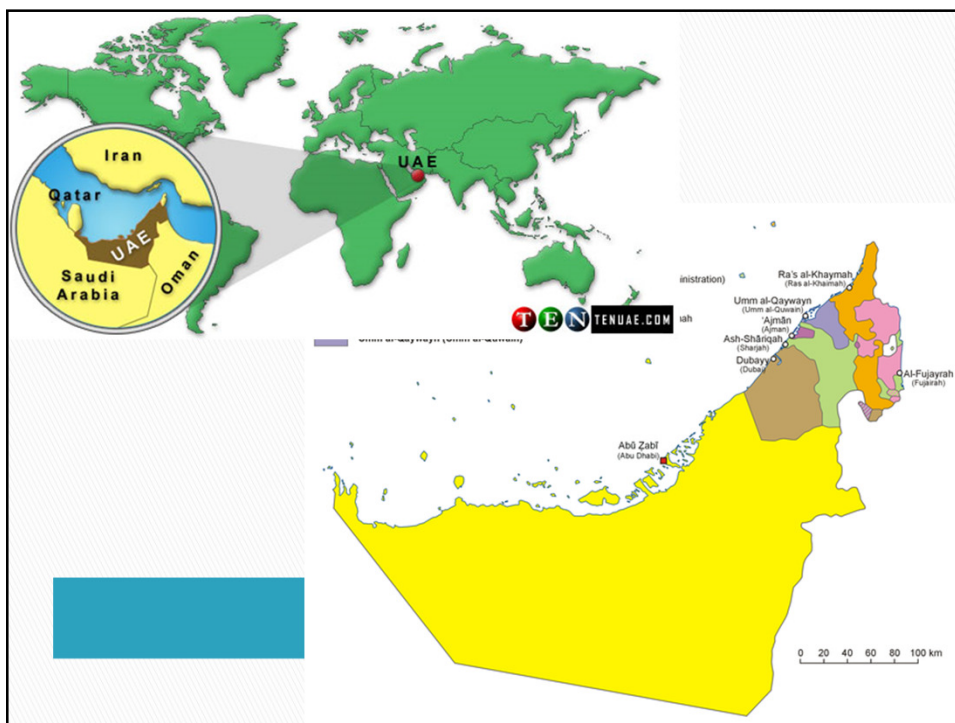


The dynamics of innovation and integration in construction



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Project Management & Innovation



Building a Nation

Dubai Past



Dubai Present



Differences across the UAE

- ▶ Dubai a traditional trading city, developed excellence in logistics and supply chain management, in addition to tourism.
- ▶ Abu Dhabi major oil and gas producer, investing in manufacturing (oil and gas obviously), renewable energy (MASDAR), Aluminium, Aerospace,..etc.
- ▶ Sharjah is the third largest economy with concentration of SME (about 85% of the UAE's)

Positive Environment for Innovation

- ▶ A survey of innovation confidence (2007) measured the willingness of people and nations to accommodate innovation.
- ▶ UAE ranked 1 out of 20 with a score of 76 compared to 44 Finland, 68 Brazil, 60 China, 58 US, and 55 UK.

Understanding the Client

- ▶ The most dominating clients in construction are public organizations and “semi public” organizations.
- ▶ Understand the affect of the demographics of the country on the public client priorities
- ▶ Key to success of business is in the ability to understand the clients’ priorities, mind sets, concerns and aspirations.

Risk Averse Clients

- ▶ Clients would support innovation but the consultants and contractors are expected to take the risk of innovation
- ▶ **Case Study: Public Private Partnership Project**
- ▶ **The client did not want to take risk for**
 - Fluctuation of prices
 - Losing jobs for locals
 - The private consortium failed

Case Study

- ▶ German Consultant working for 5 years in UAE
- ▶ Completed major projects successfully but all were for German clients!
- ▶ Failed to build a strong relationship with the local client.
- ▶ Failed to win the confidence of local clients

Structure of the Construction Industry and its impact on Integration and Innovation

Construction Industry Structure

- ▶ Dominated by foreigners many through Joint Ventures, 51% local- 49% Foreign
- ▶ Profit sharing not necessarily aligned with percentage ownership which gives more freedom for foreign partner to operate
- ▶ Examples: Belhasa-SIX, Al-Futtaim Carillion, ASGC

Construction Procurement

- ▶ Dominated by traditional Design-bid-Build.
- ▶ Consultants work with the client to develop designs
- ▶ Competitive bidding is dominant, lowest price is king
- ▶ Tried Partnering with mixed results
- ▶ The MENA region is interested in PPP in a big way

Sustainability

- ▶ In 2006 the UAE committed itself to address the massive environmental footprint it has
- ▶ Construction boom made big contribution to this footprint.
 - Foreign designs were copied,
 - Envelops that fit the climate of cities such as that of London and
 - Designers were a bit tardy with orientation

How Did We Innovate?

Case Studies



Case Study1 :

Project Type: Sustainable Residential Masterplan

Client: Dubai Properties

Design leader: X-Architects

Sub Consultants: Buro Happold, SMAQ, Reflexion, Johannes Grothaus

Location: Dubailand, Dubai



Factual Data

Xeritown

The Setting

- ▶ Client Brief: Mixed used development, 59 hectares, housing 7000 people.
- ▶ The Client told us “this is the land. Show us what you can do” (Senior Architect).
- ▶ X Architects, a local firm, founded 2003, its strategy is based on research and collaboration
- ▶ Invest in R&D and strong links with universities

The Thinking

- ▶ Client is seen as a collaborator, rather than customer, taking part in “idea evaluation”
- ▶ No iconic design but to “let the built environment emerge from the context”.
- ▶ The designer need to show their ability in **creating a micro-climate that is comfortable for people and energy efficient in the harsh weather of Dubai**
- ▶ X Architects leading role ensured the **centre of gravity was strongly and firmly in Dubai**

Case Study 2

Client: RTA

Architect: Aedas

Architect of record: Rafael Viñoly Architects

Associate architect: Carla Bechelli Architects

Interior designer: KCA International

Engineer(s): Atkins

General contractor:

Dubai Rail Link (DURL)
Consortium

**CAD system, project management,
..etc:** AutoCAD, Aconex



Factual Data

Dubai Metro

The setting

- ▶ An iconic representation of an aspect from the heritage of Dubai.
- ▶ Aedas, formed in 2002 (HK+UK), global firm
- ▶ **It is a more “mature” organisation**
- ▶ Station Architects were in Singapore, UK teams designed the depots & provided the modelling support
- ▶ Centre of gravity was not in Dubai

The Challenge of Multiculturalism to Innovation and Integration

Lack of a Dominant Local Culture

- ▶ The industry is almost all foreigners
- ▶ An integration challenge far more complex than just language differences.
- ▶ Innovation faces challenge as to which standard to follow, e.g. sustainability (LEED, BREEAM,..etc)
- ▶ BIM is likely to face the same problem.

Here Comes BIM

Embracing BIM

- ▶ Many companies are embracing BIM in the GCC region and UAE
- ▶ The driver for such move is two fold
 - Consultants and contractors embracing BIM as the norm at their own home country.
 - Major clients, especially public, are demanding the use of BIM to realise the expected benefits.
- ▶ Major challenge is the lack of readiness of industry at SME levels.

Case Study: BIM in Infrastructure

- ▶ An infrastructure mega project with simple Architectural design, complicated systems and complicated operational requirements.
- ▶ BIM is critical to project success in enabling fast tracking through early detection of clashes in the complicated design
- ▶ Creating confidence to start construction of early packages and allow early completion.

What were the Challenges?

- ▶ Convincing and enabling the different subcontractors and consultants to work on the same platform
- ▶ Availability of the hardware needed to navigate easily through the project
- ▶ Lack of experience meant some clashes in the design went undetected because designers misread them
 - More traditional/manual checking was done

Benefits Realised

- ▶ Very helpful in design review
- ▶ Most of the design clashes were detected
- ▶ Valuable lessons were learned by staff giving them the confidence to use BIM in the future.
- ▶ Now the client has made the use of BIM mandatory for all mega projects

**CASE STUDY OF
BIM IMPLEMENTATION**

Logo: NBK
Logo: Projacs
Logo: Foster + Partners
Logo: Buro Happold
Logo: BIMES
Logo: AHMADIAH

Presentation in Collaboration with
HASSAN HELMY, PMP
Assistant Vice President, Projacs International

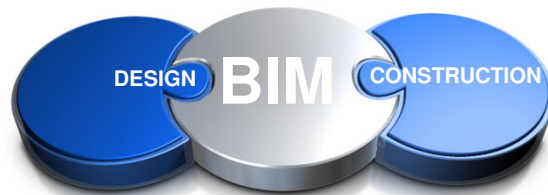
And
BIM Engineering Solutions- BIMES NBK PROJECT

Logo: BIMES
Logo: Projacs

**CASE STUDY: (NBK
PROJECT)**

CASE STUDY: INTRODUCTION

This case study discusses how the owner/PM initiated the BIM effort on NBK project after design using 2D tools had already started and was at final stages, and how BIM was **integrated** into the design and construction of the project.



HOW BIM WAS INTEGRATED INTO THE DESIGN AND CONSTRUCTION OF THE PROJECT?

CASE STUDY: NBK PROJECT PROJECT OVERVIEW

CASE STUDY: PROJECT OVERVIEW

Project Name: NBK New Headquarters

Location: Kuwait

Construction Cost: US\$ 400 Million

Build-Up Area: 130,000 m²

Project Delivery: Multi-Packaging

LEED: Gold Certificate.



CASE STUDY: PROJECT OVERVIEW

Owner: National Bank of Kuwait



Project Manager: Projacs International ,Kuwait



Architect: Foster + Partners, London

Foster + Partners

Engineer: Buro Happold, London



Buro Happold

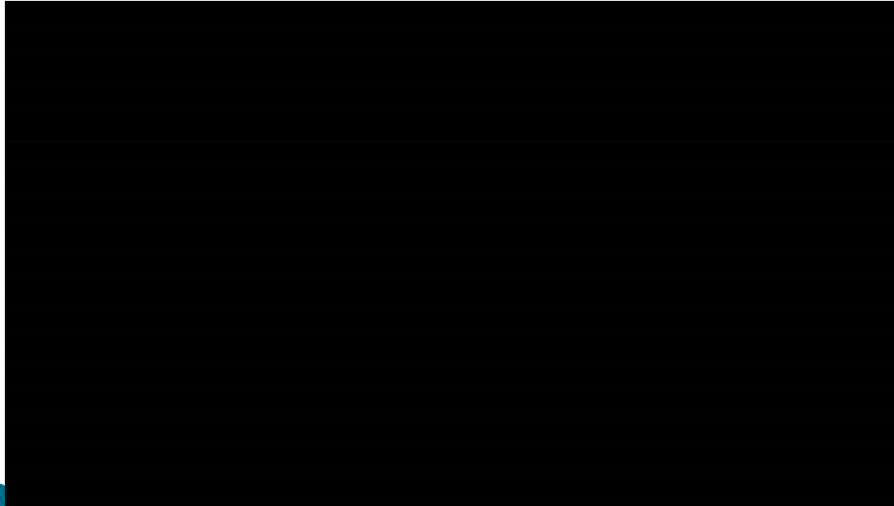
BIM Consultant: BIMES, UAE & Egypt



Contractor: Ahmadiyah Contracting & Trading



CASE STUDY: BIM IMPLEMENTATION PROCESS



CASE STUDY: BIM IMPLEMENTATION PROCESS

- ▶ The architects wished to **retain control** of the external geometry of the tower's envelope while the engineers would design the structural system to support the envelope. A hypothetical boundary surface was discussed that separated the domain of engineering responsibility from that of the architects.
- ▶ The geometry of this **interface layer** was controlled by the architects and passed to the engineer.

PARAMETRIC DESIGN AND COLLABORATION

? CASE STUDY: BIM IMPLEMENTATION PROCESS

- ▶ This complex tower's geometry raised many coordination problems between architecture and structure and other trades and identifying those problems proved to be difficult with the **traditional 2D CAD tools**. Being responsible for performing design review services, Projacs had to find a **solution** to this problem.



INEFFICIENCIES OF TRADITIONAL PRACTICES IN COORDINATION REVIEW

CASE STUDY: BIM IMPLEMENTATION PROCESS

Coordination/ Clash Detection (pre-construction)

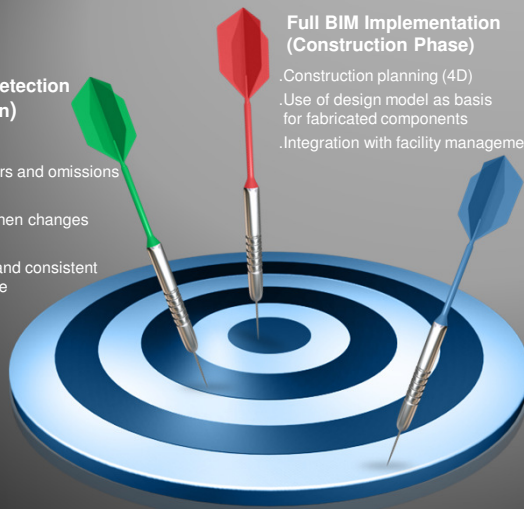
- .Discovery of design errors and omissions before construction
- .Automatic corrections when changes are made to design
- .Generation of accurate and consistent 2D drawings at any stage

Full BIM Implementation (Construction Phase)

- .Construction planning (4D)
- .Use of design model as basis for fabricated components
- .Integration with facility management

Auto-generated Quantity Take Off (pre-construction)

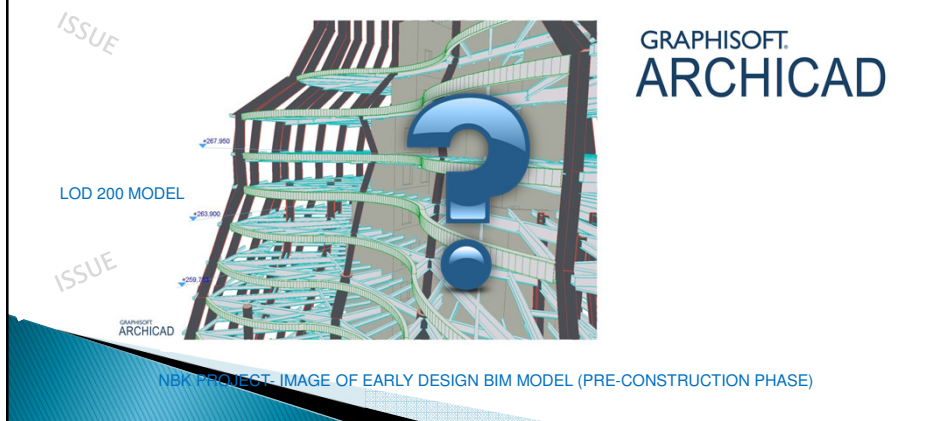
- .Extraction of accurate bills of quantities (5D)



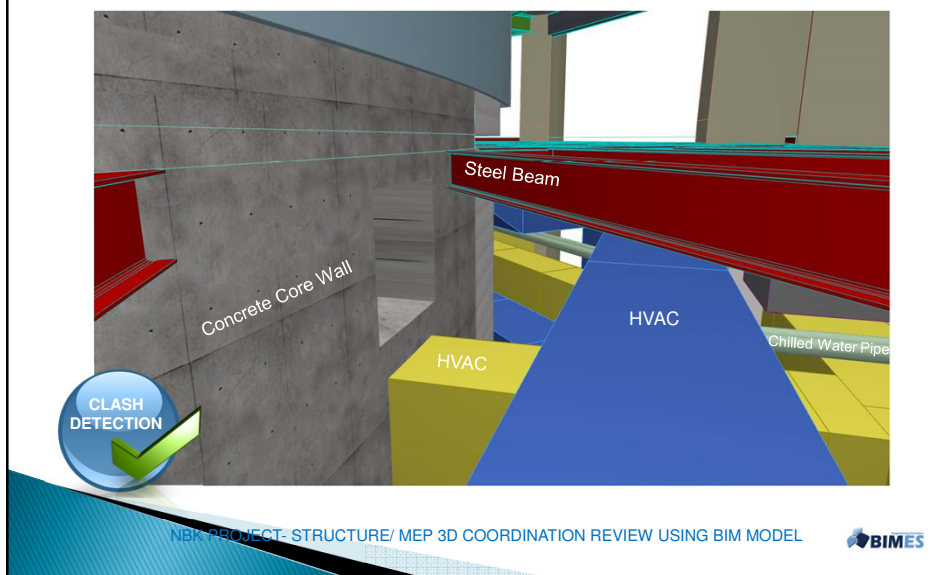
NBK PROJECT- BIM TARGETS

? CASE STUDY: BIM IMPLEMENTATION PROCESS

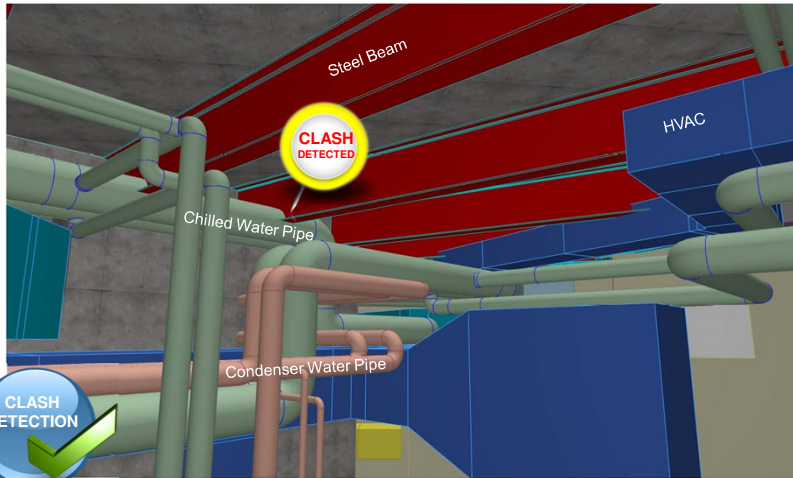
- ▶ The BIM consultant initially developed design model, using ARCHICAD and TEKLA software, based on the 2D CAD drawings of the project. The first versions of the BIM model, prepared by the BIM Consultant, were unexpected....



CASE STUDY: BIM IMPLEMENTATION PROCESS



CASE STUDY: BIM IMPLEMENTATION PROCESS



NBK PROJECT- STRUCTURE/ MEP 3D COORDINATION REVIEW USING BIM MODEL



CASE STUDY: BIM IMPLEMENTATION PROCESS



NBK PROJECT- STRUCTURE 3D COORDINATION REVIEW USING BIM MODEL



CASE STUDY: BIM IMPLEMENTATION PROCESS



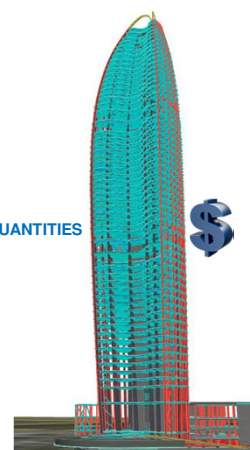
CASE STUDY: BIM IMPLEMENTATION PROCESS

Quantity Take Off

- ▶ Realizing the benefits of BIM in clash detection, the project team decided to explore another area of implementation: quantity take off.

AUTOMATIC GENERATION OF QUANTITIES

- ▶ Projacs requested the BIM consultant to **auto-generate quantities** for the structural steel works in order to verify those prepared manually.



BIM QUANTITY TAKE OFF(PRE-CONSTRUCTION PHASE)

BIMES

BIM IMPLEMENTATION

TENDER PHASE

CASE STUDY: BIM IMPLEMENTATION PROCESS

Tender Stage:

- ▶ Also realizing the benefits of BIM in planning sequencing, Projacs requested bidders during tender stage to submit an animated method statement.



TENDER STAGE (PRE-CONSTRUCTION PHASE)

? CASE STUDY: BIM IMPLEMENTATION PROCESS

- ▶ One of the main challenges for the project team (especially the contractor who was using BIM for the first time on a large complex project) was transitioning from 2D CAD environment to 3D BIM model system.



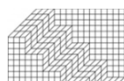
TRANSITIONING FROM 2D CAD ENVIRONMENT TO BIM MODEL SYSTEM

ACKNOWLEDGEMENTS

The below organizations were extremely helpful and made significant efforts to share their stories and provide images, information, and important insights to this case study.



Foster + Partners



Buro Happold



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THANK YOU

