Remote Energetics Manufacturing Facility at Camp Minden

Technical Consultants, Inc.

Mixer & Extruder User's Group

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Problem Definition:

Previous methods of decoy flare composition manufacture involve:

- **Shock Precipitation**
  - **Large quantities of volatile solvents**
  - **Labor intensive processes**
  - **Generation of significant waste materials**
- **Muller Mixing**
  - **Muller mixing until acetone evaporates**
  - **Manual dumping, labor intensive**
  - **Hazardous handling of granulated material**

Continuous Processing

- Drivers:
  - Safety
  - Environmental
  - Quality
  - Cost
  - Product Flexibility

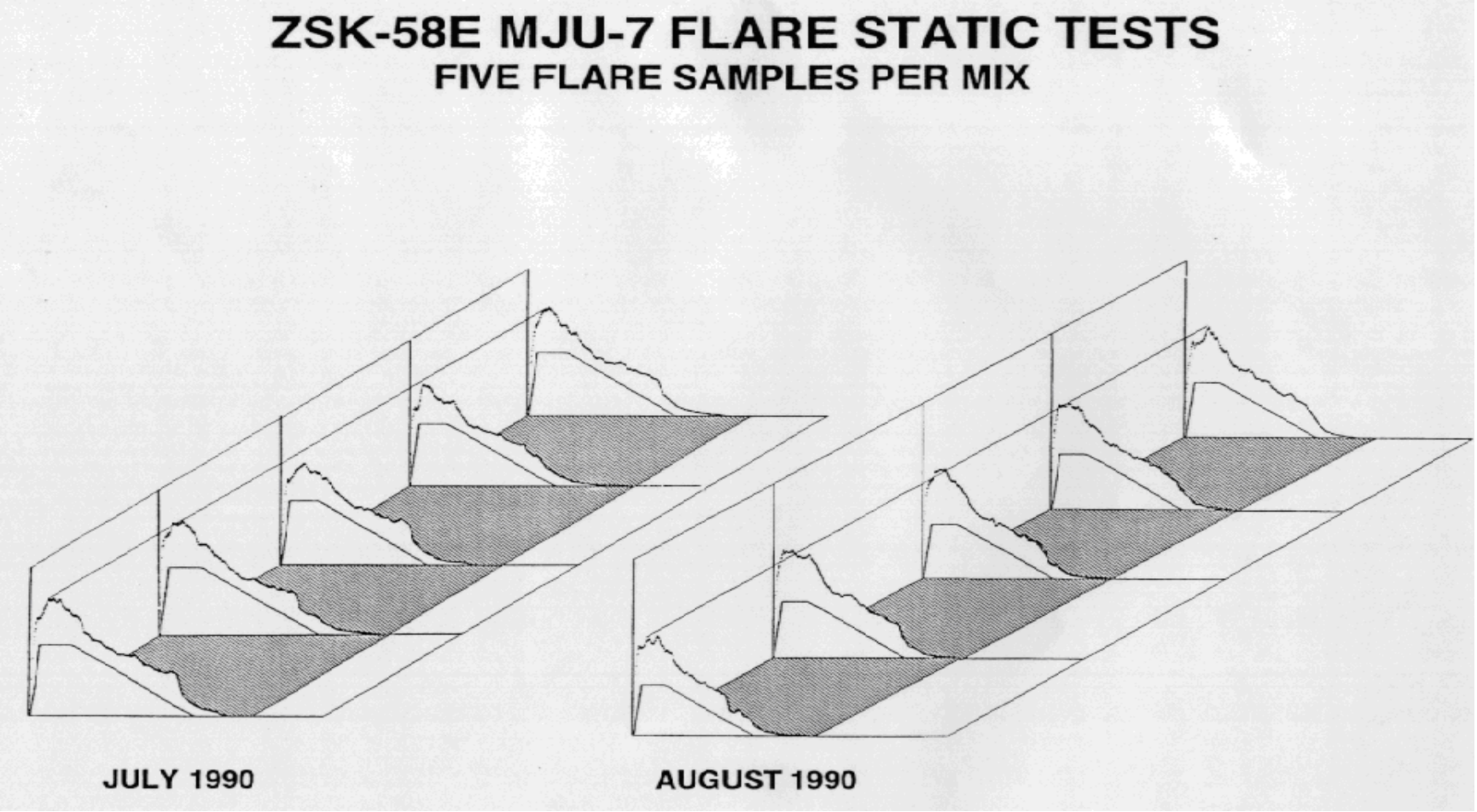
Safety Enhancement

- Raw Material Preparation
- Remote
  - Meter
  - Compound
  - Solvent Reduction
  - Granulate
  - Dry
  - Feed Extruder
  - Extrude Flare

Environmental

- Elimination of the need for hexane
- Solvent recovery of acetone
- Very low scrap rate

Quality


ZSK-58E MJU-7 FLARE STATIC TESTS
FIVE FLARE SAMPLES PER MIX
JULY 1990
AUGUST 1990

Cost

- Reduction in personnel
  - Mix crews
  - Extruding crews
  - Support & transportation crews
- Reduction in waste
- Reduced solvent usage

Product Flexibility

- **Infrared Decoy Flares**
  - **PTFE, magnesium, Hytemp binder – MJU-7, ALA-17, M-206**
  - **PTFE, magnesium, fluoroelastomer binder – Navy MJU Series**
  - **Excellent homogeneity and reproducibility of composition**
- **TPE LOVA**
  - **TPE, RDX, NC, energetic plasticizer, ethyl centralite**
  - **110 lbs extruded, chopped and reprocessed three (3) times**
  - **Final extrusion and testing showed excellent quality**

Product Flexibility (cont-)

- **Solvent Processed LOVA – M39 & M43**
  - **CAB, NC, RDX, energetic plasticizer, ethyl centralite, LICA-12**
  - **Compounded and extruded in 19 perf configuration continuously**
  - **Good SEM, goodness-of-mixing was superior to batch mixes**
- **Composite Explosive (PAX-4)**
  - **CAB, TEGDN, DEGDN, HMX**
  - **Granular explosive (similar to LX-14) produced**
  - **Pressed in warheads at Iowa AAP with good characteristics**
- **Composite Explosive (PAX-2A)**
  - **CAB, Energetic Plasticizer, HMX**
  - **Granular explosive produced (1000 lb)**
  - **Pressed in warheads at Iowa AAP with good characteristics**
- **Black Powder Substitutes**
  - **Phenolphthalein based substitute**
  - **Modified KNO3/S/Charcoal with binder**
- **Other commercial applications**

Summary

Why Twin Screw Pyrotechnic Production Facility ?

- **Major Safety Improvement**
  - **Minimal in-process energetic materials**
  - **Reduced personnel exposure/remote operations**
  - **Ease of maintenance and cleanup**
  - **Reduced volatiles/solvents in closed loop system**
  - **Significantly reduced damage risk to facilities/equipment**
- **Improved Environmental Controls**
  - **Environmental controls designed into system**
  - **Hazardous material minimized**
  - **Closed loop system**

Summary (cont-)

- **Lower Cost**
  - **Less direct labor**
  - **Reduced processing time/eliminate process steps**
  - **Less maintenance/cleanup time**
  - **Reduced production waste**
  - **Minimal production down time due to an incident**
- **Product Quality**
  - **Improved homogeneity**
  - **Demonstrated process control**
  - **Reduced scrap**
  - **Reduced performance variability**

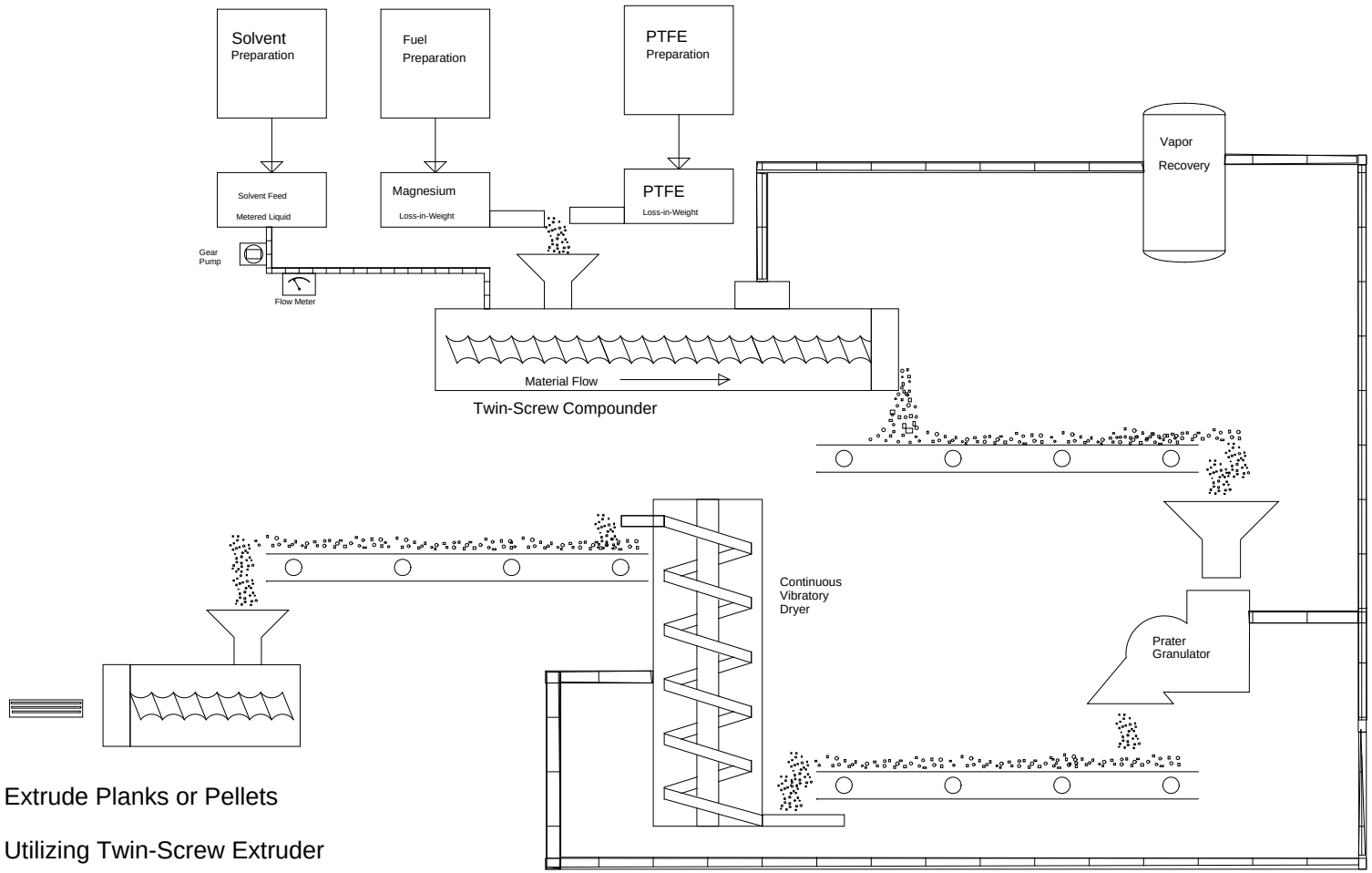
Summary (cont-)

- **Flexible Product Capability**
  - **IR flare compositions**
  - **IR night vision compositions**
  - **Nitramine gun propellants**
  - **Nitramine explosives**
  - **PBX compositions**
  - **Composite rocket propellants**
  - **Single-base gun propellants**
  - **Illuminant compositions**
  - **Delay compositions**
  - **Tracer compositions**
  - **Black powder substitute**
  - **Black powder propellant substitute**

Remote, Energetics Manufacturing Facility at Camp Minden

- Based upon technology developed at the Longhorn Army Ammunition Plant by TCI personnel from 1986-1996.
- Phase 1 completed 11 April 2006 for $993,444.
- Phase 2 contracted on 16 March 2007 for $1,137,387.
- Phase 3 funded in 2007 DoD Budget for $957,375.
  - Total: $3,088,206

Block Diagram



Extrude Planks or Pellets

Utilizing Twin-Screw Extruder

New Facility at Camp Minden

- David Turner will present the current project status.