2021 NDIA Future Force Capabilities Conference

Modernizing the Energetics Manufacturing Industrial Base

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FRANKLIN
engineering group, inc.

Presentation Overview

- Franklin Engineering Group Introduction
- Modernization Process
- Modernization Challenges
- Lessons Learned
- Success Stories
- Conclusion

Franklin Engineering Overview

- Multi-disciplinary engineering services company
  - Chemical
  - Mechanical/Structural
  - Electrical, Instrumentation and Controls
  - Environmental
- Office located in Franklin, TN (Nashville)
- 20 plus years of executing projects for energetics and munitions production processes
- Small Business

Franklin Clients

Government	
Radford RFAAP	Indian Head NSWC
McAlester AAP	Picatinny Arsenal
Crane NSWC	Lake City AAP

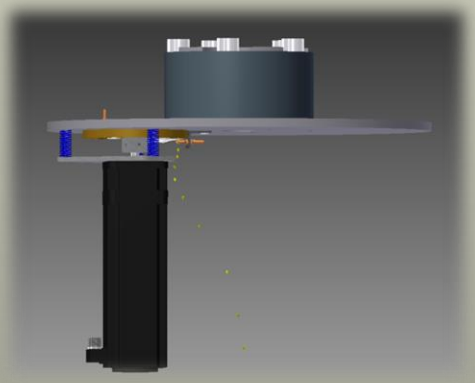
Commercial	
Eastman Chemical	Pacific-Scientific
Solvay	Tesla
Mitsubishi	Nissan

Hazardous Materials Experience

- Munitions, Ammunition, and Primers
- Propellants: Single, double, triple–based
- Explosives
  - TNT
  - PAX
  - PBX
  - Lead azide
  - Lead styphnate
  - MIC
  - HMX
  - PETN
  - KDNBF
  - DDNP
  - ZPP
- Magnesium and aluminum powders
- MTV flare composition
- Elemental phosphorus, white and red
- Phosphine gas
- Lithium and sodium metal
- Ammonium Perchlorate

Energetics Processing Experience

- Mixing/blending
- Granulating
- Slurry handling
- Drying and filtration
- Net-shape pressing
- Cast-cure filling
- Extrusion
- High speed cutting
- Pick and place handling
- Gravimetric and volumetric filling
- Abrasive jet cutting and high-pressure water washout
- Waste incineration
- Solvent/vapor recovery and distillation
- Render-safe and demil systems



Modernization – What?

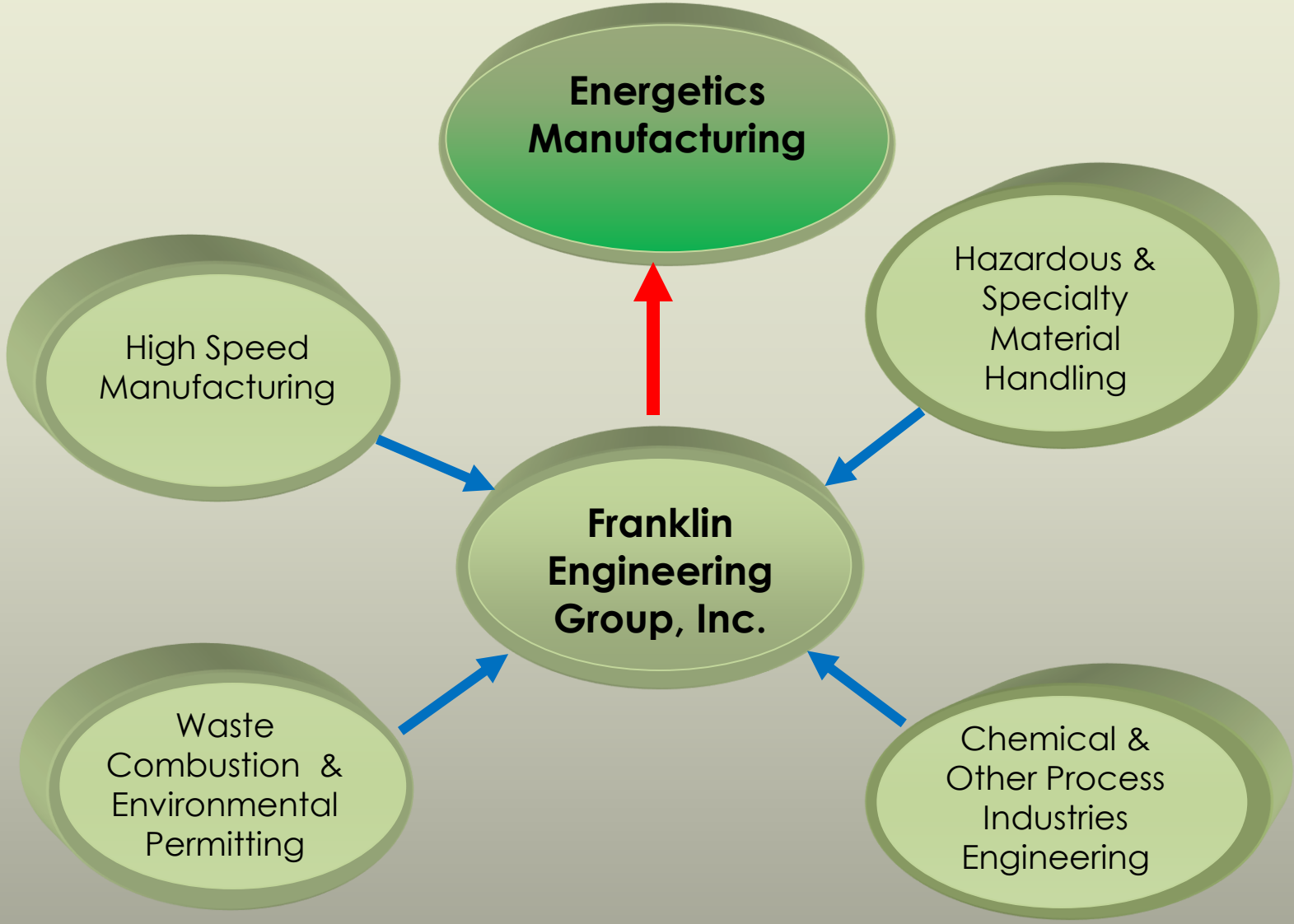
- Efforts to update current energetics manufacturing facilities
- Facilities and processes designed and constructed during WWII era (1940/50's) compared to current design and construction.

- 1950's Technology



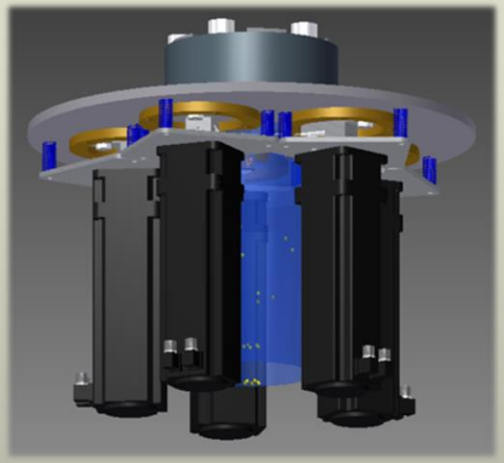
- Modern Technology


Industries


Energetics Manufacturing
High Speed Manufacturing
Hazardous & Specialty Material Handling
Franklin Engineering Group, Inc.
Waste Combustion & Environmental Permitting
Chemical & Other Process Industries Engineering

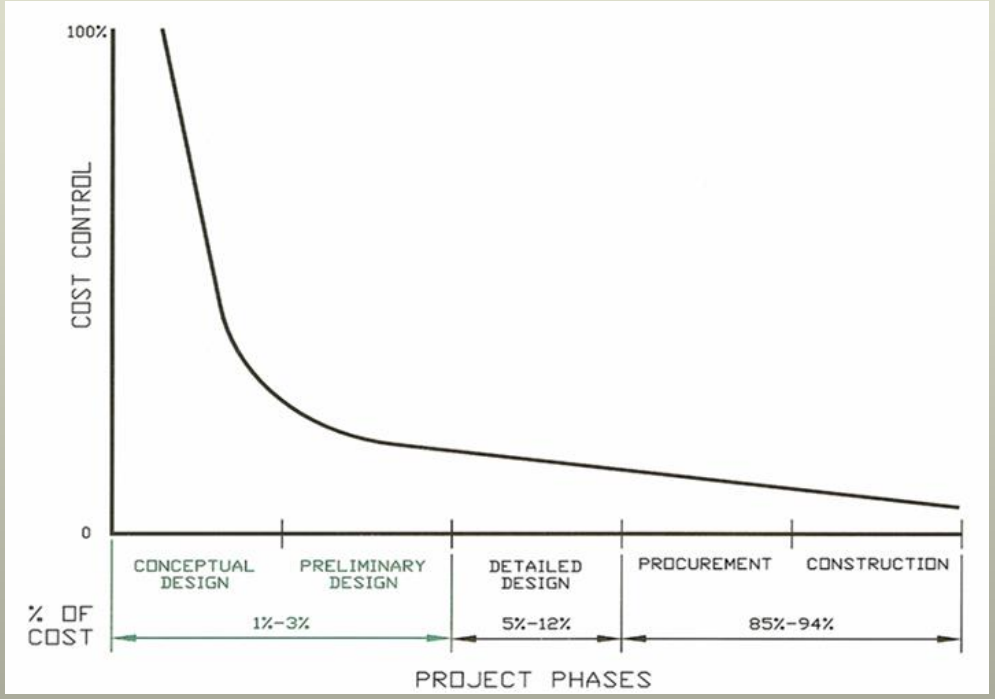
Modernization – Why?

- Safety
  - Remove operators from dangerous activities
- Quality
  - Increase consistency and improve inspections
- Production capacity and reliability
  - Improved rates with automation
- Cost
  - Reduced operating costs
- Environmental Benefits
  - Reduced emissions
- Sustainability
  - Long term viability
- Competitive
  - Remain competitive in the global market



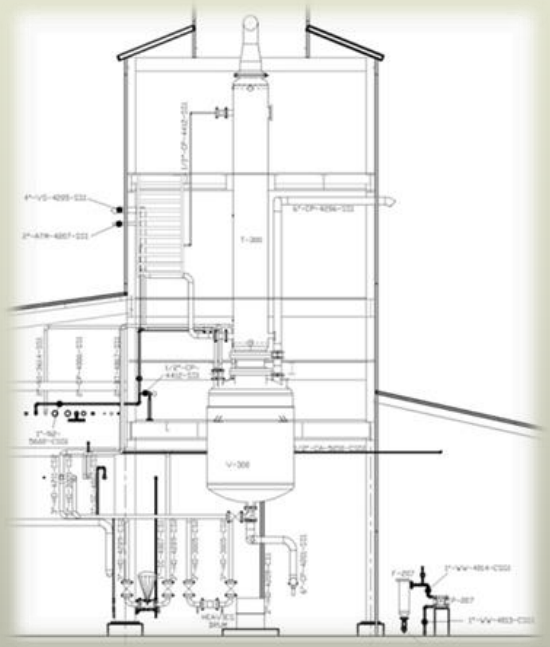
Modernization – How?

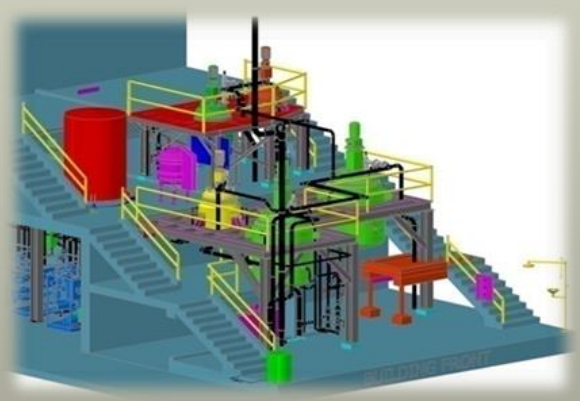
- Phase 1: Conceptual Design
- Phase 2: Development and Testing
- Phase 3: Detailed Design
- Phase 4: Construction and Installation
- Phase 5: Commissioning



Phase 1 – Conceptual Design

- Project definition and scope
- Define production and flexibility requirements
- Determine overall throughput
- Clearly define project requirements
- Survey modernization technology
- Evaluate custom solutions
- Select best viable technology solutions
- Identify facility, utility, environmental, and infrastructure constraints





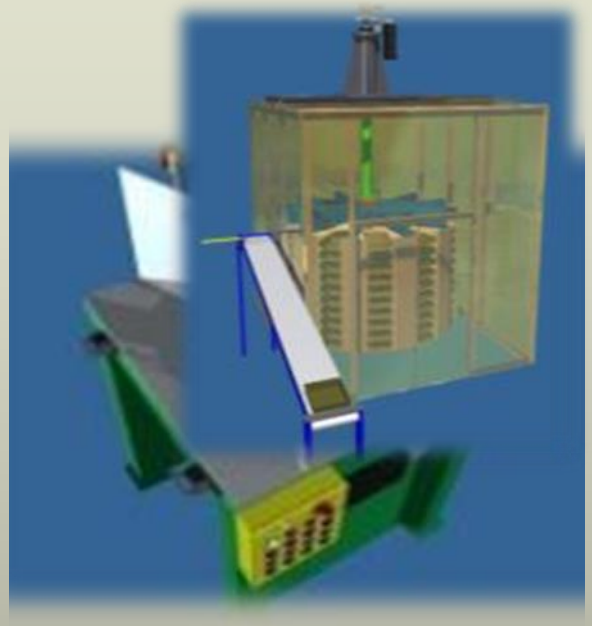
Phase 2 – Development and Testing

Objective:

Identify and validate technologies to replace aged production processes

Approach:

1. Research
2. Screening
3. Testing
4. Selection



Phase 3 - Detailed Design

- Mechanical and electrical design
- Facility design
- Safety approvals (Local, USACE, DDESB, etc)
- Generate construction drawings

Phase 4 – Construction & Installation

- Construct facilities (modify existing facilities)
- Fabricate custom equipment
- Purchase COTS equipment
- Install building equipment and process equipment

Phase 5 – Commissioning

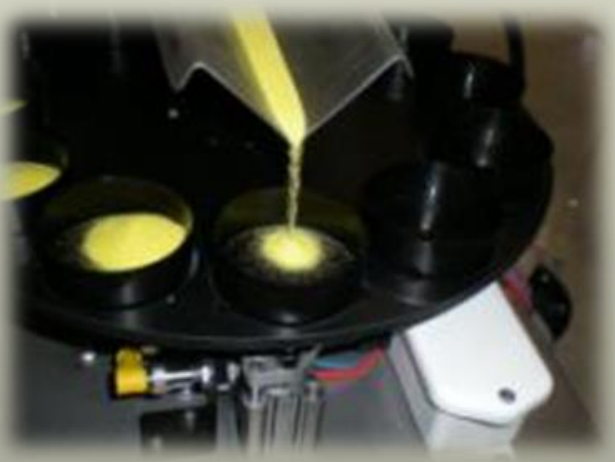
- Equipment check-out
- Testing (inert batches)
- Start-up

Modernization – Challenges

- Safety
  - Electrical classifications
  - Change from traditional processes
- Justification
  - Cost / Funding
- Facilities
  - Older buildings
  - Infrastructure
- Schedule
  - Development time
  - Safety approvals
  - Product qualifications
  - Building upgrades or new construction

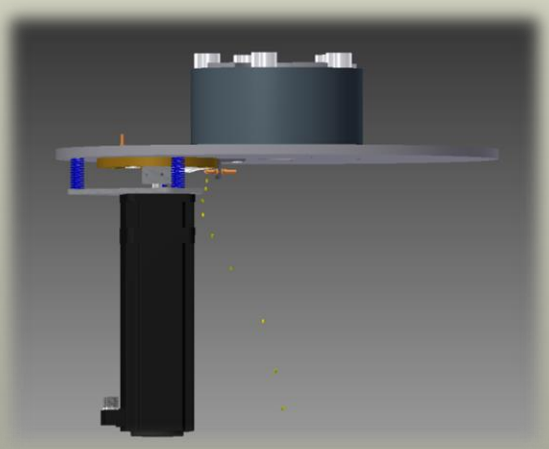
Modernization – Lessons Learned

- Safety – Always the Top Priority
- Think outside the box
- Leverage other industries
- Correctly identify problem
  - Proper scope development
  - Don't rush FEL engineering
- Funding
- Approval cycles



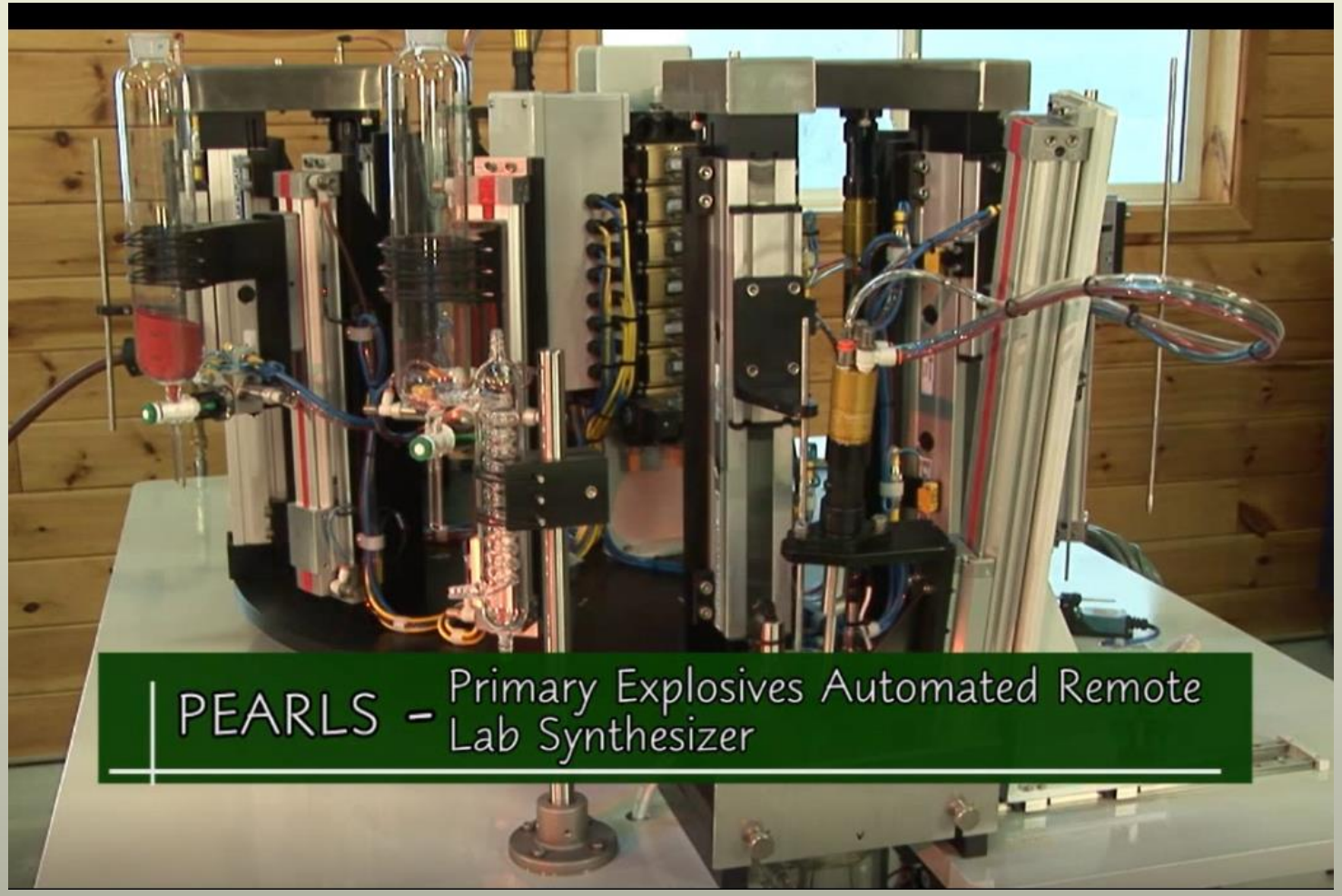
Successful Projects

- MTV Manufacturing
- Explosives Mixing
- Drying and filtration
- Pressing & extrusion
- Cast-cure filling
- High speed cutting
- Pick and place handling
- Primer assembly
- Abrasive jet cutting
- Waste incineration
- Solvent/vapor recovery
- Render-safe and demil systems



Automated mixing – Various Energetics

Primary Explosives



Modernization - Summary

- What?
  - Bringing the energetics manufacturing process into the 21st century

- Why?
  - Safety, quality, cost, sustainability
- How?
  - Follow a proven modernization process and leverage technologies from the chemical, pharmaceutical, automotive industries
- When?
  - NOW, before falling further behind
- Questions?