

Warum verschenken wir so viel Potential?

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# BIM nach dem Entwurf

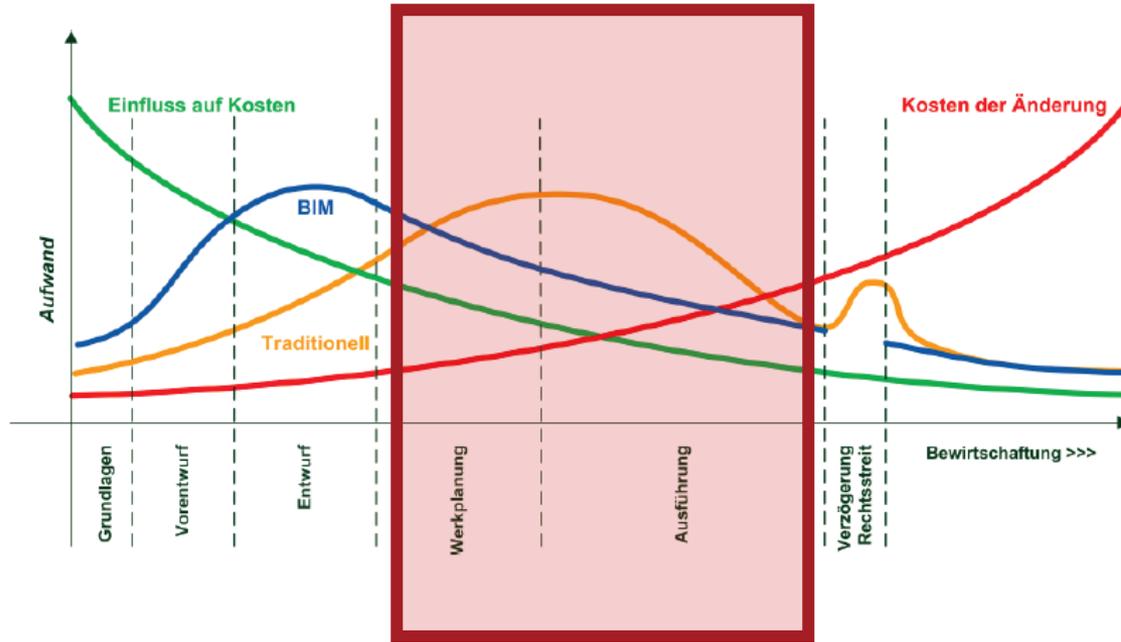


# Übersicht

- Level of Detailing LOD ist wichtig
- Schalung modellieren
- Positionierung Schalung
- Positionierung Verankerung

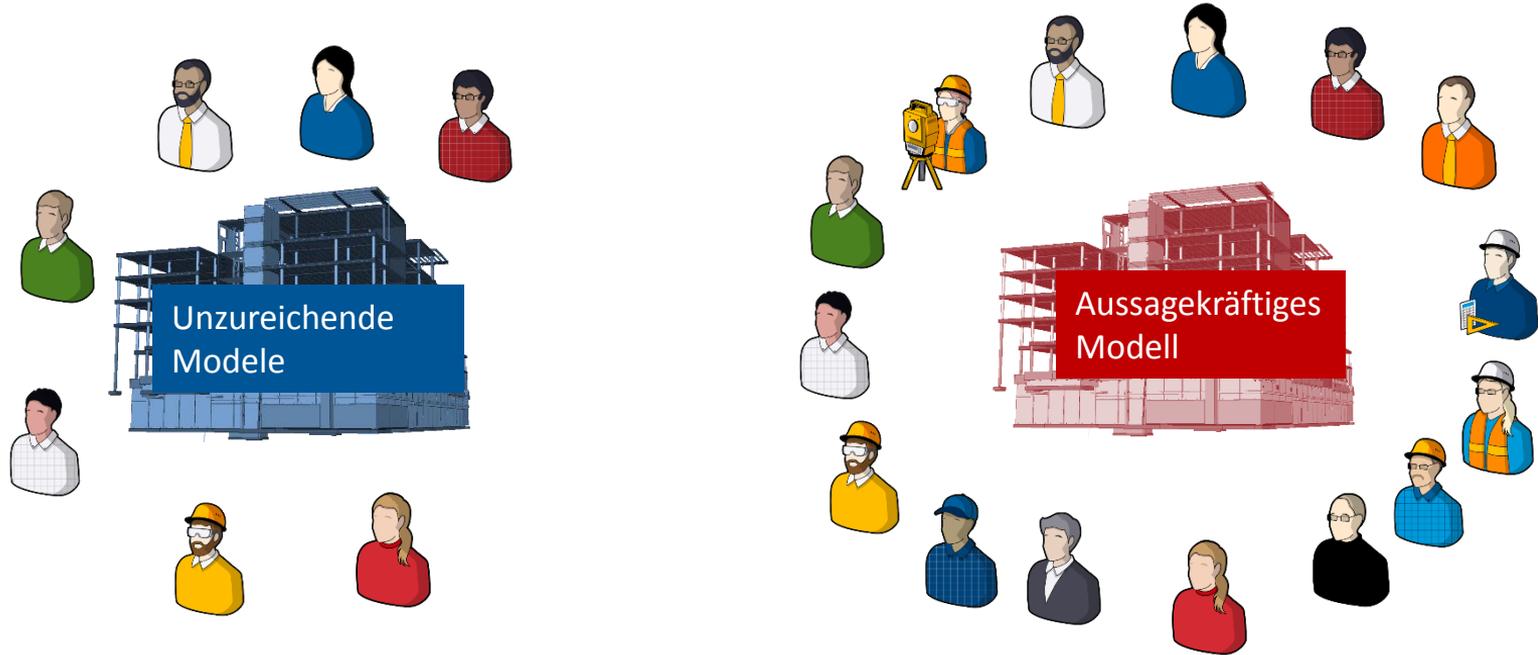
# BIM – Warum ?

## ■ Einfluss von Änderungen auf die Kosten



- Kostensicherheit
- Terminalsicherheit
- Effizienzsteigerung
- Besseres Risikomanagement
- Nachhaltigkeit

# Zuverlässigkeit schafft Vertrauen in BIM



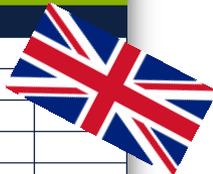
Element Code Uniclass 2015	Element Title Uniclass 2015	Stage 3 (Developed Design) 2015-12-24			Stage 4 (Technical Design) 2016-01-15			Stage 5 (Constructi 2016-02-19	
		LOD	LOI	Date Complete	LOD	LOI	Date Complete	LOD	LOI
		Ss_15_10_28		3	3	05-Dec-16	4	4	20-Nov-17
Ss_15_10_32		3	3	05-Dec-16	4	4	20-Nov-17		
Ss_15_95		3	3	05-Dec-16	4	3	20-Nov-17		
Ss_20_10		3	3	05-Dec-16	4	4	20-Nov-17		
Ss_20_10	Trusses and Lattice frames	3	3	05-Dec-16	4	4	20-Nov-17		
Ss_25_10_20	Curtain walling systems	2	2	05-Dec-16	3	3			
Ss_25_10_30	Framed partition systems	2	2	05-Dec-16	3	3	20-Nov-17	4	4
Ss_25_13_50	Masonry wall systems	2	2	05-Dec-16	3	3	20-Nov-17	4	3
Ss_25_20_60	Panel and sheet cladding	2	2	05-Dec-16	3	3	20-Nov-17	4	4
Ss_25_20_70	Rainscreen cladding	2	2	05-Dec-16	3	3	20-Nov-17	4	4
Ss_25_30_20	Door, shutter and hatch systems	2	2	05-Dec-16	3	3			
Ss_25_30_95	Window systems	1	1	05-Dec-16	2	2			
Ss_25_45_88	Tiling systems	1	1	05-Dec-16	2	2	20-Nov-17	4	3
Ss_55_20_34		2	2	05-Dec-16	2	4			
Ss_55_70_38		2	2	05-Dec-16	3	4			
Ss_60_40_37		2	2						
Ss_65_40_33		2	2						
Ss_70_30_45	Low-voltage systems	2	2						
Ss_70_80_33	General space lighting systems	2	2						
Ss_75_40_02	Access control systems	2	2	05-Dec-16	3	3			
Ss_75_40_75	Security detection alarm systems	2	2	05-Dec-16	3	3			

Status:  
LOD - Level of  
Definition

Time / Date

Classification system

Model Information Delivery Plan MIDP  
(PAS 1192-2)



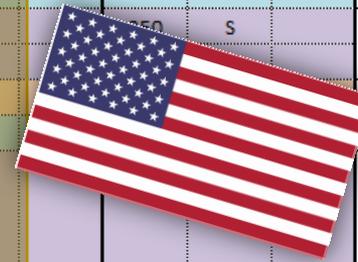
					Use on this project	Relevant Attribute Tables	Schematic Design			Developed Design			Construction Doc		
UniFormat Level							Nov-16			Apr-17			Date		
1	2	3	4	5			LOD	MEA	Notes	LOD	MEA	Notes	LOD	MEA	Notes
<b>SUBSTRUCTURE</b>															
A	10					A, B Concrete; A, B Wood; A, B Masonry; A, B Precast Concrete									
A	10	10				Standard Foundations									
A	10	10	.10			Wall Foundations									
A	10	10	.30			Column Foundations	200	S		300	S				
A	10	20				Special Foundations									
A	10	20	.80			Grade Beams									
A	20					Subgrade Enclosures									
A	20	10				A, B Concrete; A, B Wood; A, B Masonry; A, B Precast Concrete									
A	40					A, B - Str. Concrete									
A	40	10				A, B Concrete	200	S		300	S				
A	40	20				Structural Slabs-on-Grade									
<b>SHELL</b>															
<b>Superstructure</b>															
B	10					Floor Construction									
B	10	10													

Time / Date

Status: Level of Development

Classification system

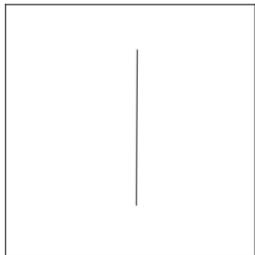
Model Element Author (Stused by..)



# Wieso profitieren wir von detaillierten Modellen?

## Concrete Column

LOD 100 – Info. Niveau 1



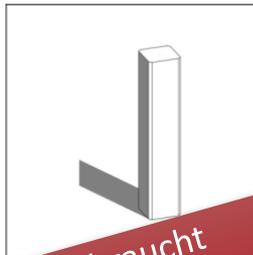
### Geometry

The column's location is represented by either a line or by a geometric deputy with an approximate geometry.

### Properties - suggestion

Approximate numbers

LOD 200 – Info. Niveau 2



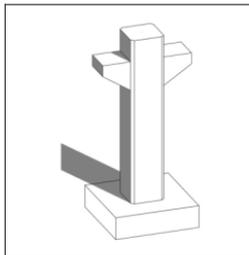
### Geometry

The column object is represented by approximate quantities, shape and shape, location and orientation.

### Properties - suggestion

Approximate numbers

LOD 300 – Info. Niveau 3



### Geometry

The column contains precise dimensions and location. Depending on type, connections and reinforcement items are modelled.

### Properties - suggestion

Approximate numbers

LOD 350 – Info. Niveau 4



### Geometry

The column contains precise dimensions and location. Depending on type, connections and reinforcement items are modelled.

### Properties - suggestion

Approximate numbers

LOD 350 vermeidet Nachfragen

Wer braucht mehr?

Die Prozesse auf der Baustelle: RFI's

Gebräuchliche BIM Software

Leistungsfähige BIM Lösungen

RFI's

RFI's

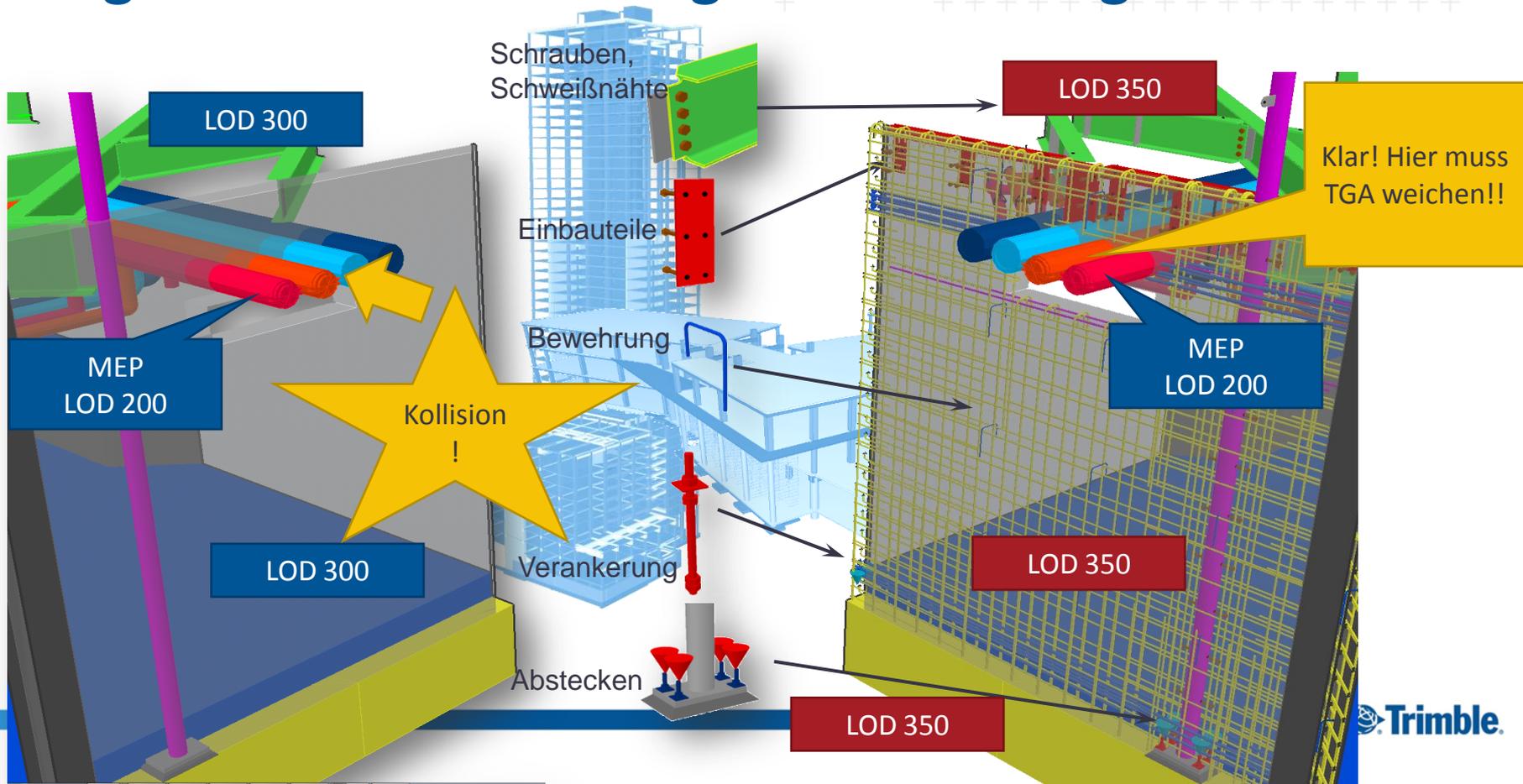
RFI's

Änderungsanzeige

Änderungsanzeige

Verzögerung

# Ein ausgereiftes Modell >LOD300 gibt Ihnen die Argumente für die richtige Entscheidung



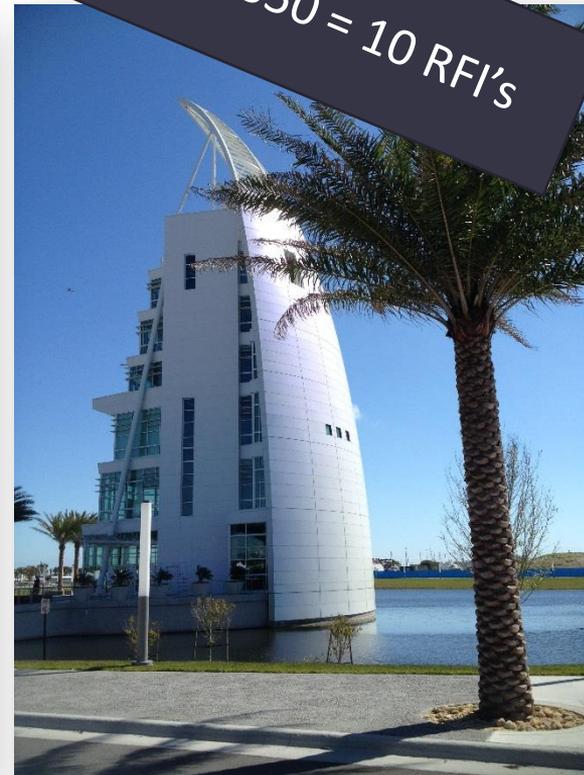
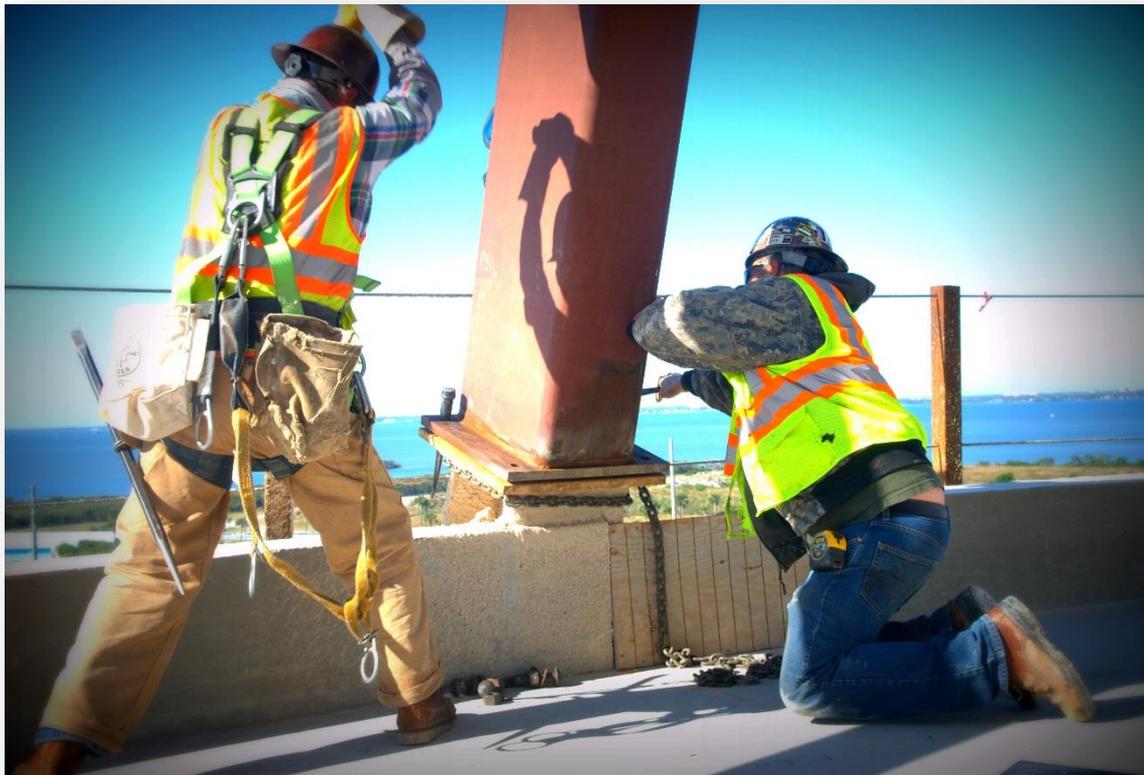


# Reduzierung der Änderungsanzeigen

Port Canaveral Welcome Center, Cape Canaveral, Florida

Thornton  
Tomasetti

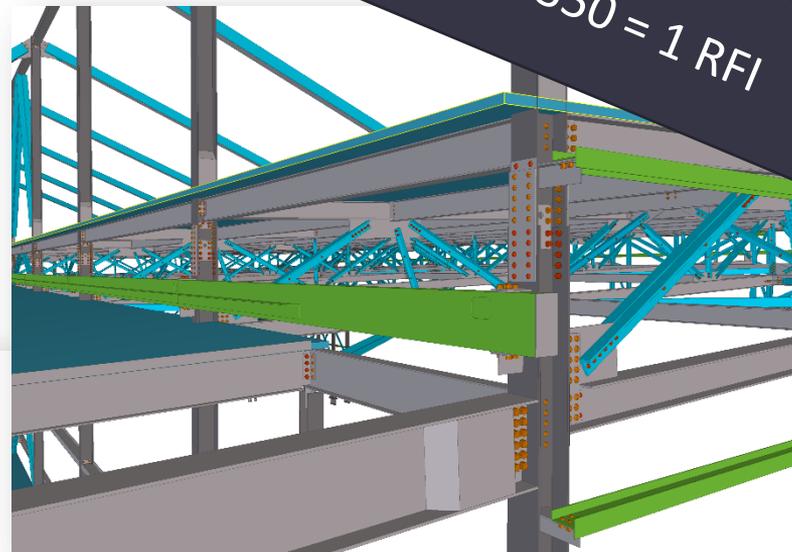
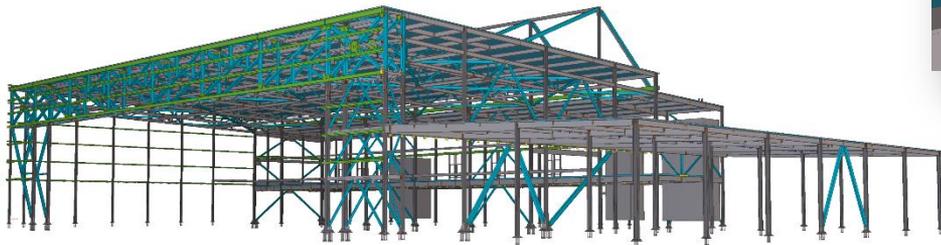
LOD350 = 10 RFI's



# Reduction in RFIs

Quantico Hangar, Quantico Marine Corps Base

- 760 Tons
- Only 1 RFI!!!
- Owner/Architect/Contractor processing time and also schedule benefits.

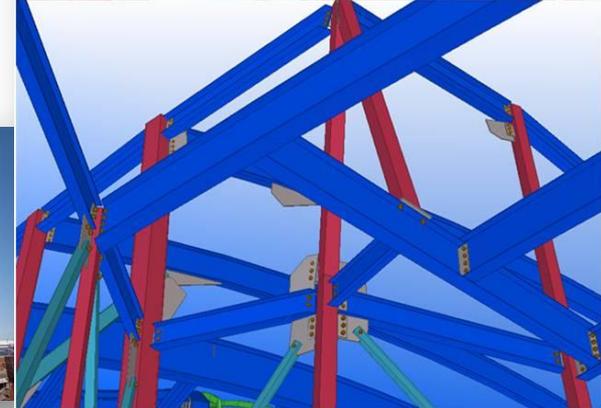


**Thornton  
Tomasetti**

# Kostensicherheit

Cathedral of Hope, Dallas, Texas

- Erste Angebotsphase: LOD300. Kein klarer gewinnder 100% Differenz im Angebotspreis)
- Zweite Angebotsphase: Modelle in LOD350 – **nur noch 10% Abweichung!**



Thornton  
Tomasetti



# Betonierablaufplanung

Model

Pour

Plan



**Task Manager (Scenario\_Frame Schedule)**

Task Name	Task Type	Planned Production Rate	Planned Start Date	Actual Start Date	Planned Duration	Planned End Date
1 Foundations			12.10.20...		12.0...	27.10.20...
2 Foundations 1	Cast-in-place	0.43 m <sup>3</sup> /h	12.10.2009		6.00 d	19.10.2009
3 Foundations 2	Cast-in-place	0.79 m <sup>3</sup> /h	20.10.2009		6.00 d	27.10.2009
4 Foundations 3	Cast-in-place	1.00 m <sup>3</sup> /h	20.10.2009		6.00 d	27.10.2009
5 Foundations 4	Cast-in-place	1.21 m <sup>3</sup> /h	22.10.2009		4.00 d	27.10.2009
6 Foundations 5	Cast-in-place	1.29 m <sup>3</sup> /h	15.10.2009		5.00 d	21.10.2009
7 CIP Columns K1			19.10.20...		20.0...	13.11.20...
8 Columns K1_1			19.10.2009		5.00 d	23.10.2009
9 Columns K1_2			26.10.2009		5.00 d	30.10.2009
10 Columns K1_3			2.11.2009		5.00 d	6.11.2009

The Gantt chart displays the task schedule from October 41st to November 51st. It shows bars for Foundations 1-5 and CIP Columns K1, with their respective durations and dependencies.

# Logistik und Lieferung



- Wir sind es der Industrie schuldig!

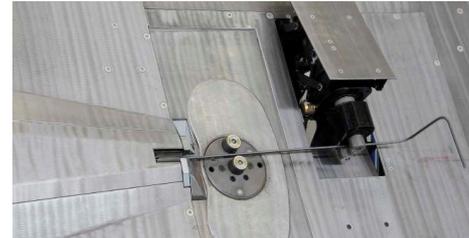
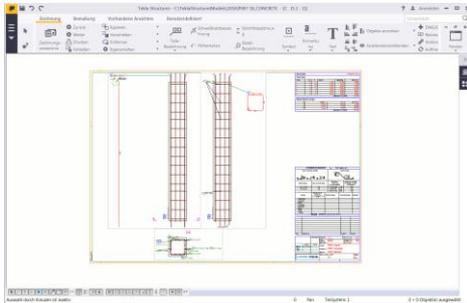
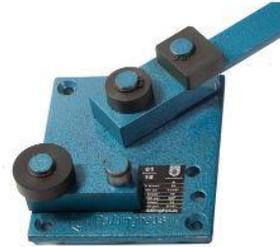


# Technische Entwicklung Stahlbeton

## Planung



## Baustelle/Fertigung





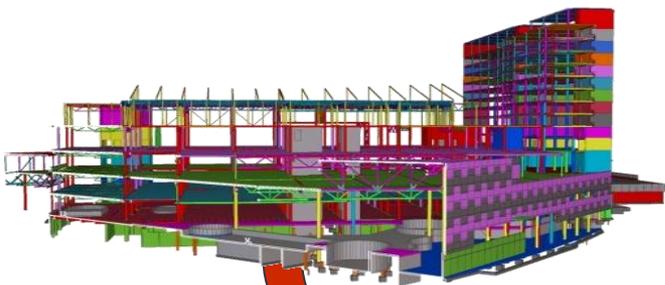
# Automatisierung





# Trimble – “BIM – auf der Baustelle”

Genaue Modelldaten

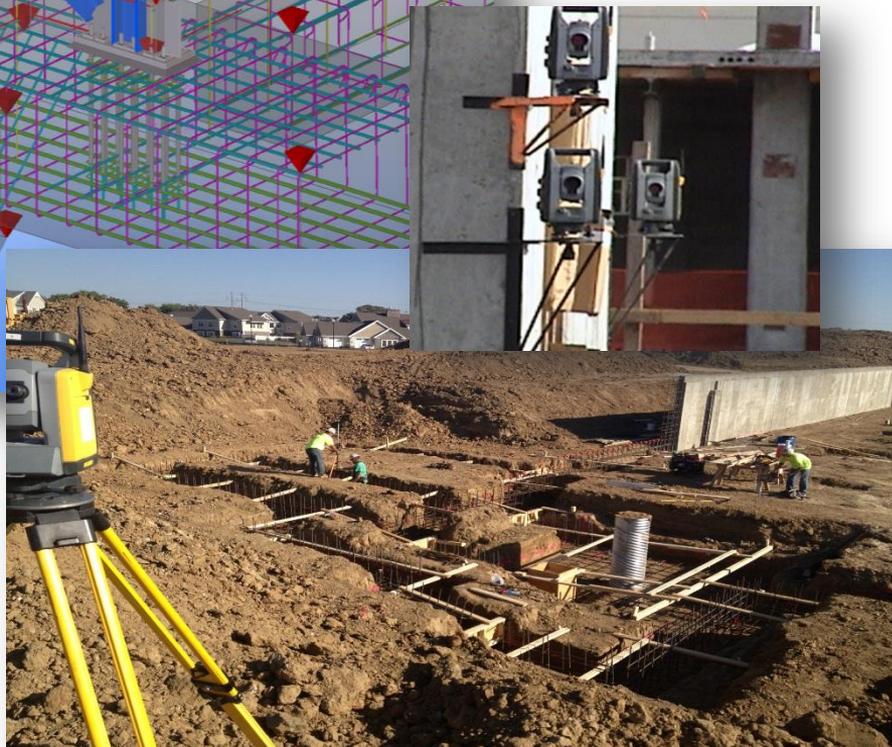
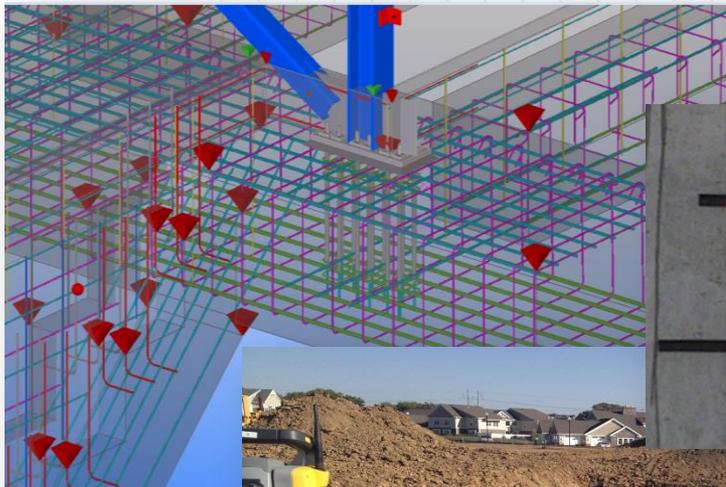


Trimble  
Kontrolleinheiten  
Optionen



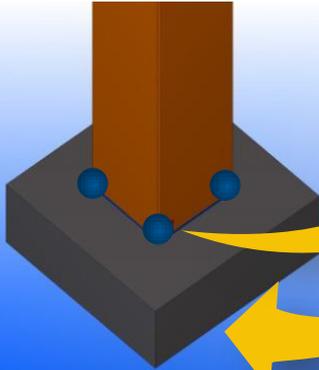
Direkter Baustelleneinsatz mit  
der Trimble Robotic Total Station

**WEITZ**



# Abstecken

Exaktes Modell



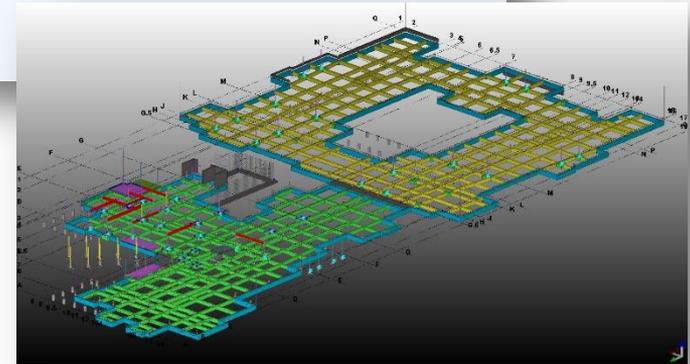
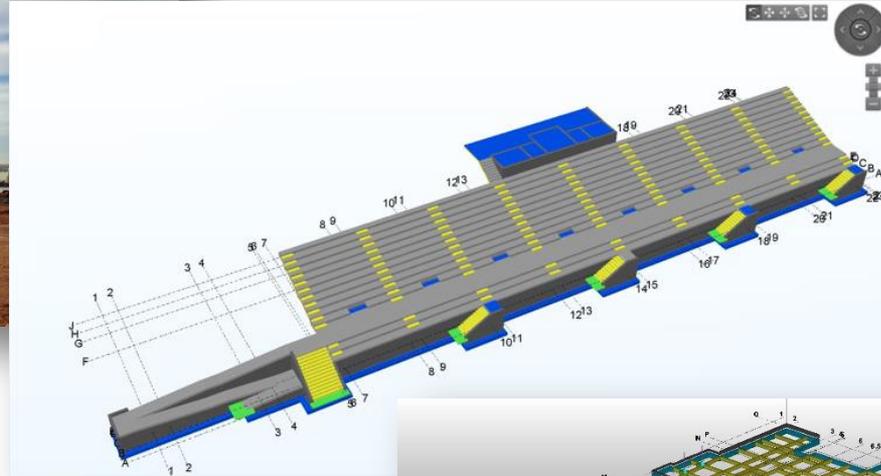
Direkte Umsetzung auf der Baustelle





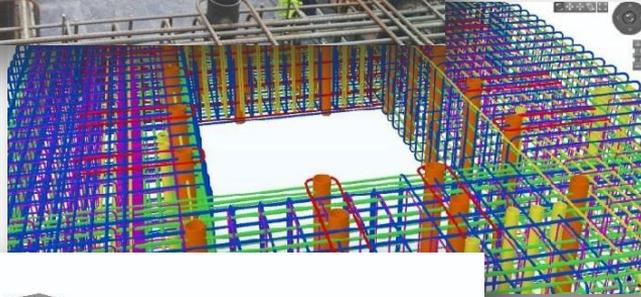
**Hensel Phelps  
Construction Co.**





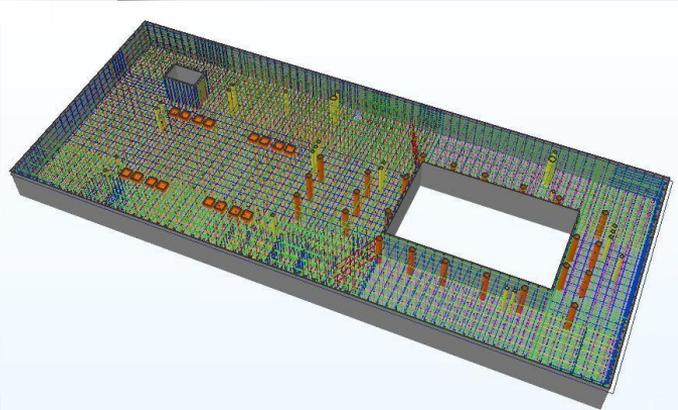
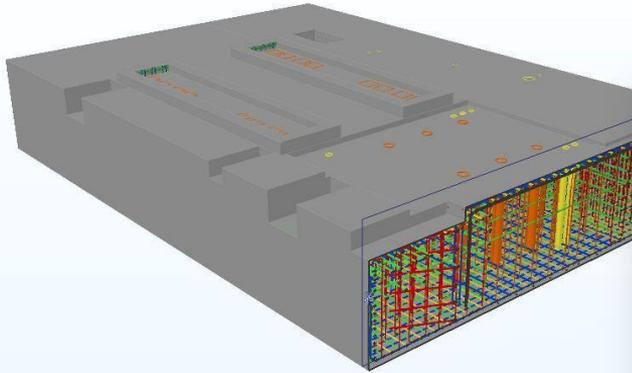
*“Using Tekla software has enabled us to reduce concrete waste during estimating and placement by 33%. Our quantitative errors have been reduced to almost zero.”*

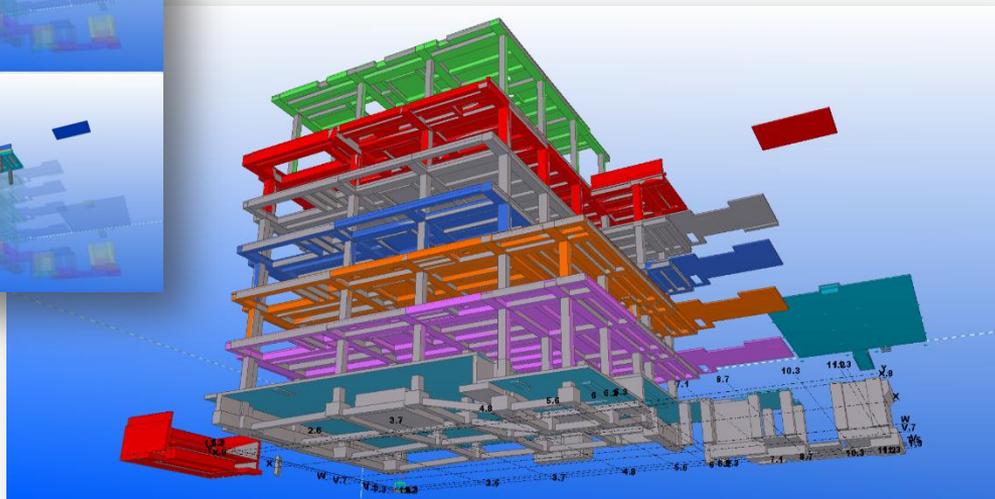
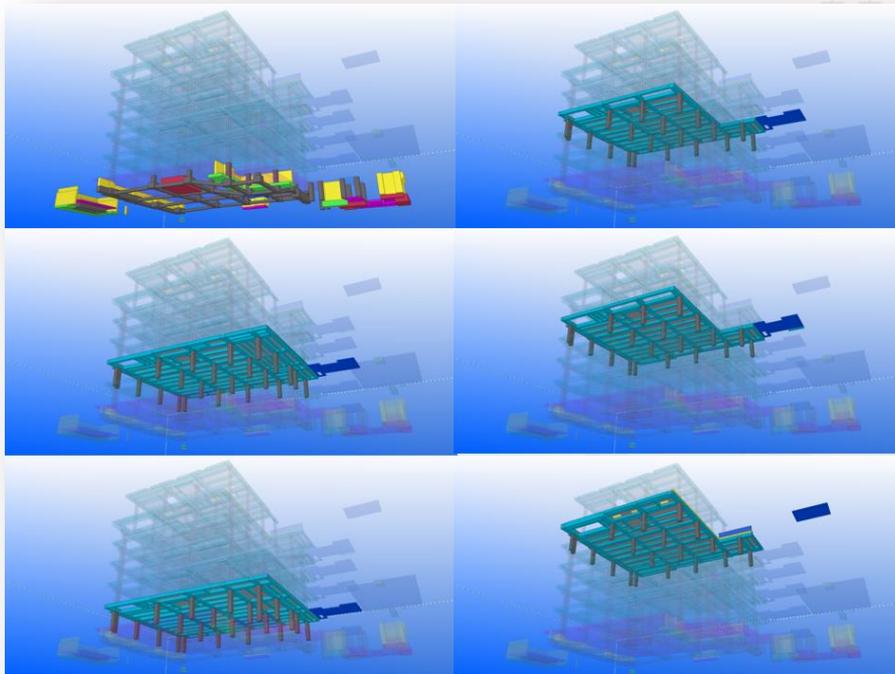
Jonathan Ciolkevich  
Assistant Concrete Project Manager, Haselden Construction



*“We should have 3D models like this in every project ... There is another reinforcement layer, we haven’t seen that one on the 2D drawings.”*

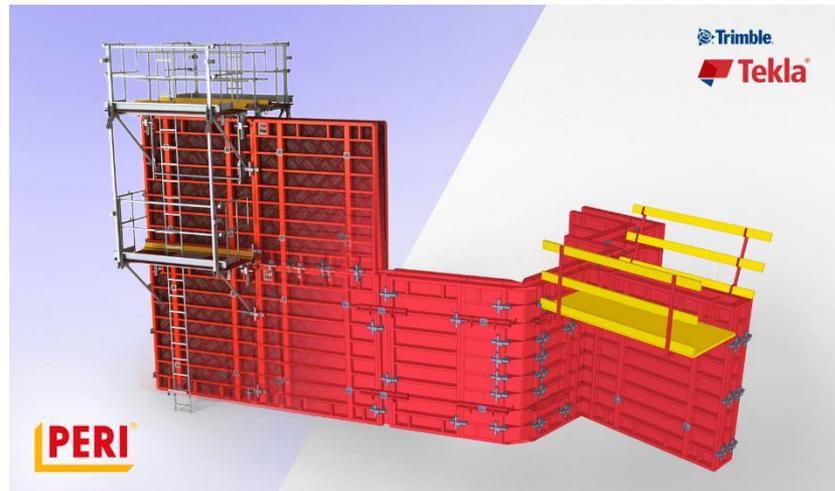
Anders Månsson  
Reinforcement worker, Skanska





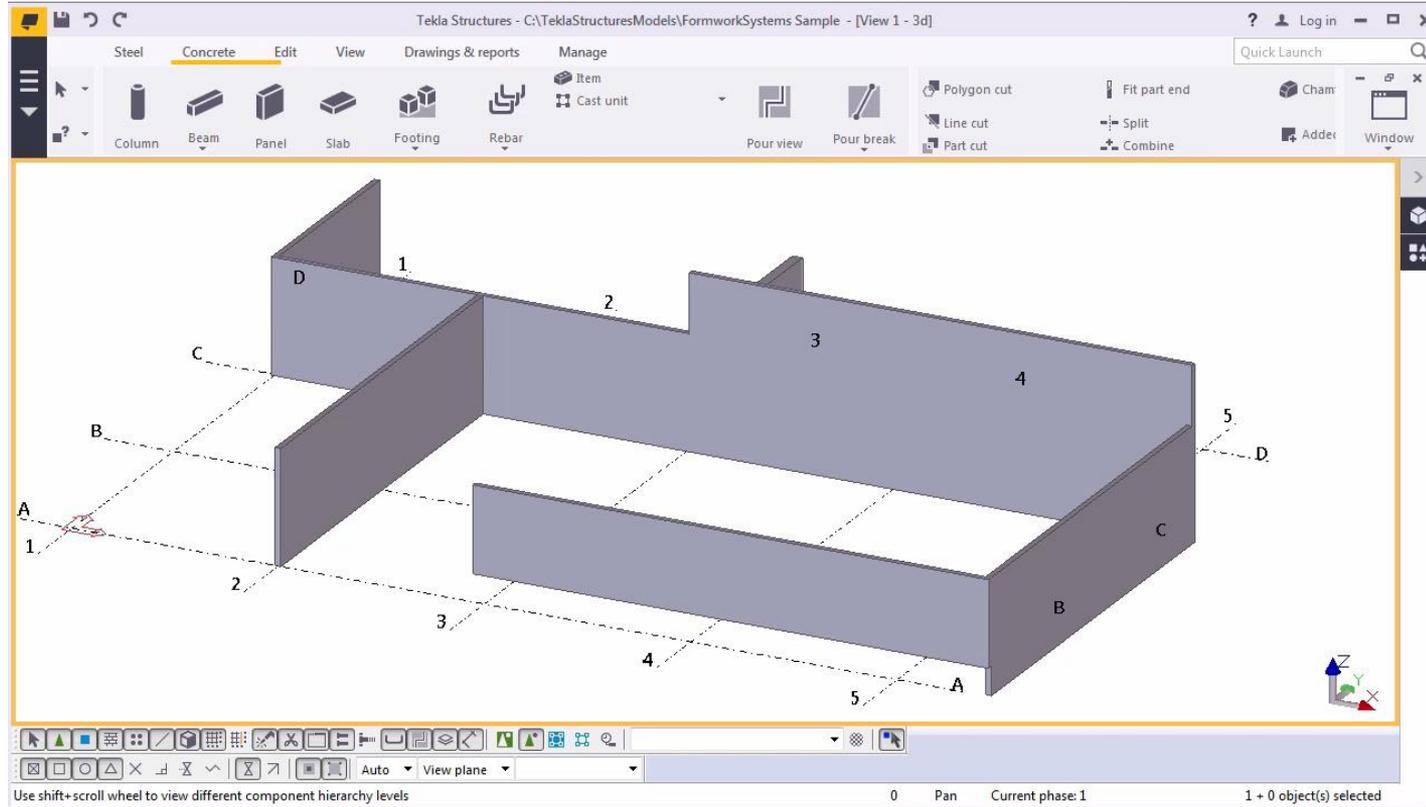
Adjustable Forms benefit from using Tekla software to relieve real business problems and project pain points by modelling concrete accurately to improve pour planning.

# Schalung planen



**HÜNNEBECK**   
A BRAND COMPANY

# Taking Formwork to the Next Level



Vielen Dank für Ihr Interesse!



If you think you have reached your potential, think again.