Perfecting Preparation Processes for Turnarounds

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Air Force Materiel Command
Arnold Engineering Development Center
Arnold Air Force Base, TN 37389

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Perfecting Preparation Processes for Turnarounds

Tim Wilson
AEDC/ATA
Agenda

• Defining the Turnaround
• Strategic Planning – Overall Turnaround Pre-Plan
• Detailed Planning – Readiness Audits
• Organizing the Work – Interactive Planning
• Building momentum with planning processes
• Questions
Overview

Our Business - Service to the Department of Defense

• Arnold Engineering Development Complex (AEDC)
  o Aerospace ground test facility and national asset
  o Testing for jet engines, planes, rockets, missiles, and other aerospace technologies

• Aerospace Testing Alliance (ATA)
  o Joint venture with Jacobs Engineering as managing partner
  o Contract testing, operations, maintenance, and modifications
  o Large industrial complex with aging infrastructure
Our Situation

• Opportunities to Improve Aging Infrastructure
  o Slowed economy world-wide
  o Uncertainty for future funding
  o Need to maintain valuable national testing assets

• Turnaround Planning Goals
  o Make best use of funding and access to equipment
  o Add projects to maintain and improve capabilities to test
  o Improve pre-planning processes
  o Institutionalize processes to deliver turnaround results
Introduction

• Turnaround (TA) results will only be as good as the preparation!
• Need some good processes to get ready!
• Plan ahead to be flexible!
• Once the turnaround starts, better have some momentum generated already!
• The primary challenge after the TA start date is managing the difficulties not anticipated!
Definitions

Outage

“Any action that will affect an asset’s ability to perform its intended mission in terms of its advertised capability.”

Turnaround

“A turnaround is collection of asset outages performed during a period of time, when production is interrupted for work that must be done with production facilities out of service.”

Turnaround – Integrated outages!
Turnaround Criteria

- **No**
  - Systems
  - Multiple outages
  - Utilities
  - Contractors
  - High risk projects
  - First time jobs
  - Non-routine
  - Production delays
  - Program delays
  - Revenue losses
  - Regulatory issues

- **Yes**
  - Complexity
  - Difficulty
  - Impact

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It costs money to plan! 
It costs more not to plan!
Real World Planning Cycle

- **Designs/dwgs/specs**
- **Procurement and delivery**
- **Planning/Integrating Schedules**
- **Fab and preliminary field work**
- **Turnaround**

- **• Design**
- **• Build**
- **• Install**

Same Year

18mos 12mos 9mos 6mos 3mos 0 “Execute”
Three Pre-Planning Phases

• Strategic Planning Phase
  o Gather scope
  o Preliminary cost and schedule

• Detailed Planning Phase
  o Work order packages
  o Fully-resourced job schedules

• Organizing the Work Phase
  o Integrating all individual jobs
  o Level load the resources

Supporting Processes
  o Overall TA Pre-Plan
  o Readiness Audits
  o Interactive Planning
Three Pre-Planning Support Processes

A plan for the plan

Overall TA Pre-Plan

Adds:
Structure and Accountability

Fit pieces together

Interactive Planning

Define the pieces and readiness

Readiness Audits
Digging Out the Scope

- Remaining life assessments
- Annual asset program (work) plans
- Investment (capital) project plans
- Preventive Maintenance forecast/backlog
- Corrective Maintenance backlog
- Forecast of rebuilds/overhaul work
- Emerging/discovered work during audits/interactive planning sessions
- Assertive, persistent digging to improve planning time and results
Overall TA Pre-Plan Process – Major Milestones

- Start Turnaround Planning
- Assign Turnaround Planner
- Hold 1\textsuperscript{st} Interactive Planning Session (Scope Definition)
- Hold 2\textsuperscript{nd} Interactive Planning Session (Preliminary Plan)
- Hold 3\textsuperscript{rd} Interactive Planning Session (Conflict Resolution)
- Assign Turnaround Manager
- Scope Freeze (Based on TA start date minus 60 days)
- Hold 4\textsuperscript{th} Interactive Planning Session (Final Schedule Review)
- Start the Turnaround
Overall TA Pre-Plan Process - Highlights

- Hold turnaround planning kick-off meeting
- Projects approved by Steering Team
- Design/preliminary drawings
- Turnaround work list deadline
- Preliminary project schedules made by job planners
- All material identified/ordered/shipped
- Material and fabrication lead times determined
- Service contracts in place

✓ General Manager (CEO)
✓ Directors (Vice Presidents)
✓ Asset Owners (Plant Managers)
Overall TA Pre-Plan Process - Highlights

- All construction equipment needs identified
- Individual detailed schedules merged into master schedule
- Master schedule distributed for review
- Scope frozen and approved
- Changes after scope freeze date - Steering Team approval
- Finalized master schedule base-lined and issued
- All major material and equipment received on site
- Shutdown plant
Readiness Audit Process

Audits 2, 3, 4....
- Planning job
- Addressing problems
- Organizing job
- Team Building

Audit 1
- Individual job
- Scope
- Priority

Audit Goals
- Authenticate scope
- Anticipate problems
- Assign accountability
- Actually solve problems
- Assure readiness
# Audit Sections for Individual Projects

## A-1. DESIGN STATUS
- A-1-01 Civil Digs
- A-1-02 Structural Digs
- A-1-04 Mechanical Ductwork Digs
- A-1-05 Misc Steel / Platforms Digs
- A-1-07 Plate (Bolted / Welded / Instrument Dismantled)
- A-1-09 Piping Digs
- A-1-11 Mechanical Equipment Digs
- A-1-12 Electrical Digs
- A-1-13 Instrumentation Digs
- A-1-17 Specialty Digs
- A-1-19 Design Support Assigned?
- A-1-21 System Engineer Involved in Process?
- A-1-22 Point of Contact Assigned

## A-2. SOFTWARE
- A-2-01 Point of Contact Assigned
- A-2-02 Software Specification completed
- A-2-03 Hardware Specification completed
- A-2-04 Architectural/Definitive Design completed
- A-2-05 CAD/3D model completed
- A-2-06 Bill of Materials completed
- A-2-07 Software Design completed
- A-2-08 Integration and Deployment Plan completed
- A-2-09 Detailed Design completed
- A-2-10 System set up in lab
- A-2-11 Software coding completed
- A-2-12 System Test Plan reviewed
- A-2-13 System Test executed in lab

## B-1. SAFETY
- B-1-03 Environmental Management Plan in place?
- B-1-05 Housekeeping Plan developed?
- B-1-07 Spa, Safety Inspectors Identified?
- B-1-09 Critical Items Identified by Safety
- B-1-10 Lead/Assistant Abatement Required?
- B-1-11 Fresh Air / Protective Clothing Required?
- B-1-14 Job Walk Performed by Safety Dept?
- B-1-16 Industrial Hygiene Requirements Identified?

## G. GENERAL
- G01 Change requests submitted
- G02 Outage request submitted
- G03 Change requests approved
- G04 V&V scheduled
- G05 Outage approved
- G06 Master work permit section 4 submitted
- G10 FOD Protection Plan

## C-1. SITE LOGISTICS
- C-1-01 Project Trailer/Office Layout Plan
- C-1-02 Power and Lighting Requirements
- C-1-09 Temp Heat/Air for Crew Work/Break Areas
- C-1-10 Special Need Equipment and consumables for design
- C-1-12 Abatement Plan developed / reviewed for contl
- C-1-13 Congestion Analysis for Equipment
- C-1-14 Congestion Analysis for Labor

## D. COSTS
- D01 Approved Budget
- D02 Approved Funding
- D05 Plan to incorporate RFIs / FCNs into Est
- D06 TA travel budget has been determined
- D07 Project Management Support to TA Planner
- D08 Work Order No.'s Reviewed / Sent to TA Planner
- D09 Checkout costs, utilities, funded?
- D10 Costs of rental equipment funded?

## F-1. MOTORIZED EQUIPMENT
- F-1-01 Crane Requirements Determined
- F-1-02 Mobile Crane Reserved
- F-1-03 Overhead Crane Reserved
- F-1-04 Training Operators Reserved
- F-1-05 Tractor / Track Reserved
- F-1-06 Trailers, Tugboats Reserved
- F-1-07 Trailers, Lo-boys Reserved
- F-1-08 Trailer Capacities Verified?
- F-1-09 Routing/staging of heavy equipment approved

## F-3. MATERIAL PROCUREMENT
- F-3-01 Material Requirements Determined
- F-3-02 Material Ordered
- F-3-03 Material Delivery Plan in Place
- F-3-04 Material Staging Area Identified

## H. CHECKOUT & STARTUP
- H01 Checkout Schedule Submitted
- H02 Resource-loaded / has realistic durations?
- H03 Tasks are linked by red/success?
- H04 Conflicts identified
- H06 Training Plan implemented
- H07 Trainees Identified by Name?
- H08 Checkout Schedule Approved
- H09 Start-up Schedule Submitted/Approved
- H10 Documentation Requirements determined
- H16 Spare Parts required for startup
### Audit Items for Individual Projects

#### The Score: 0-100% Ready

<table>
<thead>
<tr>
<th><strong>E. TURNAROUND SCHEDULE</strong></th>
<th><strong>J. SUBCONTRACTOR</strong></th>
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<tbody>
<tr>
<td>E01 Prepared for Interactive Planning Sessions</td>
<td>J03 Subcontract awarded</td>
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<tr>
<td>E02 Detailed MS Project Schedule Created</td>
<td>J04 S/C Post-award Jobsite Walk-through</td>
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<tr>
<td>E03 Schedule is Resource-Loaded</td>
<td>J05 Point of contact for Subcontractor determined</td>
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<tr>
<td>E04 Schedule has Pred/Succ Logic</td>
<td>J06 S/C Preliminary Work Schedule Produced</td>
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<td>E05 Schedule Transmitted to TA Planner</td>
<td>J07 S/C Prepares MS Project Detailed Schedule</td>
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<td>E07 Multiple Shifts Analysis</td>
<td>J08 S/C Detailed Schedule sent to TA Planner</td>
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<tr>
<td>E08 Over-time Analysis</td>
<td>J09 S/C Support Requirements sent to Base</td>
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<tr>
<td>E09 Critical path analysis</td>
<td>J10 Contractor support requirements determined</td>
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<tr>
<td>E10 Scaffolding Requirements in Schedule?</td>
<td>J11 S/C Employee Training Identified/ scheduled?</td>
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<tr>
<td>E11 Abatement Requirements in Schedule?</td>
<td>J12 S/C Trailer/Office Requirements Identified</td>
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<td>E12 Insulation Requirements in Schedule?</td>
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<td>E13 Schedule Update POC assigned/trained</td>
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<tr>
<td>E14 Off-rent scheduled</td>
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#### Auditor's Comments and Conclusions:

**Powerful tool to communicate individual project's state of readiness with improvement actions specified.**
Interactive Planning Team

Why interactive?
- Multiple jobs
- Similar needs
  - Funding
  - Access
  - Resources
- Shared info
- Integration req’d
- No surprises

CEO’s…VP’s…Plt Mngr’s

Interactive Planning - TA Planner

- Hold team accountable
- Approve scope
- Assure resources
- Horsepower
Interactive Planning Session – Organizing Work

- Requirements
- Audits results
- Conflicts
- Lockout tag out
- Equipment
- Labor resources
- First 72 hours
- Hold points
- Outages
- Configuration changes

- Critical timing
- Rentals
- Deliveries
- Staging areas
- Contractors
- Utilities
- Milestones
- Checkouts
- Plant startup
- Test Conditions

Master Execution Schedule
Building Momentum

Follow Turnaround Pre-Plan

Build and maintain momentum

Scope

Plan

Organize

Execute

9 - 18 months

4 - 8 weeks

Approved for public release; distribution is unlimited.
Beware the Black Hole!

Momentum Killers

• Scope changes
• Delayed deliveries
• Early or late starts
• Interruptions
• Injuries and incidents
• Weather problems
• Holidays
• Failure to anticipate & prevent problems!
Momentum Preservers

- Review lessons learned for past turnarounds
- Ask “what if” often during audits and interactive sessions
- Involve all the turnaround planning team for the best plan
- Include contingency plans for critical jobs and overall schedule
- Walk-thru critical jobs in the field for safety and scope verification
- Distribute audit findings for reference and action
- Assign responsibilities and action items: Follow-up!!!
- Brief status regularly to Steering Team (Horsepower)
- Commit to complete all work, once scope is frozen!
Key Points to Take Home

• Setup a turnaround pre-plan process… and follow it!
• Dig out the scope …..early enough to plan
• Audit regularly to assure readiness of each job
• Provide contingency plans for critical jobs
• Involve the whole planning team in interactive planning
• Alternate readiness audits and interactive planning sessions ‘til ready
• Produce a workable master execution schedule
• Build momentum during planning and keep it going right on into the turnaround!!!
Tim Wilson
ATA/AEDC
tim.wilson@arnold.af.mil
Backup Slides
## Turnaround Compliance Audit Example - Design

<table>
<thead>
<tr>
<th>A-1. DESIGN STATUS</th>
<th>Req'd Dwgs</th>
<th>Apprvd</th>
<th>Value</th>
<th>% Comp</th>
<th>Complete</th>
<th>Progress</th>
<th>No Start</th>
<th>Score</th>
<th>Prev Score</th>
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**Possible Category A-1 Points:** 130

**Category Total:** 0

**Score:** 0.0%
## Turnaround Compliance Audit Example - Software

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**Possible Category A-2 Points:** 160  
**Score:** 0.0%
## Turnaround Compliance Audit Example - Logistics

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<th>Y/N</th>
<th>Grade</th>
<th>Value</th>
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**Possible Category C-1 Points**: 80

**Category TOTAL**: 0

**0.0%**
# Turnaround Compliance Audit Example – Safety/QA

## B-1. SAFETY

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Possible **Category B-1 Points**: 104 0.0%

## B-2. QUALITY ASSURANCE

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Possible **Category B-2 Points**: 48 0.0%
## Turnaround Compliance Audit Example - Schedule

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### CATEGORY TOTAL

- **Possible Category E Points**: 137
- **Category E Points**: 0.0%
### TA Audit Summary

- Measure progress
- Status at a glance
- Numeric tracking
- Rating (0-100%)
- Communicate state of readiness
- How many audits?
- As many as needed to get jobs ready to work!

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Possible Points: 1105
Current Points: 0