Advanced Work Packaging In 12 Months

The First Year of Southern Company's AWP Journey
AWP Makes sense. Let’s give this a try.

We have some projects on the horizon

• Conversion projects at three power plant sites in GA and AL

What would it take to “do AWP” on those projects?

• Where do we even begin?
About Southern Company

• Electric and gas utility owner/operator
  • Atlanta-based, 9M customers across US
  • Power generation, transmission, distribution
  • Fleet: coal, natural gas, renewables, nuclear
  • Gas: storage, transmission, and distribution

• E&CS: Engineering & Construction Services
  • Internal EPCM for power generation fleet

• PIT: Performance Improvement Team
  • Me: PM for AWP Implementation
Goal For Today

• To owners and EPCs still on the fence:
  • You can get into AWP
  • Low startup cost, high organizational benefit
  • Specific real-world examples of how we did it
AWP Timeline

**Oct ’15**
- Strategy development
- AWP Concept Socialization
- Business Case Development

**Feb ’16**
- Process Development
- Introductory Training

**May ’16**
- Process Refinement
- Implementation
  - IPP Sessions
  - Database Development

**Oct ’16**
- IPP Support
  - Construction execution with WFP
Business Case
Approved in February 2016

Implement on SEVEN multi-project sites, not three

Projects to begin scope development in March
Business Case

Previous Projects: Baseline

Baseline

Stage 1
Crawl

Stage 2
Walk

Stage 3
Run

Target Performance Level for this AWP Implementation at seven sites

Metric: improved labor productivity for WFP Contractors

Stage 1
- Process Demonstrations (7 Sites)

Stage 2
- Organizational Process Adherence
- Technology Demonstrations on Single Project

Stage 3
- Fully Automated
- Integrated Systems
- Continuous Improvement
Business Case

• **Quantifiable benefits**
  • Assume ~$300M TIC per site ⇒ $2B for the program
  • Of that $2B, $600M is direct labor
  • Of that $600M direct labor, $400M will be performing WFP
  • For every 1% increase in productivity, you avoid $4M

• **Soft benefits**
  • Better project planning, accountability, responsiveness
  • Predictability of project performance, timeliness of deliverables
  • Safety – a well-planned job is a safely executed job.
  • An hour not worked is an hour not at risk.
Business Case

Costs

- AWP Project Manager
- Consulting
  - Process development
  - Initial training
- Technology
  - Simple relational database
- Contractor’s Workface Planners

Costs & Savings

Direct Labor Productivity Increase

<table>
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<tr>
<th>Percentage Increase</th>
<th>Costs</th>
<th>Savings</th>
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<tbody>
<tr>
<td>1%</td>
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<td>2%</td>
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<td>3%</td>
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<td>10%</td>
<td>$50,000,000</td>
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</table>
Process Development
Process Development: Guiding Principles

Don’t reinvent the wheel
- Follow CII guidance

Don’t bite off too much
- BUT make sure you bite off enough to make it worth your while

Get the process right first
- Technology can come later

Don’t overwhelm the end user
- Make it easy to gain buy-in
Process Development: Program Design Challenges

- Multiple projects per site
- Every site’s project delivery organization varies
- Every site has varying levels of AWP maturity
- Adaptation to existing standardized WBS
- Adaptation to existing Project Delivery Process

AWP Guideline
Process Development: Package Hierarchy

CWA – Construction Work Area
A01.FAN12345

PWP – Procurement Work Package
PWP001 – Automated Valves

EWP – Engineering Work Package
E01.MECH01.A01.FAN12345

MRP – Material Requirements Package
MRP01.E01.MECH01.A01.FAN12345

TOP – Turnover Package
KDES01 – Instrument Air System

Plant-Project
FAN12345

LWP – Labor Work Package
LPR01 – Prime Package 01

CWP – Construction Work Package
MECH01.A01.FAN12345

IWP – Installation Work Package
IWP01.MECH01.A01.FAN12345

EPCM – Contractor
### Process Development: CWP Types

- **Challenge:** make a new process fit with existing WBS
- **Solution:** align CWP types with DOW codes
- **Example CWP IDs**
  - DFDN01.A01.FAN12345
  - CONC01.A01.FAN12345
  - SSTL01.A01.FAN12345
  - MECH01.A01.FAN12345

<table>
<thead>
<tr>
<th>CWP Type</th>
<th>DOW Code</th>
<th>Description</th>
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<tbody>
<tr>
<td>STWK</td>
<td>001</td>
<td>Underground Investigations / Site Work</td>
</tr>
<tr>
<td>RELO</td>
<td>002</td>
<td>Relocations</td>
</tr>
<tr>
<td>DFDN</td>
<td>003</td>
<td>Deep Foundations</td>
</tr>
<tr>
<td>CONC</td>
<td>004</td>
<td>Foundations &amp; Concrete</td>
</tr>
<tr>
<td>SSTL</td>
<td>005</td>
<td>Structural Steel</td>
</tr>
<tr>
<td>MECH</td>
<td>006</td>
<td>Mechanical</td>
</tr>
<tr>
<td>ELEC</td>
<td>007</td>
<td>Electrical</td>
</tr>
<tr>
<td>INST</td>
<td>008</td>
<td>Instrumentation &amp; Controls</td>
</tr>
<tr>
<td>COAT</td>
<td>009</td>
<td>Insulation, Coatings &amp; Linings</td>
</tr>
<tr>
<td>FUEL</td>
<td>010</td>
<td>Fuel Receiving, Storage and Handling</td>
</tr>
<tr>
<td>DEMO</td>
<td>012</td>
<td>Demolition</td>
</tr>
<tr>
<td>WTRT</td>
<td>013</td>
<td>Water Treatment &amp; Cooling</td>
</tr>
<tr>
<td>MATL</td>
<td>014</td>
<td>Material Handling, Storage &amp; Shipping</td>
</tr>
<tr>
<td>REST</td>
<td>015</td>
<td>Site Work Restoration</td>
</tr>
<tr>
<td>ROAD</td>
<td>016</td>
<td>Permanent Fencing, Parking, Roadways &amp; Related Lighting</td>
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<tr>
<td>BLDG</td>
<td>017</td>
<td>Buildings / Architectural</td>
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<tr>
<td>ITCO</td>
<td>018</td>
<td>IT &amp; Communications Facilities</td>
</tr>
<tr>
<td>SWYD</td>
<td>019</td>
<td>Switchyard, Distribution &amp; Transmission</td>
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<tr>
<td>UGME</td>
<td>020</td>
<td>Underground Mechanical &amp; Electrical</td>
</tr>
<tr>
<td>FIRP</td>
<td>021</td>
<td>Fire Protection Piping &amp; System</td>
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<tr>
<td>FIRD</td>
<td>022</td>
<td>Fire Detection &amp; Alarms</td>
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<tr>
<td>AGAS</td>
<td>023</td>
<td>Auxiliary Gas Storage &amp; Systems</td>
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<tr>
<td>POND</td>
<td>024</td>
<td>Cells, Ponds and Landfills</td>
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<tr>
<td>RENW</td>
<td>025</td>
<td>Solar and Wind Systems</td>
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<td>HZMT</td>
<td>026</td>
<td>Hazardous Material Handling and Removal</td>
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<tr>
<td>HAUL</td>
<td>027</td>
<td>Track Cranes and Heavy Hauls</td>
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Process Development: AWP Performance Levels

• All sites have multiple projects, with multiple engineering, procurement, and construction sourcing strategies

• Goal: create a tiered AWP Product Structure that can be used by any E&CS-managed project, regardless of scope or scale

• Three levels of AWP performance:

  **Level 1:** minimal requirements on project teams, no WFP contractors

  **Level 2:** expanded requirements on project teams, optional WFP contractors

  **Level 3:** full requirements on project teams, integrated WFP contractors
Process Development: AWP Performance Levels

AWP Level 1: “AWP Lite”

- Ideal for smaller capital project scopes (<$100M)
- Teams with low levels of AWP maturity
- Standardize contracts and procurements (LWP, PWP)
- Alignment of engineering deliverables with LWPs
- Low level of materials management requirements
- No CWPs, EWPs, or Workface Planning
**Process Development: AWP Performance Levels**

**AWP Level 2: “Standard AWP, Optional WFP”**

- Ideal for medium project scopes ($100M – $300M)
- Increased engineering and construction granularity and alignment
  - EWPs, CWPs
- Higher levels of materials management requirements
- Optional: contractors performing Workface Planning (WFP)
  - Recommended for reimbursable prime contracts only
  - Contractors’ WFP processes will be manual / not integrated with design data
Process Development: AWP Performance Levels

AWP Level 3: Fully Automated AWP+WFP

- Ideal for large project scopes ($300M+)
- 4D-visualization of CWPs, EWPs, PWPs, LWPs
- Full engineering material BOMs
- Required: integrated Materials Management with WFP capability
- Contractors performing Workface Planning (WFP)
- Contractors’ software tools integrated with EPCM tools
Process Development: Project Delivery Spectrum

Fully Insourced EPCM

In: E/P
Out: CM

In: P
Out: E/CM

In: CM
Out: E/P

Fully Outsourced EPCM

AWP Guideline

BYO Process
## Process Development: AWP Performance Levels

<table>
<thead>
<tr>
<th>Site</th>
<th>Number of Projects</th>
<th>E</th>
<th>P</th>
<th>CM</th>
<th>AWP Performance Level</th>
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<tr>
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<tr>
<td>G</td>
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<td>Partner</td>
<td>Partner</td>
<td>Partner</td>
<td>Level 2</td>
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Process Development: Division of Responsibility

Projects & Construction
- AWP Lead
- PWP
- CM
- LWP
- ASMT
- ASM A

Design
- APM
- CWA

Project Planning & Services
- Startup Manager
- Project Controls
- Estimate
- Schedule
- Cost

Supply Chain
- Buyer
- Expedite
- EWP

Project Engineer
- Coordinator
- Designer

Projects & Construction
- Discipline Lead Civil
- Discipline Lead Mechanical
- Discipline Lead Electrical
- Discipline Lead I&C

WFP Interface

Contractor
- SUPT
- WFP
- GF

Fully Insourced Project Delivery
Process Development: Division of Responsibility

Fully Outsourced Project Delivery
Implementation and Lessons Learned
Implementation: Interactive Project Planning

• Regular planning sessions (~bi-weekly)
• IPP Core Team:
  • PM, APM, PE, CM/ASM, SU mgr, Contractor mgt
• IPP Supporting Team:
  • Engineers, construction leads, procurement, contractor WF Planners
• Review project plan, package associations
• Review upcoming packages to be completed
• Set production goals to be completed before next session

IPP Sessions are working meetings, not status updates!
Looking to the Future

Negotiating WFP into contracts

On-boarding CM teams and contractors into WFP

Productivity improvement measurement against baseline
Lessons Learned

- VP-level charge to “do AWP”
- At least one person on each project team who is onboard
- At least one person full time dedicated to implementation
- Don’t expect to revise all your existing procedures very quickly
- Implement on more than one project
- Get the process right first, then add technology
- Remember that you are still crawling