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RDECOM



*Cluster Munitions Replacement
Joint Armaments Symposium
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TECHNOLOGY DRIVEN. WARFIGHTER FOCUSED.

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- Cluster Munitions have come under ever increasing scrutiny for unexploded ordnance (UXO)
- US submunition payloads are classified as Cluster Munitions & required to meet a <1% UXO rate by 2018
- “Legacy” cannon fire Cluster Munitions in inventory not compliant
- Retrofit Self-Destruct Fuzing Technology has not been able to reach <1% UXO in current systems
- Monitor Domestic & Foreign Policy
- Significant opportunity to provide solutions through maturation of viable technologies



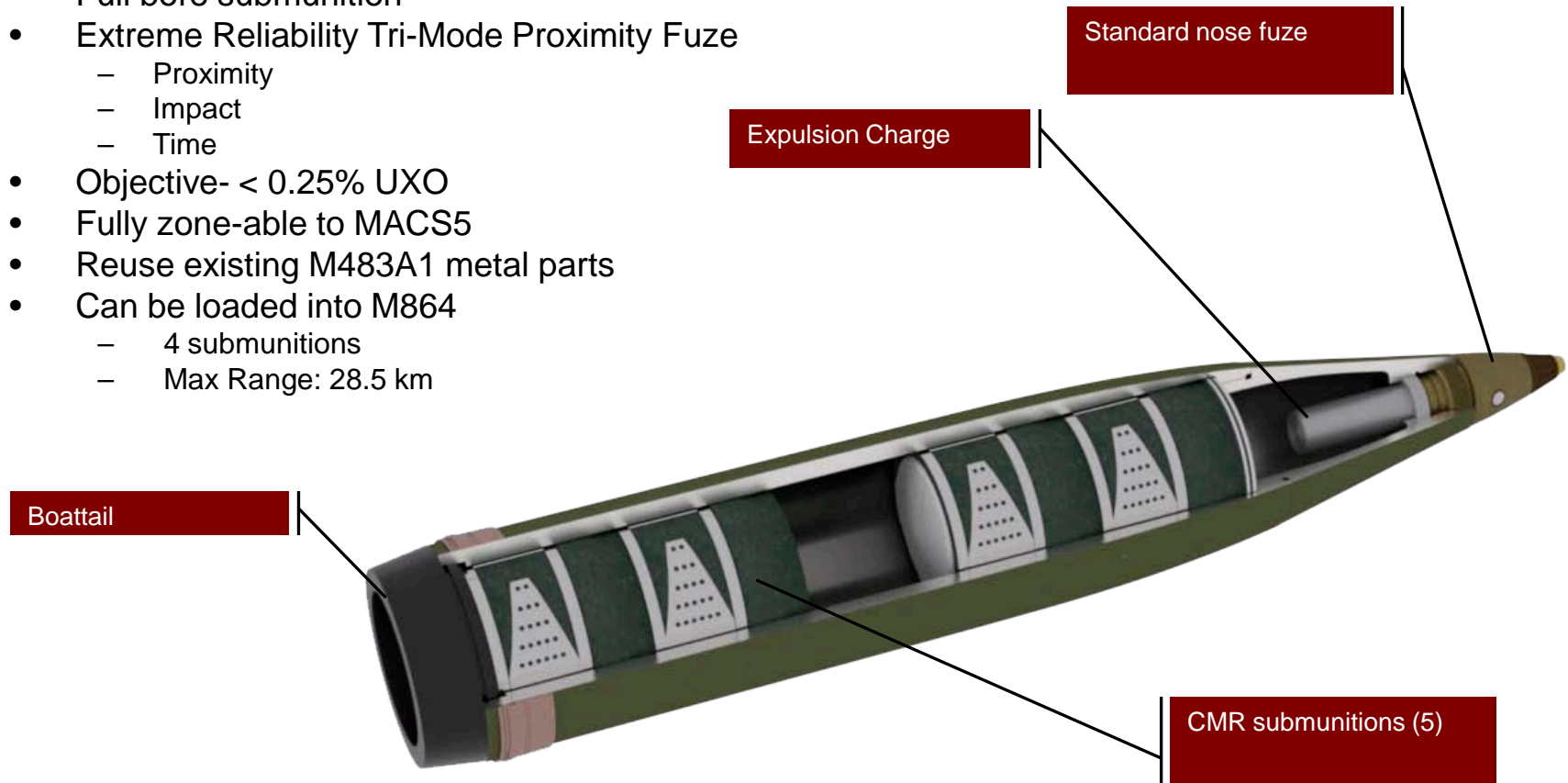


- OSD Policy
 - Memo release 19 June 2008 provides guidance on future cluster munitions
- Convention on Cluster Munitions (CCM), aka “Oslo Treaty”
 - Developed by countries in conjunction with non-government organizations (NGOs)
 - To date 111 countries have signed
 - Items exempt if certain criteria met
 - The US as well as other major producers of CM have ***not*** signed Oslo
- UN Convention on Certain Conventional Weapons (CCW)
 - Review conference was held in November 2011
 - Attempt to bridge gap between CCM-signatories and non-signatories
 - Consensus was not reached
 - No future discussions planned for CCW on CM



CMR features

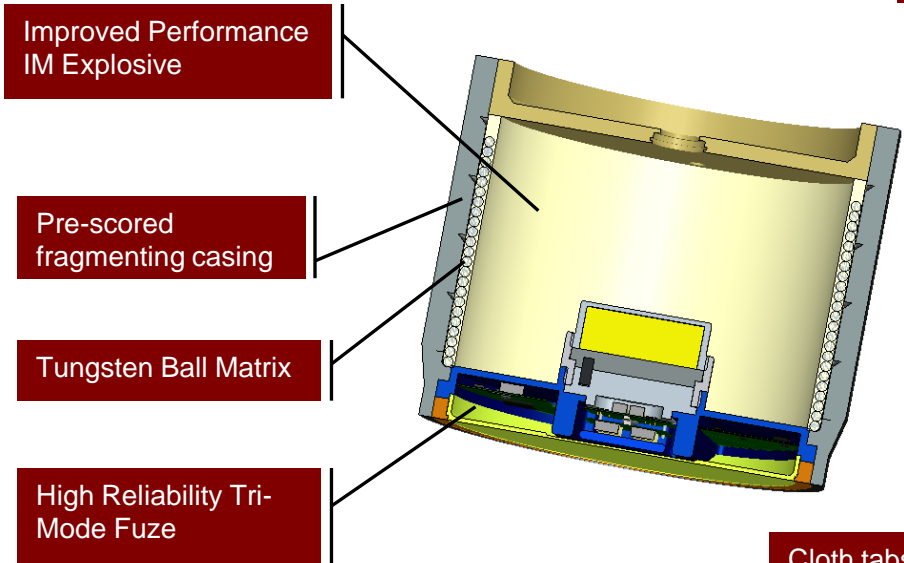
- Full bore submunition
- Extreme Reliability Tri-Mode Proximity Fuze
 - Proximity
 - Impact
 - Time
- Objective- < 0.25% UXO
- Fully zone-able to MACS5
- Reuse existing M483A1 metal parts
- Can be loaded into M864
 - 4 submunitions
 - Max Range: 28.5 km



M483A1 (5)
Max Range = 22 km



ARDEC's Cluster Munition Replacement (CMR)



Cross chute stabilizer



Cloth tabs that delay stabilizer deployment

Keyed to prevent relative rotation with carrier

Submunition de-spin fins

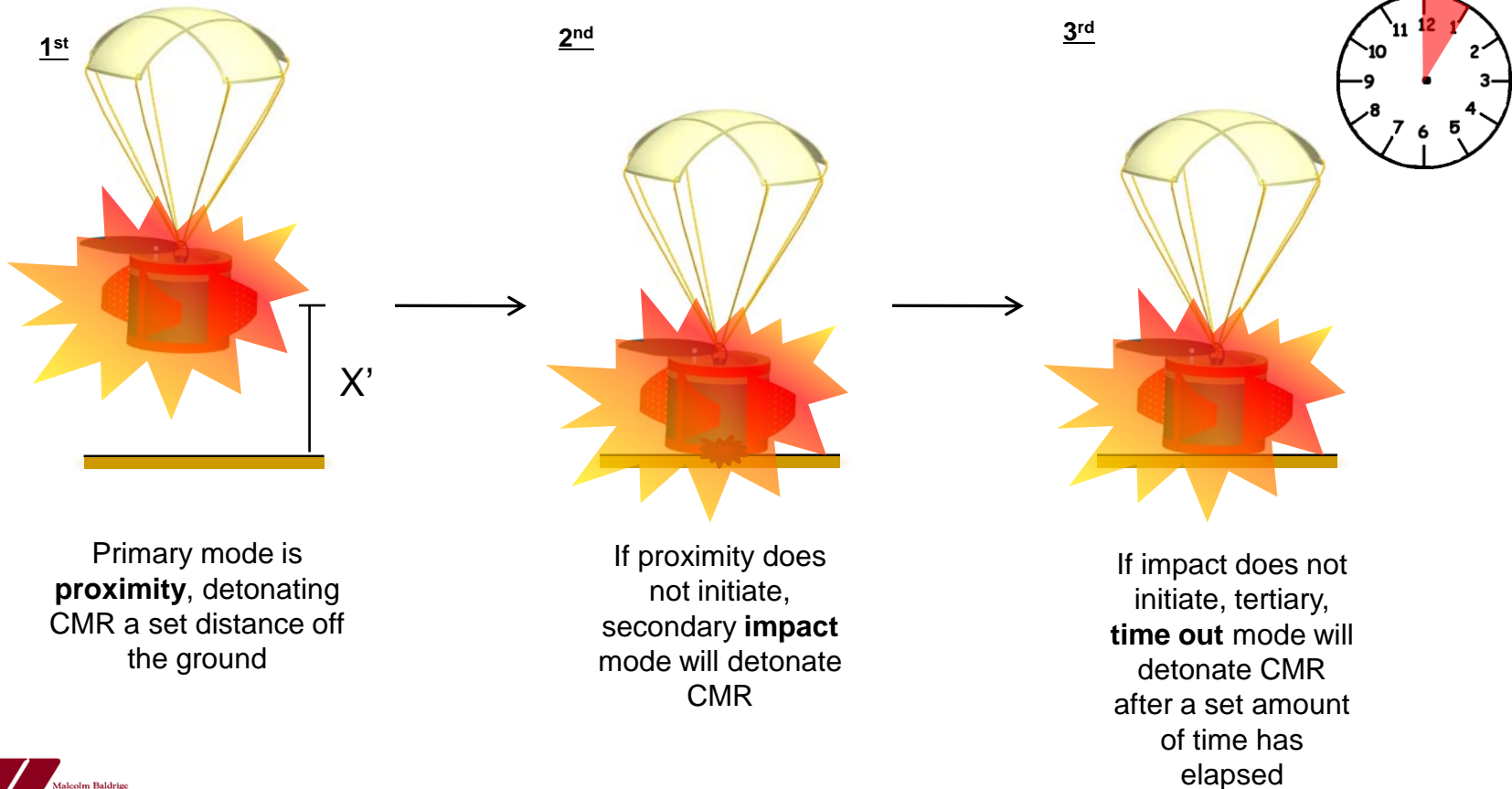


Patent Pending

TECHNOLOGY DRIVEN. WARFIGHTER FOCUSED.

Fuze Functioning

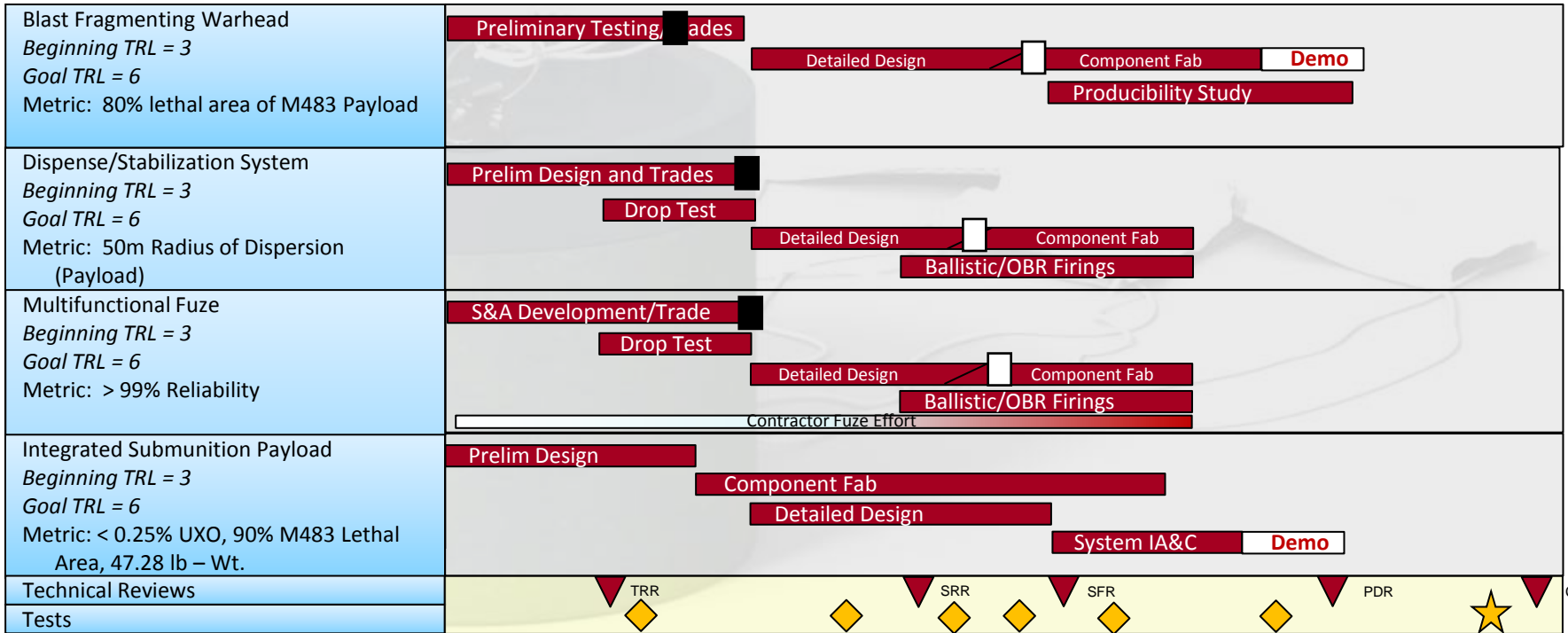
All three fuze functioning modes operate in parallel, removing common mode failures.
Provides a tactical 360° side attack in all three modes





Timetable	FY11				FY12				FY13				FY14		
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3

Program of Record: 155mm CM Replacement



Legend:

- △ Planned Start
- ▽ Planned End
- Planned Milestone
- ◇ Planned Significant Milestone
- ▲ Actual Start
- ▼ Actual End
- Actual Milestone
- ◆ Actual Significant Milestone



➤ Conducted at Blossom Point, MD

- Purpose: Collect data on fall/impact environments
- Observe performance of :
 - Fuze prototype (prox. and impact modes)
 - Stabilizer design

➤ Results

- On Board Recorders successfully recorded data from all drops (17)
- Drops were conducted with and without stabilizer
- Prox sensor worked for all fuzes tested
- Impact mode worked for all fuzes tested
- Stabilizer successfully controlled orientation





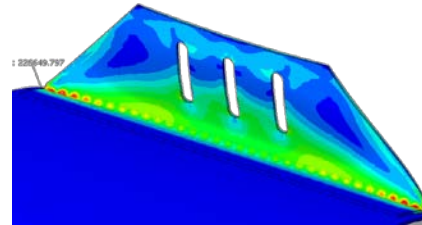
➤ Aero

▪ Stabilizer

- Fabricated dozens of stabilizers
- Conducted multiple wind tunnel tests
- Downselected stabilizer design

▪ Dispense

- Looking at concepts to aid separation
- Hardware being fabricated for ballistic test of concepts



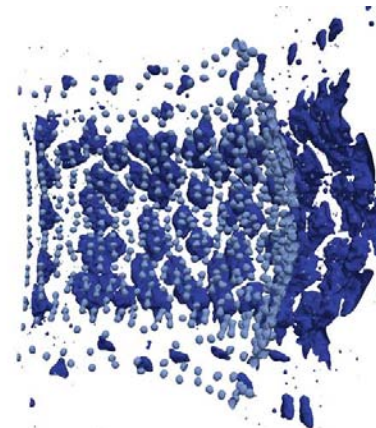
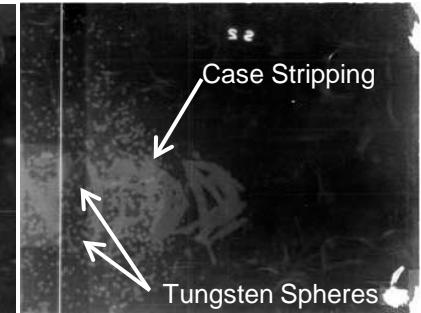
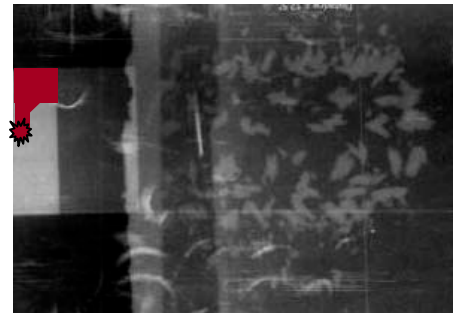
➤ Warhead

▪ Explosive

- IMX – 104 validated and selected as baseline explosive

▪ Testing

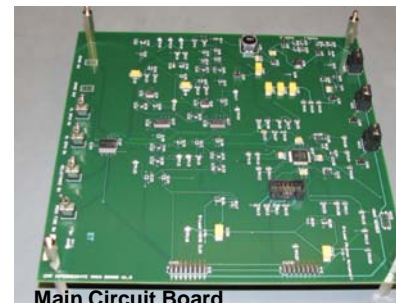
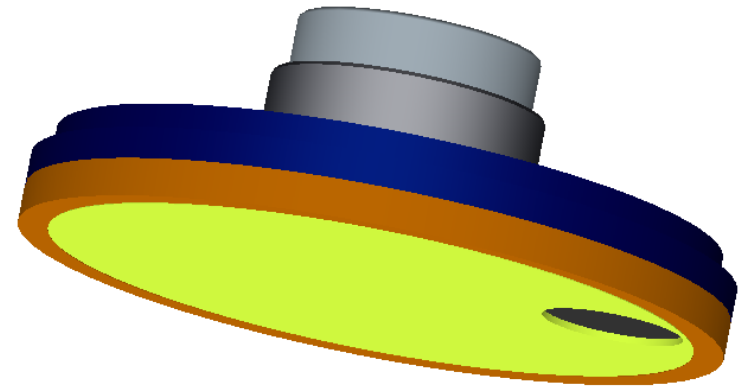
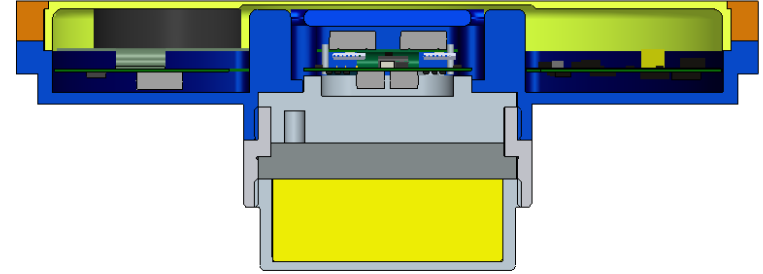
- Partial Arena and Water Pit testing conducted on 4 concepts
- Results **exceeded** M483A1 lethal area against personnel targets
- 2nd set of hardware with emphasis on lethality, survivability, cost and producibility are currently being fabricated



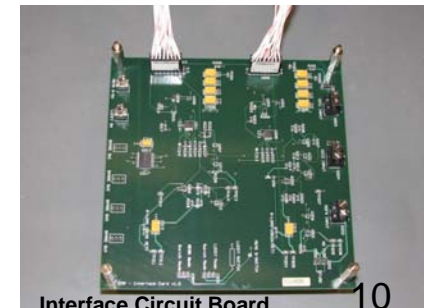


➤ Fuze

- Battery
 - Under development
- Mechanical Safe & Arm (S&A)
 - Rotor S&A
 - Successfully tested in airgun
- MEMS S&A
 - 36 out of 36 MEMS S&As successfully armed at setback acceleration from 2000 to 40,000 g's
 - Had proper command lock release function and full function of micro scale firing train
- Electronics
 - Circuit Card Assembly (CCA) design completed
 - Lab Testing yielded proper function with respect to time, function
 - Changes incorporated into 2nd revision boards- Feb 2012
 - Tactical boards in process



Main Circuit Board



Interface Circuit Board



- In 2018, User will lose Cluster Munitions
- Cluster Munitions still desirable from a capabilities perspective
- ARDEC currently developing a viable solution
 - Successful component tests completed
 - Ballistic tests to begin Summer 2012
- Mature advanced technology while leveraging existing components and hardware
- Design features being finalized
 - IM Explosive
 - Stabilizer
 - Power Source
- On track for TRL6 demonstration in FY14



