems

**Embedded Fuze Forward Assembly Cannon Test**

21885

**Mark Mlejnek**  
Electrical Engineer, L3 Fuzing & Ordnance Systems

4:20 – 4:40 pm

**Exploring High-Strain-Rate Deformation of Microscale Planar Metallic Materials using Customized Taylor Anvil Impact Test**

21840

**Jeffrey Smyth**  
Mechanical Engineer, U.S. Army CCDC Armaments Center

**Advanced Material Model Development and Setback Sensing**

21883

**Bill Bartinelli**  
Mechanical Engineer, L3 Fuzing & Ordnance Systems



4:40 – 5:00 pm

**FMCW (Frequency Modulated CONTINUOUS WAVE) Proximity Technology with Advance EM Insensitive Features**

21781

**Luis Abad**

Product Manager - Fuze Systems, Expal Systems

**Characterizing Embedded Fuzing Environments with Non-Linear Viscoelastic Modeling**

21852

**Shane Curtis**

Staff Member, Sandia National Laboratories

5:30 – 7:00 pm

**NETWORKING GRAND RECEPTION**

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**WEDNESDAY, MAY 15**

7:00 am – 4:20 pm

**REGISTRATION**

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7:00 – 8:00 am

**NETWORKING CONTINENTAL BREAKFAST**

GRAND BALLROOM FOYER

**CONCURRENT BREAKOUT SESSIONS**

**SESSION 4A – OPEN SESSIONS**

GRAND BALLROOM EFG

**Eric Roach**

Lockheed Martin  
*Session Chair*

**Telly Manolatos**

Electronics Development Corp.  
*Session Assistant*

**SESSION 4B – CLOSED SESSIONS**

GRAND BALLROOM ABC

**Byron Lee**

Northrop Grumman Innovation Systems  
*Session Chair*

**Jim Sharp**

Naval Surface Warfare Center Dahlgren  
*Session Assistant*

8:00 – 8:20 am

**DoD MEMS Fuze Explosive Train Evaluation and Enhancement**

21865

**David Muzzey**

Chemical Engineer, NSWC IHEODTD

**Advanced Fireset Electronics and Custom Packaging for Extremely High Shock Survivability**

21753

**Ron Knobler**

Director of Engineering, McQ, Inc.

8:20 – 8:40 am

**SPACIDO 1D Course-Correction Fuze**

21831

**Benjamin Campion**

Programme Manager, JUNGHANS Defence

**Electrical Transmission Line Replacement for Det-Cords in Flight Termination Systems**

21761

**Dustin Atwood**

Mechanical Engineer, Naval Air Warfare Center Weapons Division

8:40 – 9:00 am

**Guided Munitions for Aerial Gunnery;  
Increased Mission Effectiveness  
and Large Cost Savings**

21775

**Lauren Schumacher**

Self-Graduate Fellow, The University of Kansas

**Neyer Testing Results for  
MEMS S&A Bridgewires**

21762

**Charles Romaniello III**

Mechanical Engineer, U.S. Army CCDC Armaments Center

9:00 – 9:20 am

**Prototyping Fuze Electronics for  
High Reliability Manufacturing**

21772

**Stephen Redington**

Sr. Engineer, U.S. Army CCDC Armaments Center

**Matt Sargent**

U.S. Army CCDC Armaments Center

**M550 Safe & Arm Redesign**

21842

**Jason Sweterlitsch**

Fuze Engineer, U.S. Army CCDC Armaments Center

9:20 – 9:40 am

**Numerical Simulations at the Core of  
Acceleration Testing Expertise**

21841

**Paul Deconinck**

R&D Manager, Thiot Ingenierie

**Current Controlled Solidtron  
Characterization and Testing Results**

21887

**Jeff Gardner**

Electrical Engineer, L3 Fuzing & Ordnance Systems

9:40 – 10:00 am

**Providing Continued DSU-33D/B Viability**

21855

**Dave Liberatore**

Sr. Program Manager, Northrop Grumman Innovation Systems

**Advanced Nano-structuring and  
Enhanced Performance of Thermal  
Battery Cathode Materials**

21780

**Giuseppe Di Benedetto**

U.S. Army CCDC Armaments Center

10:00 – 10:20 am

**NETWORKING BREAK**

GRAND BALLROOM FOYER

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**CONCURRENT BREAKOUT SESSIONS**

Continued

**SESSION 4A – OPEN SESSIONS**

GRAND BALLROOM EFG

**SESSION 4B – CLOSED SESSIONS**

GRAND BALLROOM ABC

10:20 – 10:40 am

**FMU-139D/B Qualification and  
Production for Operation Use**

21856

**Scott Pfeiffer**

Program Director, Fuzing & Electronic Integration, Northrop Grumman Innovation Systems

**Fuze Enhanced Airburst Response  
for Medium Caliber Munition**

21757

**Alexander Neeb**

Fuze Engineer, U.S. Army CCDC Armaments Center

10:40 – 11:00 am  
**Safety Logic Dilemmas for Loitering Unmanned Ground Vehicle (UGV) Munitions**  
 21877  
**Shay Sas**  
 Fuze Engineer, RAFAEL Advanced Defense Systems, Ltd.

**EFI Fire Pulse Delay Circuit**  
 21756  
**Michael Haddon**  
 Engineer, NAWCWD

11:00 – 11:20 am  
**Drop Testing of LIGA MEMS Parallel Beam, Bi-Stable Latching Metallic Mechanisms**  
 21839  
**Kevin O'Connor, Jr.**  
 Mechanical Engineer, U.S. Army CCDC - Armaments Center Fuze Division  
**Kevin Aghaei**  
 Mechanical Engineer, U.S. Army CCDC - Armaments Center Fuze Division

**Target Scene Generator**  
 21863  
**Dexter Cook**  
 U.S. Army CCDC Armaments Center

11:20 – 11:40 am  
**Sensitivity Prediction of Exploding Foil Initiators**  
 21768  
**Qingchou Chen**  
 Engineer of Institute of Chemical Materials, China Academy of Engineering Physics

**Optical Fuze Programmer Project Update**  
 21844  
**Steve Guerrero**  
 VP of Engineering, Creative Microsystems Corporation

11:40 am – 12:00 pm  
**Innovative Developments in Carbon Cathode Matrix Materials for Li/SOCl<sub>2</sub> Reserve Batteries Used in Artillery Projectiles**  
 21851  
**Brett Barclay**  
 Design Engineer, EnerSys Advanced Systems

**Material Properties Comparison between Additive Manufactured and Machined Parts**  
 21886  
**Bryan Driskell**  
 Mechanical Engineering Manager, L3 Fuzing & Ordnance Systems

12:00 – 1:00 pm  
**NETWORKING LUNCH**  
 GRAND BALLROOM FOYER

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 Fuzing & Precision Products

**CONCURRENT BREAKOUT SESSIONS**

**SESSION 5A – OPEN SESSIONS**  
 GRAND BALLROOM EFG  
**Perry Salyers**  
 L3 Defense Electronic Systems  
*Session Chair*  
**Jim Lemister**  
 Pacific Scientific Energetic Materials  
*Session Assistant*

**SESSION 5B – CLOSED SESSIONS**  
 GRAND BALLROOM ABC  
**Doug Harms**  
 NNSA's National Security Campus  
*Session Chair*  
**Bob Metz**  
 PCB Piezotronics, Inc.  
*Session Assistant*

1:00 – 1:20 pm

### **Hardened, Compact and Fast: Adaptive Flight Control Actuators for Guided Hard-Launched Munitions**

21779

**Dr. Ron Barrett-Gonzalez**

Professor of Aerospace Engineering, Director of the Adaptive Aerostructures and Aircraft Design Laboratories, The University of Kansas

### **Wireless Power Transmission for Distributed Multi-Point Fuzing Applications**

21870

**Joshua Dye**

Electrical Engineer, Sandia National Laboratories

1:20 – 1:40 pm

### **A Historical Review of US Aerial Engagements: 1946-Present**

21777

**Lauren Schumacher**

Self-Graduate Fellow, The University of Kansas

### **ARDEC Fuze S&T**

21854

**Evan Young**

U.S. Army CCDC Armaments Center

1:40 – 2:00 pm

### **A Structured Approach to Fuze Technology Refresh**

21902

**Vince Matrisciano**

R&D Program Coordinator, Joint PEO Armaments & Ammunition

### **High Voltage Switch Development**

21861

**Paul Heffernan**

DOE KC-NSC (Honeywell FM&T)

2:00 – 2:20 pm

### **High Quality, High Throughput Neutron Radiography using Accelerator Based Neutron Generators**

21857

**Brad Bloomquist**

Director of Business Development, Phoenix, LLC

### **Small-Scale Testing of Electronic Components in Shock Loading**

21904

**Vasant Joshi**

Scientist, NSWC

2:20 – 2:40 pm

### **Survivability and Reliability of Silicon MEMS Components**

21868

**Caitlyn May**

Mechanical Engineer, NSWC IHEODTD

### **Ground Testing Suite to Reduce Risk for Fuzes in Hard Target Penetrators**

21872

**Ericka Amborn**

Senior Engineer, Applied Research Associates

2:40 – 3:00 pm

### **Equipment for Characterization of an EFI according to STANAG 4560 – A Generic STANAG Comes Alive...**

21812

**Christian Euba**

Systems Engineer, TDW (MBDA)

### **Missile ESAD Enhancements**

21859

**Eric McDonough**

Northrop Grumman Innovation Systems

3:00 – 3:20 pm

### **NETWORKING BREAK** GRAND BALLROOM FOYER

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## CONCURRENT BREAKOUT SESSIONS

Continued

### SESSION 5A – OPEN SESSIONS GRAND BALLROOM EFG

### SESSION 5B – CLOSED SESSIONS GRAND BALLROOM ABC

3:20 – 3:40 pm

#### Development and Testing of Setback Locks for High Reliability in DPICM-XL 21765

**Laura Ostar-Exel**  
Mechanical Engineer, U.S. Army CCDC Armaments Center

#### Tailored EFIs for Enhanced Safety & Performance 21769

**Nate Sanchez**  
R&D Engineer, Los Alamos National Laboratory

3:40 – 4:00 pm

#### Li-Ion Battery for FTS and Telemetry Application 21771

**Dmitry Molchanov**  
Electrical Engineering Manager, EnerSys

#### Antifuse Obsolescence Mitigation in ESAD Applications: Analysis of High Shock, Acceleration and Vibration Effects on Safety Critical Logic Devices 21884

**Nicholas Adams**  
Engineering Supervisor, L3 Fuzing & Ordnance Systems

4:00 – 4:20 pm

#### Development of Electronics for DPICM-XL CMRT 21837

**Andrew Warne**  
Chemical Engineer, U.S. Army CCDC Armaments Center

#### Smart Distributed Embedded Fuzing: Current and Future Research Directions 21875

**Curtis McKinion**  
Mechanical Engineer, Air Force Research Laboratory

4:20 pm

### ADJOURN

## THURSDAY, MAY 16

8:30 – 10:30 am

### FACILITY TOUR OF PCB PIEZOTRONICS, INC. PCB PIEZOTRONICS, INC. 3425 WALDEN AVENUE, DEPEW, NY 14043

\*Separate registration required to attend.

The NDIA has a policy of strict compliance with federal and state antitrust laws. The antitrust laws prohibit competitors from engaging in actions that could result in an unreasonable restraint of trade. Consequently, NDIA members must avoid discussing certain topics when they are together at formal association membership, board, committee, and other meetings and in informal contacts with other industry members: prices, fees, rates, profit margins, or other terms or conditions of sale (including allowances, credit terms, and warranties); allocation of markets or customers or division of territories; or refusals to deal with or boycotts of suppliers, customers or other third parties, or topics that may lead participants not to deal with a particular supplier, customer or third party.

# KEYNOTE BIOGRAPHY



## COL GARY R. CHARLTON II, USAF

*Commander*  
107th Attack Wing, New York Air National Guard

Col. Gary R. Charlton II is the commander, 107th Attack Wing, New York Air National Guard, Niagara Falls Air Reserve Station, Niagara Falls, NY. He commands the 107th Attack Wing, encompassing operations, medical, and mission support group functions as well as, two geographically separated units. He is responsible for the deployment and employment of assigned personnel and equipment to ensure these assets are available to support all state and national requirements.

Charlton enlisted in the New York Air National Guard in May 1990 and served as a fuels systems technician. He graduated from Columbia College in 1995 earning a Bachelor of Arts degree in psychology. He then commissioned in 2000 and attended undergraduate pilot training in 2001. Charlton completed initial F-16 qualification training in 2002 and served as an F-16C pilot flying with the 138th Fighter Squadron, Hancock Field, NY. He has held the positions of flight, detachment and squadron commander of the 138th Fighter Squadron; as well as 107th Operations Group commander. Prior

to his current assignment, he was the vice commander of the 107th Attack Wing, Niagara Falls, NY.

A combat veteran, Charlton served seven combat deployments, three while enlisted, Operations Desert Shield and Storm, and Northern Watch, and four additional deployments flying F-16C combat missions in Operations Iraqi and Enduring Freedom. He is a command pilot with over 3,200 flying hours in the T-37, T-38A, T-38C, F-16C/D, MQ-1, and MQ-9

# AWARDEE BIOGRAPHY



## PHILIP T. GORMAN, JR.

*Lead Associate*  
Booz Allen Hamilton

March 2019 – Present: Booz Allen Hamilton Senior Lead Technologist, Ordnance. Fuzing Systems: 36 years' experience in fuzing from science and technology through production and sustainment. 16 years as the Fuze Division Chief, Army Armaments Research

Development and Engineering Center (ARDEC) responsible for research, development, production, test, and evaluation of fuzes, fuze setters, and munitions power sources. Served 17 years as the Army Lead on the DoD Fuze IPT addressing technology and industrial base issues. Served 9 years as the Army member on the Joint Fuze Technology Panel

overseeing a joint S&T program sponsored by OSD, addressing department technology gaps in fuzing and fuzing systems. Led development program on the M734A1 Multi-option Fuze for Mortars, led production program for PATRIOT M143 S&A Device. M.S. Mechanical Engineering, DAWIA Level III SPRDE Certified, Secret Clearance.

## NEW PRODUCTS FOR YOUR FUZING NEEDS.





## Defense Electronic Systems

### REGISTRATION & OPENING RECEPTION SPONSOR

L3 Defense Electronic Systems (L3 DES), a division of L3 Technologies, Inc., provides precision electronic components, subsystems, and systems for the Department of Defense and international allies. L3 DES specializes in the design and manufacture of build to print and modernized fuze solutions, ignition safety devices, proximity sensors, inertial measurement and GPS navigation systems, assured position, navigation, and timing (A-PNT) capabilities, aerospace status indicators, and intelligence management systems. As a trusted partner, you can count on L3 DES to deliver quality products and develop superior solutions that enhance capabilities and provide overmatch superiority to the warfighter.

Headquartered near Cincinnati, Ohio, L3 DES' primary manufacturing facility was specifically designed and constructed for the manufacture of fuzing and ordnance systems and precision electronic components. With additional locations in Anaheim, CA, Budd Lake, NJ, and San Diego, CA, L3 DES has strategically located its resources, including program management, engineering, and quality assurance, at each site to ensure complete adherence to programmatic and technical requirements, enabling process efficiencies.

Dedicated to continuous improvement, L3 DES operates a quality management system certified to AS9100D and ISO 9001:2015 standards. With highly flexible manufacturing operations, L3 DES can accommodate a variety of products, with run rates that can exceed 40,000 units per month down to individual production units for development efforts. L3 DES also has on-site inspection and test capabilities to perform all required environmental test procedures.

At L3 DES, customer focus is a key element of who we are and how we operate. Our customers are the foundation of our success and we are committed to establishing long-term relationships and ensuring collaboration throughout the product lifecycle.

L3 DES is committed to supporting the warfighter. We will continue to innovate and develop unique solutions by leveraging our valued workforce. To learn more, please visit [www.L3T.com](http://www.L3T.com) or call 513-943-2000.

## **NORTHROP GRUMMAN**

### GRAND RECEPTION SPONSOR

At Northrop Grumman, we are focused on providing our warfighters with high-quality products that provide overmatch in a number of land, sea, and air engagement scenarios. Key to the effectiveness of many U.S. and ally weapon systems are our advanced bomb

fuzes and proximity sensors. Our fuze portfolio includes electronic and electro-mechanical bomb fuzes that are capable of penetrating deeply buried targets, engaging high speed maneuverable surface threats and delaying detonation for mission success, while our sensors detect the height of a weapon above a target and operate in an electronic countermeasure environment. For more information, speak with one of us during the conference or visit us at [northropgrumman.com](http://northropgrumman.com).

## **KAMAN**

### Fuzing & Precision Products

### WEDNESDAY LUNCH & WRISTBAND SPONSOR

Kaman Precision Products is the integration of two respected ordnance manufacturers in the United States: Raymond Engineering of Middletown, Connecticut, and Dayron, Inc. of Orlando, Florida. Two great defense manufacturers, one specializing in missile fuzing and one specializing in bomb fuzing, came together to create a company that serves many of the U.S. and international militaries' missile and bomb systems. Kaman Precision Products provides design, development, test and manufacture of fuzing, safe and arm, and flight termination products and systems. In addition, we design and build inductive (eddy current) sensors for operation in severe conditions, and advanced data storage and retrieval systems for military applications. Our products are found on many new and legacy missile systems such as Maverick, Harpoon, Tomahawk, ATACMS, STANDARD, Hawk and AMRAAM. Our fuzing products segment is also involved with high-g, 3 axis data recorders and flight termination Safe & Arm systems.

## **EXCELITAS** TECHNOLOGIES®

### TUESDAY LUNCH SPONSOR

Excelitas Technologies is a leader in the design, test, and manufacturing of Electronic Safe, Arm and Fire (ESAF); Electronic Safe and Arm Devices (ESAD); and Firing Modules (FM) for safe fuzing requirements of both legacy and next-generation missiles and munitions. Our dedicated staff of research and design experts use the latest advances in technology to design smaller, lighter, and more cost effective ESAFs and FMs to meet evolving requirements of newer more sophisticated weapon systems. Capabilities include a line of components and subsystems that have been qualified for hard target penetration environments as well as for the next generation of smaller class munitions.

We also produce a large array of custom energetic devices to meet specific customer requirements for many Department of Defense and National Nuclear Safety Administration systems. Excelitas ensures the reliability and consistent performance of each energetic device through control of in-house recrystallization, processing, and pressing of our own explosive powders.



# DISPLAY HOURS

**MONDAY, MAY 13**  
5:00 – 6:00 pm

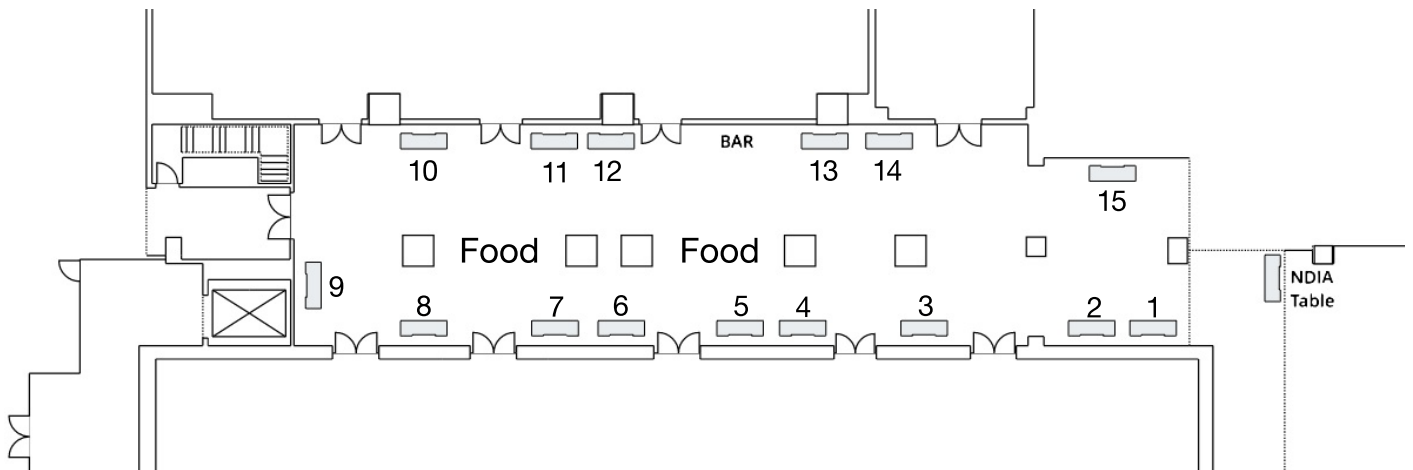
**TUESDAY, MAY 14**  
7:00 am – 5:00 pm

**WEDNESDAY, MAY 15**  
7:00 am – 3:20 pm

## TABLE TOP DISPLAYS

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## DISPLAY MAP



## **DIEHL & EAGLE-PICHER GMBH** #11

Diehl & Eagle-Picher GmbH (D&EP), is one of Europe's leading manufacturers of individualized power supplies for the military and civil market.

Diehl & Eagle-Picher a German-American joint venture, develop and produce activatable thermal batteries for defence applications and customized battery packs for both the defence and civil market. In addition, more than 15 years ago D&EP furthermore began to design and manufacture lithium reserve batteries for applications in proximity, time and multifunction fuzes used for mortar, artillery and naval gun ammunition.

In 2013 Diehl & Eagle-Picher started a new development in the field of defence in order to minimize the size of lithium thionylchloride (Li/SOCl<sub>2</sub>) reserve batteries in response to the trend towards more efficient and less energy requiring fuzes in the medium caliber sector. The system lithium thionylchloride (Li/SOCl<sub>2</sub>) for Reserve batteries stands out due to extremely high energy density. Therefore, especially these minimized batteries are perfectly suitable to deliver energy for fuzes used in medium/large caliber ammunition for rocket and grenade weapons.

Diehl & Eagle-Picher are a most flexible partner corresponding to various customer demands due to different modular design possibilities of our batteries.

## **ENERSYS** #8

EnerSys, the global leader in stored energy solutions for industrial applications, has an Advanced Systems division solely focused on powering submarines to satellites. Our mission is to design and manufacture custom, state-of-the-art batteries for military, space and aviation applications. By leveraging 50 years of experience in powering Fuzing applications, we remain at the forefront of powering advanced weapons across the Department of Defense. Our proprietary Cobalt Disulfide chemistry also raises the bar for what is possible with Thermal batteries for Munition applications. EnerSys Advanced Systems' wide breadth of technologies and capabilities allows us to provide our customers with the best performing products and highest quality services at the best possible value.

## **EXCELITAS** #12

See company description on page 15.

## **EXPAL SYSTEMS, S.A.** #14

EXPAL Systems is a global defense and security company. We offer high-end technology products, services and solutions to meet the current and future needs of Air, Land and Sea Armed Forces.

We are a trusted ally in over 60 countries adding safety, precision and advanced systems to any mission. EXPAL manages the entire life-cycle of ammunition, from R&D and manufacturing to maintenance and integration services, up to our leading demilitarization solutions.

From its Fuzes Excellence Center, a cutting-edge facility located in Europe, the company designs, manufactures and integrates a wide portfolio of fuzes. Among its latest developments, the company produces electronic FMCW proximity fuzes: a sophisticated solution that integrates time, proximity and impact functioning modes. This safety and reliability system have been proved, even when subjected to the most severe and adverse on-board electromagnetic environments.

EXPAL's fuzes, designed following the latest NATO standards, are compatible with the most demanding ammunition systems and are currently in use in over 35 armed forces all over the world.

EXPAL supports the U.S. Armed Forces through its subsidiary company EXPAL USA. Headquartered in Dallas since 2011, EXPAL USA has state-of-the-art facilities in Texarkana and a R&D center in Camp Minden to develop demilitarization services for the U.S. Army and energetic materials for the US DoD, holding the potential to extend its capabilities to the rest of EXPAL offering.

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## **GOWANDA COMPONENTS GROUP #3**

GCG designs and manufactures reliable, robust, high-performance magnetics and filters for use in demanding applications in military, aerospace, medical and communication systems around the world. GCG has a unique combination of product breadth, custom-design capabilities, proprietary equipment, in-house environmental testing and multiple facilities, all located in the USA. With more than 150,000 sq. ft. of manufacturing/engineering space spread out over six locations, GCG is disaster-plan qualified. Nearly 10,000 sq. ft. of machining space, including in-house transfer molding capability, provides quick turnaround of prototypes. All of this combined with other in-house vertical integration, helps GCG to streamline its operations and manage process flow, thereby reducing time-to-market for customers. GCG affiliates include Gowanda Electronics, DYCO Electronics, HiSonic, Butler Winding, Communication Coil, Gowanda REM-tronics, TTE Filters, Microwave Circuits, and Instec Filters.

Magnetics Products include RF & power inductors: broadband, QPL, high-reliability for space; RoHS & Pb; chips, chokes, coils, common-mode, conicals, toroids, transformers; surface-mount, thru-hole; AS9100, ISO9001. Filters Products include RF & microwave filters: bandpass, band-rejection, highpass, lowpass; Bessel, Butterworth, Chebyshev, Elliptical-Function, Gaussian; multiplexers; bias tees; and EMI/RFI filters: feed-thru's & bolt-styles.

GCG products are utilized in numerous space projects: NASA Europa, Delta IV heavy, James Webb Space Telescope, MAVEN, LADEE, and GOES-R.

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## **HT MICROANALYTICAL, INC. #1**

HT Micro's mission is to replace conventionally manufactured switches and connectors with the smallest, most robust metal microfabricated products. For military applications such as safe and arm, target detection, and guidance systems, the Company produces the smallest and most reliable, passive, surface mount inertial switches in the world. The product line can survive 100,000+ Gs while still responding to nominal thresholds ranging from 2 to 10,000 Gs. The company's entire product line and data sheets can be found at [www.htmicro.com](http://www.htmicro.com).

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## **KNOWLES-NOVACAP #6**

Novacap, a Knowles Precision Devices Brand, features high temperature, high energy capacitors designed for reliable operation under single or multiple pulse firing applications. Energy density exceeds that of conventional Class 1 materials, providing excellent short duration pulse delivery at temperatures to 200°C. Integral bleed resistors are offered in a range of values.

Capacitors are 100% tested to application tailored, Novacap high reliability screening and evaluated at operational extremes consistent

with munitions and oil field exploration/seismic detonation conditions. Other applications include power supply filtering, energy storage and coupling/decoupling. Custom size, voltages and capacitance ratings are available in single, series and series/parallel arrangements.

A division of Knowles Corporation, Knowles Precision Devices is a leading global innovator and manufacturer of high performance solutions. We focus on production of a wide variety of highly engineered Capacitors, EMI and Microwave to Millimeter Wave components for use in critical military, medical, industrial, electric vehicle, and 5G market segments. From 8,000 feet below the earth's surface to orbiting 254 miles above on the ISS, we take on the complex challenges that come with High Reliability, High Temperature, High Performance, High Energy and High Frequency solutions. Our Heritage Brands include Compex, DITF, DLI, Johanson, Novacap, Syfer and Voltronics.

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## **MEGGITT ENDEVCO #4**

Meggitt is a leading supplier of high-performance sensing and monitoring systems for physical parameter measurements in extreme environments. Meggitt's Endevco® range of piezoelectric, piezoresistive, Isotron® and variable capacitance accelerometers, piezoresistive pressure transducers, acoustic sensors, electronic instruments and calibration systems ensure critical accuracy and reliability within aerospace, automotive testing and medical applications.

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## **NASCENTECHNOLOGY MANUFACTURING, INC. #15**

INASCENTechnology Manufacturing manufactures High-Reliability, High Temp transformers and inductors for commercial and military grade markets. We operate with a class 10,000 clean room and our Quality system is compliant with ISO9000:2015, AS9100D, and PQR1060 issue U. We maintain permanent, full traceability for all of our manufactured parts to materials and testing data.

Our Low-Temperature Co-Fired Ceramic transformers and inductors are flat, thin, and a fraction of the size of wire-wound transformers. The LTCC transformer imbeds the coil windings within one solid unit making it a miniature monolith. As a result, they are far more reliable, and able to withstand extreme shock and vibration.

NASCENTechnology will also manufacture custom wire wound products with a focus on producing parts that are highly reliable in adverse conditions.

Our staff continues to research ways to process, apply, and combine magnetic materials that enhance the performance of our existing designs as well as meet the needs of future applications. For example, ceramic flyback transformers operational beyond 200-degree C are now available. Stop by and visit with us today.

**PCB PIEZOTRONICS, INC.**

#13

PCB Piezotronics, Inc. is a designer and manufacturer of microphones, vibration, pressure, force, torque, load, and strain sensors, as well as the pioneer of ICP® technology used by design engineers and predictive maintenance professionals worldwide for test, measurement, monitoring, and control requirements in automotive, aerospace, industrial, R&D, military, educational, commercial, OEM applications, and more. With a worldwide customer support team, 24-hour SensorLineSM, and a global distribution network, PCB® is committed to Total Customer Satisfaction. Visit [www.pcb.com](http://www.pcb.com) for more information. PCB Piezotronics, Inc. is a wholly owned subsidiary of MTS Systems Corporation. Additional information on MTS can be found at [www.mts.com](http://www.mts.com).

**PRESIDIO COMPONENTS, INC.**

#9

Founded in 1980, Presidio Components is a US manufacturer of high reliability ceramic capacitors. One of our product line focused on pulse energy capacitors for Exploding Foil Initiator (EFI) used in fuse systems for missiles and ordnances. As an added safety feature, our pulse energy capacitors can be ordered with bleed resistors. Lead frames are also available for board flex compliance. Energy output is designed to match customer requirements.

Overall Presidio supplies ceramic capacitors used in other high reliability industrial, military or space applications. Presidio's power products include low inductance chips SMD, high reliability SMPS stacks, and high voltage radial leads.

Presidio's RF Power and RF /Microwave product group features Ultra-Porcelain™ capacitors with ultra-low ESR and ultra-high Q, broadband DC blocking capacitors, as well as the smallest wire-bondable single layer and broadband bypass capacitors available.

Presidio is qualified to most MIL specs including the highest established reliability rating of 'S' Level for MIL-PRF-55681. All QPL testing per MIL-STD-202 is done on site in Presidio's DSCC approved test lab.

**SILICON POWER CORPORATION**

#2

Silicon Power Corporation is a developer and solutions provider dedicated to the design, development, testing and manufacturing of high-voltage semiconductor switches, high-voltage pulsed-power switches, and high-power utility-applicable systems.

Through its SolidTRON product group, Silicon Power assembles, tests, and delivers to the defense industry proprietary semiconductor discharge switches, which are designed into the critical fuze initiation of numerous active smart weapons programs.

Silicon Power's Pulsed Power product group offers the world leading technology in solid state high-speed, high voltage, and high-energy transfer switches. Beginning with the design of the constituent semiconductors, SolidTRON, our focus is enabling system-level designs with unprecedented performance compared to other solid state thyatron, ignitron and spark gap.

**SPACE ELECTRONICS, LLC**

#10

ISpace Electronics is the world's leading manufacturer of totally safe igniter / squib circuit testers. Our SQB Series consists of automated multi-node systems, rackmount testers and portable single channel units. These systems are ideal for safely measuring the resistance and stray voltage in a weapon's multiple electrical circuit paths.

Customers such as the US Navy, Raytheon, Boeing, L3 Technologies and Lockheed Martin rely on Space Electronics systems to safely test rocket igniters, fuses, explosive bolts, squibs, detonators and electro-component lines (relays, actuators, diodes and semiconductor devices). Our designs incorporate multiple layers of safety and internal microprocessors. These features produce highly accurate, rapid and stable readings, while drastically reducing the risk of accidental detonations.

We designed and built our first squib meters in 1977 (many of our original units remain in use and we continue to support them). Space Electronics customers benefit from our detailed version control and world class customer service.

# THIOT INGENIERIE

#7

THIOT INGENIERIE, shock physics specialist since 1988, is working in two main activities around its expertise in shock physics.

First in design and manufacturing test equipment for fast dynamics studies:

Gas guns | Acceleration generator | Split Hopkinson bars | Detonation chamber

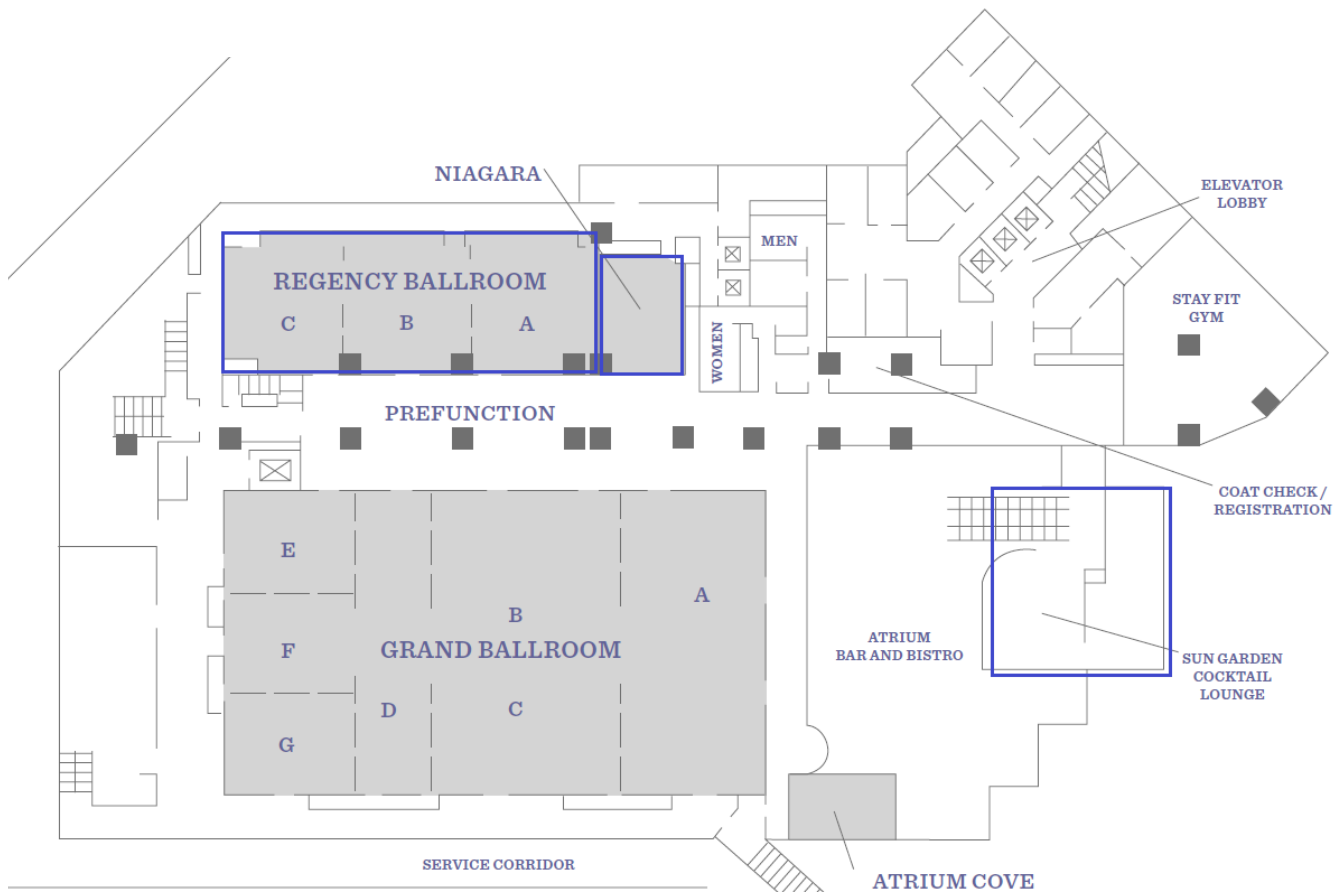
The second parts of its activity is a high level of expertise in shock physics with a terminal ballistics laboratory and a R&D department specialized in dynamic behavior of materials.

Our philosophy: To combine experimental tests results to numerical simulation to have the best knowledge of the material behavior.

Our equipment:

- 4 gas guns for impact tests: we can fire any type of projectile onto any kind of target from 50m/s up to 8500m/s (i.e. we can reproduce fuze behavior during impact).
- Numerical simulation: with our expertise in numerical simulation, we are able to simulate the behavior of your structures in all types of shock situation: ballistic impacts on armor, explosions inside a building or acceleration and/or deceleration phenomena.
- Mechanical characterization (Hopkinson bars tests, dynamic press).
- Acceleration testing (up to 100 000G): to observe and study the behavior of embedded systems under high levels of stress (MEMS, IMU, SAU).

# VENUE MAP





# NDIA CELEBRATES 100 YEARS!



The technology used by today's modern warfighter was unimaginable 100 years ago. In 1919, BG Benedict Crowell's vision of a collaborative team working at the intersection of science, industry, government and defense began what was to become the National Defense Industrial Association. For the past century, NDIA and its predecessor organizations have been at the heart of the mission by dedicating their time, expertise and energy to ensuring our warfighters have the best training, equipment and support.

Reflecting on NDIA's history, we embrace the opportunity to emphasize the need for legal and ethical collaboration among military, government, industry and academia to ensure the defense industrial base is prepared for future challenges and conflicts. Just as the early 20th century was characterized by massive transformation in military capabilities, emerging trends in technology and increasing geopolitical challenges demand new strategies and policies in today's national security landscape.



# THANK YOU TO OUR SPONSORS



Defense Electronic Systems

***NORTHROP GRUMMAN***

**KAMAN**

Fuzing & Precision Products

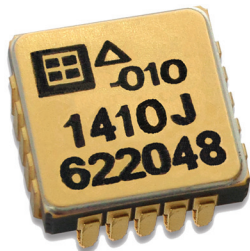
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TECHNOLOGIES®

**JUNGHANS**  
Defence

**PACSCI EMC**

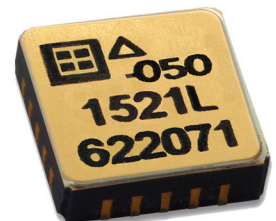
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MTS SYSTEMS CORPORATION

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# 2019 ARMAMENT SYSTEMS FORUM

**Small Arms • Guns, Ammunition, Rockets & Missiles (GARM) • Unconventional and Emerging Armament (UEA)**

The 2019 NDIA Armament Systems Forum will focus on **leveraging armament technology integration to achieve modernization, overmatch, and operational readiness.**

The can't miss, high-density agenda features parallel sessions for small arms, GARM, and UEA addressing synergy, communication, and networking opportunities across the entire armament community. This forum will also allow for an expanded number of technical/oral presentations and poster presentations addressing subjects relevant to legacy and evolving future armaments as well an incredible opportunity to interact with the latest technologies available on the exhibit floor.

**June 3 – 6, 2019 | Fredericksburg, VA | [NDIA.org/Armaments19](http://NDIA.org/Armaments19)**

