

Munitions Executive Summit



10 February 2010

Presented by: COL Scott Turner
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PM CAS Organization




PM Combat Ammunition Systems
 PM, COL Scott Turner DPM, Mr. Rene Kiebler
 973 724-2003 973 724-2110



PM Excalibur
 PM, LTC Mike Milner
 DPM, Mr. Matt Butler
 973 724-3152



PM Mortars
 PM, LTC Norman Hilton
 DPM, Mr. Pete Burke (acting)



Conventional Ammunition
 Mr. Martin Moratz
 973 724-2245



Advanced Systems
 Mr. Paul Manz
 973 724-2245



Business Management
 Ms. Maryellen Lukac
 973 724-7106



- Block 1a-1
- Block 1a-2
- Block 1b
- EPIAFS/PEFCS

- Weapons and Fire Control
- Precision Effects
 - APMI
 - PGK

- Artillery Ammunition
- Mortar Ammunition
- Energetics
- JMC Commodity Team

- Tech Base Transition

- RDTE/OPA/WTCV Branch
- PAA Branch
- Acquisition Planning Team
- Program Control Cell



PM CAS Family of Products



Precision Munitions



Excalibur



APMI
(3 candidates in competition)



PGK

Artillery Ammunition 105/155mm



HE Illum Smoke HERA Practice

Mortar Platforms & Fire Control



LHMBC



Dismounted MFCS



M252A1 Lightweight
81mm Mortar System



M224A1 Lightweight
60mm Mortar System

Quick Stow

Mortar Ammunition 60/81/120mm



HE Illum Smoke FRPC



FY09 Contracting Summary



➤ Contracts Executed

- ✓ 19 New Contracts (\$91.6M) and 420 Modifications (\$581.8M)
- ✓ 113 Active Contracts and 80 Solicitations & Modifications

➤ Conventional Munitions Delivered

- ✓ 283,000 60mm Mortar Ctgs.
- ✓ 324,000 81mm Mortar Ctgs.
- ✓ 188,000 120mm Mortar Ctgs.
- ✓ 599,000 105/155mm Artillery Projectiles
- ✓ 52,400 Artillery Fuzes
- ✓ 971,420 155mm Artillery Prop Chg Increments



➤ Precision Munitions – 132 Excalibur Rounds

**Executed 439 Awards Valued at ~\$750M
Delivered ~\$1 Billion in Ammunition**



FY10 Contracting Projections



- **Anticipate ~25% Increase in Modifications**
- **Anticipate ~100% Increase in New Contracts (~\$600M)**
- **Major FY10 Projected Awards:**
 - ✓ SBSA IDIQ (Pica)
 - ✓ APMI UMR Production
 - ✓ 60/81mm HE/FRPC LAP
 - ✓ 60/81mm FRPC Fuzes & 120mm fins IDIQ
 - ✓ Mortar Ignition Cartridge & Burster LAP IDIQ
 - ✓ Supplemental Charges & Primer IDIQ
 - ✓ Large Cal Metal Parts IDIQ
 - ✓ MACS Ball Powder
 - ✓ M31A2 Propellant
 - ✓ M67 Prop Charges
 - ✓ Excalibur Engineering Services
 - ✓ Excalibur Production
 - ✓ PGK Production

Reflects Change to IDIQ Contracting Strategy



TC/FMR Activities



➤ FY09/10 Completed

- ✓ M1155A1 Enhanced Portable Inductive Artillery Fuze Setter (EPIAFS) - **FMR**
- ✓ M95 Mortar Fire Control System (MFCS) Version 4.1 Software Block 2 - **FMR**
- ✓ M915 Cartridge, 105mm DPICM (< 1% UXO) - **FMR**
- ✓ XM1066 Infrared Illum Projectile - **UMR & Follow-on**
- ✓ M821A2 81MM, High Explosive Cartridges - **FMR**
- ✓ M889A2, 81MM, High Explosive Cartridges – **FMR**
- ✓ M1155A1 EPIAFS (integrated on a Paladin) – **CMR**
- ✓ M1066 155mm IR Illum – **TC-STD**
- ✓ M150/ M151 MFCS (Mortar Fire Control System)/ MFCS-D Software v 5.0 – **FMR**
- ✓ M326 (Quick Stow) – **TC-STD & FMR**

➤ FY10 Planned

- ✓ XM1064 105mm IR Illum – **FMR**
- ✓ XM1122 155mm Affordable Training (M483 Reuse) – **TC-STD**
- ✓ XM1156 Precisions Guidance Kit – **TC-STD**
- ✓ XM395 Accelerated Precision Mortar Initiative (APMI) – **UMR**
- ✓ XM982 Excalibur 1a2 - **FMR**



Precision Munitions Update



➤ XM982 Excalibur

- ✓ **Ia-1 Production Re-Start (Aug 09) – Produced 132 Projectiles / 116 Delivered to Theater (To Date)**
- ✓ **Ia-2**
 - SET-S & SET-P Completed
 - Reliability Assessment is 86%-93% (86% is "most-likely")
 - Operational Test Readiness Review (OTRR) – 2 Completed (Dec 09)
 - Configuration Steering Board (CSB) Completed (Dec 09)
 - OTRR – 3 Completed (5 Feb 10)/ IOTE (48 Rounds) in Progress (6 Feb 10 Start)
- ✓ **1b Upcoming Demonstration Test and Down Select (July 10)**

➤ XM395 Accelerated Precision Mortar Initiative

- ONS Approved (8 Jan 09)
- Demos Completed with Candidate Systems (May 09)
- AR2B GOSC UMR Approval Received (Jun 09)
- Three Competitive Contracts Awarded (Oct 09)
- Completed Kick-offs & CDRs
- Fired (200 each) Inert Rounds at Yuma Proving Grounds for Firing Table Development
- Shoot-off (25 each live rounds) in Progress (2-17 Feb 10)

➤ XM1156 Precision Guidance Kit (Increment 1)

- Completed Critical Design Reviews and Interoperability Demonstrations
- Demonstrated 50m Circular Error Probable (CEP) in Contractor Development Firings
- Successful Electromagnetic Environmental Effects (E3) Testing (Feb 10)
- On Track for Government Qualification Testing (May-June 10)
- Milestone C (July 10)



IM Saving Lives



Insenstive Munitions in the Field

12 Sep 09

Specialist Ng was travelling in a Mine Resistant Ambush Protected (MRAP) vehicle when it was hit by a very powerful Improvised Explosive Device (IED). The IED ruptured the vehicle's hull and fuel tank, which engulfed the vehicle interior in flames—to include sixteen M768 60mm mortar cartridges that were carried inside the cabin with the seven-man crew. Although several soldiers were seriously injured in the ambush, all survived. Specialist Ng credited the Insenstive Munitions (IM) features of the M768 cartridges with averting a much greater disaster.



Exterior view of the MRAP after the fire.



Interior view of the MRAP after the fire. An unexploded shell body from a M768 cartridge can be seen.



Shell bodies and separated M768 fuzes recovered from the vehicle after the fire.



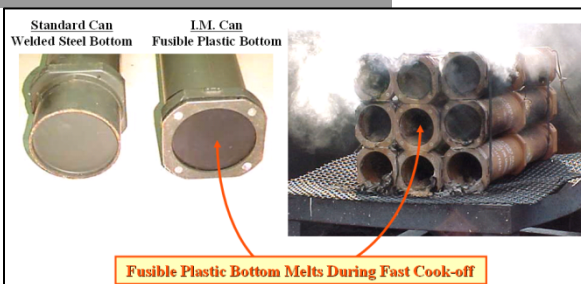
SPC Alan Ng visits on 5Oct09





Insensitive Munitions

Fielded



Fusible Plastic Bottom Melts During Fast Cook-off



Exterior of building that remained standing after Fire

IM Features of MACS Worked effectively as designed to minimize overall reaction

OEF IED attack on a MRAP carrying 16 60mm High Explosive M768 Mortar Cartridges. The IM design features resulted in the fuze separating from the shell body preventing high order detonations thus saving the lives of the Soldiers.



Problems, Challenges & Risk

- Negating the Affects of Unplanned Stimuli During the Life Cycle of Munitions
- Developing IM Solutions to Meet Legacy Form/Fit/Function
- Passing IM Tests and Meeting Ballistic and Performance Requirements
- Developing Affordable Novel Technologies, Without Creating Single Point Failures, within the NTIB
- Integration with PM Program Schedules to Timely Field IM Enhanced Munitions

Future/Emerging

Common Low-cost IM Explosive

- TNT Replacement – FY10
- Comp B Replacement – FY11

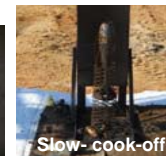
Passed Sympathetic Reaction without Barriers

IM Test:	FCO	SCO	BI	FI	SD	SCJI
Passing Criteria	V	V	V	V	III	III
TNT Baseline (M795)	III	III	IV	IV	(I)	(I)
IMX-101 (M795)	(V)	SOE/FI (V)	(V)	6,000 ft/s (V)	(III)	(III)
Comp B Baseline (81mm)	(II)	(II)	(II)	(II)	(I)	(I)
IMX-104 (81mm)	(V)	(V)	(IV)	(IV)	(III)	(I)

M795 IM IMX-101 TNT Replacement Results



81mm IMX-104 Comp B Results



Threats

FUEL FIRE Such as a truck or an aircraft on a flight deck 	NEARBY HEAT Such as fire in adjacent magazine store or vehicle. 	BULLETS Such as small arms from terrorists or combat 	FRAGMENTS Such as from bombs, artillery, or IEDs 	SYMPATHETIC REACTION Such as detonation of adjacent stores 	SHAPED CHARGE JET RPG, Bomblets, ATGMs: Combat or terrorists
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How Can Industry Help?

➤ Development

- ✓ Don't Bid Beyond Capacity to Execute
- ✓ Provide Realistic Proposals (Cost & Technical Maturity)
- ✓ Understand Increased Data Rights Sensitivity
- ✓ Don't Promote 'Technology' over 'Program of Record'
- ✓ Be Prepared for Developmental Competition
- ✓ Better APUC Fidelity
- ✓ Improved Vendor Accountability/Interface Control

➤ Production

- ✓ Don't Bid Beyond Capacity to Execute
- ✓ Improved Control of "Critical Processes" – Too Many Shutdowns
- ✓ Must Improve Critical Defect Responsiveness – Average is ~20 Days
- ✓ Improve Focus on Vendor Quality
- ✓ Continued Pursuit of Six Sigma Quality
- ✓ Support Government Quality Audits and Resolve Findings
- ✓ Aggressively Pursue Reduced O/H Rates



Summary

- **Supporting Overseas Contingency Operations (OCO)**
 - ✓ Respond to Operational Needs from Theater
 - ✓ No shortages on either operational and training ammo
 - ✓ Supporting needs of Coalition Partners and Allied Nations
- **Exceptional Customer Satisfaction**
- **Capability Improvements**
 - ✓ Continually drive to improve our ammunition/equipment and provide the Warfighter with better capabilities
- **Outstanding People/Develop Great Teams**





Back-Up





PM CAS Mission



MISSION

Perform Life-Cycle Management of
Tube-Launched Indirect Fire Munitions,
Mortar Weapons, and Mortar
Fire-Control Systems



PM CAS



GOALS

- Supporting the OCO
 - ✓ Respond to Operational Needs from Theater
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PM CAS Family of Products



105mm PGM

VAPP

155mm PRAXIS

Enhanced/Scalable Lethality 'Green' Smoke

PGK

483 Reuse Training XM1122 Smoke XM110A3 XM116A2 Illum XM485A3 XM1066A1

Excalibur Inc. lb XM1128

105mm M1 HE

155mm M110A2 SMK

M485A2 VL Illum

XM1130

105mm M314A3 Illum

155mm M804 Training

M1066 IR Illum

155mm M107 HE

105mm M915 DPICM

155mm M485A2 Illum

M110A2

155mm M795 HE

Projectile Gun Unit PGU

M767

M782 MOFA

M762 ET

EPIAFS

M1155 PIAFS

155mm MACS

Inc. 1a-1/2

Concept

Development

Production

MGK

120mm FERA

MFCS Software

DAGR

LW Pointing Device

Primary Computer

MFCS Light

APMI

XM785 Fuze

MAPAM-E

XM784 Fuze

Lightweight 60 & 81mm Mortar Systems

XM1061

SINGARS Radio

Squad Leader Computer

Gunner's Display

Quick Stow on M1101 Trailer

Pointing Device

XM150 MFCS Dismounted

MAPAM

M326 Quick Stow

M95/M96 MFCS Mounted

M32 LHMBC

M224 60mm Mortar

M120/M121 120mm Mortar

60, 81, 120mm Smoke Rounds

60, 81, 120mm HE Rounds

M772/M776 MT Fuze

M734A1/M783 Fuze

60, 81, 120mm VL Illum Rounds

60, 81, 120mm Training Rounds

Concept

Development

Production



PM-CAS TDP Scrub Summary



➤ The TDP scrub is a **complete review & update** of the TDP at the top drawing/round level, ending with a certification. It includes a review/update of **all drawings & specifications**, including **all components of the TDP**, to ensure that they are **complete, correct, current, concise and properly marked** with the appropriate distribution code. TDP components to be reviewed/updated as part of the detailed scrub include:

- ✓ Product, Packaging and Inspection Drawings/Documents
- ✓ Specifications and Standards
- ✓ Hazardous Component Safety Data Statements
- ✓ Outstanding Approved Engineering Changes
- ✓ Identification of any risks associated with the TDP, such as Single Point Failures (SPFs) and any equipment/materials that may be difficult to procure
- ✓ Development of 3-D Models
- ✓ Reduction/elimination of dimension & tolerance stack up
- ✓ Safety Critical Characteristics Review (SCC)
- ✓ Key Performance Characteristics (KPC)

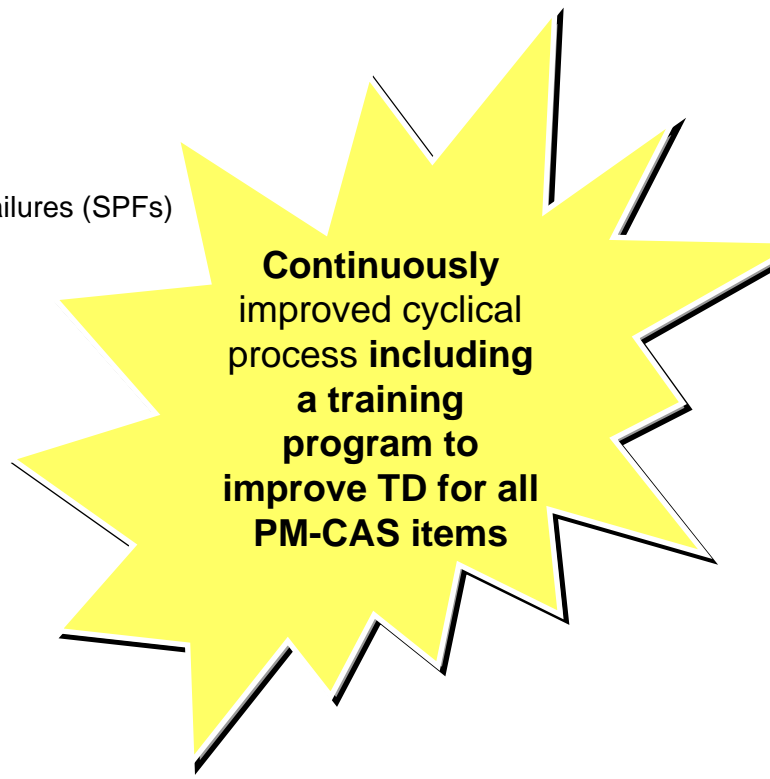
Ongoing Scrub:

(completion Dec 2009)

- 155mm M549A1 HE RAP
- 81mm M821A2 HE
- 81mm M816 IR Illum
- 60mm M888 HE
- 60mm M769 FRPC
- 60mm M721 Illum

Completed Scrub:

- 60mm HE M720A1
- 81mm HE M889A1
- 120mm HE M933A1
- 120mm VL Illum M930
- M1 New Production with TNT





Post Award Conferences



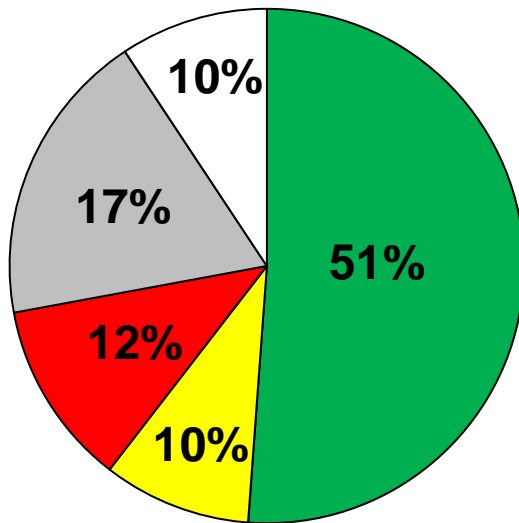
- Post Award - Clarification of contract requirements
 - ✓ Government expectations
 - ✓ Education and training needed
 - ✓ Critical Characteristic Control requirements
 - ✓ Flow down of SCC requirements to subs
 - ✓ Material certification requirements
 - ✓ Audits of Suppliers, both prime and subs

16
Post-Awards
since
March 2007

Fully comprehend and comply with Contract requirements.



Independent Audit Status



Supplier Ratings		
Satisfactory <i>No findings</i>	22	Met or Exceeded Quality Management System controls for prevention of SCCs.
Satisfactory <i>Minor findings</i>	4	Isolated lapses in Quality Management System controls. Not likely to introduce non-conforming material into the supply chain.
Un-Satisfactory <i>Major findings</i>	5	Complete absence of a Quality Management System control.
Not yet Audited	8	Will audit [Some] out of [Total] this quarter
New Suppliers	4	

71 Audit events as of December 3, 2009

Planned Audits			
Crane AAA <i>(Crane, IN)</i> Visible, IR Candles	IMT <i>(Ingersoll, Ontario-CAN)</i> M931 120mm FRPC	GDOTS-Scranton <i>(Scranton, PA)</i> Artillery/Mortar Bodies	GDOTS-LeGardeur <i>(LeGardeur, Quebec-CAN)</i> Mortar LAP
Bluegrass AAD <i>(Richmond, KY)</i> Mortar Fins	Gayston <i>(Springboro, OH)</i> Mortar Fins	GDOTS-Valleyfield <i>(Valleyfield, Quebec-CAN)</i> MACS Energetics	Raytheon-NAPI <i>(Farmington, NM)</i> XM982 EXCALIBUR

Producer's Quality Systems verified at the factory floor.



Quality in the Supply Chain

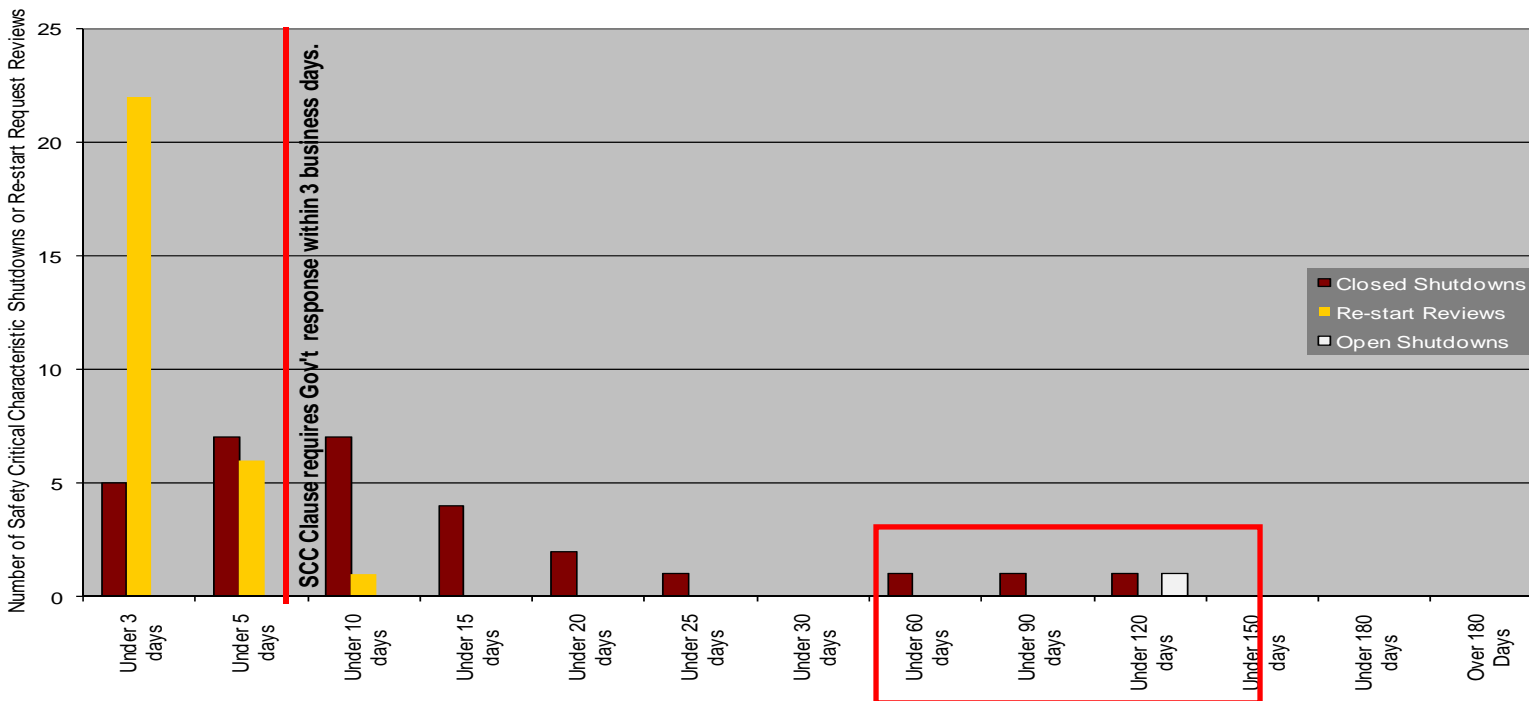
➤ SCC Shutdowns

- ✓ Quantified risk to vendor base
- ✓ Identified preferred risk mitigation tool (CPOA)

Shutdown Cycle Time
80% Re-Start w/in 20 Calendar Days

Government Review
96% Complete w/in 3 days

Production Lapses & Re-Start Review Times in Calendar Days

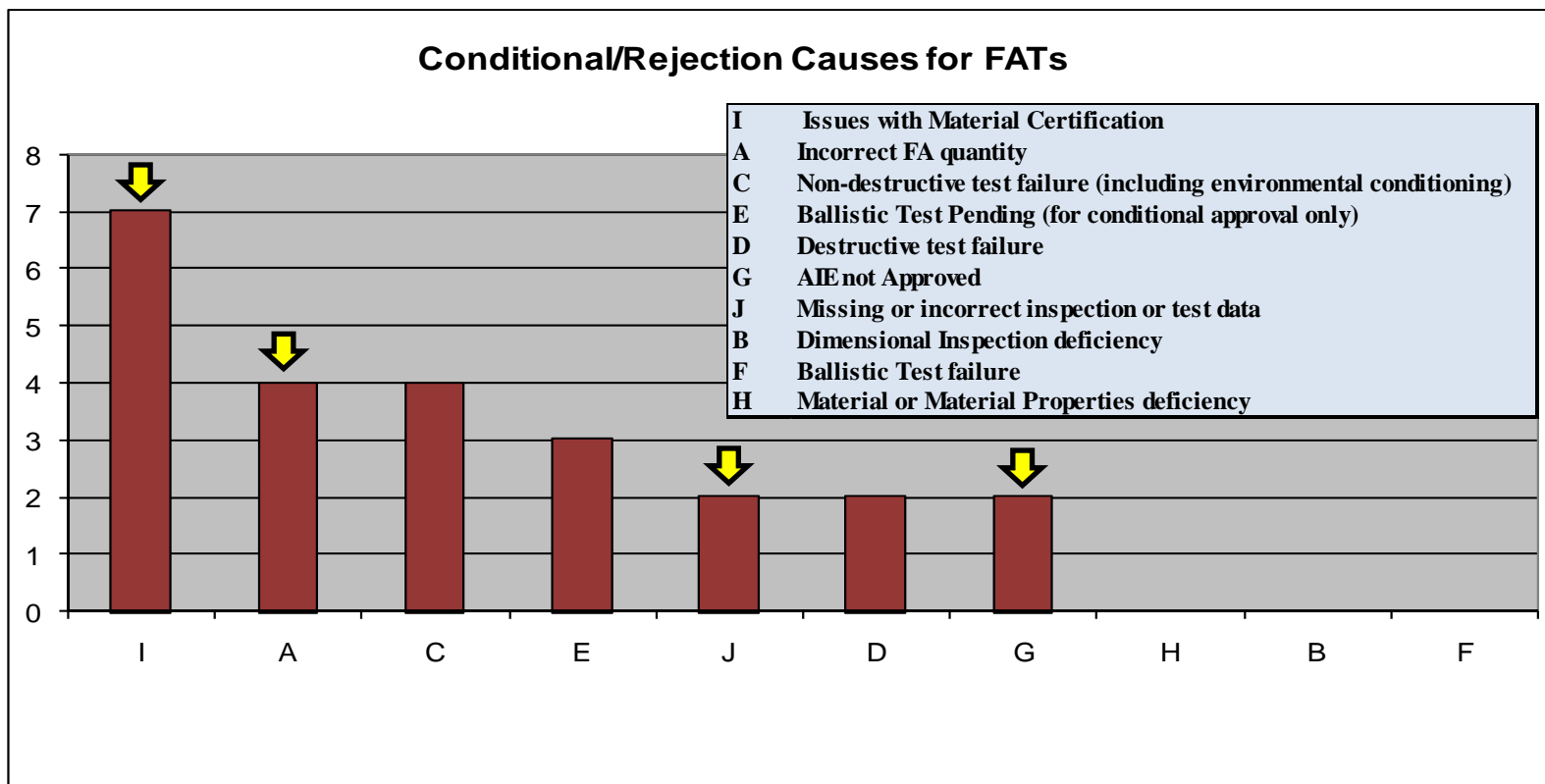




Quality in the Supply Chain

➤ FAT Acceptance

- ✓ Quantified pass rate (73%), and reasons for failure
- ✓ Better paperwork addresses around two-thirds of all conditionals or rejections





PM CAS Vendor Quality Day



- First Annual Meeting
- Robust Agenda
 - ✓ Lagging vs. Leading Quality Indicators
 - ✓ Technical Data Package Improvement Effort
 - ✓ Critical Characteristics Clause Implementation
 - ✓ CPOA Development Primer
 - ✓ Post Award Conferences (what to expect)
 - ✓ Automated Inspection Equipment Procedure Review
 - ✓ Quality Audit Process/Findings
 - ✓ First Article Test Procedure Checklist
 - ✓ Quality Metrics Review
 - ✓ MIL-STD-1168 Implementation Guidance
- Government panel to Address Questions/Concerns

