

THE DESIGN OF CHEMICAL COMPONENTS THROUGHOUT THE LIFECYCLE OF TRACER AMMUNITION

ADVANCED CHEMISTRY – FINN MALLON

WHAT IS TRACER AMMUNITION AND HOW DOES IT WORK?

A SPECIAL TYPE OF AMMUNITION WHICH CONTAINS A PYROTECHNIC CHARGE IN ITS BASE. WHEN IT IS FIRED THE CHARGE IGNITES AND PRODUCES A BRIGHT, VISIBLE TRAIL OF LIGHT ALLOWING THE TRAJECTORY TO BE TRACKED.

THE PRIMARY USES WITHIN THE OME INDUSTRY ARE:

- ASSIST WITH IDENTIFYING TARGET POSITION
- SUPPRESSING FIRE
- SIGNALING AND CO-ORDINATION
- MAGAZINE EMPTY INDICATOR



CHEMICAL COMPONENTS USED IN TRACER AMMUNITION

■ PYROTECHNIC COMPOUND WHICH IS TYPICALLY MADE FROM STRONTIUM, MAGNESIUM OR BARIUM COMPOUNDS.

■ THE PRIMARY PYROTECHNIC COMPOSITIONS ARE:

■ RED TRACERS –

- STRONTIUM NITRATE
- STRONTIUM PEROXIDE
- MAGNESIUM METAL POWDER
- STRONTIUM CARBONATE

■ WHITE TRACERS –

- MAGNESIUM POWDER
- ALUMINIUM POWDER
- BARIUM NITRATE

■ GREEN TRACERS –

- BARIUM NITRATE
- BARIUM PEROXIDE
- MAGNESIUM POWDER



HOW IS TRACER AMMUNITION MADE?

THE CHEMISTRY BEHIND MAKING TRACER AMMUNITIONS PYROTECHNIC COMPONENT INVOLVES SEVERAL PRECISE STEPS TO CREATE A COMPOSITION THAT BURNS WITH THE CORRECT COLOUR, BRIGHTNESS AND DURATION. THESE STEPS ARE:

- CHEMICAL COMPOSITION FORMULATION
 - OXIDISER
 - FUEL
 - BINDER
 - ADDITIVES
- CHEMICAL MIXING PROCESS
 - DRY MIXING STAGE
 - WET MIXING STAGE
 - DRYING PROCESS
- CHEMICAL PROCESSING STEPS
 - OXIDISER PREPERATION
 - FUEL PROCESSING
 - BINDER PREPERATION
- QUALITY CONTROL
 - ANALYTICAL TESTING
 - PERFORMANCE CHEMISTRY

EXTRAS ADDED TO PYROTECHNIC COMPOSITIONS IN TRACER AMMUNITION

OTHER THAN THE PRIMARY PYROTECHNIC COMPOSITIONS, THE PYROTECHNICS USED IN TRACER AMMUNITION ALSO CONTAIN BINDING AND SUPPORTING COMPONENTS, OXIDISERS AND CATALYSTS AS WELL AS OTHER ADDITIVES.

- BINDING AND SUPPORTING COMPONENTS – MAINTAIN STRUCTURAL INTEGRITY, COMBUSTION CONTROL, ENVIRONMENTAL PROTECTION
- OXIDISERS AND CATALYSTS – OXYGEN SUPPLY, ENERGY PRODUCTION, COMBUSTION STABILITY. REACTION SPEED, COMBUSTION EFFICIENCY PERFORMANCE TUNING.
- OTHER ADDITIVES – ENHANCE PERFORMANCE AND RELIABILITY

THE OME LIFECYCLE OF TRACER AMMUNITION

THE LIFECYCLE OF TRACER AMMUNITION FOLLOW A COMPREHENSIVE PATH WITH STRICT CONTROLS AT EACH STAGE IN THE PROCESS:

1. RAW MATERIAL SOURCING

2. MANUFACTURING

3. CLASSIFICATION AND CERTIFICATION

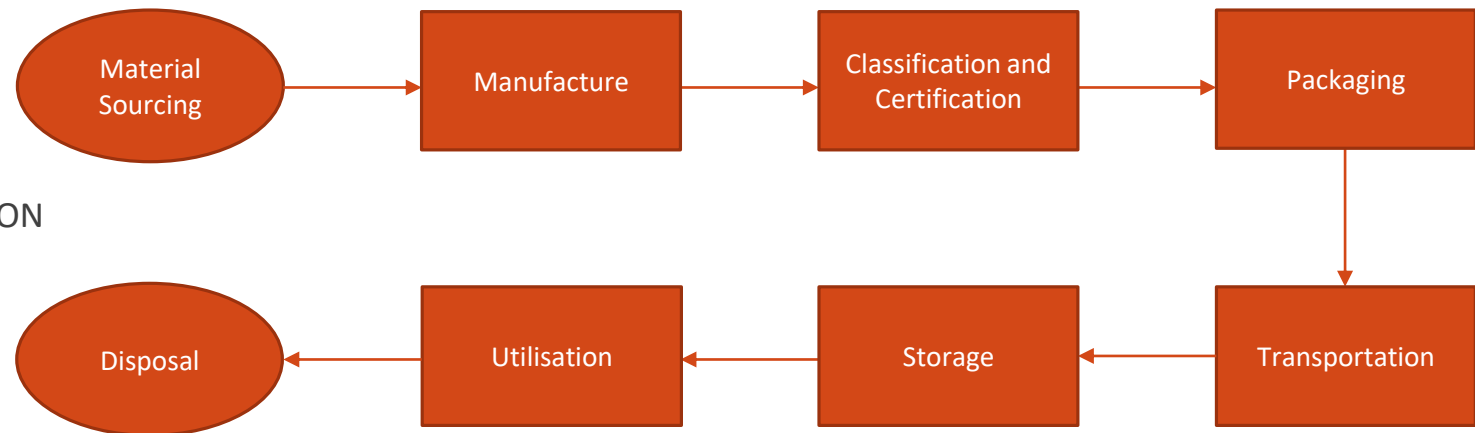
4. PACKAGING

5. TRANSPORTATION

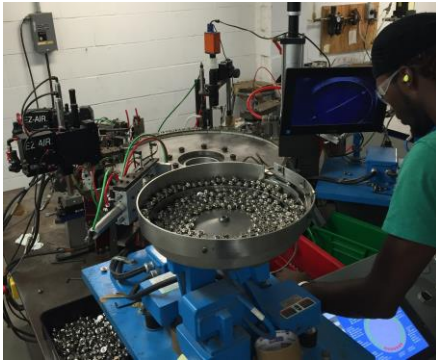
6. STORAGE

7. UTILISATION

8. DISPOSAL



TRACER AMMUNITION PYROTECHNIC COMPONENTS THROUGHOUT THE OME LIFECYCLE



THE ROLES AND BENEFITS OF BINDING AND SUPPORTING COMPONENTS THROUGHOUT THE OME LIFECYCLE OF TRACER AMMUNITION

MANUFACTURE – MIXING FACILITATION, PROCESSING SAFETY, CONSOLIDATION PROPERTIES, STRUCTURAL COHESION

TRANSPORTATION AND STORAGE – MECHANICAL PROTECTION, ENVIRONMENTAL BARRIER, THERMAL STABILITY, AGING RESISTANCE

DEPLOYMENT AND USE – CONTROLLED BURNING, ACCELERATION RESISTANCE, PERFORMANCE CONSISTENCY

DISPOSAL – CONTROLLED DECOMPOSITION, ENVIRONMENTAL IMPACT

SPECIFIC BINDERS AND THEIR LIFECYCLE BENEFITS

- CALCIUM RESINATE
- SYNTHETIC RESINS
- PVC BASED BINDERS
- WAXES

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