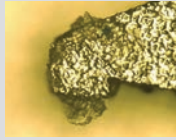


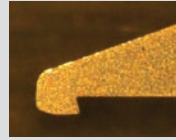
Micro Electrical Mechanical Systems Safe and Arm (MEMS S&A) Component Manufacturing Improvements

OBJECTIVE/SOLUTION:

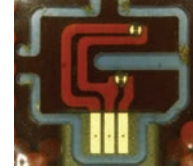
The objective of this effort is to bring innovative metal MEMS S&A technology to manufacturing readiness by eliminating touch labor/rework, establishing second sources for component parts, enabling optimized tolerances and reducing process variation to produce highly reliable devices. The development of high-volume, cost-effective manufacturing processes for MEMS scale components allows automated inspection and assembly to bring this disruptive technology to fruition in the fuzing market.



Powder Metal Injection Molding requires rework



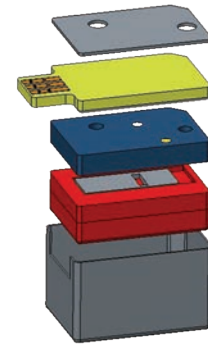
UV-LIGA Process allows defined part features



Embedded Resistor



Final MEMS S&A Package



Component Level Package

Achievements:

- New initiator boards have reduced lead time from 3 months to 3 weeks, and cost by an order of magnitude.
- Modeling and testing of explosive interfaces confirm critical processing steps and result in a design modification that facilitates explosive ink loading.
- Comprehensive margin study of the micro-scale fire train (MSF) conducted to optimize tolerances, designs, and processes.
- Frame/Diaphragm/Base components integrated into a single unit using both polymeric injection molding and die casting fabrication methods.
- UV LIGA replaces X-ray LIGA for SAM fabrication reducing both lead time and cost of complex MEMS mechanism.
- Ballistic testing of all ManTech initiatives demonstrates proper arming, detonation transfer, and viability of new components.
- Improved manufacturing readiness levels from MRL4 to MRL7

Benefits:

- High volume, cost-effective manufacturing processes for MEMS scale components
- Automated inspection and assembly to produce highly reliable metal MEMS S&A assemblies

Benefits (cont):

- Smaller S&A size and weight allows added capability or payload at system level
- Current focus is advanced medium caliber munition systems, including Increased Range Anti-Personnel (IRAP), which is a 40mm grenade capable of defeating targets in defilade.
- Additional transition opportunities include Cluster Munition Replacement Technologies (CMRT) and Lightweight 30mm for Apache.
- Replaces vendor unique processes with industry standard processes to develop high-volume, cost-effective manufacturing
- Reduces cost and lead times for key components, including initiator board, frame and Setback-Arm Mechanism (SAM).
- UV-LIGA advancements enable SAM manufacturing options and an integrated base/frame component (reducing part count).

Transition and Weapon Systems/Secondary Items Impacted:

- Increased Range Anti-Personnel Cluster Munition Replacement
- 40mm Grenade

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