



M67 Hand Grenade – Redesign of C70 Detonator of M213 Fuze

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May 15 2008



Outline



- Introduction
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- Approach
- Work Accomplished & Results
- Conclusion
- Ongoing Efforts



Introduction

- M67 Hand Grenade not IM compatible
- Contains large quantities of lead based materials (primary explosives)
- Single Point Failure





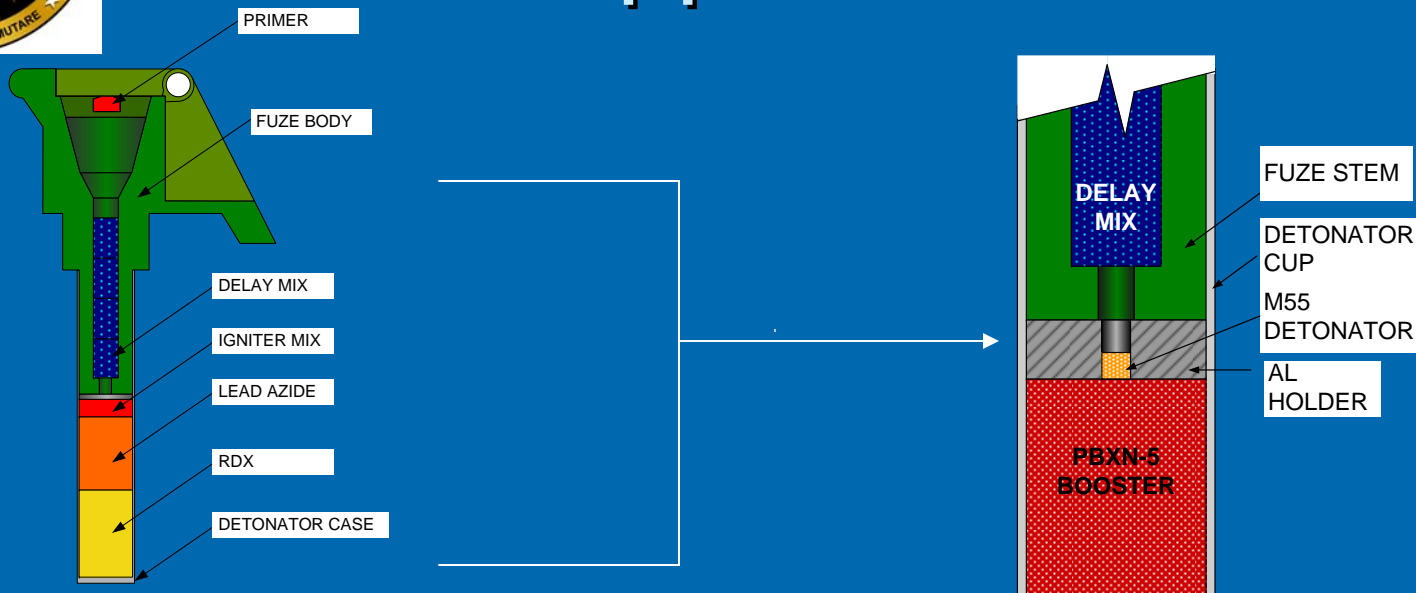
Objective



- Replace C70 detonator of M213 fuze - M67 hand grenade fuze
 - CONUS producible
 - Meet the IM requirements
 - Reduce amount of Lead Azide and Lead Styphnate
 - Improve Safety



Approach



➤ M55 Detonator to Booster

- Reduced quantity of lead azide and lead styphnate
 - Improve Safety
- Single point failure issue resolved



Work Accomplished



- Performed reliability tests of redesign of C70 detonator
 - 25 hot
 - 25 cold
 - Ambient
- Mini arena test
 - Standard
 - Hot
 - Cold



Reliability Test



- 25 standard M213 fuzes were tested and dent depth were measured
- 25 Hot M213 fuzes with new C70 detonator design were tested and its dent depth were measured
- 25 Cold M213 fuzes with new C70 detonator design were tested and its dent depth were measured



Reliability Tests - Setup





Reliability Tests - Results



	Standard M213 fuze Dent Depth (in)	Redesign – COLD Dent Depth (in)	Redesign – HOT Dent Depth (in)
Average	0.038	0.032	0.034
Std. Dev	0.002	0.004	0.004
Maximum	0.041	0.039	0.041
Minimum	0.035	0.024	0.026





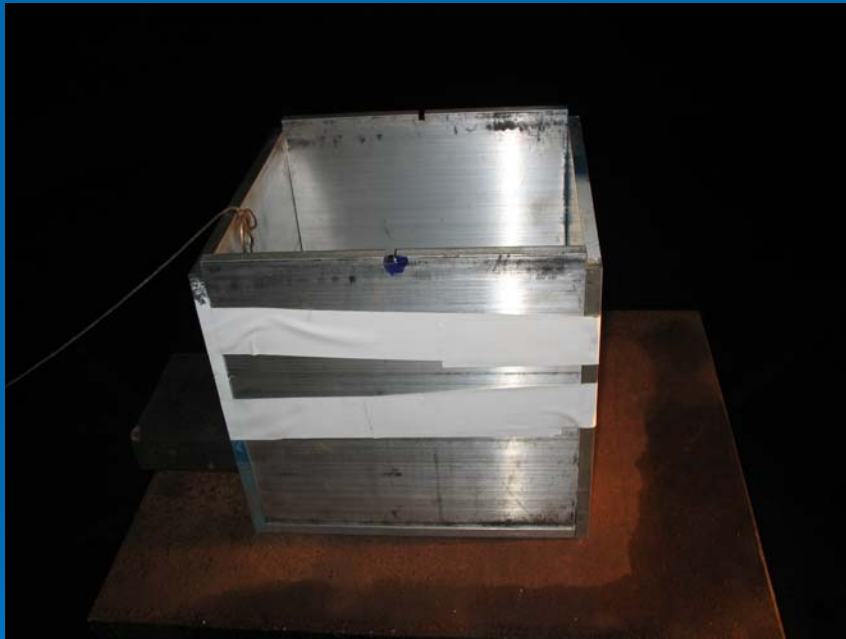
Mini Arena Test



- To see if the new design functions high order when loaded into the M67 Hand Grenade
- Also to see if it maintains the grenade's lethality



Mini Arena Test - Setup





Mini Arena Test - Results





Mini Arena Test - Results



No.	No. of fragments	Comments
Standard Cold	1312	This test was a short version of the sawdust fragment test. Not all the fragments were collected as the top was open. As can be seen from the results, the new design produces more or a comparable amount of fragments as compared to the standard design.
Cold 2	1337	
Cold 4	1312	
Cold 8	1379	
Cold 9	1217	
Standard Hot	1265	
Hot 3	1237	
Hot 5	1470	
Hot 6	1435	
Hot 7	1421	



Conclusion

- Reduced lead based materials (lead azide and lead styphnate) in the C70 Detonator
 - Improved Safety
 - CONUS producible
- Compares with standard configuration
 - Equivalence in Reliability
 - Equivalence in Lethality
 - Easier to produce
 - Improved safety in production



Ongoing Effort



- Do more reliability test before ECP to M213 fuze
- Test with IM booster materials