AU LAS VEGAS 2019

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CES321230 - Industrial BIM:

Best Practices learned in a Complex Hydroelectric Plant Project:
Agenda

- Presenters, Companies and Introduction
- The Project
- BIM Implementation
- Interoperability
- Dynamo / BIM360
- Wrap-Up
About the Speakers

Testard Philippe – BIM Manager
Vinci Construction Grands Projets

Marschall Andreas – BIM Manager
Andritz Hydro

Nabil Nougha – DSS Enterprise
Customer Success Organization
What does BIM mean to you?
Civil

- Change of mindset (Sharing is Caring)
- Parametric Elements instead of “Just 3D”
- Increasing designer skills
- Formworks drawing the “french way”
- Precast/Rebars need to be developed
- Sub-suppliers often not BIM compliant

Electromechanical

- Software, Software, Software!
- IFC classes not reflecting complete scope
- Concept design critical
- Silo mentality
- Long supply chain
- Cable routing not feasible in Revit
- O&M implementation
- Linking of external information
- Sub-suppliers often not BIM compliant
The Project

- BIM Implementation
- Interoperability
- Dynamo / BIM360
- Wrap-Up
Project Presentation

VINCI CONSTRUCTION SELECTED TO BUILD A PUMPED-STOREAGE HYDROELECTRIC PLANT IN MOROCCO

- Client: Office National de l’Electricité et de l’Eau Potable (ONEE)
- Financing:
  - 25 % African Bank of Development
  - 75 % European Investment Bank
- Contract: « Turnkey »
Project Location
Project Overview
Basic BIM Figures

- Number of People Involved in BIM:
  - VCGP Structural Office: 8
  - VCGP Project Team: ~10 (currently)
  - Andritz: ~10
  - MEP: 4
  - Architectural: 2

Number of issues
Closed issues
STEP Abdelmouumen
Site by end of April
It’s All About Planning!
• Presenters and Companies
• The Project

**BIM Implementation**

• Interoperability
• Dynamo / BIM360
• Wrap-Up
Why BIM?
Software Interfaces
Workflows of Interaction
BIM Implementation: Everyday Hurdles

Do you know what BIM is about?

We can do 3D!

YAAAYYY??

A Lot of Communication / Explanations / Trainings Needed
Simplified Process

1. Model
2. Control
3. Aggregate
4. Analyse & Prepare
5. Decide
6. Publish Information

- STR
- MEP
- E&M
- ARC

BEP
Coordination Meeting
Goal:

- Create and follow-up issues
- Traceability of issues
- Coordination KPI’s
- Live reporting
- Cloud based solution
- BCF server
• Presenters and Companies
• The Project
• BIM Implementation

Interoperability

• Dynamo / BIM360
• Wrap-Up
Presentation Will Focus on...

INTEROPERABILITY
Creating a Federated Model

**Challenges:**
- Software compatibility
- Geolocation
- Integration of Issue Management Platform
- File size
- Offline availability for site
- Viewing performance
Workflow Model Exchange

- **ARC**: Archicad
- **Coordination**: Navisworks
- **Simulate/Manage**: Revit
- **Process/E&M**: Revit
- **Structure**: Revit
- **MEP**: Revit

Conversion
- Container GEN
- Container TUR
- Container PEG

Containers:
- GEN
- TUR
- PEG
Simplifying Models
Simplifying Models in Inventor

Facts:
weight: ~70 tons
dimensions:
(L x W x H)
7,3 x 5,4 x 7,2m
Ø 1,25m
File Size Comparison

Simplified Component

Original Version

30 MB

230 MB

13%!
Linking Models
Andritz Model: PSA-VCAN7-GEN-ALT-MAQ-100003

GEN-01.sat

GEN-02.sat

GEN-03.sat

Revit Generator Model.rvt

GEN-N.sat
Andritz Models: Overview

Generator Model

Turbine Model

Penstock & Gates Model

EPS Model

Revit Andritz model.rvt
The Way to Wisdom…
We Have a Problem, Don’t We?
LIES! DECEPTION!!!
Methods To Create 2D Drawings

1. Inserting in generic or Mass families
   - Revit native file => All sectioning available
   - **Missing geometry**
   - No automatic placement in models
   - Requires family management
   - Generic families (filter to handle visibility of elements needed)

2. Link .sat, export in DWG, reinsert in families
   - All sectioning available
   - File extremely heavy and slow
   - Exporting may crash the computers
   - Requires huge model organization
   - No automatic placement in models
   - Very time consuming
3. Create In-Place Generic Models and Link the .sat File!
3. The Simple Method

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<th>Disadvantages</th>
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<td>• View plan sectioning</td>
<td>• Limited classification</td>
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<td>• Upper plan sectioning</td>
<td>(no mechanical equipment for example)</td>
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<tr>
<td>• Section plan sectioning</td>
<td>• In-place models</td>
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<td>• Automatic placement for others actors</td>
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Evolution of Structural model size

Size of the structural model in Mo in function of the time

Peak due to in Place Models
Revit Families Integration Organisation

Direct integration of .sat files in IN-situ models

Revit families DWG integration Organisation

Lose of time due to reorganisation

2D impacts on drawings
• Presenters and Companies
• The Project
• BIM Implementation
• Interoperability

Dynamo / BIM360

• Wrap-Up
Automation | The New Normal

Automation Is the Disruptor

- Visual interface to construct logic routines
What is Dynamo?

• Dynamo is a **visual programming interface** made to access the Revit API (Application Programming Interface). Programming Languages used to access Revit API are mainly Python & C# but you do not necessarily need to know how to code to use Dynamo.

• Dynamo has been created by Autodesk to allow **experienced Revit users** to develop their own functions that cannot be achieve directly or easily in Revit.

• Dynamo allows you to write scripts. **Scripts are chains of code blocks** (called nodes) linked together that forms a specific query.

• Dynamo requires time to understand how nodes work, and how to use them. There is a quite strong **Dynamo users community** at [http://dynamobim.org/](http://dynamobim.org/) with tutorial videos and a forum.

Dynamo often refers to computational design, but many non-graphical things can be achieved with it.
Dynamo to reorganize your models
How to display .sat elements at the beginning?
After reorganisation

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All document filters are defined and modified here

Edit/New...
The list of filter to create:

Around 70!
Now, create all this filters manually and assign it to the views and template that you need please!
If we decompose the sentence:

« Now, create all this filters¹ manually and assign² it to the views and template that you need please! »

1. Create filter…
   - What?
   - Check if Mark = XXX-XX

2. Assign to the views and template
   - Which views?
   - Select views and view template
   - Which graphical appearance?
   - Setup graphical appearance

With what?
- EXCEL list of elements
Make a little Ecosia research and…
BIM 360 PDF Workflows
What is BIM 360?
How to use BIM 360 2D Comparison Tool
BIM 360 Comparison tool feedback

- Easy detection of elements that disappeared / changed
- User friendly
- Sometimes unstable => Autodesk support
Contribution of Autodesk EPS
24 Direct Solutions (or workarounds)
8 Enhancement Requests (or linked to existing Ideas)
10 Escalations (or linked to existing escalation)
6 Fix planned (1 fixed - 2019)
The top 3 ways to boost your BIM ROI

- What keeps AEC Professionals awake at night?
  - 32%: Using the correct file version.
  - 33%: Accessing the latest set of documents.

- 60% of major capital programmes fail to meet cost and schedule targets.

- 1 in 3 AEC Professionals say that using multiple software tools during a design project causes duplication of data.

[Link]
• Presenters and Companies
• The Project
• BIM Implementation
• Interoperability

Wrap-Up
#good

- Better Design
- Improved Communication
- Issue Tracking!
- Ecological: Less Physical Meetings!
- Less Travel Time -> More Time to Work!
- Platform Access for Everyone to Check Issues
- Automation of painful and time consuming tasks

#couldbebetter

- Hard to Train People from Abroad
- Software Limitations
- (Global) Understanding of BIM
- BIM≠BIM in Some Cases
- Easier Transfer of Information
# perspectives

- Dynamo knowledge and implementation
- Improve simplification of Equipment
- Training, Education and Certification
- Data Exchange between Software Packages
- Processes for O&M
- Standards ?
- …
We are BIM!