AIA TAP Innovation Awards

2015 Professionals’ Choice Award

Brian Skripac, Assoc. AIA, LEED AP BD+C
Astorino/CannonDesign

#BIMForumED @aia_tap @BrianSkripac
TAP BIM | Innovation Awards 2005 to 2015 – 11 Years!
2015 AIA TAP Leadership Group

Jeffrey Ouellette
2015 Chair

Robert Yori
2016 Chair

Brian Skripac
2014 Chair

#BIMForumED
2015 AIA TAP At-Large Advisory Group

Cory Brugger
Lee Miller
Mark Green
Joseph Joseph
Andy Smith
Angi Izzi
Kimon Onuma
David Scheer
Calvin Kam
Stephen Hagan
Tony Rinella
2015 AIA TAP Innovation Awards Jury

To Be Presented at 2015 AIA Convention  | Atlanta  | May 13 2015
AIA TAP Innovation Awards Reception and Ceremony
Category A - Stellar Architecture

Recipient
Emerson College Los Angeles
Morphosis Architects
Category B - Delivery Process Excellence

Recipient

Interdisciplinary Science and Engineering (ISE) Lab - University of Delaware
Ayers Saint Gross
Category D - Exemplary use in a Small Firm

Recipient
D-Bridge
Point B Design
Category B - Delivery Process Excellence

Honorable Mention

OHSU/PSU/OSU Collaborative Life Sciences Building and OHSU Skourtes Tower
SERA Architects, Inc.

#BIMForumED
EMERSON COLLEGE LA (ELA)
Cory Brugger - Morphosis Architects

ISE Lab University of Delaware
Andrew Watkins - Ayers Saint Gross
David O’Connell, P.E. - Thornton Thomasetti
Emerson College (ELA)
2015 Professionals’ Choice Award
Cory Brugger, AIA,
Morphosis Architects
OUTLINE

PART I: EMERSON LOS ANGELES
  PROJECT OVERVIEW & VERTICAL CAMPUS DESIGN

PART 1: DESIGN DEVELOPMENT & COORDINATION
  1A 3D BIM & RAPID PROTOTYPING

PART 2: FABRICATION & DELIVERY INNOVATION
  2A PREFABRICATED BUILDING PANELS (ZEPPS)
  2B FOLDED METAL SHADING SCREEN
  2C HELIPAD SMARTBEAMS

PART 3: SUSTAINABILITY & URBANISM
  3A SUSTAINABILITY STRATEGIES
  3B OPERABLE FAÇADE
  3C URBAN CAMPUS

PART 4: CONCLUSION

BIMFORUM 2015 – SAN DIEGO
MORPHOSIS ARCHITECTS
3D MODELS & RAPID PROTOTYPING
EMERSON COLLEGE LOS ANGELES
3D MODELS & RAPID PROTOTYPING
EMERSON COLLEGE LOS ANGELES
ROI

- REDUCED SCHEDULE FOR ON-SITE CONSTRUCTION.

- ACCURATE AND EFFICIENT CONSTRUCTION OF COMPLEX FORMS.

- ELIMINATED THE NEED FOR LARGE SCALE CONSTRUCTION PLATFORMS AND SCAFFOLDING.

- ESTIMATED 20 – 30% REDUCTION IN CONSTRUCTION COSTS FROM TRADITION STICK BUILT SYSTEMS.
DESIGN PROCESS

EMERSON COLLEGE
TYPE OF FACADE PANELS

19 variation of folding

side elevation

front elevation

unfolded shape

number of facade panels

EMERSON COLLEGE
LOS ANGELES CENTER
INTERIOR FACADE

west facade: 1595
area of region: 10,033 sqft

north facade: 376
area of region: 2,534 sqft

east facade: 1984
area of region: 12,260 sqft

total: 3935 panels
area of region: 24,827 sqft
POROSITY VARIATION

OVERLAPS

PANEL FOLDING AND SHEET PACKING

EMERSON COLLEGE
- MINIMAL IMPACT ON PRIMARY STRUCTURE OF THE RESIDENTIAL TOWERS.

- 100' SPAN WITH A SINGLE STRUCTURAL MEMBER.

- SIMPLE AND EFFICIENT INSTALLATION WITH NO TEMPORARY SUPPORTS OF BRACING REQUIRED.
PART 3A
AUTOMATED FAÇADE LOUVER SYSTEM

EMERSON COLLEGE
ISE Lab
University of Delaware

Andrew Watkins, AIA
David O’Connell, P.E.
Opened in the fall of 2013, the University of Delaware’s Interdisciplinary Science and Engineering Laboratory (ISE-Lab) was designed around the philosophy of integrating teaching, learning and research. This 194,000-square-foot facility is intended to engage students and stimulate excitement about science and engineering for a new generation.

The ISE-Lab includes classrooms and teaching laboratories, as well as state-of-the art imaging and materials synthesis laboratories and a class 100/1000 clean room. Also included are spaces for open collaboration for teams of researchers and offices for University institutes related to energy and the environment.
The University challenged the design and construction team to rethink how the traditional materials of campus Georgian architecture could be incorporated in an entirely new design style. The team embraced this challenge as an opportunity to rethink the building’s design style, but also to deliver a modern building that could only be realized through modern project delivery techniques.

The resultant process affected everything from the selection of consultants, to collaboration with the Construction Manager, to how design ideas were presented to the client. The architect and consulting engineers developed thirteen Revit design models, which were combined to allow a full understanding of how each building system affected the other.

Fewer than 4% of field changes were a result of geometric interferences.
THE CONSULTING TEAM

Ayers Saint Gross (Architecture & Landscape)

Thornton Thomasetti (Structural)

Mueller Associates (MEP)

RK&K (Civil)

RFD (Laboratories)
Diagram of model and data workflows among disciplines and software tools.
Specific components of the building’s structural design required a greater level of analysis not typically undertaken in more conventional design. The structural engineer analyzed the structure in Tekla Structure, refined in Revit Structure and reanalyzed.

This process was continued in construction as steel fabricators created highly detailed structural models that were analyzed by the engineer.

Precise building layout was done using the structural engineer’s design model input into GPS surveying equipment for drilled piles, edges of slabs, and elevations of structural elements.
Will it Work?
Significant sustainability measures include automated control of energy use for the whole building, as well as *daylight harvesting* measures that dim lighting when sunlight provides adequate illumination.

Lighting analysis studies were performed using Radiance and Revit, and resultant wattages and lamping for light fixtures showed a significant reduction in lighting power density.
Early in construction, the CM required that each sub-contractor prepare *fabrication models* for their portion of the work. This reinforced the importance of the critical nature of the coordination of building systems.

Whiting Turner’s BIM coordinator managed and compiled each fabrication model for frequent review meetings in the project trailer, as well as in the offices of the design team using web-conferencing technologies.
The civil engineer modeled the existing utilities surrounding the building in Civil 3D in order to coordinate new and existing utility profiles, as well as the interaction between the utilities and the deep building foundations. This enabled complicated layouts of new infrastructure to route through and between existing infrastructure and new deep pile foundations – thereby optimizing the layout and providing focused coordination of site systems.
Robotic bulldozers allowed a greater level of control for site micrograding.
CONSTRUCTION MANAGER

The effective communication made possible by BIM during each phase of the project ensures each party understands the complex coordination and reinforces the importance of collaboration with each team member. As problems are uncovered, solutions are tested virtually and evaluated by each party. This atmosphere of collaboration gives each stakeholder a sense of ownership in the project’s success. Install in the field is held to high standards knowing that the complex systems left little tolerance between trades.

modeled elements linked to timelines ensured early or on-time completion of each phase of construction.
COORDINATION OF COMPLEX SYSTEMS

Accurate models from fabricators allowed close and constant coordination, saving valuable time and reducing the number of RFI’s and Change Orders by substantial amounts.
Detailed coordination model of main electrical conduits

Installed condition of main electrical room

Information Modeling of panelboards and circuits
**VIRTUAL SEQUENCING**

The interaction between standard building systems and specialized laboratory systems was closely coordinated. BIM enabled better decision-making for the subcontractors for installation.

Using mobile virtual reality technology with **BIM 360 Glue**, installers were able to **visualize and understand construction sequences.**
PREFABRICATION OF MATERIALS

CLEAN ROOM DUCTWORK

PREFabricated AT ALL HOODS
PREFABRICATION OF MATERIALS

INSULATED METAL PANELS
Prefab structure with arrows pointing to details.
University of Delaware Statement

“We brought together a team that embraced the spirit of collaboration from the outset of the project. Their incorporation of the latest technologies and BIM processes fostered an atmosphere of innovation and communication between all major stakeholders.

“BIM was the catalyst for continuous improvement that was crucial to the continued success of this important project.

“We continue to work with our facilities group to incorporate BIM into our maintenance programs, allowing more integrated management of this and future facilities.

“We made it clear to our project partners that we had high standards for this new facility and accountability was an important component.”
“Our expectations were exceeded as the result of constant collaboration and communication.”
Thank You

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