



# “The Little Shop that Could: Transitioning from a Small Jobs Shop to the Manufacturer of a Flight Test Vehicle”

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# Overview

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- ◆ **Timeline**
- ◆ **Implementing A1X Fabrication – Management Perspective**
- ◆ **Implementing A1X Fabrication – Safety and Health Perspective**
- ◆ **What it takes to manage Safety and Health during times of change**



# Timeline

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- ◆ **8/2005 – Decision Made to combine Machine Shop and Fabrication Shop into one Building**
- ◆ **9/2005 – Technical Workforce in Manufacturing Division submitted RIF resumes**
  - GTED program introduced which draws multiple talented individuals out of the Manufacturing Division
  - Reassignments fostered to move people into other organizations with active workload
- ◆ **5/2006 – AIX USS Awarded to Glenn Research Center**



# Timeline

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## ◆ 7/2006 – Began Facility Modifications to Accommodate AI-X Work

- Excessing or storing equipment to accommodate space requirements
- Acquiring temporary storage facility
- Installing Critical Lift Qualified Crane
- Re-routing HVAC system
- Installing new Rolling Machine
- Designing and installing segment build stands
- Increasing electrical supply to Building
- Fabricating the Blast and Paint Booths
- Securing the building

# Timeline

- ◆ **8/2006 - Began fabrication of Pathfinder 1 segment**
- ◆ **2/2007 – Began Fabrication of Pathfinder 2 segment**
- ◆ **7/2007 – Began Fabrication of first USS FTV segment**
- ◆ **10/2008 – Shipped 11 FTV segments and 2 SSASs to KSC**

NASA C-2008-3926



National Aeronautics and Space Administration  
John H. Glenn Research Center at Lewis Field

NASA C-2008-3451



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NASA C-2008-3548



National Aeronautics and Space Administration  
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## ◆ What Was Needed – Fabrication Perspective

### ◆ New Equipment

### ◆ Tasks to manufacture USS

#### ◆ Welding

#### ◆ Grinding

#### ◆ Rolling/Shaping/Fitting/ Torquing

#### ◆ Crane/Forklift/JLG

#### ◆ Blasting and Painting



## ◆ What Was Needed – Management Perspective

### ◆ Procedures

- ◆ AS9100

- ◆ Flight Readiness Review

- ◆ No room for innovation

### ◆ Drawings

- ◆ Analysis and design lagging

- ◆ Leadership in multiple areas





# GRC – Fab Shop - Where to Start

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## ◆ What Was Needed –Management Perspective

### ◆ Personnel

- ◆ Knowledge of equipment – experience
- ◆ Proven record of operating equipment safely
- ◆ Working with diverse workforce
  - ◆ Civil servants mixed with contractors
  - ◆ Union members mixed with non-union members

## ◆ What Was Needed – Safety Perspective

- ◆ Resident Safety and Health Professional
- ◆ Medical Surveillance
  - ◆ Medical staff tour through facility
  - ◆ Fitness Center Staff involved in back safety training
- ◆ Training
  - ◆ Safety
  - ◆ Equipment
- ◆ IH Surveillance
- ◆ Blanket Hot Work Permit





# GRC – Fab Shop - Where to Start

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- ◆ **What Was Needed – Safety Perspective**
  - ◆ Procedures
    - ◆ Incorporating safety into unknown
  - ◆ Job Hazards Analyses
  - ◆ Protective Equipment (PPE, GFCI, Barricades)
    - ◆ Purchasing
    - ◆ Encouraging Use
  - ◆ Management Support (QS and DM)



# We had to Come a Long Way Baby...and Fast

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- ◆ Go Slow – resist the urge to push too hard too fast
- ◆ Give options and solutions...not standards and references
- ◆ Give folks a chance to change behaviors – “managers don’t need to know everything”
- ◆ Don’t get frustrated...get creative ...go back to basics
  - ◆ Anticipation – potential issues
  - ◆ Recognition – emerging issues, issues becoming a problem before they are a problem
  - ◆ Evaluation – options, seek input from engineers and technicians
  - ◆ Control – implement options



# We had to Come a Long Way Baby...and Fast

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## ◆ Balance Priorities

- ◆ Safety and Health Risk
- ◆ Mission Goals
- ◆ Organizational Goals/Concerns
- ◆ Employee Goals/Concerns

◆ **Priorities did not always overlap...this created the “dark forces”**



# “The Dark Forces”

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## ◆ Personnel moral issues

- Threat of Reduction in Force
- Consolidation into a single building
- Working together in a production environment
- Never had to work to processes and procedure before
- Innovation discouraged

## ◆ Union

- Opposed to change
- Every change was viewed as a threat
- Wanted a vote on everything
- Conflict with contractor welders (union and non union)

## ◆ EEO Process

- Staff wanted to do things the way they always did and used whatever resources available to them

## ◆ Management

- Understaffed by 3 Branch Chiefs and a Division Chief
- Underpowered – two Deputy Branch Chiefs with no experience in flight hardware

## ◆ Safety

- Implement comprehensive safety program without impacting schedule
- Conflicts with Union
- Minimal management support initially because resulted in union grievance, EEO complaint or other conflict with staff

## ◆ Project

- Maintain schedule
- Successfully execute
- Keep on cost

## ◆ Center

- AS 9100 Certification
- Required success to capture future work



# Self Examination

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**Providing Safety and Health Support During Change:  
Do you Have What it Takes?**



## The Referee



- ◆ This EH&S professional remains uninvolved during the project design and planning stage and tends to throw flags on the field and stops the play after the game starts.
- ◆ Impacts schedule, cost and momentum

## The Coach

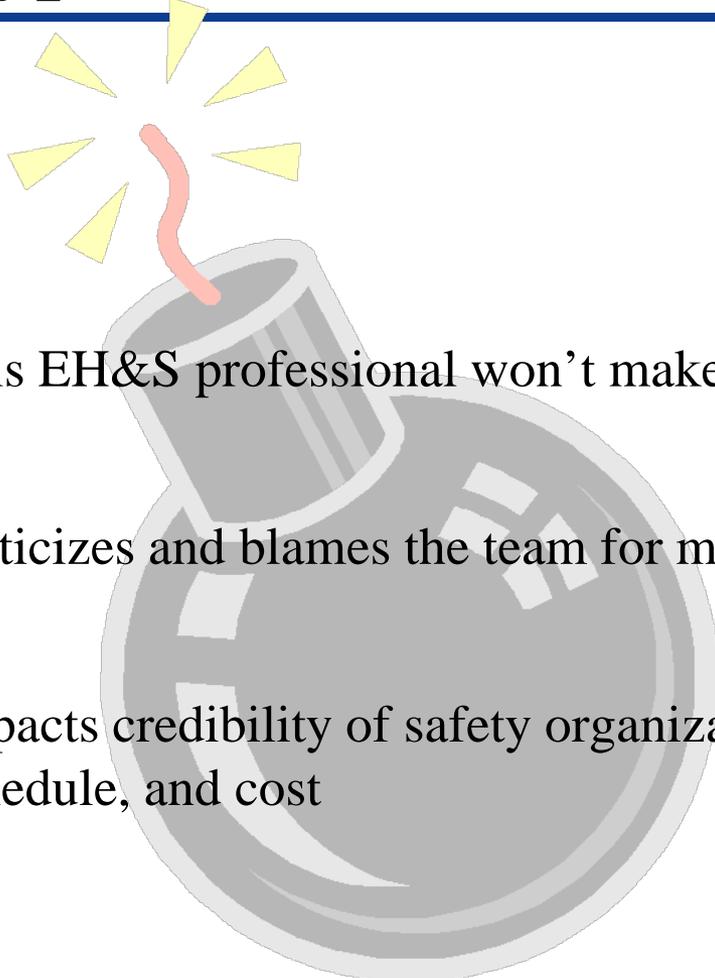


- ◆ This EH&S professional tells people how to do their jobs and does not seek input from people doing the work
- ◆ Impacts safety organization's credibility, safety of workers, schedule and cost

# Types of EH&S Professionals

## The Fan



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- ◆ This EH&S professional won't make the hard decisions
  - ◆ Criticizes and blames the team for mistakes and accidents
  - ◆ Impacts credibility of safety organization, safety of workers, schedule, and cost

# Types of EH&S Professionals

## The Offensive Lineman



**This EH&S professional stays actively involved in the project planning, design and implementation phases. . .**

# The Offensive Lineman

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They lead the way and provide protection to the backs (engineers) and receivers (fabricators and machinists) to create a safe pathway to the end zone (mission goals). . .



# The Offensive Lineman

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They do not criticize, or place blame for mistakes and accidents. They jump on the ball and try to recover the team's position to get them safely back on track.



# The Offensive Lineman

This style creates minimal  
schedule and cost impacts



**Safety is seen as a beneficial,  
credible member of the team,  
not as someone that must be  
“tolerated” as part of the  
process**



# Thank You

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## Mission Success Begins and Ends with Safety

