American Concrete Institute®
Advancing concrete knowledge

Advancements in the Use of Building Information Modeling (BIM) Systems

ACI Fall 2012 Convention
October 21 – 24, Toronto, ON

ACI
WEB SESSIONS

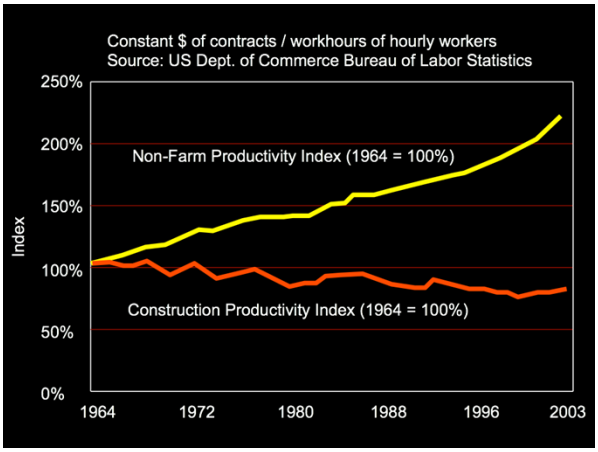
Dr. Julian Kang is a History Maker Homes Endowed Professor of Construction Science at Texas A&M University and the Director of BIM Texas Alliance. He is also a member of the ACI BIM Committee, where he leads the effort to produce videos promoting the use of BIM for cast-in-place concrete construction. Dr. Kang's primary research interests include BIM, Construction Simulation, and RFID in construction. He is interested in investigating how these emerging technologies would facilitate to improve productivity in construction. He earned his Ph.D. in Construction Engineering and Management from the Department of Civil Engineering at Texas A&M University. Prior to joining Texas A&M, Dr. Kang worked at Korea Power Engineering Company (KOPEC) for 9 years where he led the effort to best utilize Virtual Design and Construction (VDC) technology for nuclear power plant design and construction since 1993.

ACI
WEB SESSIONS

BIM + Robotic Total Station: Field Test for Cast-in-Place Concrete Construction

October 22, 2012
ACI 2012 Fall Convention – BIM Technical Session
"Advancements in the Use of Building Information Modeling (BIM)

Julian Kang, Adithya Ganapath, JinHoon Lee, and Vahid Faghihi
Texas A&M University



BIM in Construction

Clash Detection
Spatial Coordination
Client Engagement
Prefabrication & Modularization
Quantity Takeoff
Cost Estimation
4D Scheduling

Key benefit of BIM - Smart Market Report on BIM, McGraw Hill, 2009

Prefabrication & Modularization

BIM practitioners saw model-driven prefabrication as a way to design and construct Greener Buildings.

77% of contractors believe that BIM would allow them to use prefabrication on larger, more complex projects in the future.

Green BIM Smart Market Report, McGraw Hill, 2010

Prefabrication & Modularization

McGraw Hill Smart Market Report on Prefabrication and Modularization, 2011

Prefabrication & Modularization

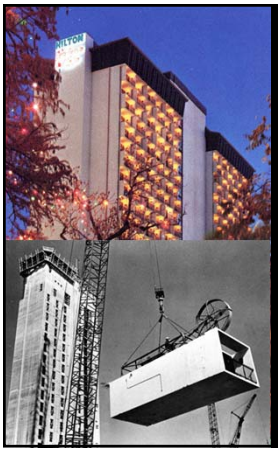
66% report that project schedules are decreased.
- 35% by 4 weeks or more

65% report that project budgets are decreased.
- 41% by 6% or more

77% report that construction site waste is decrease.
- 44% by 5% or more

SMR - Prefabrication and Modularization, McGraw Hill, 2011

1968



Hilton Palacio del Rio Hotel in San Antonio, Texas

Texas World fair in 1968
Built by Zachry Construction
21 Story Building
Designed, constructed, occupied in 202 working days

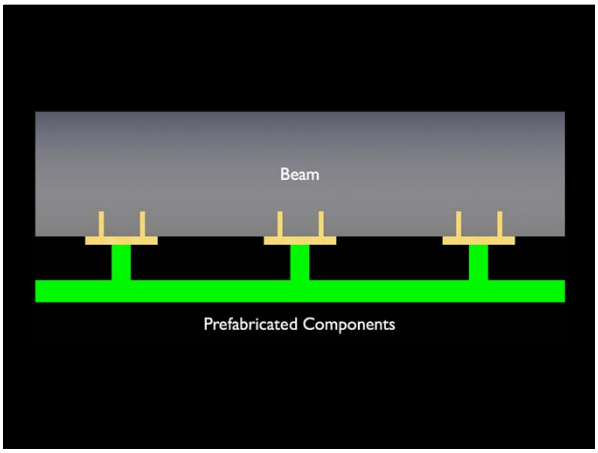
496 rooms from the 5th floor to 20th were placed in 46 days by crane (11 rooms/day).

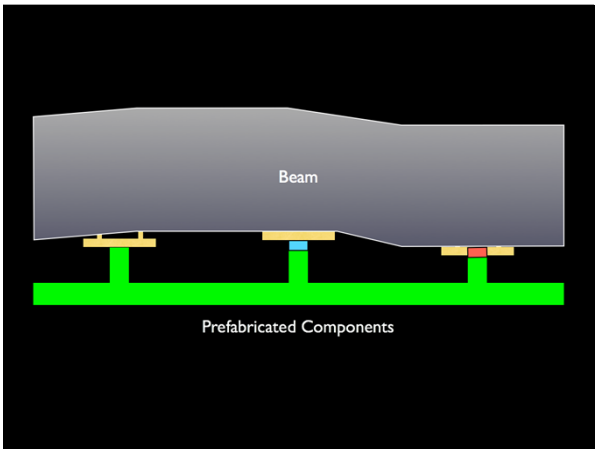
Each room was fully decorated, including beds, carpeting, TV, coffee makers, etc.

2011

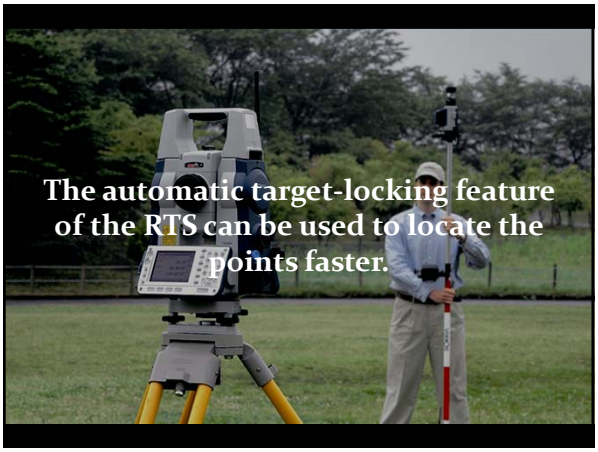
30 Story Building in 15 Days Hunan, China

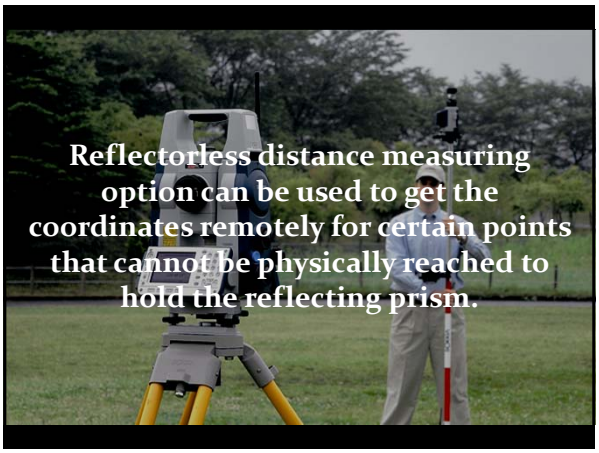

052:36:30


Beam
Prefabricated Components


Beam
Prefabricated Components

Can we get the model updated on time for prefabrication?





To increase the knowledge base about the use of Robotic Total Station (RTS) from the Construction Manager's perspective.

Two main technology vendors

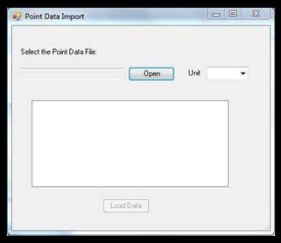
Liberal Arts Building construction at Texas A&M University

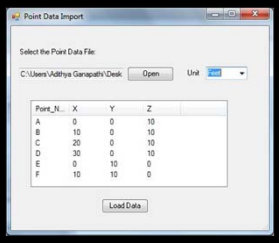
Beam Face
(4 corners of the rectangular beam face)

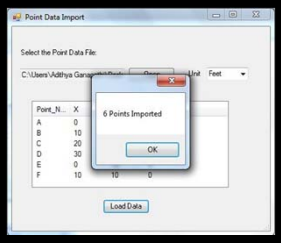
Steel Embeds Location
(4 corners of the steel embeds)

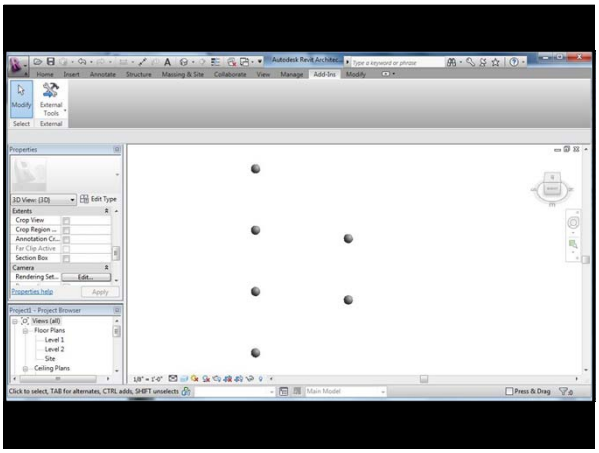
Column Location

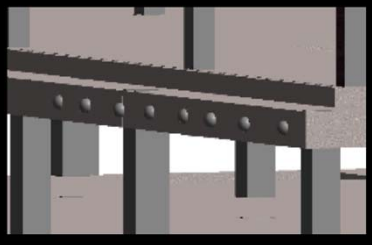
Parameter	Vender A	Vender B
Initial Setup	10 min.	10 min.
Beam Side (4 Corners)	2 min.	5 min.
Beam Side (Series of Points)	3 min.	3 min.
Embeds (3D)	1.3 ea./min.	1.25 ea./min.
Columns (2D)	22 min.	25 min.











The research team figured out the step-by-step procedure to setup and use the RTS for measuring points in field.

The use of RTS can expedite:

The process of laying out the locations for dry wall

The process of collecting as-built point data and creating as-built BIM

If the as-built BIM can be created in real time as project is moving on,

It is reasonable to expect that as-built BIM would facilitate project managers to identify potential problems and make proactive decisions to prevent schedule delays

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