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Facility Infrastructure Study for Caseless Ammunition

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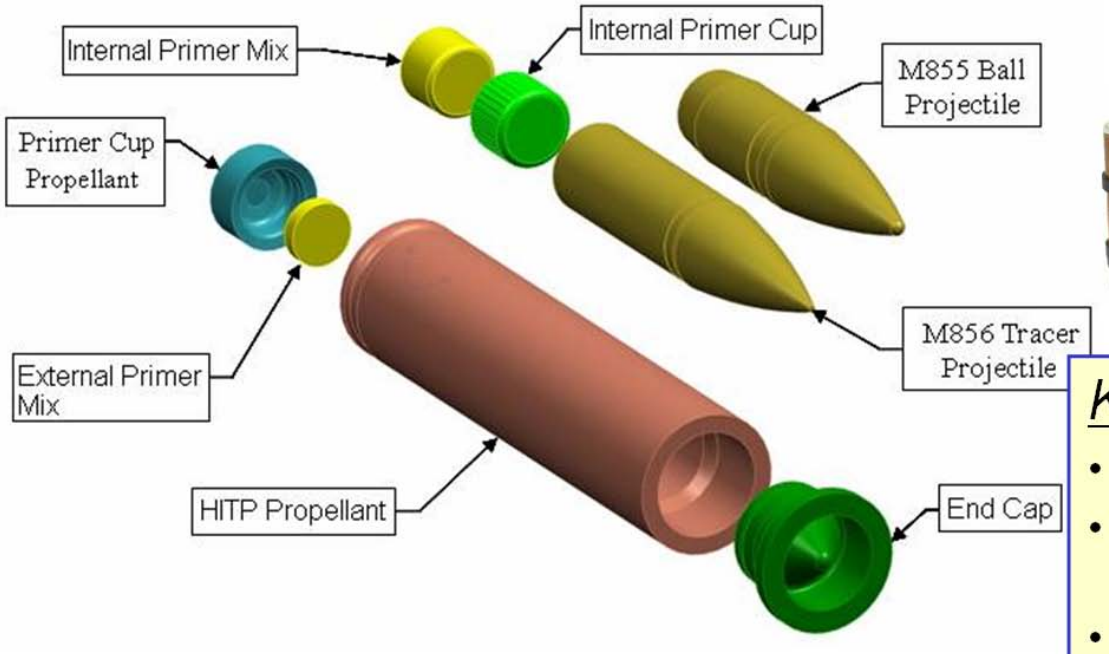
Project Scope

- Develop Rough Order of Magnitude (ROM) cost estimate for Caseless (CL) ammunition production
- CL has only two common components w/current (brass-cased) ammo: bullet & primer mixture
- Focus on new or unique infrastructure needed
  - Facilities
  - Equipment
- Consider two production rates:
  - 400 million rounds per year (sustainment)
  - 1 billion rounds per year (surge)
- Production concept not detailed – only defined sufficient to support ROM estimate

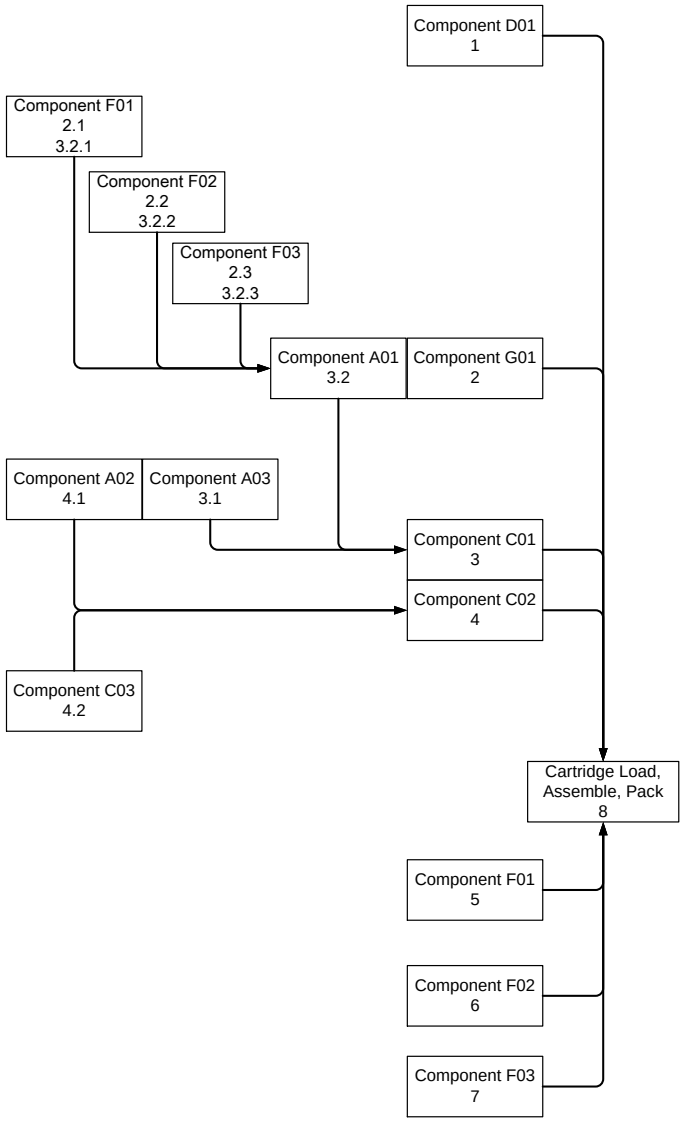
Caseless Ammunition Technology

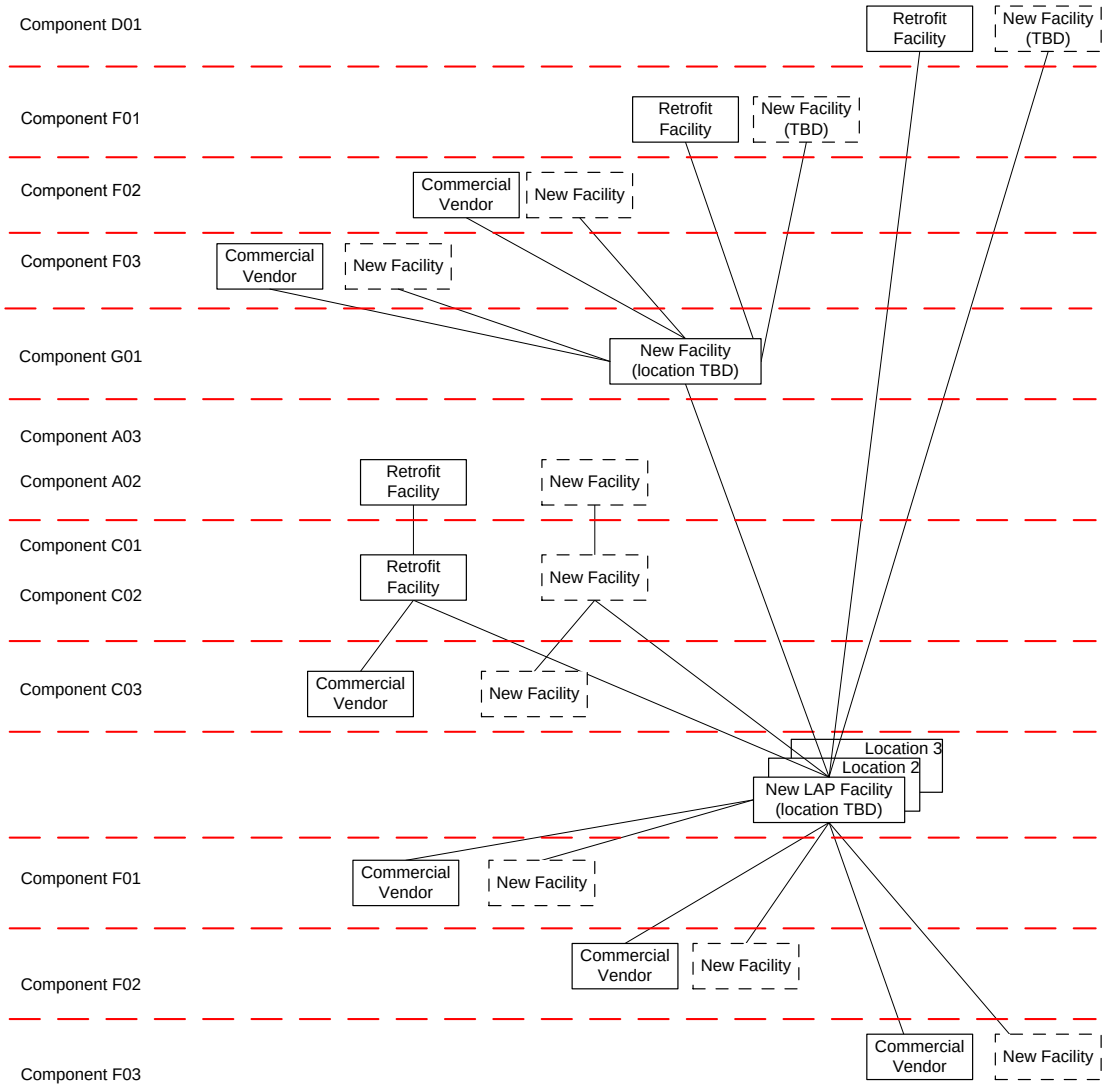


Key Technologies

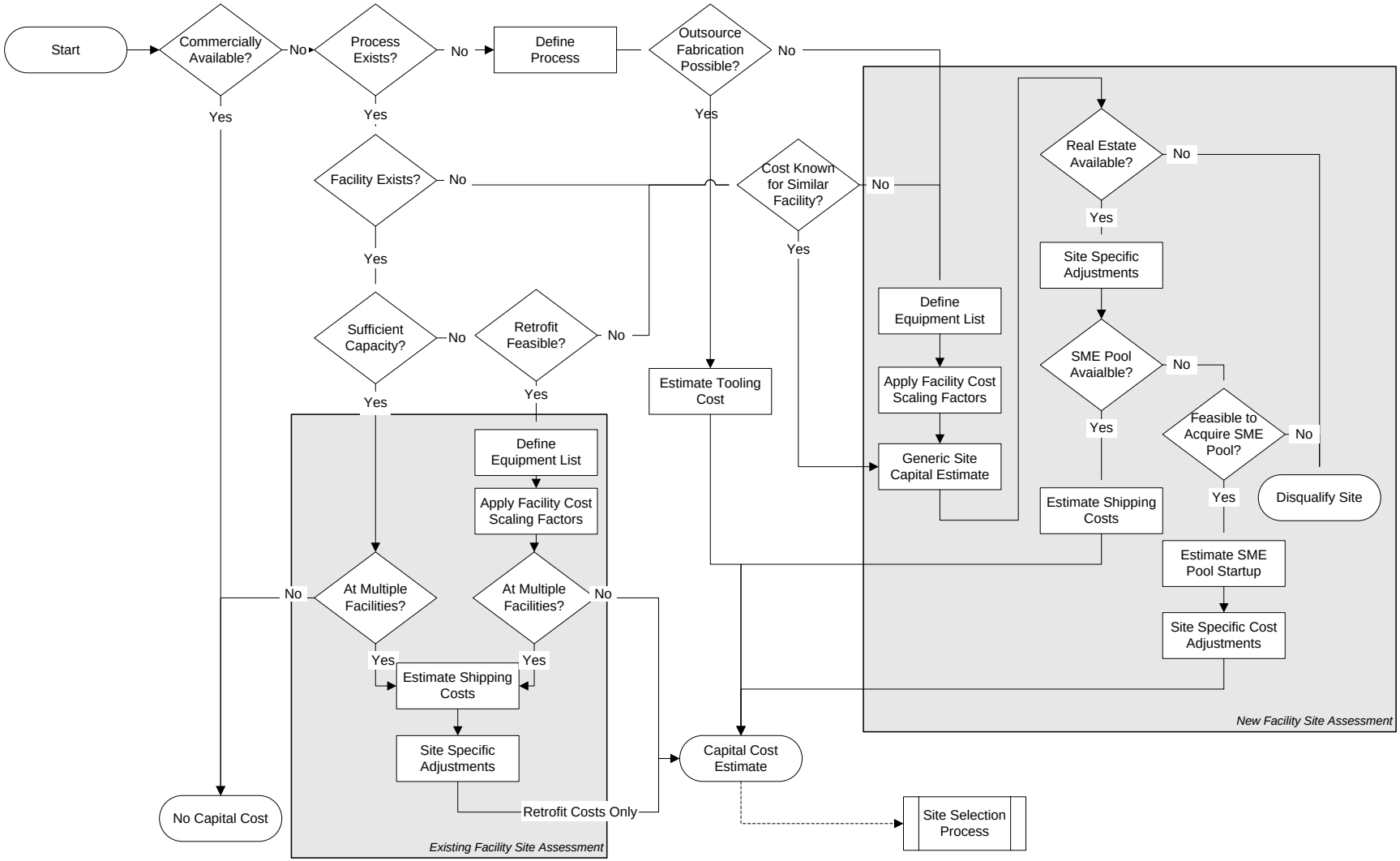
- Telescoped configuration
- High Ignition Temperature Propellant (HITP)
- Internal Primer assisted interior ballistics
- 50% wt Reduction
- 40% volume reduction

Site Selection Trade Study

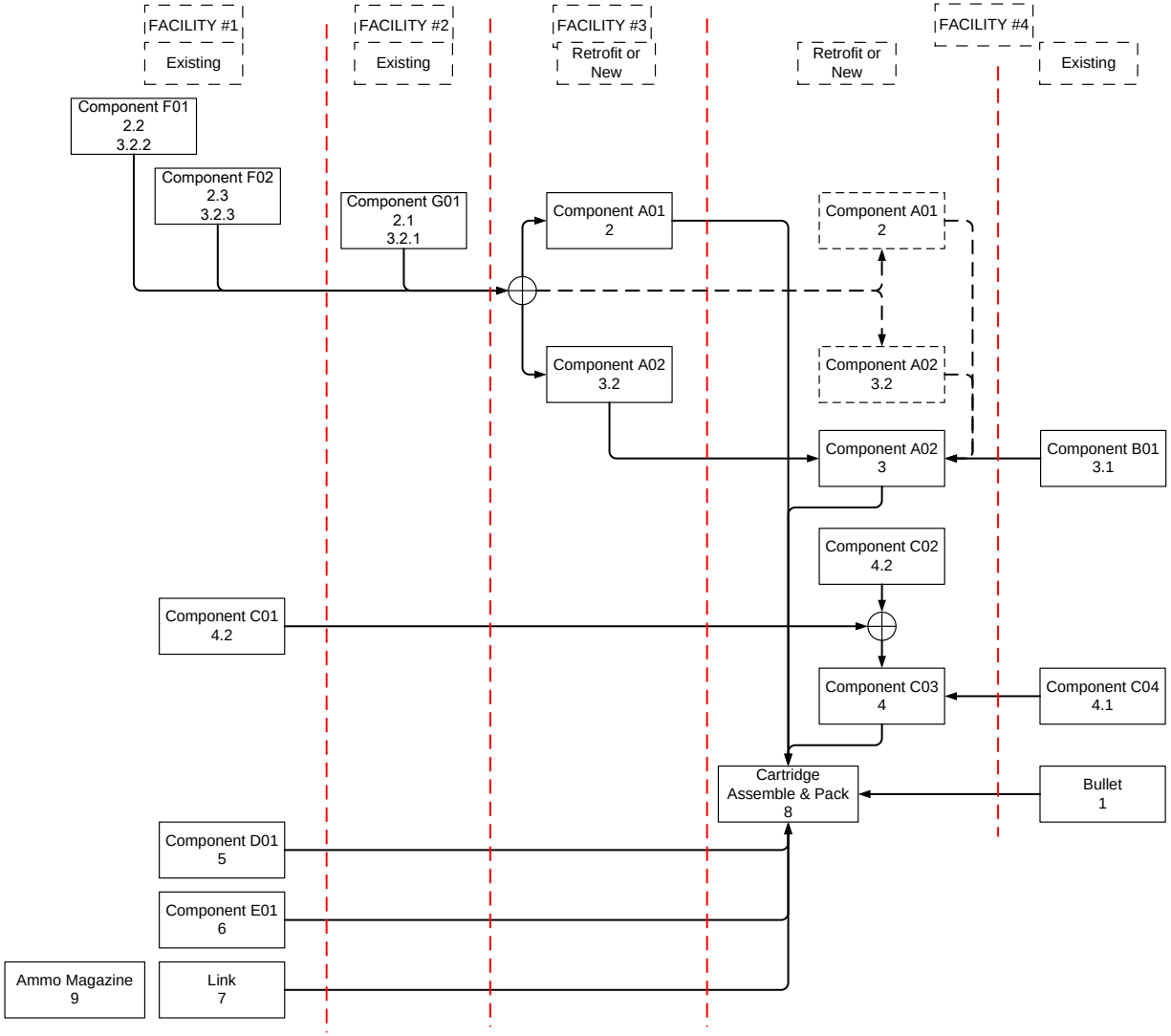




Capital Costing Approach

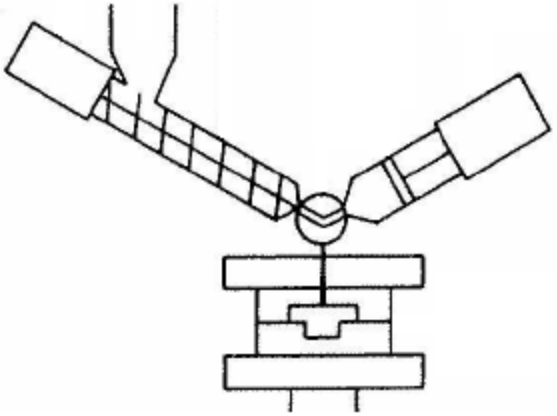


CL Production Network Concept



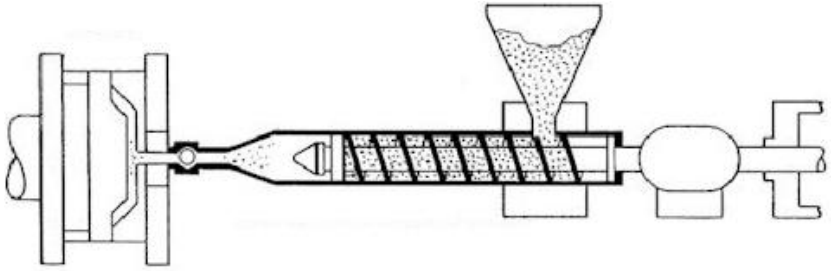
Production Network Diagram

Molding Concepts



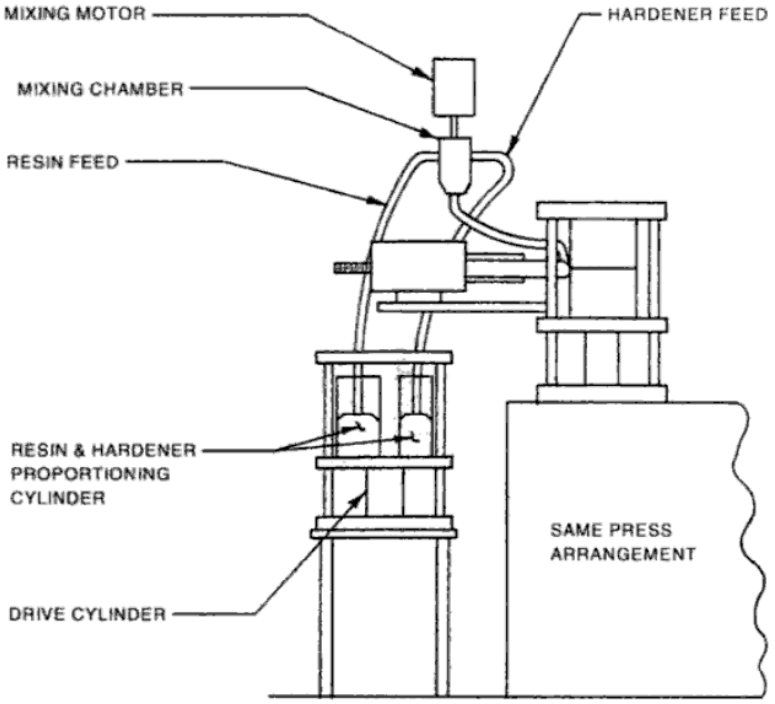
Injection Molding

- Binder and propellant in separate feed lines
- Propellant and binder mixed during injection
- May employ de-airing manifold (high-speed, filling without air pockets)

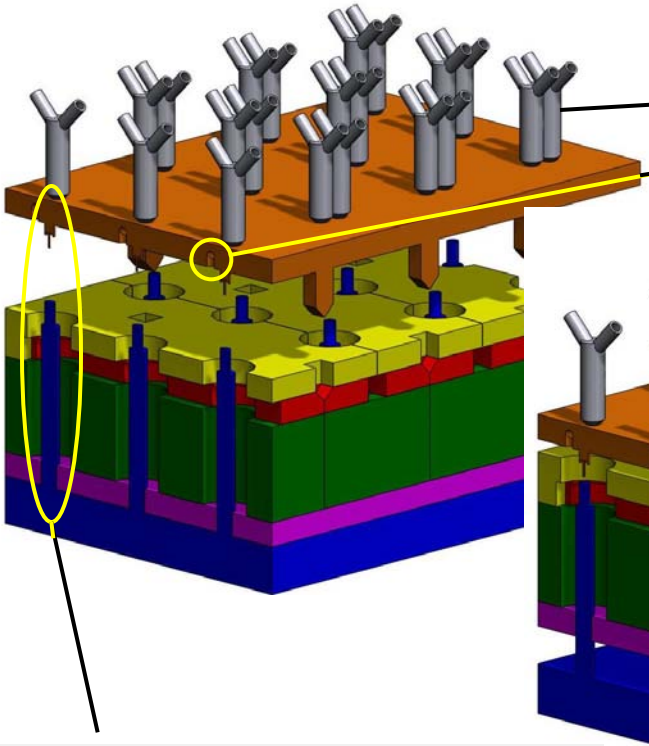


Liquid Injection Molding

- Propellant mixed with binder precursors in separate pre-mixes
- Premixes in separate feed lines
- Premixes mixed prior to injection
- May employ de-airing manifold (high-speed, filling without air pockets)

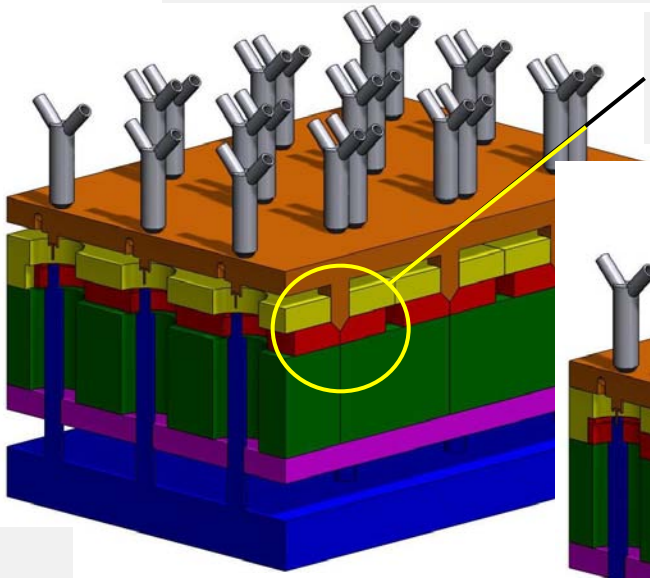


Mold Assembly Concept



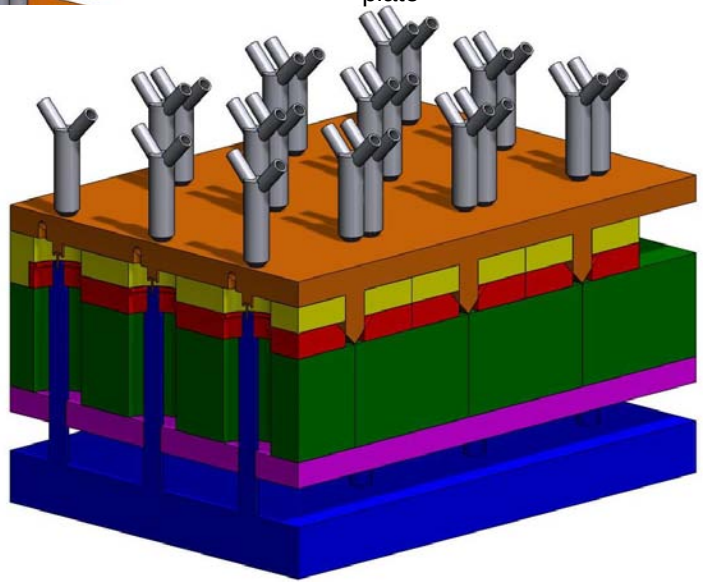
Injector Manifold

- Static mixers paired to balance load on mandrels
- May employ de-airing manifold (high-speed, filling without air pockets)



Link Groove Inserts

- Form Link Groove without pinch points
- Automatic engage/disengage via pins in top plate



Two-Piece Mandrels

- Form entire internal cavity without pinch points
- Lower Mandrel used to eject Cartridge Bodies

Molding Line Concept

Maintenance Swap
•Molds flagged for maintenance are swapped out with spares to avoid downtime; serviced off-line

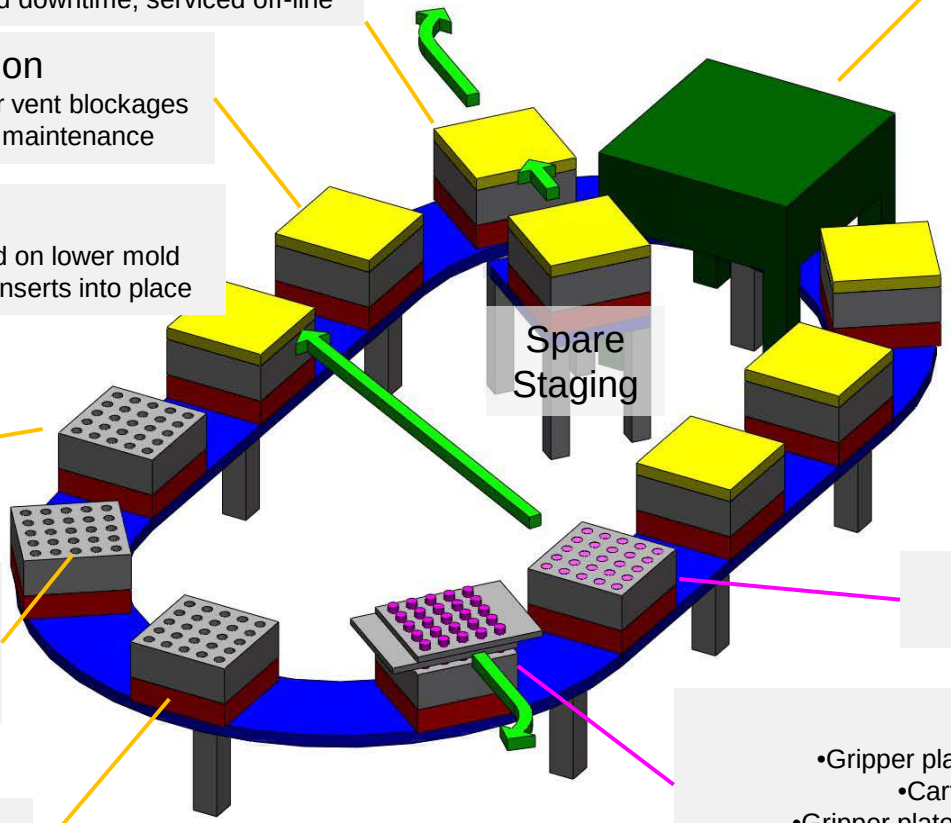
Pressure Inspection
•Manifold applies air pressure test for vent blockages
•If blockage then mold flagged for maintenance

Close & Latch
•Mold lid from previous cycle placed on lower mold
•Pins on mold lid push Link Groove Inserts into place

Visual Inspection
•Machine vision inspection of mold
•If evidence of residue mold flagged for maintenance

Spray Release
•Mold release applied as required - ensures clean separation of propellant from mold

Clean
•Mold is cleaned to remove residual propellant pieces



Injection Machine
•Propellant mix injected into mold
•Slight pressure applied ensures complete fill

Cure
•Propellant in mold for several fill cycles until cured enough for subsequent handling

Unlatch & Lift
•Mold top removed

Eject
•Gripper plate lowered onto mold
•Cartridges ejected
•Gripper plate engages OD of Bodies
•Cartridges transferred to remainder of production line

Summary

- Developed Rough Order of Magnitude (ROM) cost estimates for Caseless (CL) ammunition production for two production rates
  - 400 million rounds per year (sustainment)
  - 1 billion rounds per year (surge)
- Focused on new or unique infrastructure needed
  - Facilities
  - Equipment
  - Trained personnel
- Concepts for production tooling and a new kind of production line were defined to a level sufficient to support ROM estimate

Contact Information

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