

Application of Automation in Demilitarization Processes



PROMOTING NATIONAL SECURITY SINCE 1919

GLOBAL DEMILITARIZATION SYMPOSIUM

*"ENERGIZING THE DEMILITARIZATION ENTERPRISE THROUGH
TEAMWORK, INNOVATION, AND EFFICIENCY"*

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Outline of Presentation

- Automation in Demil Processes
- Disassembly equipment
- Engineering phase
- Summary
- Questions



Definition of AUTOMATION

The automatically controlled operation of an apparatus, process or system by mechanical or electronic devices that take the place of human labor.

Source: www.merriam-webster.com

Why Automation?

Operator related

- Increase operator safety
- Reduce hard physical and monotonous work
- Reduce human factor
- Reduce labor cost

Why Automation?

Process related

- Increase throughput
- Better use of existing infrastructure
- Reduce production cost
- Better production planning
- Better process control and monitoring
- Process with high reliability
- 24/7 operation

Automation in Demil Processes

- Machine operation in safety cell
- High throughput
- Environmental friendly



- Demil was not part of grenade design
 - Risk for detonation during demil operation
- Grenade disassembly only inside safety cell
- Modular machine design

CBU Disassembly Line



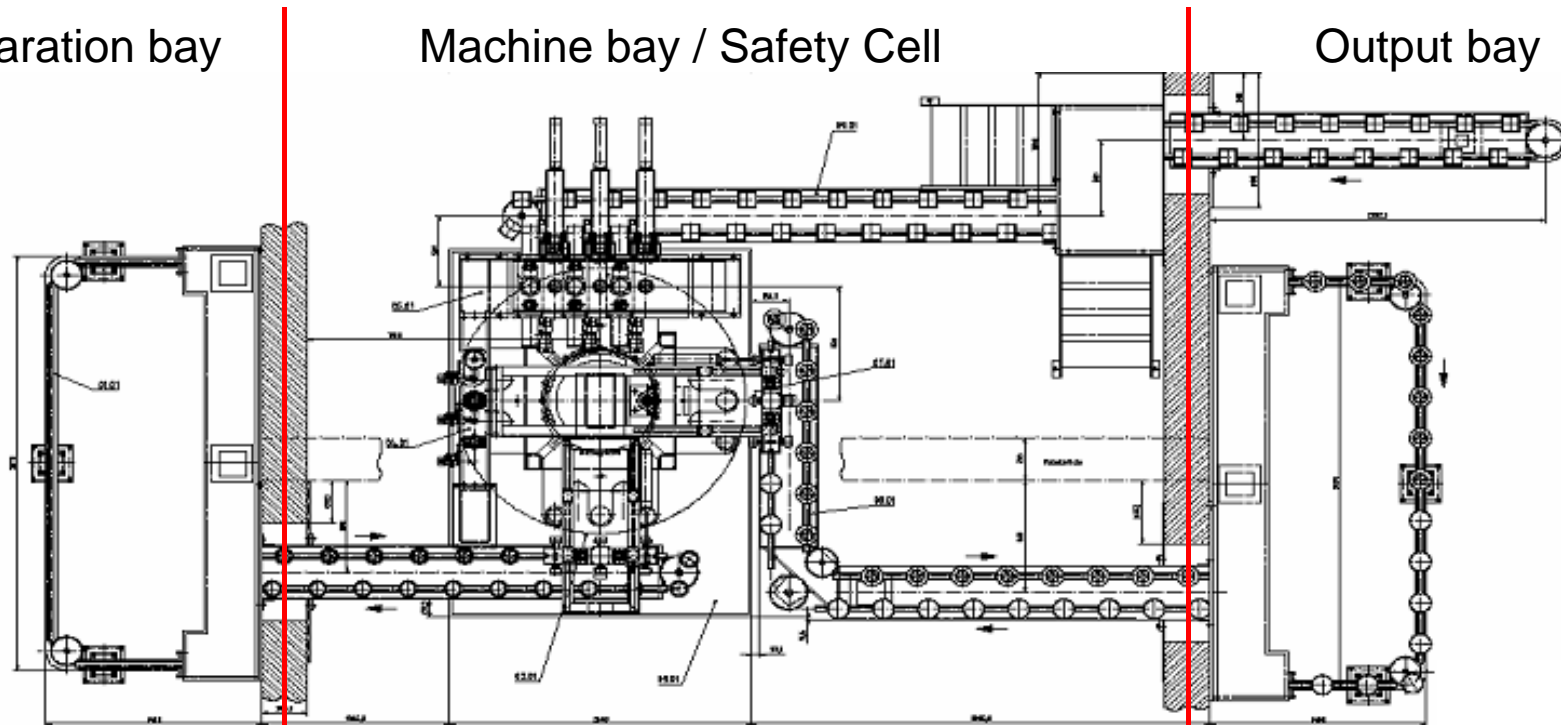
	BLU 61 A/B	BLU 63 A/B	BLU 86 B
Quantity / CBU	220	650	650
NEW / bomblet	0.61 lbs	0.28 lbs	0.26 lbs

CBU Disassembly Line

Preparation bay

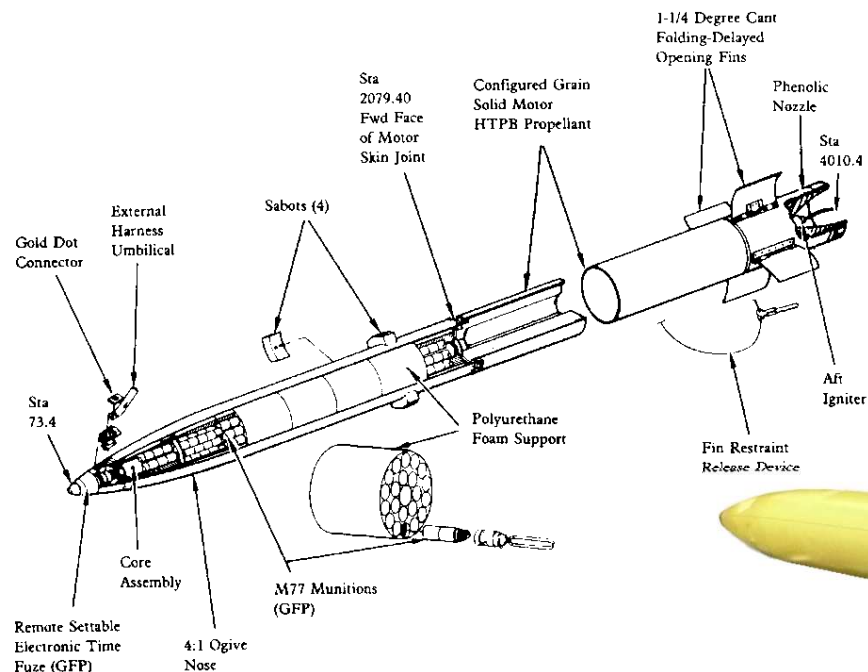
Machine bay / Safety Cell

Output bay



- Grenade type: BLU 61 A/B, BLU 63 A/B, BLU 86 B
- Automatic fuze removal
- Automatic detection and separation of reject grenades
- Machine performance: 720 bomblets / hour

MLRS Thermal Treatment Process



	Rocket Pod	M26 Rocket	Rocket motor	Warhead
Length	13.85 ft	12.92 ft	6.34 ft	6.58 ft
Weight	5,236 lbs	674.6 lbs	324.1 lbs	350.5 lbs
Diameter		8.94 in		
Content	6 x M26	644 x M77		

MLRS Thermal Treatment Process



- Rocket type: M26
- Underwater sled for rocket motor transport
- Underwater band-saw cutting process
- Water circulation with band filter unit
- Segment transport to ignition unit by transfer crane
- Process rooms separated by sluice gates
- Machine performance 3 rocket motors / hr

Disassembly Line for ICM / MLRS Grenades

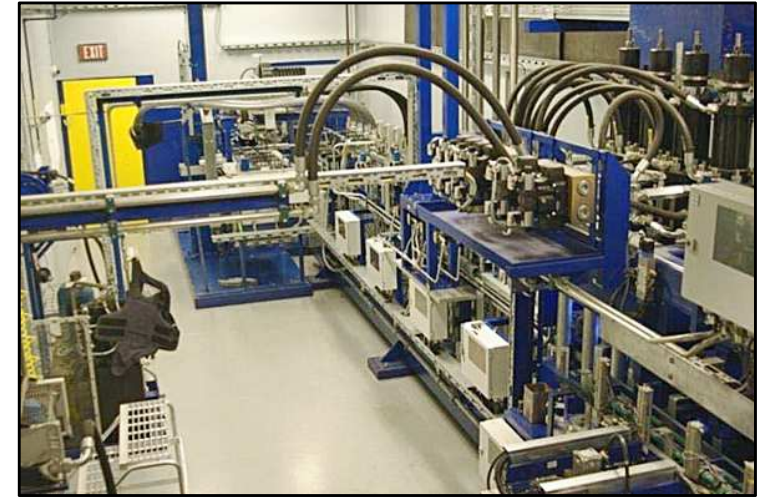
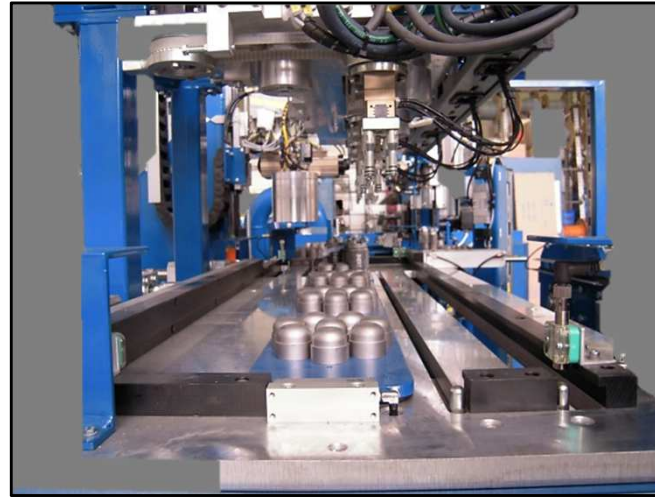
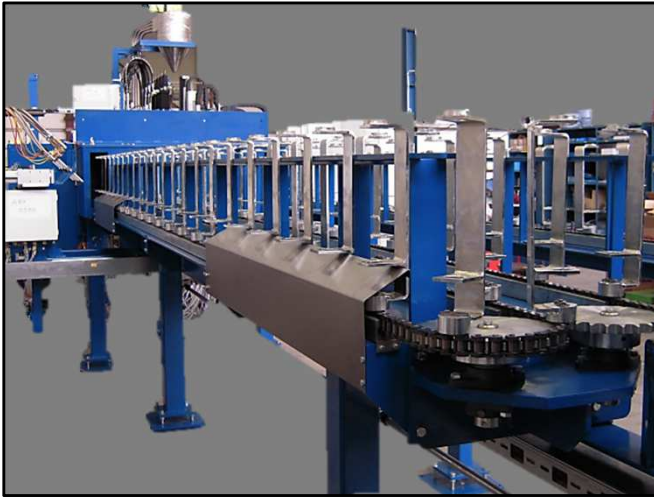


	M42	M77
Diameter	1.5 in	1.5 in
Length	3.24 in	3.3 in
Weight	7.33 oz	7.5 oz
NEW/ grenade	1.1 oz	1.09 oz

	ICM projectile	MLRS rocket
Diameter	6.1 in	8.94 in
Length	31.69 in	12.93 ft
Weight	102.5 lbs	677 lbs
Grenades per projectile / rocket	88 M42/M46	644 M77



Disassembly Line for ICM / MLRS Grenades



- Grenade type: M42 / M46 / M77
- Removal of ribbon, fuze and copper cone
- Thermal treatment of grenades by ignition of explosive
- Explosives detection station at end of process
- Static kiln for fuze thermal treatment
- Machine performance 900 grenades / hour

Grenades Processed

Demil capacity of SAB equipment

>130,000,000 ICM/MLRS grenades processed to date

Demil capacity

150,000 ICM/MLRS grenades / day*

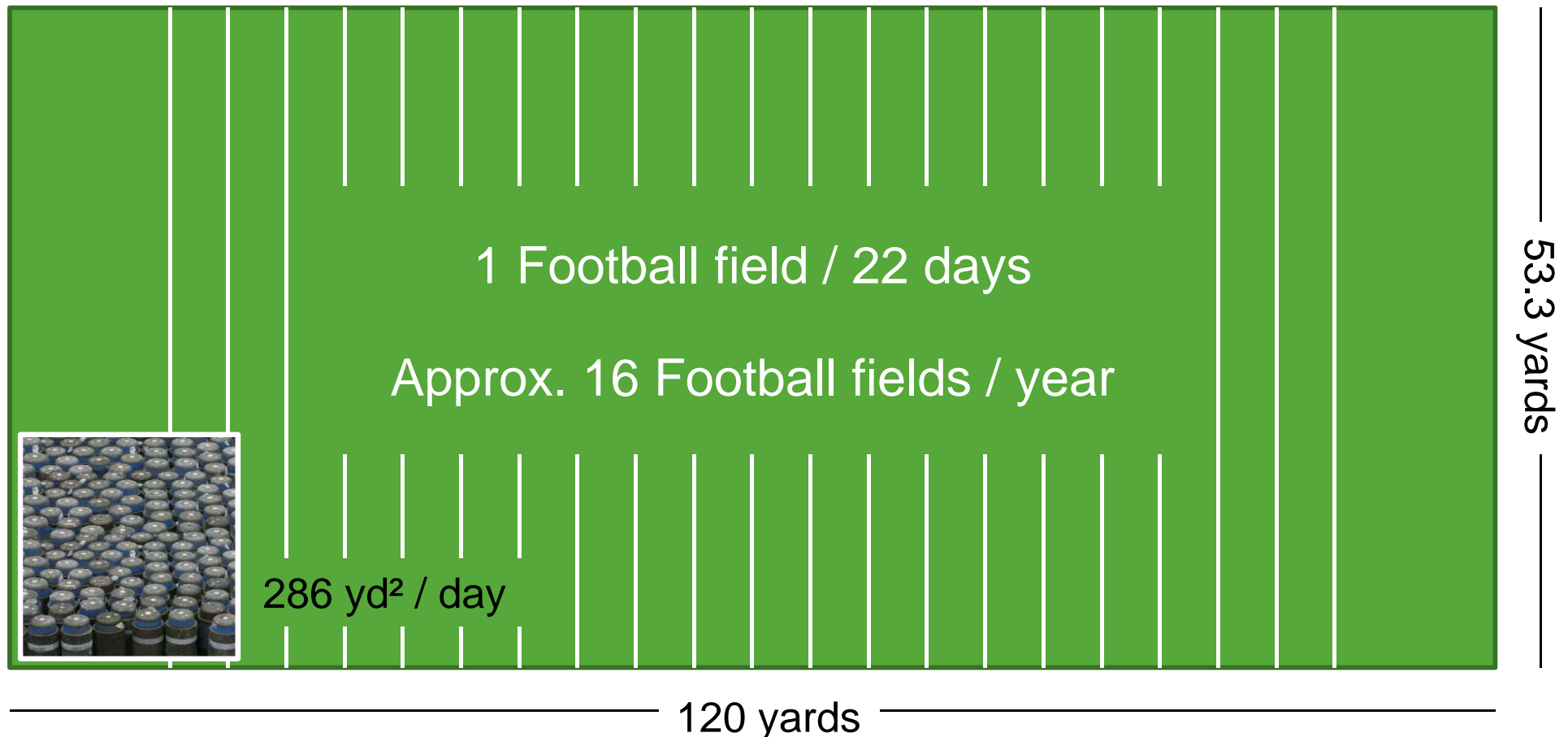
31 tons / day

*Based on 24 hour operation

Process Performance

Demil of ICM/MLRS grenades by SAB equipment

150,000 grenades / day



Process Performance

Demil of ICM/MLRS grenades by SAB equipment



Engineering Process

Concept

- Evaluation of Requirements
- Analysis of Infrastructure

Basic Engineering

- Layout drawing
- Process description

Detailed Engineering

- Detailed drawings
- Detailed process development
- Design reviews

From Design to Production

Equipment Manufacturing

- Equipment assembly
- Dry runs at SAB
- FAT
- Shipment

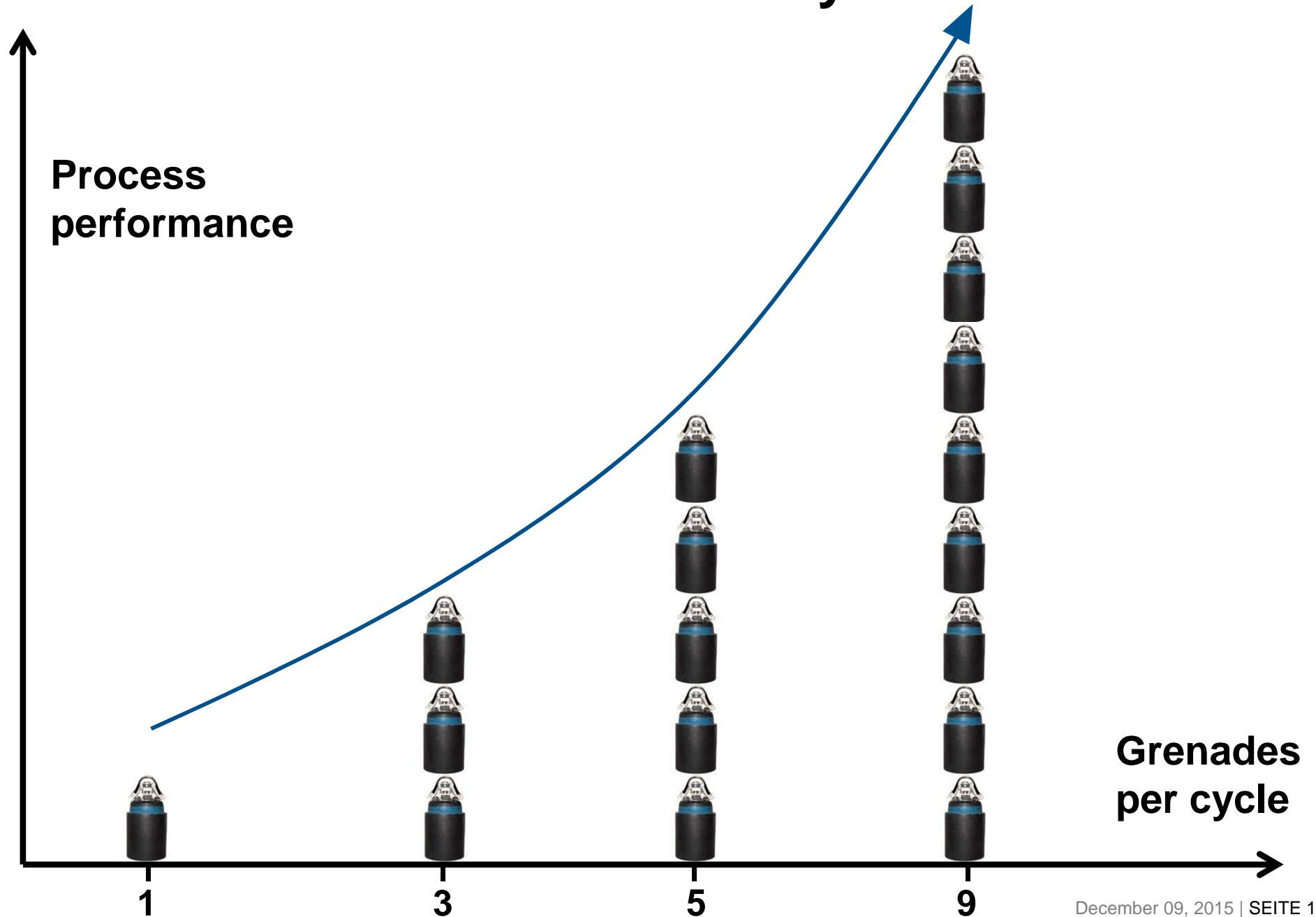
On-site Installation

- Equipment installation
- Operator training
- Service personnel training

Production

- Start-up assistance
- Low rate → Full rate production
- SAT

Process Scalability



Product Tracking

- Tracking of entire disassembly process
- Check points throughout the process
- Tracking software evaluates current status
- Process stops if any inconsistency is detected
- Detailed error message
- Database interface

Product Tracking

Process Control Unit

RFID

Sensors

Motors

Cylinder

ENTRY

Grenades

Disassembly process

EXIT

Disassembled
and demiled
components



Process Control

- Product tracking
- Process dashboard
- Detailed status information
- Online performance data
- Defined process interlocks
- Different access level
according to operator qualification

Level of Automation

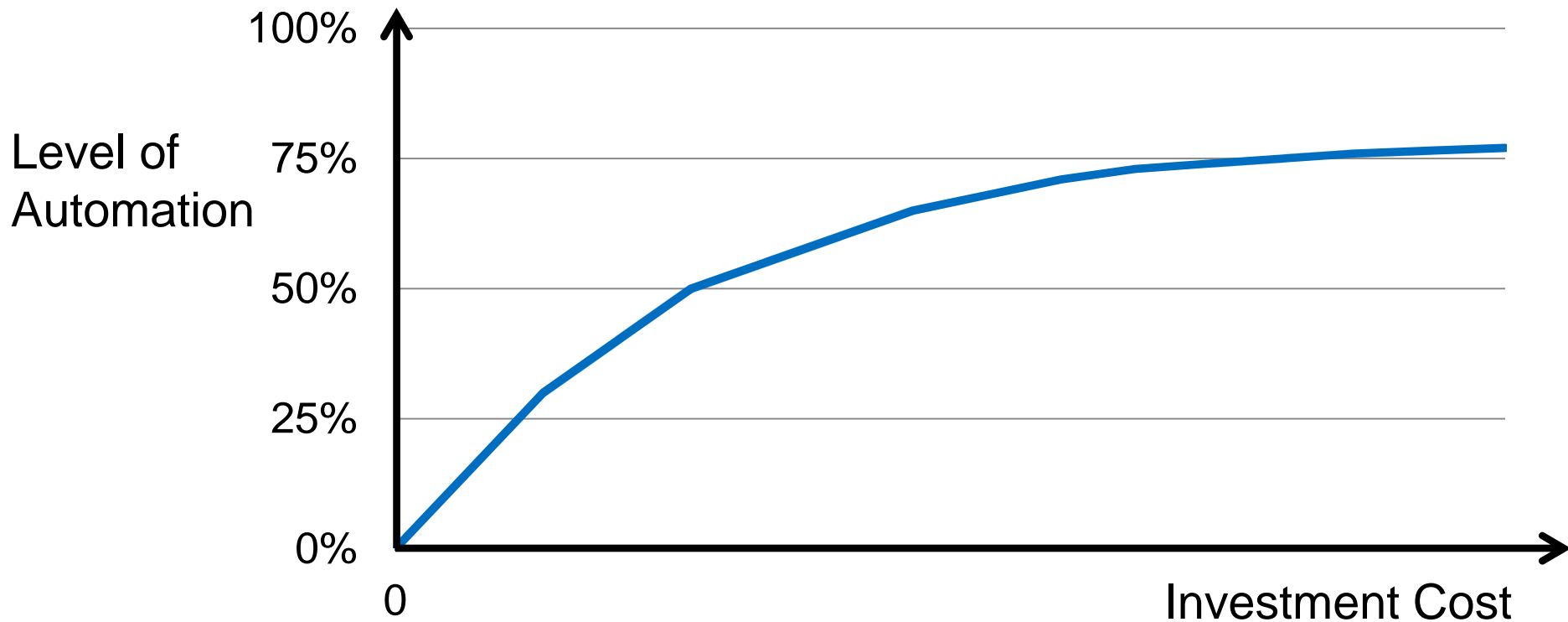
- Safety
- Analyze type of munition
- Process performance
- Infrastructure
- Investment cost



→ Right balance between automation and manual labor

Does 100% Automation always make sense?

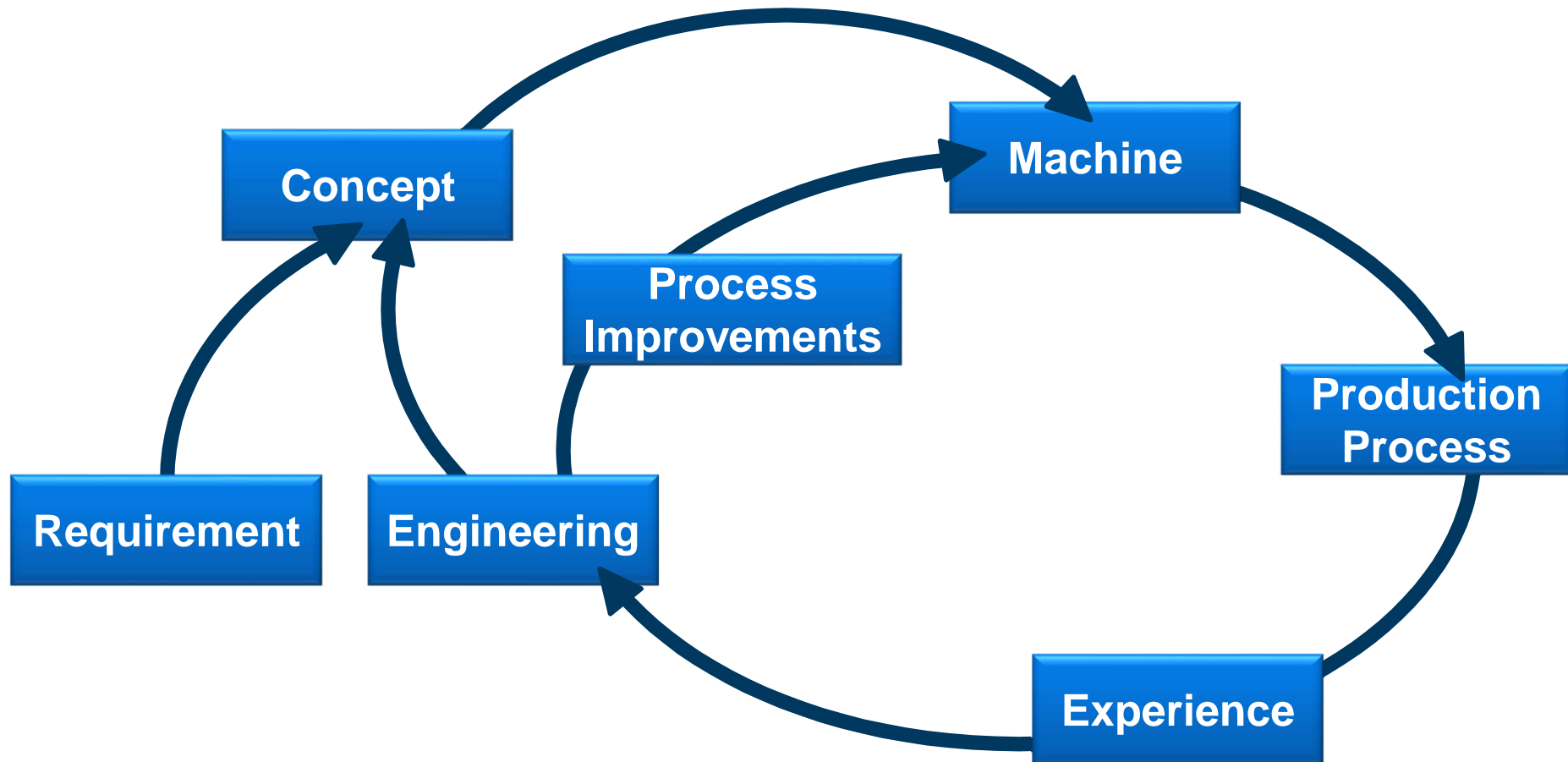
Cost-effectiveness-analysis



GD-OTS / SAB Team

Longtime partnership

Co-operation between engineering and production



Summary

- Full process control
- Product tracking
- High throughput
- Reduce human factor
- Operator safety

Thank you for attending our presentation:

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Questions?

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