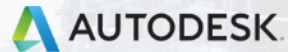


# Autodesk Construction Technology for Advanced Work Packaging

Chuck Mies

Sr. Mgr., Business Development



Cody Austin

Technical Solutions Executive





## Chuck Mies, Senior Manager, Business Development

Chuck is a member of the Autodesk Business Development Team focused on looking at the application of technology to the entire ecosystem of a project, extending from preliminary design through operations and maintenance. In this role Chuck works on a global scale with owners in Industrial and other segments as a resource to assist these clients and the firms that work for them understand the value of Building Information Modeling and the ways to maximize the value of BIM.



## Cody Austin, Technical Solutions Executive

Cody is a member of Autodesk's Technical Solutions Team focused on connecting Autodesk's solution portfolio with Customer's challenges, goals and strategic initiatives . He brings with him over 13 years of Industrial Construction experience including 4 Texas Gulf Coast projects with Zachry Group, laser scanning with Hi-CAD/LFM, plant design and engineering with AVEVA and now 6 years in his current role with Autodesk. Cody is also a member of CII RT 344 focused on improving supply chain visibility.

# Safe Harbor

*We may make statements regarding planned or future development efforts for our existing or new products and services. These statements are not intended to be a promise or guarantee of future availability of products, services or features but merely reflect our current plans and based on factors currently known to us. These planned and future development efforts may change without notice. Purchasing decisions should not be made based upon reliance on these statements.*

*These statements are being made as of [November 9, 2018](#) and we assume no obligation to update these forward-looking statements to reflect events that occur or circumstances that exist or change after the date on which they were made. If this presentation is reviewed after [November 9, 2018](#), these statements may no longer contain current or accurate information.*

# Agenda

- AWP Terms & Definitions
- Autodesk AWP Vision
- Autodesk AWP Areas of Focus
  - AWP Companion
  - Scalable AWP
  - Assemble Systems
- Extending the Platform with Forge
- Final Thoughts





# Advanced Work Packaging

## Terms and Definitions

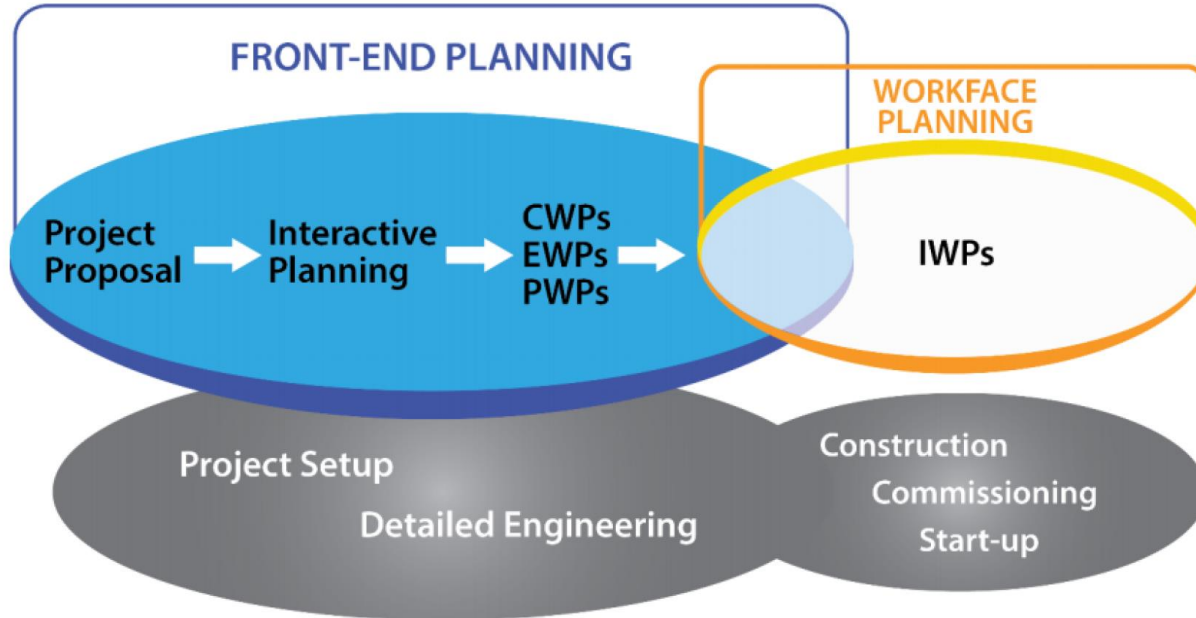
*“Advanced Work Packaging (AWP) is a work **process framework** fundamentally based on the idea of **thinking with the end in mind**. It is designed to allow engineering planning to be driven by construction sequencing...”*

# Advanced Work Packaging (AWP)

## Schematic Workflow

### AWP Overview

Developed by The Construction Industry Institute (CII) <https://www.construction-institute.org>



# AWP Key Terms and Definitions

## **Advanced Work Packaging (AWP)**

Advanced work packaging 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 and progressive construction, and presumes the existence of a construction execution plan.



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Advanced work packaging provides the framework for productive and progressive construction, and presumes the existence of a construction execution plan.

# AWP Key Terms and Definitions

## **Workface Planning (WFP)**

Workface planning is the process of organizing and delivering all the elements necessary for an installation work package, before the work is started.

This proactive process enables craft workers to perform their work safely, effectively, and efficiently.

This is accomplished by breaking down construction work (by trade) into discrete installation work packages that completely describe/cover the scope of work for a given project.

This process promotes the efficient use of available resources and permits the tracking of progress.

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This process promotes the efficient use of available resources and permits the tracking of progress.

# AWP Key Terms and Definitions

## **Work Breakdown Structure (WBS)**

The Work Breakdown Structure (WBS) is a hierarchical representation of a complete project or program.

The components of a WBS are arrayed in ever-increasing detail, as is appropriate for any given project (CII, 1988).

## **Engineering Work Package (EWP)**

An engineering work package (EWP) is an engineering and procurement deliverable that is used to create construction work packages (CWPs).

The EWP should be aligned with the construction sequence and priorities.

# AWP Key Terms and Definitions

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The EWP should be **aligned** with the **construction sequence** and priorities.

# AWP Key Terms and Definitions

## **Construction Work Package (CWP)**

A construction work package (CWP) defines a logical and manageable division of work within the construction scope.

CWPs are aligned with the project execution plan (which includes the construction plan) and the WBS.

The division of work is defined such that CWPs do not overlap within a discipline.

CWPs are to be measurable and in alignment with project controls. CWPs are the basis for the development of detailed installation work packages. Also, they can contain more than one EWP. A CWP is typically aligned with a bid package.

# AWP Key Terms and Definitions

## Construction Work Package (CWP)

A construction work package (CWP) defines a **logical and manageable division of work** within the construction scope.

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# AWP Key Terms and Definitions

## **Installation Work Package (IWP)**

An installation work package (IWP) is the deliverable that enables a construction work crew to perform work in a safe, predictable, measurable, and efficient manner.

An IWP is scoped to be manageable and “progressable”; it is typically of limited size such that a crew can complete the work in about a week.

An IWP contains the necessary documentation supporting workface execution.

IWP should be approved by the responsible stakeholders, and any constraints should be mitigated before issuance to the field.



# AWP Key Terms and Definitions

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# Advanced Work Packaging

## The Autodesk Vision

# What We've Heard

## Challenges with Traditional AWP Applications

- Not cost-effective to deploy on small projects
- Deployments take months
- On-premises with high administrative cost
- Paper-based, high latency workflows
- Proprietary standards
- Closed architectures, difficult integrations
- Design system dependent



# Autodesk AWP Platform Vision

## Key Principles

- Scalable (cost-effective on all projects)
- Deploy in minutes
- Cloud-based and mobile off-line
- Real-time, paperless workflows
- Industry standards compliant
- Robust APIs, many partners
- Design system agnostic (S3D, PDS, PDMS, etc.)



# Autodesk AWP Platform

Autodesk BIM 360 & Autodesk Forge

AUTODESK<sup>®</sup> BIM 360<sup>™</sup>



AUTODESK<sup>®</sup> FORGE




## AWP Platform

Design Collaboration	VDC / BIM Management	Project Management	Cost Management	Planning & Scheduling	Layout & Verification	Field Management	Future Workflows

## Common Data Platform (CDP)

## Foundation Services

					$\frac{d}{dx} = f(x)$			
Access Control	Big Data Platform	Object Store	Transfer Avoidance	Service Message Bus	Derivative Service	Translate	Machine Learning	Event Services



# Advanced Work Packaging

## The Autodesk Areas of Focus

# Our Focus

What is the Autodesk Near-Term Direction

- **AWP Companion** - Increase the return on your legacy WorkFace Planning investment
- **Scalable AWP** - Align the Autodesk platform to scalable AWP processes and workflows
- **Assemble Systems** - Leverage the acquisition to accelerate the Autodesk AWP Platform





## **AWP Companion**

Increase the return on your legacy WorkFace  
Planning investment





# AWP Companion 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

**B** AUTODESK®  
**BIM 360™**

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

**KBR**  
We Deliver



*“If you use any other product for Advanced Work Packaging, you still need a method to get the information into the field, and that is what BIM 360 allows you to do.”*

**Connie McLaughlin**  
Operations Manager



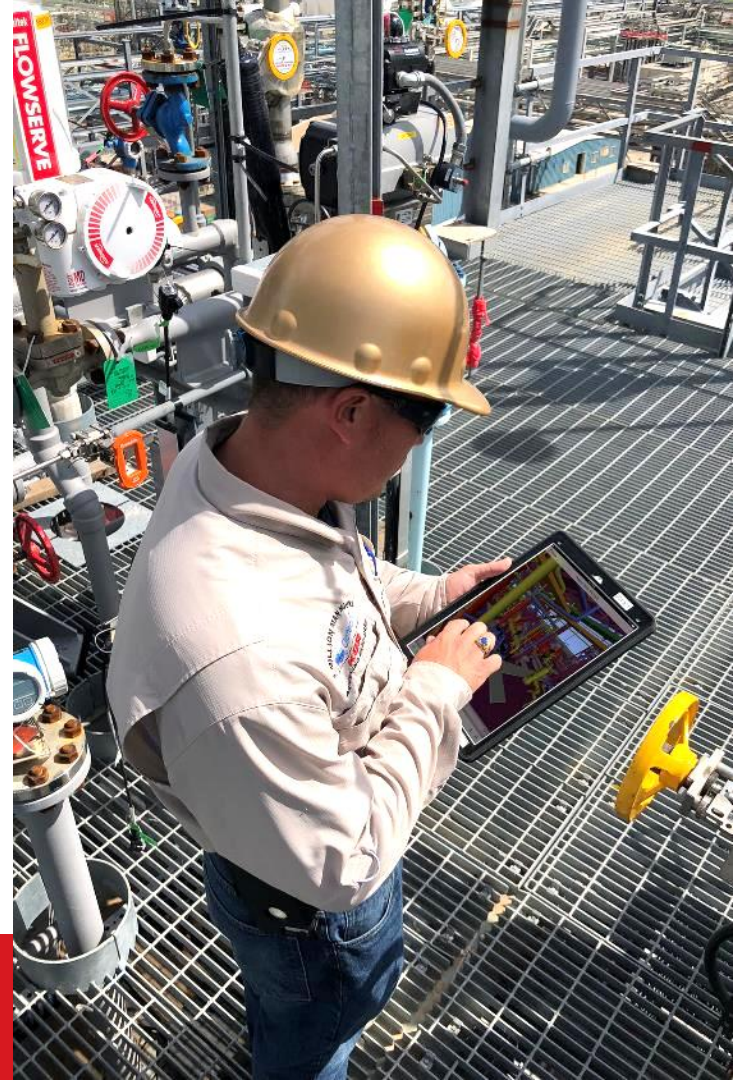
# Case Study Presentation

Today @ 2:45PM - Lando 4306, Level 4

## CS226833 - Case Study: Using BIM 360 on an Industrial Construction Project

In this class, we will cover how KBR used Autodesk BIM 360, Autodesk Navisworks and iConstruct to facilitate their Advanced Work Packaging process and increased project visibility, construction productivity, quality, and safety on a \$500 million industrial construction project on the Texas Gulf Coast.

**KBR**  
We Deliver





# Scalable AWP

Our Observations from the COAA Report and  
Customer Workshops

# COAA Scalable Report

How does AWP apply to <\$100m projects?



## AWP Conference

October 2-3, 2018 • Houston, Texas

### COAA AWP Scalability Project

Release of the Report

Featuring: The COAA AWP Scalability Project Steering Committee  
(Lloyd Rankin, Randy Friesen, Jeremy Furzer, Kirk Harris, Ben Swan and Ryan Posnikoff)

### Project Screening Tool

COAA AWP - SCALABLE		Construction Familiarity & Complexity Screening Tool	
Project Name		Project Size Range	
Project Start/End Dates		Category	Complexity
Project Owner		Level	Phase
Project Manager		Year	Year
Project Location			

No.	Category	Complexity (Risk)	Risk Level	Phase	Screening Date/Comments
1	Construction Management	Low	Low	Construction	
2	Construction Management	Medium	Medium	Construction	
3	Construction Management	High	High	Construction	
4	Construction Management	Very High	Very High	Construction	

AS1 AWP 2018 CONFERENCE

### Where Are We Now?

- Identified AWP Principles
- Project Categorization based on Familiarity and Complexity
- Project Screening Tool
- Rank Assessment Matrix
- Four Project Categories
- Recommendations for Each Category
- Releasing Model
- Looking for Pilot Projects




AS1 AWP 2018 CONFERENCE

# Scalable vs. Traditional AWP

## What's different?

- 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



**The Challenge**  
Adapting AWP  
for projects  
under \$100MM

“There is significant opportunity to apply AWP guidelines for projects **under \$100 million.**”

"Scalable Advanced Work Packaging"  
Construction Owners Association of Alberta  
Document Number: COP-AWP-PBP-XX-2018-v1



“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.**”

"Scalable Advanced Work Packaging"  
Construction Owners Association of Alberta  
Document Number: COP-AWP-PBP-XX-2018-v1

“90% of our projects **do not have a 3D model.**”

Customer Quotation  
Scalable AWP Customer Workshop  
September 2018



# Autodesk Scalable AWP Platform

Aligning the Autodesk platform to scalable AWP processes and workflows

# Autodesk AWP Platform Vision

## Applying BIM 360 to Scalable Projects

- **Scalable** (cost-effective to deploy on all projects)
- **Easy to Deploy** (minutes, not weeks)
- **Cloud-based** and mobile off-line
- **Paperless** – automated and data-centric
- **Real-time**, single-source-of-truth
- **Robust APIs** with extensive partner integrations
- **Design system agnostic** (S3D, PDS, PDMS, etc.)



# Create Work Package

## Better Work Package Management with BIM 360



AUTODESK BIM 360 FIELD

Advanced Work Packaging > Equipment



25

CA

Search Reset

Close



More Actions

Filter  
1.1 Work Packages (IWP)

Name

Type  
all

Description

Location  
all

Include sub-locations?

Status  
all

Custom Properties  
Activity ID

Constraint Free

Discipline  
all

Discipline Sub-Type

Duration

Earnable Hours

	Location Path	WP Type	Name	Description	Discipline	Discipline Sub-Type	Status	Constraint Free	Planner	Activity ID	Planned Hours
<input type="checkbox"/>	WBS>CWA-101>101-CWP-PI	IWP	101-IWP-PI-01	Installation of Area 101 AG Piping	PIPE	ABOVE GROUND	Planning	<input type="checkbox"/>	Cody Austin		669
<input type="checkbox"/>	WBS>CWA-101>101-CWP-PI	IWP	101-IWP-PI-02	Installation of Area 101 AG Piping	PIPE	ABOVE GROUND	Planning	<input type="checkbox"/>	Cody Austin		627
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# Create Work Package

## Create Work Package

**AUTODESK® BIM 360™ FIELD** Advanced Work Packaging - Equipment

Search Reset Close Add Edit

Filter: 1.1 Work Packages (IWP)

Name: [ ]

Type: all

Description: [ ]

Location: all

Include sub-locations?

Status: all

Custom Properties: Activity ID [ ]

Constraint Free: [ ]

Discipline: all

Discipline Sub-Type: [ ]

Duration: [ ]

Earnable Hours: [ ]

Location Path: [ ]

**Add New Equipment** Save Close

**Details**

- \* = required
- = COBie-standard property

Profile

- \* Name: 401-IPW-PI-15
- Type: Work Package
- Description: Installation of Area 401 AG Piping
- Location: 401-CWP-PI
- Status: Planning
- Activity ID: 1234567
- Constraint Free:
- \* Discipline: PIPE
- Discipline Sub-Type: ABOVE GROUND
- Duration: 0

Location Path	Equipment ID	Equipment Name	Equipment Type	Equipment Description	Equipment Discipline	Equipment Discipline Sub-Type	Equipment Duration	Equipment Status	Equipment Activity ID	Equipment Planner	Equipment Activity ID	Equipment Planned Hours
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WBS>CWA-401>401-CWP-PI	IWP	401-IWP-PI-06	Installation of Area 401 AG Piping	PIPE	ABOVE GROUND	Planning				Cody Austin		923
WBS>CWA-401>401-CWP-PI	IWP	401-IWP-PI-06	Installation of Area 401 AG Piping	PIPE	ABOVE GROUND	Planning				Cody Austin		933
WBS>CWA-401>401-CWP-PI	IWP	401-IWP-PI-06	Installation of Area 401 AG Piping	PIPE	ABOVE GROUND	Planning				Cody Austin		648
WBS>CWA-401>401-CWP-PI	IWP	401-IWP-PI-06	Installation of Area 401 AG Piping	PIPE	ABOVE GROUND	Planning				Cody Austin		1175
WBS>CWA-401>401-CWP-PI	IWP	401-IWP-PI-06	Installation of Area 401 AG Piping	PIPE	ABOVE GROUND	Planning				Cody Austin		590
WBS>CWA-401>401-CWP-PI	IWP	401-IWP-PI-06	Installation of Area 401 AG Piping	PIPE	ABOVE GROUND	Planning				Cody Austin		1020
WBS>CWA-401>401-CWP-PI	IWP	401-IWP-PI-06	Installation of Area 401 AG Piping	PIPE	ABOVE GROUND	Planning				Cody Austin		1051
WBS>CWA-401>401-CWP-PI	IWP	401-IWP-PI-06	Installation of Area 401 AG Piping	PIPE	ABOVE GROUND	Planning				Cody Austin		1196
WBS>CWA-401>401-CWP-PI	IWP	401-IWP-PI-06	Installation of Area 401 AG Piping	PIPE	ABOVE GROUND	Planning				Cody Austin		996
WBS>CWA-401>401-CWP-PI	IWP	401-IWP-PI-06	Installation of Area 401 AG Piping	PIPE	ABOVE GROUND	Planning				Cody Austin		540
WBS>CWA-401>401-CWP-PI	IWP	401-IWP-PI-06	Installation of Area 401 AG Piping	PIPE	ABOVE GROUND	Planning				Cody Austin		907

# Update Work Package Contents

Add Drawings, Details, etc.

The screenshot shows the Autodesk BIM 360 Field interface. On the left, a sidebar contains navigation icons and a profile form. The main area displays a modal dialog titled "Add file or folder from Library". The dialog shows a breadcrumb path: "401-CWA > 401-CWP-PI-01 > Piping Isometrics". Below the path, it states "Selected Document: 401-BBD-5102003-01.pdf". A list of files is displayed, with the first file, "401-BBD-5102003-01.pdf", highlighted in blue. The list contains the following files:

- 401-BBD-5102003-01.pdf
- 401-BBD-5102003-02.pdf
- 401-BO-6801001-01.pdf
- 401-BO-6801001-02.pdf
- 401-BWM-4101002-01.pdf
- 401-BWM-6502001-01.pdf
- 401-BWM-6502002-01.pdf
- 401-BWM-6502002-02.pdf
- 401-BWM-6502003-01.pdf
- 401-BWM-6502003-02.pdf

At the bottom of the dialog, there are navigation buttons: "< Prev", "1", "2", "3", "4", "5", "6", and "Next >". The "1" button is highlighted. In the background, the profile form is visible, showing fields for Name, Type (Work Package), Description (Installation of Area 401 AG Piping), Location (401-CWP-PI), Status (Planning), Activity ID (1234567), Discipline (PIPE), and Discipline Sub-Type (ABOVE GROUND).

# Update Work Package Contents

Add Drawings, Details, etc.

◀ Back to Equipment

👤 Checklists | 📄 Issues | 📅 Tasks | 📎 Attachments | 💬 Comments | 🕒 History

\* = required  
● = COBie-standard property

**Profile**

\* Name  
401-IWP-PI-15

Type  
Work Package

Description  
Installation of Area 401 AG Piping

Location  
401-CWP-PI ❌

Status  
Planning

Activity ID  
1234567

Constraint Free

\* Discipline  
PIPE

Discipline Sub-Type  
ABOVE GROUND

Duration  
0

Earnable Hours

Issued To

Planned Finish Date

### Attachments

📄 File | 📖 Library | 📖 Library Preview | 🔗 Link | 📷 Camera | ⬇️ Download All

**401-BBD-5102003-01.pdf**  
Added/Modified Jul 26, 2018 6:48 PM

Public link:

📄 Markup | ⬇️ Download | ❌ Delete

**401-BBD-5102003-02.pdf**  
Added/Modified Jul 26, 2018 6:48 PM

Public link:

📄 Markup | ⬇️ Download | ❌ Delete

**401-BO-6801001-01.pdf**  
Added/Modified Jul 26, 2018 6:48 PM


Public link:

📄 Markup | ⬇️ Download | ❌ Delete




# Update Work Package Contents

Add Materials, Progress, Safety, Specifications, etc.

						<b>Progress for IWP</b>										<b>IWP#:</b>		
																<b>Field Execution Start:</b>		<b>2/19/2018</b>
																<b>Field Execution Finish:</b>		<b>3/19/2018</b>
																<b>Revision Status:</b>		<b>Rev 0</b>
Drawing	Sheet No	Timesheet Code	Piece Mark	Milestone 1	Weight	Milestone 2	Weight	Milestone 3	Weight	Milestone 4	Weight	Milestone 5	Weight	Milestone 6	Weight	Record No		
1017-25100	2	1017P312	1	MATERIAL SHAKEOUT	5%	ERECT SPOOL	20%	CONNECT (ONE END)	20%	CONNECT (OTHER END)	20%	TRIM	15%	READY FOR TEST	10%	_54L0TRN3T		
1017-25100	3	1017P720	0	INSTALL	90%	COMPLETE	10%		0%		0%		0%		0%	_54L0TRN3Z		

1017-25100	5	1017P312	1	MATERIAL SHAKEOUT	5%	ERECT SPOOL	20%	CONNECT (ONE END)	20%	CONNECT (OTHER END)	20%	TRIM	15%	READY FOR TEST	10%	_54L0TRN3T
1017-25100	3	1017P312	1	MATERIAL SHAKEOUT	5%	ERECT SPOOL	20%	CONNECT (ONE END)	20%	CONNECT (OTHER END)	20%	TRIM	15%	READY FOR TEST	10%	_54L0TRN3T
1017-25100	6	1017P312	1	MATERIAL SHAKEOUT	5%	ERECT SPOOL	20%	CONNECT (ONE END)	20%	CONNECT (OTHER END)	20%	TRIM	15%	READY FOR TEST	10%	_54L0TRN3T
1017-25100	6	1017P720	0	INSTALL	90%	COMPLETE	10%		0%		0%		0%		0%	_54L0TRN3Z
1017-25100	4	1017P720	0	INSTALL	90%	COMPLETE	10%		0%		0%		0%		0%	_54L0TRN3Z
1017-25100	2	1017P720	0	INSTALL	90%	COMPLETE	10%		0%		0%		0%		0%	_54L0TRN3Z
1017-25100	1	1017P312	2	MATERIAL SHAKEOUT	5%	ERECT SPOOL	20%	CONNECT (ONE END)	20%	CONNECT (OTHER END)	20%	TRIM	15%	READY FOR TEST	10%	_54L0TRN3T
1017-25100	4	1017P312	1	MATERIAL SHAKEOUT	5%	ERECT SPOOL	20%	CONNECT (ONE END)	20%	CONNECT (OTHER END)	20%	TRIM	15%	READY FOR TEST	10%	_54L0TRN3T
1017-25100	5	1017P720	0	INSTALL	90%	COMPLETE	10%		0%		0%		0%		0%	_54L0TRN3Z
1017-25100	1	1017P312	1	MATERIAL SHAKEOUT	5%	ERECT SPOOL	20%	CONNECT (ONE END)	20%	CONNECT (OTHER END)	20%	TRIM	15%	READY FOR TEST	10%	_54L0TRN3T
1017-25100	2	1017P312	2	MATERIAL SHAKEOUT	5%	ERECT SPOOL	20%	CONNECT (ONE END)	20%	CONNECT (OTHER END)	20%	TRIM	15%	READY FOR TEST	10%	_54L0TRN3T
1017-25100	2	1017P312	3	MATERIAL SHAKEOUT	5%	ERECT SPOOL	20%	CONNECT (ONE END)	20%	CONNECT (OTHER END)	20%	TRIM	15%	READY FOR TEST	10%	_54L0TRN3T
1017-25100	1	1017P720	0	INSTALL	90%	COMPLETE	10%		0%		0%		0%		0%	_54L0TRN3Z
1017-25100	1	1017P312	2	MATERIAL SHAKEOUT	5%	ERECT SPOOL	20%	CONNECT (ONE END)	20%	CONNECT (OTHER END)	20%	TRIM	15%	READY FOR TEST	10%	_54L0TRN3T
1017-25100	1	1017P312	3	MATERIAL SHAKEOUT	5%	ERECT SPOOL	20%	CONNECT (ONE END)	20%	CONNECT (OTHER END)	20%	TRIM	15%	READY FOR TEST	10%	_54L0TRN3T
1017-25100	1	1017P312	3	MATERIAL SHAKEOUT	5%	ERECT SPOOL	20%	CONNECT (ONE END)	20%	CONNECT (OTHER END)	20%	TRIM	15%	READY FOR TEST	10%	_54L0TRN3T
1017-25100	6	1017P312	2	MATERIAL SHAKEOUT	5%	ERECT SPOOL	20%	CONNECT (ONE END)	20%	CONNECT (OTHER END)	20%	TRIM	15%	READY FOR TEST	10%	_54L0TRN3T
1017-25101	1	1017P720	0	INSTALL	90%	COMPLETE	10%		0%		0%		0%		0%	_54L0TRN3Z
1017-25101	1	1017P312	1	MATERIAL SHAKEOUT	5%	ERECT SPOOL	20%	CONNECT (ONE END)	20%	CONNECT (OTHER END)	20%	TRIM	15%	READY FOR TEST	10%	_54L0TRN3T
1017-25101	1	1017P312	1	MATERIAL SHAKEOUT	5%	ERECT SPOOL	20%	CONNECT (ONE END)	20%	CONNECT (OTHER END)	20%	TRIM	15%	READY FOR TEST	10%	_54L0TRN3T

						<b>Materials for IWP</b>										<b>IWP#:</b>		
																<b>Field Execution Start:</b>		<b>2/19/2018</b>
																<b>Field Execution Finish:</b>		<b>3/19/2018</b>
																<b>Revision Status:</b>		<b>Rev 0</b>
Fast Access	BOM Doc No	MTO Breakdown	WBS	Material Reference	Description	UOM	MTO Qty	REQ Qty	ISS Qty	REM QTY	Avail Date	Source						
MC06302122	1017-25100	1	1017	1017-25100-1-3	PIPE SPOOL: 2 INCH; ; PAINT SYSTEM:SZ253S;SO AND DETAIL #: 35897-20286131	EA	1			0	07-Feb-18	OH						
MC00091605	1017-25101	1	1017	JGJBUCA	BOLT STUD A193-B7 W/HH NUTS A194-2H COATED SP11C BLUE	EA	8			0	07-Feb-18	OH						
MC06302154	1017-25106	1	1017	1017-25106-1-6	PIPE SPOOL: ; ; PAINT SYSTEM:SZ253S;SO AND DETAIL #: 35897-20286296	EA	1			0	07-Feb-18	OH						
MC00091557	1017-25106	1	1017	JGJBUCA	BOLT STUD A193-B7 W/HH NUTS A194-2H COATED SP11C BLUE	EA	8			0	07-Feb-18	OH						
MC06302134	1017-25100	5	1017	1017-25100-5-1	PIPE SPOOL: 2 INCH; ; PAINT SYSTEM:SZ253S;SO AND DETAIL #: 35897-20286190	EA	1			0	07-Feb-18	OH						
MC04546003	1017-25102	1	1017	DVBF3CA	FLG 150 TH RF 125-250AA SS A182-F316/F316L	EA	1			0	07-Feb-18	OH						
MC01584487	1017-25100	1	1017	JBB82AB	VLV 150 FL RF 125-250AA BALL B82AB	EA	1			0	07-Feb-18	OH						
MC04560785	1017-25100	4	1017	XF11-B-B-11.2-5.98-NA	PIPE SUPPORT; PIPE SUPPORT BEAMS (HORIZONTAL LINES)	EA	2			0	07-Feb-18	OH						
MC06302148	1017-25106	1	1017	1017-25106-1-3	PIPE SPOOL: 3 INCH; ; PAINT SYSTEM:SZ253S;SO AND DETAIL #: 35897-20286253	EA	1			0	07-Feb-18	OH						
MC00091557	1017-25102	1	1017	JGJBUCA	BOLT STUD A193-B7 W/HH NUTS A194-2H COATED SP11C BLUE	EA	8			0	07-Feb-18	OH						
MC00091607	1017-25106	1	1017	JGJBUCA	BOLT STUD A193-B7 W/HH NUTS A194-2H COATED SP11C BLUE	EA	4			0	07-Feb-18	OH						

# Update Work Package Contents

Add Materials, Progress, Safety, Specifications, etc.

**AUTODESK® BIM 360™ FIELD** Industrial Construction (AWP) > Equipment > 401-IWP-PI-15

Back to Equipment

Checklists Issues Tasks Attachments Comments History

**Attachments**

File Library Library Preview Link Camera Download All

**\* = required**  
● = COBie-standard property

**Profile**

**\* Name**  
401-IWP-PI-15

**Type**  
Work Package

**Description**  
Installation of Area 401 AG Piping

**Location**  
401-CWP-PI

**Status**  
Planning

**Activity ID**  
1234567

**Constraint Free**

**\* Discipline**  
PIPE

**Discipline Sub-Type**  
ABOVE GROUND

**Duration**  
0

**Earnable Hours**

**Issued To**

**Planned Finish Date**

**401-BBD-5102003-01.pdf**  
Added/Modified Jul 26, 2018 6:48 PM  
Public link: [redacted]  
Markup Download Delete

**401-BBD-5102003-02.pdf**  
Added/Modified Jul 26, 2018 6:48 PM  
Public link: [redacted]  
Markup Download Delete

**401-BO-6801001-01.pdf**  
Added/Modified Jul 26, 2018 6:48 PM  
Public link: [redacted]  
Markup Download Delete

**Materials\_List.pdf**  
Added/Modified Jul 27, 2018 1:03 PM  
Public link: [redacted]  
Markup Download Delete

**Progress.pdf**

# Update Work Package Contents

## Typical Paper-based ITRs / Checklists

Centrifugal Pump - M-02-1A Page 1 of 2

**MECHANICAL**  
**CENTRIFUGAL PUMP**  
**M-02-1A**

Construction Area: \_\_\_\_\_ Tag No: \_\_\_\_\_  
 System Description: \_\_\_\_\_ Sub-system No: \_\_\_\_\_

No	Description of Check / Action to be made	Results	Signature
1	Nameplate is attached and complies with the data sheets.		
2	Confirm pump release note signed and all vendor punch list items cleared		
3	Confirm pump has visible CE marking and confirm availability of certificate of conformity.		
4	Confirm pump is installed in accordance with manufacturer's recommendations and free from damage.		
5	Confirm pump is installed in line with current drawings and specifications		
6	Check all pump suction and discharge valves and instrumentation is fitted and accessible.		
7	Confirm all testing is complete and test certification available		
8	Check that the pump is resting firmly on mounting base with load being correctly distributed and check all pump and motor mounting bolts torqued to correct specification.		
9	Check that all flange faces are clean and free from defects.		
10	Check that all gaskets are fitted and correct to specification.		
11	Ensure that all bolts are to the correct material specification, torqued or tensioned to the recommended specification and are correctly lubricated and preserved.		
12	Ensure correct relief valve has been installed.		
13	Check that pump and motor are free to rotate.		
14	Ensure that rotating shafts have guards fitted.		
15	Check that the lube oil system is complete to design.		
16	Check that the seal oil system is complete to design (if fitted).		
17	Check earth boss is fitted and earth strap installed.		
18	Check that the accessibility for maintenance and removal acceptable.		
19	Check preservation measures are intact and effective. Clean pump skid of all contaminants.		
20	Check external painting and insulation installed in accordance with the pump data sheet.		
21	Confirm where applicable Coupling alignment checks are complete and recorded on Protocol M-02-5A		
22	Check strainers fitted to pump suction lines.		
23	Ensure pump skid drains pan / tray extends to catch all skid drains.		

PRE-LEAK TEST PUNCH LIST

Job #: \_\_\_\_\_ Page / Cabin/ Line #: \_\_\_\_\_

Contractor: \_\_\_\_\_ Area/Module: \_\_\_\_\_

Scheduled Start Date: \_\_\_\_\_ Scheduled Finish Date: \_\_\_\_\_ System #: \_\_\_\_\_

Scheduled Signoff: \_\_\_\_\_ Date Planned: \_\_\_\_\_ Actual: \_\_\_\_\_ Sub System #: \_\_\_\_\_

ITR Owner/Title: \_\_\_\_\_ 11.08.2015 \_\_\_\_\_ Discipline: \_\_\_\_\_ General: \_\_\_\_\_

Test # (Test Pack): \_\_\_\_\_ Item Desc: \_\_\_\_\_

Item #	Drawing #	Item Description and Location	Completed By and Date
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			
13			
14			
15			
16			
17			
18			
19			
20			

NOTES: Punch - RA - Not Applicable, P - Punch Mated, - OK

Remarks: \_\_\_\_\_

Approval Required from:	Print Name	Signature	Date
Crat Supervisor			
QC Inspector			
Owner's Inspector			

# Update Work Package Contents

## Microsoft Excel ITR / Checklist Template Import

Installation of Piping Systems Checklist.xls [Compatibility Mode] - Excel

Cody Austin

File Home Insert Page Layout Formulas Data Review View Tell me what you want to do

F15 Verify low point drains are installed.

	B	C	D	E	F	G	H	I	J	K
1	Checklist Name	Permissions	Auto Create Issue	Display Number	Item Text	Response Type	Drop-down Answers	Default Answer	Answers that create Non-conformances	Default Issue Desc
	Required	Required	Optional	Optional	Required	Required	Optional	Optional	Optional	Optional
2	Name of the checklist that will appear in lists, headers, reports,	Controls whether this checklist is visible to any	Controls whether non-conforming responses on this checklist will	Number for the checklist item. <b>Recommend 4</b>	Text for the checklist item OR group header.	To create a group header, enter <b>Group Header</b>	If Response Type for a row is <b>Single-Select List</b> or <b>Multi-Select List</b> , fill in	If filled in, make sure it matches up with a valid answer corresponding to the	List answers that will auto-create non-conformances, separated by commas.	Will be the default for any issues created for this checklist item. If no issue descriptions v
3	<b>REMINDER: Don't delete or rename columns - the spreadsheet will not import. It is OK to delete the rows below, including the sample data.</b>									
4	Checklist Name	Permissions	Auto Create Issue	Display Number	Item Text	Response Type	Drop-down Answers	Default Answer	Answers that create Non-conformances	Default Issue Desc
5	FO-G061-ADSK-QC-027	all	TRUE		General	Group Header				
6	FO-G061-ADSK-QC-027	all	TRUE	1	Verify line size is correct.	Pass, Fail, N/A				Incorrect line size
7	FO-G061-ADSK-QC-027	all	TRUE	2	Verify material is correct.	Pass, Fail, N/A				Incorrect material
8	FO-G061-ADSK-QC-027	all	TRUE	3	Verify flange rating is correct.	Pass, Fail, N/A				Incorrect material
9	FO-G061-ADSK-QC-027	all	TRUE	4	Verify installation is level & plumb.	Pass, Fail, N/A				Incorrect installation
10	FO-G061-ADSK-QC-027	all	TRUE	5	Verify line slopes are correct per drawings.	Pass, Fail, N/A				Incorrect line slope
11	FO-G061-ADSK-QC-027	all	TRUE	6	Verify branches are located correctly.	Pass, Fail, N/A				Incorrect branch locati
12	FO-G061-ADSK-QC-027	all	TRUE	7	Verify branches are reinforced (if required).	Pass, Fail, N/A				Missing reinforment
13	FO-G061-ADSK-QC-027	all	TRUE	8	Verify weepholes are in reinforcing pads.	Pass, Fail, N/A				Missing weepholes
14	FO-G061-ADSK-QC-027	all	TRUE	9	Verify high point vents are installed.	Pass, Fail, N/A				Missing high point ven
15	FO-G061-ADSK-QC-027	all	TRUE	10	Verify low point drains are installed.	Pass, Fail, N/A				Missing low point drai
16	FO-G061-ADSK-QC-027	all	TRUE	11	Verify reducers are correctly located.	Pass, Fail, N/A				Incorrect reducer place
17	FO-G061-ADSK-QC-027	all	TRUE	12	Verify the type of reducer is correct.	Pass, Fail, N/A				Incorrect reducer type
18	FO-G061-ADSK-QC-027	all	TRUE	13	Verify blinds are installed.	Pass, Fail, N/A				Blinds missing
19	FO-G061-ADSK-QC-027	all	TRUE	14	Verify cold springs are per drawings.	Pass, Fail, N/A				Incorrect cold spring
20	FO-G061-ADSK-QC-027	all	TRUE		Pipe Support	Group Header				
21	FO-G061-ADSK-QC-027	all	TRUE	15	Verify field supports are installed.	Pass, Fail, N/A				Missing field supports
22	FO-G061-ADSK-QC-027	all	TRUE	16	Verify anchors are installed.	Pass, Fail, N/A				Missing anchors

# Update Work Package Contents

## Associate ITR / Checklist Templates with Work Package

**AUTODESK® BIM 360™ FIELD** Industrial Construction (AWP) › Equipment › 401-IWP-PI-15

25 CA

5 items

Back to Equipment

Checklists Issues Tasks Attachments Comments History

Completion and Turnover - Aboveground Piping + Checklist Edit Link Checklists

Created	Modified	Name	Author	# Issues	# Open
Jul 27, 2018 3:18 P	Jul 27, 2018 3:18 P	401-IWP-PI-15 - Completion and Turnover	cody.austin@autodesk.com	0	0
Jul 27, 2018 3:12 P	Jul 27, 2018 3:22 P	401-N-4104001-01 - Installation of Piping	cody.austin@autodesk.com	0	0
Jul 27, 2018 3:17 P	Jul 27, 2018 3:17 P	401-NH-5302060-02 - Installation of Piping	cody.austin@autodesk.com	0	0
Jul 27, 2018 3:19 P	Jul 27, 2018 3:22 P	401-PW-4102001-01 - Installation of Piping	cody.austin@autodesk.com	0	0
Jul 27, 2018 3:18 P	Jul 27, 2018 3:21 P	401-SSM-5102001-09 - Installation of Piping	cody.austin@autodesk.com	0	0

Profile

\* Name

401-IWP-PI-15

Type

Work Package

Description

Installation of Area 401 AG Piping

Location

401-CWP-PI

Status

Planning

Activity ID

1234567

Constraint Free

Discipline

PIPE

Discipline Sub-Type

ABOVE GROUND

Duration

0

Earnable Hours

Issued To

Planned Finish Date

Installation of Piping Systems

Craft Supervisor

Owner's Inspector

QC Inspector

1 Verify line size is correct. **Issue**

2 Verify material is correct. **Issue**

3 Verify flange rating. **Issue**

4 Verify installation is per drawings. **Pass**

5 Verify line slopes are correct per drawings. **Pass**

6 Verify branches are located correctly. **Pass**

7 Verify branches are reinforced (if required). **Pass**

8 Verify weepholes are in reinforcing pads. **Pass**

# Update Work Package Details

Planned Start / End - Duration

The screenshot displays the Autodesk BIM 360 FIELD interface for an Industrial Construction project. The main form contains the following fields:

- Equipment ID: 1234567
- Constraint Free:
- Discipline: PIPE
- Discipline Sub-Type: ABOVE GROUND
- Duration: 5
- Earnable Hours:
- Issued To:
- Planned Finish Date: Jul 23, 2018
- Planned Hours: 854
- Planned Start Date: Jul 27, 2018
- Purchasing and Warranty:
  - Install date:

A calendar overlay is shown for July 2018, with the 27th highlighted. The right sidebar shows a 'Checklists' section with a 'Created' list containing the following entries:

- Jul 27, 2018 3:19 |
- Jul 27, 2018 3:12 |
- Jul 27, 2018 3:18 |
- Jul 27, 2018 3:18 |
- Jul 27, 2018 3:17 |

# Monitor Work Package Constraints

## Add Constraints to Work Package

The screenshot displays the Autodesk BIM 360 Field interface. The main window shows a sidebar with navigation options and a central panel for editing an issue. The issue is titled "000010" and is of type "Constraint". The description is "Waiting on material. 401-NH-5302060-02". The source is "Equipment 401-IWP-PI-15 [Planning]". The root cause is "Materials", the company is "Piping Contractor", and the author is "cody.austin@autodesk.com". The status is "Open" and the due date is "Jul 30, 2018". The location is "WBS>CWA-401>401-CWP-PI".

**AUTODESK® BIM 360™ FIELD** Industrial Construction (AWP) → Equipment → 401-IWP-PI-15

Back to Equipment

Issue type: Constraint

\* Issue ID: 000010

\* Description: Waiting on material. 401-NH-5302060-02

Source: Equipment 401-IWP-PI-15 [Planning] X

Link Task Link Equipment

Root cause: Materials

Company: Piping Contractor

Author: cody.austin@autodesk.com

Status: Open

Due date: Jul 30, 2018

Location: WBS>CWA-401>401-CWP-PI X

Location detail

Save Close

1 of 1 checked

	Due Date	Date Created
autodesk.com	Jul 30, 2018	27 Jul 2018 3:52

# Monitor Work Package Constraints

## Manage Constraints

**AUTODESK® BIM 360™ FIELD** Industrial Construction (AWP) \ Equipment \ 401-IWP-PI-15 25 CA

Back to Equipment

Checklists Issues Tasks Attachments Comments History

Issue Edit Void

2 items

Status	Type	Description	Root cause	Company	Location Path	Author	Due Date	Date Created
<input type="checkbox"/> Open	Constraint	Waiting on material. 401-NH-5302060-02	Materials	Piping Contractor	WBS>CWA-401>401-CWP-PI	cody.austin@autodesk.com	Jul 30, 2018	27 Jul 2018 3:52
<input type="checkbox"/> Open	Constraint	Waiting on material. Spool 401-N-4104001-01	Materials	Piping Contractor	WBS>CWA-401>401-CWP-PI	cody.austin@autodesk.com	Jul 30, 2018	27 Jul 2018 4:02

**Profile**

\* Name  
401-IWP-PI-15

Type  
Work Package

Description  
Installation of Area 401 AG Piping

Location  
401-CWP-PI

Status  
Planning

Activity ID  
1234567

Constraint Free

\* Discipline  
PIPE

Discipline Sub-Type  
ABOVE GROUND

Duration  
5

Earnable Hours

Issued To

Planned Finish Date



# Approve Work Package

## Flag Work Package for Approval

**B** | AUTODESK® BIM 360™ FIELD | Industrial Constr

← Back to Equipment

\* = required  
● = COBie-standard property

Profile

\* Name  
401-IWP-PI-15

● Type  
Work Package

● Description  
Installation of Area 401 AG Piping

Location  
401-CWP-PI

Status  
Planning

Activity ID  
1234567

\* Approval Status  
Not Approved  
Ready for Approval  
Approved  
Rejected

Discipline Sub-Type  
ABOVE GROUND

Checklists

Completion and Turnov

Created

Jul 27, 2018 3:19 P J  
Jul 27, 2018 3:12 P J  
Jul 27, 2018 3:18 P J  
Jul 27, 2018 3:18 P J  
Jul 27, 2018 3:17 P J

# Monitor Work Package Constraints

## Constraint Free Work Package

**B** AUTODESK® BIM 360™ FIELD Industrial Construction (AWP) > Equipment > 401

Back to Equipment Saved at 13:29:09 -05:00

\* = required  
● = COBiE-standard property

**Profile**  
\* Name  
401-IWP-PI-15

● Type  
Work Package

● Description  
Installation of Area 401 AG Piping

Location  
401-CWP-PI ✘

Status  
Planning

Activity ID  
1234567

\* Approval Status  
Not Approved

Constraint Free

Checklists Issues Tasks

+ Issue Edit Void

Status	Type	Description
<input type="checkbox"/> Closed	Constraint	Waiting on m
<input type="checkbox"/> Closed	Constraint	Waiting on m

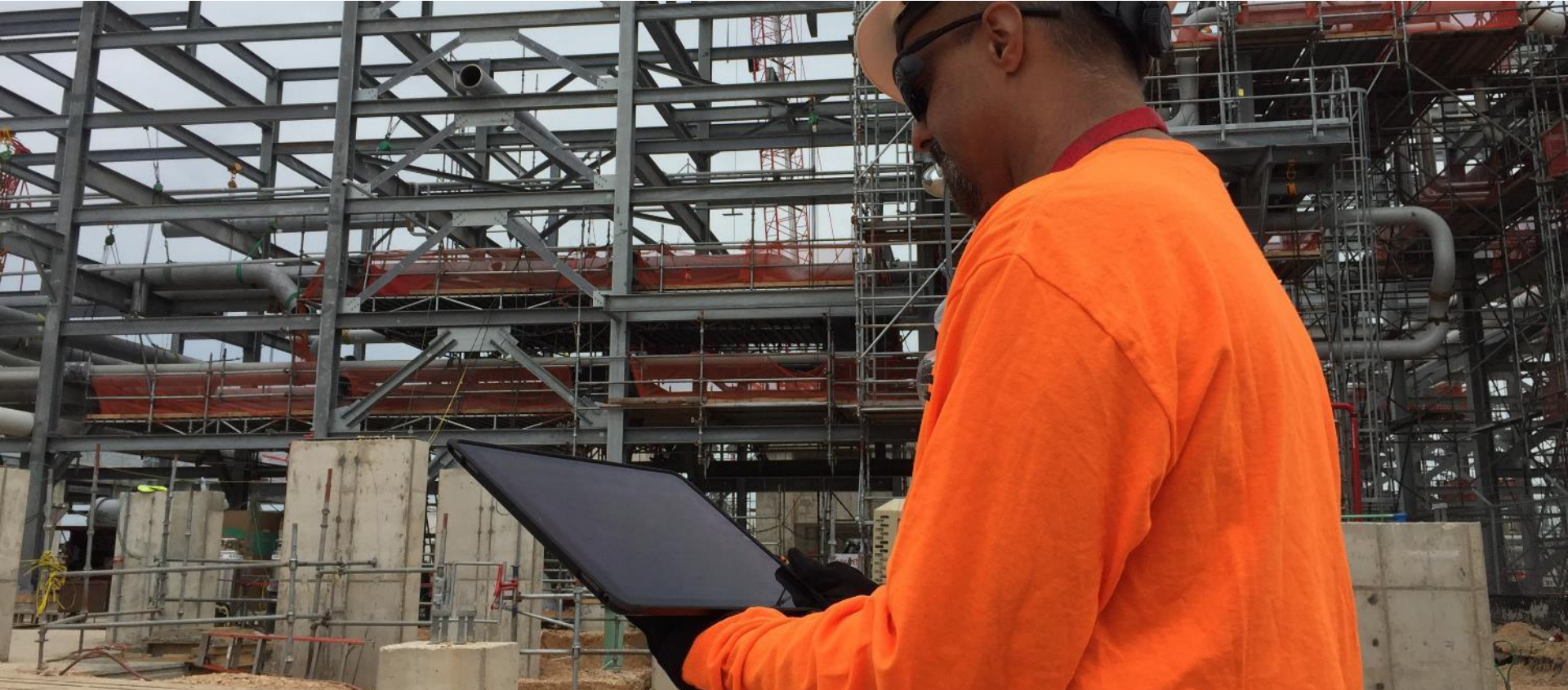
# Issue Work Package and Execute in the Field

Print Work Package and Deliver to Field



# Issue Work Package and Execute in the Field

Digitally Deliver, Execute and Track Work Packages





# Assemble Systems

Leverage the acquisition to accelerate the Autodesk AWP Platform

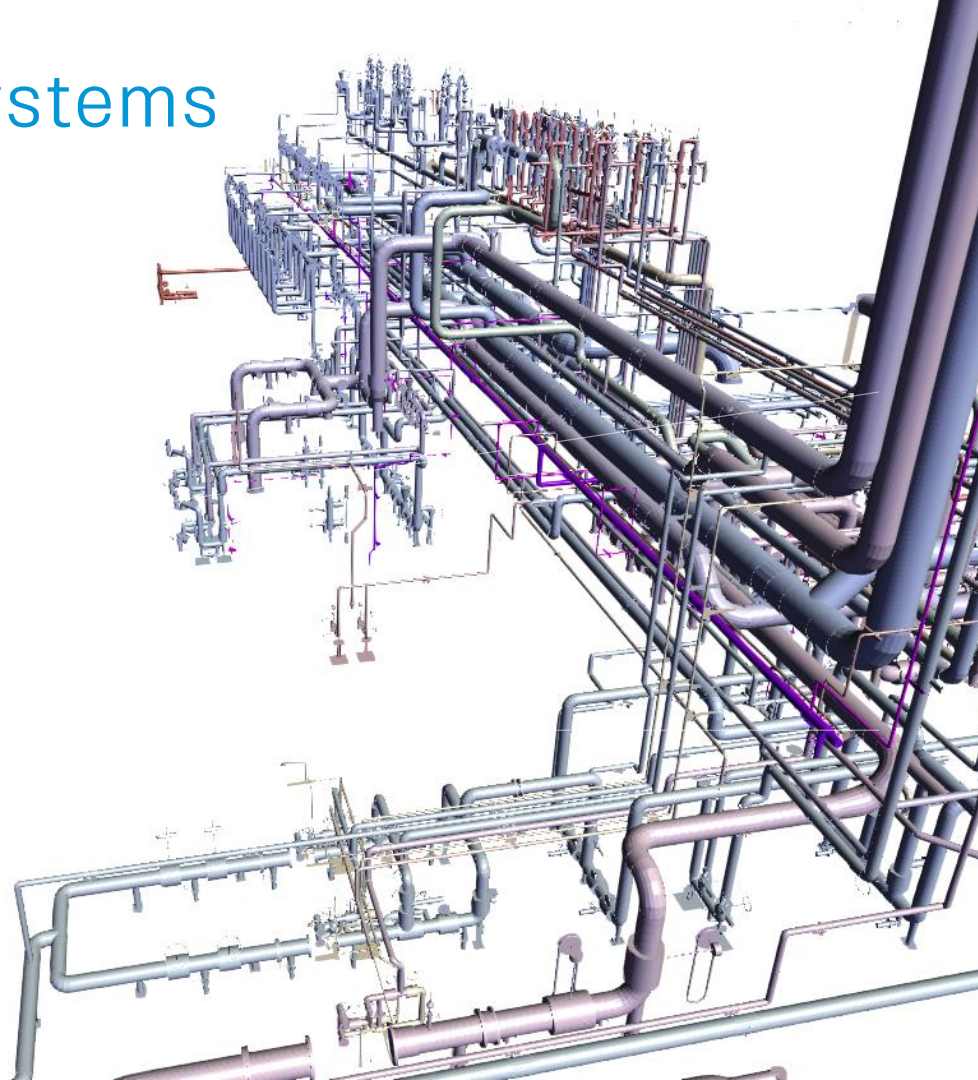
# Introducing Assemble Systems

Assemble Systems at a Glance

Assemble is a System of Engagement

- Assemble combines and unlocks models, drawings, and point clouds
- Assemble conditions and organizes the data
- Assemble connects to your other construction systems

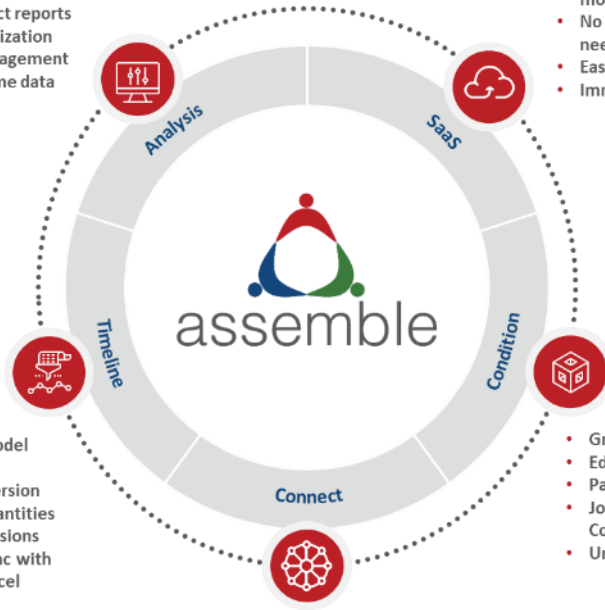
**CONDITION – ORGANIZE  
CONNECT**



# Introducing Assemble Systems

## Five Key Areas

- Interactive Dashboards
- Custom Calculations
- Group project reports across organization
- Change management
- Near real-time data



- Autosave model updates
- Report by version
- Compare quantities between versions
- Two-way sync with Revit and Excel

- Plan rooms
- Estimating systems
- Scheduling
- Project Management
- Documentation

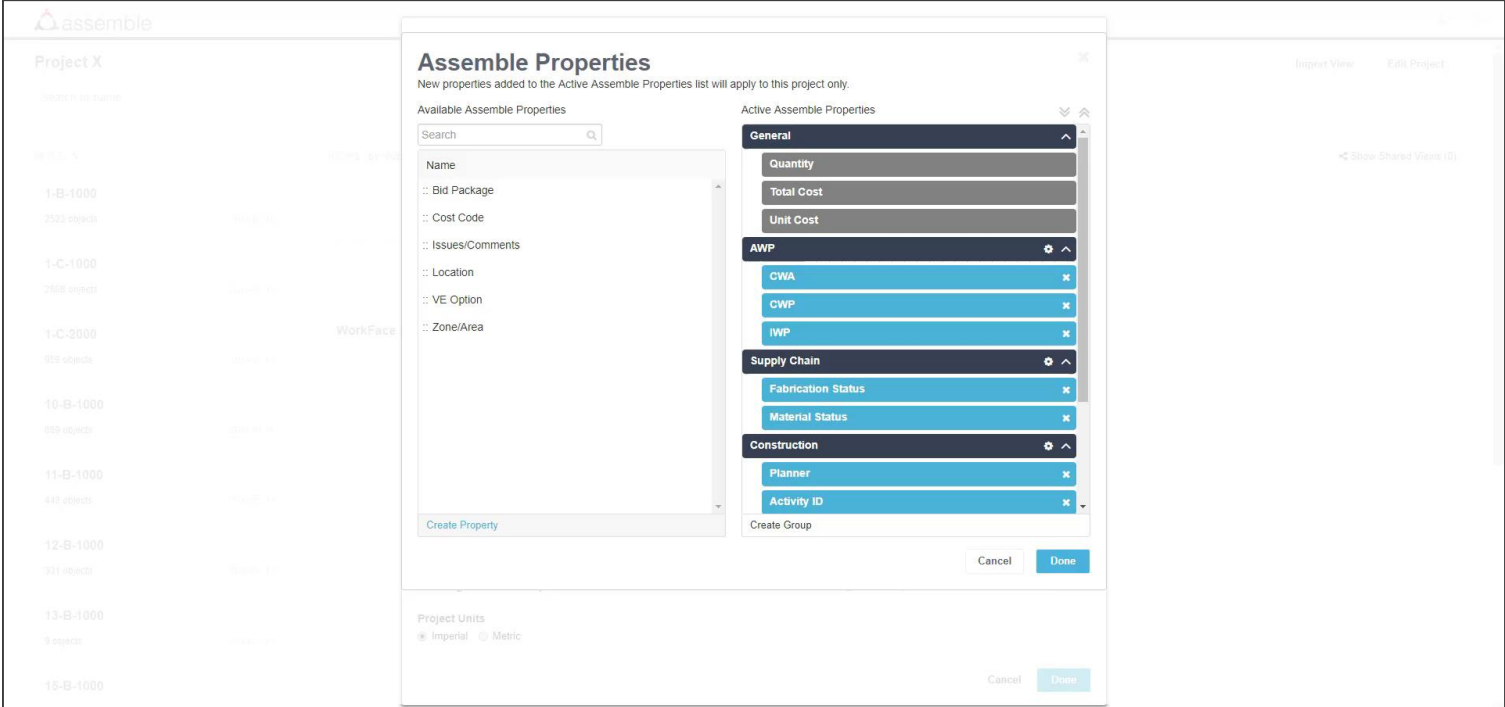
- Cloud based by a browser or mobile device
- No software/no hardware needed
- Ease of use
- Immediately useful/access

- Group/Sort/Filter
- Edit/Create/Import
- Packaging/Coding/Coloring
- Job codes, Cost Codes, Est. Codes, Sub Codes
- Uniformat, CSI, ERP



# Cloud-Based Model Conditioning

## Supplement Engineering BIM Models with Additional Data





# Real-Time Status Visualization

Visualize any data in the context of your project model

The screenshot displays the 'assemble' software interface for 'Project X'. The main view is a 3D visualization of a piping system with pipes colored according to their fabrication status. On the left, a table lists the components, and on the right, a 'Color by Property' panel provides a legend for the colors.

**Table Data:**

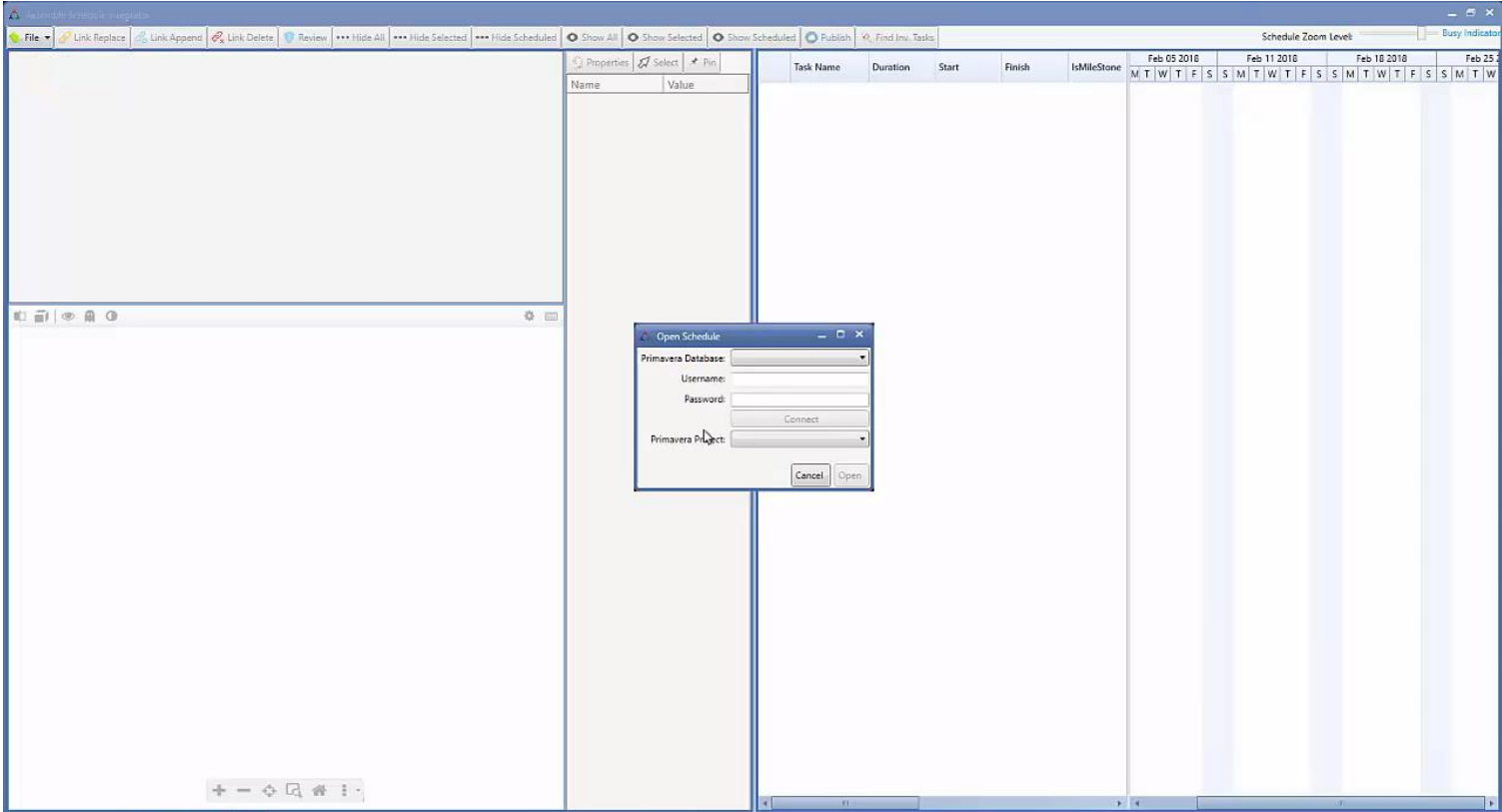
Name	Quantity	Unit	CWA
1-BFW-1050	27	EA	
1-BFW-1051	8	EA	
1-BFW-1052	17	EA	
1-BFW-1053	7	EA	
1-BFW-1054	16	EA	
1-CC-1021	13	EA	
1-CWR-1010	9	EA	
1-CWR-1020	10	EA	
1-CWR-1022	29	EA	
1-CWR-1023	8	EA	
1-CWR-1024	23	EA	
1-CWR-1025	24	EA	
1-CWR-1026	40	EA	
1-CWR-1027	12	EA	
1-CWR-1043	10	EA	
1-CWS-1009	30	EA	
1-CWS-1019	17	EA	
1-CWS-1028	25	EA	
1-CWS-1029	11	EA	
1-CWS-1032	33	EA	
1-CWS-1033	7	EA	
1-CWS-1042	21	EA	
1-FF-1007	9	EA	
1-FF-1008	14	EA	
1-FF-1012	15	EA	
1-FG-1004	31	EA	
1-FG-1011	14	EA	
1-FG-1034	11	EA	

**Color by Property Panel:**

- Color objects by values of the property:
- Property: Fabrication Status
- Legend:
  - Not Assigned (White circle)
  - Fabricated (Yellow circle)
  - In Progress (Dark Red circle)
  - On Truck (Red circle)
  - Waiting IFC (Orange circle)

# Primavera P6 Integration

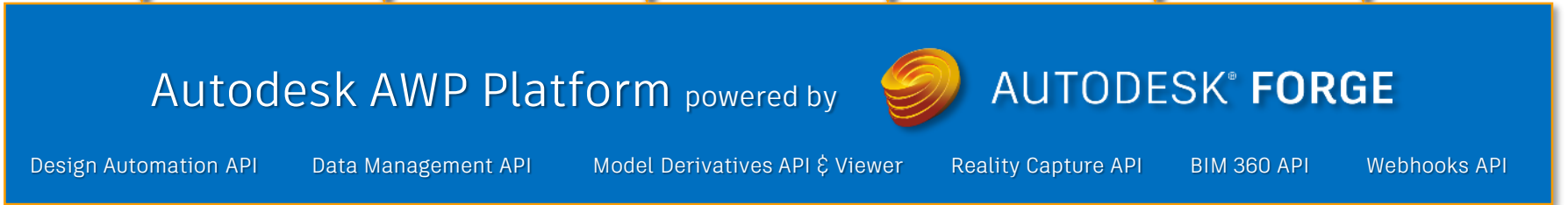
## 4D Visualization of the Path of Construction





# Extending the Platform

## Autodesk Forge for Industrial Construction



# EPC Dashboard Example



<https://forge-rcdb.autodesk.io/configurator?id=58cac141597e53832268b88e>

## Goal:

- Show the integration of a plant model generated in a non-Autodesk authoring platform (PDS) and Forge Viewer
- Create a dashboard to illustrate the ability of the Forge platform to theme the model based on underlying attributes

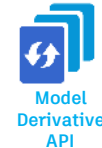
Construction Work Area

Discipline

System, Priority

Material Status

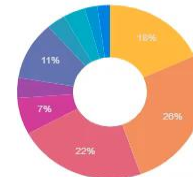
## APIs Used:



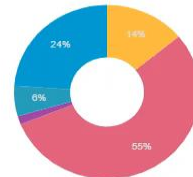


Project

Area



Discipline

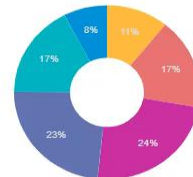


Piping

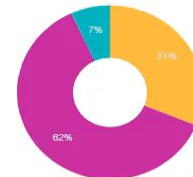
System



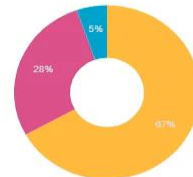
Priority



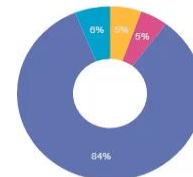
Fabrication Status



Material Status



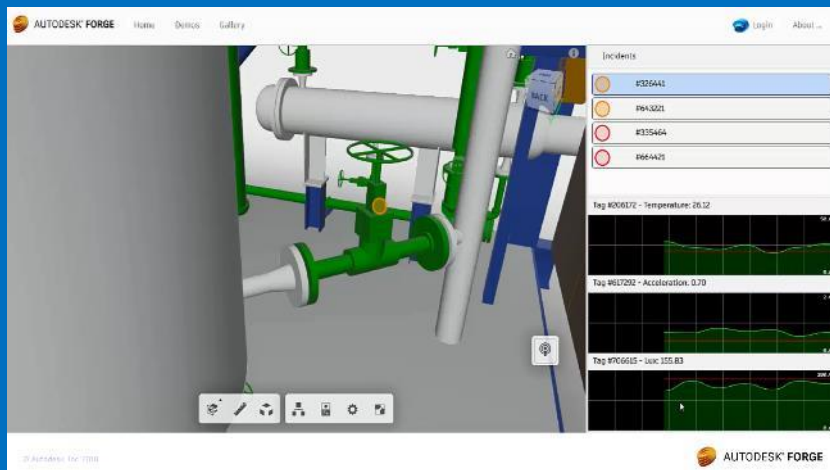
Progress



IWP

Value	% Components
Other	52.76 %

# Operational IoT Example



<https://forge-rcdb.autodesk.io/configurator?id=58adee163e6f342cf1e92dae>

## Goal:

- Show the ability to connect real time sensor data to specific locations within a model
- Create a model dashboard view showing conditions that are either in caution or warning.
- Facilitate the navigation to the caution or warning in the model through either a direct model link or through the dashboard

## APIs Used:



Viewer



Model  
Derivative  
API



Data  
Management  
API



Incidents

#326441

#643221

#335464

#664421







# Final Thoughts

# Summary

## Key Takeaways

- Now
  - Autodesk BIM 360 can coexist and extend your current digital AWP process into the field
  - Autodesk BIM 360 is your technology platform for your scalable AWP projects
- Next
  - Assemble Systems brings new capabilities around cloud-based model conditioning, status visualization, schedule integration and many other possibilities
- After Next
  - Stay Tuned, More to come!





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