VDC and the Digital Domain in Construction

ARCHA4675

Instructors
John Cerone - jdc@shoparc.com
Scott Overall - spo@shoparc.com

Guest Lecturers
*TBD

Seminar Time
Tuesday 2-4pm
504 Avery / 202 Fayerweather

Course Description
The traditional drawing set has had a good, long run. But the future points elsewhere. While the recent emergence of 'Building Information Modeling' (BIM) in architecture has reformed the coordination of systems from various trades in a federated 3D environment, little has been done to challenge the primacy of the 2D deliverable as a means to communicate with the client as well as most construction trades. Even as the increasing availability and sophistication of laser scanning, CNC, and direct-to-Fabrication processes make it possible to truly *manufacture* buildings—skipping altogether older forms of documentation—all too often, the static drawing remains the primary method of communication between parties.

Tomorrow's architects will work in a virtual, cloud-based environment, encouraging owners, architects and contractors alike to form strategic relationships and deliver built work. The reason to do this is simple. By demystifying the process of construction, by presenting complex processes in a manner that even non-specialists can immediately comprehend, architects can access the knowledge of every stakeholder in real-time. The result is broader, more fruitful, more fluid, and far more equitable collaborations. And that means better-performing buildings.

At the heart of the process is set of evolving tools and techniques that have come to be known as Virtual Design and Construction (VDC). In a multi-dimensional, 4D+ environment, VDC is the process of digitally simulating the complexities of a design project. This can include geometric rationalization, systems development/fabrication, logistics analysis and cost estimation, from concept through construction (or fabrication through assembly). This seminar will demonstrate the principles of VDC and other key technical processes, focusing on how architects utilize emerging technologies to promote collaboration throughout all phases of design, production and operation. Technology-focused lectures will be paired with, and informed by, presentations of real-world precedents from current project work. The course will share the current state of construction communication in the AEC industries—and *why* it must be radically changed.

Course Schedule

SPRING '17	Lecture Schedule
WEEK 01	Course Intro
WEEK 02	Multiple Modeling Environments: Organizing the Project
WEEK 03	Global Wireframe Modeling: Quantity Take-off & Logistics Sequencing/Simulation
WEEK 04	Rapid Vignette Modeling Techniques & The Parametric Approach
WEEK 05	Parts & Assemblies: Fabrication Deliverables (CNC & Direct to Fabrication)
WEEK 06	The Federated Model: Clash Detection & Point Cloud Integration
WEEK 07	Midterm Presentations
WEEK 08	Systems Modeling: Structure, MEP, Environmental
SPRING BREAK	NO CLASS
WEEK 09	Final Project Strategy
WEEK 10	Data Integration: Process Tracking & Facilities Management
WEEK 11	Desk Crits / Help Sessions
WEEK 12	Desk Crits / Help Sessions
WEEK 13	Final Project Presentations
WEEK 14	FINALS WEEK
WEEK 15	Final Project Submission

Assignments

Student teams will develop a project* from a concept-design to various levels of detail at multiple scales, from global wireframe resolution to selective, detailed systems' vignette models. We will focus on tracking of quantities, logistics and the part/assembly makeup of building systems' components.

*Each team will develop a single project throughout the semester with assignments in the form of progress updates/presentations at specific intervals:

1 - Initial Strategy & Storyboard
2 - Midterm
3 - Final

A base global massing will be assigned randomly to each team for development, and grading criteria will be based on the process and communicative success of the hosted systems as opposed to formal aesthetic. (massing from a previous/working student projects will be considered on a case-by-case basis)

The form of deliverables can (and should) vary, but all projects must address:

- Global wireframe descoping for metrics and logistic strategies
- Selective detailed vignette modeling
- Selective part/assembly details & documentation

The final deliverable will be a short, narrated animation (verbally or textually) summarizing the project and the respective systems developed.

Tracking & Organization
A basic project schedule template with global course milestones/deliverables will be provided, and teams will be encouraged to update/maintain a work breakdown structure (WBS) of design process and workflow--studies should be recorded and all associated sketches, notes and modeling attributed to tasks.

Course Requirements

- Attendance at lectures and tutorials
- Posting of all assignment and projects on course website
- Submission of archival quality media

Grading Criteria

- 15% Class attendance and participation
- 15% Assignment 1
- 30% Assignment 2
- 40% Assignment 3

*Tutorial Schedule TBD, pending TA assignments
**Grading for all assignments will take into account both the difficulty and the execution of the assignment, as well as timeliness of submittal. Any problems uploading or submitting work by the due date should be reported to the course instructor.