AB1420: 3D IDP (Integrated Design Process) Integration Using GIS and BIM Techniques

Charles McLean - OM Green Group

This class will explain how to use Google Earth™ to import GIS information using AutoCAD® Civil 3D® and Autodesk® Revit® software. Autodesk Revit and Autodesk® Ecotect® Analysis software will be used to properly analyze, place, and orient the design of the building. Autodesk® Revit® MEP and Autodesk® Revit® Structure software will be used to design the energy analysis and cost analysis for the class. Upon completion of any structural-related building within Autodesk Revit, an energy analysis template will be used to track all electrical and heating costs for the owner’s operational use. A second template will dictate the cost of building construction using Autodesk Revit and Autodesk® Revit® Navisworks® software. Upon completion of the Revit 3D model and cost analysis templates, Autodesk Navisworks will be used to simulate the IDP construction process. The audience will see documentation on how 3D Integrated Design Process is integrated, from the Civil GIS phase to the construction and bidding phase.

Learning Objectives
At the end of this class, you will be able to:

- Begin and complete the IDP process integrating a variety of 3D Autodesk® products.
- Become more familiar with integrating BIM information together.
- Connecting the "Real World to "BIM+BIM" (Building Information Model + Building Information Management) techniques and simulating the facts.
- Completing the architectural IDP process virtually within a 3D environment.
- Completing the 1D to 8D work scope.

About the Speaker
Charles McLean from Detroit MI. Charles has been an Autodesk Developer for 4 years and is proficient in multiple Autodesk Software pertaining to Architecture, Engineering and Manufacturing.

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Integrating a variety of Autodesk BIM products into the IDP process
3DIDP=BIM+BIM. What does this formula do for me?

3DIDP is the process an A/E firm must undergo to complete the IDP methodology. Utilizing different analytical software to drive the functionality and efficiency of a structure. Implementing 3DIDP sustains the ownership of BIM+BIM from the client. Building Information Modeling +Building Information Management is achieved during the use of multiple BIM type software. It is used to manage and maintain client personal property, allowing the Architect to become more transparent within the client/architect contract. Managing and controlling the design and construction phase enables the potential to own the life cycle analysis of a client’s structure and infrastructure enabling future partnerships within the industry.

Become more familiar with integrating BIM information together to create “Real Life” analysis results.

BIM+BIM relates to Building Information Modeling plus Building Information Management.

Implementing the two together creates a guide to where the construction process should lie in the future. Diversifying BIM+BIM constructs a higher in efficiency structure than the traditional architectural process. Being able to manage and virtual model any structure reduces cost, errors, and ultimately improves the architectural integrity as a whole.

BIM+BIM improves the overall score for LEED and HERS accreditation effortlessly.

Connecting the “Real World” to “BIM+BIM” techniques and simulating the facts.

Real World relates to how significant the 3D replica will resemble its true structural form thus completing the 1Dto8D process.

3D replication can open the doors to many different types of production from customizing crown moulding from foam or installing that high power high speed wind turbine on any rooftop. Rapid-prototyping has excelled from cad drawings into something more dominant with 3D printing capabilities. Building the replica before hand reduces many safety issues and it will lead the future of architecture/engineering to perfection.
The Definition of IDP

- The design of buildings requires the integration of many kinds of information into a synthetic whole. An integrated process, or "whole building" design process, includes the active and continuing participation of users, code officials, building technologists, cost consultants, civil engineers, mechanical and electrical engineers, structural engineers, specifications specialists, and consultants from many specialized fields. The best buildings result from active, consistent, organized collaboration among all players.

- [http://www.wbdg.org/design/engage_process.php](http://www.wbdg.org/design/engage_process.php)

Obtaining GPS Data from Google Earth.

Import Google Earth GPS Data into Autodesk Civil 3D Effortlessly..

*AutoCAD® Civil 3D® software is a Building Information Modeling (BIM) solution for civil engineering design and documentation. Civil 3D is built for civil engineers, drafters, designers, and technicians working on transportation, land development, and water projects. Stay coordinated and explore design options, analyze project performance*

[http://usa.autodesk.com/civil-3d/](http://usa.autodesk.com/civil-3d/)

Beginning The 3D IDP Process

- Import GIS data from Google Earth online service or any BIM civil engineer.
- Use Autodesk Civil 3D and Google earth to produce a live model of the earth's contours.
- Autodesk Civil 3D controls grading design to coexist with a BIM model, civil layout plans and other landscaping details to kick off any project.

Simulating concepts to predetermine the facts.
Pre-plan all of energy and rapid-prototyping needs using Project Vasari to analyze life cycle results.

*Project Vasari is focused on conceptual building design using both geometric and parametric modeling. It supports performance-based design via integrated energy modeling and analysis features.*

*Autodesk® Project Vasari is an easy-to-use, expressive design tool for creating building concepts. Vasari goes further, with integrated analysis for energy and carbon, providing design insight where the most important design decisions are made. And, when it’s time to move the design to production, simply bring your Project Vasari design data into the Autodesk® Revit® platform for BIM, ensuring clear execution of design intent.*


**Site Orientation**

- Use Project Vasari to orientate the structural footprint to optimize the 3D IDP process.
  - Reduce the structure's energy usage and cost
  - Gain LEED credits
  - Optimize space design
  - Optimize circulation patterns
  - Plan for building materials
  - Infrastructure planning

Autodesk Revit finalizes the conceptual model. Revit compiles a comprehensive data base to complete any work scope on time with full detail.
Autodesk Revit creates the “real life” replica for construction documentation. Using Autodesk Revit to manage the BIM workscope allowing for the A/E firms to collaborate the project efficiently.

_Built for BIM, Autodesk Revit helps you to model and analyze design concepts and more accurately maintain your vision through design, documentation, and construction. Use information-rich models to make more informed design decisions to support sustainable design, clash detection, construction planning, and fabrication. Any design change you make is updated throughout your project, keeping design and documentation coordinated and more reliable._


**Building Material Analysis**

- Manipulate Project Vasari analysis mass to create "real life" building materials.
- Revit Architecture support sustainable design decision-making early in the design process.
- Physical materials improve efficiency of BIM-based building performance workflows by assigning thermal and structural properties to the building envelope.
- Begin calculating costs and square footage counts pertaining to building materials. Keep track of all changes from the beginning process.
- Prepare pre heating and cooling loads based on cubic volume.

Autodesk Revit MEP calculates concrete HVAC and Plumbing data to meet city and statewide safety codes.

Completing the 1Dto8D process utilizes the calculation method and parameters needed to design core systems to become more efficient, meet code and become greener to achieve LEED, Ashrae and HERS rating scores.

_Autodesk® Revit® software provides mechanical, electrical and plumbing (MEP) engineers with the tools to design even the most complex building systems. Revit supports Building Information Modeling (BIM), helping you drive accurate design, analysis, and documentation of more efficient building systems from concept through to construction. Use information-rich models to support building systems design throughout the building lifecycle._
http://usa.autodesk.com/revit/mep-engineering-software/

**MEP Design Analysis**

- Check to see if elements are fully connected and contributing to system load requirements for more accurate sizing. See the total electrical load, air flow, or pipe flow at any point within a system.
- Design Ducts to ASHRAE Standards with Duct Fitting Database.
- Calculating Engineering Spaces.
- Calculating Pressure and Flow for Duct and Pipe

Autodesk Ecotect calculates extensive sun studies, thermal comfort levels and defines analysis for A/E firms within a different light.

Autodesk Ecotect uses extensive building properties to find fine line items during the design and construction process. Calculating natural ventilation and mechanical operations pertaining to air and water side equipment elaborates the possibility to perform new design methods and open the door for rapid-prototyping of shop drawings.

*Autodesk® Ecotect® Analysis sustainable design analysis software is a comprehensive concept-to-detail sustainable building design tool. Ecotect Analysis offers a wide range of simulation and building energy analysis functionality that can improve performance of existing buildings and new building designs. Online energy, water, and carbon-emission analysis capabilities integrate with tools that enable you to visualize and simulate a building’s performance within the context of its environment.*

http://usa.autodesk.com/ecotect-analysis/

**MEP Design Analysis**

- Calculate heating and cooling loads for models and analyze effects of occupancy, internal gains, infiltration, and equipment.
- Autodesk Ecotect creates a separate BIM model for energy analysis calculations.
- Utilize sun and shading studies to improve orientation, exterior and interior design.
- Compare and contrast data from multiple analysis reports to finalize design options.
Determine a true Project Schedule Using Autodesk Navisworks.

Autodesk Navisworks eliminates discombobulated scheduling efforts and will also redefine installation instruction for sub's and tradesmen.

Autodesk® Navisworks® project review software products help architecture, engineering, and construction professionals gain control over project outcomes. Integrate, share, and review models and multi format data with all your project stakeholders. A comprehensive set of integration, analysis, and communication tools helps teams better coordinate disciplines, resolve conflicts, and plan projects before construction or renovation begins. Navisworks supports Building Information Modeling (BIM) for building and infrastructure, as well as 3D model-based design for process and power plants.

[http://usa.autodesk.com/navisworks/](http://usa.autodesk.com/navisworks/)

**Construction Analysis**

- Supports the creation of a single, coordinated model to facilitate collaboration, encouraging shared learning and helping to provide a platform for interdisciplinary workflows.
- Comprehensive schedule, cost, animation, and visualization capabilities enable you to demonstrate design intent and simulate construction, promoting insight and predictability.
- Provides a comprehensive range of markup, review, and commenting tools to support collaboration among all design disciplines.