Phil Djali

BAE SYSTEMS

The Design, Installation and Commissioning of High Volume PBX Facilities at BAE Systems, Land Systems Munitions, Glascoed

Phil Djali

IPT Leader/IM Facilities

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IM Facilities Plan

- **Phase 1- Low Volume PBX Facility – Glascoed (£1.2M)**
  - 4 Te RX1100 per week
  - Filling and curing of 81mm mortar; shell (155, 105 & 4.5”); warheads
- **Phase 2 - High Volume PBX Facility – Glascoed (£10M)**
  - 4 Te RX1100 per day
  - Shell (155, 105 & 4.5”) filling
- **Bridgwater transferred processes (£10M)**
  - Pre Cure Manufacture
  - Pre Mix Manufacture
- **LOVA gun propellant R&D Facility – Glascoed (£1.24M)**
  - Designed to replicate Bishopton capability
  - Supports R&D on advanced LOVA propellants for direct & indirect fire

Systems Approach for Insensitive Munitions

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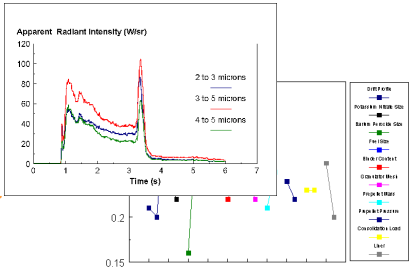
IM mitigation design features

Package design IM mitigation

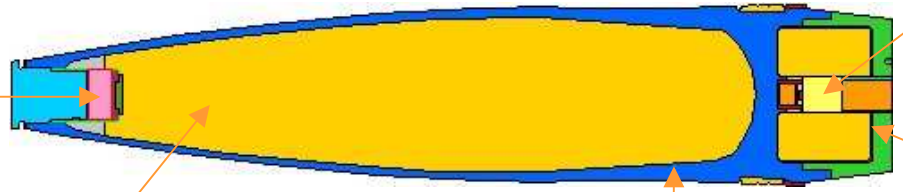
Environmental survival

Gun firings & recovery fragmentation trial



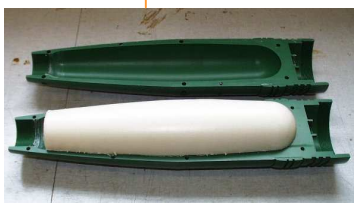
Igniter Taguchi trials

Reduced vulnerability booster explosive



PBX formulation

Castable PBX filling Process – presentation focus



Interface Technology

Base bleed static burn rig

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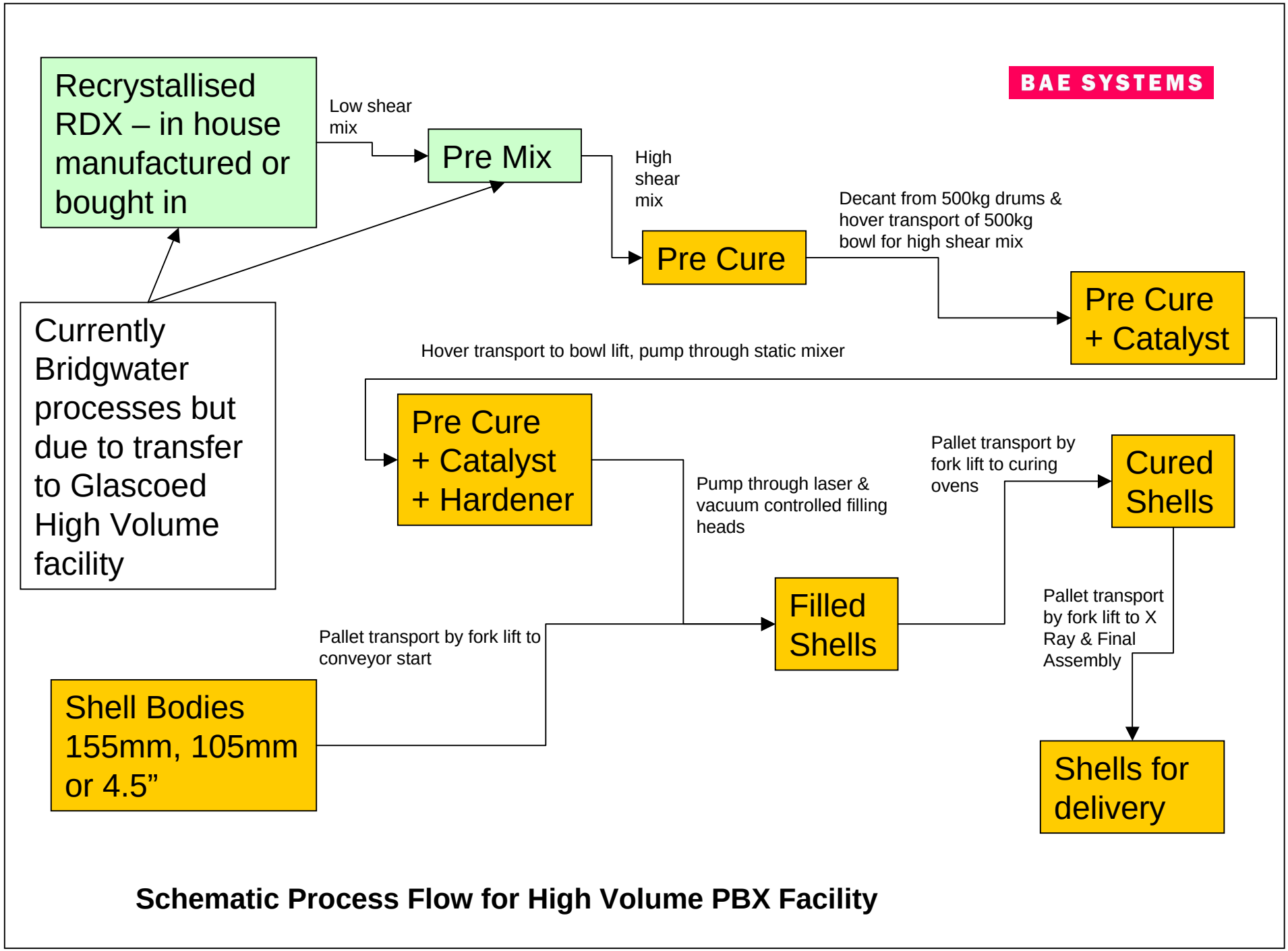
Selection Rationale for Cast-Cure PBX IM Filling with Rowanex 1100

- System performance on a par with RDX/TNT 60/40
- IM compliant performance demonstrated
- Comprehensively characterised
- Good environmental stability
- Universally adaptable to wide range of shell designs
- Backwards compatible for earlier shell designs
- Fully qualified



Schematic Process Flow for High Volume PBX Facility

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Phase 1 - Low Volume Filling Facility

300kg bowl and bowl lift

Pallet Conveyor

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Phase 1 - Low Volume Filling Facility – Curing Ovens

Aerial View of PBX Facility Locations

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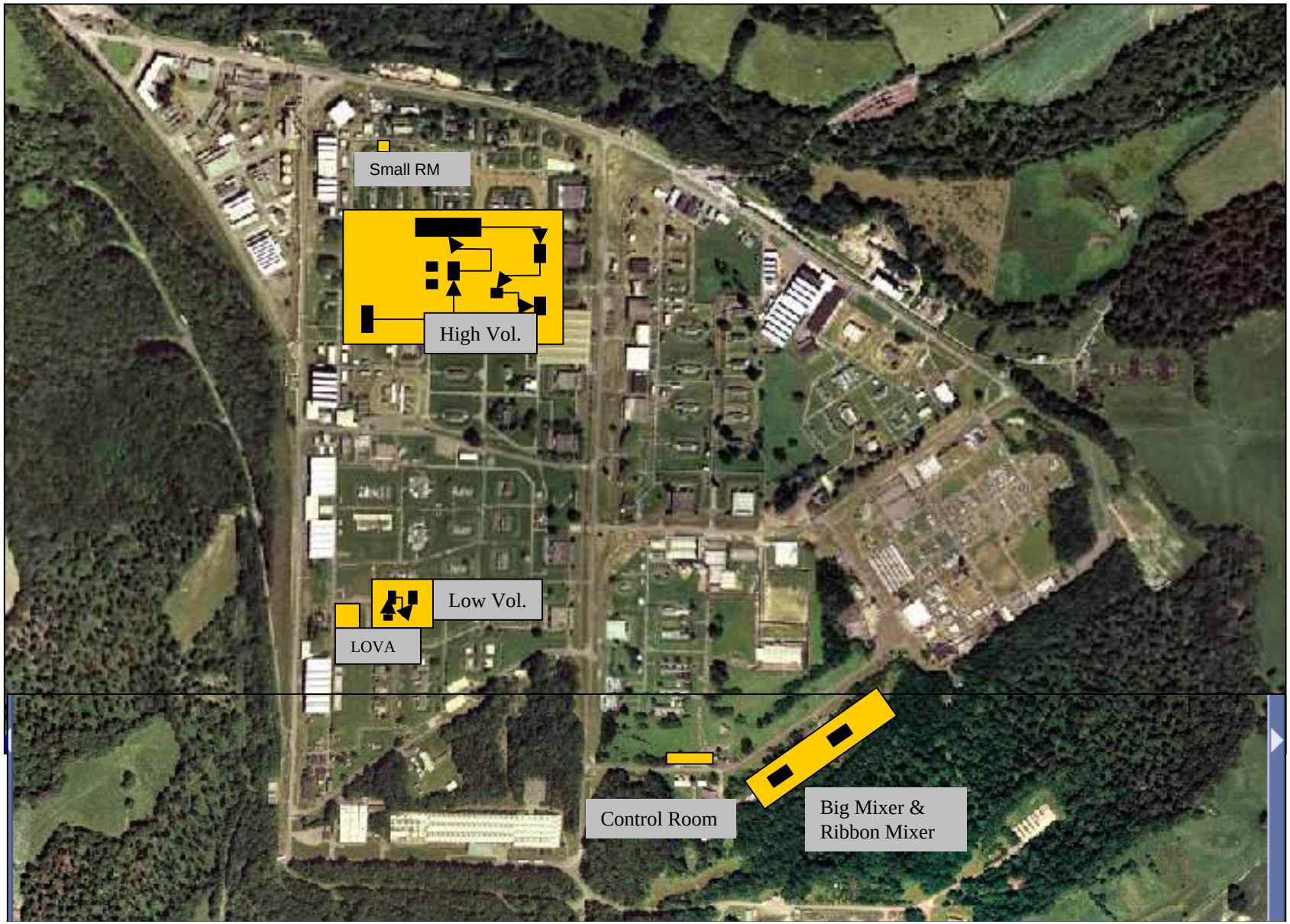

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Phase 2 – High Volume PBX Facility
Curing Oven Area – start of construction in 2003

AS AT 15th October 03

AS AT 3rd November 03

AS AT 27th January 04

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Curing Oven Area in construction May 04

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Curing Oven Area completed Sept 04

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Curing Ovens – Building Capacity 10Te HE

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Explosive decant & mixing area July 04

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500kg Mixer Building

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500kg High Shear Mixer

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Explosive Decant Building

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500kg Drum Decant

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Aerogo Transport System

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Filling Heads & Pallet Conveyor

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Explosive Clean – Pallets & Drums

Low & High Volume PBX Facility capacities

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Low Volume 780 kg per double shift (46 weeks)

	Daily Shell	Weekly Shell	Annual Shell	
155mm	66	297	13,662	or
105mm	240	1,080	49,680	or
4.5 inch	240	1,080	49,680	

High Volume 2Te per shift = 4Te per double shift (46 weeks)

	Daily Shell	Weekly Shell	Annual Shell	
155mm	317	1,428	65,688	or
155mm Trg	502	2,258	103,868	or
105mm	1,333	6,000	276,000	or
4.5 inch	1,280	5,760	264,960	

NB Capacity can be increased up to 30% on above

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VR Flythrough

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2 Year IM Plan for Land Systems Glascoed

- 2006
  - Start production of shells in the High Volume PBX facility
  - Re-commission the Low Volume facility and start production of 81mm mortars and shells
  - Start live operation in the LOVA R&D facility
- 2007
  - Continue volume production in both Low and High Volume facilities
  - Transfer pre-mix and pre-cure processes from Bridgwater to Glascoed
  - Transfer other IM processes from Bridgwater to Glascoed (eg replace PE4 with RX4100)

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New Facility Installation – Key Points

- Land Systems was able to run a major capital programme as an IPT
- Stakeholders were identified and a communication route established
- The product and process design was (largely) determined before construction start
- The process and throughput were modelled using Witness, at an early stage
- Materials & safety data for intermediates had to be established
- New technology was the biggest risk
- Conservation laws were not initially understood by all the team!

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Bat Conservation in action