



NECA
PHILADELPHIA
SEPT 29-OCT 2, 2023

BIM Tips to Maximize Project Success




Speakers : Sarvesh Kekatpure, Naman Patwari

TRADE SHOW EDUCATION

This session is eligible for 1 Contact Hour.

For these hours to appear on your certificate, you must:

- Have your badge scanned at the door
- Attend 90% of this presentation
- Fill out the online evaluation for this session

Agenda

- AEC Industry Challenges and need for BIM
- Significance of Automation
- BIM Integrated Value Engineering
 - Project Lifecycle
 - Prefabrication
 - Reduce wastage – Labor & Material
- Tips for successful BIM Implementation
- Closing Thoughts / Digital Twin
- Q&A




Challenges in Traditional Construction

<p>30% of projects do not meet original program requirements</p> 	<p>92% Proper information is not available when plans are made</p> 	<p>37% of materials used in construction become waste</p> 	<p>15% of the cost of project are due to change orders</p> 	<p>38% of carbon emissions are from building</p> 
---	---	--	---	---

CMAA Owners survey, CMAA Industry Report, Economist Magazine




Why is BIM essential for AEC Industry ?



Over **60%** of major capital programs fail to meet cost and schedule targets



30% of construction cost is rework



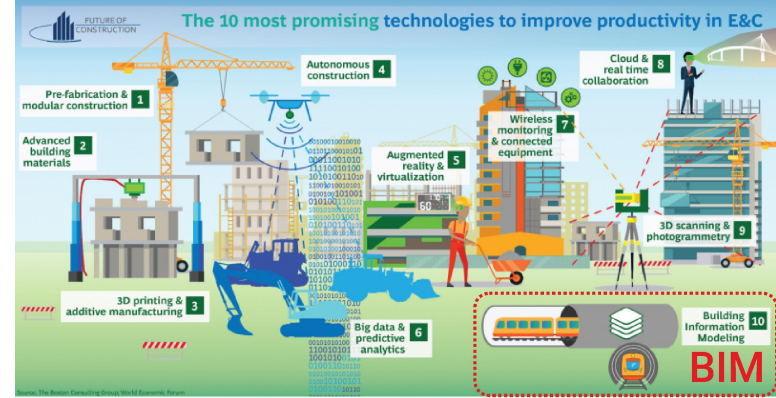
Owner's burden is about **2/3** of the costs during ongoing operations



55% of maintenance remains reactive

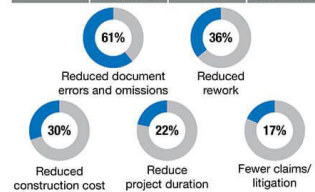


BIM – a key Construction Technology enabler



Improved time, cost & resource management

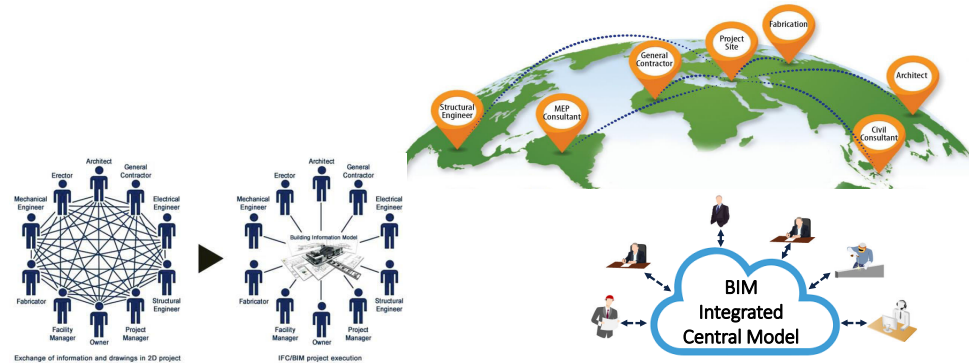
- ❑ Reductions in tender risk premiums, lower insurance costs, fewer opportunities for claims.
- ❑ Material waste reduction by VE & CR review of the project before starting reduces waste on unused materials.
- ❑ Timely completion of project – better scheduling
- ❑ Proper documentation
- ❑ Labor cost reduction
- ❑ Building offsite in a controlled environment – increased efficiency



*One study by McKinsey found that 75% of companies that have adopted BIM reported positive returns on their investments.

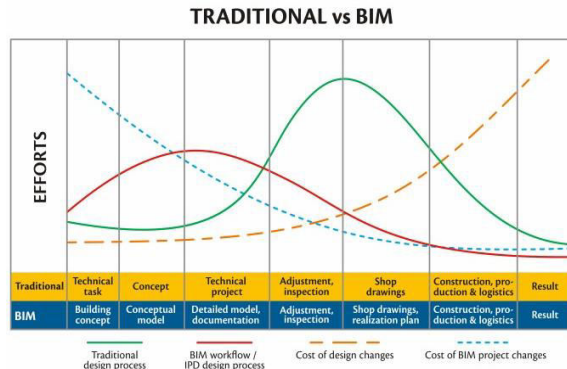


Seamless collaboration among project stakeholders



BIM – Cost Benefit Analysis

- Upfront cost of BIM
- Rework is expensive on-site
- Change Order reduction



Necessity and Benefits of Automation in BIM

- Precision and Consistency
- Handling Data Complexity
- Streamlined Workflow
- Time and Cost Efficiency



Improved coordination & clash detection

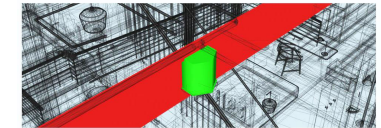
- Minimize reworks
- Eliminate workflow clashes
- Eliminate design bottlenecks early
- Improve interdisciplinary collaboration
- Automatic clash detection and resolutions
- Reduce risk and bring down construction costs



Maximizing Clash Detection Efficiency in BIM

Automation Tips

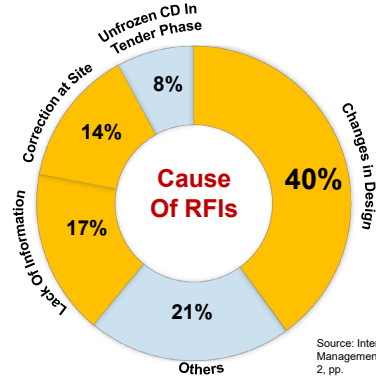
CLASH DETECTION WITH NAVISWORKS



- 01**
Grouping Similar Clashes: Minimizing Repetition
- 02**
Sorting Test Results for Prioritization
- 03**
Comprehensive Clash Report
- 04**
Auto Detection of Services Below Ceiling
- 05**
Efficient Constructability Review



No Rework, Reduce RFI / Change Order(Survey Report)



Source: International Journal of Construction Project Management, IJCPM 2009 ISSN: 1944-1436 Volume 1, Issue # 2, pp.

BIM Integrated Value Engineering, Schedule and Drawings

Calculations

- 1) Load Analysis and Short Circuit Analysis
- 2) Illumination Calculation

Sizing & Routing

- 1) Cable Sizing & Voltage Drop Calculation
- 2) Cable Tray Sizing & Routing
- 3) Conduit Sizing & Routing
- 4) Equipment Sizing

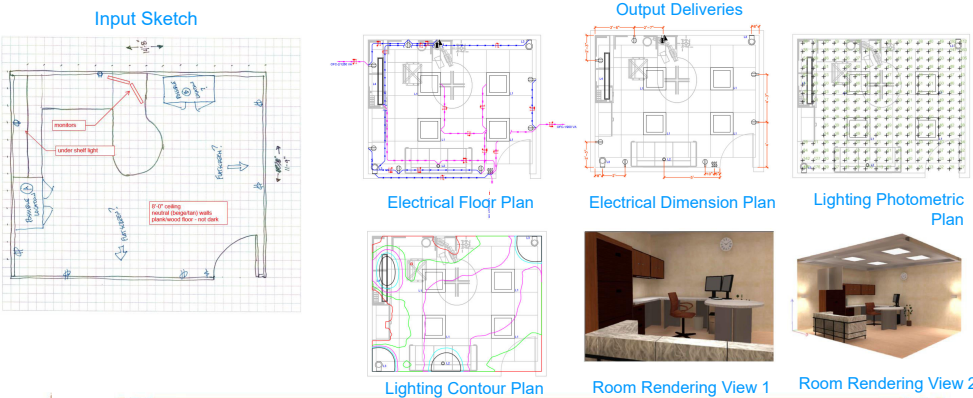
Schedules

- 1) Panel Schedule
- 2) Fixture Schedule

Drawings

- 1) One Line Drawing
- 2) Room Circuit Connections Drawings
- 3) Riser Drawings
- 4) Detail, Enlarge & Isometric Drawings

BIM Integrated Value Engineering, Drawing(Sample)



BIM Integrated VE to Reduce RFI/Cost(Case Study)

Project Overview

500,021 Sq. Ft Hotel Building
9 Floor, 500 Rooms
Location : Tampa, Florida

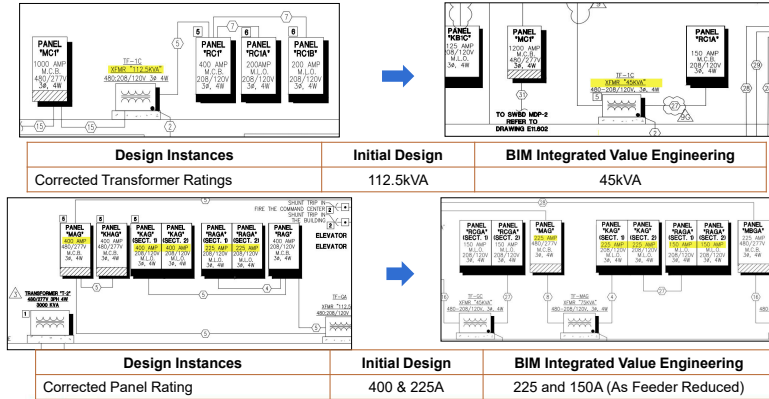


Expected RFI	Actual RFI Raised	RFI Saved with Integrated Design Process	% of RFI Saved	Original BIM Contract Value	Expected Change Order Value Saved	% Change Order Value Saved
24	8	16	66%	25,000\$	8,950\$	27%

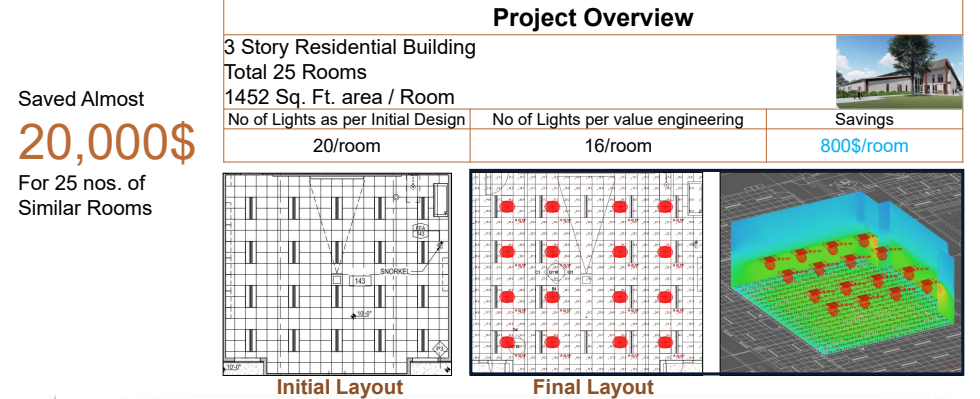
BIM integrated value engineering activities that reduced re-work and material cost

Design Instances	Initial Design	BIM Integrated Design
Corrected Transformer Ratings	112.5kVA	45kVA
Eliminated Transformer Feeder	Repetitive Feeders	Feeders Reduced for the same area
Corrected Panel Rating	400 & 225A	225 and 150A (As Feeder Reduced)
Added Missing Panels	Panels Missing	Panels Provided

BIM Integrated VE to Reduce RFI/Cost(Case Study)

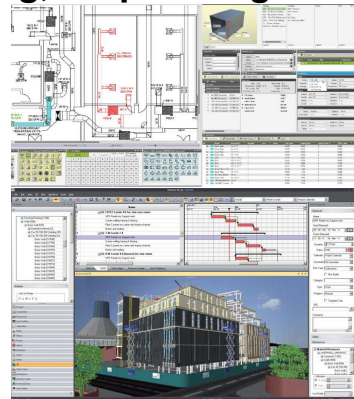


BIM Integrated VE & CR to optimize Project Cost (Case Study)



Improved Prebid, Scheduling, Sequencing & QTO

- Pre-bid estimation Services
- 4D phasing & simulation
- QTO
- Planned vs Actual construction schedule



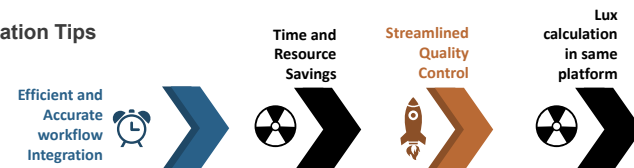
Electrical Fixture Alignment and Spacing

Precise Alignment: The process of placing electrical fixtures is crucial in ensuring their accurate alignment with nearby walls and the ceiling.

Distance Consideration: Apart from alignment, the distance of the fixtures from the floor or ceiling is a vital aspect to be taken into account.

Time-Consuming Checks: The necessity of individually assessing each fixture for alignment and distance can lead to a time-consuming process.

Automation Tips



Efficient Quality Checking

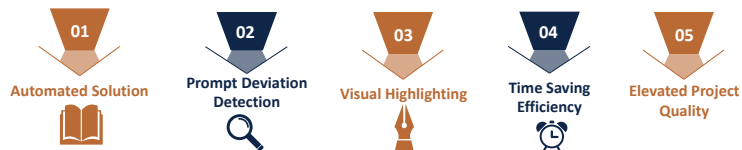
Standard Conduit Bends QC

Standard Angles Implementation: Adhering to project and industry standards, standard conduit bend angles are to be integrated into the design.

BIM Modeler's Role: The BIM Modeler takes on the responsibility of quality checking(QC) for angle verification.

Time-Intensive Process: The QC process involves sequential checks of each conduit bend angle.

Automation Tips

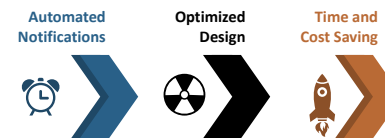


BIM Implementation with NEC Standards

NEC Article 358.26:-

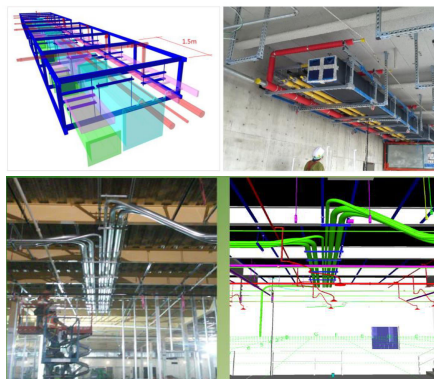
When installing EMT conduits, it is required to incorporate a pull box or conduit bodies after the accumulation of four or more quarter bends totaling 360 degrees in the conduit run.

Automation Tips



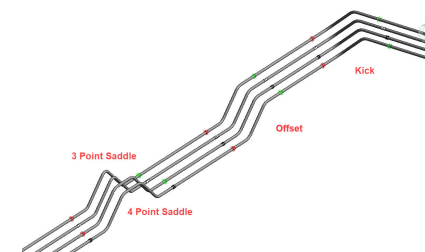
Use of prefabrication and modular construction

- ❑ Quick turn around time
- ❑ Waste reduction - Prefabricated elements can be easily bolted in place rather than created on-site.
- ❑ BIM for construction along with prefabrication increases efficiency and avoids possibilities of hard clashes during this project.



Automation for Efficient Prefabrication

- ❑ Prefabrication Data
- ❑ Simplified Spooling Process
- ❑ Parametric Modeling
- ❑ Quantification and Cost Estimation
- ❑ Smart Bend Legends

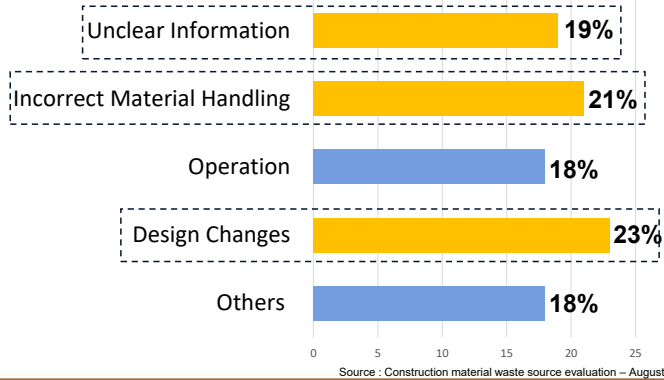


Construction Waste

Construction Waste Analysis (Cost) In Conventional Method

“37% of Materials used in Construction industry end up being sent to the landfill”

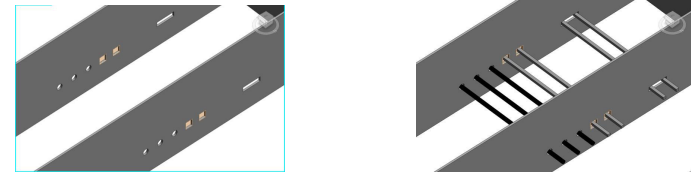
- Kristine Fallon Associates Inc. (2012)



Source : Construction material waste source evaluation – August 2000



BIM Automation- Reducing Construction Waste



Automatic placement of sleeves and cuts



Early passage creation for services



Easy relocation of sleeves for coordination needs



Accurate Material Estimation



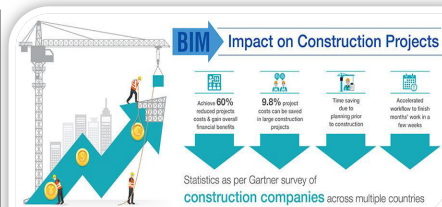
Impact of BIM on Construction Projects(Survey Statistics)

The case study report of Otterspool Railway station(UK) proves that BIM helps the AEC industry to work with higher accuracy, and with lower cost and time. **By implementing BIM, they have acquired about 70% higher accuracy in cost prediction, improved schedule by 85% with proper allocation of resources, reduced error in construction by 85%, avoided rework and wastage of construction material and also provided a better level of understanding to client and workers.**

*A Case Study of the Otterspool Railway Station, UK to Measure the Benefit of BIM (International Journal of Engineering Research & Technology (IJERT)ISSN: 2278-0181,ENCADEMS - 2020 Conference Proceedings

The results of research with a case study in a construction project stated that the use of **BIM can reduce work time by up to 50% while costs can be reduced by 52.36%.**

*Effect of Building Information Modeling (BIM) on reduced construction time-costs: a case study (ICENIS 2020)



Quantitative benefits summarized by CIFE (2007) based on 32 major projects implementing BIM:

- Up to 40% elimination of unbudgeted change
- Cost estimation accuracy within 3%
- Time saving up to 80% for cost estimation
- Up to 10% savings in clash elimination
- Overall project effort saving up to 7%



BIM Automation- A helping hand in safer site execution



Real-time Data Exchange



Automated Measurement and Verification



As Built with Laser Scanners



Real time visualization with AR



Integrated Asset and Facility Management

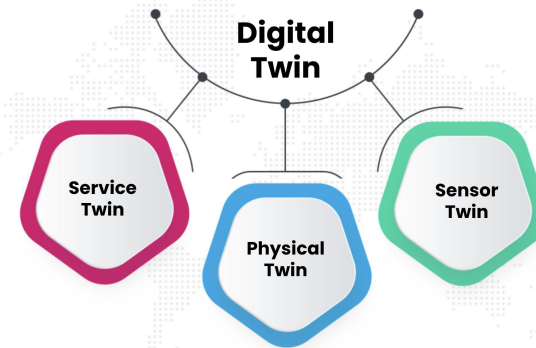


10 Tips for successful BIM Implementation

- Tip 1 • Establish BIM Standards and Guidelines
- Tip 2 • Provide BIM Training and Support
- Tip 3 • Implement a BIM Execution Plan
- Tip 4 • Address BIM Adoption Challenges
- Tip 5 • Realize the Benefits of BIM
- Tip 6 • Choose the Right BIM Software
- Tip 7 • Integrate BIM with Other Tools and Systems
- Tip 8 • Use BIM for Facility Management
- Tip 9 • Collaborate with Stakeholders
- Tip 10 • Continuously Improve BIM Processes



Importance of Physical Twin



Thank you – Q&A
Complete the Online Evaluation

