

# Casting and Forging Forum

Joint Technology Exchange Group (JTEG)

24 June 2014

## Agenda

1300-1305	Welcome, Intro & Purpose – Greg Kilchenstein, OSD-MPP
1305-1315	DLA Overview – Dean Hutchins, DLA
1315-1330	American Metal Casting Consortium (AMC) – Thornton White
1330-1345	Forging Defense Manufacturing Consortium (FDMC) – Jon Tirpak
1345-1410	Naval Foundry in Philadelphia – Faris Ibrahim, NNSY
1410-1435	Connecting American Manufacturing – Brench Boden, AFRL
1435-1445	Break
1445- 1510	Army Perspective – Eric Hoover, AMC •Digital Radiography Inspection
1510-1535	NAVSEA Perspective – NUWC Keyport – Kyle Morris •3D Printing of Sandcasts & Molds
1535-1555	Identify Challenges & Leverage Points Discussion – All
1555-1600	Wrap-Up – Greg Kilchenstein, OSD-MPP

# Casting and Forging Forum

Joint Technology Exchange Group (JTEG)

24 June 2014

## Welcome, Intro & Purpose

Greg Kilchenstein - OSD-MPP

## DLA Overview

Dean Hutchins

## American Metal Casting Consortium (AMC)

Thornton White

# CASTING SOLUTIONS FOR READINESS



**AMC**  
AMERICAN METALCASTING CONSORTIUM

**JTEG Forum**  
**June 24, 2014**





- Combining the metalcasting industry, their technical associations, leading metalcasting research universities, and application engineers in an effective consortium to support DoD's objectives to procure cost-effective, high-quality cast parts to meet readiness requirements
- Developing and integrating new metalcasting technologies and processes to ensure a U.S. manufacturing industrial base that responsively supports the U.S. warfighter



### DoD Directive 4200.15:

***“ManTech investments shall be directed at improving the quality, productivity, technology, and practices of businesses and workers providing goods and services to the Department of Defense”***



<http://amc.scra.org>

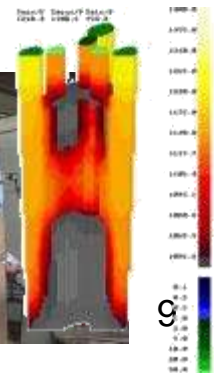
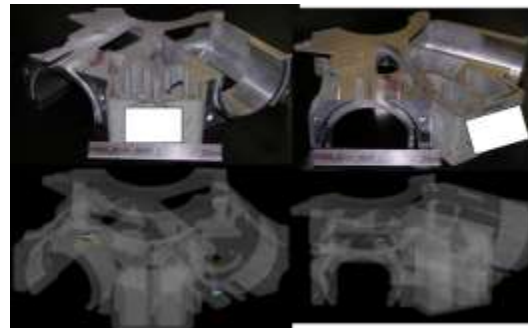
### Castings Solutions for Readiness

- DLA ManTech sponsored program with industry cost share
- Consortium of four trade associations representing ~90% of metalcasting capacity
- Integration lead and prime contractor – SCRA Applied R&D
- Research universities developing new manufacturing capability
- CAST-IT engineering support services for casting design and procurement





- Developing and implementing new casting processes and technologies to:
  - Reduce administrative and production lead times
  - Improve the quality of replacement and newly designed parts
  - Reduce costs per part
  - Strengthen the casting supply chain to ensure a dependable US manufacturing base for the future
  - Develop future manufacturing labor force



# AMC

## AMC CSR Organizational Chart



**AMC Executive Board**

**Defense Logistics Agency**



**Program Manager**

**Technical Advisory Committee**



**CAST-IT**



**CAST-IT & Supply Centers**

**R&D & Industry**



# AMC

## AMC Program Partners



**DoD / DLA**



**Metalcasting Associations**



















**Researchers**



- Improve acquisition time, quality, and cost of cast parts for stressed legacy weapons system
  - New technology and manufacturing processes
  - Best practices to reduce customer wait time
  - Strengthening the supply chain
  - Supporting the Supply Centers
  - Technology Transfer



Project	Partners
Modeling of Steel Casting Performance	
High Performance Die Casting Alloy Development	  
Incorporation of Aluminum Alloy Property Data into Materials Handbook	
Lube-Free Die Casting	    
Defense Casting Resources for Supply Chain Integration	
Welding of High-Strength Steels	 
Design and Manufacturing Resources	  



### Technical Description

- Deployed application engineering team
- Improving procurement processes for best value
- Prepositioning supply chain solutions

### Benefits

- Reduced unfilled orders
- Reduced lead times
- Improved casting quality
- Reduced procurement costs
- Rapid technology transfer

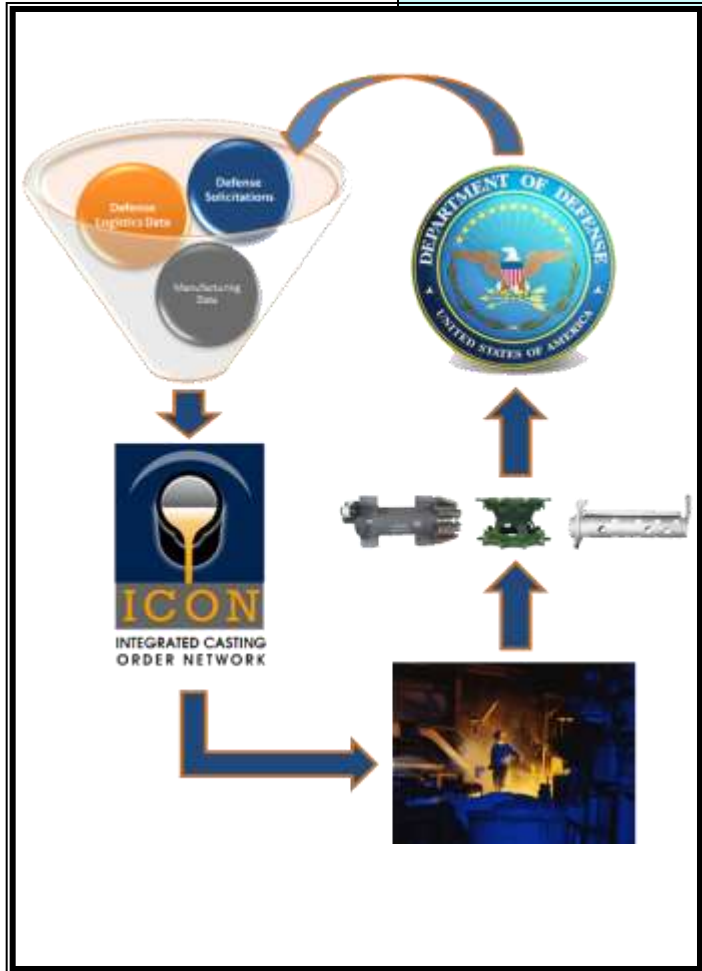


### Milestones

- Technical and Procurement Seminars
- Electronic Business System (EBS) process improvements and data enhancements
- Backorder resolution process implementation

### Implementation Milestones

- Castings identified within EBS
- Capable Supply Chains integrated
- Improved Technical Data Packages



### Problem

- Unfilled and unqualified DLA/DoD orders for cast components
- Difficult to locate opportunities
- Industry resource constraints
- Lack of automation resource for manufacturers

### Objective

- Automate the sourcing of capable suppliers with DoD needs
- Develop advanced resources to assist DLA/DoD in hard-to-procure cast parts acquisition
- Ensure responsive metalcasting supply chains

### Benefits

- Reduction in costs and lead-times (both ALT & PLT)
- Strengthen domestic supply base to maintain defense readiness
- Replicable model to link capable industry suppliers to DoD Procurement Needs

### Partners:

- NFFS, DLA Centers, Lamlinks Corp., CAST-IT Engineers



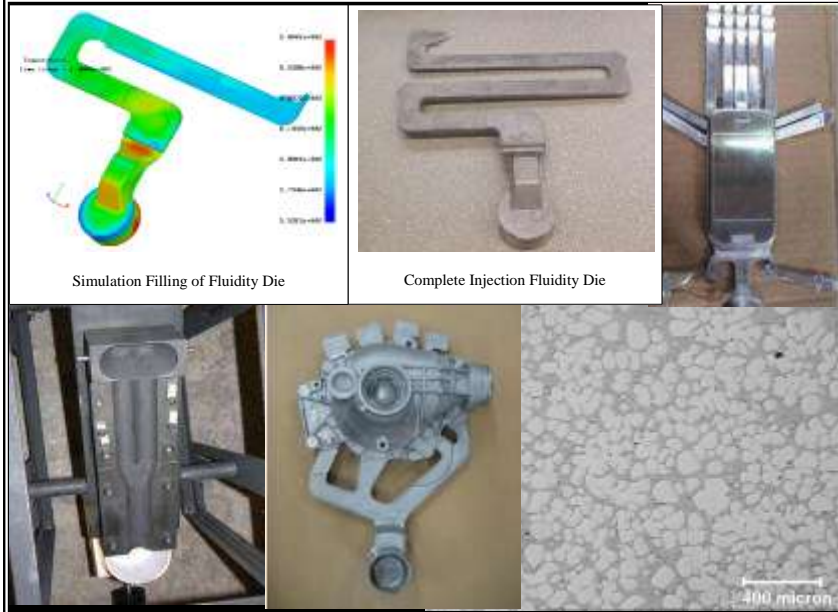
### Milestones / Deliverables

- Online automation of Procurement solutions Network for Castings

### Transition Plan

- Industry workshops, publications, supplier conferences
- DLA Site Visit(s) to benchmark project progress against DLA needs and requirements





### Problem

- High fluidity Al and Mg alloys don't exist for light-weighting by thinner sections.
- High strength alloys (A201, A206) are not die castable.

### Objective

- Develop high fluidity alloys, processing parameters and die design methods for thin wall applications.
- Develop SSM and squeeze casting process parameters for high strength alloys such as A201 and A206.

### Benefits

- Higher quality / performing parts from weight savings, higher strength and improved production reliability
- Cost savings from reduced cycle times, less metal and increased die life
- Supply chain reliability from increased die life
- Environmental improvement (lower energy usage)

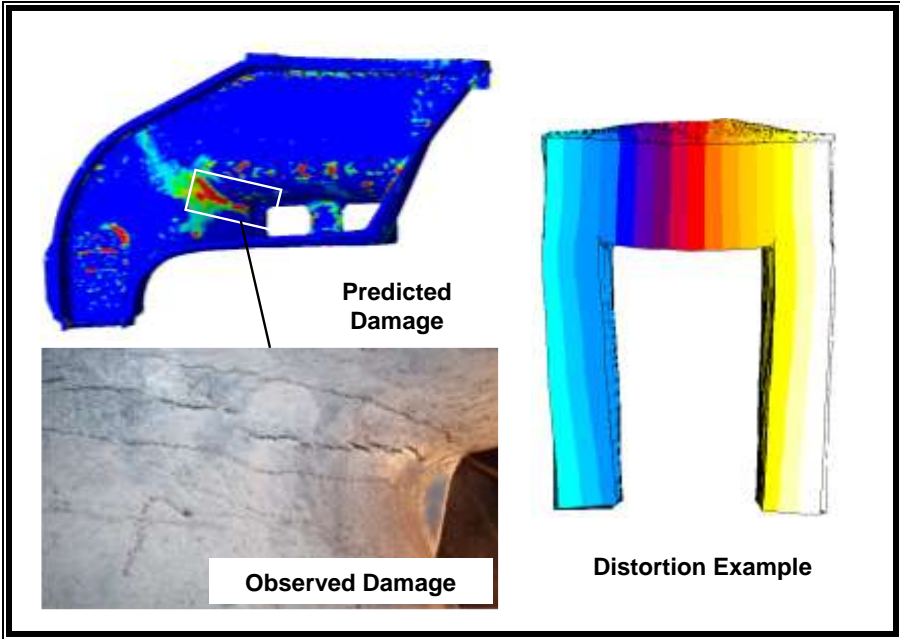
**Partners:** Case Western Reserve, Ohio State University, NADCA, Twin City Die Castings, Mercury Marine, Premier Tool & Die Cast, Gibbs Die Casting



### Milestones / Deliverables

- Thin wall alloy compositions and process parameters
- High strength Al alloy processing parameters
- Property data
- Computer modeling method for die and process design





### Technical Description

- Develop modeling algorithms for reliable dimension and distortion predictions in steel casting and the necessary mold/metal property data to apply them.
- Incorporate modeling algorithms into commercial software for use by industry and DoD

### Benefits

- Reduced costs and lead times resulting from first pour parts produced correctly
- Higher quality parts from reduced variability
- Lighter weight parts from thinner-walled castings
- Improved service reliability

### Partners

- University of Iowa, Caterpillar, Oshkosh Truck, SFSA, Sivyer Steel, Harrison Steel.



### R&D Milestones

- Mechanical properties of bonded sand and steel as a function of temperature
- Develop model to predict dimensional changes, distortions, stresses and cracks
- Validate improved stress model through controlled tests
- Develop model to predict surface shrink and seeding by blind riser feeding in steel castings



### Problem

- Applying die lubricant:
  - Reduces die life
  - Source of porosity
  - Adds time to the casting cycle, increases costs
  - Produces effluent with associated waste issues

### Objective

- Develop non-sticking and self-lubricating coatings for metal molds to reduce cycle time and process costs, and improve part quality.

### Benefits

- Cost savings from reduced cycle times and increased die life
- Higher quality / performing parts
- Supply chain reliability from increased die life
- Environmental improvement (lubricant-free process)

### Partners:

- Colorado School of Mines, NADCA, Phygen, Vforge, Ohio State University, Case Western

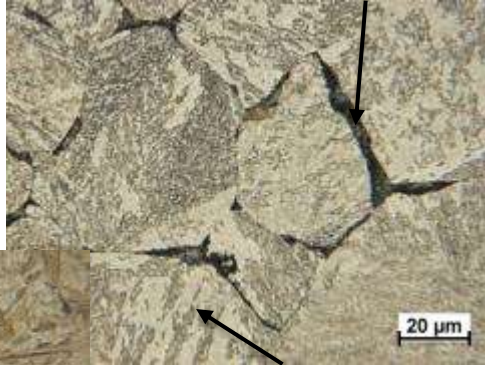


### Milestones / Deliverables

- Coating properties measured and characterized
- Computer modeling method for die and process design
- In-plant trials on coating system

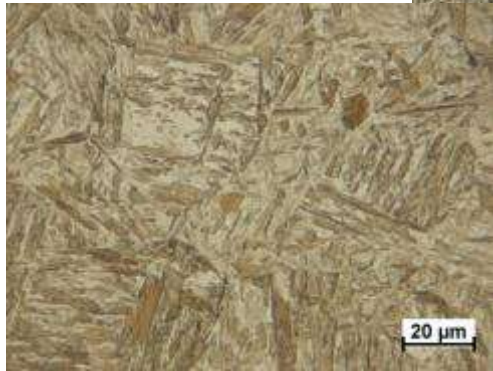


Pearlite



### Technical Description

- Establish the influence of welding on the microstructure and mechanical properties of welds in high strength steels.
- Develop welding procedures and post-weld heat treatments that restore the impact toughness of the weld to that of the base metal value



Bainite



### Benefits

- Reduction of excess processing steps -> reduced lead times
- Improved part performance / reduced failures
- Decreased costs associated with re-work

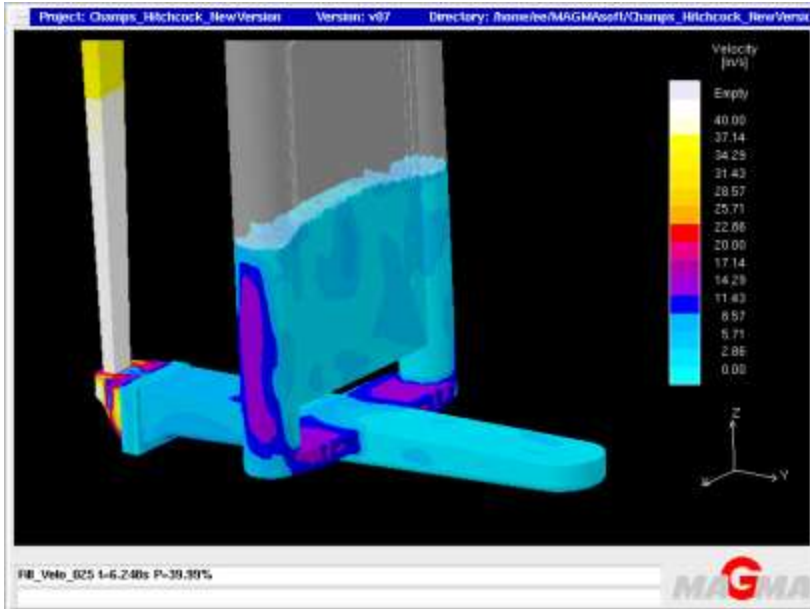
### R&D Milestones

- Thermal cycle experiments for mechanical property testing and microstructural characterization
- Guidelines on welding of high strength steels for optimal strength

### Partners

- Lehigh University, SFSA, ESAB, Stainless Foundry and Engineering, Penn State, MS&T, Army Research Lab, Air Force, Spokane Industries, BAE





### Technical Description:

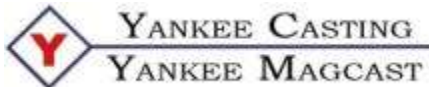
- Develop statistically validated properties for sand cast A206T4 and T7 aluminum
- Develop an AFS Recommend Practice for the in-process weld repair of aluminum-silicon hypo-eutectic alloys

### Benefits

- Incorporating A206 T4 and T7 into MMPDS
- Lighter weight component designs
- Improving design flexibility
- Reducing lead-times (weld repairs)
- Part consolidation
- Developing a template to introduce other cast materials into MMPDS

### Partners:

AFS, Eck Industries, Carley Foundry, Denison Industries, CPP, Magma, Boose, PDA, Spirit AeroSpace, Boeing, Northrop-Grumman, Lockheed-Martin, Morel Ind., Yankee Casting, UAB

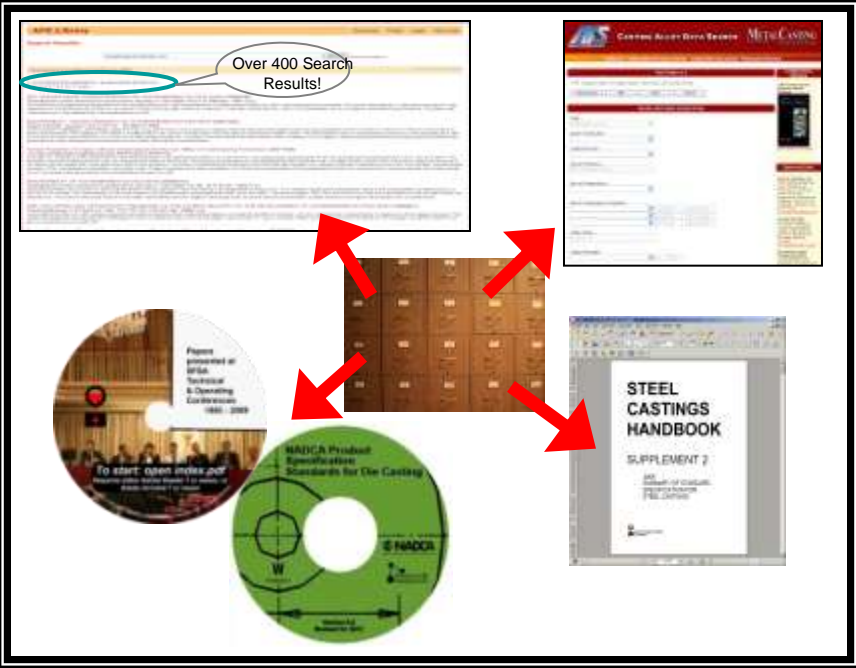


### R&D Milestones

- Test plate design and gating definition
- Tooling production and casting test plates
- X-ray and grade test plate sets
- Test and analyze samples for properties
- Compile test data
- Correlate NDE, structure, and properties

### Implementation Milestones

- Interim briefings to MMPDS
- Incorporate results into MMPDS



### Technical Description

- SFSA Supplements revised and online, high alloy steel research report library on CDs
- Casting design tutorials available online
- Largest online fully searchable metalcasting library
- Address the customer for metalcasting properties database portal for CAD/CAM
- NADCA alloy specifications expanded

### Benefits

- Engineering training through casting tutorials
- Engineering support through web-based specifications, articles, and periodical literature
- Specific accurate metalcaster capability information
- Up to date commercial specification requirements and material property database online

### Partners:

- AFS, SFSA, NADCA, Pacific Steel Casting Company Stainless Foundry & Engineering, Wollaston Alloy, Nova Precision, Caterpillar, Magma, Modern Casting, Engineered Casting Solutions, Eck Industries

### Implementation Milestones

- Revised SFSA Supplements and NADCA specs available online
- Casting design tutorials available online
- High alloy steel casting library CDs distributed
- **Casting Alloy Data Search** online material database linked to **Casting Alloy & Process tool**
- Enhance **AFSearch™** online database





## 2013 Value Engineering Award



***“Your award winners are clearly deserving of recognition for the tremendous job they did in achieving savings and cost avoidance for the Department. Please extend my congratulations to all of those who supported and participated in the VE program this year and help me in recognizing them for a job well done.”***

**Frank Kendall, Under Secretary of Defense  
Acquisition, Technology and Logistics**



**2010 DLA Commanders Choice Award**



**2011 DMC Achievement Award**



### Proposed Program Budget

Year	1	2	3	4	5
Govt	\$2.2M	\$2.2M	\$2.2M	\$2.2M	\$2.2M
Industry	\$.6M	\$.6M	\$.6M	\$.5M	\$.5M

Dean Hutchins, DLA PM, 804-279-5033  
 Thornton White, CSR PM 843-760-3483

### Technical Description

#### Improve acquisition time, quality, and cost of cast parts for legacy weapons systems

- New technology and manufacturing processes
- Best practices to reduce customer wait time
- Strengthening the supply chain
- Supporting the Supply Centers
- Workforce Development

### Benefits

#### Quality

- Digital radiographic standards
- Simulation software to predict strength and solidification accuracy
- New aluminum alloys based on desired properties
- Guidelines for welding duplex high alloy steel to maintain corrosion resistance

#### Rapid Acquisition

- Tooling database
- Procurement support to DLA Supply Centers
- Software for short run insert production

#### Cost Effectiveness

- Casting process for high-volume, light weight armor
- Rapid tooling for short-run quantities





***“Pathway to Improved Metalcasting Manufacturing Technology and Processes - Taking Metalcasting Beyond 2020”***

- NIST AMTech Award
- Two year road mapping effort to identify needs to improve U.S. metalcasting processing capabilities and productivity
  - Reach industry consensus on metalcasting capability gaps, solution priorities, and investment recommendations
  - Identify potentially transformative technologies requiring collaborative research
  - Establish clear problem definitions and a common framework for parallel work by multiple organizations
  - Chart a transition path to facilitate interoperability of developed solutions with existing systems
  - Build a collaborative infrastructure tailored to the roadmap's targeted outcomes
  - Initiate development of an infrastructure that supports an advanced U.S. metalcasting industry



AMC's ***Casting Solutions for Readiness*** (CSR) program is sponsored by the Defense Supply Center Philadelphia, Philadelphia, PA and the Defense Logistics Agency Research & Development (R&D) Office, Ft. Belvoir, VA.



## Forging Defense Manufacturing Consortium (FDMC)

Jon Tirpak

# FDMC Toolbox



**JON D. TIRPAK, PE, FASM**  
**EXECUTIVE DIRECTOR**  
**(843)760-4346**  
**JON.TIRPAK@SCRA.ORG**

# What is FDMC?



# One Way FDMC Works



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# Outline

## Enterprise Tools

- **FORGE-IT**
- **AFCAT**
- **MetaLFACT**
- **National Forging Tooling Database**
- **Job Shop Lean**

## Technical Tools

- **FORGE-IT**
- **Simulation**
- **Work Force Development**

# Why Enterprise Tools?

## Challenges:

- Small quantity orders
- Short lead times
- Infrequent buys
- Labor intensive RFQ System
- No tooling
- Fragmented supply chains
- Inadequate procurement data
- Hog it out?

## Warfighter Relevance:

- Unfilled orders
- Preventing cancelled contracts
- Parts for demanding applications present unique challenges

## Objectives:

- A more innovative approach
- Responsive to industry concerns
- Utilization of industry expertise
- Sharing of knowledge

*Forgings and castings represent about 4% of DLA solicitations, but 15-20% of backorders over 180 days*



# AFCAT Streamlines Procurement

## Problem

- OEM needed domestic 410 seamless extruded tubing, now!
- Procurement delays occurring

## Solution

- AFCAT located domestic source that met all DLA requirements
- Prevented further procurement delays

## Details

- NSN: 3040-01-310-2137
- F100 PW 0229 engine powers USAF F-15s & F-16s

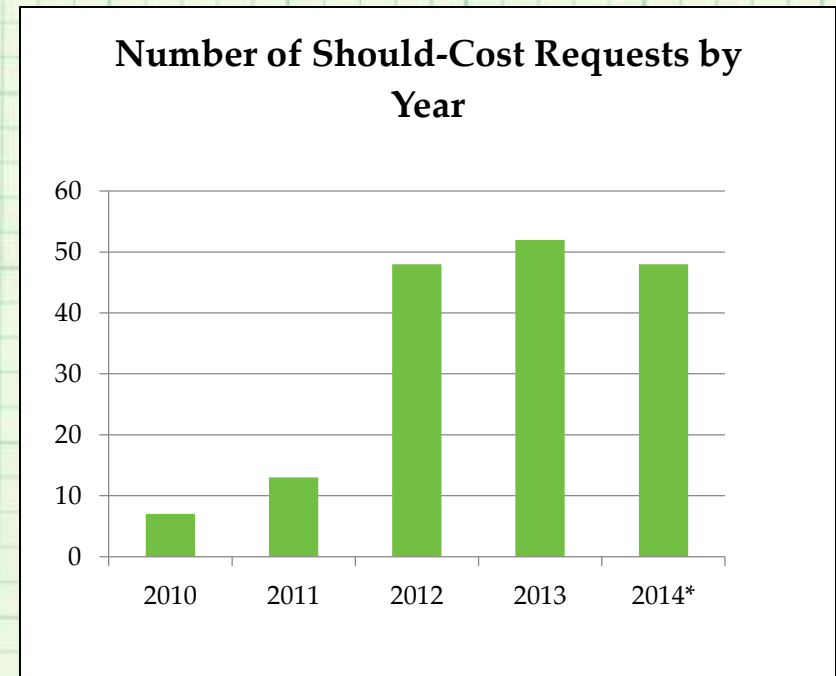


*AFCAT recently received a DoD Value Engineering Team Achievement Award for contributing to DLA's achievement of \$346.5 million in savings and cost avoidance in FY2012.*

# MetaLFACT

## Cost estimating tools are used to:

- Perform Should-Cost Analyses
- Evaluate potential Reverse Engineering projects
- Recommend alternative manufacturing methods (when technically permissible)



*“The MetaLFACT and FORGE-IT teams have provided timely and detailed estimates for our should cost customers. The detailed response provides our buyers fair and reasonable targets for contract negotiations to secure the best possible pricing for our military customers”*

# FORGE-IT Assists DLA

## Problem

- DLA issued solicitation for machined version of parts that HAD to be a forging
- New forging source(s) needed

## Details

- NSN: 1560-01-024-6735 & 1560-01-024-6736
- T-38 Support-Fuselage, Lower Aft

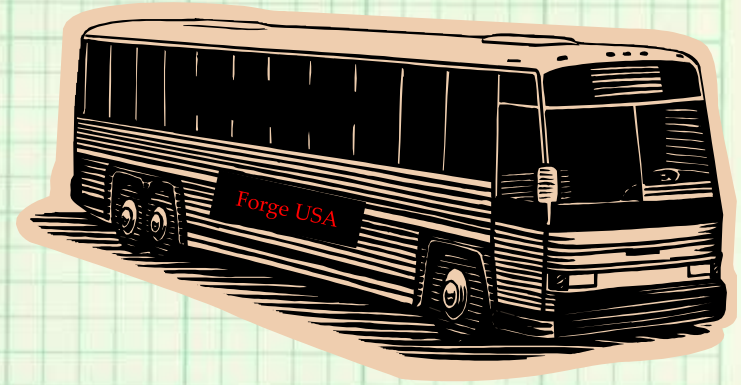
## Solution

- Machined version of part cancelled and removed from DLA system
- Found potential sources via FIA RFQ site
- Provided contact information to DLA and Air Force procurement personnel
- Recommended DLA ensure any machine shops bidding on parts provide proof of forging source prior to award



# Workforce Development

- **Bus trips to forges for DLA personnel**
  - Buyers
  - Item Managers
  - Quality Assurance Representatives
- **On-site Seminars for DOD personnel**
  - Designers
  - Commodity managers
  - Quality Assurance Representatives



# National Forging Tooling Database

- Locate forging dies rapidly for old systems
- Recently updated contact information for 57 forges and data for nine forges
- <http://www.ihs.com/haystack>

# National Forging Tooling Database

- ✓ Part Number
- ✓ Forging Die Number
- ✓ Part Description
- ✓ Weapon System
- ✓ Forge Shop
- ✓ Federal Supply Class
- ✓ CAGE

IHS The Source for Critical Information and Insight™

Database Reports About Help

National FLIS/TIR

Enter search → Super Search

Search Tools

Pricing and Procurement

Part Number

Forging/Die Number

Contact Us | IHS Menu | Log Out

IHS Haystack Gold

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IHS The Source for Critical Information and Insight™

Database Reports About Help

Hits: More than 1500 National

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Database Reports About Help

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	Summary	FSC
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	<a href="#">Details</a>	1620
	<a href="#">Details</a>	1620
	<a href="#">Details</a>	1650
	<a href="#">Details</a>	1620
	<a href="#">Details</a>	1620
	<a href="#">Details</a>	1620

Copyright

NFTD Summary Information			
Part Number	Description	Weapon Sys	
4G13761-101A	CAP,LINEAR ACTUATIN	C5,	
Forging/Die No.	NSN	Supplier Cage	
9330	1650-00-113-2130		

Tool Information								
Material/Alloy	Customer	Status	Forging Grade	Weight	DLA Unique ID	Product Type	Tool Type	Tooling Status
				0.0000000				

NSN Information			
FSC	NIIN	INC	Item Name
1650	00-113-2130	61719	CAP,LINEAR ACTUATING CYLINDER

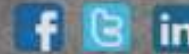
Shop Details	
Shop Cage	50502
Shop Name	ALUMINUM PRECISION PRODUCTS
Address	6500 CEDAR AVENUE
City	CLEVELAND
State	OH
Postal Code	44103
Country	USA
Phone	216-361-1400

# RFQ Service at <http://www.forging.org>



Worldwide Integration, Innovation & Development  
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## Request For Quotation

### To Send An RFQ

Here is a free, simple and fast method for design engineers, component specifiers or purchasing professionals to receive bids from FIA forging producers to manufacture your forged component. Simply answer a few short questions about your component requirements, click *submit*, and FIA Member companies subscribing to receive RFQs will instantly and automatically be e-mailed your RFQ. Those forging companies interested in receiving further information on your RFQ may then contact you directly. **That's it! No strings attached! No obligations, no fees, no contracts, no commissions, no hassle!**

**There are currently 139 individuals signed up to receive your quote.**

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### Forging Videos

*Click on the video links below to learn more about the forging industry:*







# NDT Cell Layout Project Goals

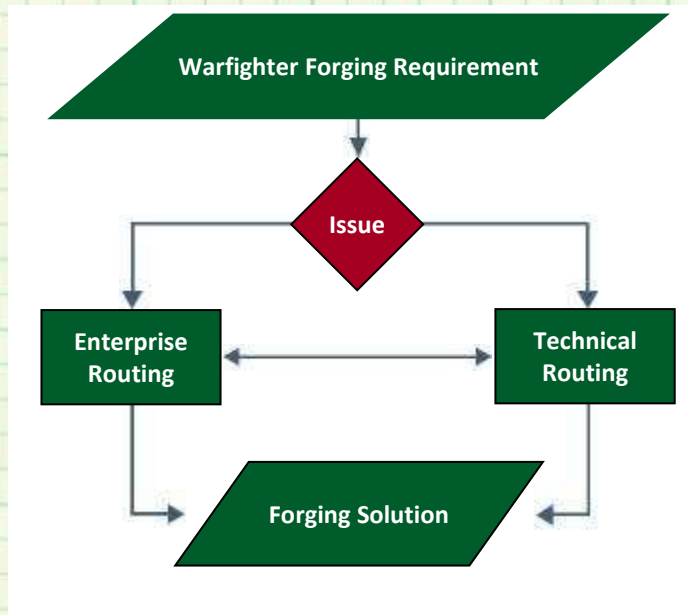
- Re-design NDT cell layout so magnetic particle inspection units are in-line or parallel
- Utilize visual controls for specific incoming/outgoing staging locations for forgings
- Implement 1 piece (or small-batch) flow to increase throughput and reduce start-to-finish flow time
- Develop a software tool to rapidly calculate workload balance, labor allocation and planned transfer of manpower to and from other cells to the NDT cell

# Technical Tools

- **FORGE-IT Team**
- **Simulation**
- **Work Force Development**

# FORGE-IT Technical Solutions

## Sample Issues



- Forging vs. machining
- Poor technical drawings
  - GD&T
  - Obsolete alloys
- Surface finishes
- Meeting mechanical properties

# Process Simulation

- Process simulation has become an indispensable tool for many companies.
- For some companies, linking the science of simulation to their production processes is still a new concept.
- This leaves them at a disadvantage when challenged by difficult-to-produce parts or materials.
- FAST project partners are working together to leverage process simulation technologies at small and mid-sized forge shops.

# Process Simulation

- FIA member company manufactures IN 625 elbow fittings for a Navy application.
- The original process resulted in forgings that had trouble meeting mechanical property requirements.
- Process adjustments improved the properties, but also resulted in extremely poor die life.
- FDMC, forge & SFTC are collaborating to improve die life while meeting required mechanical properties.



# Contacts

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- **For Program & Project Tools**

## **Chris Bergner, PMP**

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- **(843)760-3325**
- **For FORGE-IT Tools related to Technical & Enterprise Problems**

# Acknowledgements

**The Forging Advanced Systems & Technologies Program is sponsored by the Defense Logistics Agency with support from the DLA Contracting Services and Logistics R&D Program Offices.**

**FAST is cost shared by our industrial partners.**



## Naval Foundry in Philadelphia

Faris Ibrahim - NNSY





**NAVAL FOUNDRY &  
PROPELLER CENTER**



**M  
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“to provide a single facility within the Naval Establishment for designing, manufacturing, and repairing propellers for all types of surface and subsurface craft of the United States Navy.”

NAVSEAINST 5450.45A

“National Consolidated Naval Ship Foundry providing castings previously manufactured at Naval Shipyards. Intermediate Maintenance Facilities, Ship’s Intermediate Maintenance Activity.” CNO N43 ltr 3 FEB 97

*The Navy’s submarine industrial base for the manufacture of propulsors and propellers, and the Navy’s only organic source of cast components for ships.*

- *Unique facility, critical to the submarine industrial base*
- *Core Logistics Facility*
- *Propeller manufacturer for Trident, Los Angeles & Virginia Class*
- *Experienced in the manufacture and repair of most of the Navy’s propellers and propulsors*
- *Can produce most castings of various materials*

# Naval Foundry and Propeller Center

Norfolk Naval Shipyard Detachment Philadelphia

## HISTORY



**IN OPERATION FOR  
OVER 95 YEARS**



- Originally part of Philadelphia Naval Shipyard
- 1991 Base Realignment Commission closed Philadelphia Naval Shipyard and retained the Foundry and Propeller Shop
- September 1995 NFPC stood up as a Detachment of Norfolk Naval Shipyard

# Naval Foundry and Propeller Center

Norfolk Naval Shipyard Detachment Philadelphia

## BUSINESS & TECHNICAL PARTNERS

### BUSINESS OPERATIONS

NAVSEA 04X - Command Support  
Norfolk NSY - Command/Operating Support  
NAVFAC - Facilities Support

### MANUFACTURING

NAVSEA PMS 450 - VA Class Project  
NAVSEA PMS 397 - Ohio Replacement  
NAVSEA 05P - Repair & Refit  
Electric Boat - Shipbuilder  
Newport News - Shipbuilder  
BAE inc. - Propulsor Assembly  
Penn State ARL - Acoustic Testing

# NFPC

### TECHNICAL

NAVSEA 05P - Technical Authority  
NSWCCD - Hydrodynamic Design  
NSWCCD PHIL - LCM & Inspection  
Propulsor Technology Inc - Software & Inspection  
Penn State ARL - Hydrodynamic Design

### NEW TECHNOLOGY

Center Naval Shipbuilding Tech - Measurement Tech  
ONR - MANTECH

# Naval Foundry and Propeller Center

Norfolk Naval Shipyard Detachment Philadelphia

## KEY ASSETS

### FOUNDRY

- *Among the largest non-ferrous pour capacities in the US (250K lbs.)*
- *Large lift/crane capacity*
- *Furnaces ranging from 50 lbs. to 50 ton capacity*
- *Centrifugal casting capability*
- *Capable of providing most castable alloys*

### MACHINE SHOP

- *Large Scale Machine Centers*  
*(5) five-axis numerically controlled (NC) profilers capable of monobloc machining up to 31 feet in diameter*  
*(3) hi-speed profilers*  
*(1) five-axis NC profiler with dual spindle*
- *Large lift/crane capacity*
- *Multiple small machine centers*

### STAFFING - 207 Personnel

- *141 Production*
- *20 Manufacturing Engrg*
- *8 Facilities Engrg, WHE, & OSHE*
- *16 Quality Assurance*
- *13 Business Office*
- *9 Administration*

### LASER MEASUREMENT

- *Providing pioneering non-contact surface measurement technology*
- *Laser Tracker and Leica Scan*

# Naval Foundry and Propeller Center

Norfolk Naval Shipyard Detachment Philadelphia

## FURNACES



Misc. Small Furnaces



3000hz Furnaces

## Capacities from 50 lbs. to 50 tons

*“Among the largest non-ferrous pour capacities in the US (250K lbs)”*



3 & 5 Ton Furnaces



50 Ton Furnace

# Naval Foundry and Propeller Center

Norfolk Naval Shipyard Detachment Philadelphia

**NATIONAL CONSOLIDATED  
NAVAL SHIPS FOUNDRY**

*“the Navy’s only organic ships foundry”*

**10” Gunmetal Elbow**



**1/2” Steel Valve Body**



**Valve Gate Pattern**



*“supporting emergent & hard to contract fleet requirements”*

**Centrifugal Casting Capability**



**SSN 688 Shaft Sleeve**



**Tin Bronze Strainer Plug**

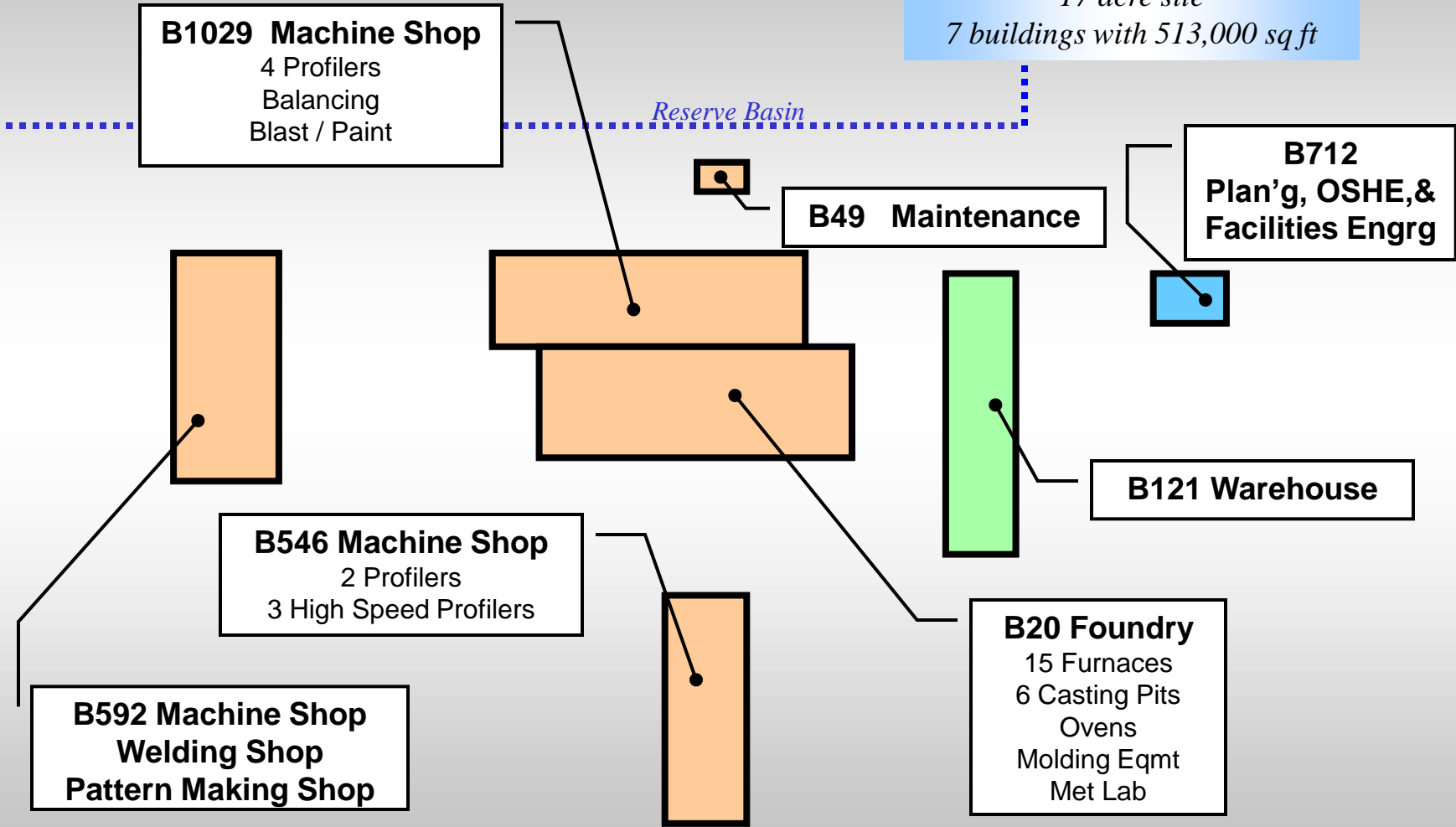


# Naval Foundry and Propeller Center

Norfolk Naval Shipyard Detachment Philadelphia

## FACILITY

17 acre site  
7 buildings with 513,000 sq ft



Delaware River



## Connecting American Manufacturing

Brench Boden - AFRL



# Connecting American Manufacturing (CAM)

Helping U.S. Warfighters, Industry and Taxpayers



# Background



- DoD FY12 Budget is >\$700B
- Defense Logistics Agency
  - Manages nine supply chains and more than 5 million items
  - Supports 2,210 weapon systems
  - Processes over 111,000 requisitions and 11,000 contract actions a day
- DoD does a lot of things right...
  - Acquisition reform has been underway for years
  - Numerous small business programs
- Part/System acquisition is not without its challenges...
  - Estimate (roughly) 20,000 backlogged acquisition items aged 180+ days
  - Estimated 10% of the 330,000 US manufacturers do business with the DoD
  - Diminishing manufacturing sources and material shortages remain daily problems at maintenance depots



# CAM Overview



- Objectives
  - Make it easier and more attractive for U.S. manufacturers to work with the DoD
  - Improve the DoD's ability to find U.S. manufacturers with the right capability and capacity at the right time
- Key metrics
  - Increase pool of DoD manufacturers
  - Increase number of responses per RFQ
  - Decrease parts price with no loss of quality
  - Decrease customer wait time



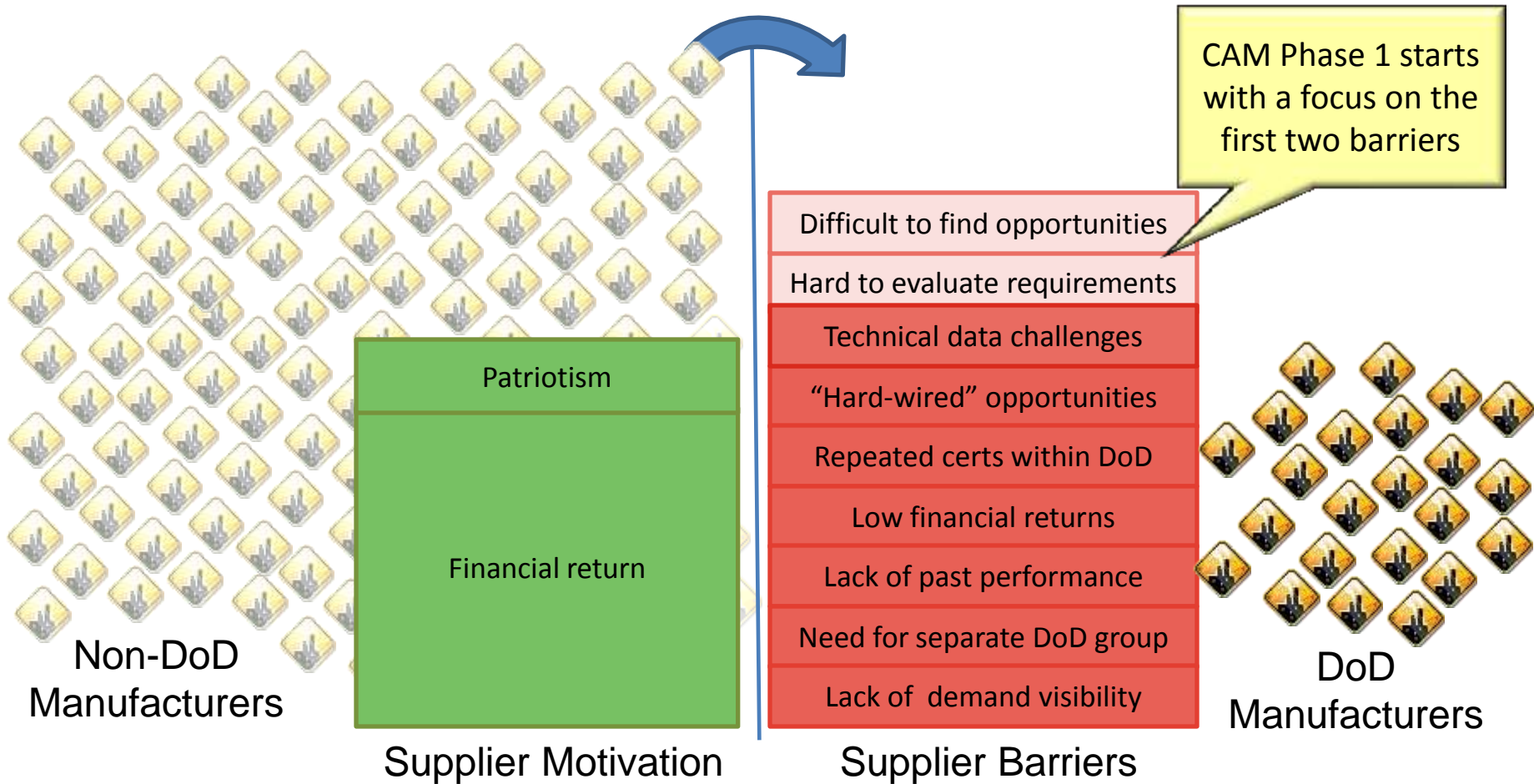
# CAM Phase 1 - Approach



- Leverage manufacturing e-marketplaces
  - E-marketplaces are comprised of buyers and sellers that use a common internet solution to find each other, exchange information and conduct business.
- Use e-marketplaces to help:
  - Reduce a manufacturer's effort to match DoD needs with their capabilities
  - Extend reach of DoD RFQs to a new and much broader manufacturing audience



# Goal #1: Reduce DoD Barriers





# Goal #1: Reduce DoD Barriers

NSN:  
1005-00-957-3893

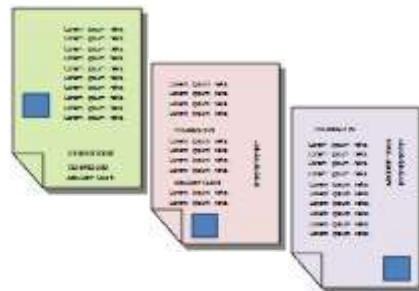
Match DoD parts to  
manufacturing capabilities



SPM2DS-12-Q-0096	SPM2DS-12-Q-0987
SPM2DS-12-Q-0098	SPM2DS-12-Q-0772
SPM2DS-12-Q-0575	SPM2DS-12-Q-0114
SPM2DS-12-Q-0301	SPM2DS-12-Q-0698
SPM2DS-12-Q-0339	SPM2DS-12-Q-0339
SPM2DS-12-Q-0425	SPM2DS-12-Q-0425
SPM2DS-12-Q-0123	SPM2DS-12-Q-0123

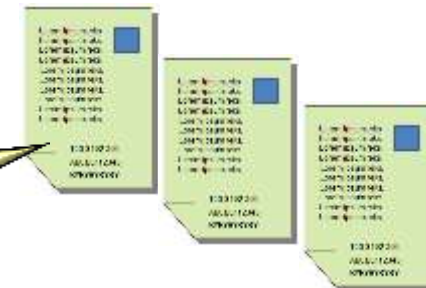
Filter many RFQs to present  
just those that best match

SPM2DS-12-Q-0339  
SPM2DS-12-Q-0425  
SPM2DS-12-Q-0123



**DoD**

Present RFQ information in a  
consistent format



**E-marketplaces**

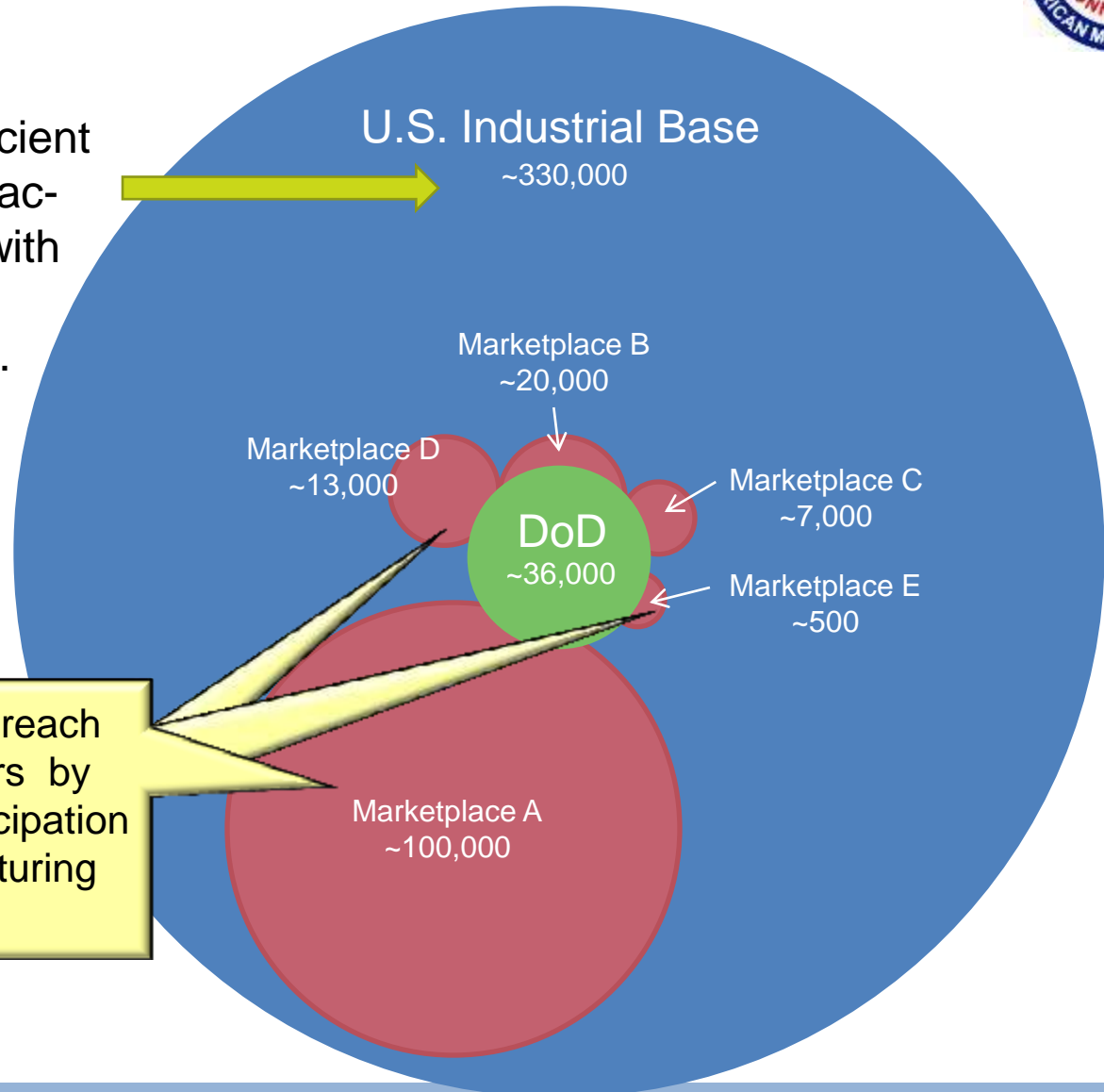
**Manufacturers**



# Goal #2: Expand Mfg Pool



Ideal state is to have efficient access to all U.S. manufacturers to find a supplier with the right capability and capacity at the right time.



CAM will help DoD reach more manufacturers by leveraging their participation in various manufacturing marketplaces.



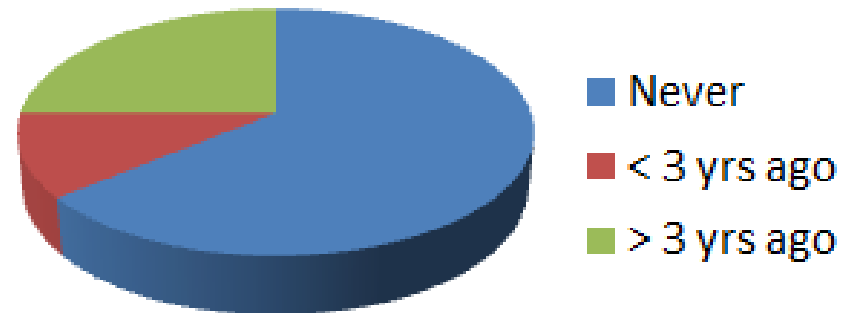


# Goal #2: Expand Manufacturing Pool

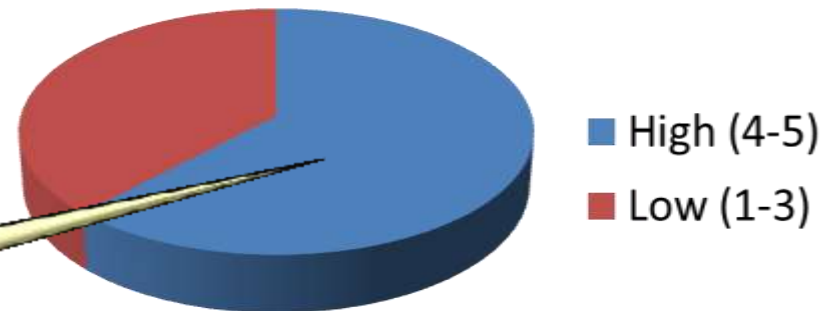


Phase 0 survey of manufacturers to determine their interest in DoD opportunities made available through the marketplace. The results indicate the potential for a significant pool of new manufacturers for the DoD.

### Supplied to DoD?



### Interested in DoD Opportunities?



62% of manufacturers surveyed are interested in DoD work



# Sourcing Scenarios



- Seeking out buying organizations
  - Having difficulty finding manufacturers to make parts
    - Receiving one or no bids
    - Foreign sources
  - Manufacturing lead times are too long
  - Cost for parts is too high
- Candidate items
  - Material is metal, plastic or composite (no electronics)
  - DoD has tech data or part is available for reverse engineering



# Program Status

- Phase 1 Initiated - contracts run through May 2013
- Three Phase 1 Marketplace Awardees
  - America's VOICe (Imaginestics Team)
  - Live Source (MFG.com/Hillmer Team)
  - MfrSearch (GDIT/TechSolve Team)
- <https://www.dodmantech.com/Execution/CAM.asp>
- <http://www.connectingmfg.com/twiki/CAM>
- CAM Team Cultivating Participants



# Casting and Forging Forum

Joint Technology Exchange Group (JTEG)

24 June 2014

## Break

1435 - 1510

## Digital Radiography

Eric Hoover - AMC



# Digital Radiography



## Advanced Imaging Nondestructive Testing and Inspection

Eric D. Hoover

Army Materiel Command

[Eric.d.hoover2.civ@mail.mil](mailto:Eric.d.hoover2.civ@mail.mil)

309.782.1077



# Agenda



- **Overview**
- **Commercial Applications**
- **Value and Benefits**
- **Composite Testing and Inspection**
- **Comparison**
- **Path Forward**



# Overview



- **As technology advances, digital radiography solutions replace many traditional film applications offering distinct advantages, such as fewer consumables, shorter exposure and processing times, as well as being more environmentally friendly**
  - **Nondestructive**
  - **High resolution imaging**
  - **3D imaging capability**
  - **Layered, efficient, and real-time results**
  - **Computer controlled**
  - **Automated digital detection**
  - **Extensive commercial applications**

# Commercial Applications

- **Aerospace and Aviation**
  - Composite airframe
  - Composite flight surfaces
  - Metal components
- **Metals and Castings**
  - Cast & composite airfoil
  - Welded structures
  - Forged disks
- **Oil and Gas**
- **Power Generation**
- **Transportation**
- **Defense (Emerging)**



# Value and Benefits



- Provides a “layered” inspection “ 3D landscape”
- Ability to readily identify flaws, thickness, and other component properties
- Reduces inspection and product acceptance lead times
  - Reduction is from hours to minutes
- Reduces X-ray process environmental waste products
- Cost reductions through process efficiencies
- Improves equipment functionality
- Improves quality – manufacturing process feedback
- Increases equipment readiness

# Composite Testing & Inspection

- **Composite materials continue to gain popularity in lightweight high-performance products - such as aerospace components.**
- **Increase in the use of composites creates a requirement for improved inspection and testing techniques for:**
  - **Bond integrity in honeycomb composites products**
  - **Carbon fiber composites**
  - **Metal integrity and metal joints**
  - **Castings**

***Provides efficiencies and enhancements to increase test and inspection capabilities***

# Comparison

## Traditional X-ray vs Digital Radiography

- X-ray inspection testing typically reveals defects in components such as sand castings, such as gas holes, shrinkages, and foreign materials through the use of “static film”
- Digital Radiography displays the exact location of the defect through the ability to “decompose or layer” the sample
  - 3D data capability allows quantitative product defect analysis
  - Computer-aided
- Increases inspection information:
  - Size
  - Volume
  - Density of inclusions and cavities
  - Improved contrast = reveals smaller defects



***Improved Visibility of Product = Improved Quality***

# Path Forward

- **Technology already used within the commercial sector**
- **Aviation and Missile Command in harmony with the Aviation and Missile Research, Development and Engineering Center are working to:**
  - **Update of testing inspection specifications**
  - **Transformation of inspection procedures within the Aviation Sector**
- **End state**
  - **Characteristics of dimensions, shape, internal defects, and density**
  - **Increase in sources of supply**
  - **Costs savings**
  - **Reduced product lead times**
  - **Improved product quality**



***Enhance Readiness***

# Aviation and Missile Research, Development and Engineering Center

- **Points of Contact.**

- **Government – United States Army Primary**

- ❖ Robert Olson, Aviation Industrial Base Lead

- [robert.j.olson11.civ@mail.mil](mailto:robert.j.olson11.civ@mail.mil), 256.876.4993

- **Academia**

- ❖ Rodney Lee, Lean Manufacturing and Supply Chain

- Specialist, University of Huntsville, [rodney.lee@uah.edu](mailto:rodney.lee@uah.edu)

# Casting and Forging Forum

Joint Technology Exchange Group (JTEG)

24 June 2014

Identify Challenges & Leverage  
Points Discussion



# Casting and Forging Forum

Joint Technology Exchange Group (JTEG)

24 June 2014

## Wrap-Up

Greg Kilchenstein - OSD-MPP