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Taking AWP Global

• Co-Chair of AWP Committee at COAA
• Contributing author of CII/COAA RT 272 - AWP Best Practice
CII-COAA: Advanced Work Packaging

Volume I: Recommended Process
Volume II: Implementation Guidance
Volume III: Case Studies and Expert Interviews
AWP Definition

AWP is the overall process flow of all the detailed work packages (CWPs, EWPs, and IWPs). It is a planned, executable process that encompasses the work on an engineering, procurement, and construction (EPC) project, beginning with initial planning and continuing through detailed design and construction execution. Advanced work packaging provides the framework for productive design and progressive construction, and presumes the existence of a construction execution plan.

CII-COAA, IR 272-2, Vol. 1

“AWP provides a structured method and work process for early engagement of construction considerations and expertise in advance to influence engineering design, project controls, and supply chain and their related processes, in scoping, coding and prioritizing the deliverables in alignment to the build method and path of construction on a project.”

Yogesh Srivastava, Co-chair COAA AWP Committee, CII-COAA AWP Best Practice IR 272 contributing author
Industry being challenged for...

- Improve Safety & Quality
- Cost Certainty
- Scope clarity
- Enhance Productivity
- Material Confidence
- Schedule Certainty
- Visibility
- Leadership
- Adoption of Best Practices
- Cultural: Working in other regions such as Middle East

Asia Pacific
North America
Company specific
Europe
AWP/WFP Best Practices continue to evolve

- Construction Industry Institute (CII) & COAA’s research team delivered an end to end AWP/WFP Process view
The AWP Work Process

WORK PACKAGES / COMPLETION / TURNOVER
- EWP: Engineering deliverables
- CWP: EWP + Construction
- IWPs: Foreman level work execution package
  - FIWP: Field installation work packages
  - MIWP: Module Installation work package
- Sub systems
- System Packages

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AWP: Basic Design, Stage 1

- Setup of WBS Structure / Coding
- Design Area Definition
- Project Database & Server
  - Design, Plot Plan & Estimate
  - Path of Construction
- CWAs and Early CWPs / EWPs
  - Level 3 Schedule
  - CWP Execution Plan
  - EWP Release Plan
  - SCM Plan

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AWP: Detail Design, Stage 2

- Incorporate Turnover Requirements (O&M Review)
- CWPs/EWPs (3D Model)
  - Level 4 Schedule
  - Update CWP Execution Plan with IFC defn.
  - Issue EWPs
  - Issue POs
  - IWP Release Plan

- Project Database & Server
  - EWP Progress
  - Align Doc Management
  - Early IWPs

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AWP: Construction Execution, Stage 3

- Release CWPs and create IWPs
- IWP based Bag & Tag Materials
- Identify and Manage Safety, Constraints, Equipment, Services
- Execute IWPs and start completions

**Project Database & Server**

- Level 5 Schedule
- IFC Issue EWPs, CWPs & IWPs
- Issue POs

**Workface Planning**

- Reproduced with permission from Teknoplant
AWP: Construction Completions, Stage 3

- Pre-startup Safety Reviews
- QC Documentation / Punch lists
- System Completions
- Project Database & Server
  - Issue IWPs for Systems
  - As-Builts Compilation
  - Build TO Packages
- As-Builts
- Build System Packages

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Construction: An industry at a changing phase
The need for increased efficiency, productivity & cost certainty in project delivery

Architecture, Engineering & Construction

Process, Power, Marine

BIM

Economies of Information
DATA CENTRICITY

Economies of Time
JIT, TQM, Kanban

LEAN

Manufacturing

Economies of Scope
WORK PACKAGES

AWP
LEAN, BIM & AWP can be synergistic
Japanese Management

- Just in Time
- Kanban
- Kaizen Continuous Improvement
- Total Quality Management
- Lean Production
- Theory Z Company for Life
“Lean production is a superior way for humans to make things. It provides better products in wider variety at lower cost. Equally important, it provides more challenging and fulfilling work for employees at every level, from the factory to headquarters.”

Idea is to be focused on the importance of getting things right the first time rather than spending a lot of time checking afterward
They found the system rife with muda -- a Japanese term that encompasses wasted effort, wasted material and wasted time

“Lean production: Its genius was to shift the focus of manufacturing from economies of scale to "economies of time."
The first was by **making every employee a quality checker**, responsible for spotting errors as they happen and correcting them immediately.

- Toyota gave workers the right to stop the production line as soon as they saw errors.

Second was - **started making components "just in time,"** with parts arriving just as they were **needed** on the production line.

The third way to **save time was "demand pull."** Kanban
Classical Mass Production Methods:

The first is the **inability of a classic mass-production system to respond to rapid changes** in demand. Mass producers tend to be much keener on keeping standardized designs.

The second cost is an **unacceptably high rate of faulty products**. Large batches make it difficult to detect defects.
Rework Causes: Alberta Example

**Human Resource Capability**
- Unclear Instructions to Workers
- Inadequate Supervision & Job Planning

**Leadership & Communications**
- Excessive Overtime
- Insufficient Skill levels
- Ineffective Management of Project Team
- Lack of Operations (End User) Persons Buy-in
- Lack of Safety and QA/QC Commitment
- Poor Communications

**Engineering & Reviews**
- Late Design Changes
- Poor Document Control
- Scope Changes
- Errors and Omissions
- Late Designer Input
- Constructability Problems

**Construction Planning & Scheduling**
- Unrealistic Schedules
- Insufficient Turnover and Commissioning Resourcing
- Prefab. & Constr. not to Project Req.

**Material & Equipment Supply**
- Untimely Deliveries
- Non-compliance with Specification
- Materials not in Right Place When needed

Contribute to Re-Work

Figure 4.2. COAA’s Fishbone Rework Cause Classification (last updated October 2002)
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BIM
What is BIM

BIM is an approach to design, construction and management of assets. It supports the continuous and immediate availability of project design scope, schedule and cost information that is reliable, integrated, fully coordinated, and of a high quality.
AWP
AWP: Managing scope by work packages across stages

"AWP provides a structured method and work process for early engagement of construction considerations and expertise in advance. Incorporating these in engineering design, project controls, supply chain and their related processes, project efficiencies are increased by managing scope, coding and prioritizing the deliverables in alignment to the build method and path of construction on a project."

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The AWP Work Process

Project Controls Work Break Down

Unit

CWA (Construction Work Areas)

Sub Areas

Functional Control Work Break Down

- Engineering Design
- Construction Planning
- Field/ Mods Execution
- Start of Progressive Turnover
- Sub system / Tag based Turnover
- Turnover Completion

System Packages

TCPs / Sub Systems

IWPs Executed

IWPs

CWPs

EWPs

PWP
Building Information Modeling

- 7D: Component Data & Specs
- 6D: Visualization
- 5D: Cost & Estimate
- 4D: Schedule Integration
- 3D Model
- Drawings
- Architecture, Engineering & Construction

Plant Life-cycle Management

- Cost & Estimate
- Schedule Integration
- Visualization
- 2D Drawing outputs
- 3D Model
- Components and Specifications
- Process, Power & Marine

BUSINESS PROCESS & TECHNOLOGY EVOLUTION
Convergence of BIM and PLM; differing routes to the same end

**BIM**
- AEC
- Drawings
- 3D Model
- 4D: Schedule Integration
- 5D: Cost & Estimate
- 6D: Visualization
- 7D: Component Data & Specs

**PLM**
- Process, Power, Marine
- Component Data & Specs
- 3D Model
- 2D Drawing outputs
- Visualization
- Schedule Integration
- Cost & Estimate

**DATA CENTRIC BIM / PLM**