Award Winning BIM
Stephen Hagan FAIA
Award Winning BIM
Stephen Hagan FAIA
BIM Awards Committee

Mission & Goals

- Support the Annual the BIM Awards Program
- Develop the BIM Awards Program with evolving metrics
- Assist BIM Awards Reception
  - Case studies | publications | tools for BIM information distribution
  - Webinars!

Technology in Architectural Practice
http://www.aia.org/TAP

Email: tap@aia.org
BIM Awards Committee

Timeline

- 7 years of AIA BIM Awards

Archives at AIA Technology in Practice:
http://www.aia.org/about/initiatives/AIAS078440


**BIM Awards 2005-2011**

*What's in a name?*

A lot, actually.

If we didn't have BIM, we wouldn't have a National BIM Standards Committee - an important component in the

**BIM Comes Alive**

The 4th Annual AIA TAP BIM Awards reveal the liveliness BIM demonstrated in 2007 - a year called a tipping point for this advanced technology tool set.

The fear that institutions of higher education were not hitting their groove with BIM is allayed with four awards in the academic category. One award went to a graduate studio that convinced installation architects that modular housing can be done with BIM.


Education Thrives, Process Arrives, Design Survives

The 2010 Awards reveal that what was award-winning five years ago is becoming standard practice today. The use of BIM processes alone is no longer worth heralding. We are able to look into process details and recognize subtle refinements and artful applications. See www.aia.org/tap for more of the Art of BIM as embodied by this year's award recipients and compare them to winners from previous years. The comparison is revealing.

**2007 BIM Awards**

3rd Annual

AIA Technology in Architectural Practice (TAP) presents its 3rd Annual Building Information Model (BIM) awards honoring projects that have used integrated modeling processes, advanced data exchange techniques and a high level of interdisciplinary collaboration.

**2009 BIM Awards**

5th Annual

AIA Technology in Architectural Practice (TAP) presents its 5th Annual Building Information Model Awards honoring projects that have used integrated modeling processes, advanced data exchange techniques and a high level of interdisciplinary collaboration.

**2010 BIM Awards**

6th Annual

AIA Technology in Architectural Practice (TAP) presents its 6th Annual Building Information Model Awards honoring projects that have used integrated modeling processes, advanced data exchange techniques and a high level of interdisciplinary collaboration.

The 2010 Awards reveal that what was award-winning five years ago is becoming standard practice today. The use of BIM processes alone is no longer worth heralding. We are able to look into process details and recognize subtle refinements and artful applications. See www.aia.org/tap for more of the Art of BIM as embodied by this year's award recipients and compare them to winners from previous years. The comparison is revealing.

**2011 BIM Awards**

7th Annual

The AIA Technology in Architectural Practice (TAP) presents its 7th Annual Building Information Modeling (BIM) Awards honoring projects that have used technology as a mechanism to bridge the gap between people and processes.

The 2011 Awards reveal how BIM is advancing from a pure tool to a comprehensive approach that is helping organizations improve their processes.
Creating Stellar Architecture Using BIM
Creating Stellar Architecture Using BIM

Fredric C Hamilton Building
Denver Art Museum

M.A. Mortenson Company

Technology in Architectural Practice
http://www.aia.org/TAP

Email: tap@aia.org
Creating Stellar Architecture Using BIM

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Creating Stellar Architecture Using BIM
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Email: tap@aia.org
CATEGORY A : BIM EXCELLENCE

• JURY ASSESSMENT OF ARCHITECTURAL QUALITY

• CLEAR USE OF MULTIPLE APPLICATIONS INTEROPERATING TO REALIZE OUTSTANDING DESIGN

• ARCHITECTURAL EXPRESSION THAT COULD NOT HAVE BEEN REALIZED IN OTHER WAYS
BIM EXCELLENCE

BIM AWARD CITATION
DC Consolidated Forensic Lab
District of Columbia
HOK

Technology in Architectural Practice
http://www.aia.org/TAP

Email: tap@aia.org
FACADE DESIGN AND INTEGRATION

http://www.aia.org/TAP

Email: tap@aia.org
LAB PLANNING AND CONSTRUCTABILITY

DATA EXCHANGES EMPLOYED

DESIGN TEAM

OWNER / CONSTRUCTION MANAGEMENT

GENERAL CONTRACTOR

DESIGN

LAB

INTERIORS

BLOCK & STACK

APPROVALS

SPECIALTY STUDIES

LAB CASEWORK

COORDINATION

LABORATORY EXTERIOR WALK THROUGH

SCHEDULE

COST

FABRICATION

STRUCTURAL

EXTERNALLY
BIM Awards Committee

Participants

- Stephen Hagan, Co-Chair
- Marty Doscher, Co-Chair
BIM Awards Committee

- In 2012 Expand BIM Awards: AGC BIMForum and COAA
  - For the 2012 Building Information Modeling (BIM) Awards competition, the AIA TAP Knowledge Community seeks projects that have used integrated and interoperable BIM.
    - Category A: BIM Excellence
    - Category B: Delivery Process Innovation (in association with BIMForum, Professional’s Choice Award—Owners Choice and COAA added for 2012
    - Category C: Outstanding Sustainable Design
    - Category D: Academic Program / Curriculum Development
    - Category E: Exemplary use of BIM in a Small Firm

- WEBINARS!!!

Technology in Architectural Practice
http://www.aia.org/TAP
Email: tap@aia.org
BIM Awards Committee
2011 Jury

Joseph G. Burns, FAIA - Thornton-Tomasetti Group – Chicago, IL
Luciana Burdi, Ph.D. - State of Massachusetts Office of Planning, Design and Construction Division of Capital Asset Management – Boston, MA
Rodd Merchant, P.E. - JE Dunn Construction – Denver, CO
Kimon Onuma, FAIA - Onuma, Inc. – Pasadena, CA
Marty Doscher, AIA Co-Chair of TAP BIM Awards Committee
BIM Awards 2005-2011

2005, 2006, 2007, ...

What's in a name?
A lot, actually.

If we didn't have BIM, we wouldn't have a National BIM Standards Committee - an important component in the...

Education Thrives, Process Arrives, Design Survives

BIM Comes Alive

The 4th Annual AIA TAP BIM Awards reveal the liveliness BIM demonstrated in 2007 - a year called a tipping point for this advanced technology tool set.

The fear that institutions of higher education were not hitting their groove with BIM is allayed with four awards in the academic category. One award went to a graduate studio that convincingly illustrated how BIM could be used to provide modular housing and support its BIM.

2009 BIM Awards

The 5th Annual Building Information Model Awards honoring projects that have used integrated modeling processes, advanced data exchange techniques and a high level of interdisciplinary collaboration.

The 2009 Awards reveal that what was award-winning five years ago is becoming common practice today. The use of BIM processes alone is no longer worth heralding. We are able to look into process details and recognize subtle refinements and artful applications. See www.aia.org/tap for more of the Art of BIM as embodied by this year's award recipients and compare them to winners from previous years. The comparison is revealing.

2011 BIM Awards

The AIA Technology in Architectural Practice (TAP) presents its 7th Annual Building Information Modeling (BIM) Awards honoring projects that have used technology as a mechanism to bridge the gap between people and processes.

The 2011 Awards reveal how BIM is advancing from a pure tool of visualization and coordination to an integral part of the design and delivery process.
Award Winning BIM

stephen.hagan@gmail.com
Founder of AIA TAP BIM Awards
Director, Project Knowledge and Innovation
GSA Public Buildings Service, GSA
Generative Design and Parametric Structures

Jonatan Schumacher
Generative Design and Parametric Structures

- Integrated Design Exploration utilizing advanced ‘digital engines’.
- Integrated form finding approach for freeform structures using custom automation tools.
- Interlinked architectural and engineering models for advanced analysis.
- Illustration of digital fabrication approach from early design concept design.
Generative Design and Parametric Structures

Jonatan Schumacher
jschumacher@thorntontomasetti.com
Generative Modeling
collaborative modeling
Taiwan Tower
Taiwan Tower

Competition with AEDAS London

Architect's conceptual Rhino model
Taiwan Tower

Competition with AEDAS London

Architects’ Grasshopper definition
Taiwan Tower

Competition with AEDAS London

Thornton Tomasetti’s Grasshopper definition - VIDEO
Taiwan Tower

Structural concept
automated information exchange
Al Menaa 30K Stadium

Rendering by 360 Architects
Al Menaa 30K Stadium

Architect's 3DSmax model
Grasshopper model demo
Grasshopper model demo
Structural Analysis model

Automated Rhino to SAP translation
REVIT Documentation model

Automated SAP to REVIT translation
REVIT Model
Basrah 30K Stadium

Rendering by 360 Architects
Basrah 30K Stadium

Rendering by 360 Architects
Scheme 1: June 15th
15 Floors

Scheme 2: Aug 12th
20 Floors

Scheme 3: Aug 23th
34 Floors
create new building geo

- RH_BotPts
- G
- Move
- G
- Move
- G
- Move
- G
- Move
- New Roof
- Square Floors
- Elev_Corner1 273.5
- Elev_Corner2 192.5
- Elev_Corner3 148.5

1. Receiver
2. Receiver
3. Receiver
4. Receiver
5. Receiver
6. Srf4Pt
7. Plane
8. Move
9. Move
10. Move

Grasshopper Demo
Structural geometry translator

Grasshopper to ETABS

TT in-house E2K text file creation
TT Grasshopper to Etabs Translator
Roof model by Calatrava
integrated analysis
VTB Arena, Moscow
### Data Extraction

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VTB Arena, Moscow

**Panel Callouts**

---

**Panel 1707**
- Smallest Panel
- Area: 23.1 m²

**Panel 115**
- Small - Avg Panel
- Area: 30.6 m²

**Panel 1847**
- Average Size Panel
- Area: 50.5 m²

**Panel 1645**
- Avg - Large Panel
- Area: 82.0 m²

**Panel 1486**
- Largest Panel
- Area: 113.5 m²

---

**Wind Loads**

Until results of the wind tunnel test are available, cladding is to be designed to withstand wind loading calculated in accordance with SNIP 2.01.07-85 Section 6 with the following parameters:

\[ W_{s} = 0.23 \text{ kPa} \]

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<td>Wind pressure (kPa)</td>
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---

**Snow Loads**

The cladding is to be designed to withstand snow loading calculated in accordance with SNIP 2.01.07-85 Section 5 with the following parameters:

\[ S_{y} = 1.6 \text{ kPa} \]

The coefficient \( m \) for snow accumulation and drift is to be determined depending on the final cladding shape. It should be noted that \( m \) can be as high as 2.0 locally and needs to be considered for cladding design.

\[ S = S_{y}m \mu = 3.6 \text{ kPa} \]
VTB Arena, Moscow

Panel Size: Max: 115.5 m$^2$ | Min: 23.1 m$^2$

Panel Curvature: Max: 22.7 % | Min: 0 %
VTB Arena, Moscow

Structural model defined in Grasshopper

Manica Architecture
VTB Arena, Moscow

Structural model defined in Grasshopper
Glass façade panelization

Project
> 600 Meter High Rise
> 119 Floors
> Mixed Use Tower
> Asia
Glass façade panelization

Pitched Mullion Analysis in X Axis

Study to evaluate warpage, slope and pitch of the current configuration of façade panels, and to optimize for constructability and cost efficiency.

Tower Façade Optimization
Panel Warpage Analysis

Torsion in corners of edge spacer

Force to “press into form”

“Twist” offset \( < \frac{D}{175} \) ?

Primary seal is main element of service-ability, seal is stressed by overall twist.

Deflected edge shape depends on sub-structure stiffness, shape is not necessarily linear = impact on air-tightness joints.

\[ D = \frac{(D_1 + D_2)}{2} \]
Rationalizing the building geometry

Rebuild Vertical Curve

Tower Façade Optimization

TAP Faster Forward 2011
Rationalizing the building geometry

NOMINAL DISPARCIMENT FROM ORIGINAL CURVE

Fitness (Reduce)
7.056605

Arc1_EndPt 0.610
Arc2_EndPt 0.483
Arc3_EndPt 0.619
Arc4_EndPt 0.387
Arc5_EndPt 0.520
Arc6_EndPt 0.566
Arc7_EndPt 0.566
Arc8_EndPt 0.566
Glass façade panelization

out of plane warpage shown in percent
Max warpage allowed: 0.57%
Glass façade panelization

out of plane warpage shown in percent
Max warpage allowed: 0.57%
Glass façade panelization
Glass façade panelization
custom software
TT Integrated Analysis

Interoperable

Floor Slabs

TAP Faster Forward 2011
TT Integrated Analysis
Embodied carbon calculator
embodied energy & carbon efficiency optimization tool
bringing it all together
Basrah 65K Soccer Stadium

Rendering by 360 Architecture Kansas City
Basrah Skin Design
Parametric Panel Informs Connection Brackets

**Geometry data output to Excel for bracket design coordination and cost estimation of GRP panel**

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**TAP Faster Forward 2011**
Coordination model
Transportation planning
Bracket design

TEKLA steel fab model
Automated model generation
Reference Geometry scripted in DP.

Then translated into Tekla model.
Digital to Physical Modeling

GFRP Panel mold created from CATIA model
Digital to Physical Modeling

GFRP Panel mold created from CATIA model
Digital to Physical Modeling

First Type E Panel (Feb 2011)
Digital to Physical Modeling

Ten weeks later (May 2011)
Questions?
Thank you!

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Thank you!

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