AWP Conference

Presented by Group ASI, Developed by Industry  london.awpconference.com

Scalable AWP

Applying AWP Principles to Smaller Projects

Featuring: Lloyd Rankin, Chuck Mies, Cody Austin, Connie McLaughlin
Introducing the Topic

• Conference Theme - Improving Construction Productivity using AWP and Digitalization

• In this session:
  • COAA will introduce their newest Recommended Practice - Scalable AWP
  • Autodesk will share what they learned in Owner Contractor Focus Groups on Scalable AWP
  • KBR will share their experience using technology applicable to Scalable AWP

• Takeaways
  • COAA Scalable AWP Report
  • Autodesk White Paper
Agenda / Format

• Agenda
• Panel Introduction
• COAA Scalable AWP Model
• Autodesk Scalable AWP Whitepaper
• KBR Experience with a potential Scalable AWP Technology
Introducing Today’s Panelists & Facilitator

Lloyd Rankin
AWP Sage and Jedi Master
Group ASI, Inc.
lrankin@groupasi.com

Chuck Mies
Senior Manager, Business Development
Autodesk, Inc.
chuck.mies@autodesk.com

Cody Austin
Technical Solutions Executive
Autodesk, Inc.
cody.austin@Autodesk.com

Connie McLaughlin
Operations Manager, U.S. Construction
KBR
Connie.McLaughlin@kbr.com
How familiar are you with Scalable AWP?

Join at

slido.com

#awplondon
COAA Scalable AWP Report
The Key Findings from COAA
Committees and Chairs

<table>
<thead>
<tr>
<th>Committee/Role</th>
<th>Chair/Individual</th>
</tr>
</thead>
<tbody>
<tr>
<td>Steering Committee</td>
<td>Lloyd Rankin (Group ASI)</td>
</tr>
<tr>
<td>Owners</td>
<td>Jeremy Furzer (Enbridge)</td>
</tr>
<tr>
<td>Engineering and Supply Chain</td>
<td>Randy Friesen (Fluor)</td>
</tr>
<tr>
<td>Front End Construction</td>
<td>Kirk Harris (Black and Veatch)</td>
</tr>
<tr>
<td>WorkFace Planning</td>
<td>Ryan Posnikoff (Bentley Systems)</td>
</tr>
<tr>
<td></td>
<td>Ben Swan (Element Industrial)</td>
</tr>
<tr>
<td>Writer</td>
<td>Caitlin Lopez (COAA)</td>
</tr>
<tr>
<td>Editor</td>
<td>Narjis Shahzad (Teknobuilt)</td>
</tr>
</tbody>
</table>

*The committees are composed of over 40 professionals from the owner, and engineering, supply chain and construction communities from both sides of the border*
Scalable AWP - A Best Practice
The Challenge: Adapting AWP for smaller projects (up to 100 million)
What's in the report?

• Identified AWP Principles
• Projects Categorized based on Familiarity and Complexity
• Project Screening Tool Developed
• Rank Assessment Matrix Created
• Four Project Categories Developed
• Recommendations for Each Category
• Looking for Pilot Projects
Stages

SCALABLE ADVANCED WORK PACKAGING FLOWCHART

STAGE 1
Preliminary Planning / Design
- Project Definition and Strategy
- Construction, Engineering and Procurement Planning
- Path of Construction
- Schedule and WBS Development
- Boundary Development

STAGE 2
Detailed Engineering
- Engineering Deliverables
- Procurement Deliverables
- CVP Creation
- Detailed Construction Schedule

STAGE 3
Construction
- IWP Scoping
- IWP Creation
- IWP Execution
- Quality Control
- Turnover

Rev. 2019-05-22
AWP Principles: Preliminary Planning and Design

1. Determine the Project Scope “What will the project include and what is excluded?”
2. Determine the Project Contract Strategy “Who will design, procure, engineer, and construct the project and what contract strategy will be used?”
3. Determine the Path of Construction (POC) for the Project “How will the project be built?”
4. Determine how to Work Package the Project “How will the project be work packaged and managed?”
5. Determine the Project Resource Requirements
   a) Identify and supply the necessary information/engineering requirements
   b) Identify and supply the necessary permanent material requirements
   c) Identify and supply the necessary construction equipment requirements
   d) Identify and supply the necessary construction execution labor requirements
AWP Principles: Construction

6. Confirm the Project Resource Requirements are satisfied prior to execution “How will resource readiness be determined?”

7. Monitor Progress and Manage Construction “How will construction be progressed and managed including turnover, commissioning and start-up?”
AWP Practices: Must Change
Project Familiarity:

• Unfamiliar or Familiar Based on the following:
  o Scope of Work Familiarity
  o Project or Program
  o Project Information & Documentation
  o Permitting
  o Construction Contract Strategy
  o Equipment/Procurement Strategy
Project Complexity:

• Low or High Based on the following Conditions:
  o Greenfield vs. Brownfield Project
  o Number of Construction Work Areas
  o Number of Disciplines
  o Number of Work Shifts
  o Type of Tie-Ins - Hot Work vs. Shut Downs
  o Geotechnical Conditions
# Project Categories

<table>
<thead>
<tr>
<th>Category</th>
<th>Unfamiliar / Low Complexity</th>
<th>Medium Rank</th>
<th>First time value insertion</th>
</tr>
</thead>
<tbody>
<tr>
<td>Category B</td>
<td>Familiar / Low Complexity</td>
<td>Low Rank</td>
<td>Repeated valve insertion</td>
</tr>
<tr>
<td>Category C</td>
<td>Unfamiliar / High Complexity</td>
<td>High Rank</td>
<td>Debottlenecking project</td>
</tr>
<tr>
<td>Category D</td>
<td>Familiar / High Complexity</td>
<td>Medium Rank</td>
<td>Repeated solar project</td>
</tr>
</tbody>
</table>
Project Example: 150MW Solar Facility Project

Key Points:
- Part of multiple Project Program
- Installation of Owner supplied Photovoltaic modules on ~9000 fixed tilt racks
- Site Clearing, grading, roads, fencing
- Installation of combiner boxes, inverters, underground utilities and tie in to existing substation.
- Start-up and commissioning support
- Sequential Turnover of 37.5 MW blocks
- Owner/EPC Contract Strategy
  - Partnered with Select General Contractors
  - Lump Sum EPC Contract including permitting
  - Procurement is approved with previous Vendors
Project Example: 150MW Solar Facility Project
Principle 1: Determine the Project Scope

Familiar – High Complexity

- Detailed project scope narrative, project management plan, and WBS – largely repeatable.
- Highlight program details and variances from typical.
Principle 2: Determine the Project Contract Strategy

Familiar – High Complexity

• Accelerated tender process – standardized Request for Quote (RFQ) including AWP requirements
• Allow for reimbursable or lump sum contract
Principle 3: Determine the Path of Construction

Familiar – High Complexity

- Adapted from previously developed POC
- Multiple CWAs – adapted from previous
- Align CWAs with turnover blocks
Principle 4: Determine How to Work Package

Familiar – High Complexity
- CWAs adapted from previous
- Templated EWPs / CWPs / IWPs

![Work Breakdown Structure]

1. Scope
2. Contracts
3. PoC
4. Work Packaging
Principle 5: Determine the Project Resource Requirements

Familiar – High Complexity

- Design reviews with focus on changes from typical
- Use of several design tools, including use of 3D model
- Use of templated design – common EWP release date
- Staged material delivery by CWP
- Repeatable Construction equipment plan by CWP
- Direct Field Labour estimated by CWP with use of resource loaded schedule
- Dedicated Construction team necessary to manage project complexity.
Principle 6: Confirm the Project Resource Requirements are Satisfied Prior to Execution

Familiar – High Complexity

- All EWPs available at construction start
- Material receipt by CWP
- Construction readiness incorporated into IWP generation
- Contractor executes in typical fashion
  - Materials management
  - Equipment plan
- Planning typically by dedicated Work Face Planners for each discipline (templated scope may allow for IWP creation by GFs)
Principle 7: Monitor Progress and Manage Construction

Familiar – High Complexity

- Templated IWPs developed to include:
  - One discipline
  - Multiple IWPs for a single CWP
  - Dedicated WFPs may support multiple disciplines.
- Progress tracking
  - Project Controls team updates project progress and schedule
  - Transition to systems completion and turnover to follow standard project methodologies as CWPs begin to reach completion.
Project Example: First Time Valve Insertion

Key Points:
• The first of a program
• 36” actuator valve and piping, E&I, E-House
• Engineering has familiarity
• Onsite stakeholders include:
  • GC
  • Utility Contractor
  • Owner’s maintenance crew
Principle 1: Determine the Project Scope

Unfamiliar - Low Complexity

• Reasonably simple project scope narrative, project management plan, and WBS
Principle 2: Determine the Project Contract Strategy

Unfamiliar - Low Complexity

- Owner and Engineering collaborate
- Preferred or pre-approved local contractor
Principle 3: Determine the Path of Construction
Principle 4: Determine How to Work Package

Unfamiliar - Low Complexity

• PoC a single area
• Possibly single EWP/CWP
Principle 5: Determine the Project Resource Requirements

Unfamiliar - Low Complexity

- Limited design reviews needed
- Few tools, likely not using 3D model
- No need for PWP
- Construction equipment schedule by Contractor
- Direct Labour – preferred contractor estimate field labour by trade upon receipt of CWP
Principle 6: Confirm the Project Resource Requirements are Satisfied Prior to Execution

**Unfamiliar - Low Complexity**

- Contractor executes in typical fashion
  - Materials management
  - Equipment plan
- Planning typically by GF or Superintendent
Principle 7: Monitor Progress and Manage Construction

Unfamiliar - Low Complexity

- IWP creation to be small in scope and may be:
  - One system
  - Multiple discipline
  - Fully align with ITP/ITR
- Progress tracking
  - Field updates from Superintendent to Owner’s PMT
Scalable AWP Requirements

Technical Requirements for scaling AWP to projects >$100m
Scalable vs. Traditional AWP

- Shorter project lifecycle, typically brownfield
- Repeatable, programmatic approach
- 2D deliverables, may not have a 3D model
- Contractors may not have extensive processes and systems
- Contract strategies may use maintenance contractors
- Packaging requirements & Planner roles may vary
- Owner as Construction Manager
“There is significant opportunity to apply AWP guidelines for projects under $100 million.”
“As part of the AWP best practice, there are many templates and tools available. However, they may or may not be applicable on smaller projects.”
“Many of our projects do not have a 3D model.”
Scalable AWP Requirements

Scalable AWP Requirements

Advanced Wastewater Permitting (AWP) is a project assurance methodology being used by owners, contractors, and engineers to improve construction efficiency and affordability. AWP is accomplished using collaboratively planning and execution activities throughout the project lifecycle from concept through handover.

The approach is gaining traction within the included sector, particularly on very large, complex projects. Some AWP implementations, on large capital projects, have produced significant productivity improvements and cost savings, providing firms to consider how the approach could be scaled down to smaller projects. To this end, Autodesk organized a series of collaborative workshops with owners and engineering, procurement, and construction (EPC) firms that were early adopters of AWP. This paper summarizes the lessons learned from those workshops.

Contents

Introduction to AWP.................................................. 2
What is Scalable AWP?........................................... 3
Scalable AWP benefits............................................ 4
Key Requirements.................................................. 5
Value Proposition.................................................. 7

AWP for the owner

Scalable AWP Requirements

AWP presents a project assurance methodology that can be summarized as follows:

- Project assurance: AWP provides a framework for project owners, contractors, and engineers to collaboratively plan and execute activities throughout the project lifecycle from concept through handover. This framework helps to ensure that the project is planned and executed in a way that maximizes efficiency and minimizes cost.

- Collaboration: AWP encourages collaboration among project stakeholders, including owners, contractors, and engineers. This collaboration helps to ensure that all parties are working towards the same goals and that any potential problems are identified and resolved early in the project lifecycle.

- Transparency: AWP promotes transparency in project data and decision-making. This transparency helps to ensure that decisions are made based on accurate and up-to-date information.

- Accountability: AWP holds all parties accountable for their roles and responsibilities. This accountability helps to ensure that the project is completed on time and within budget.

- Efficiency: AWP promotes efficiency in project execution. This efficiency helps to reduce waste and improve productivity.

- Cost savings: AWP has been shown to provide significant cost savings to project owners. This cost savings is achieved through increased efficiency, improved productivity, and reduced rework.

AWP for the contractor

Scalable AWP Requirements

AWP presents a project assurance methodology that can be summarized as follows:

- Project assurance: AWP provides a framework for project contractors to collaboratively plan and execute activities throughout the project lifecycle from concept through handover. This framework helps to ensure that the project is planned and executed in a way that maximizes efficiency and minimizes cost.

- Collaboration: AWP encourages collaboration among project stakeholders, including owners, contractors, and engineers. This collaboration helps to ensure that all parties are working towards the same goals and that any potential problems are identified and resolved early in the project lifecycle.

- Transparency: AWP promotes transparency in project data and decision-making. This transparency helps to ensure that decisions are made based on accurate and up-to-date information.

- Accountability: AWP holds all parties accountable for their roles and responsibilities. This accountability helps to ensure that the project is completed on time and within budget.

- Efficiency: AWP promotes efficiency in project execution. This efficiency helps to reduce waste and improve productivity.

- Cost savings: AWP has been shown to provide significant cost savings to project contractors. This cost savings is achieved through increased efficiency, improved productivity, and reduced rework.

.Scalable AWP Requirements Whitepaper

2019-05-22

© 2019 Autodesk, Inc. All rights reserved
Scalable AWP Workshops

Better understanding scalable AWP technical requirements

• A total of four workshops
  • Owners and EPS’s
  • Most were well versed in AWP concepts
  • Most had experience on AWP projects

• Participating Owners
  • Suncor; Enbridge; Chevron; Dow; ExxonMobil; Shell; Williams

• Participating EPC Companies
  • Fluor; Ford, Bacon & Davis; KBR; Wood; WorleyParsons

• Subject Matter Expert
  • Group ASI

• Workshop Facilitation
  • Ruckus Innovation Consulting
Workshop Process

How did we get there?

EXERCISE ONE: PERSONA PROFILES
Who Should Care?

EXERCISE TWO: INTERVIEWING
Going Deeper...

EXERCISE THREE: PRIORITY DIAGRAMMING
Critical-Req’d-Good To Have

EXERCISE FOUR: IMPORTANCE/DIFFICULTY
What Do We Start With?

EXERCISE FIVE: VISION STATEMENT
Where Do We Start?
## Critical Requirements Summary

* A summary of the Low Hanging, High ROI and Strategic

<table>
<thead>
<tr>
<th>Owners</th>
<th>EPCs</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Low Hanging</strong></td>
<td>• Minimum possible deliverable</td>
</tr>
<tr>
<td></td>
<td>• Tracking vendor drawings</td>
</tr>
<tr>
<td></td>
<td>• Who approves?</td>
</tr>
<tr>
<td></td>
<td>• Path of construction</td>
</tr>
<tr>
<td></td>
<td>• IWP progress visibility</td>
</tr>
<tr>
<td></td>
<td>• Respect existing processes (if possible)</td>
</tr>
<tr>
<td></td>
<td>• Real-time (access/information) find information quickly</td>
</tr>
<tr>
<td></td>
<td>• Ease of use (not tech savvy)</td>
</tr>
<tr>
<td></td>
<td>• Walk-downs</td>
</tr>
<tr>
<td><strong>High ROI</strong></td>
<td>• Visible critical path (include ops)</td>
</tr>
<tr>
<td></td>
<td>• Vendor data is late</td>
</tr>
<tr>
<td></td>
<td>• Field management mobility</td>
</tr>
<tr>
<td></td>
<td>• Graphical/systems-based constraint notification</td>
</tr>
<tr>
<td></td>
<td>• Engage construction managers early</td>
</tr>
<tr>
<td></td>
<td>• Involve construction early in sequencing</td>
</tr>
<tr>
<td></td>
<td>• Who buys what?</td>
</tr>
<tr>
<td></td>
<td>• Involve vendors early to get data</td>
</tr>
<tr>
<td></td>
<td>• Remove constraints</td>
</tr>
<tr>
<td></td>
<td>• Change management</td>
</tr>
<tr>
<td><strong>Strategic</strong></td>
<td>• Safety!</td>
</tr>
<tr>
<td></td>
<td>• Platform agnostic</td>
</tr>
<tr>
<td></td>
<td>• AWP process - step by step</td>
</tr>
<tr>
<td></td>
<td>• Data we can trust</td>
</tr>
<tr>
<td></td>
<td>• Single source of truth</td>
</tr>
<tr>
<td></td>
<td>• Easy/immediate access to information</td>
</tr>
<tr>
<td></td>
<td>• Digitization of corporate practices</td>
</tr>
<tr>
<td></td>
<td>• ROI/reduce cost of solution</td>
</tr>
<tr>
<td></td>
<td>• Convince people of change benefit</td>
</tr>
<tr>
<td></td>
<td>• Engineering procurement construction visibility</td>
</tr>
<tr>
<td></td>
<td>• Data integration</td>
</tr>
<tr>
<td></td>
<td>• Scalable one size does not fit all</td>
</tr>
<tr>
<td></td>
<td>• Material status visibility</td>
</tr>
</tbody>
</table>
Key Requirements

What are the must have components of a scalable solution

1. **AWP process:**
   There must be a consistent use of well-documented AWP processes in their organizations and on their projects. EPCs were adamant that the use of AWP processes necessitates contractual changes to the project delivery structure to ensure the early engagement and input of construction managers and vendors.

2. **Data access and ease of use:**
   A technology platform must provide real time, easy access to high-integrity digital project data that represents a single source of truth for all project stakeholders, in the office and in the field. All tools related to AWP must be easy to install and maintain, regardless of user persona or company stakeholder affiliation.

3. **Constraints:**
   Construction constraints must be identified early in the planning process to help ensure that all of the things necessary for work execution are in place before the work begins. The technology platform should consolidate and visually present all constraints for management and resolution.
Key Requirements
What are the must have components

4. Monitoring, tracking, and information flow:
The technology platform must help project teams monitor and track key AWP elements such as: procurement work packages (PWPs), vendor performance, requests for information, construction rework, safety metrics, and so forth. This platform must also support a structured, configurable flow of project information related to the AWP process amongst all pertinent project stakeholders to support management of change.

5. Modeling and visualization:
The technology platform must allow owners to work with modeled data from a variety of sources to support 2D, 3D, 4D, and 5D constructability modeling and reviews without requiring the source authoring applications. In addition, the platform should provide a visual status of a variety of resources on the critical path.
Key Requirements
What are the must have components

6. Business case:
   For owners to build a business case for AWP on smaller projects, they must be able to convince their own company and partners of the benefit and return on investment. This business case involves balancing its potential construction cost savings against the investment required to implement AWP processes and technology. In particular, owners were adamant that technology costs for scalable AWP solutions must be reduced from traditional AWP technology costs.

7. Field mobility:
   Owners recognize the importance of accessing data related to AWP processes from the field in addition to office settings. They also recognize the benefits of reducing or eliminating paper in the field, including cost, environmental impact, and practicality. As such, scalable AWP tools must support mobile access.
Key Requirements

Similarities and Differences between Owners and EPC’s

Shared Areas of Importance

• Adherence to well-documented AWP processes
• Easy access to reliable data
• Constraint management
• Tools that enabled AWP process monitoring, tracking, and visualization
• Model-based visualization of key AWP elements

Owners Emphasized

• Business case
• Field mobility
EXERCISE FIVE:
VISION STATEMENT
Where Do We Start?

FOR ALL OF US IN CAPEX;

WHO PROVIDE VALUE BY BUILDING SAFE AND EFFECTIVE PROJECTS;

THE SAWPS (SCALED ADVANCED WORK PACKAGING SOLUTIONS) INITIATIVE;

IS A QUANTUM LEAP IN EFFECTIVENESS;

THAT PROVIDES MEASURABLE GAINS AND CONTRIBUTIONS TO “NAMED” CORPORATE AND SITE PROJECT GOALS/OUTCOMES AND SAFE, RELIABLE, AND PRODUCTIVE PROJECT DELIVERY;

UNLIKE THE ACCEPTANCE THAT THE “NORM IS GOOD ENOUGH”;

WE REMOVE CHAOS FROM MANAGING PROJECTS, MAKE PROJECT MANAGEMENT FUN AGAIN, AND WILL POSITIVELY CHANGE OUR INDUSTRY FOR FUTURE GENERATIONS!
Vision Statements
The EPC’s Vision

EXERCISE FIVE:
VISION STATEMENT
Where Do We Start?

FOR EBITA AND/OR THE ORGANIZATION’S PRESIDENT;

WHO WANT TO IMPROVE MARGINS;

THE “SMOOTH OPERATOR” INITIATIVE;

IS A CONSTRUCTION DRIVEN, PROJECT DELIVERY PROCESS THAT ALIGNS E&P WITH POC;

THAT IS CONSISTENT, TRANSPARENT, AND WILL ENABLE THE BUSINESS TO PRODUCE PRODUCT FOR THE MARKET FASTER AND COST EFFECTIVELY, WHILE INCREASING PROFITS;

UNLIKE EPC’S NOT FULLY INTEGRATED AND REMAINING SILOED;

WE PREDICTABLY IDENTIFY THE OPTIMUM POC AND ALIGN OUR TEAMS WITH REAL-TIME VISUAL MODEL STATUS AT ALL STAGES, ACCESSIBLE TO ALL STAKEHOLDERS THROUGH WELL-DEFINED SYSTEMS AND PROCESSES THAT AUTOMATICALLY TALK TO ONE ANOTHER TO GUARANTEE ALIGNMENT.
Scalable AWP requires the adaptation of both practices and technologies
Scalable AWP - KBR Introduction

How KBR looks at scalable workflows
BIM 360 Case Study

Impact of Digitization

- Cultural change
- 5D mobilization confirmation
- Increased productivity
- Reduced rework
- Reduction of indirect roles
- Easy RFI = $$$
- Paperless system walkdowns
- Increased construction visibility
- Automated reporting

1 Federated 3D Model
12,769 Drawings
20,270 Tags
433 RFIs
808 MC Punchlist
2,281 Photos
10+ Gigabytes

AS OF 9/28/18
Wrapping Up

• Conference Theme - Improving Construction Productivity using AWP and Digitalization

• In this session:
  • COAA will introduce their newest Recommended Practice - Scalable AWP
  • Autodesk will share what they learned in Owner Contractor Focus Groups on Scalable AWP
  • KBR will share their experience using technology applicable to Scalable AWP

• Takeaways
  • COAA Scalable AWP Report
  • Autodesk White Paper
Q & A

Question and Answer Period
Thank You!