MIL-STD-461G Training

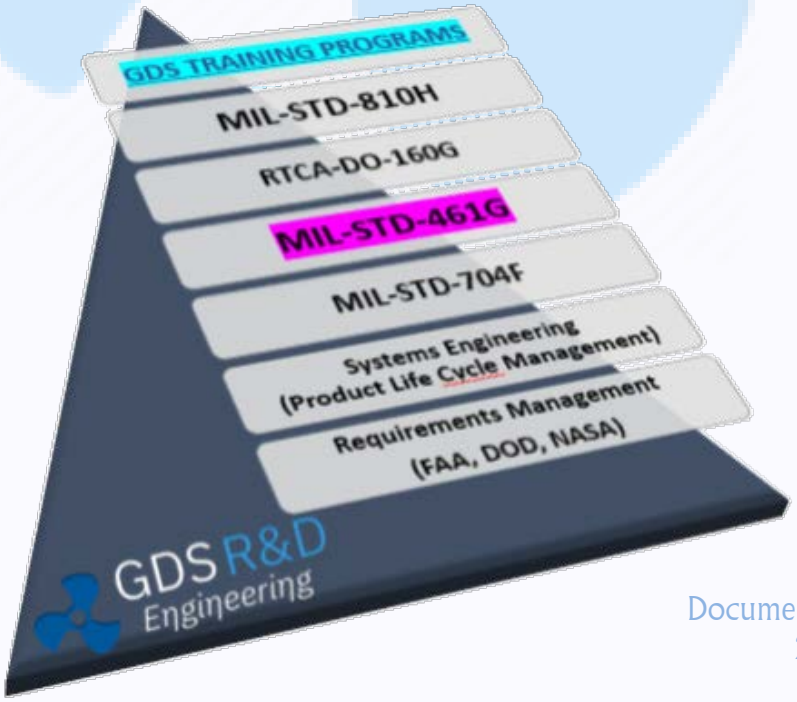
EMI/EMC Testing of Military Equipment

TRAINING PROGRAM DESCRIPTION

Two and a half days of
focused **International** and **Online** Training
on **MIL-STD-461G (& MIL-STD-464D)**

by

GDS Enginε^2ring R&D, Inc.



Document Revision Date:
2 February 2022

GDS Engineering R&D, Inc | GDS Mühendislik ARGE San. Tic. Ltd. Şti
TEKNOPARK ISTANBUL. Sanayi Mah. Teknopark Bul. 1/2C: 2008. 34906 Pendik – Istanbul
Tel: TURKEY +90 (537) 210-4068 | USA: +1 (937) 912-1220
E-mail : info@GlobalDynamicSystems.com; **Web:** www.GlobalDynamicSystems.com

Foreword

This training is an important step for testing your military equipment for Electromagnetic Interference (EMI) and Electromagnetic Compatibility (EMC) for the targeted test requirements described in MIL-STD-461G and platform requirements described in MIL-STD-464D. The training focuses on the test sections described in these standard documents:

"MIL-STD-461G
Requirements for the Control of Electromagnetic
Interference Characteristics of Subsystems and
Equipment"

and

"MIL-STD-464D
Electromagnetic Environmental Effects, Requirements
for Systems"

The Instructors share their experience and knowledge gained by working long years in the field with designing products and performing tests in accordance with such as MIL-STD-810H, RTCA-DO-160, and MIL-STD-461G. The slides are supported by many graphics and test videos for the efficiency and clarity of the information and each session is planned in accordance with the tests described in MIL-STD-461G. Sessions include presentations on platform level requirements, guides, and lessons learned items based on MIL-STD-464D. The training also includes test process and requirements overview in view of DOD Systems Engineering Processes. Dr. Ismail Cicek is the lead instructor of this training and several experienced test personnel and design engineers help complete the training sessions.

Purpose

The main goal of this training is to have a good understanding of equipment testing in accordance with MIL-STD-464G standard document.

The attendees completing this training are expected to have knowledge in the following areas:

- Understand MIL-STD-461G Standard Test Sections and Test Procedures
- Understand the MIL-STD-464D platform level requirements and additional material provided
- Be able to write a list of susceptibilities
- Understand the test process goals and activities
- Develop test plans, and schedule tests
- Execute tests
- Understand test results
- Create test reports
- Be able to resolve issues in the test results by means of change recommendations, or accepting the anomalies with risk assessment.

GDS Engineering R&D, Inc | GDS Mühendislik ARGE San. Tic. Ltd. Şti
TEKNOPARK ISTANBUL. Sanayi Mah. Teknopark Bul. 1/2C: 2008. 34906 Pendik – Istanbul
Tel: TURKEY +90 (537) 210-4068 | USA: +1 (937) 912-1220
E-mail : info@GlobalDynamicSystems.com; **Web:** www.GlobalDynamicSystems.com

Training Scope

The training sessions cover the following topics with annotated slides, test photos, videos, and additional reference material from standards, specifications, and FAA/EASA guides and documents:

- Systems Engineering Process Overview and Test & Evaluation (T&E): Important Concepts, such as Product Development and V&V Processes, Test Requirements, Requirements Management, Environmental Profile, and Mission Profile.
- Part 21 and FAA/EASA Regulations
- Understanding the Purpose of the Tests
- Test Category Selections
- Be able to Select Tests in MIL-STD-461G based on the Targeted Platform
- Develop a Susceptibilities List for Use in Test Plan and in Tests
- Understand Test Equipment, Chambers, and other Devices Use in Testing and Their Specifics
- Test Procedures and Other Technical Details for Running Tests
- Scheduling and Implementation of the Tests
- Review of Test Reports for all Test Procedures
- Design Issues, Discussion of Test Failures, and Recommendations
- Risk Management Process based on MIL-STD-882E
- Additional or Discussions with Other Standards and Test Recommendations

Read more details about this training content and schedule at the GDS Website: http://www.GlobalDynamicSystems.com

GDS Engineering R&D, Inc | GDS Mühendislik ARGE San. Tic. Ltd. Şti
TEKNOPARK ISTANBUL. Sanayi Mah. Teknopark Bul. 1/2C: 2008. 34906 Pendik – Istanbul
Tel: TURKEY +90 (537) 210-4068 | USA: +1 (937) 912-1220
E-mail : info@GlobalDynamicSystems.com; **Web:** www.GlobalDynamicSystems.com

Instructors

Training is provided by Dr Ismail Cicek and an Avionics Chief Engineer who is also a Certified Verification Engineer (FAA/EASA). Training is also assisted by our personnel experienced in design and environmental testing. The second instructor with CVE certification has over 18 years of experience. He has worked as the avionics systems chief engineer in product development of avionics systems. He is also experienced in the product testing per environmental and EMI/EMC standards and FAA/EASA certification processes.

Dr. Ismail Cicek studied PhD in Mechanical Engineering Department at Texas Tech University in Texas, USA. He studied included random vibration. He has both industrial and academic experience for over 30 years. He gained engineering and leadership experience by working in the United States Department of Defense projects and programs as systems development engineer for 15 years. He led the development of various engineering systems for platforms including C-5, C-17, KC-10, KC-135, and C-130 E/H/J. Dr. Cicek's experience includes unmanned aerial vehicle development where he utilized the Geographical Information Systems (GIS) and Malfunction Data Recorder Analysis Recorder System (MADARS) development for military transport aircraft.

Dr Cicek worked as the lab chief engineer for five years at the US Air Force Aeromedical Test Lab at WPAFB, OH. He received many important awards at the positions he served, due to the excellent team-work and his detail oriented and energetic personality. These included Terra Health's Superior Client Award in 2009 and Engineering Excellence Award in 2010 as well as an appreciation letter from the US Air Force Aeronautical Systems Center (ASC), signed by the commander in charge.

GDS Engineering R&D, Inc | GDS Mühendislik ARGE San. Tic. Ltd. Şti
TEKNOPARK ISTANBUL. Sanayi Mah. Teknopark Bul. 1/2C: 2008. 34906 Pendik – Istanbul
Tel: TURKEY +90 (537) 210-4068 | USA: +1 (937) 912-1220
E-mail : info@GlobalDynamicSystems.com; **Web:** www.GlobalDynamicSystems.com

Dr Cicek also established a test lab, called Marine Equipment Test Center (METC) and located at Istanbul Technical University, Tuzla Campus, for testing of equipment per military and civilian standards, such as RTCA-DO-160. Providing engineering, consultancy, and training services to many companies and organizations, Dr. Cicek has gained a good insight into the tailoring of standard test methods in accordance with military standards, guides, and handbooks as well as Life Cycle Environmental Profile LCEP) developed for the equipment under test.

Dr. Cicek also completed various product and research projects, funded in the USA, EU, and Turkey. He is currently teaching at Istanbul Technical University Maritime Faculty, Tuzla/Istanbul. He is the founding manager of the METC in Tuzla Campus of ITU. Meanwhile, he provided engineering services, consultancies, and training to many organizations for product development, engineering research studies such as algorithm development, test requirements development, and test plans and executions.

Dr Cicek worked as the Principle Investigator and became a Subject Matter Expert (SME) at the **US Air Force Aeromedical Test Lab** (WPAFB/OH) for certifying the products to the US Air Force Platform Requirements. He also developed Joint Enroute Care Equipment Test Standard (JECETS) in close work with US Army Test Lab engineers and managers.

Read DAU Paper: "A New Process for the Acceleration Test and Evaluation of Aeromedical Equipment for U.S. Air Force Safe-To-Fly Certification". Click to display this report.

GDS Team has provided MIL-STD-810, RTCA-DO-160, MIL-STD-461 training courses to more than five hundred students and over one hundred organizations around the world since 2009. Read more details about the instructors at https://www.GlobalDynamicSystems.com.

Training Schedule and Execution Type

- Online training using ZOOM.
- Led by live two instructors experienced in the field by both testing and lecturing.
- Two and a half days of focused online training schedule is typically as follows
  - 1st Day: 09:00 – 17:00 (Lunch Break between 12:30 and 13:30)
  - 2nd Day: 09:00 – 17:00 (Lunch Break between 12:30 and 13:30)
  - 3rd Day: 09:00 – 13:00
  - Time zone: Central European Time (CET)
- Attendees will receive a Training Certificate.
- Training includes knowledge check quizzes, a competition type, fun way or learning with prizes.

Visit GDS Website to check the calendar of scheduled training classes and for registration information. Or, send an email to us with your registration request: info@GlobalDynamicSystems.com.

Or call us to further discuss about your training needs. Ph: +1 (937) 912-1220 (USA) | Ph: +90 (537) 210-4068 (Turkey)

Our training calendar includes all open training classes, including RTCA-DO-160, MIL-STD-810, and MIL-STD-461.

GDS Engineering R&D, Inc | GDS Mühendislik ARGE San. Tic. Ltd. Şti
TEKNOPARK ISTANBUL. Sanayi Mah. Teknopark Bul. 1/2C: 2008. 34906 Pendik – Istanbul
Tel: TURKEY +90 (537) 210-4068 | USA: +1 (937) 912-1220
E-mail : info@GlobalDynamicSystems.com; **Web:** www.GlobalDynamicSystems.com

Training Material

The Instructors present the topics using the presentation slides with references to RTCA-DO- 160G sections and contents with the inclusion of information included from relevant regulations, standards, and specifications. The lecturers provide slides for sharing their own experience and knowledge gained by working long years in the field and performing tests in accordance with RTCA-DO-160, MIL-STD-810, and MIL-STD-461. The slides are supported by many graphics and test videos for the efficiency and clarity of the information.

The sides and other sharable course material will be shared with the registered students before the class using GOOGLE DRIVE.

- Registration includes all presentations and additional material shared before the class.

The RTCA-DO-160G standard must be purchased separately through RTCA, Inc. website at https://www.rtca.org/standards/publications/.

Training Contents (Detail)

2.5 days of training covers the following topics:

- EMI/EMC Training, Opening Session
  - General understanding of EMI and EMC.
  - Introductory Design Considerations: Grounding, Bonding, and Shielding.
- MIL-STD-461G Standard General Overview
  - Introduction & History
  - MIL-STD-461: General overview, definitions, nomenclature, purposes, language, and scope
  - MIL-STD-461 Contents Overview
  - General and detailed requirements
  - Selection of test methods and procedures based on the platform and equipment type
- MIL-STD-461G – CE Tests (Part I)
  - Conducted Emissions Test Methods CE101, CE102, CE106
  - Example Test Results and Report Reviews / Q&As
- MIL-STD-461-G – CE Tests (Part II)
  - Conducted Emissions Test Methods CE101, CE102, CE106
  - Example Test Results and Report Reviews / Q&As
- MIL STD 461G – CS Tests (Part I)
  - Conducted Susceptibility Test Methods CS101, CS103, CS104, CS105, CS109
  - Example Test Results and Report Reviews / Q&As
- MIL STD 461G – CS Tests (Part II)
  - Conducted Susceptibility Test Methods CS114, CS115, CS116, CS 117, CS 118
  - Example Test Results and Report Reviews /Q&As

GDS Engineering R&D, Inc | GDS Mühendislik ARGE San. Tic. Ltd. Şti
TEKNOPARK ISTANBUL. Sanayi Mah. Teknopark Bul. 1/2C: 2008. 34906 Pendik – Istanbul
Tel: TURKEY +90 (537) 210-4068 | USA: +1 (937) 912-1220
E-mail : info@GlobalDynamicSystems.com; **Web:** www.GlobalDynamicSystems.com

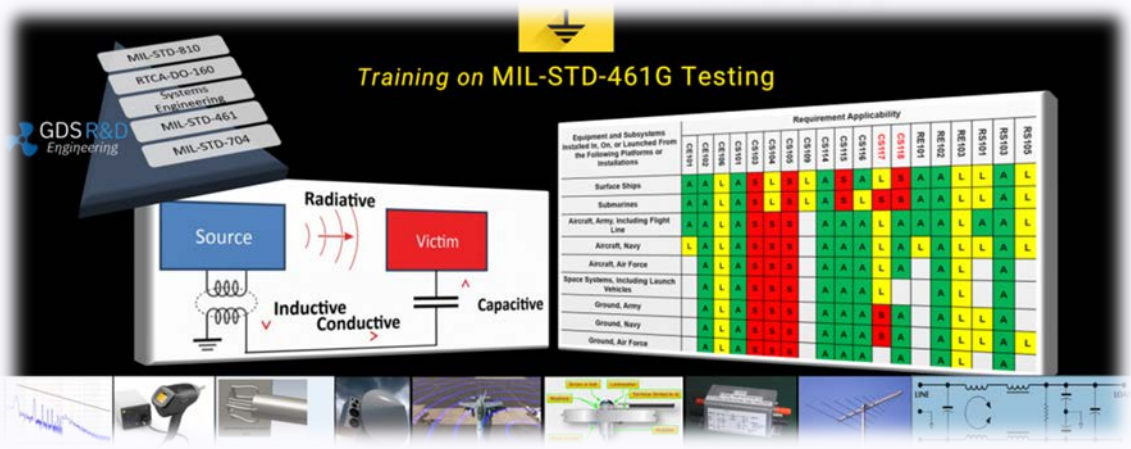
- Product Development and Certification Process
  - US DOD Systems Engineering V&V Processes, R&D Project vs. End Product
  - Certification Process (MIL-STD-461, MIL-STD-464, MIL-HDBK 516, US DOD SE)
  - US Air Force and US Army EMI/EMC Test and Certification Process
  - FAA/EASA Part 21 and Certification Process
- Documentation, Test Plans, and Test Reports
  - Test Plan Examples
  - Test Results and Risk Assessment / Test Reports
  - US DOD Data Items (DI) Forms and Data Item Descriptions (DID), governmental and non-governmental documentation
- MIL-STD-464 Standard
  - MIL-STD-461 vs MIL-STD-464
  - EMI/EMC Platform Level Requirements Review
  - MIL-STD-464 Guides: Requirements Rationale and Lessons Learnt Items
- MIL-STD-461G RS Tests
  - Radiated Susceptibility Test Methods RS101, RS103, RS105
  - Example Test Results and Report Reviews / Q&As
- MIL-STD-461G RE Tests
  - Radiated Emissions Test Methods RE101, RE102, RE103
  - Example Test Results and Report Reviews / Q&As
- EMI/EMC & Equipment Design
  - EMI/EMC and Equipment Design
  - EMI/EMC Analysis Software Programs and Application Examples
  - EMI/EMC Analysis Test Programs
- Additional Tests (RTCA-DO-160)
  - Power Input, RTCA-DO-160G Section 16
  - Magnetic Effect, RTCA-DO-160G Section 15
  - Lightning Direct Effects, RTCA-DO-160G Section 23
- Relevant Test Standards Summary Session
  - MIL-STD-464D Electromagnetic Environmental Effects, Requirements for Systems
  - MIL-STD-704F Aircraft Electric Power Characteristics
  - MIL-STD-1275E Interface Standard, Characteristics of 28 Volt DC Input Power to Utilization Equipment in Military Vehicles
  - MIL-STD-1399 Interface Standard, Section 300, Part 1 Low Voltage Electric Power, Alternating Current
  - MIL-STD-1399 Interface Standard, Section 300, Part 2 Medium Voltage Electric Power, Alternating Current

All MIL-STD-461G test sections are discussed and explained in detail, including

- The Purpose of the Test
- Test Configurations and General Requirements

GDS Engineering R&D, Inc | GDS Mühendislik ARGE San. Tic. Ltd. Şti
TEKNOPARK ISTANBUL. Sanayi Mah. Teknopark Bul. 1/2C: 2008. 34906 Pendik – Istanbul
Tel: TURKEY +90 (537) 210-4068 | USA: +1 (937) 912-1220
E-mail : info@GlobalDynamicSystems.com; **Web:** www.GlobalDynamicSystems.com

- Test Requirements and Procedures
- EMI Test Chamber / Test Equipment, Cabins, or Devices Test Environment
- Test Pass/Fail Criteria Test Procedures
- Test Setup: Test Setup (Tabletop) / Test Setup (Free Standing)
- Measurement Tolerances
- Evaluation of Results and Example Test Report Reviews
- Potential Failures and Design Recommendations Additional Discussions and Recommendations



GDS Engineering R&D, Inc | GDS Mühendislik ARGE San. Tic. Ltd. Şti
TEKNOPARK ISTANBUL. Sanayi Mah. Teknopark Bul. 1/2C: 2008. 34906 Pendik – Istanbul
Tel: TURKEY +90 (537) 210-4068 | USA: +1 (937) 912-1220
E-mail : info@GlobalDynamicSystems.com; **Web:** www.GlobalDynamicSystems.com

Organizational (Group) Training

- Upon request, a training can be customized to your organizational needs. In such cases, training could emphasize selected topics in more details with additional discussions and Qs & As.
- Considerable discounts will apply to organizational trainings.
- Please communicate with us to discuss further.

GDS Engineering R&D, Inc. is an official member of RTCA Organization.

GDS Engineering R&D, Inc | GDS Mühendislik ARGE San. Tic. Ltd. Şti
TEKNOPARK ISTANBUL. Sanayi Mah. Teknopark Bul. 1/2C: 2008. 34906 Pendik – Istanbul
Tel: TURKEY +90 (537) 210-4068 | USA: +1 (937) 912-1220
E-mail : info@GlobalDynamicSystems.com; **Web:** www.GlobalDynamicSystems.com

Our References

We have provided training courses to more than 100 companies and organizations and over 500 individual trainees so far.

GDS Engineering R&D, Inc | GDS Mühendislik ARGE San. Tic. Ltd. Şti
TEKNOPARK ISTANBUL. Sanayi Mah. Teknopark Bul. 1/2C: 2008. 34906 Pendik – Istanbul
Tel: TURKEY +90 (537) 210-4068 | USA: +1 (937) 912-1220
E-mail : info@GlobalDynamicSystems.com; **Web:** www.GlobalDynamicSystems.com