

Il BIM: prospettive e scenari per Imprese e Professionisti



Le declinazioni dei software BIM nell'ambito dei progetti edili e infrastrutturali

ANCE Giovani – Catania 23 maggio 2014

NIST GCR 04-867



U.S. Department of Commerce
Technology Administration
National Institute of Standards and Technology

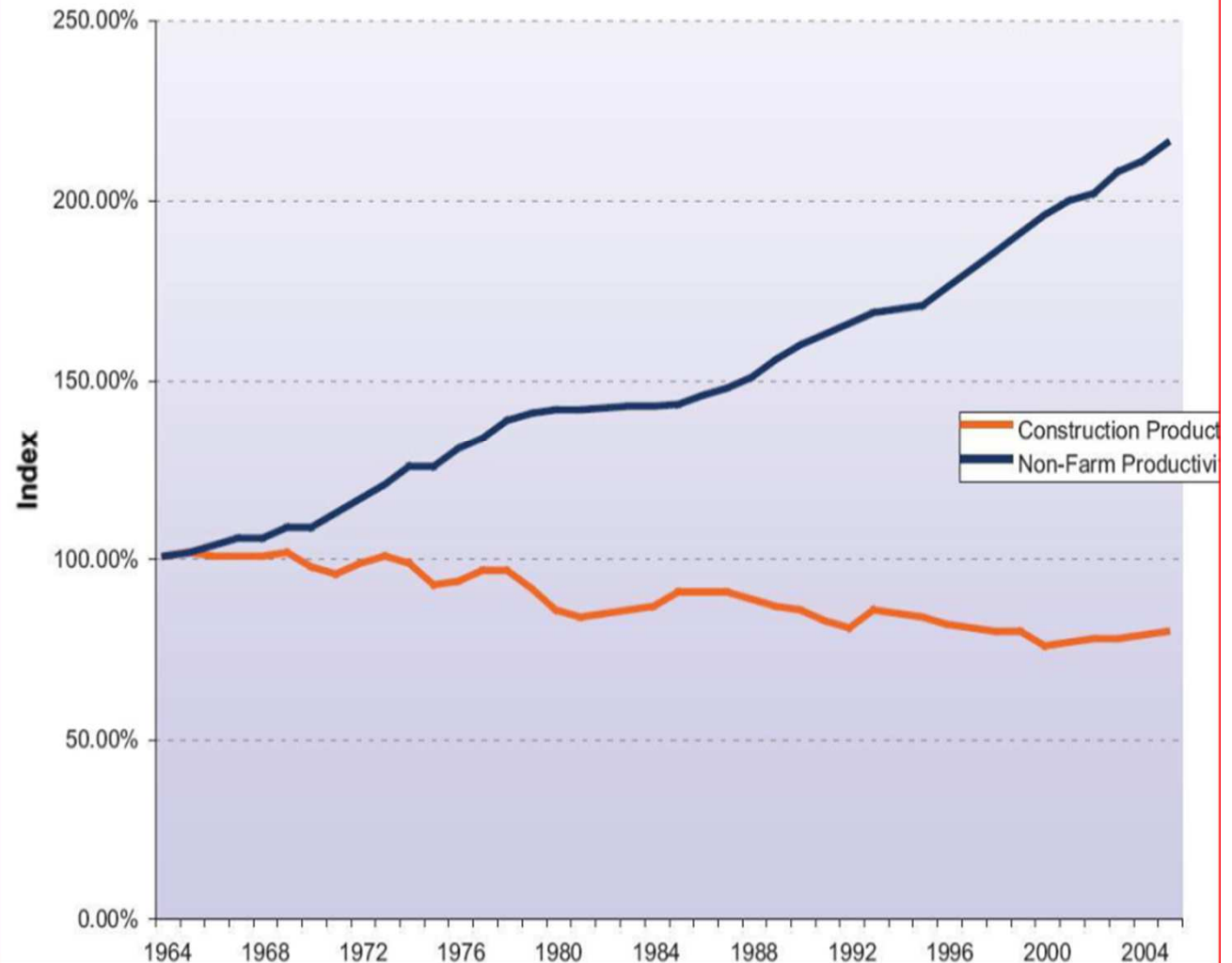
Advanced Technology Program
Information Technology and Electronics Office
Gaithersburg, Maryland 20899

Cost Analysis of Inadequate Interoperability in the U.S. Capital Facilities Industry

Michael P. Gallaher, Alan C. O'Connor, John L. Dettbarn, Jr., and Linda T. Gilday

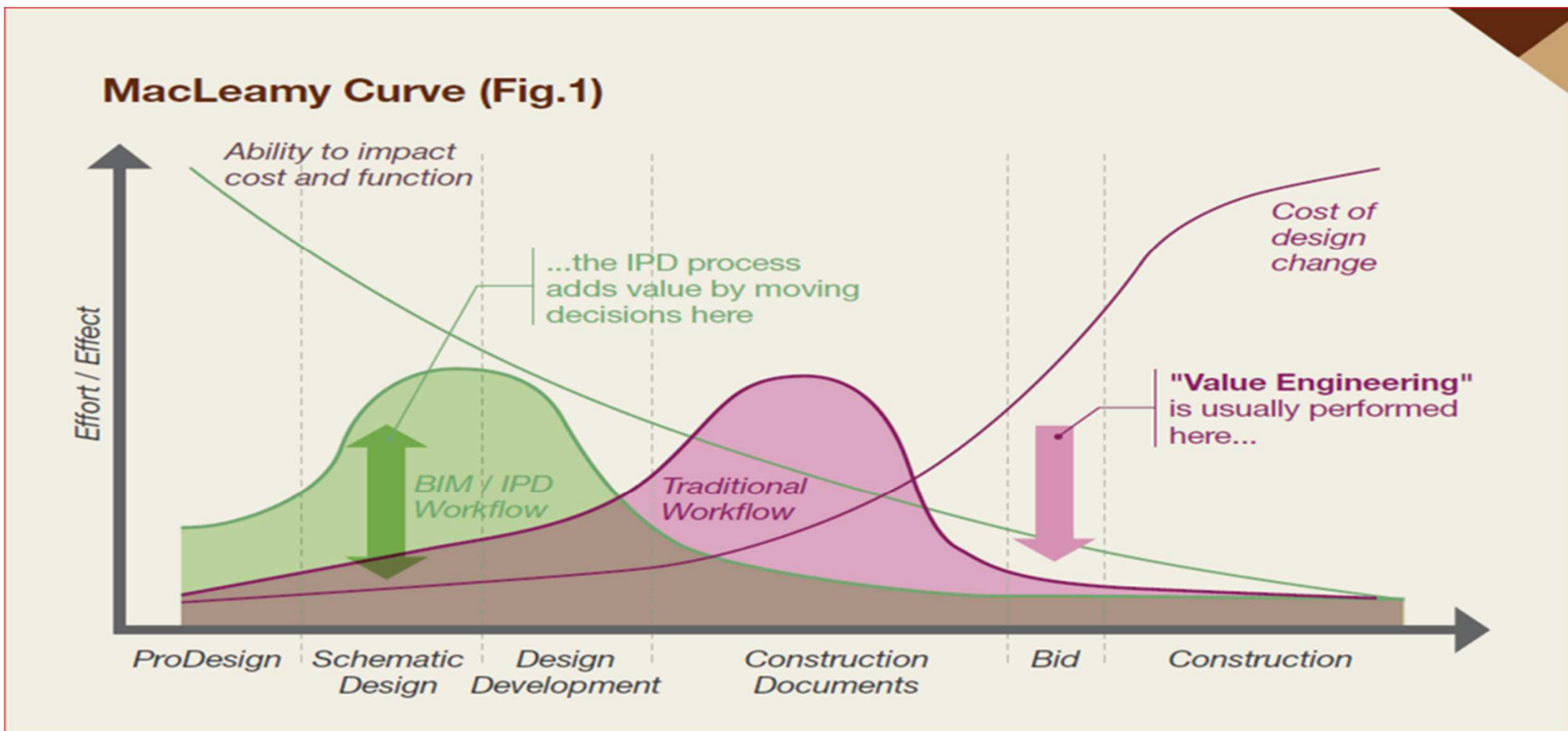


Constant \$ of Contracts/Workhours of Hourly Workers
Sources: U.S. Dept. of Commerce, Bureau of Labor Statistics

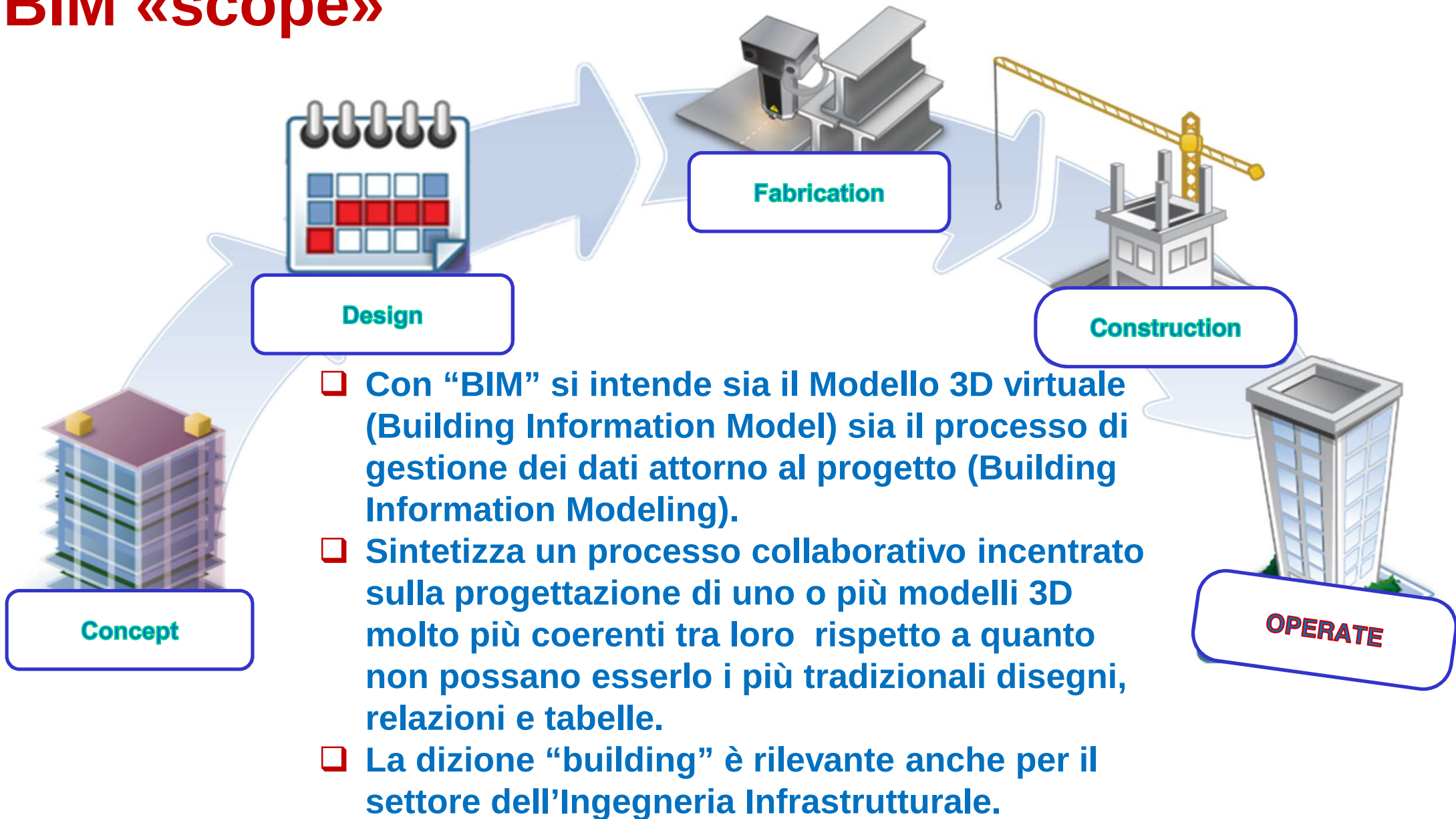


Il BIM è il «game changer»

Permette di **anticipare molte decisioni** riducendo errori progettuali e eliminando problematiche in costruzione



BIM «scope»



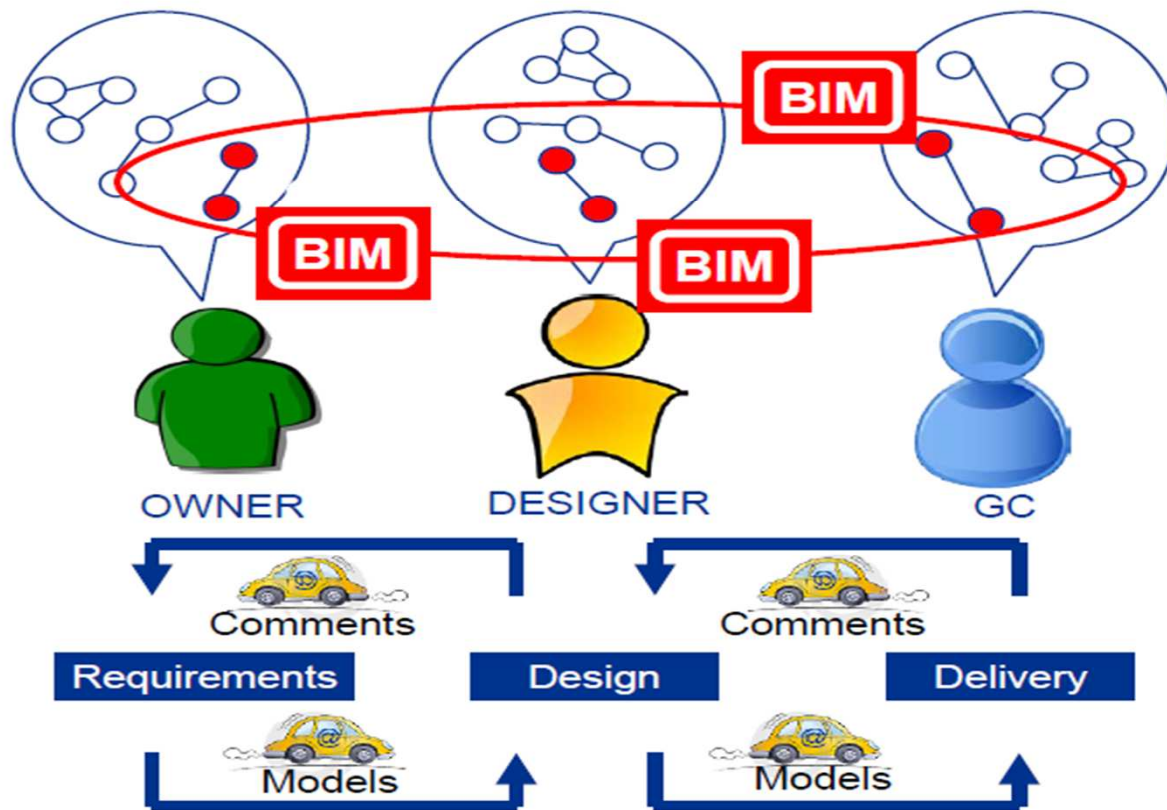
BIM: un processo, non un software

BIM is a **business process** that defines which software is best to meet your needs.

BIM is a **technology** that defines your business process based upon the software vendor's capability.

Drawing-3D-BIM process

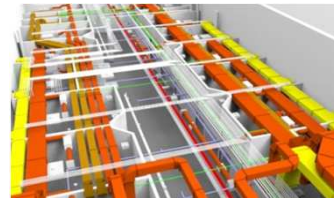
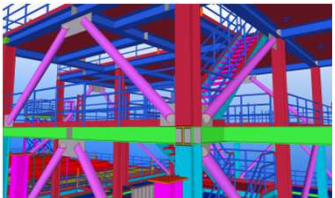
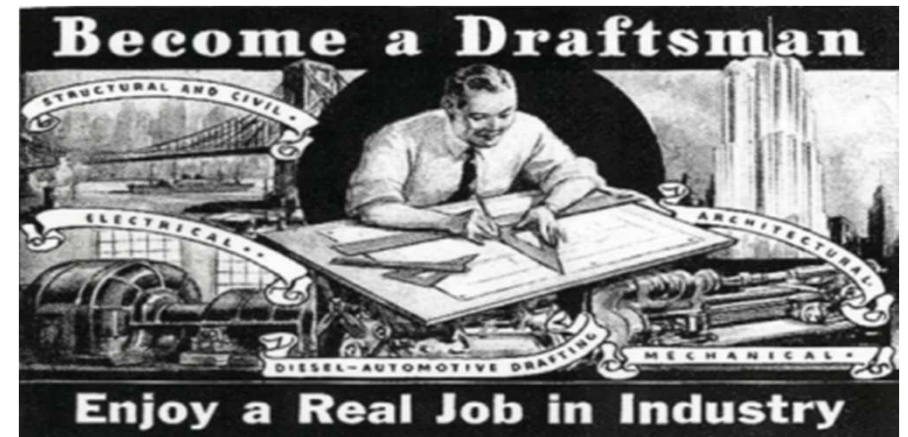
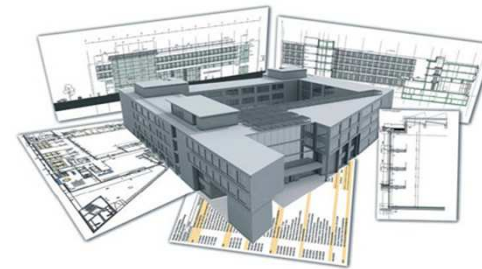
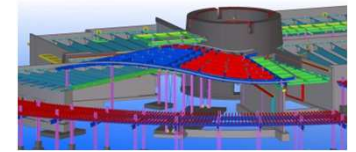
BIM process



- > BIM tools allow publishing data across enterprise walls
- > Transactions turn into model based interactions

Ruoli professionali: il BIM manager

- ❑ Redige il BEP del progetto
- ❑ Presiede le riunioni interdisciplinari
- ❑ Definisce standard software per l'interoperabilità
- ❑ Mantiene aggiornati i modelli master
- ❑ Controlla la pubblicazione di ogni «delivery»
- ❑ Predispone il modello «As-Built»
- ❑ Coordina le sessioni «Model Review»
- ❑ Coordina il «Model Checking»



II BIM in Europa

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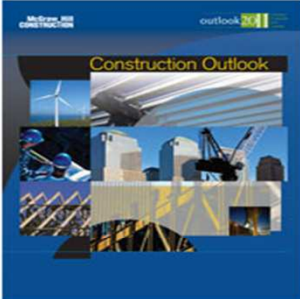
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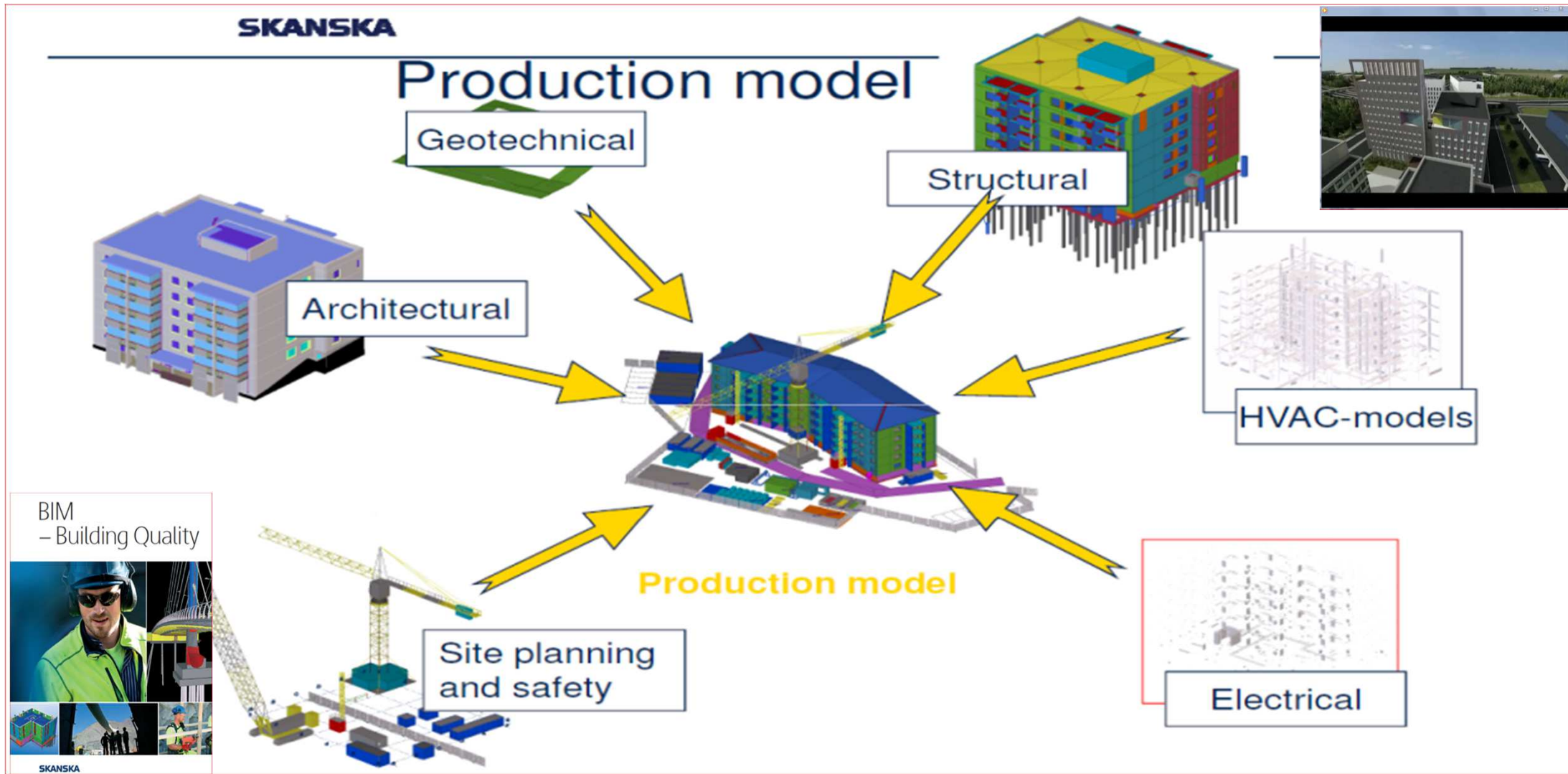
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The Business Value of BIM in Europe

Getting Building Information Modeling to the Bottom Line in the United Kingdom, France and Germany

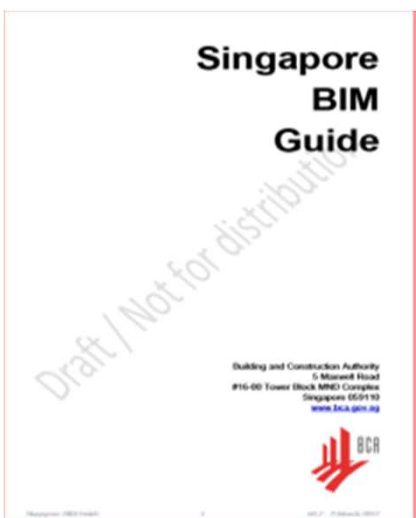
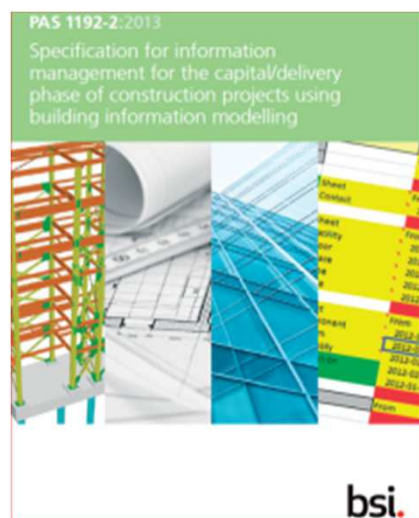
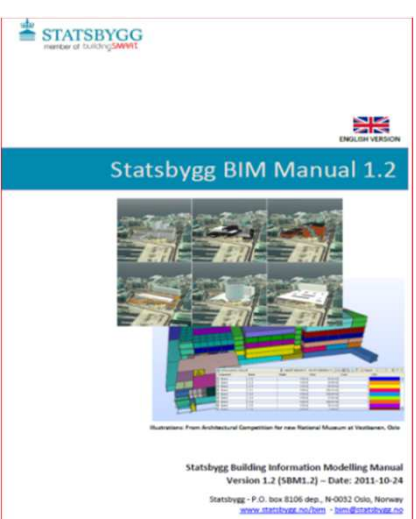
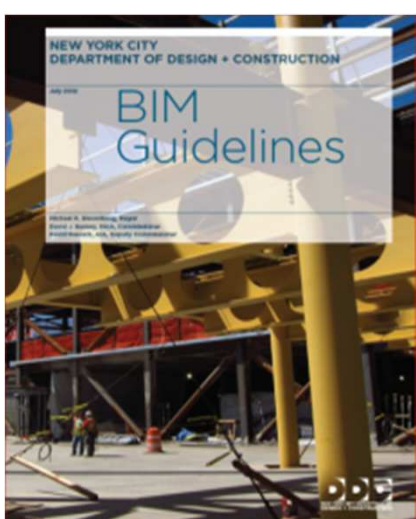


Intedisciplinarieta: Il modello SKANSKA



SKANSKA - Tiina Koppinen, Business Development Director

BIM Guides



Il Regno Unito ha bruciato i tempi

- ❑ In Giugno del 2011 il governo inglese ha pubblicato la sua «Building Information Modelling (BIM) Working Party Strategy» con l'intenzione di imporre «collaborative 3D BIM» in formato elettronico riferito alle informazioni relative a progetti, asset, documenti e dati entro il 2016.
- ❑ Il formato per questa innovazione sarà il «Construction Operations Building Information Exchange (COBie)».
- ❑ La strategia nasce dal rincorrere un potenziale forte risparmio nel settore (20%) ritenuto raggiungibile con l'introduzione dell'obbligo entro il 2016 di presentare progetti in ambito BIM 3D per le opere pubbliche di importo lavori superiore a 5 Milioni di Sterline.

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"This Government's four year strategy for BIM implementation will change the dynamics and behaviours of the construction supply chain, unlocking new, more efficient and collaborative ways of working. This whole sector adoption of BIM will put us at the vanguard of a new digital construction era and position the UK to become the world leaders in BIM."

Francis Maude
Minister for the Cabinet Office

A photograph of Francis Maude, Minister for the Cabinet Office, speaking at a podium. He is wearing a dark suit and a patterned tie, gesturing with his hands as he speaks.

Iniziativa Internazionale – BIM Task group UK

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Front View
Rear View
Loft
1st Floor
Ground Floor

Inside
Outside
Zoom Out

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La direttiva dell' Unione Europea sostiene l'uso del BIM (15/01/2014)

- ❑ Il Parlamento europeo ha deciso di raccomandare l'uso di strumenti elettronici come il BIM per consentire una maggiore efficienza nella progettazione e costruzione in Europa.
- ❑ Entro due anni occorre adeguare le legislazioni dei paesi membri



*«For public works contracts and design contests, Member States may require the use of specific electronic tools, such as of **building information electronic modelling tools** or similar...»*

EDI (1998) ... BIM (+2002)

Standardizzazione dello scambio dati in progetti impiantistici

Miroslav
Schonauer,
Aecad,
(U.K.)

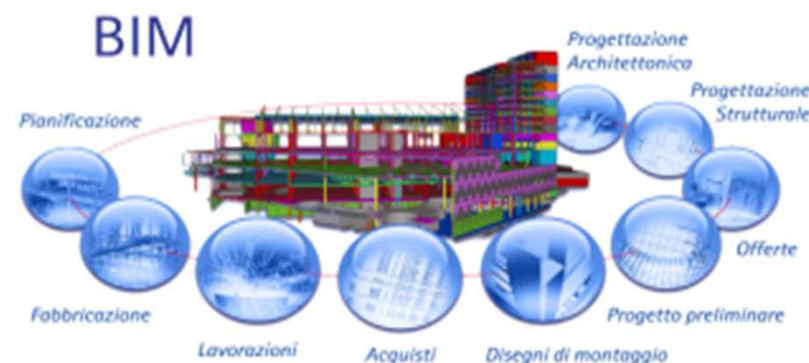
Paolo Odorizzi
Harpaceas,
Milano

Collegamenti diretti e su base CIMsteel
per le costruzioni in acciaio

L'information technology, divenuta via via più significativa soprattutto con l'avvento del computer, ha irreversibilmente abbracciato tutte le aree industriali moderne, senza risparmiare, fortunatamente, i progettisti di costruzioni in acciaio e coinvolgendoli in pieno nel loro lavoro. Le nuove tecnologie hanno consentito la realizzazione di molteplici soluzioni software, sviluppatesi e ampliatesi sulla base della domanda di progettisti e costruttori d'impianto.

L'obiettivo è la crescente esigenza di gestire le informazioni in maniera più intelligente e proficua. Era necessario mantenere e gestire le informazioni in

I programmi software per i progettisti di costruzioni in acciaio riguardano aree molto diversificate tra loro. Dal momento che sul mercato non sono disponibili applicazioni in grado di coprire a livelli adeguati tutte queste aree di lavoro contemporaneamente, è chiaro che il problema dello scambio dati si pone sempre più come fondamentale nel processo progettuale. In quest'articolo si cerca di analizzare e di catalogare i processi di scambio dati (EDI, Electronic Data Interfaces) e il flusso delle informazioni tra pacchetti software impiegati in settori tra loro differenti ma funzionali l'uno all'altro. Si possono individuare due filosofie EDI distinte: i collegamenti diretti uno-uno mono e bidirezionali e l'integrazione standardizzata così come sviluppato nel progetto CIMsteel (Computer Integrated Manufacturing Technology for the Constructional Steelwork Industry).



Bim Summit 2013

Marzo 2013: Harpaceas ha riunito 200 professionisti al I° BIM Summit italiano

BIM Summit 2013

DATA
mercoledì 6 marzo

ORARIO
14.00 - 17.30

DOVE
Centro Congressi FAST
Piazzale Morandi 2, Milano

COME ARRIVARE
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Metropolitana M3, fermata Turati
Bus 94 e 61 fermata Cavour
Tram 2 fermata Cavour



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Con il patrocinio di



organizza il convegno

BIM Summit 2013

"Il Building Information Modeling
per la filiera delle costruzioni: la migliore
soluzione per efficientare e risparmiare"

Case studies e modelli di business per condividere
esperienze di committenti, progettisti e costruttori

mercoledì 6 marzo 2013 - ore 14.00
Centro Congressi FAST - Piazzale Morandi 2, Milano

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Presentazione del Convegno

Il Building Information Modeling (BIM) ottimizza tutto il ciclo di vita legato allo sviluppo immobiliare: è infatti una metodologia ed uno strumento di progettazione basato sulla creazione ed utilizzo di un modello di informazioni coordinate, computabili e coerenti, del progetto nelle sue diverse fasi di programmazione, progettazione e realizzazione.

L'adozione della metodologia BIM risulta essere l'unica scelta possibile per chi vuole invertire la tendenza negativa del mercato: innovazione e riduzione di costi diventano infatti imperativi dai quali non si può prescindere.

Grazie alla metodologia BIM è possibile creare una rappresentazione digitale di ogni tipologia di edificio per sviluppare scelte progettuali, generare documenti di costruzione e produzione, valutare le performance del progetto, pianificare le fasi di realizzazione e stimare i costi. La capacità di mantenere queste informazioni aggiornate e accessibili in un ambiente digitale integrato consente a tutti gli operatori sia una chiara visione globale del progetto sia di migliorare la capacità di prendere decisioni aumentando quindi qualità e redditività dei progetti.

Il BIM trasforma l'operatività dell'intera filiera delle costruzioni riducendone i costi, velocizzando i tempi di realizzazione e favorendo la condivisione delle informazioni tra i diversi attori.

Il BIM è stato recentemente al centro della presentazione dell'ultimo rapporto congiunturale sul mercato delle costruzioni pubblicato dal Cresme (Centro Ricerche Economiche Sociali di Mercato per l'Edilizia e il Territorio). Nel documento, la "rivoluzione BIM" viene presentata come la soluzione per poter abbattere i costi nella filiera con stime sino al 30% di riduzione come sta avvenendo in altri Paesi.

Il convegno, dando voce a diversi rappresentanti della filiera, consentirà di verificare lo stato dell'arte sull'adozione del BIM in Italia e quali sono le azioni in essere per favorire la sua diffusione nel nostro Paese, anche alla luce della recente proposta di Direttiva Comunitaria per la regolamentazione degli appalti pubblici che prevede la definizione di standard tecnici, da utilizzarsi per lo scambio di informazioni e che incoraggia l'impiego di building information electronic models proprio per garantire una maggiore interoperabilità.

Agenda - BIM Summit 2013

14.00

Saluti e presentazione dell'incontro

Ing. Luca Ferrari - Direttore Generale Harpaceas

Moderatore

Prof. Aldo Norsa - Docente Università IUAV di Venezia, Estensore del Rapporto 2012 sull'Imprenditoria del Progetto

L'attività di Building Smart Italy a favore della diffusione della metodologia BIM

Prof. Stefano Della Torre - Direttore Dipartimento Architettura, Ingegneria delle Costruzioni e Ambiente Costruito del Politecnico di Milano, Presidente Building Smart Italia
Prof. Ezio Arlati - Vice Presidente Building Smart Italia

La formazione quale leva di valore per le aziende e gli studenti

Prof. Roberto Cigolini - MIP, Business School Politecnico di Milano

I criteri di successo per l'adozione della metodologia BIM

Ing. Paolo Odorizzi - Direttore Tecnico Harpaceas

Il punto di vista della committenza pubblica

Ing. Pietro Baraton - Provveditore interregionale alle Opere Pubbliche Lombardia-Liguria

Il punto di vista della committenza privata

Ing. Giovanni Marroccoli - Operations Director Bovis Lend Lease

Lo sfruttamento delle sinergie di filiera: il circolo di approfondimento del BIM

Dott. Mario Caputi - responsabile scientifico dell'Osservatorio ICT nel Real Estate

Il BIM nella progettazione architettonica

Arch. Paola Pontarollo - Senior Partner Starching, Milano
Arch. Simone Villa - BIM Manager Starching, Milano

Il BIM nella progettazione strutturale

Ing. Sabatino Tonocci - Contitolare Exa Engineering, La Spezia

Il BIM nella costruzione

Ing. Luca Benetti - Direttore Commerciale - Stahlbau Pichler, Bolzano

Seguirà dibattito

17.30 Conclusione

Al termine è previsto un rinfresco

Appello al governo (2013)

Progetti

45
19-24
NOVEMBRE
2012

Concorsi

NEL SITO @

DONNE E ARCHITETTURA
Luigia Fontana e Gas Aulenti
esempio di determinazione

CONCORSI
Salvo Jonike
per qualificare
il design italiano

**Progetti, taglio ai costi
con la rivoluzione Bim**

di Alessia Terenzi

Una disruptive technology che rivoluzionerà il modo di business delle costruzioni e della edilizia. Una tecnologia che produrrà i diversi attori del mercato edile, dalle imprese di progettazione, alla costruzione, al cantiere, fino al cliente finale. Con il BIM (Building Information Modeling), il sistema di progettazione e costruzione che integra i dati di tutti i componenti del progetto, si creerà un unico database che consentirà di ottimizzare i costi, ridurre i rischi e migliorare la qualità del progetto. Il BIM è la tecnologia del futuro e la rivoluzione del settore edile.

COME FUNZIONA IL BUILDING INFORMATION MODELING

DESIGN PROJECT MANAGEMENT FACILITY MANAGEMENT

DETTAGLI INGEGNERIA CANTIERI

BIM

Edilizia smart, il Governo agisca

Filiera delle costruzioni informatizzata per elevare la produttività

di Giovanni Arzzone, Paolo Buzzetti, Giorgio Squinzi e Piero Torretta

Almeno i settori sono stati coinvolti. Il più pesante è stato quello delle costruzioni. Ma, rispetto ad altri, tra questi, il comparto delle costruzioni presenta diversi problemi che, se non vengono affrontati, porteranno a un declino del settore. A sua volta, il settore delle costruzioni è un settore che ha una grande importanza per l'economia italiana. È un settore che ha una grande importanza per l'economia italiana. È un settore che ha una grande importanza per l'economia italiana.

La forte correlazione del settore delle costruzioni con molti altri comparti dell'economia ne fa, tradizionalmente, un settore volatile su cui investire per chi ha una visione a medio e lungo termine. La forte correlazione del settore delle costruzioni con molti altri comparti dell'economia ne fa, tradizionalmente, un settore volatile su cui investire per chi ha una visione a medio e lungo termine.

In concreto, non va dimenticato che proprio le opere pubbliche sono in grado di creare occupazione e di stimolare la crescita del settore. In concreto, non va dimenticato che proprio le opere pubbliche sono in grado di creare occupazione e di stimolare la crescita del settore.

Vantaggi

1. Riduzione costi
2. Aumento qualità
3. Asset aggiuntivo



- ✓ Congruenza geometrica dei dati
- ✓ Anticipo decisioni progettuali
- ✓ Produzione elaborati grafici

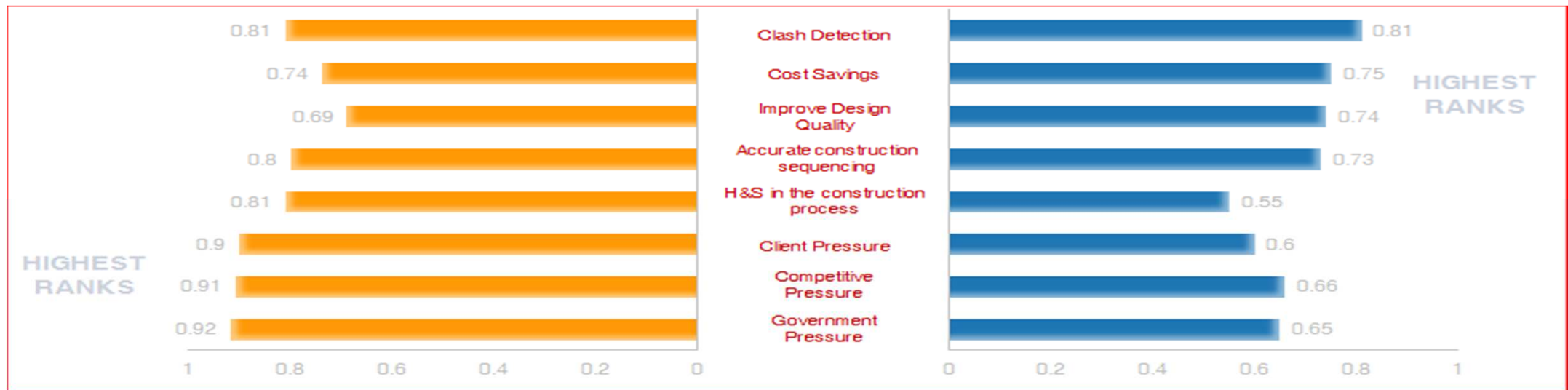
- ✓ Precisione nei computi
- ✓ Gestione delle RFI
- ✓ Controllo revisioni
- ✓ Comunicazione interdisciplinare

- ✓ Tracciabilità materiali
- ✓ Presentazione
- ✓ Disponibilità modello «As built»



Aspettative e Riscontri

Un recente studio evidenzia la diversa percezione sui vantaggi del BIM in funzione dell'esperienza dell'utilizzatore nel suo utilizzo: chi già lo usa ne apprezza i vantaggi pratici, chi ancora non lo usa „teme“ di doverlo utilizzare solo a seguito di pressioni esterne.



► ***Pressioni esterne e considerazioni legate a salute e sicurezza sono i vantaggi maggiormente percepiti da chi non usa ancora il BIM***

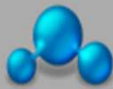
► ***Clash Detection, risparmio dei costi, migliore qualità progettuale e accurata pianificazione sono i principali vantaggi per chi già utilizza il BIM***

Le dimensioni del BIM



BIM

Building information modeling (BIM) - is a process involving the generation and management of digital representations of physical and functional characteristics of a facility. The resulting **building information models** become shared knowledge resources to support decision-making about a facility from earliest conceptual stages, through design and construction, through its operational life and eventual demolition.



3D

3D modelling - is the process of developing a mathematical representation of any three-dimensional surface of object (either inanimate or living) via specialized software. The product is called a 3D model. It can be displayed as a two-dimensional image through a process called *3D rendering* or used in a computer simulation of physical phenomena.



4D

4D design = 3D model + **time**. Planning of design and construction tasks and processes in space and time. Calculation of quantities, work loads, task management based on real design objects of the 3D model. Construction sequencing and planning. 4D animations - i.e. visualizations of design and construction works.



5D

5D - 5'th dimension appears when takeoff quantities taken from the project 3D model used for **estimate**. Model can be divided according to construction logic for scheduling and **estimate** multiplied by unit **costs** for materials, labour and machinery.



6D

6D

SUSTAINABILITY

- Conceptual energy analysis via DProfiler
- Detailed energy analysis via EcoTech
- Sustainable element tracking
- LEED tracking



7D

7D

FACILITY MANAGEMENT APPLICATIONS

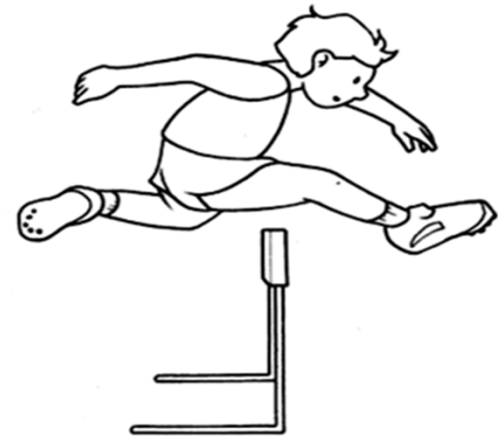
- Life Cycle BIM Strategies
- BIM As-Built
- BIM embedded O&M manuals
- COBie data population and extraction
- BIM Maintenance Plans and Technical Support
- BIM file hosting on Lend Lease's Digital Exchange System

OPEN

BIM™

Ostacoli da superare

- ❑ Costi piattaforma informatica ritenuti troppo elevati
- ❑ Indisponibilità di risorse addestrate sul tema
- ❑ Indisponibilità per la condivisione multidisciplinare dei dati
- ❑ Anelli deboli nella catena di progetto
- ❑ Non riconoscimento del valore contrattuale del modello
- ❑ Mancanza di regolamentazioni contrattuali
- ❑ Formati proprietari nello scambio dei dati



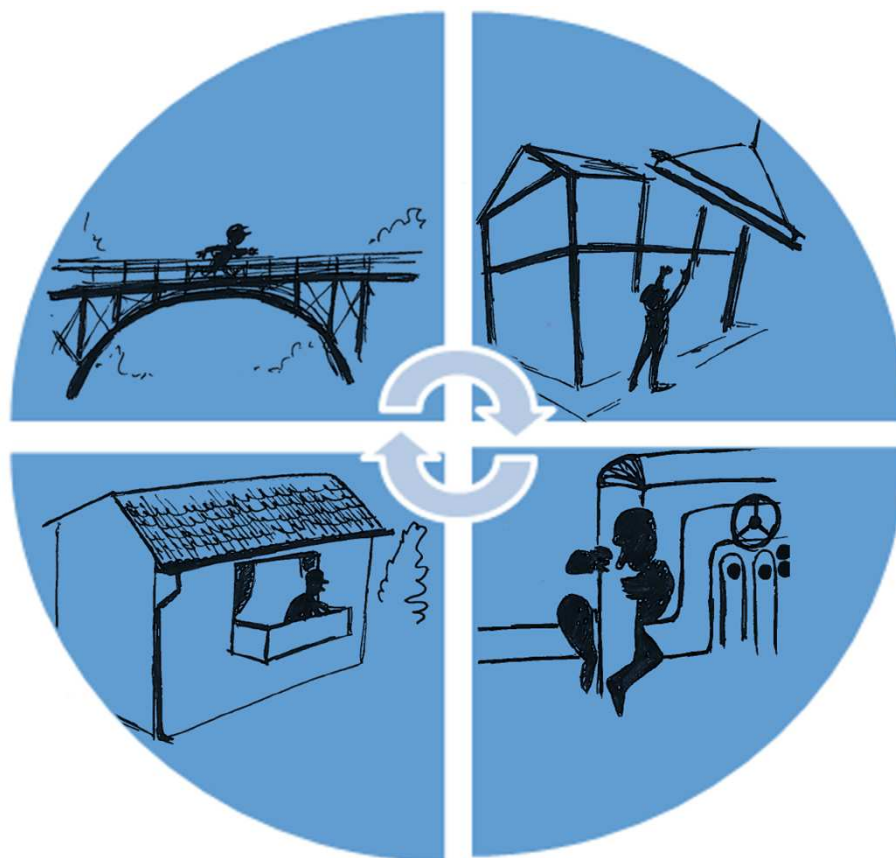
Il Bim Authoring

Il BIM authoring è l'attività di modellazione che fa nascere i componenti del progetto (oggetti) descrivendoli compiutamente in termini di geometria, caratteristiche, collocazione e correlazione reciproca.

Infrastrutturale



Architettonico



Strutturale



Impiantistico

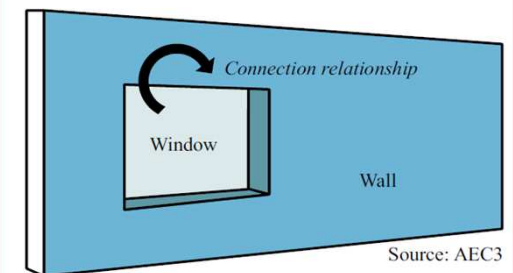


BIM Architettonico

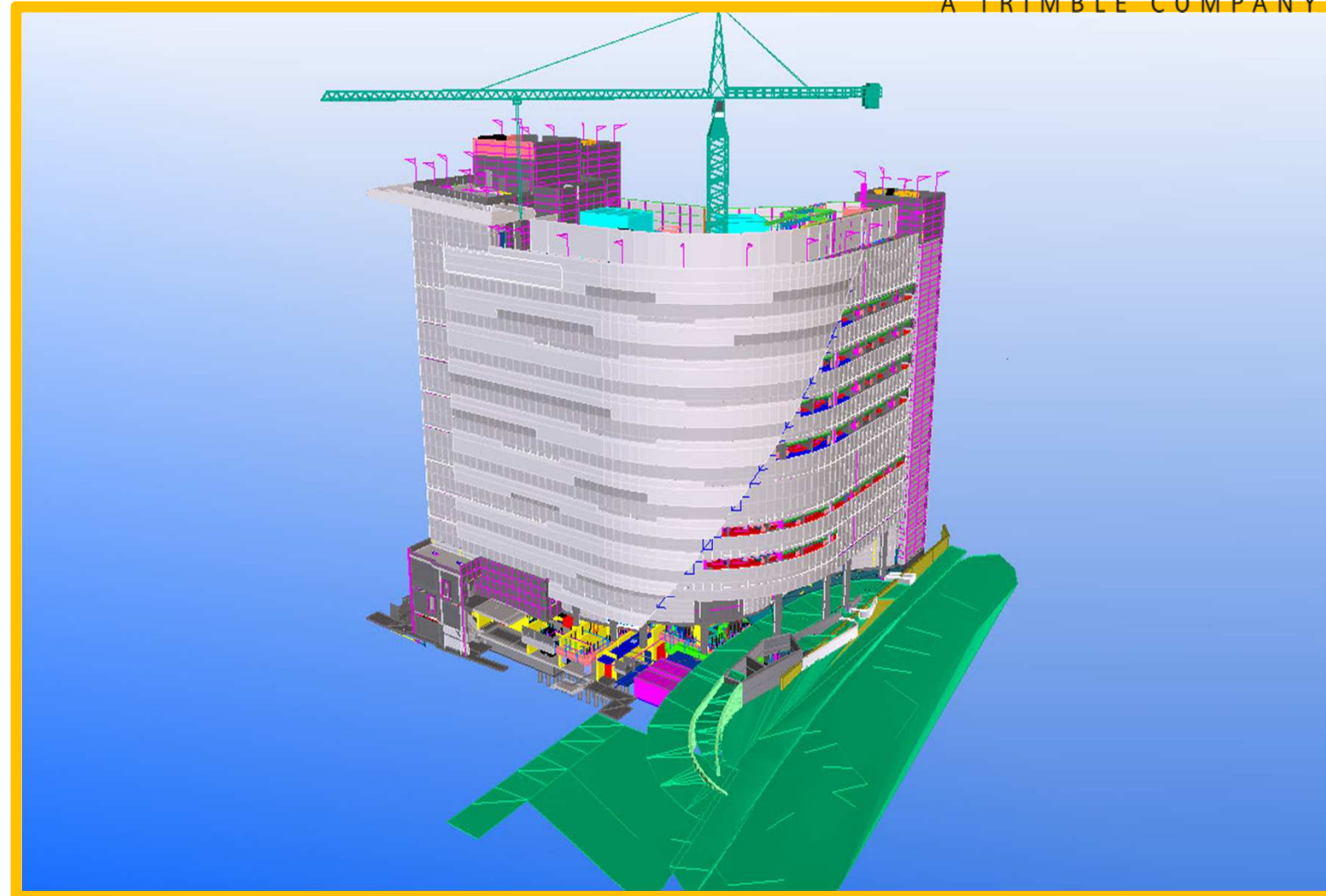
- ❑ Rendering
- ❑ Space Planning
- ❑ Computo materiali
- ❑ BIM coordination
- ❑ WBS di progetto



Figure 2.1 Relationship between wall and window captured by IFC



BIM Strutturale

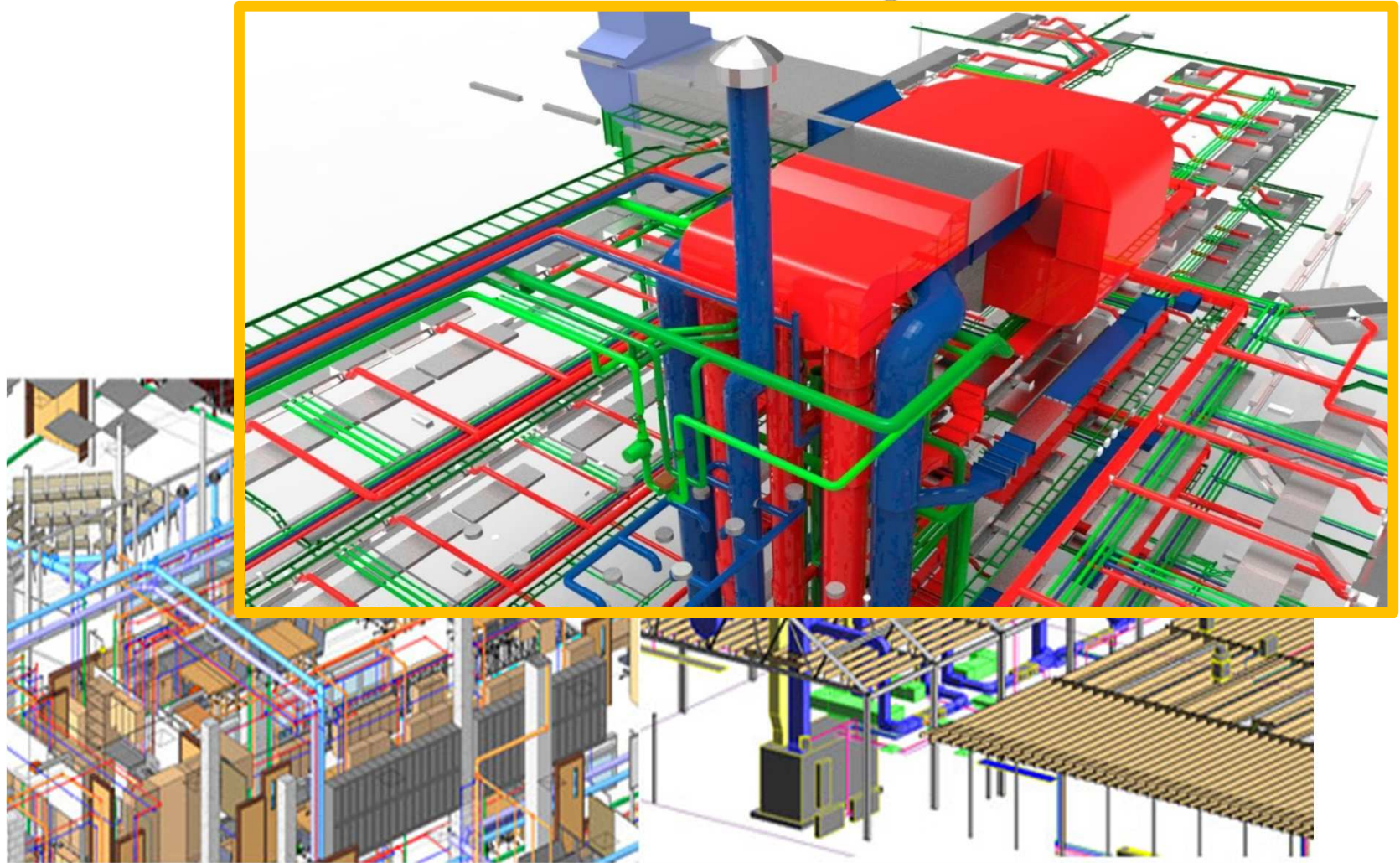


- ☐ Prelavorazione
- ☐ Prefabbricazione
- ☐ Costruzione
- ☐ 4D, Scheduling
- ☐ DSTV
- ☐ IFC
- ☐ BVBS
- ☐ Link to Field
- ☐ BIMreview
- ☐ Calcolo strutturale

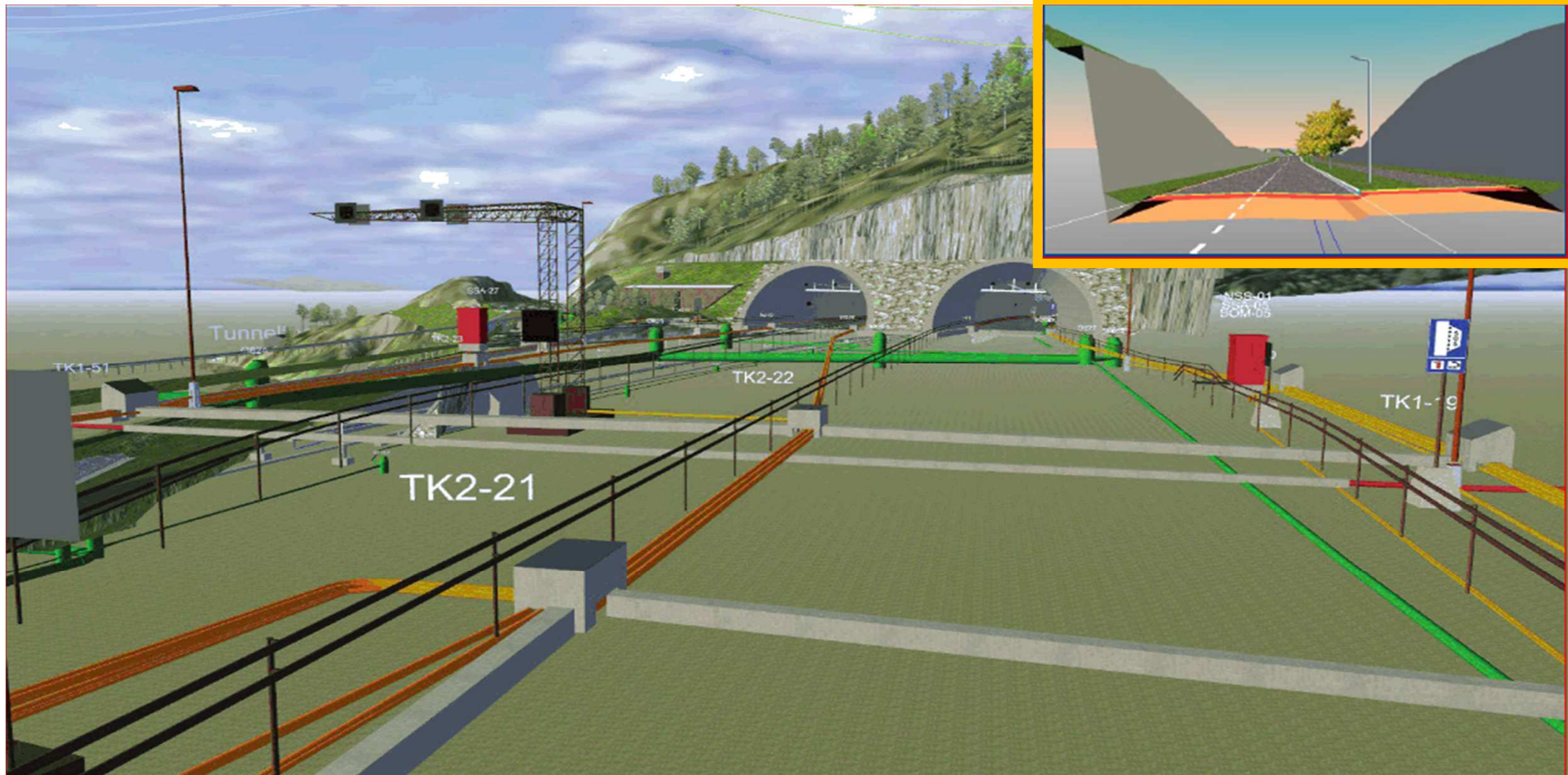
BIM Building Service (MEP)



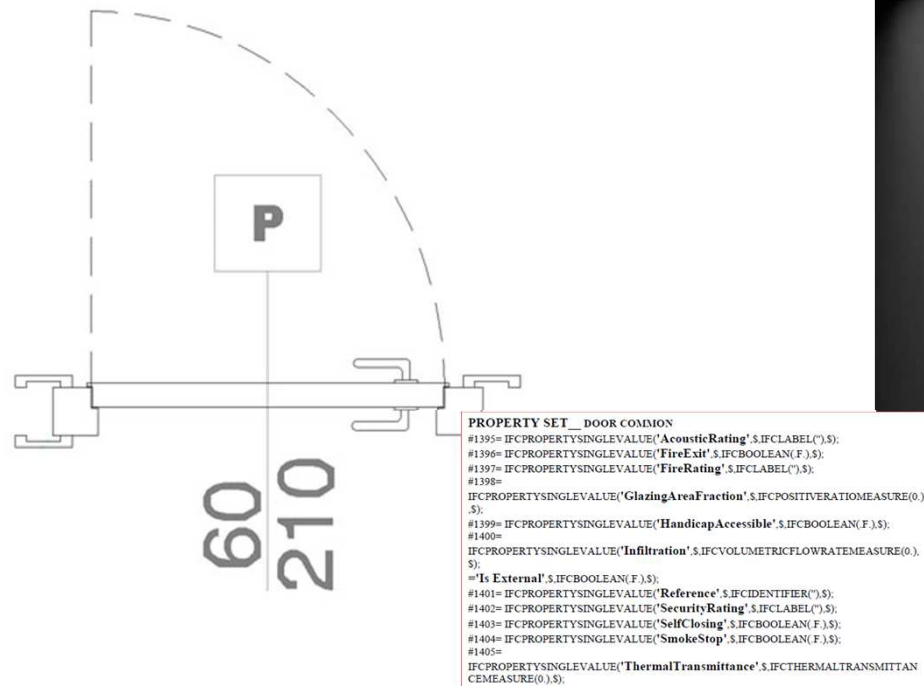
- ☐ Mechanical,
- ☐ Electrical
- ☐ Plumbing
- ☐ Heating
- ☐ Electrical
- ☐ Ventilation
- ☐ Drinking Water
- ☐ Waste Water



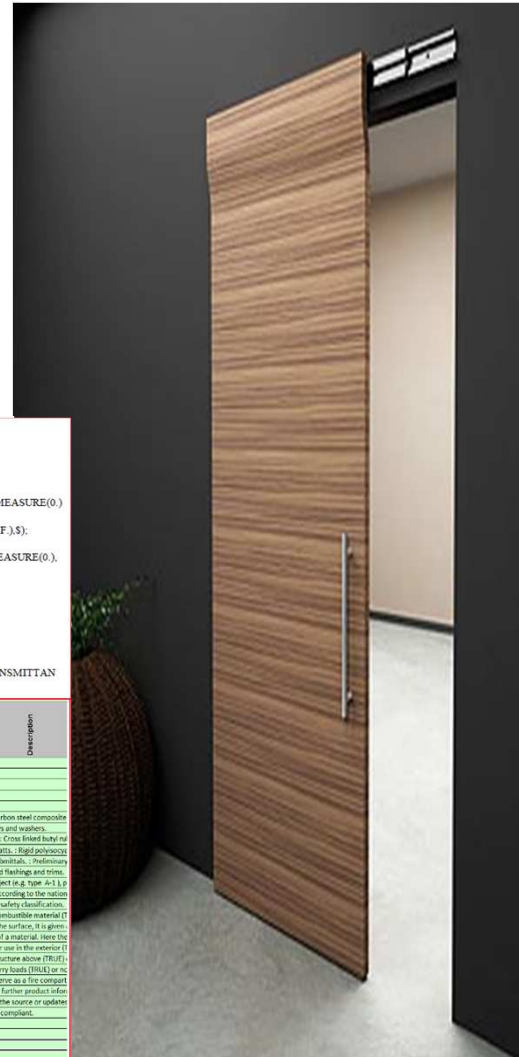
BIM Infrastrutturale



Prescrizioni (Pset)



Name	Value	Unit	Estimate	Description
Tag	Krigpans Template	n/a	1SP049979900ENR599	Tag
Unit type	1SP049979900ENR599	n/a	1SP049979900ENR599	Unit type
Trade/type	use-defined	n/a	1SP049979900ENR599	Trade/type
System manufacturer	safeflex@nrg.com	n/a	NBL_MetalComposite@nrgChlding_UK	System manufacturer ()
Panel type	Panel type	n/a	NBL_MetalComposite@nrgChlding_UK	Panel type
Panel type	aluminum composite panels	enumeration	NBL_MetalComposite@nrgChlding_UK	Panel type: Aluminum composite panels, Carbon steel composite panels
Panel fasteners	carbon steel stand-off screws and washers	enumeration	NBL_MetalComposite@nrgChlding_UK	Panel fasteners: Carbon steel stand-off screws and washers
End and side joint	metalopolymer glue based joints, defined	enumeration	NBL_MetalComposite@nrgChlding_UK	End and side joint: Bond-based element types, Cross linked butyl
Continuity Thermal insulation	rigid polyisocyanurate foam (pi-r)	enumeration	NBL_MetalComposite@nrgChlding_UK	Continuity thermal insulation: Mineral fibre batts, Rigid polyisocyanurate
Substrates	information about substrates	enumeration	NBL_MetalComposite@nrgChlding_UK	Substrates: Control surfaces, Information substrates, Prefabricated
Identical	information about identicals and trims	enumeration	NBL_MetalComposite@nrgChlding_UK	Identical: System, System accessories
End and side joint	270-52-A	n/a	Part: Walk-Common	Reference ID for this specified type in this project is a/n 270-52-A
Acoustic rating	0.2	n/a	Part: Walk-Common	Acoustic rating for this object. It is provided according to the national
Part	Part	n/a	Part: Walk-Common	Part: Part
Combustible	false	boolean	Part: Walk-Common	Indicates whether the object is made from combustible material
Surface Slope/Chl Name	C	n/a	Part: Walk-Common	Indicates on how the flames spread around the surface. It is given
Thermal Transmittance	0.2	n/a	Part: Walk-Common	Thermal Transmittance Coefficient (U-Value) of a surface. Here, it
Internal	boolean	boolean	Part: Walk-Common	Indicates whether the element is designed for use in a exterior
Extern/Extracure	Part: Walk-Common	Part: Walk-Common	Part: Walk-Common	Indicates whether the object extends to the structure above (True)
Part	Part	Part	Part: Walk-Common	Indicates whether the object is intended to carry loads (True)
Component/Interation	false	boolean	Part: Walk-Common	Indicates whether the object is designed to serve as a fire
Documentation	http://www.whyb.org/indormon.html	n/a	COBie - Specification	Location (Uniform Resource Information) for further product information
Reference	http://www.whyb.org/indormon.html	n/a	COBie - Specification	Reference (Uniform Resource Information) for the source or additional
End/overcland	BS 5555	n/a	COBie - Specification	Reference (Uniform Resource Information) which the product is compliant



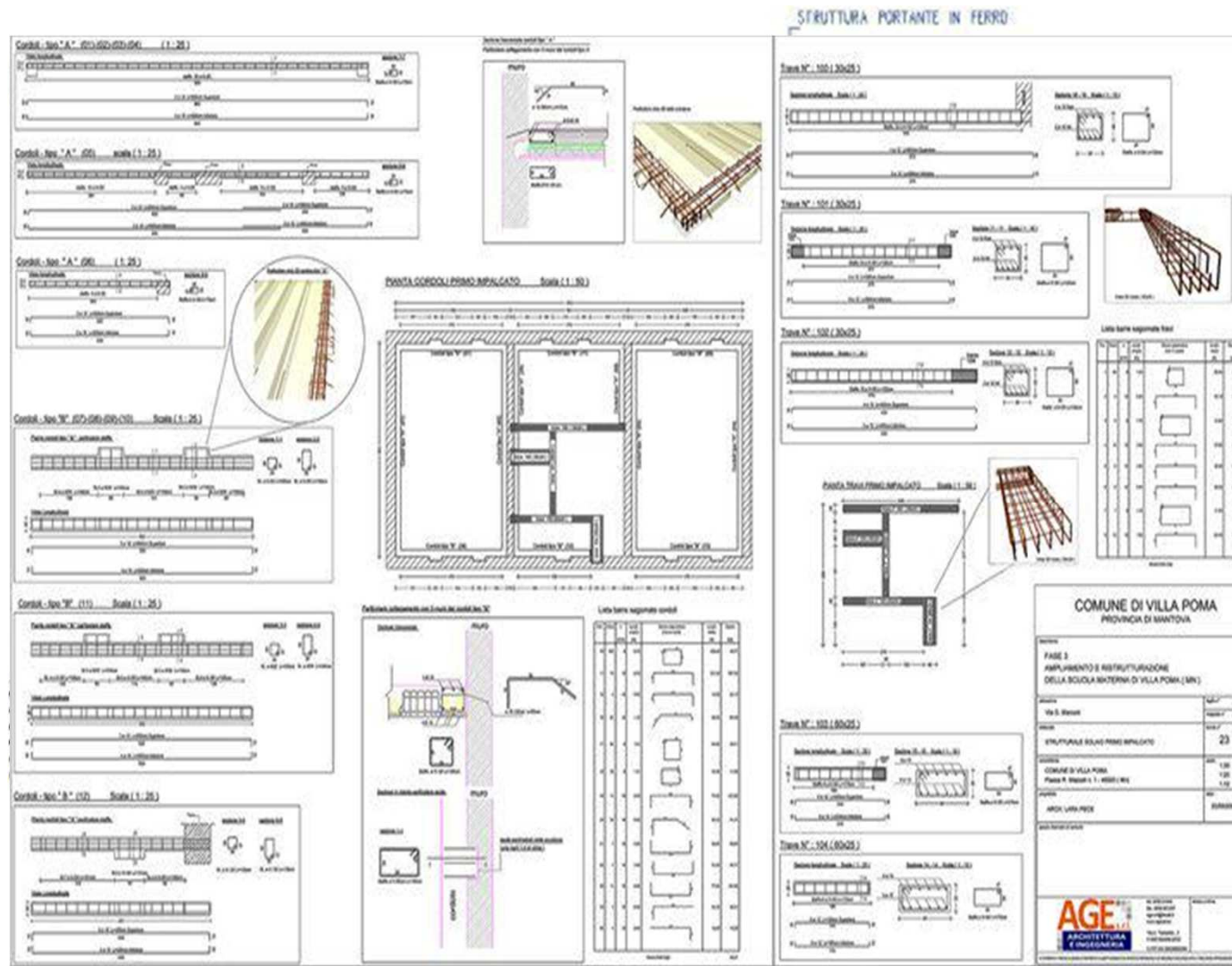
- ☐ Produttore
- ☐ Codice prodotto
- ☐ Resistenza fuoco
- ☐ Garanzia
- ☐ Installatore
- ☐ Data installazione
- ☐ Materiale
- ☐ Manuale di installazione
- ☐ Peso al trasporto
- ☐ RFID
- ☐ Colore
- ☐ Rapporti aero illuminanti
- ☐ Revisione
- ☐ Accessori
- ☐ Codici chiavi

- Altezza
- Larghezza
- Apertura
- Tipologia

Space Planning

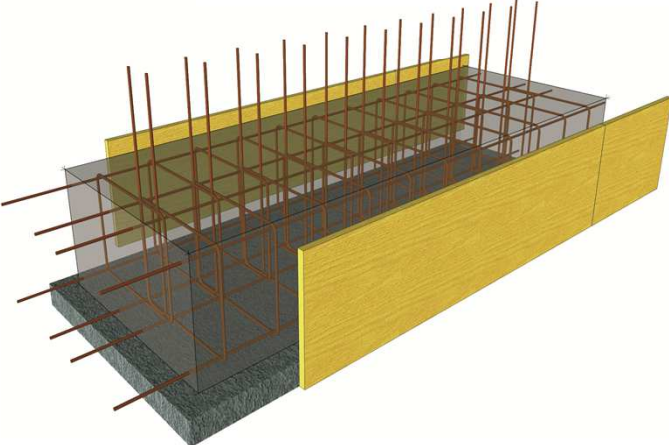
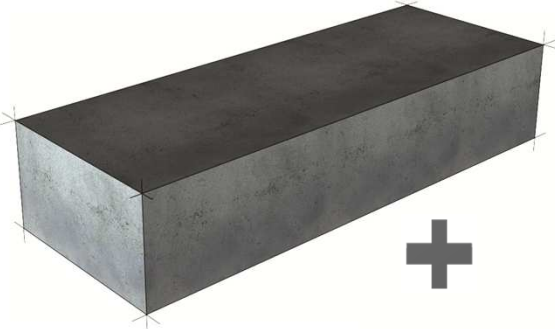


Gestione delle pratiche edili



- ❑ Disegni per pratiche edilizie
- ❑ Disegni esecutivi
- ❑ Tavole per concorsi

Il Computo delle quantità



Testo breve	Codice	Unità	Prezzo	Formula
Design2Cost			0,00	
FONDAZIONE CONTINUA	FO.001		0,00	
Fondazione continua in cemento armato	FO.001.010	m3	108,60	Volume
Magrone di fondazione	FO.001.020	m3	77,19	$((Spessore+0.15*2)*Lungh)*0.10$
Ferro tondino di armatura	FO.			
Casseri per l'armatura	FO.			

Formula

Volume

$((Spessore+0.15*2)*Lungh)*0.10$

Volume*70

$2*Superficie_media$

Materiale/Codice	Testo breve	Record	Quantità Unità	PU eff	PT eff
FO.001.010	Fondazione continua in cemento armato	$(1.000*2.750*0.500)$	1,375 m3	108,60	149,32
FO.001.020	Magrone di fondazione	$((1.00 + 0.15*2)*2.75)*0.10$	0,358 m3	77,19	27,63
FO.001.030	Ferro tondino di armatura	$1.375*70$	96,250 kg	1,01	97,21
FO.001.040	Casseri per l'armatura	$2*(2.750*0.500)$	2,750 m2	21,36	58,74

Stampa 3D



Z CORPORATION™

iKix

Architectural Modeler in India Introduces 3D Printing as Project Management Tool

- **iKix** – An architectural modeling service based in India and serving the world
- **Challenge** – Helping architects, builders and their teams save time, labor and materials by reducing errors
- **Solution** – Using 3D printing as a project management tool

Rosedale by ETA Star, Chennai India



In his two decades in the computer-aided design industry, R. "Partha" Parthasarathy's first question to clients has always been, "What problems can we solve for you?"

"Getting our projects to market more quickly," was the inevitable answer.

Because of the long lead time required to produce such a usually commission these i time to reveal final plans t

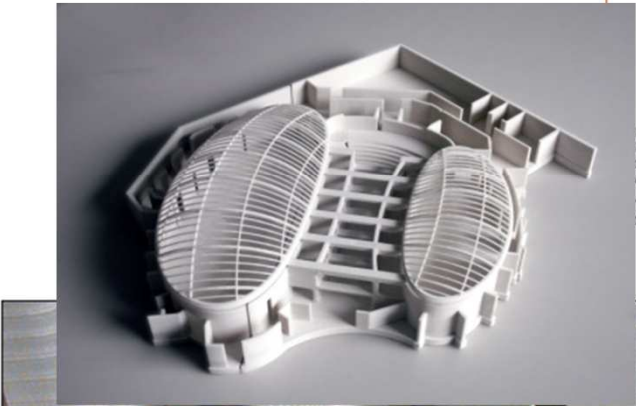
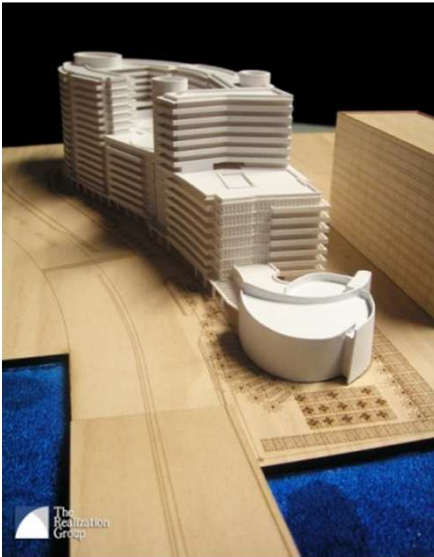
iKix, however, can "3D print in six to 10 days, far less t



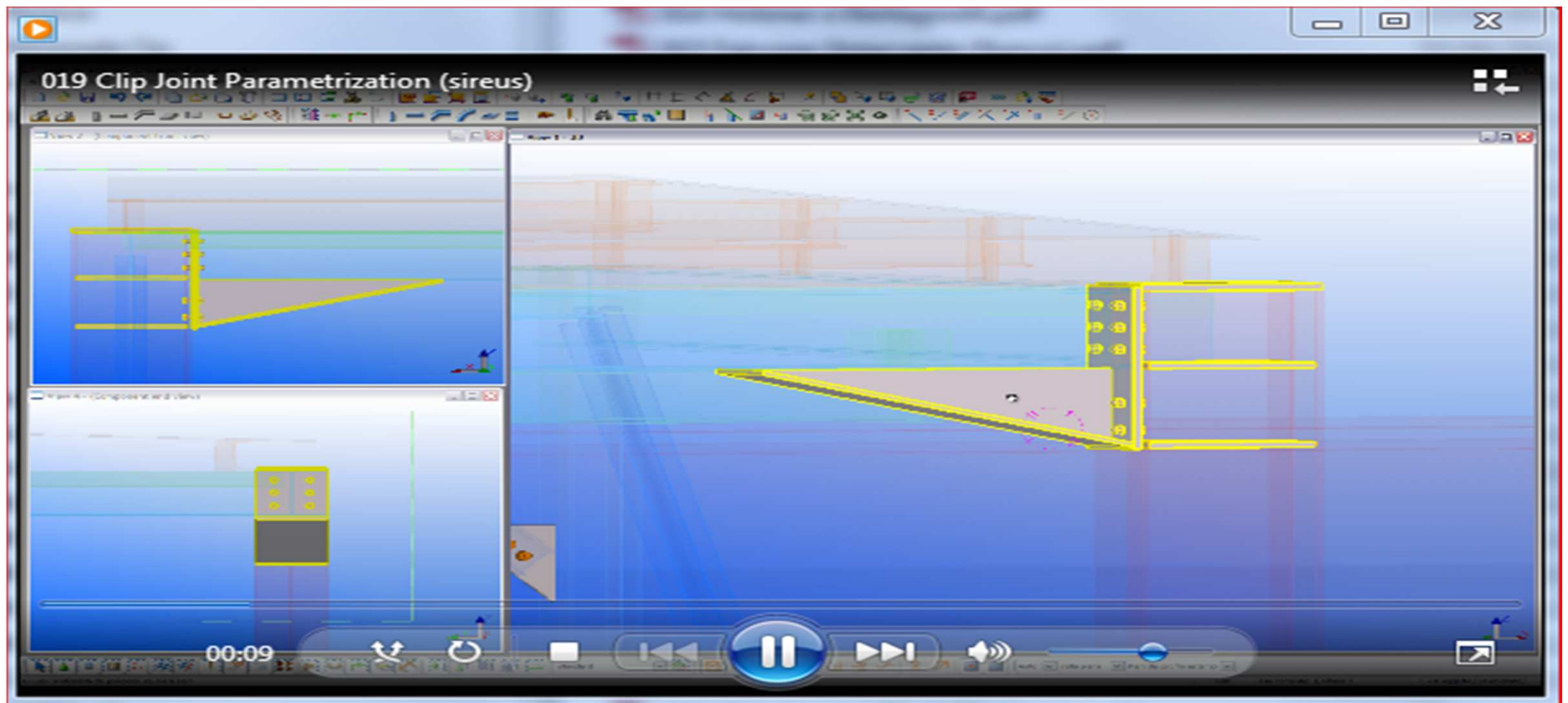
Durban Millenium Tower (Photo Courtesy of F.A.D. Publishers) and ZPrinter® 310 model



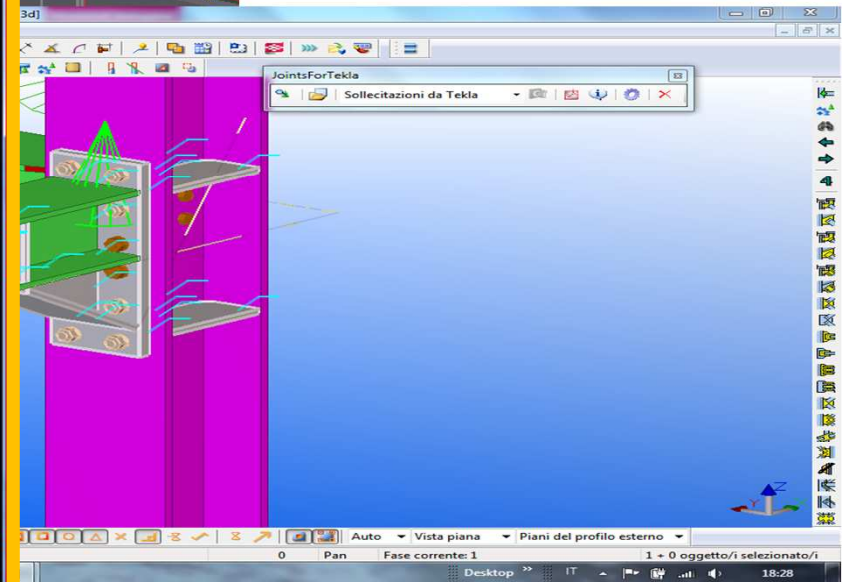
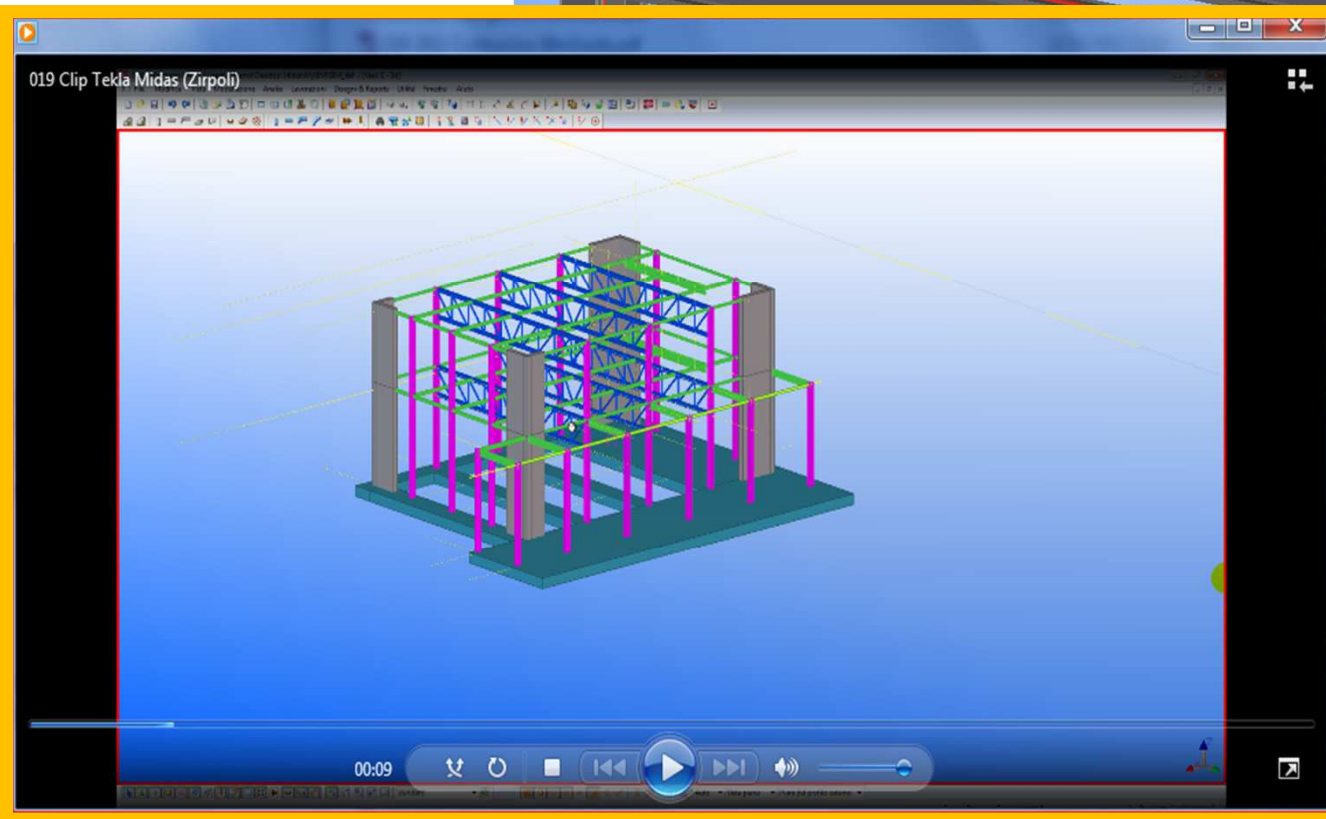
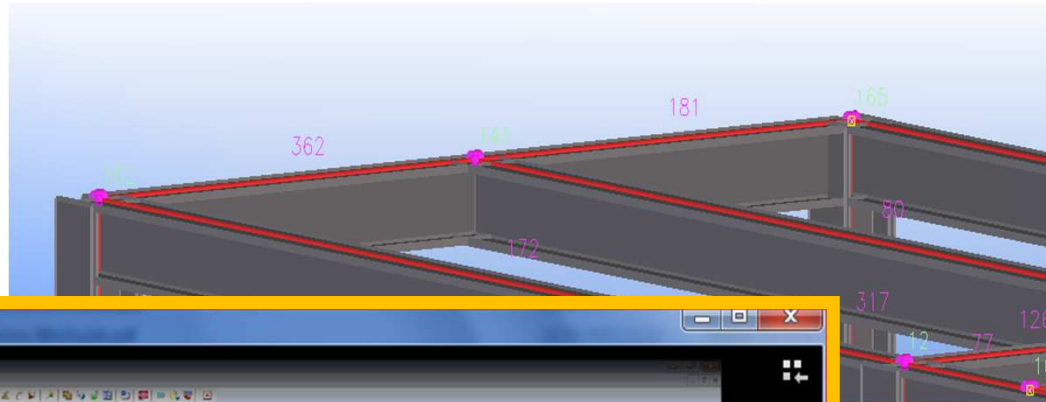
The Realization Group used the ZPrinter 310 Plus to create this 28-inch-high model of "The Met" in Miami, in one-fourth of the time and cost of traditional architectural modeling methods.



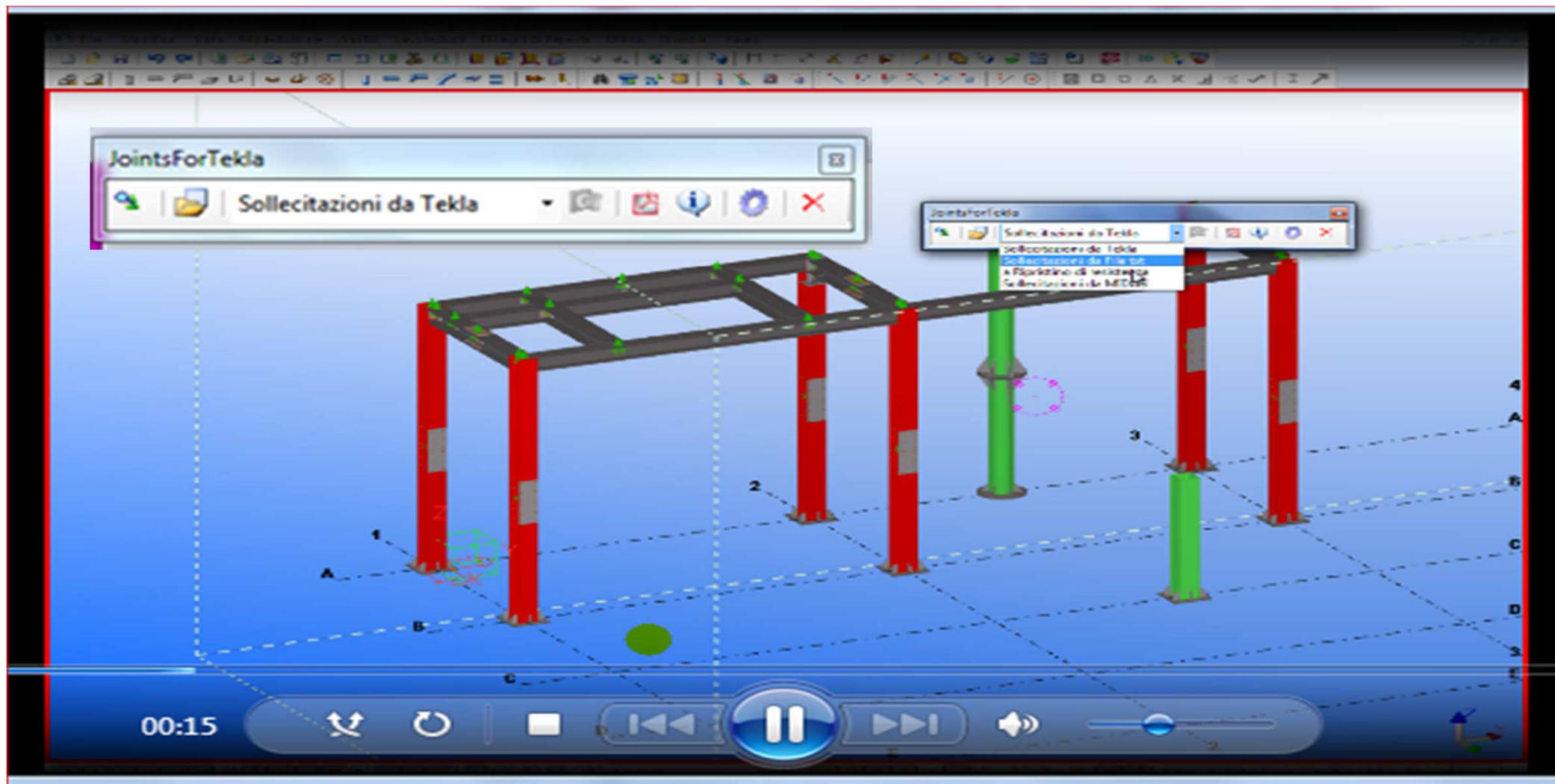
Automazione e parametricità della modellazione



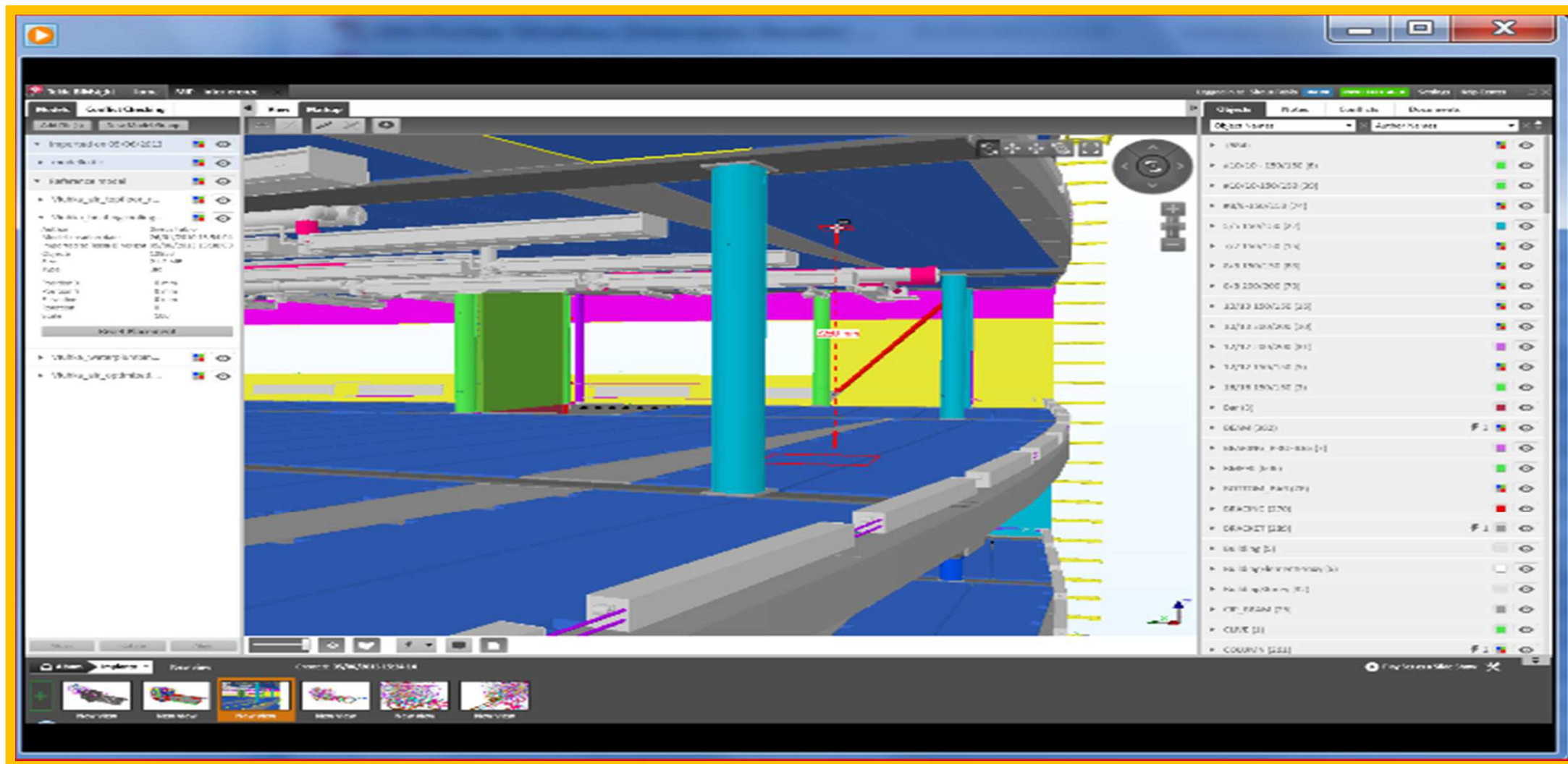
Analisi Strutturale FEM



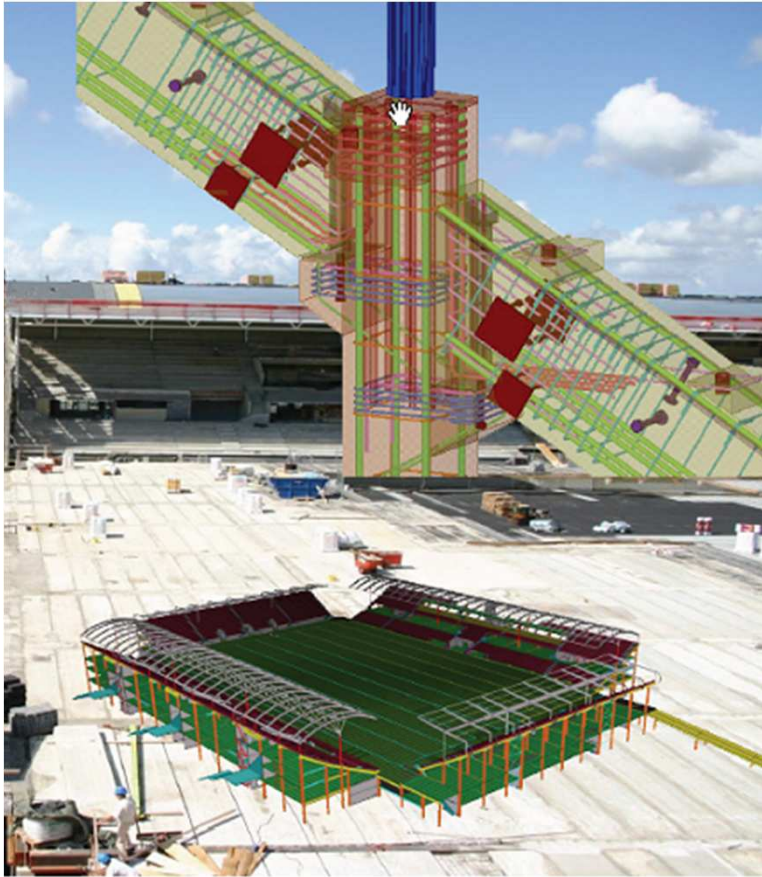
Verifica strutturale dei nodi in acciaio



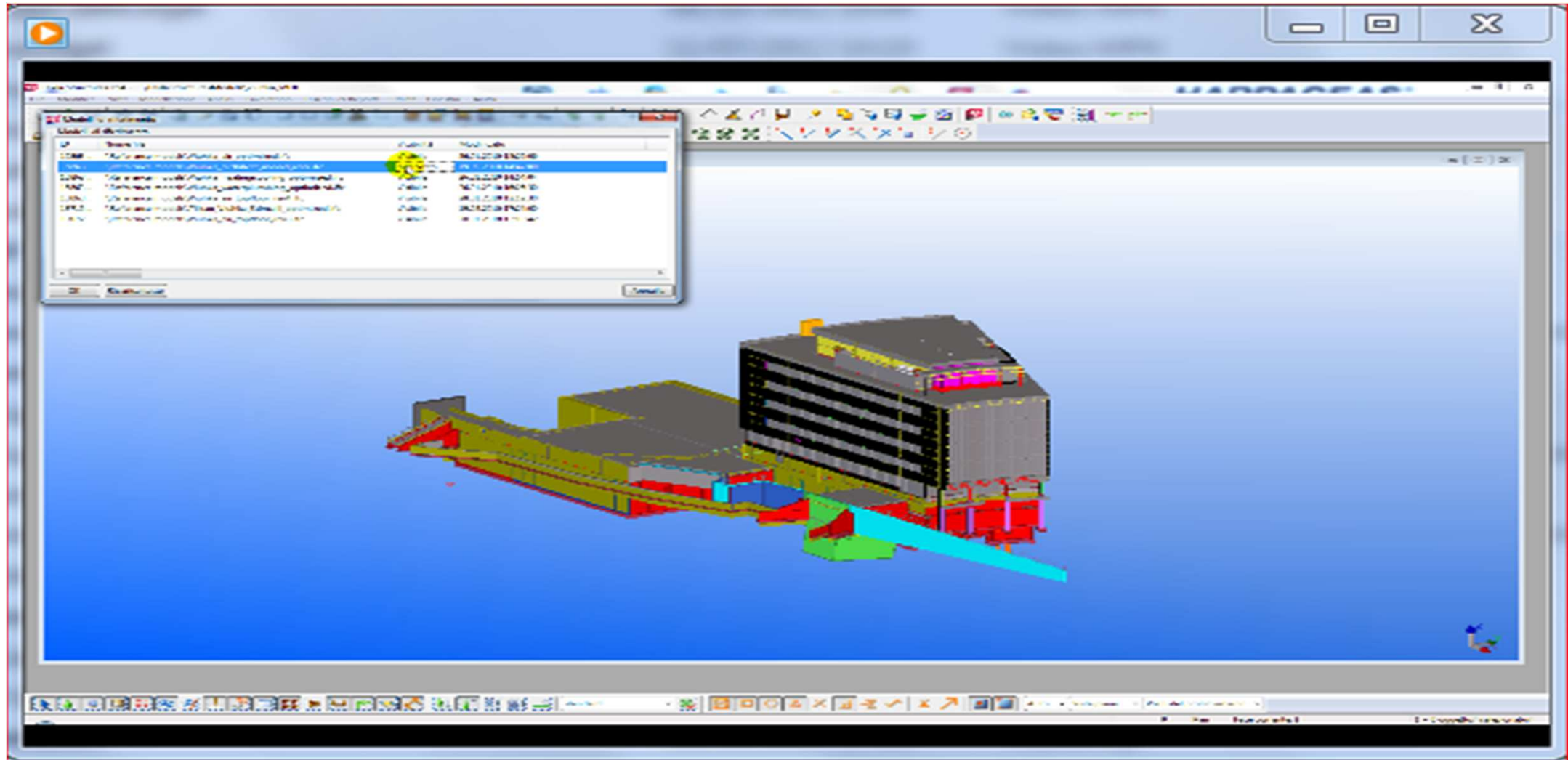
Cooperazione interdisciplinare



Interference check



Modello di riferimento



Lavorazioni automatizzate



Gabbie armatura e reti (contr. num.)



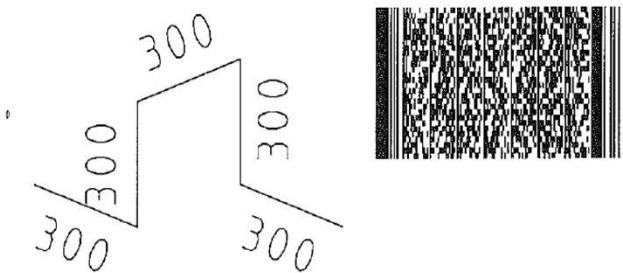
9.2 BF3D Example

As example the drawing number 417 index a from the project TestPDF, item 1, quantity 10, diameter 12, grade 500S and the bending diameter 4*ds = 48 are used. For better comprehension the data are printed **bold** and the block identifications larger.

The header block therefore reads:

BF3D@H|TestPDF@r417@a@p1@l1500@n10@e1.223@d12@g500S@s48@v@
(59 characters)

Example 5:



Only coordinate notation is used for 3D bar items. The only coordinates to be given are those that actually change.

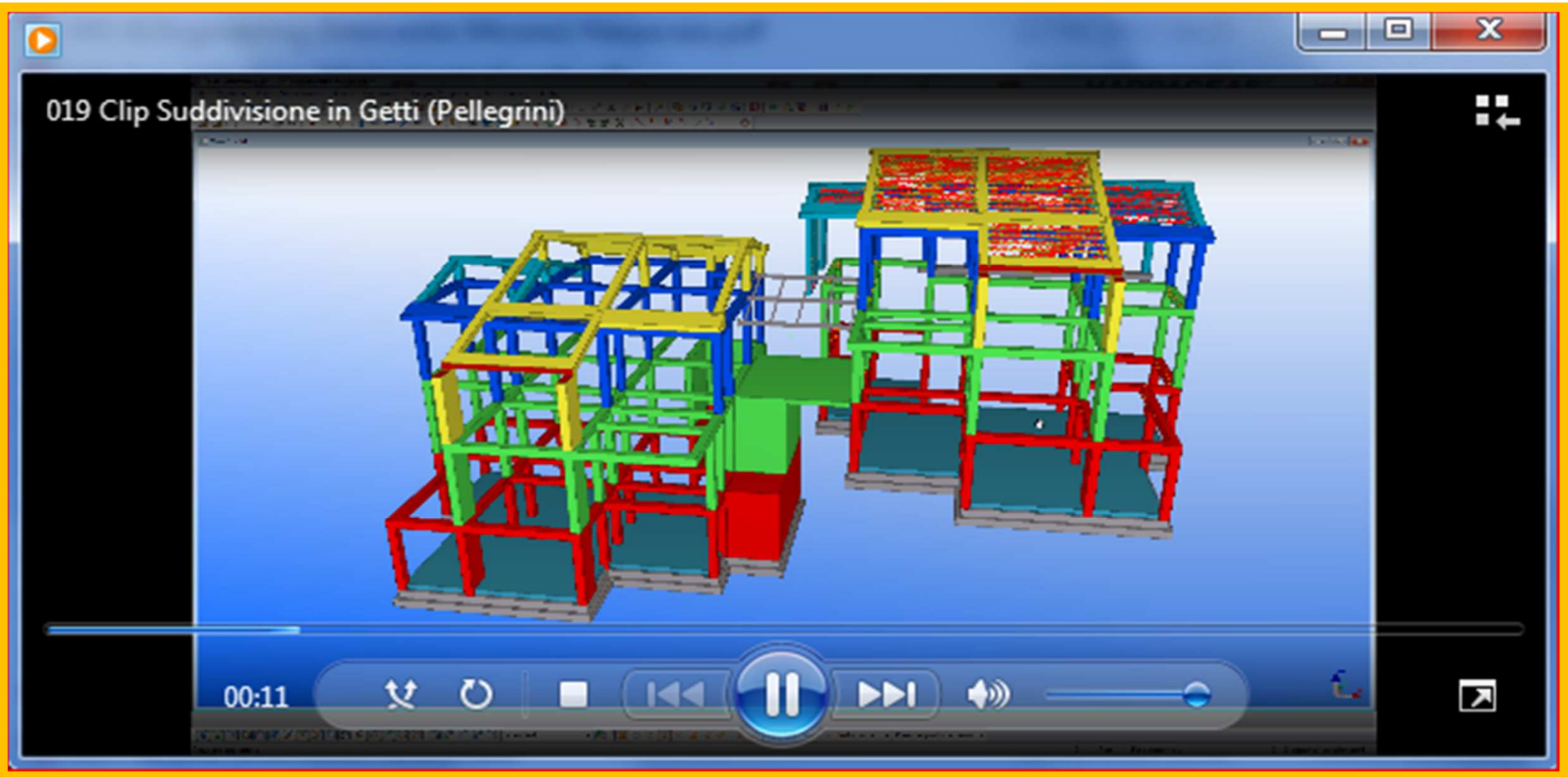
The geometry block reads:

Gx300@y0@z0@_
x0@y0@z300@_
x0@y300@z0@_
x0@y0@z-300@_
x300@y0@z0@_



Progress Maschinen & Automation

Gestione dei lotti/getti di cantiere

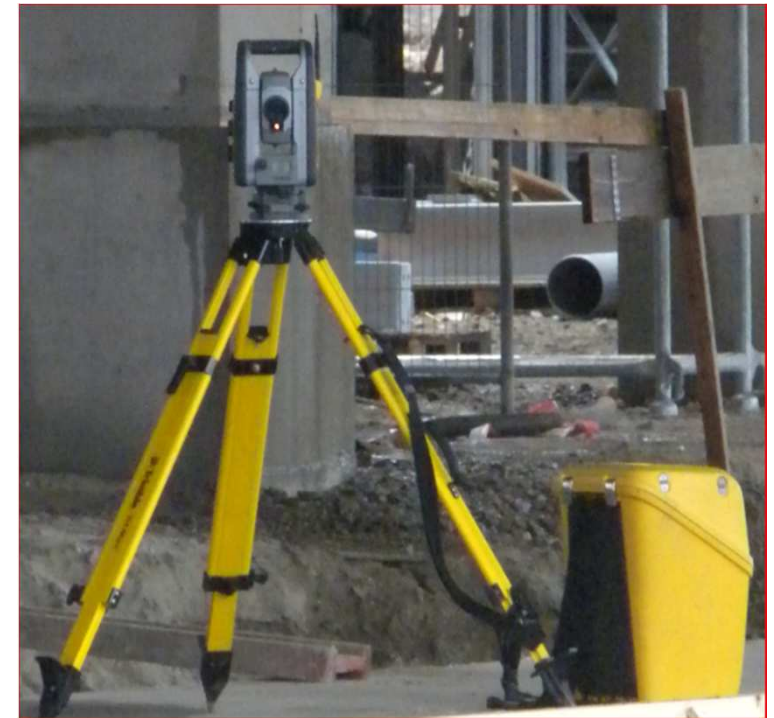
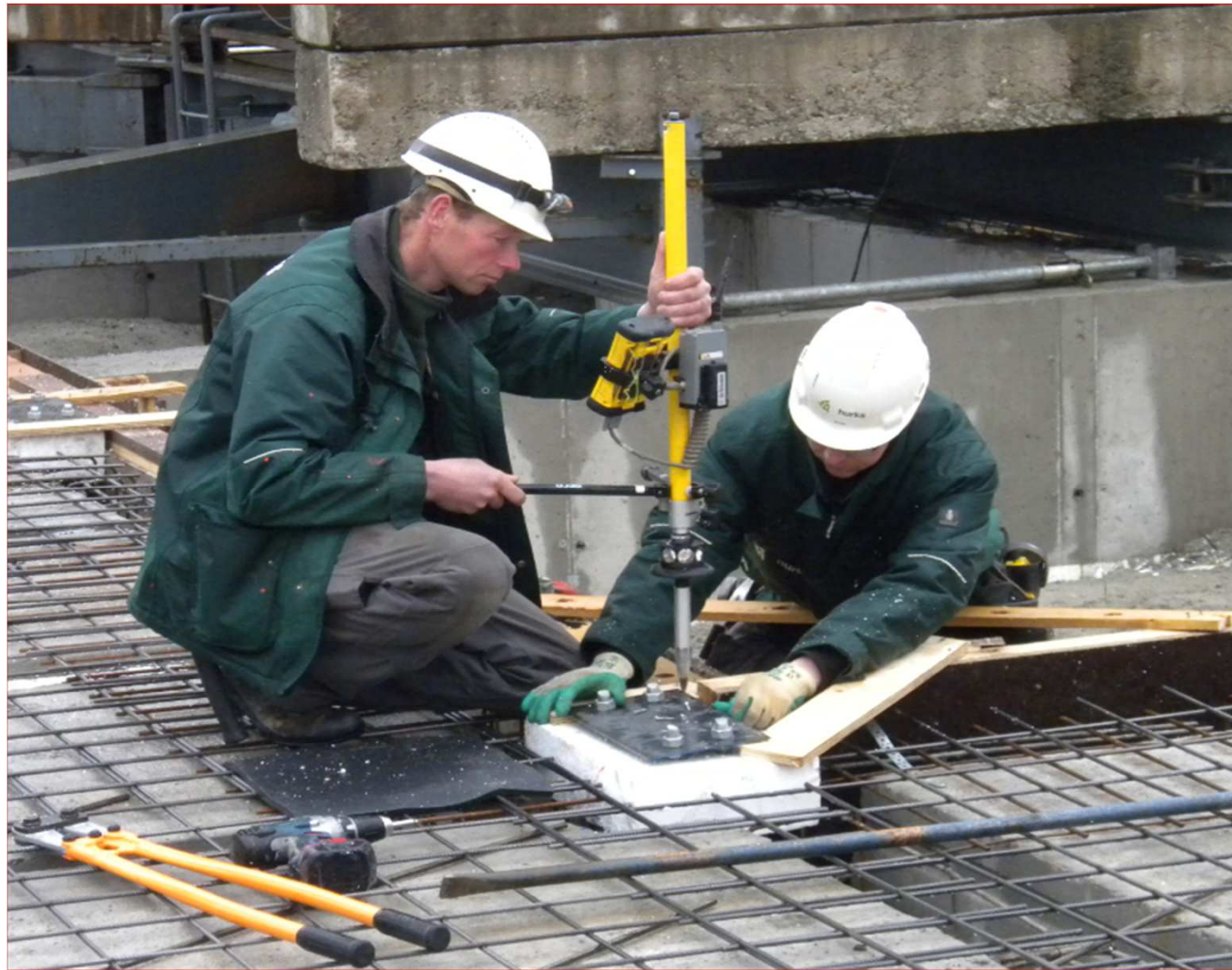


BIM to Field workflow



“It’s a seemingly simple connection between the office and field that has the potential to save an extraordinary amount of time, and allow us to transition the BIM model from a design tool into a true downstream construction and facility management solution.”
field Workflow

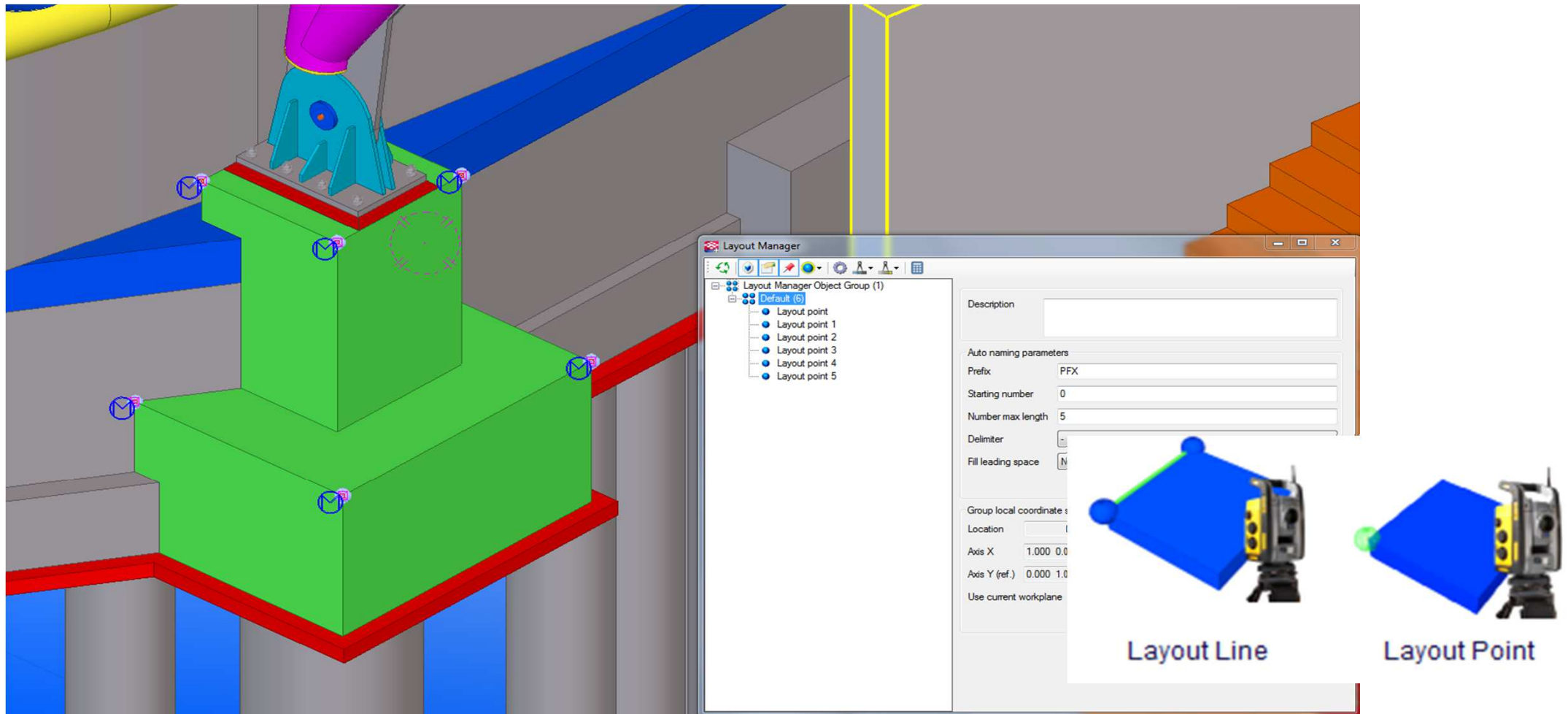
Bim to Field



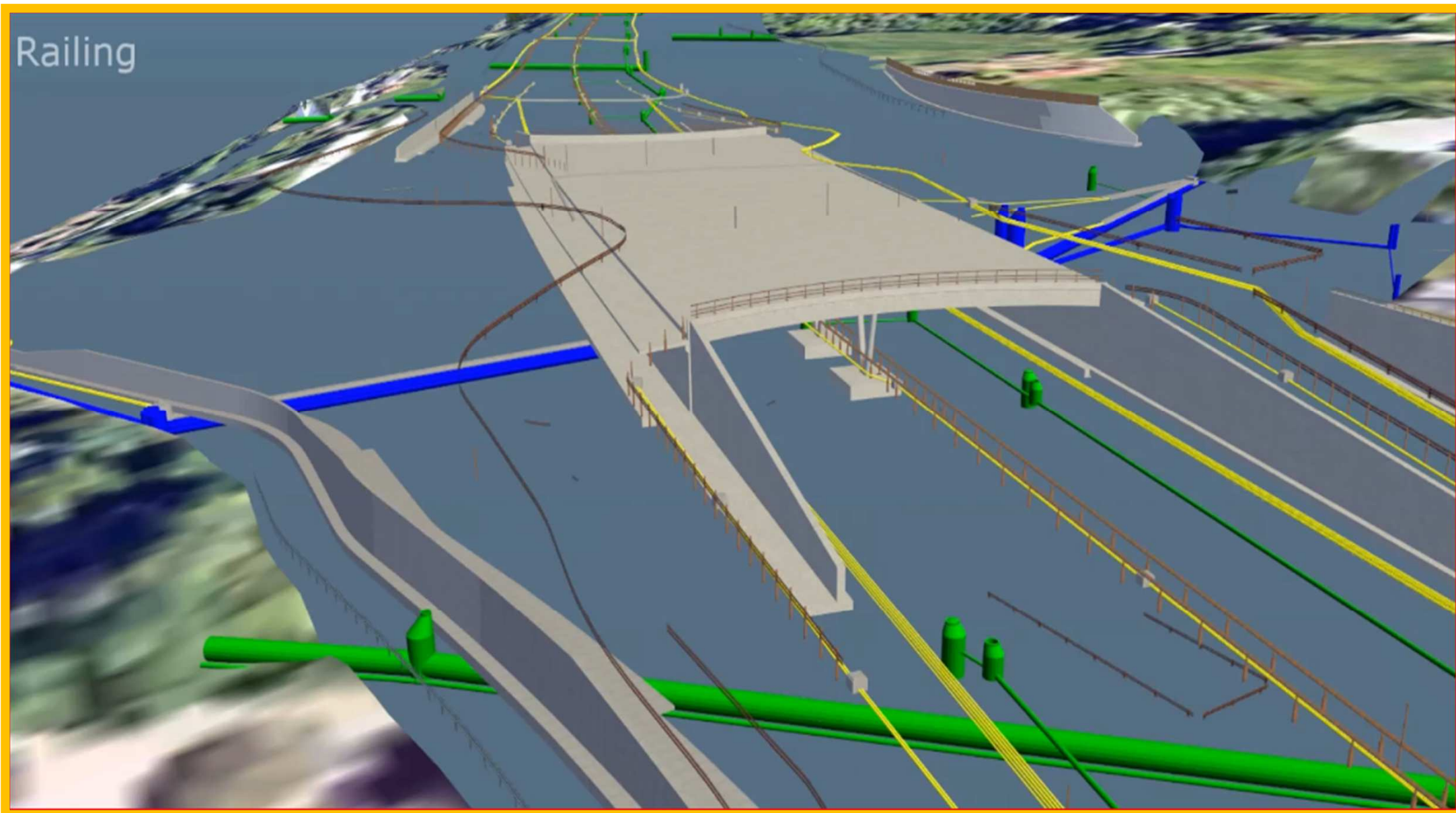
Trimble Inc. - HURSK Construction (Netherlands)

Layout manager

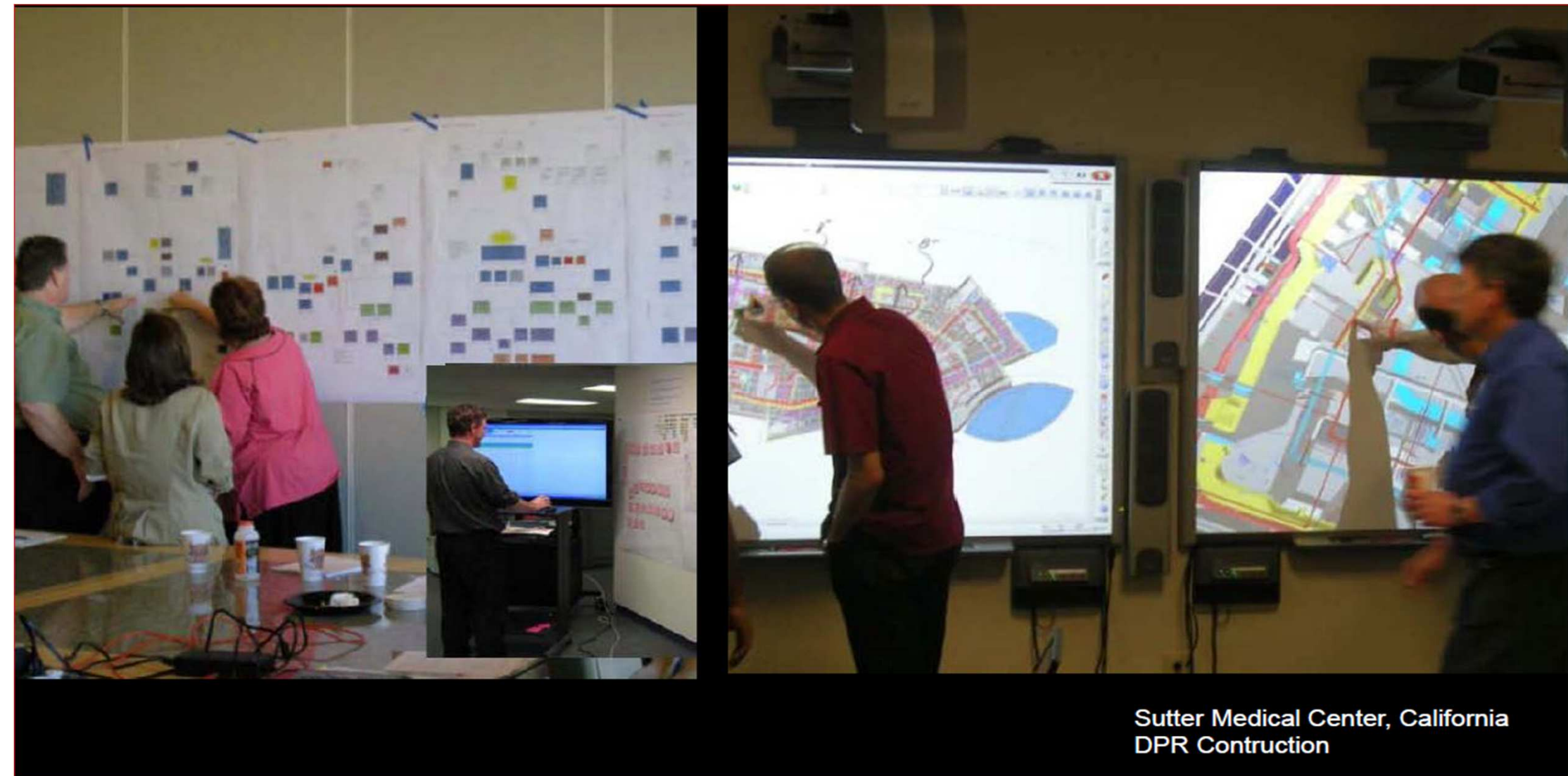
Use Layout Manager to import and export layout data between BIM software and a field layout device. Layout Manager enables you to use accurate model data on the construction site.



Opere sottostradali



BIM nell'ufficio tecnico e in cantiere



Sutter Medical Center, California
DPR Contruction

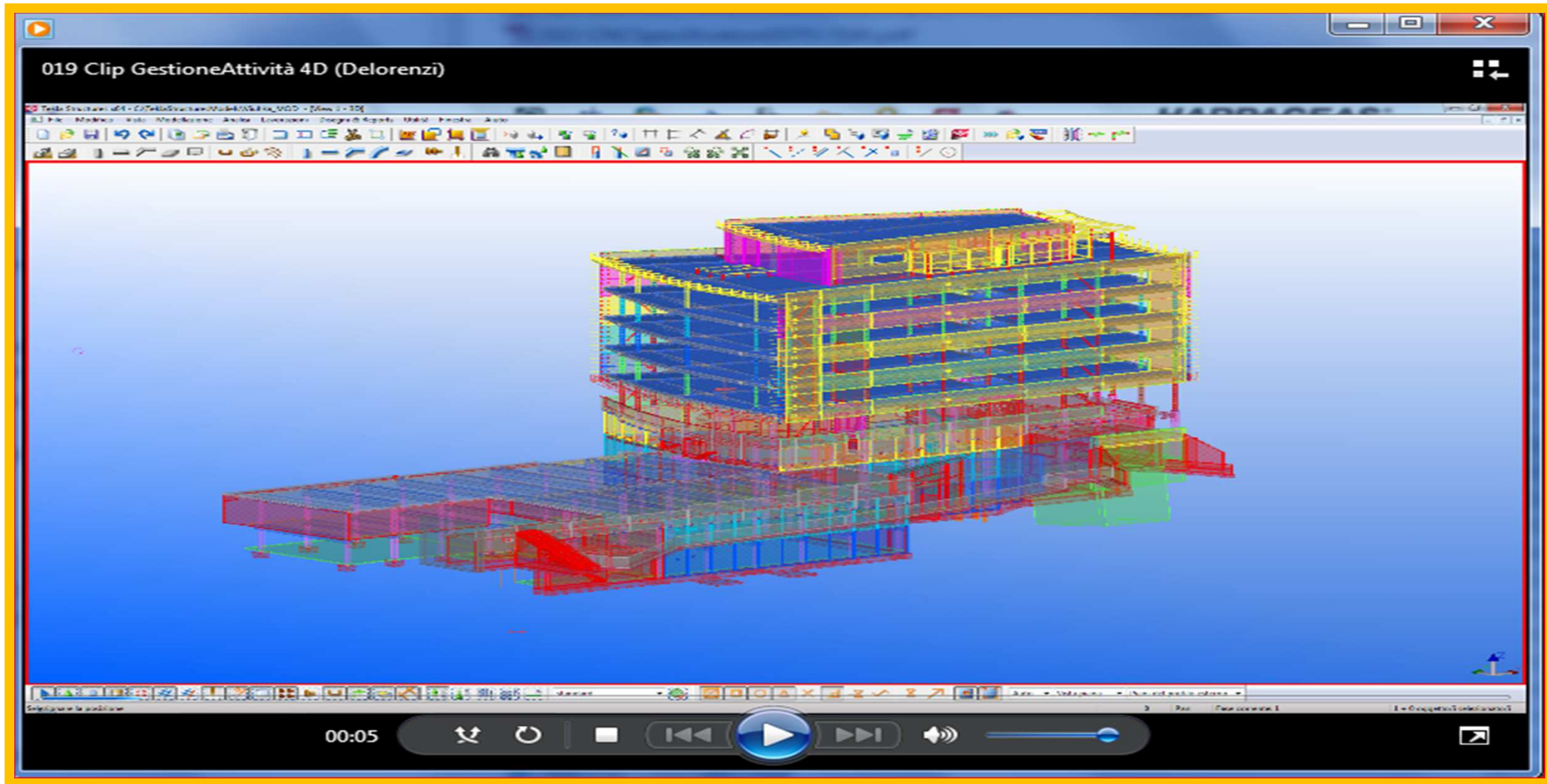
DPR Construction (USA)

Tables – *(android applications)*

This BIM to the field workflow provided one of the more compelling demonstrations of the power of BIM to assure accuracy, and remove costly and frustrating assembly errors in the field.



4D e Construction management



Archivio documentazioni

SPEC DATA

QUICKRETE
CEMENT & CONCRETE PRODUCTS™

1. Product Name
QUICKRETE 5000 High Early Strength Concrete Mix #1007

2. Manufacturer
The QUIKRETE Companies
One Securities Centre
3490 Piedmont Road, Suite 1300
Atlanta, GA 30329

PHYSICAL/CHEMICAL PROPERTIES
QUICKRETE 5000 High Early Strength Concrete Mix exceeds the compressive strength requirements of ASTM C887, as shown in Table 1.

TABLE 1 TYPICAL PROPERTIES OF QUICKRETE 5000 CONCRETE MIX

Cure time	Compressive strength
1 day	5000 psi (34.5 MPa)
3 day	5500 psi (37.9 MPa)
7 day	5800 psi (40.1 MPa)
28 day	6000 psi (41.4 MPa)
Slump range	2" - 3" (51 - 76 mm)

QUICKRETE 5000 High Early Strength Concrete Mix #1007

TEMPERATURE OF WATER
Set times will fluctuate in extremely hot or cold weather. In cold water or water mixed with ice cubes in severely cold weather, use hot water when mixing in severely cold weather.

SITE PREPARATION
Strike out the base and remove soil or silt to the desired depth. Nail and shore forms securely in place. Tamp the subgrade until firm.

APPLICATION

- Dump the subgrade before concrete is placed. Do not leave standing puddles. Shovel or place the concrete into the form, fill to the full depth of the form.
- After the concrete has been compact and spread to completely fill the form, strike off on a float immediately.
- To strike off, use a straight board (just moving the edge back and forth) at a 45-degree angle to smooth the surface. Use a trowel or bull float to float the surface. The trowel level only edge and fill voids left by the straight edge.
- Cut the concrete away from the forms by running an edging tool or trowel along the forms to compact the slab edge.
- Cut 1" (25.4 mm) control joints into the slab every 4' - 8' (1.2 - 2.4 m) using a grooving tool.
- Allow the concrete to stiffen slightly, waiting until all water has evaporated from the surface before troweling or applying a broom finish.

Note: For best results, do not overwork the material.

FAST-SETTING CEMENT BASED PRODUCTS - DRY-PACKAGED

MATERIAL SAFETY DATA SHEET
(Complies with OSHA 29 CFR 1910.1200)

SECTION I - PRODUCT IDENTIFICATION

The QUIKRETE® Companies
One Securities Centre
3490 Piedmont Road, Suite 1300
Atlanta, GA 30329

Emergency Telephone Number
(770) 216-9580

Information Telephone Number
(770) 216-9580

MSDS V2
Revision: Jan-07

QUICKRETE® Product Name

Product Name	Code #
Fast-Setting Concrete Mix	1004-50
Commercial Grade FastSet™ Cement	1124-92
Commercial Grade FastSet™ Non-Shrink Grout	1585-09
Commercial Grade FastSet™ Repair Mortar	1241-60
Commercial Grade FastSet™ Concrete Mix	1004-51
Commercial Grade FastSet™ DOT Mix	1244-56
Concrete Resurfacer	1131-40

SECTION II - HAZARDOUS INGREDIENTS/IDENTITY INFORMATION

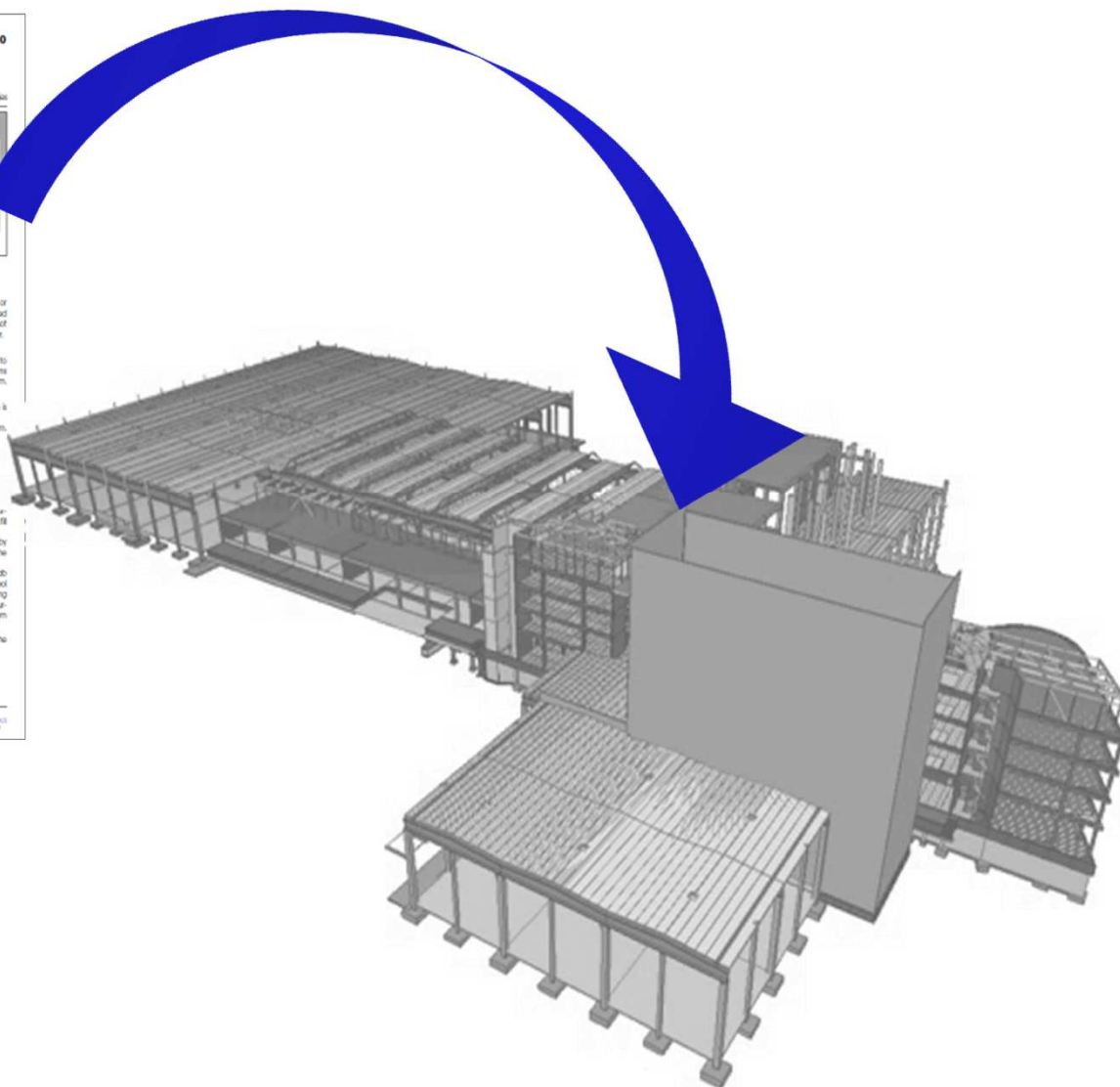
Hazardous Components	CAS No.	PEL (OSHA) mg/M ³	TLV (ACGIH) mg/M ³
Portland Cement	65997-15-1	5	5
Lime	01305-62-0	5	5
Silica Sand, crystalline	14808-60-7	10 %SiO ₂ +2	0.05 (respirable)

May contain one or more of the following ingredients:

Ingredient	CAS No.	PEL (OSHA) mg/M ³	TLV (ACGIH) mg/M ³
Amorphous Silica (From fly ash)	07631-86-9	80 %SiO ₂ +2	10
Alumina (From Fly Ash)	01344-28-1	5	5
Limestone Dust	01317-85-3	5	5
Calcium Sulfate	10101-41-4 or 13397-24-5	5	5
Calcium Sulfaluminate	65997-16-2	15	10

Other Limits: National Institute for Occupational Safety and Health (NIOSH). Recommended standard maximum permissible concentration=0.05 mg/M³ (respirable free silica) as determined by a full-shift sample up to 10-hour working day, 40-hour work week. See NIOSH Criteria for a Recommended Standard Occupational Exposure to Crystalline Silica.

ONE SECURITIES CENTRE, 3490 PIEDMONT ROAD, SUITE 1300, ATLANTA, GA 30329 TEL 404-634-9100 WWW.QUICKRETE.COM



La trappola dei formati 'proprietaari'

Lightweight Capture of As-Built Construction Information

E. East

Engineer Research and Development Center, Champaign, IL, USA

N. Nisbet, J. Wix

AEC3, London, UK

ABSTRACT: Discussions of Building Information Modeling (BIM) often center on commercial software and building geometry. Such discussions typically ignore the need for information capture and exchange during construction. This paper identifies several patterns of information exchange needed for the capture and delivery of construction handover data. A prototype tool set, bimServices, has been developed to support of these information exchange patterns. The paper also includes specific examples of how the prototype tool would be used to capture and transmit as-built construction information.

1 INTRODUCTION

The use of BIM during construction has focused, for the most part, on the visualization and manipulation of the geometric model elements. Anecdotal evidence from large commercial contractors indicate that they are beginning to create a BIM for complex areas within a project to resolve design discipline coordination problems prior to construction. Manipulation of geometric objects in three dimensions prior to construction reduces on-site conflicts due to hard-to-communicate dimensions. A leading U.S. trade magazine, *ENR*, reports that one hour of construction activities results in ten hours of re-work [Post 2009]. Adding of the BIM to BIM allows the creation of so-called "point applications" of BIM. The objective of such models is to reduce conflicts due to trade scheduling and of products in material storage yards. The use of 4D models is most highly visible in constrained premier projects, such as China's Olympic stadium, where the project team uses technology to link building elements with construction sequence [Tekla 2009].

The use of commercial software to display geometry in static and time-sequenced approaches is the most easily adopted aspect of BIM by commercial software firms and users of their products. These models are typically created by one "BIM jockey" at the prime contractor's office whose job is to present the model and identify problems that are resolved to update the design. Ideally, these changes are fed back into the BIM model and result in the production of improved construction contract documents. Today's efforts require a single party, typically the architect, to be responsible for the creation and publication of a model. Such "point applications" of BIM are far from the vision of models that capture the entire transformation of owner functional requirements throughout the project life-cycle. The life-cycle perspective is a key tenet of buildingSMART and large public owners such as the Corps of Engineers who are adopting open standards approaches for BIM exchange.

The American Institute of Architects recently released a document describing the expected evolution of the Integrated Design process. The document, AIA's *Integrated Design Process*, states that "the use of BIM for those aspects of the design process that require a single unified model implies that the idea of information exchange between all required information to all needed parties is an idea of contracted information exchange."

For many practitioners today, there is a perceived gap between the question of proprietary technology and the definition of information exchanges. The definition of a single proprietary software stack that allows seamless transmittal of information between project stakeholders. This

technology used, if information exchange is critical to the success of the project, then the technology is one of technology, but not of requirements for information exchange.

For many public owners interested in maintaining control of their facilities' information, the use of proprietary data formats and media is problematic. Over time, proprietary data formats are superseded by later non-compatible versions and storage media becomes obsolete. Owners interested in ensuring competitive markets and maintaining control of their facilities' information require open standards. The commonly acknowledged open standard for building information is the Industry Foundation Class (IFC) model. IFC, however, only provides a starting framework for the



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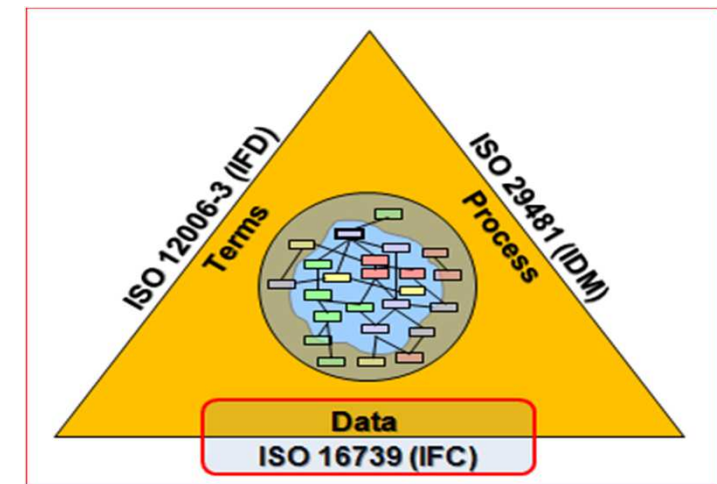
IFC4



BuildingSMART develops and maintains international standards for openBIM combining:

- ❑ buildingSMART **Processes** – (IDM) Information delivery manuals
- ❑ buildingSMART **Data Dictionary** - (bsDD, former IFD) Library
- ❑ buildingSMART **Data Model** - (IFC) Data Model

IFC Data File Formats and Icons		
IFC data files are exchanged between applications using the following formats and should be indicated by the published icons:		
.ifc	IFC data file using the STEP physical file structure according to ISO10303-21. The *.ifc file shall validate according to the IFC-EXPRESS specification. This is the default IFC exchange format.	
.ifcXML	IFC data file using the XML document structure. It can be generated directly by the sending application, or from an IFC data file using the conversion following ISO10303-28, the XML representation of EXPRESS schemas and data. Note: an .ifcXML file is normally 300-400% larger than an .ifc file.	
.ifcZIP	IFC data file using the PKzip 2.04g compression algorithm (compatible with e.g. Windows compressed folders, winzip, zlib, info-zip, etc.). It requires to have a single .ifc or *.ifcXML data file in the main directory of the zip archive. Note: an .ifcZIP files usually compress an .ifc down by 60-80% and an .ifcXML file by 90-95%.	



Model & Project Checker

