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51st Annual
FUZE
CONFERENCE

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Changing Safety Requirements

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"Changing Fuze Standards"

Weapon Evolution

- Modern Warfare is Not the Same as With Earlier Times
- Unintentional or Collateral Damage is No Longer Acceptable
- Weapon Systems Are Becoming More
  - Sophisticated
  - Specialized
- Fuzing Systems Must Adapt to New Requirements

Fuzing Needs

- Fuzing Systems Must Provide
  - Flexibility
  - Analytical Capability
  - High Reliability
- Most of all, Fuzing Systems Must Provide the Necessary Safety

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Fuzing Design

- As Fuze Requirements Increase, the Use of Electronic Sensing of Launch Environments Becomes Necessary
- Availability of Launch Environments are Reduced in Many Systems
- Programmability Requirements Increase
- Fuze/Weapon System Interfaces Become More Critical
- Fuze Requirements Become Considerably More Demanding

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In-Line Fuzing

- ESADs are Becoming the Answer to Many New Fuzing System Needs
- ESAD Electronic Sensors Can Monitor Events and Environments
- ESAD Electronics Can Verify That Environment Measurements are Within “Normal” Limits
- ESADs Can:
  - Monitor Events and Verify Their Sequencing and Timing
  - Respond to System Control Inputs
  - Can Respond to System Programming

Fuzing Requirements

- Fuzing Performance Requirements Need to Be Simplified to Provide Only the Necessary Capability
- Fuze Requirements Need to be a Part of Early System Design and Not an After-Thought
- Fuze Safety Requirements Should Only Specify the Safety Level Not How to Achieve It
- Personal Likes and Dislikes Should Not Define Fuze Safety Requirements

Fuzing Requirements Cont'd

- All Safety Review Boards Should Work to the Same Requirements
- Changes to Safety Requirements During a Development, Should Not Be Imposed on "In Process" Developments
- Safety Requirements Should Be Enforced Uniformly
- Everyone Needs to Understand That Our Function is to Get Adequate Fuzes to the Weapon Systems That Support Our Troops
- All Involved Need to Understand the Cost and Schedule Constraints

Fuzing Issues

- Bomb Fuzes With Many Arm Times Selectable in Multiple Ways
- Penetrating Fuzes With Large Numbers of Delay and Target Sensing Options
- Bomb Fuzes With Delays Up To 24 Hours (Also Adds a Safety Compromise)
- Application of Jolt and Jumble Environments to ESADs
- Impact Detonation Delays of a Few Microseconds (Testing of Same)
- Fuze Safety That Requires Up to Four Independent Arm Delay Timers
- Elaborate Interface Requirements (i.e. Firewire)
- 30 Minute Energy Bleed Time

Fuzing Issues Cont'd

- Verification of Safe/Arm Status in Unpowered State
- BIT Requirements
- Satisfying of All Component Specifications
- FPGA/ASIC/Microprocessor Common Mode Failure Requirements
- Generalized Component Requirements (i.e. 400VAC Non Initiation of EFIs)
- Unnecessary EMI/ESD Requirements
- UXO Versus Non-Hazardous Duds
- Dual Reset for all Complex Logic Devices

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We Need To Remember Our Mission!

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Conclusion

- Our Mission is to Provide
  - Competent
  - Reliable
  - Affordable, and
  - Safe Weapons to Our Armed Forces Who Place Their Lives on the Line to Protect our Country and Our Freedoms