



DE Test & Evaluation Joint Conference on T&E Support to  
Prototyping and Experimentation Pre-Conference Tutorials  
*NOTE: Pre-Conference Tutorials require a separate fee from the Conference.  
Single Tutorial - \$300, Two Tutorials - \$550*

*See the conference [Security Information](#) for instructions on  
participating in courses with Limited Distribution*

**Monday, 30 January**

**8:00 AM – 12:00 PM**

### **Course 1. T&E of HEL Systems**

Classification: Unclassified, Limited Distribution C

Instructor: Dr. Todd Steiner, TRMC

CEUs awarded: 0.35

Course Description: An introduction to fundamental considerations for the test and evaluation (T&E) of High Energy Laser (HEL) weapon systems. Students will be given an overview of the various distinct types of HEL testing, including example test concepts/configurations, considerations for test instrumentation, and key testing issues, such as safety and environmental concerns.

Topics to be covered include:

- HEL employment/testing challenges
- Types of HEL testing
- Lethality phenomenology testing
  - HEL effects
  - HEL lethality testing types and test diagnostics
- System output testing
- System performance testing
  - HEL examples of static ground testing, dynamic OT, OT/Live
  - HEL test measures
- Instrumentation Considerations
  - HEL instrumentation summary
  - Instrumentation protection
  - Non-intrusive measurements
- HEL testing considerations
  - HEL testing issues
  - HEL testing safety
  - Test planning tools

Intended Audience: T&E engineers who may be responsible for planning, supporting, and/or executing range tests that involve HEL weapon systems.



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Instructor Biography: Dr. Todd Steiner is the Principal Scientist for the Test and Evaluation Science and Technology Program within the Test Resource Management Center under USD R&E. He leads the TRMC's Directed Energy Test and Evaluation Portfolio and is responsible for the DE Test Investment Roadmap. He has 40 years of experience in DOD RDT&E and has worked in the Directed Energy field since the mid-1990's, including work on the Airborne Laser Program and the Active Denial Program.

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## **Course 2. T&E of HPM Systems**

Classification: Unclassified, Limited Distribution C

Instructor: Jeff Schleher, American Systems

CEUs awarded: 0.35

Course Description: The short course is an introduction to the testing of high power radio frequency weapons. The course contains an introduction to the fundamentals of these high-power microwave (HPM) weapons to establish a common vocabulary. The focus of the course is on test practices as they apply to HPM weapons for U.S. system testing and susceptibility testing as specified in MIL STD 464C. HPM instrumentation, test measures, and analysis make up a section of the course. Various presentations address military applications of HPM weapons and how fielded systems have been tested. Substantial new HPM test equipment has been recently made available to military test ranges and developmental laboratories. The course will address the availability, location, and procedures for these test capabilities as well as the process used to determine what test equipment was needed. A portion of the course will address the specialized requirements of these systems for safety considerations and permitting required for testing to proceed. This course is appropriate for managers and analysts requiring an overview of HPM weapons and how they are tested in addition to new HPM field test engineers for which best HPM test practices are addressed.

Topics include:

- HPM Fundamentals
- Testing Fundamentals as Applied to HPM
- Test and Evaluation HPM Environment
- Sources for HPM Testing and Where to Find Them
- HPM Test Locations
- HPM Test Instrumentation and Setup
- Safety and Spectrum Management



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**Intended Audience:** This course is appropriate for managers and analysts requiring an overview of HPM weapons and how they are tested in addition to new HPM field test engineers. A background in science and engineering at least to the technical level is required to understand the technical portion of the course.

**Instructor Biography:** Jeff Schleher has spent 40-years in military test and is an early member of ITEA, participating in concept, developmental, and operational test. Mr. Schleher's early test activities focused on large radar and space system testing, but since the 1990's he has engaged in high power microwave test support. Mr. Schleher's current activities are as a subject matter expert for the Test Resource Management Center science and technology efforts to provide military test ranges with necessary equipment and capabilities to support testing of high powered microwave weapon and modern electronic warfare systems. Previously, he supported the acquisition of high power microwave sources and sensors through the Directed Energy Test and Evaluation Capability. Mr. Schleher is retired from the Air Force and is the current president of the Albuquerque Chapter of the Association of Old Crows.

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### **Course 3. . Introduction to the DoD Test & Evaluation Process**

**Classification:** Unclassified, Limited Distribution D

**Instructor:** Robert Newton, USAF, Retired

**CEUs awarded:** 0.35

**Course Description:** This course discusses the fundamentals of testing DoD systems, with an emphasis on directed energy systems. Topics include:

- Overview of Defense Acquisition System
- Where do we start? - Good requirements
- The role of the Systems Engineering process
- Test Planning - when and what do we do it?
  - Test Development Strategy
  - Test & Evaluation Master Plan
  - Role of Test Lead manager
- Types of testing/when started/finished
  - Developmental Testing
  - Initial Operational T&E
  - Live Fire T&E
- Test execution and reporting
- Directed energy testing issues



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- Instrumentation
- Safety
- Training
- Best practices and lessons learned
- Some important test parameters of laser systems

Intended Audience: While the primary audience for the course remains DoD staff, DEPS shares the course broadly, not as a blueprint, but in a spirit of collegiality and an interest in contributing to others' efforts and continuing our collective dialogue about Directed Energy. As a basic introduction to T&E, it is suitable for personnel in other technical acquisition management and program management positions who want to understand more about T&E and the critical role it plays in DE system acquisition.

Instructor Biography: Robert (Bob) Newton is an advanced systems developer with nearly 20-year DE experience. Currently he leads a defense technology company in applying his over 35 years of US Air Force and commercial industry experience. Beginning with a technical education in Aerospace Engineering from The Ohio State University and the Georgia Institute of Technology, his mission perspective comes from F-16 fighter and special operations. He is an acquisition professional and test pilot with over 4500 hours in over 60 types of aircraft. His specific acquisition related responsibilities involved F-16 performance / flying qualities / avionics / sensors / weapons flight test and airworthiness certification, F-22 program management, Air Force Material Command headquarters, Pentagon Air Staff, and industry. He has commanded flying units and is a veteran of Operations ENDURING FREEDOM and IRAQI FREEDOM.

**Monday, 30 January**

**1:00 PM – 5:00 PM**

**Course 4. . Design of Tests for Transitioning DE Weapon Systems to Acquisition Programs for Warfighter Fielding**

Classification: Unclassified, Limited Distribution D

Instructor: Dan A. Isbell, USAF, Retired

CEUs awarded: 0.35

Course Description: Test & Evaluation (T&E) of Directed Energy (DE) Systems is nothing new; however, the purpose of testing is changing. DE's many decades of research focused testing is now transitioning to support programs of record that lead to fielded DE weapons systems. This course is designed as an entry level short course where the instructors will briefly review the T&E processes and highlight applicable DoD guidance. Since Directed Energy (DE) is a technology very different from the kinetic weapons that form the basis of DoD written guidance, the instructors will apply the core T&E principles to DE weapon system development.



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This will include familiarization about methodologies along with unique test range resources that are required for DE weapons T&E.

There are differences in DE T&E phases. For instance, laboratory Research and Development (R&D) T&E has a science and engineering focus. In contrast, DE T&E for defense acquisition of fieldable DE weapons for warfighters has a more combat operational focus. The course will highlight the distinct differences between these types of DE T&E to include the spectrum of R&D T&E, Developmental T&E (DT&E) and Operational T&E (OT&E).

The phases of DT&E and OT&E for DE weapon systems are the types of testing that lead to fielding a DE weapon system after it has been proven to meet technical system performance requirements, military utility, and operational suitability requirements. These combat-relevant areas of T&E also include Logistics T&E (LT&E), which are focused on validated reliability, maintainability, sustainability and other specific logistics requirements that help to determine DE weapon system mission availability in a realistic combat environment.

The course will emphasize the need to consider integrated mission-level T&E for DE weapons, since the cost (in time and resources) is very high if done in a sequential DT&E followed by OT&E, followed by LT&E (as was historically done for other types of systems). Live fire testing of DE weapon systems is costly, and the resources are precious and few in terms of full-scale DE weapon systems test ranges and instrumentation. Careful design of test principles can result in much more effective and efficient DE weapons T&E by integrating all the elements of DT&E, OT&E, and LT&E to the maximum extent possible.

Intended Audience: To understand the material in this course, the attendee should have already completed DE 101, or have prior familiarization with DE weapon systems.

Instructor Biography: Dan Isbell brings a broad range of expertise and experience to the defense and technology industry with his 27 years of service in the US Air Force. His insight comes from an educational background that includes a Master's degree in National Resource Strategy from the National Defense University, a Master's degree in Human Resource Management from Troy State University and a Bachelor of Science degree in Aerospace Engineering from Georgia Institute of Technology. During his Air Force career he also completed flight school, test pilot school, Senior Acquisition Manager's course, Industrial College of the Armed Forces and the professional military service schools.

Mr. Isbell's formal education and training founded his broad experience in aircraft and weapons airworthiness certification and program management, business development and integration, technology and engineering, fighter aircraft and special operations. His positions include Chief, F-16 Systems Program Office, Commander of 514th Flight Test Squadron, Operations Research Systems Analyst for Assistant Secretary of Defense for Program Analysis & Evaluation, Air



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Vehicle Program Manager for F/A-22 Systems Program Office, Chief of Weapon System Sector  
and Technology Integration Lead for Battlefield Air Operations Kit National Team.

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## **Course 5. HPM Modeling & Simulation Tools for T&E**

Classification: Unclassified, Limited Distribution D

Instructor: TBD

CEUs awarded: 0.35

Course Description: The Directed Energy Test & Evaluation Capability (DETEC) has developed two software tools to facilitate High Power Microwave (HPM) testing: HPM Test Hazard Prediction (THP) Tool and the HPM Target Surrogate Material (TSM) database. This short course presents an introduction to both. Drawing from propagation codes such as RF-PROTEC and the EMPIRE Suite, THP provides the T&E community with critical tools and information to mitigate safety and hazard risks to personnel and electronics during open-air tests of HPM systems. THP's essential functions include:

1. Support safety and regulatory compliance by calculating and displaying hazard boundaries
2. Prepare frequency clearance applications in Standard Frequency Action Format (SFAF)
3. Aid in identifying potential harmful effects to non-test site electronics
4. Display specific locations or boundaries with specified field levels

In this portion of the short course, students will see the code in action while instructors discuss: Modeling the Physical Scene, Specifying Scenario Input Parameters, Understanding & Selecting Propagation Models, Graphical Visualization and Output Products, Hazard Thresholds and Hazard Zones, Standard Frequency Action Format, Basic Weather and Atmosphere Models, transferring environmental data to THP, Loading and Using HPM Electric Field Sensor Data in THP. The TSM database is a browser based repository of information on hazardous materials as well as surrogates that can be substituted for these hazardous materials during HPM testing. The purpose of the tool is to provide the HPM T&E community with access to a database that contains information on hazardous materials, how to handle those materials during test, and commonly available materials that can be substituted for the hazardous materials. The TSM database's essential functions are to:

1. Access to the electromagnetic properties of hazardous materials
2. Suggestions for safe substitutes for those materials, to include electromagnetic properties



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3. Test Range unique restrictions on hazardous materials
4. Hazardous material handling instructions, including cleanup procedures

In this portion of the short course, students will see TSM in action while instructors discuss: Finding the electromagnetic properties of a hazardous material; Finding a surrogate for the hazardous material; Making plots of material properties as a function of temperature and frequency; Entering new materials into the database; Extracting the original sources of the electromagnetic data.

DEMER: The Directed Energy Models and Effects Repository's (DEMER) was created to aid and encourage the distribution of and collaboration on directed energy (DE) modeling and simulation (M&S) tools and effects data throughout the wider DE community. An appropriate collaborative environment was established to provide for community wide discovery of DE tools and effects data which balances security with utility. The distribution format ensures owners and creators the freedom of development for, and confidence in the ownership of, their products. To reach this end, DEMER's overarching philosophy will be 'Local Management, Enterprise Discovery.' DEMER is a secure web-based card catalog of meta-data files describing the current M&S capabilities and effects testing efforts. Using a meta-data format favors autonomy for resource owners by only describing pertinent details of their products, without surrendering control to a centralized database. The repository also provides the capability for members and agencies to catalog and organize their M&S and effects testing products internally, only sharing with the wider community those products they deem appropriate. In this portion of the short course, students will be given a walk-through tutorial on how to register and use the DEMER database.

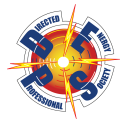
HPM PULSE: The High Power Microwave Procedures Leading to Standardized Effects (HPM PULSE) is a guidebook designed to standardize HPM effects testing and is meant to be used by both experienced and novice effects test personnel. It provides best practices and useful information on common aspects of HPM effects testing. The information included in HPM PULSE will aid personnel with test design and setup, as well as provide various quick reference charts, formulas, and other background information for use during the test execution. During this portion of the short course, students will receive an overview of the HPM PULSE guidebook to better understand how it can be used to aid in conducting HPM effects tests.

Intended Audience: The intended users of these HPM tools are test planners, spectrum managers, range safety personnel, test technicians or engineers, and environmental personnel involved in HPM testing.

Instructor Biography: TBD

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**Course 6. Test and Training Solutions with TENA, JMETC, and BDKM**

Classification: Unclassified, Public Release (Dist A)

Instructor: Gene Hudgins, TRMC, TENA/JMETC

CEUs awarded: 4

Course Description: Together, TENA and JMETC enable interoperability among ranges, facilities, and simulations in a timely and cost-efficient manner while BDA enables the application of advanced analytics tools to help quickly process, visualize, understand, and report what we have learned. TENA provides for real-time system interoperability, as well as interfacing existing range assets, C4ISR systems, and simulations; fostering reuse of range assets and future software systems. JMETC is a distributed, LVC capability which uses a hybrid network architecture; the JMETC Secret Network (JSN), based on the SDREN, is used for secret testing and the JMETC Multiple Independent Levels of Security (MILS) Network (JMN) is the T&E enterprise network solution for all classifications and cyber testing. JMETC provides readily-available connectivity to the Services' distributed test and training capabilities and simulations, as well as industry resources. Big Data Analytics (BDA) has demonstrated that applying enterprise big data analytic tools and techniques to T&E leads to faster and more informed decision making that reduces overall program cost and risk. This tutorial addresses using the well-established TENA and JMETC tools and capabilities combined with BDA tools and techniques to reduce risk in an often-uncertain environment; regularly saving ranges time and money in the process.

Intended Audience: Anyone wanting to use Enterprise Services of the TRMC will benefit from the Tutorial. Services include use of TENA, JMETC, Cybersecurity and Big Data/Data Analytics.

Instructor Biography: Gene Hudgins works for KBR as Director of Test and Training Environments and supports the Test Resource Management Center (TRMC) Test and Training Enabling Architecture (TENA) Software Development Activity (SDA) and Joint Mission Environment Testing Capability (JMETC) as the lead for the TENA and JMETC User Support Team. Since October 1998, the Central Test and Evaluation Investment Program (CTEIP) has overseen the development of TENA - which drastically improves range interoperability and resource reuse among DoD range systems, facilities, and simulations. As a key member of the TENA SDA and JMETC Program Office, Gene is responsible for Distributed Event Coordination, Design, and Integration. Gene also manages TENA training and Range Commanders Council coordination. Gene is an active member of the International Test and Evaluation Association (ITEA) and recently served as President on the Executive Committee of the ITEA National Board of Directors (BOD). Prior to this work for the TRMC, Gene worked on Eglin AFB as an Instrumentation Engineer and Department Head. Gene has a Bachelors Degree in Electrical Engineering from Auburn University (War Eagle!), a Masters Degree in Electrical Engineering from the University of Florida (Go Gators!), and an MBA from the University of West Florida.