HOLTEC

Value Addition using

Integrated Approach to

Steel Detailing

HOLTEC CONSULTING

(Sunil Sah)

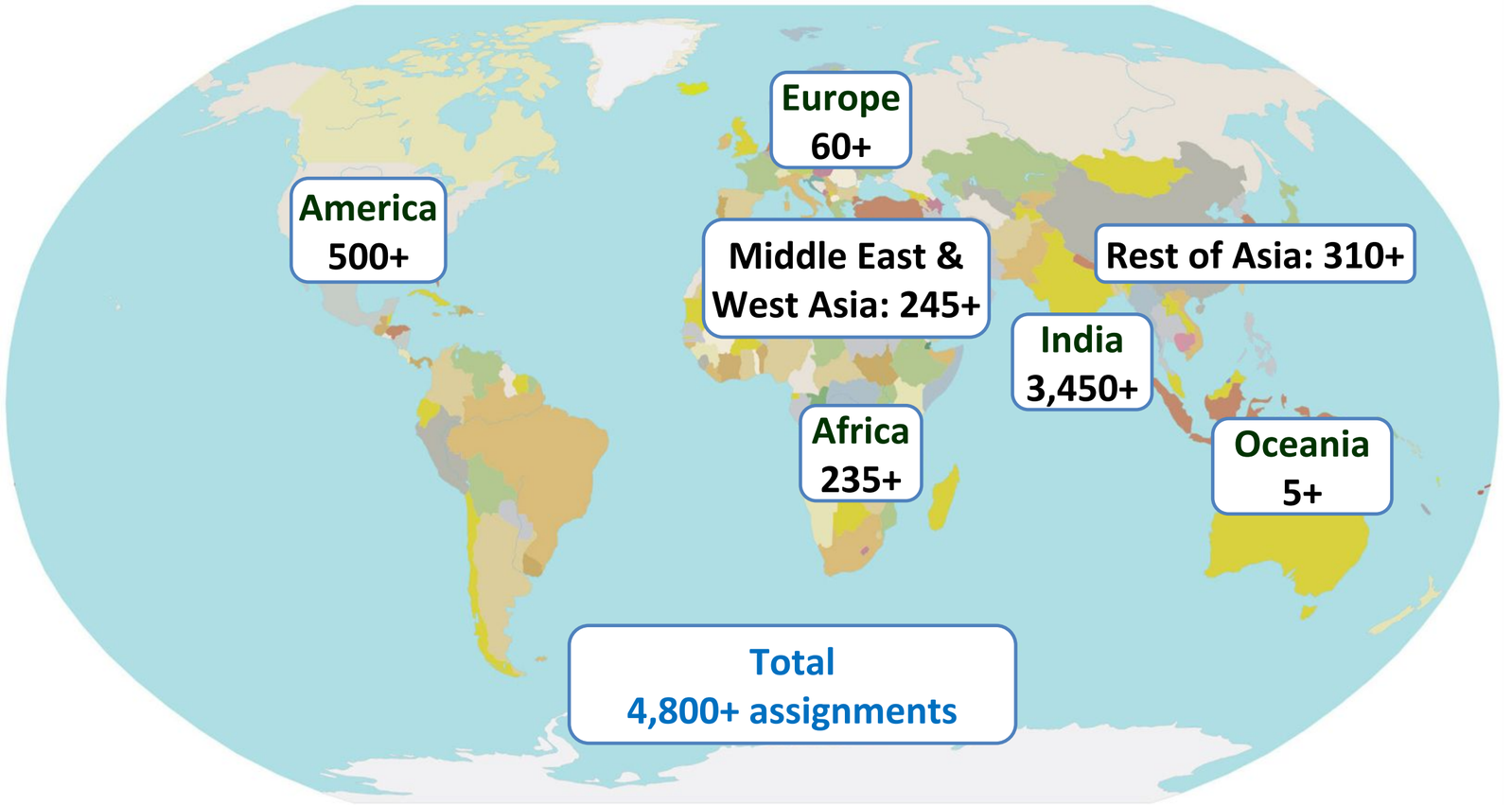
ABOUT HOLTEC

- Created in year 1967
- Services firm focused on the Global Cement Industry: Advisory, Engineering, Plant Operations & Maintenance, Solutions
- Also offer services in Highways, Power & Engineering Support Services
- 4,800+ assignments for 1,000+ clients in 100+ countries
- Full fledged engineering and business consulting firm
- Strong execution processes (ISO certified)
- Total Solutions: Integrated service from concept through commissioning and operations
- Industry expertise with 6,500 man-years experience
- Extensive database built over 55+ years
- Offices: 3 in India, 1 in UAE (Sharjah) and various other site offices

HOLTEC delivers comprehensive, end-to-end for the global cement industry solutions tailored

EXPERIENCE IN THE GLOBAL CEMENT INDUSTRY

Type of Projects	No. of Projects
Due Diligence, Valuations and Investment Studies	190+
Raw Material Studies	750+
Feasibility, Market and Strategic Studies	1,100+
Performance Enhancement and Audit Studies	320+
Project Engineering, Procurement, Field Services, etc.	2,260+
Other Miscellaneous Studies	180+
Total	4,800+



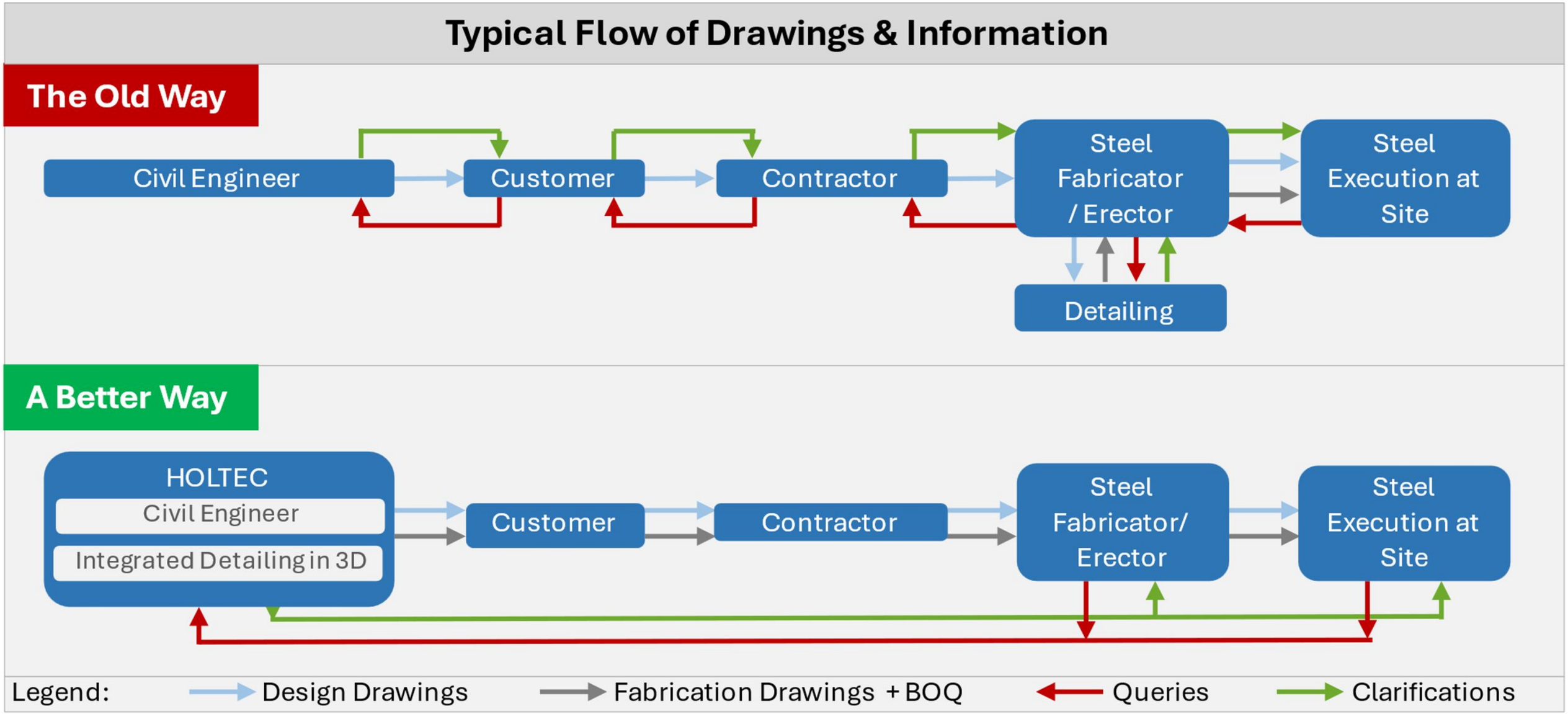
Highlights

- Engineered over 100 large-sized projects, greenfield and brownfield; 20+ with kiln capacities of >8,000 tpd and 30+ with kiln capacities of 6,000-8,000 tpd
- Successfully executed 165+ Mine Optimisation projects worldwide

AGENDA

1. Typical flow of drawings & information.
2. Challenges with old ways.
3. Solved in A Better way.
4. Integration with other trades & BIM (5- Project examples)
5. Advance Bill of material.
6. Fabrication & Erection drawings.
7. Consolidated quantity sheet.
8. CNC, DXF files & Bolt list etc.
9. Material management reports.

TYPICAL FLOW OF DRAWINGS & INFORMATION



CHALLENGES WITH “THE OLD WAYS”- 2D ACAD

Inconsistent Quality of Execution

Imprecise Steel Detailing Drawings made by small detailing firms using 2D software, which may/may not be consistent with the Design Drawings, leading to compromises in Steel Fabrication & Erection quality.

Poor Control of Steel Quantities

Inaccurate BOQs. Prepared manually from 2D drawings leading to material shortages/surplus, delay, problems in material reconciliation, higher costs from wastage.

Extra Efforts & Time Taken in Coordination

It’s a multi-step, time-consuming process for the detailer to get clarifications on Design Drawings. The engineer will normally not check fabrication drawings, and the detailer may/may not fully understand the Design Drawings.

SOLVED IN A BETTER WAY- 3D MODELING

Highly Improved Quality of Execution

Accurate & clear fabrication drawings with 3D views, integrated with the Civil Engineering process, leading to high-quality Fabrication & Erection. Quality of drawings similar to what we provide for USA and other advanced countries using Tekla & other specialized software.`

Precise Control of Steel Quantities

Accurate BOQs issued along with the drawings so that material control & reconciliation is perfect. Accurate Advance Bill of Materials provided to order material correctly, on time. All this leads to significantly reduced wastage/costs.

Simple Efficient Coordination

First time right, consistent design & fabrication drawings from a single point of contact, leading to smooth execution with very few queries from the site. When queries are there, they can be directly & quickly resolved by our Integrated Civil Engineering & Detailing team.

INTEGRATION WITH OTHER TRADES & BIM

EXAMPLE 1: INTEGRATION WITH CIVIL 2D DRAWING

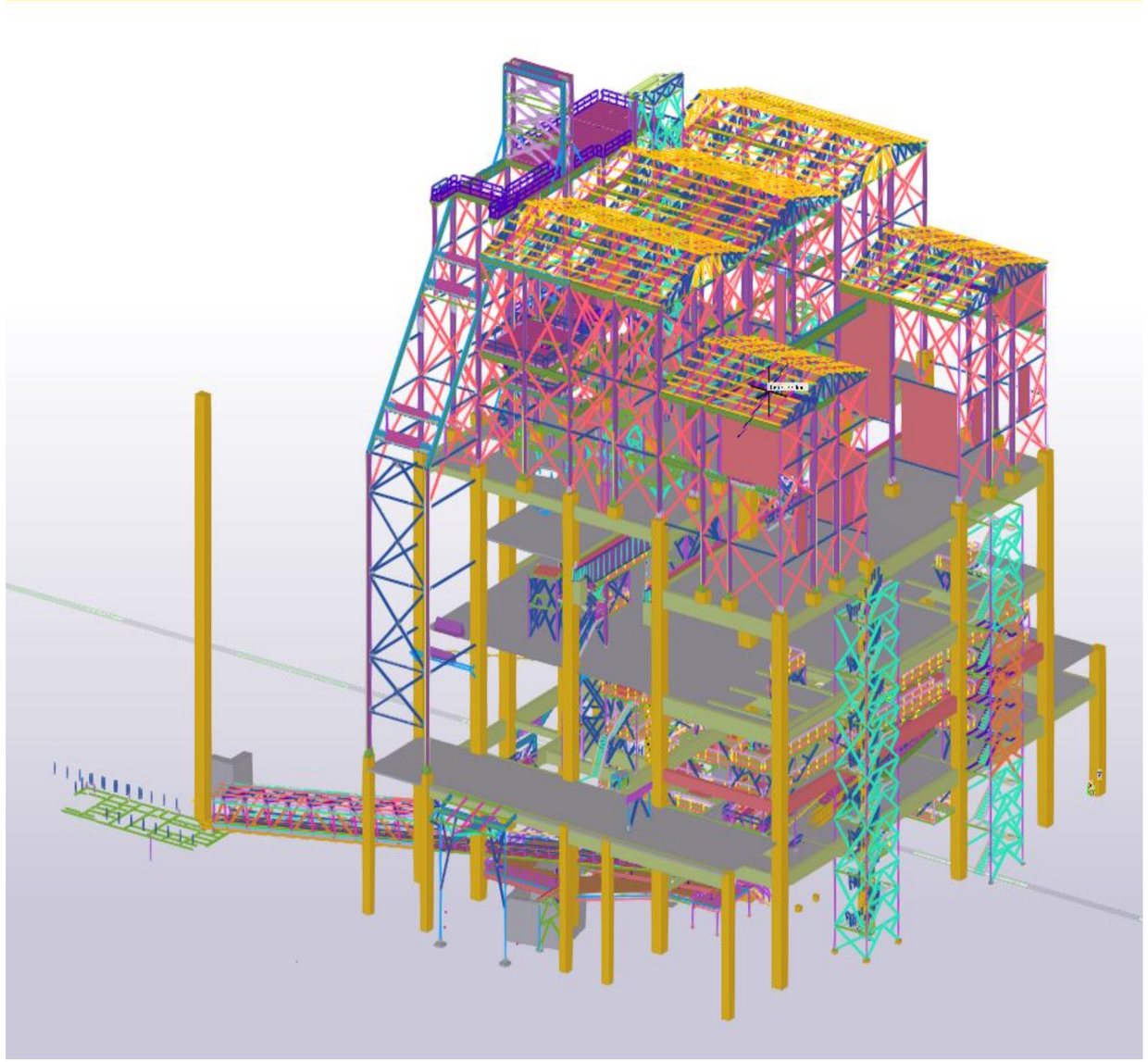
EXAMPLE 2: INTEGRATION WITH MECHANICAL 2D DRAWING

EXAMPLE 3: INTEGRATION WITH RCC 3D MODEL

EXAMPLE 4: RCC SILO ROOF DOME

EXAMPLE 5: BIM PROJECT

EXAMPLE 1 - INTEGRATION WITH CIVIL 2D DRG



Scope

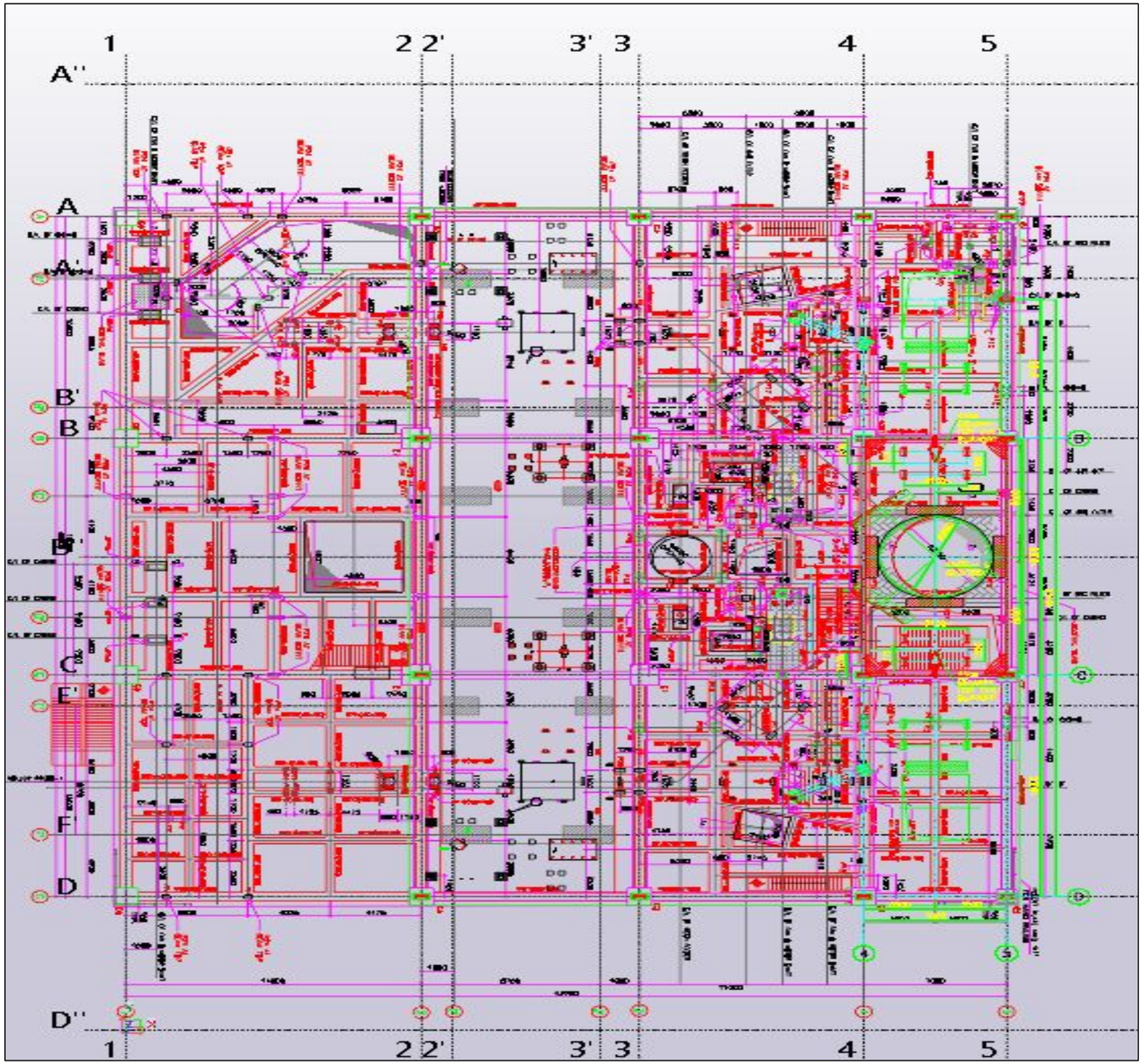
- This building consist of steel framed structure with roof trusses, galleries, platforms and stairs supported on RCC structure. Total steel tonnage is around 800 Tons

Information used from CIVIL 2D Drg

- Civil 2D Drgs were inserted into Tekla model at all floors
- We got RCC Columns, beams & slab opening sizes from these inserted drawings

Benefit in 3D model

- All insert plates and anchor bolts connecting with steel structures were co-ordinated
- Any conflict between steel & RCC



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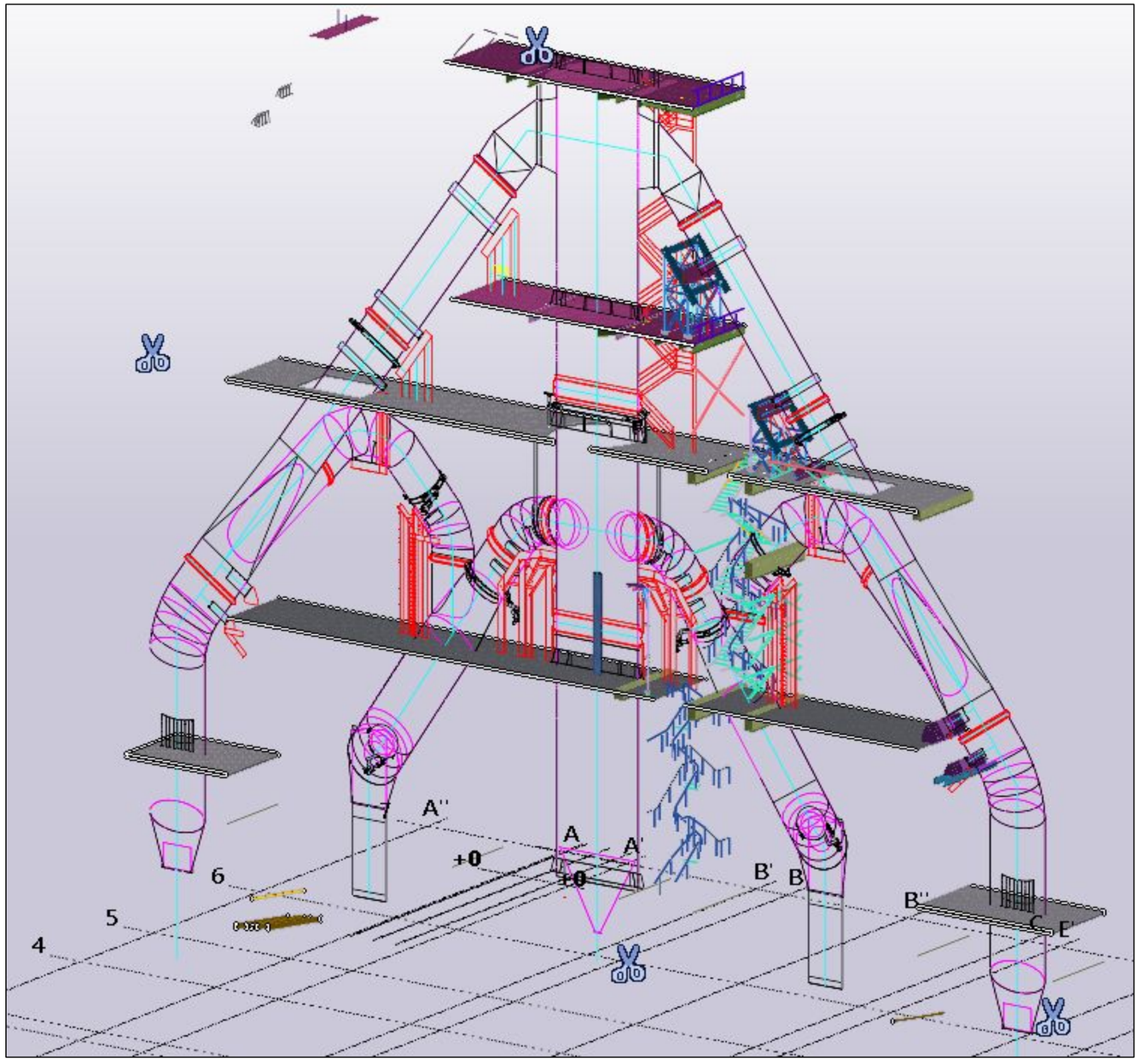
EXAMPLE 2 - INTEGRATION WITH MECH. 2D DRG



Scope

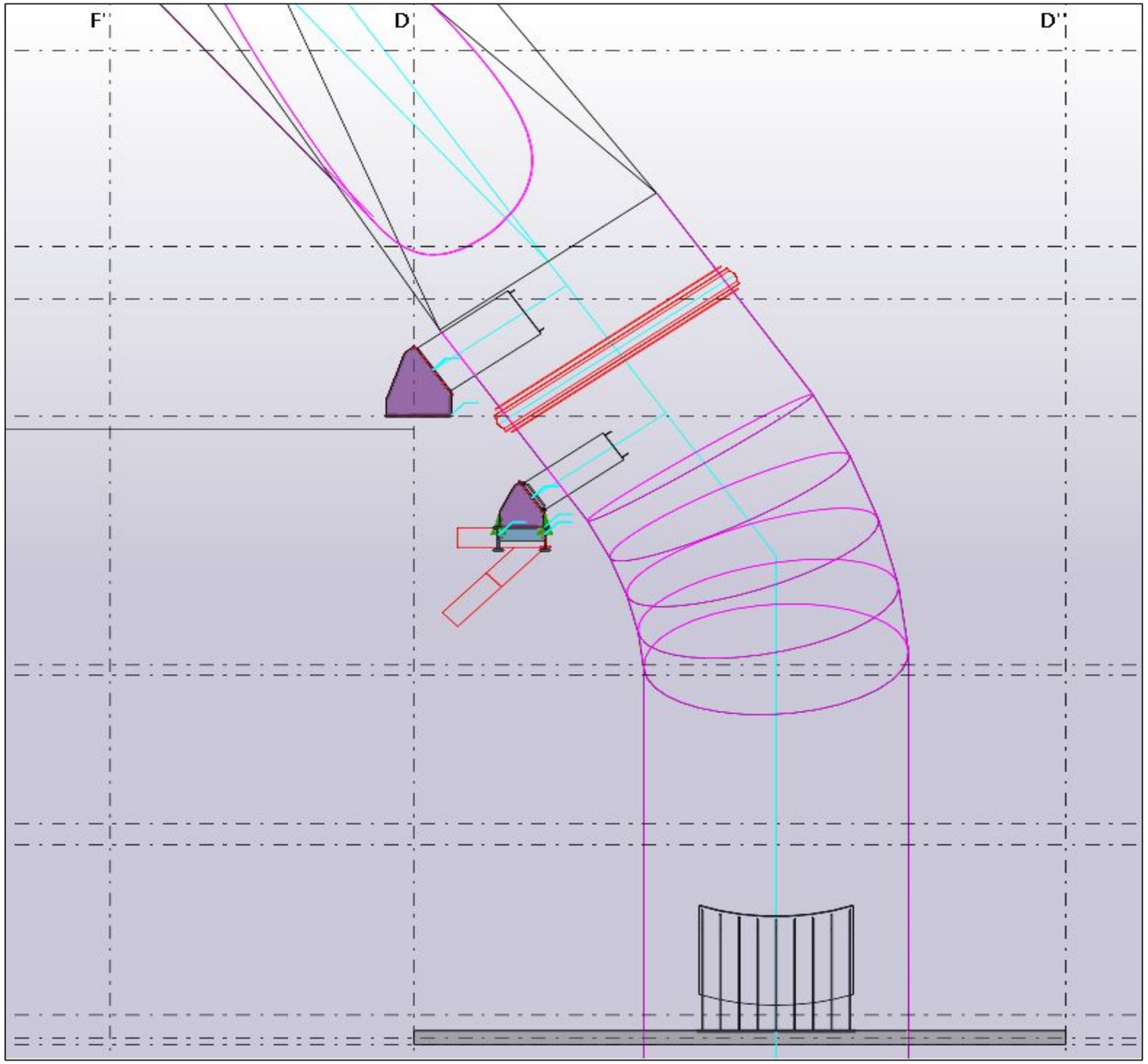
- This building consist of duct supporting steel structure with five floors. Total steel tonnage is around 200 Tons

Information used from MECH. 2D Drg

- Mech. 2D Drg were inserted into Tekla model
- We got duct sizes and support elevations from these inserted drawings

Benefit in 3D model

- It was easy to place duct support steel at right elevation.
- We checked if duct is passing through slab openings smoothly at every floor without any interference with steel



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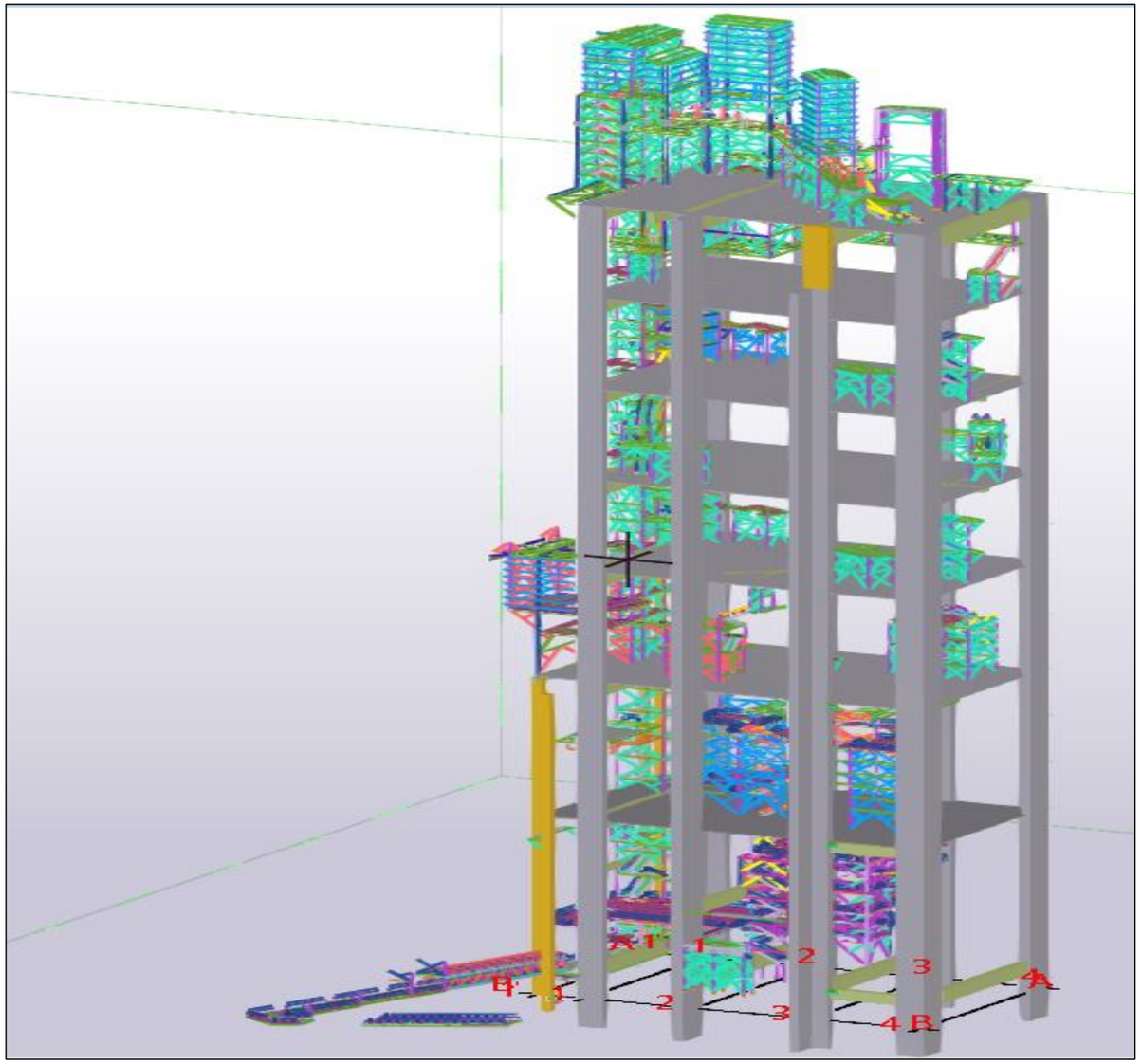
EXAMPLE 3 - INTEGRATION WITH RCC 3D MODEL



Scope

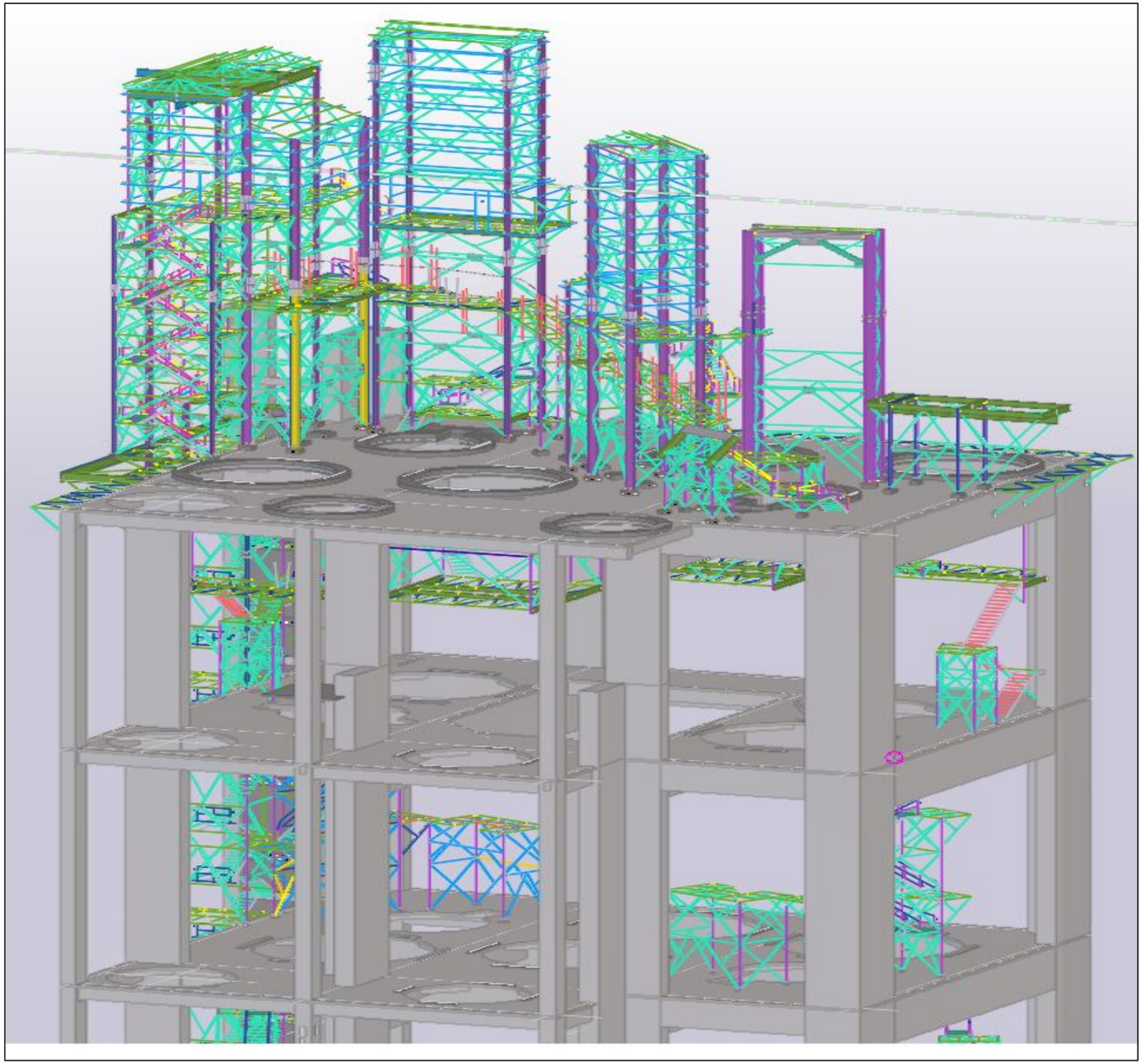
- This building consist of high rise RCC structure with steel structure on roof, inside RCC floors, hanging platforms and stairs. Total steel tonnage is around 600 Tons

Information used from RCC 3D model

- Full RCC model was inserted into Tekla model
- We got RCC Columns, beams & slab opening sizes from this model

Benefit in 3D model

- You worked on all the floors simultaneously
- All insert plates and anchor bolts connecting with steel structures were co-ordinated



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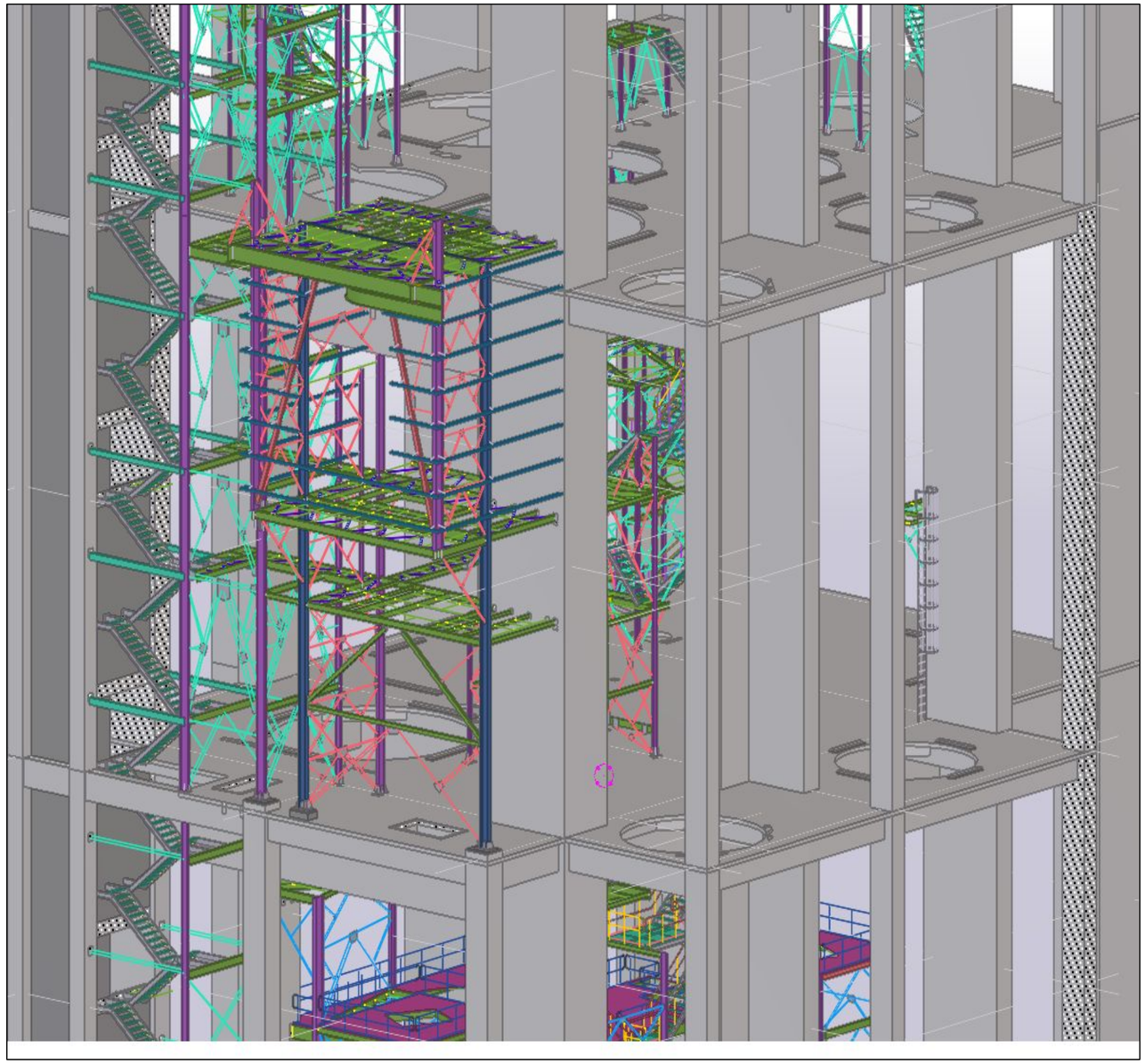

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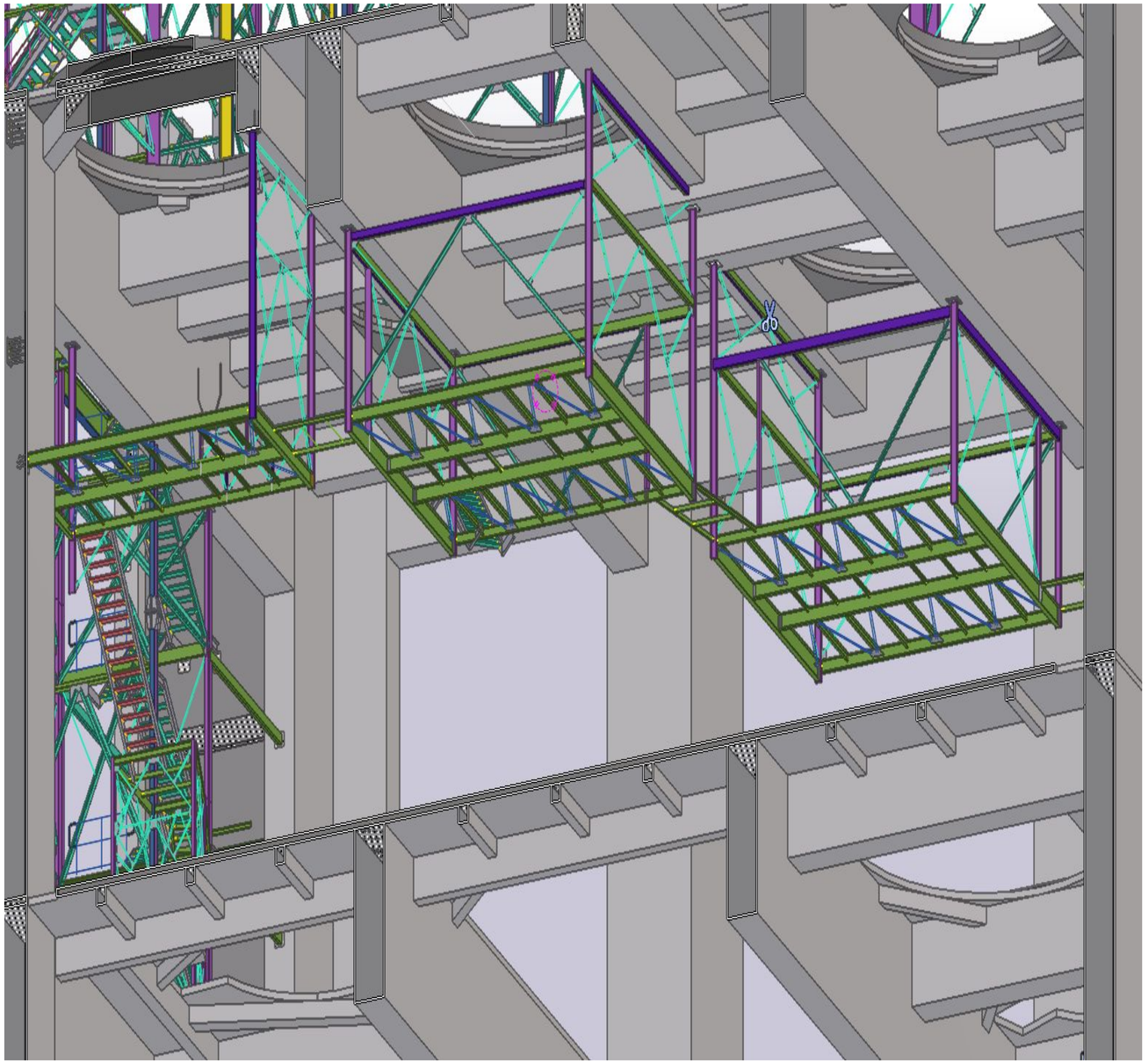

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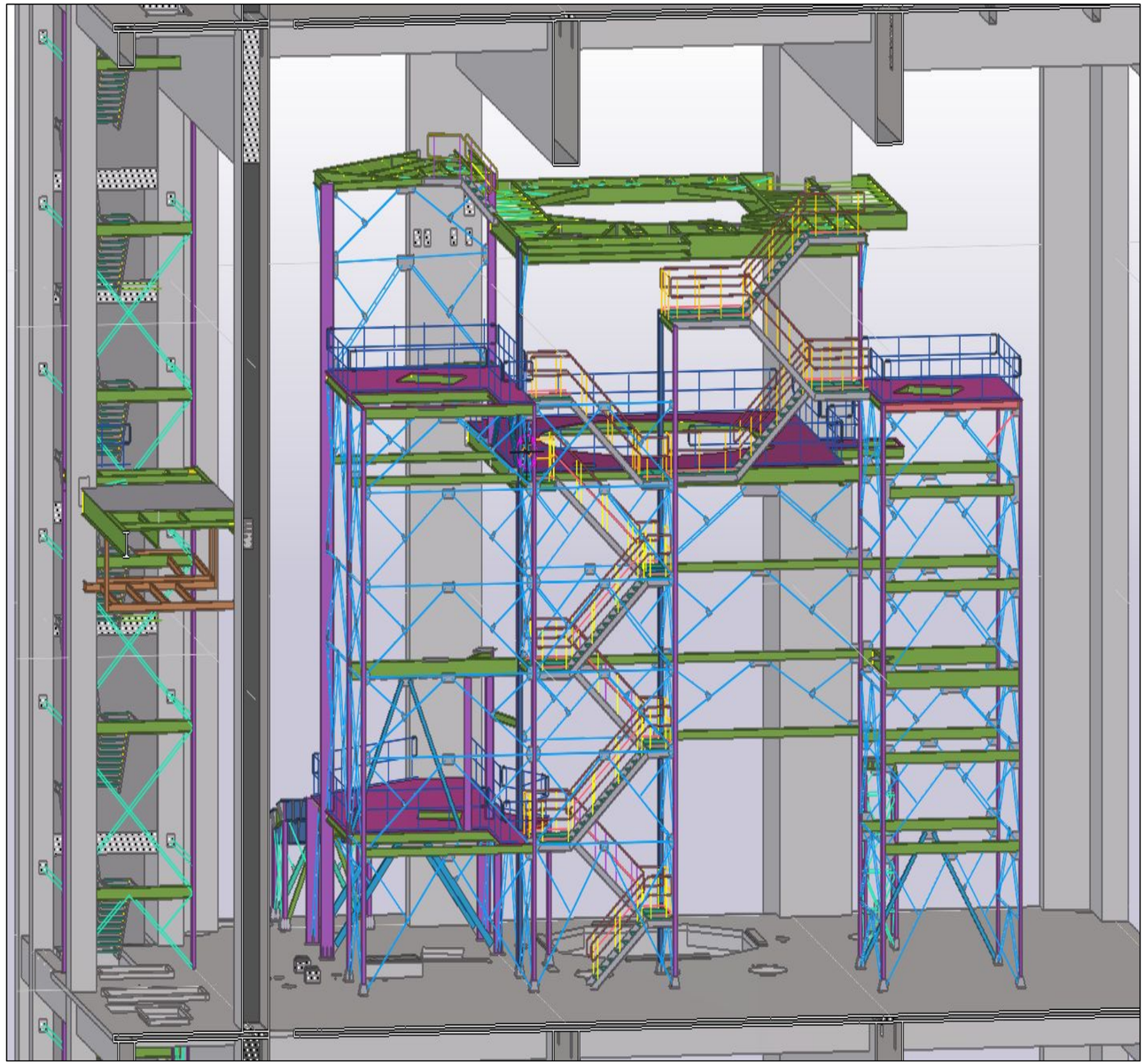
- Any conflict between steel & RCC members



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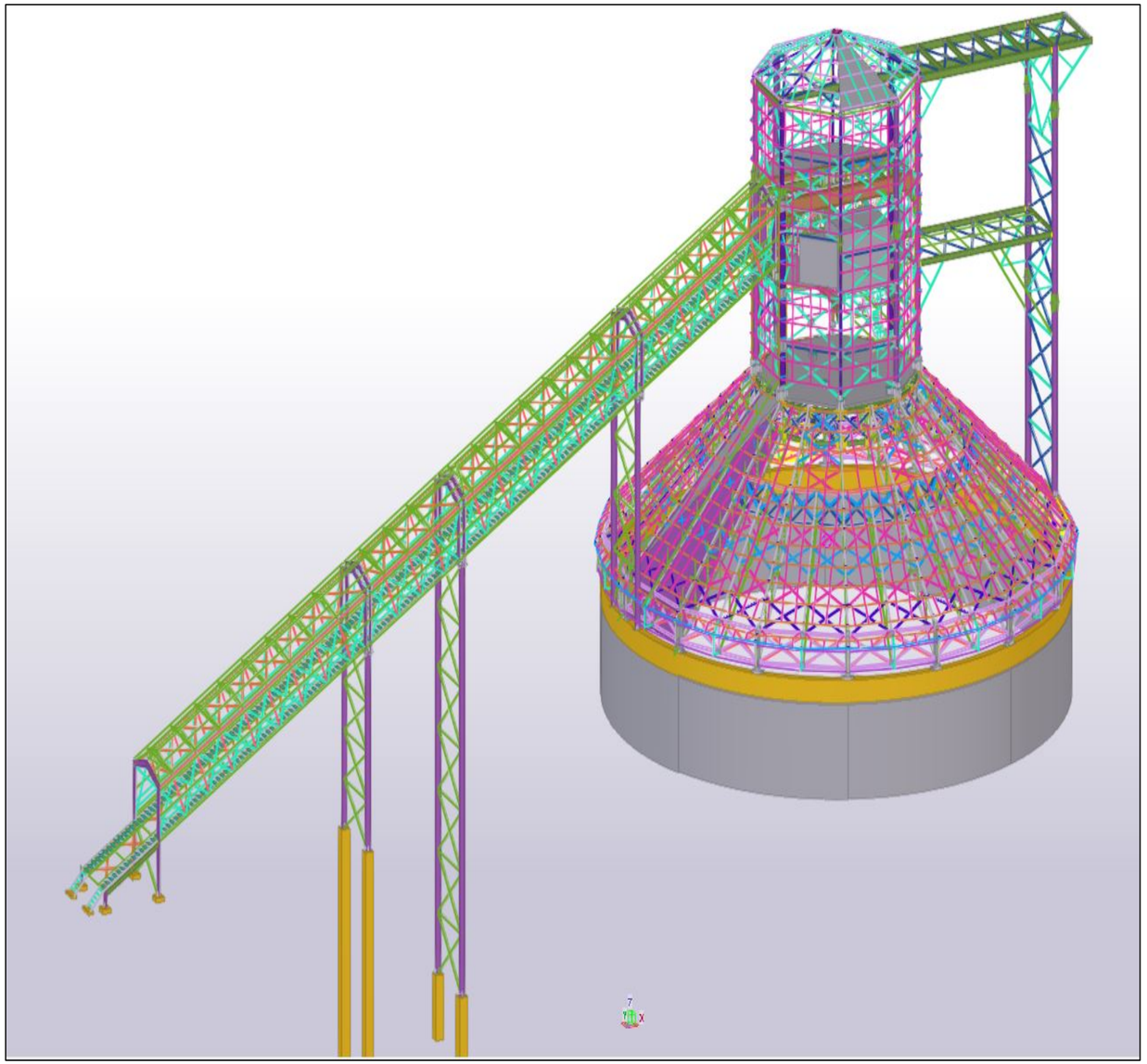
EXAMPLE 4 - RCC SILO ROOF DOME



Scope

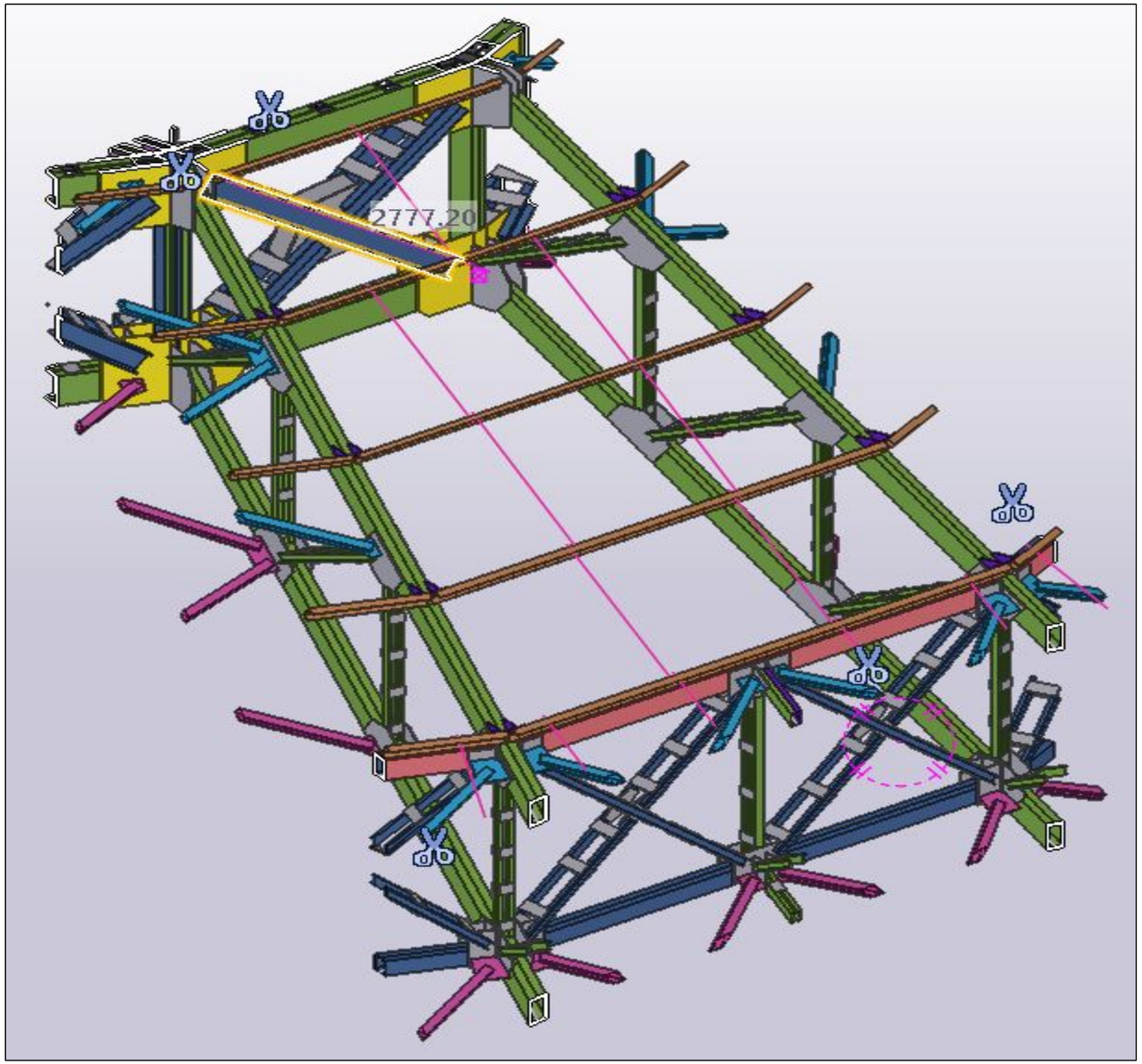
- This building consist of steel dome structure supported on RCC silo with penthouse. Total steel tonnage is around 400 Tons

Information used from RCC Silo Drgs

- RCC silo diameter & wall thickness
- Silo ring beam top elevation

Benefit in 3D model

- We could easily do accurate modelling of Radial trusses, ring girder etc
- Due to 3D visualization accurate connections of roof purlins, top & bottom braces became possible
- All insert plates and anchor bolts on top of RCC ring beam supporting radial trusses were co-ordinated



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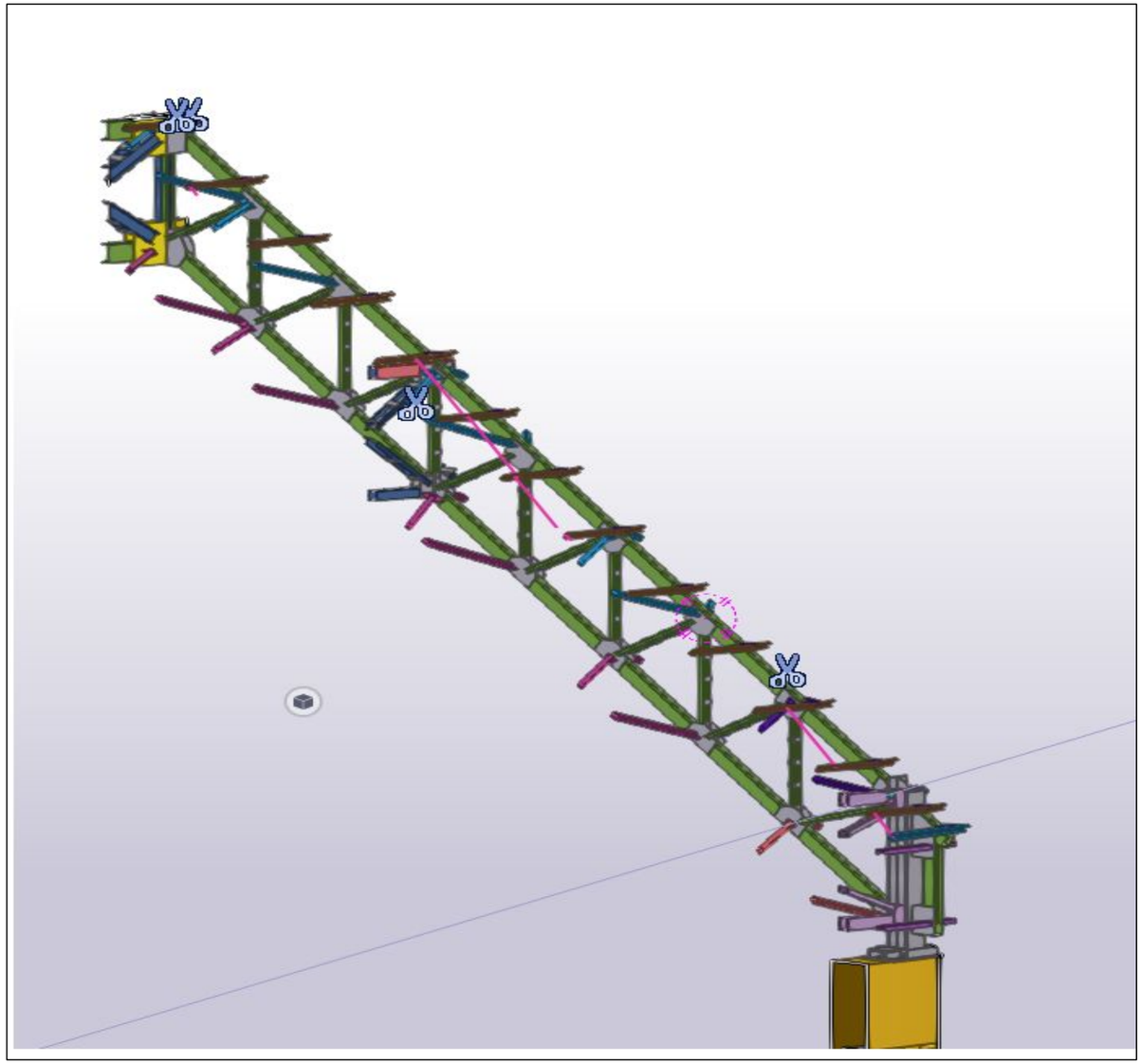

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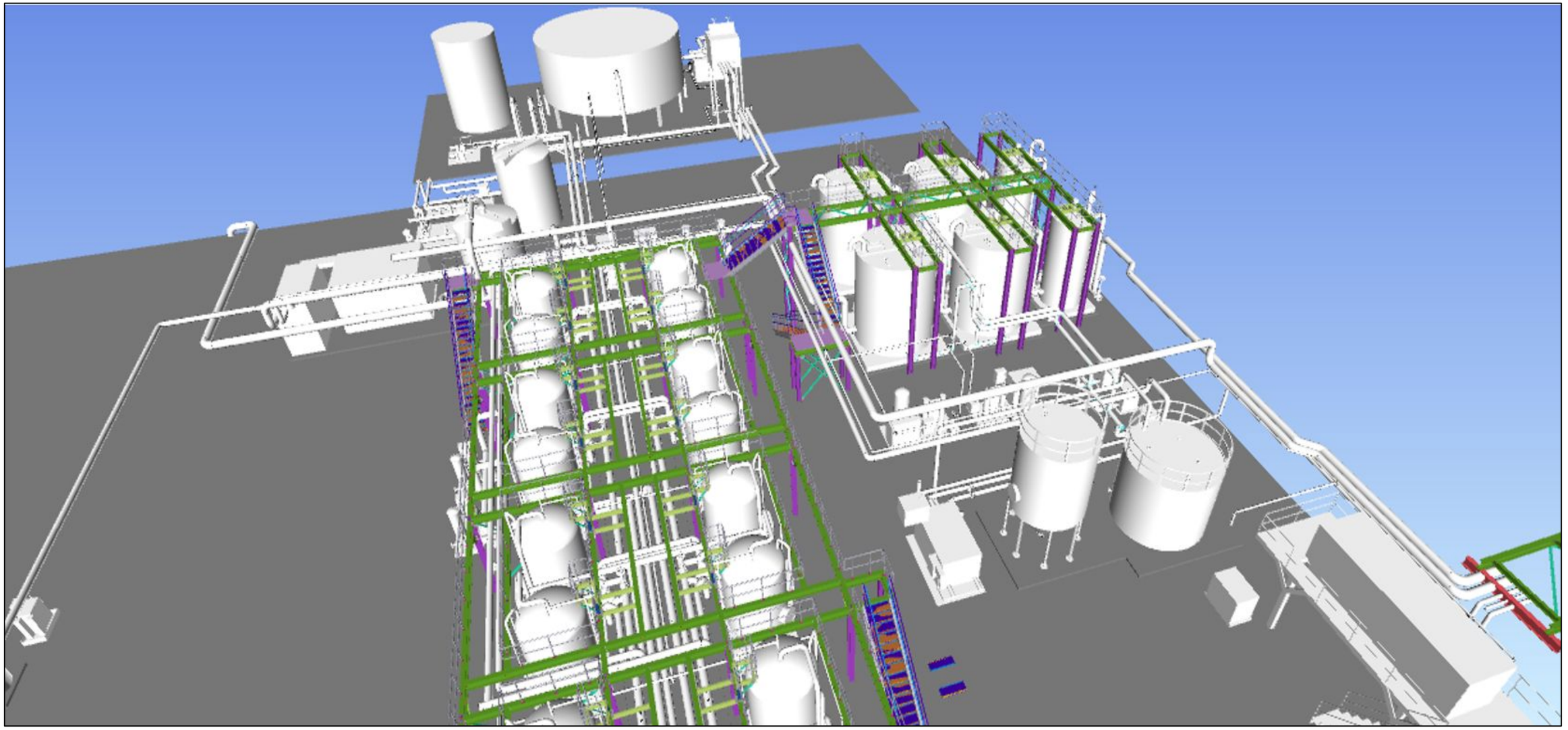
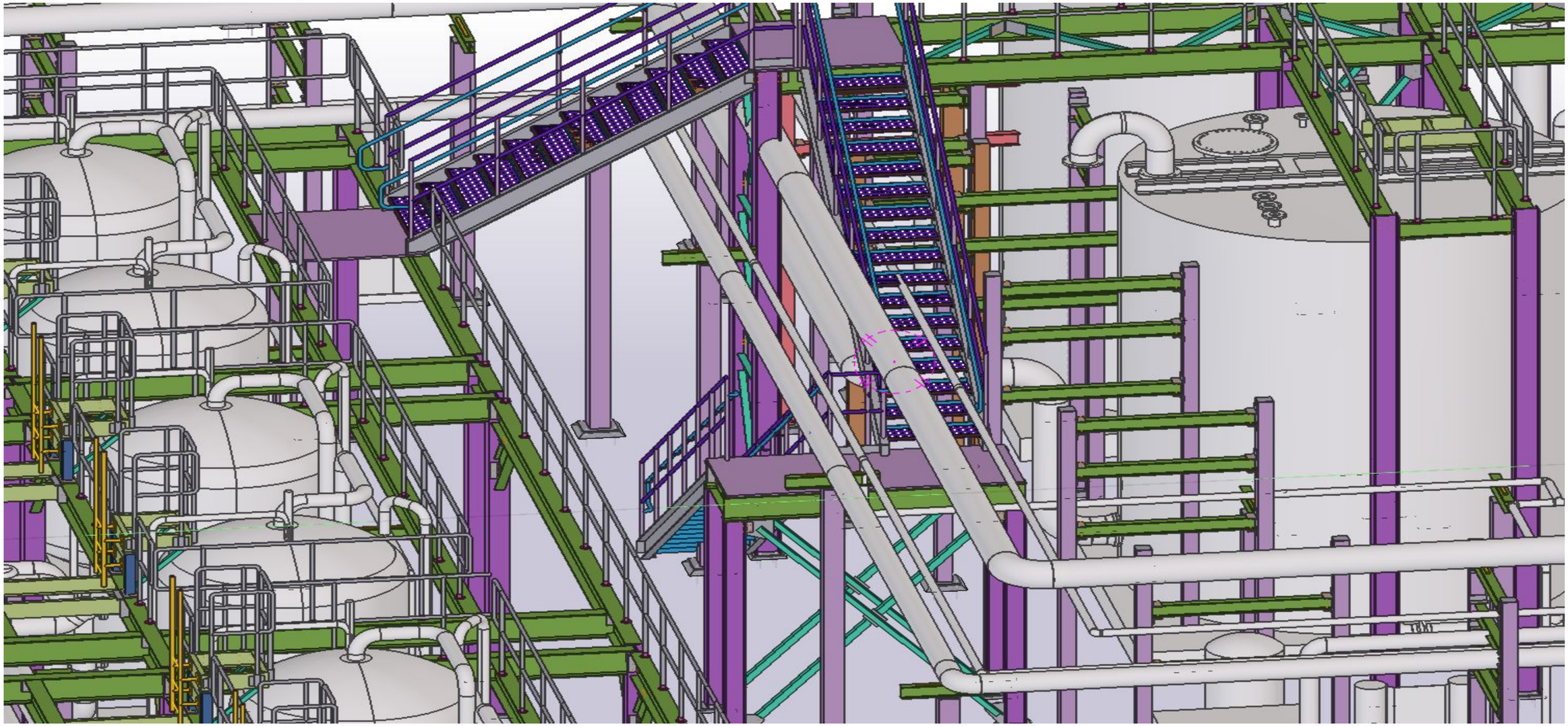
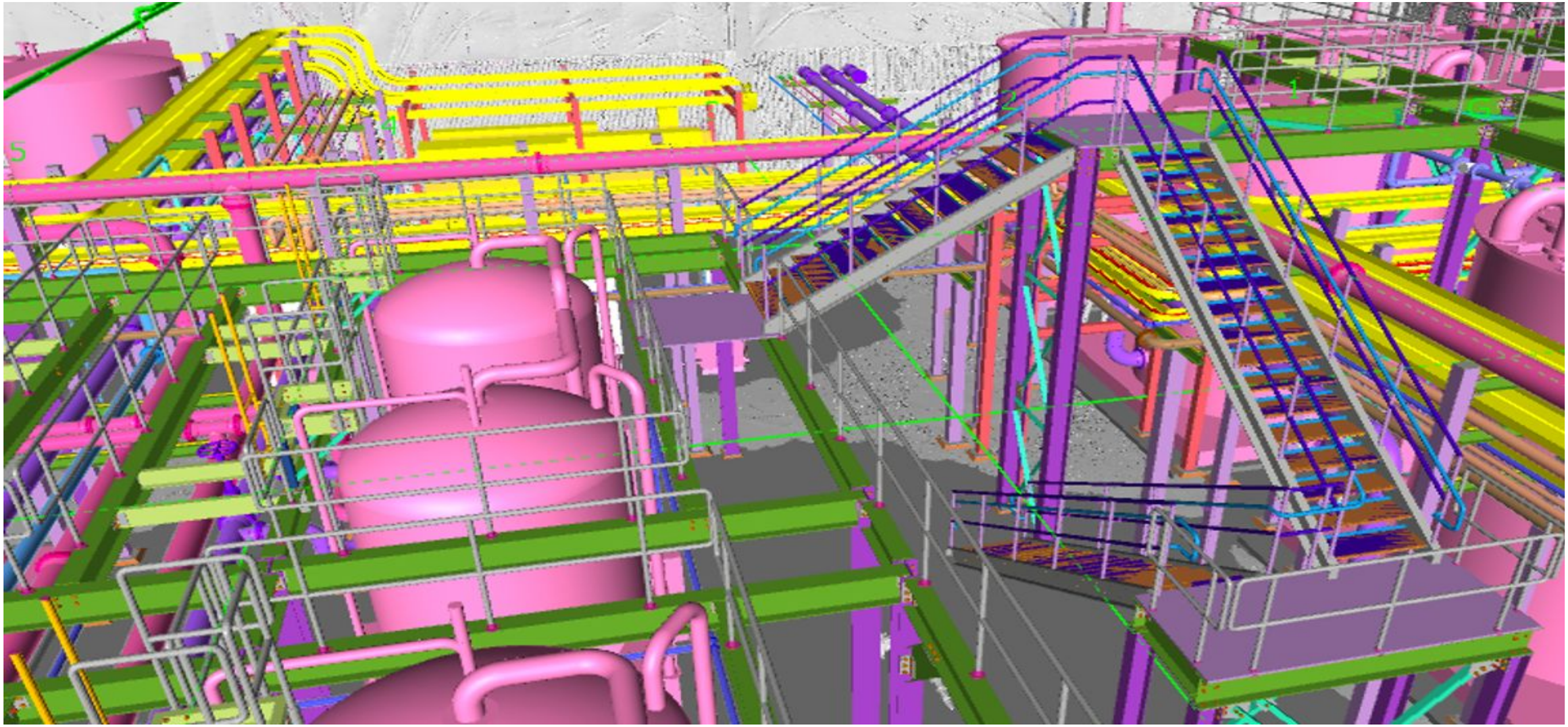
EXAMPLE 5 - BIM PROJECT



PART VIEW SHOWING STEEL MODEL WITH MEP MODEL AT INITIAL STAGE OF



PART VIEW SHOWING STEEL MODEL BEFORE PIPPING MODEL CORRECTION



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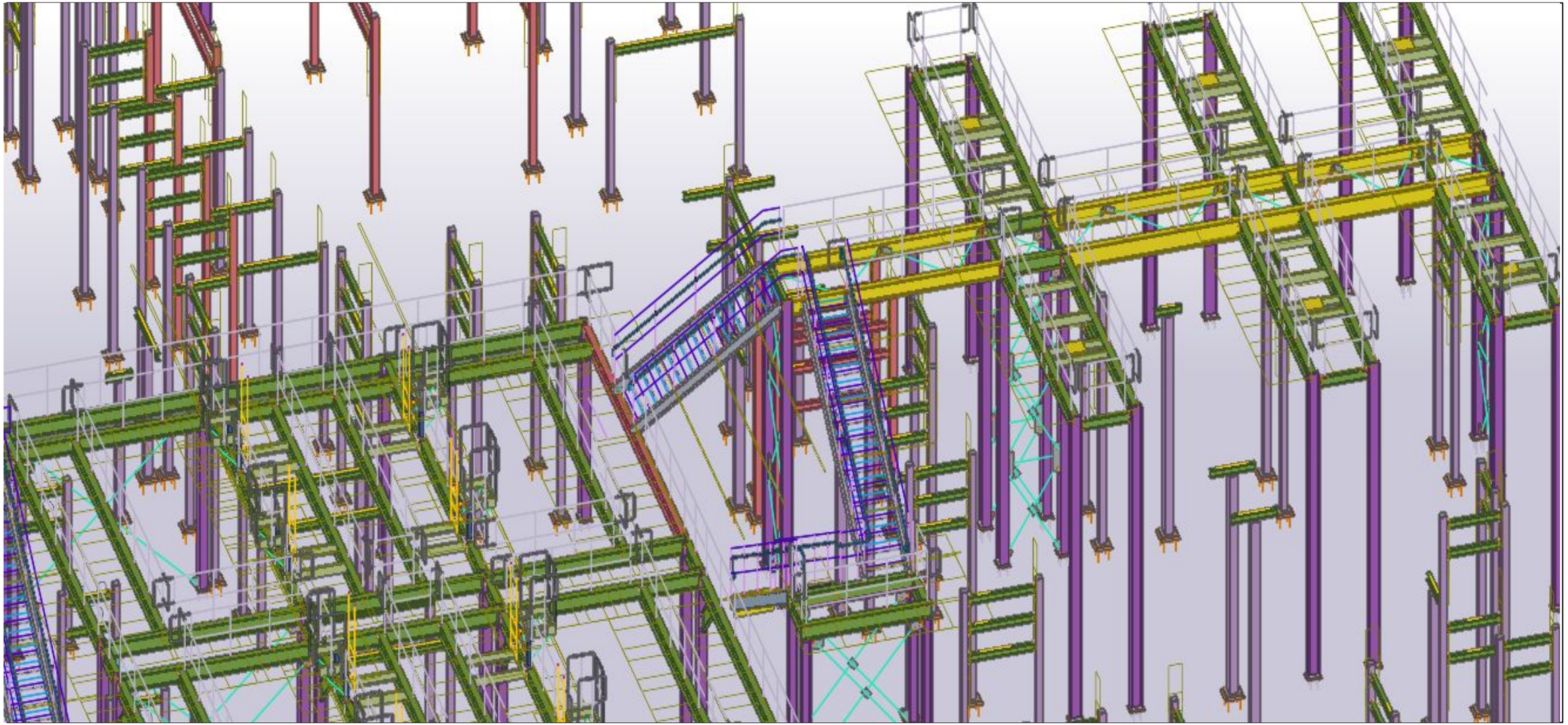
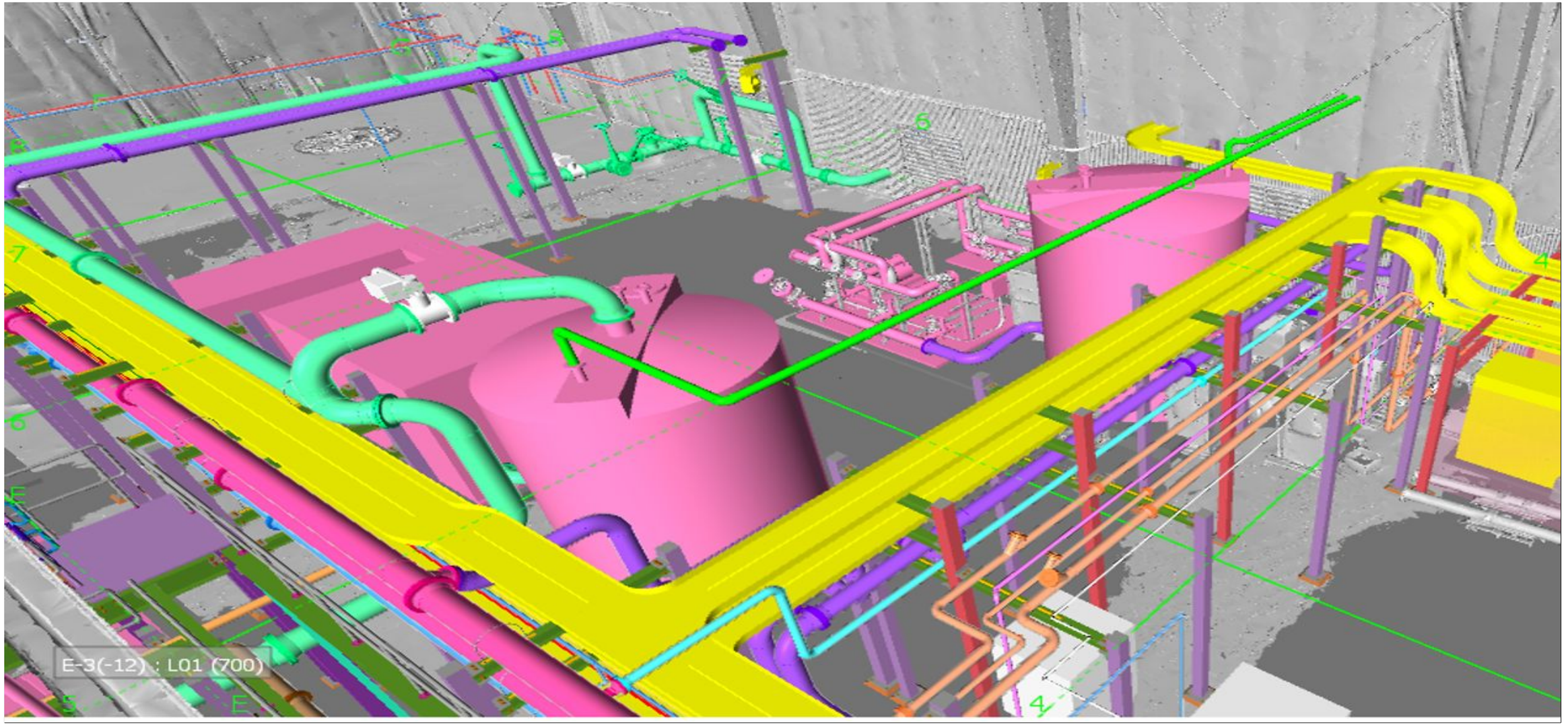
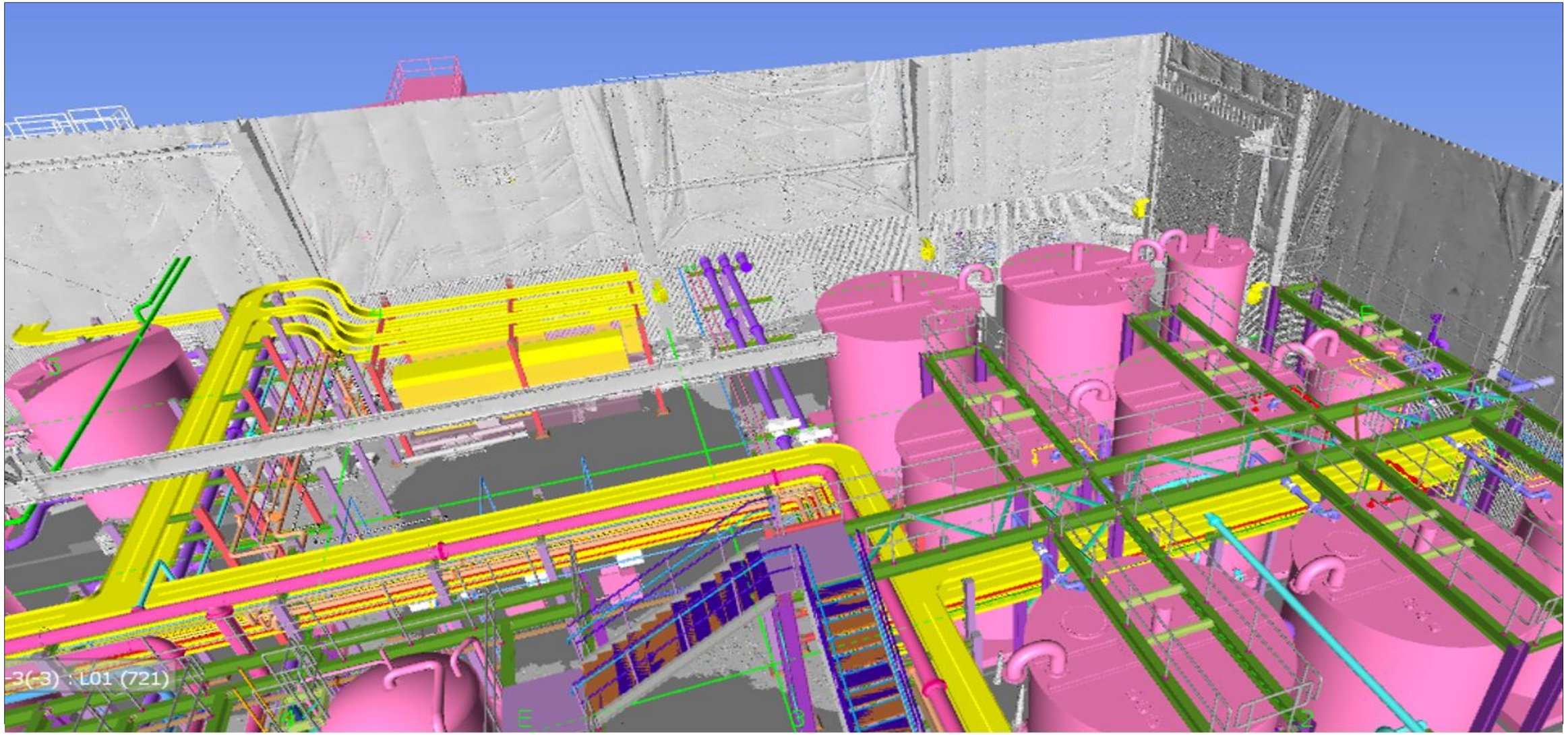


PART VIEW SHOWING STEEL MODEL WITH STAIR & HANDRAILS



PART VIEW SHOWING EXISTING STRUCTURE, PIPPING, CABLE TREY & STEEL MODEL



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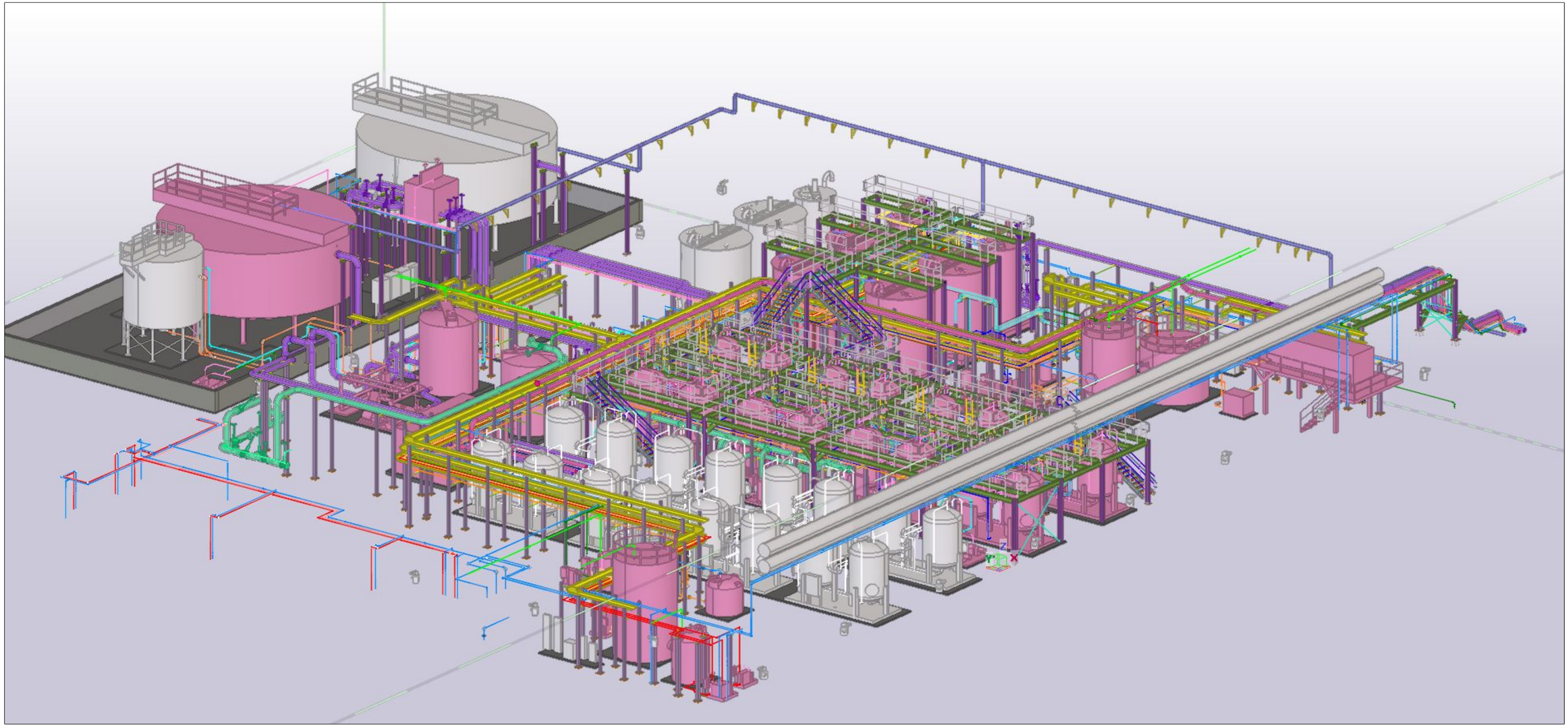


FULL VIEW OF PROJECT

OUTPUT FROM 3D MODEL

ADVANCE BILL OF MATERIAL

Advance Bill of Material

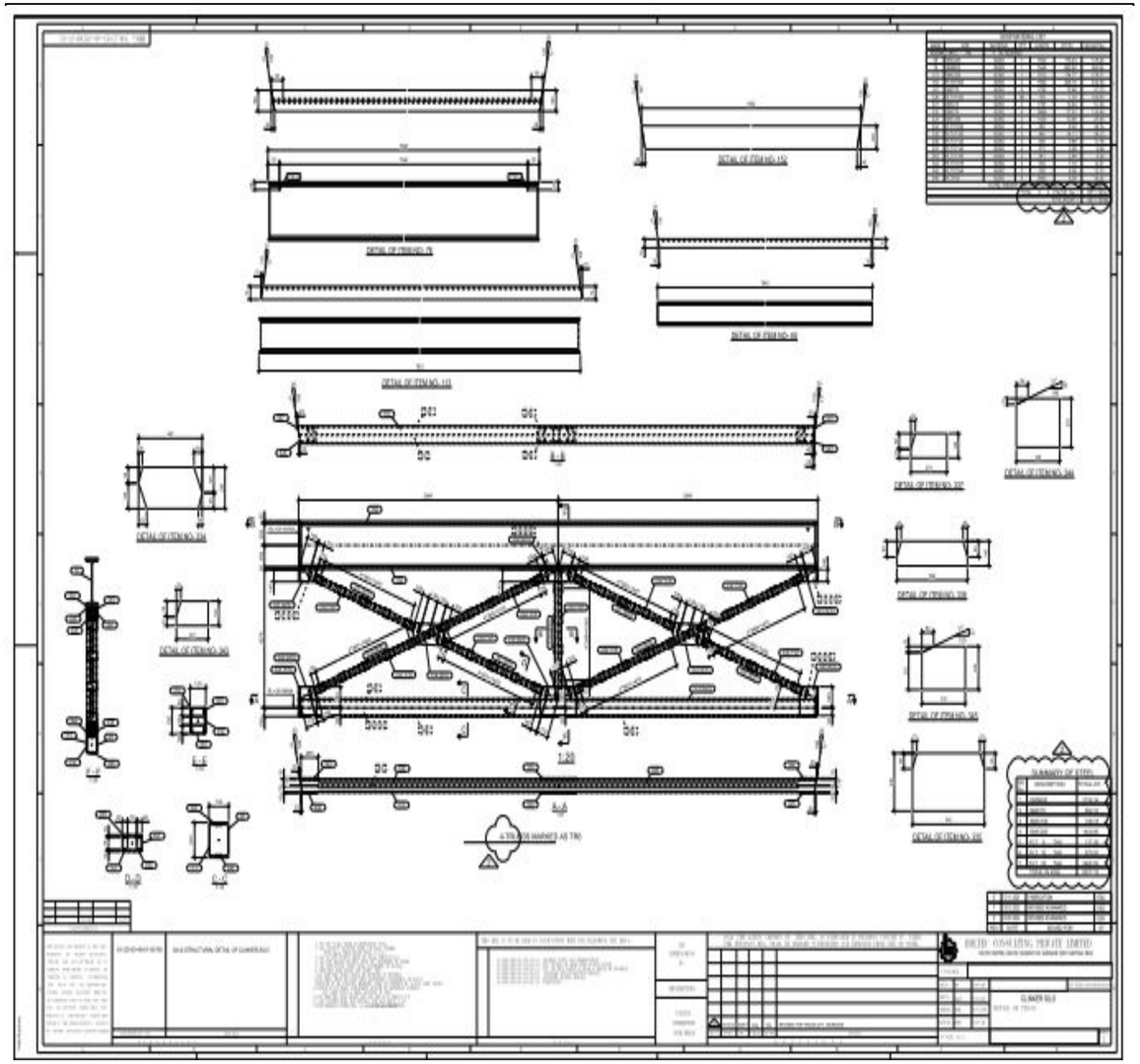
Project Number: XX183
Building: Clinker Silo Dome & Preheater
Date: 19.12.2023

SNo.	SIZE	MATERIAL	LENGTH (mm)	WEIGHT (kg)	REMARKS
1	ISMB500	IS2062	31,392.00	2,735.30	Clinker Silo Dome
2	ISMC75	IS2062	54,41,161.50	38,868.90	Clinker Silo Dome
3	ISMC100	IS2062	14,76,915.10	14,144.40	Clinker Silo Dome
4	ISMC125	IS2062	2,70,378.30	3,544.50	Clinker Silo Dome
5	ISMC150	IS2062	4,26,607.00	7,133.10	Clinker Silo Dome
6	ISMC200	IS2062	19,42,988.50	43,469.50	Clinker Silo Dome
7	ISMC300	IS2062	1,66,501.50	6,051.60	Clinker Silo Dome
8	ROD12	IS2062	9,81,751.60	784.70	Clinker Silo Dome
9	ISA50X50X6	IS2062	426311.2	1900.8	Preheater
10	ISA65X65X6	IS2062	945484.1	5522.0	Preheater
11	ISA75X50X6	IS2062	595.0	3.3	Preheater
12	ISA75X75X6	IS2062	337413.3	2293.8	Preheater
13	ISA75X75X8	IS2062	22427.5	200.7	Preheater
14	ISA90X90X6	IS2062	30303.9	249.8	Preheater
15	ISA90X90X8	IS2062	27034.1	292.9	Preheater
16	ISA150X90X12	IS2062	1760.0	38.0	Preheater
17	ISMB200	IS2062	66393.1	1605.3	Preheater
18	ISMB250	IS2062	64482.3	2404.4	Preheater
19	ISMB300	IS2062	152744.7	7026.4	Preheater
20	ISMB400	IS2062	55666.3	3425.9	Preheater
21	ISMB450	IS2062	12469.8	902.5	Preheater
22	ISMB500	IS2062	67287.3	5863.1	Preheater
23	ISMB600	IS2062	60394.2	7395.9	Preheater
24	ISMC75	IS2062	42198.0	301.4	Preheater
25	ISMC100	IS2062	203689.8	1950.7	Preheater
26	ISMC125	IS2062	150902.2	1978.3	Preheater
27	ISMC150	IS2062	7310.0	122.2	Preheater
28	ISMC200	IS2062	359414.0	8041.0	Preheater
29	ISMC250	IS2062	143910.6	4405.8	Preheater
30	ISMC300	IS2062	4244.6	154.3	Preheater
31	ISMC400	IS2062	33434.0	1674.5	Preheater
Total				1,74,485.0	

- **Information provided in report**
  - it contains all the relevant details about materials, such as type, dimensions, specifications, and properties

- **Benefit of report from 3D model**
  - An advanced BOM automatically updates in real time. This ensures that material quantities and specifications are always accurate and aligned with the latest design
  - This eliminates the need for manual adjustments and ensures the accuracy of material ordering, reducing errors and

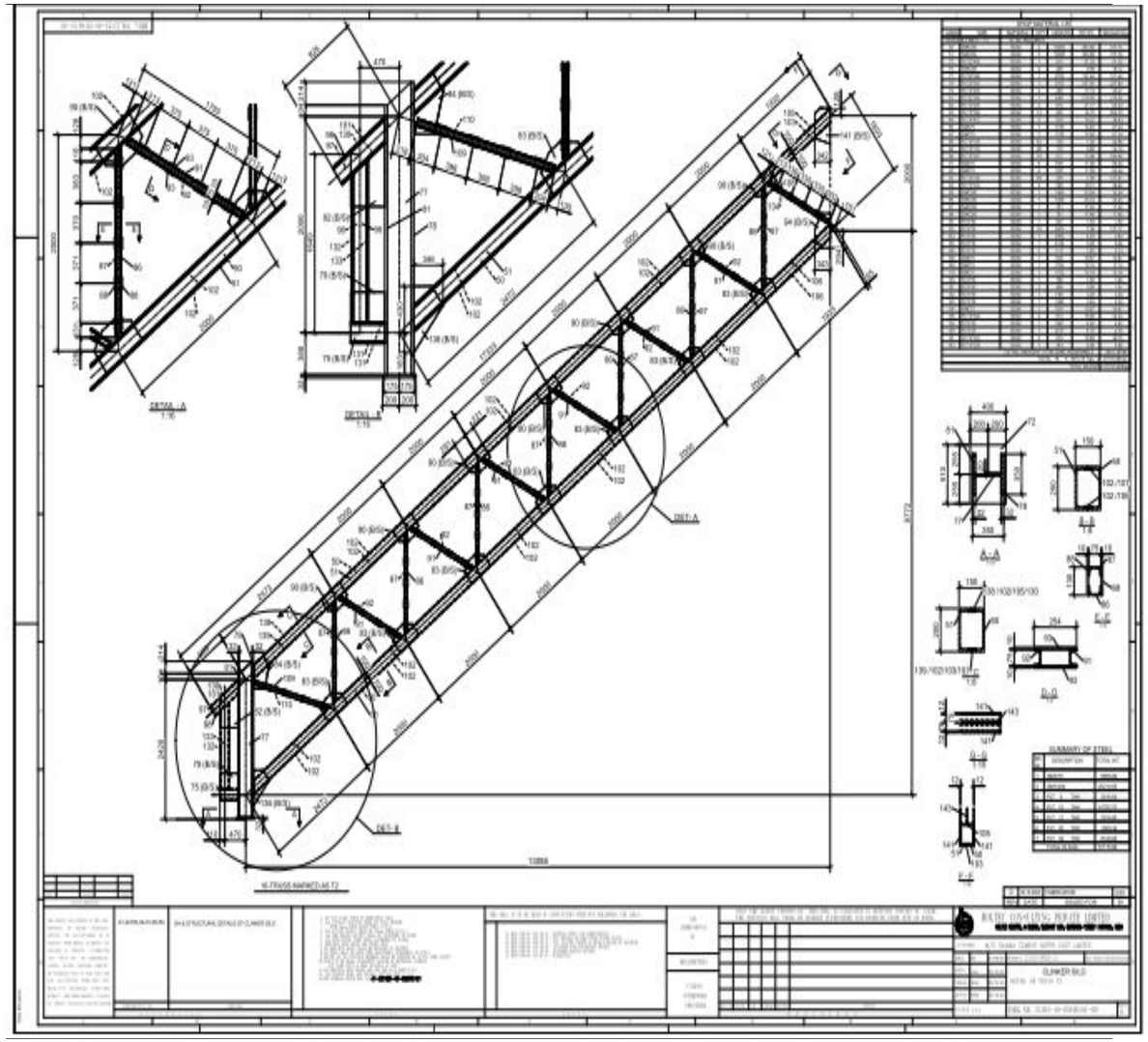
FABRICATION DRAWING



- **Information provided in fabrication drawing**
  - They typically provide information on dimensions, material specifications, and construction techniques
  - All critical dimensions, such as lengths, widths, heights, and angles, are shown on the fabrication drawings

- **Benefit of fabrication drawing from 3D model**
  - They provide precise details needed to fabricate components that fit together seamlessly on-site
  - With precise and well-documented instructions, the likelihood of errors in

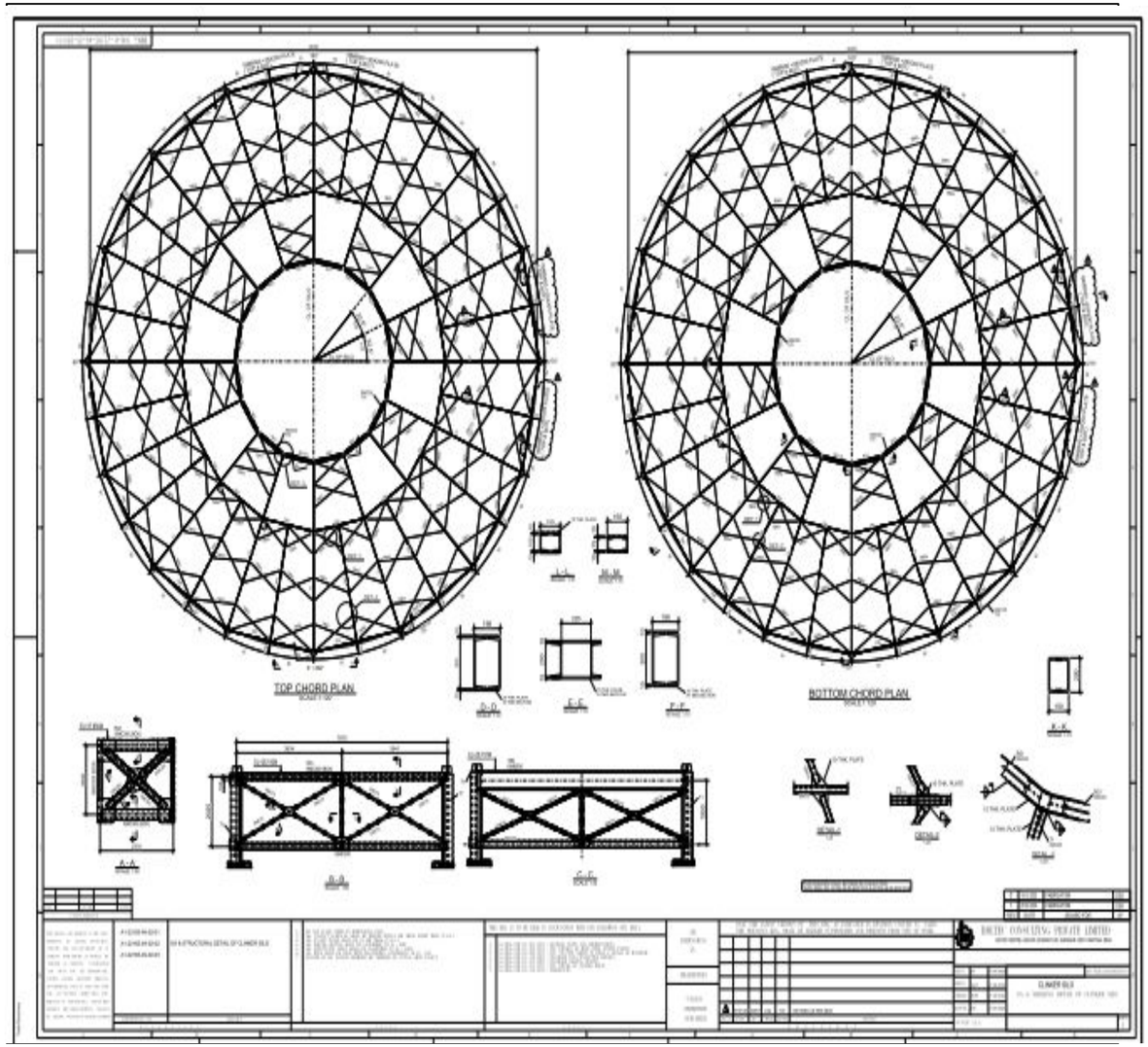
FABRICATION DRAWING



- **Information provided in fabrication Drgs**
  - All the required plans & sections with bill of material (BOM)

- **Benefit of fabrication drawing from 3D model**
  - Accurate dimensions & material sizes.
  - Drawing automatically reflects the changes made in the model

ERECTION DRAWING



- **Information provided in erection Drg**
  - It shows how structural elements should be placed, assembled, and connected on-site.

- **Benefit of erection drawing from 3D model**
  - All assembly marks shown in erection drawings are linked with model & fabrication drawings.
  - Any changes made in the model gets updated in erection drawing

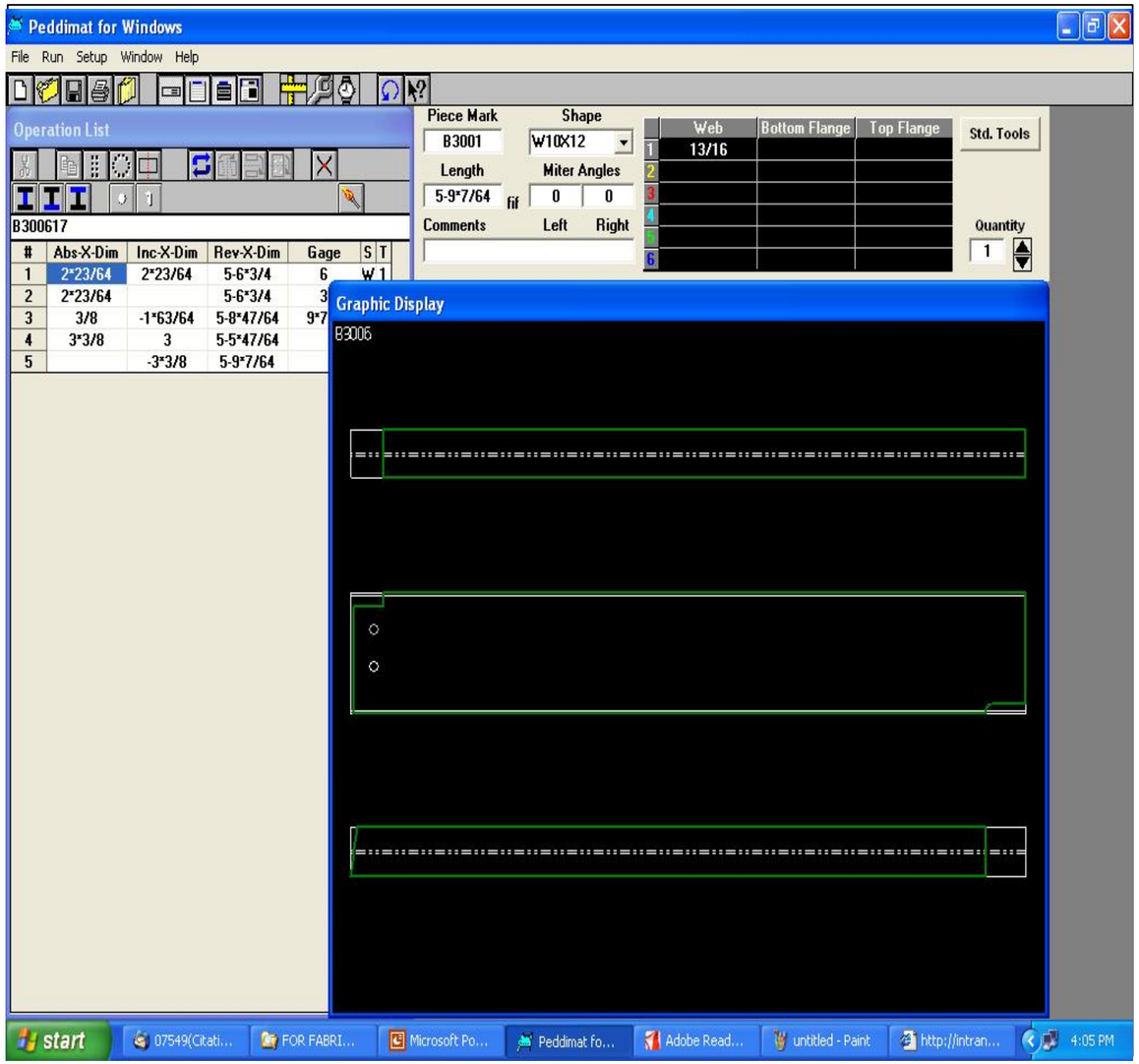
CONSOLIDATED QUANTITY SHEET

Project XX133 - Consolidated Quantity Sheet

				Updated on:	20-Aug-23			
	Structural Input Drawing	Structural Input Drawing Dwg.No:	REV.	Fabrication Drawing	Fabrication Drawing No:	REV.(Fab. dwg.)	Release date of Fabricatio n Drgs.	Drgwise quantity Fab. (M Ton)
1	Preheater (44)							
	GA & STRUCTURAL DETAL OF BRACING ELEVATION	A1-1234-44-01-121	4	ERECTION MARKING PLAN OF BRACING ELEVATION	A1-1234-44-121-ERC-101	0	06-Jul-24	0.000
	GA & STRUCTURAL DETAL OF BRACING ELEVATION	A1-1234-44-01-121	2	DETAIL OF BRACE	A1-1234-44-121-FAB-101	1	02-May-24	0.415
	GA & STRUCTURAL DETAL OF BRACING ELEVATION	A1-1234-44-01-121	2	DETAIL OF BRACE	A1-1234-44-121-FAB-102	1	02-May-24	0.482
	GA & STRUCTURAL DETAL OF BRACING ELEVATION	A1-1234-44-01-121	2	DETAIL OF BRACE	A1-1234-44-121-FAB-103	1	02-May-24	0.195
	GA & STRUCTURAL DETAL OF BRACING ELEVATION	A1-1234-44-01-121	2	DETAIL OF BRACE	A1-1234-44-121-FAB-104	1	02-May-24	0.365
	GA & STRUCTURAL DETAL OF BRACING ELEVATION	A1-1234-44-01-121	2	DETAIL OF BRACE	A1-1234-44-121-FAB-105	1	02-May-24	0.349
	GA & STRUCTURAL DETAL OF BRACING ELEVATION	A1-1234-44-01-121	2	DETAIL OF BRACE	A1-1234-44-121-FAB-106	1	02-May-24	0.238
	GA & STRUCTURAL DETAL OF BRACING ELEVATION	A1-1234-44-01-121	2	DETAIL OF BRACE	A1-1234-44-121-FAB-107	1	02-May-24	0.447
	GA & STRUCTURAL DETAL OF BRACING ELEVATION	A1-1234-44-01-121	2	DETAIL OF BRACE	A1-1234-44-121-FAB-108	1	02-May-24	0.282
	GA & STRUCTURAL DETAL OF BRACING ELEVATION	A1-1234-44-01-121	2	DETAIL OF BRACE	A1-1234-44-121-FAB-109	2	07-Jun-24	0.401
	GA & STRUCTURAL DETAL OF BRACING ELEVATION	A1-1234-44-01-121	2	DETAIL OF BRACE	A1-1234-44-121-FAB-110	1	02-May-24	0.261
	GA & STRUCTURAL DETAL OF BRACING ELEVATION	A1-1234-44-01-121	2	DETAIL OF BRACE	A1-1234-44-121-FAB-111	1	02-May-24	0.399

- **Information provided in this report**
  - Report is created in the form of an excel sheet
  - It contains material quantity of a total project required against each fabrication drawings
- **Benefit**
  - It helps the procurement team determine exactly what materials are needed and in what quantities, ensuring that orders are placed well in advance and in the correct amounts. This reduces delays caused by material shortages or excess orders.

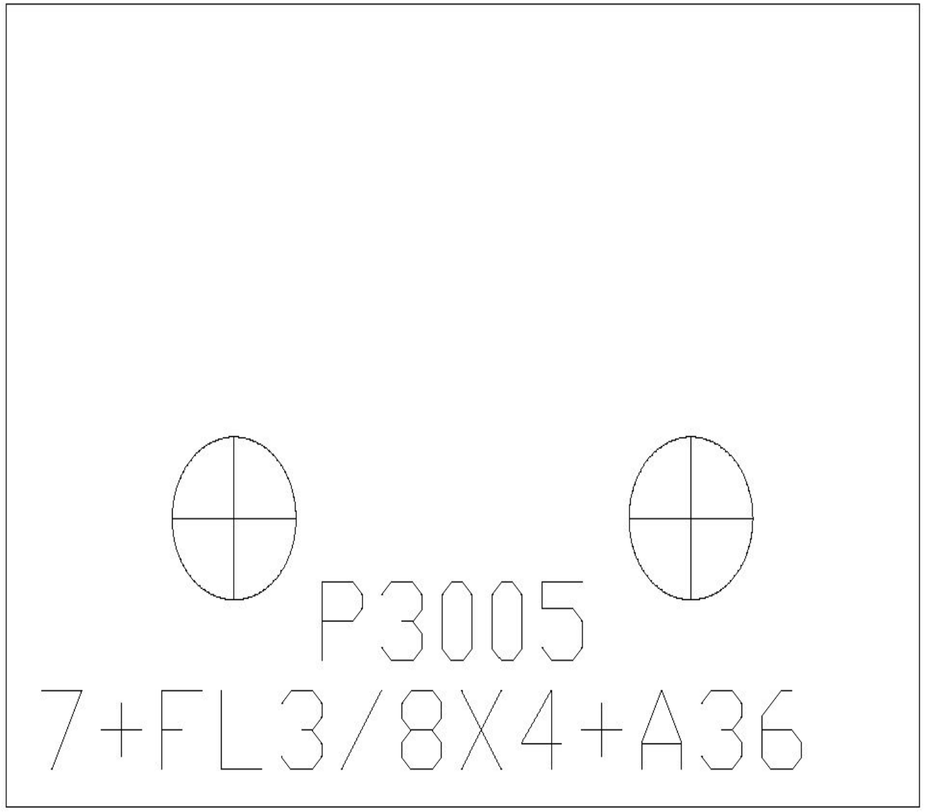
CNC FILE



- **Information provided in this file**
  - CNC files provide the instructions necessary for automating and precisely controlling CNC machines during the manufacturing process.

- **Benefit of this file from 3D model**
  - CNC files is created directly from the model without any user intervention.
  - These files enhance efficiency, precision, and repeatability, while reducing human error and production costs.

DXF FILE



- **Information provided in DXF file**
  - DXF files contain the geometrical shapes and elements that make up the drawing, such as lines, polylines, circles, arcs, and splines.
  - DXF files are commonly used in CNC machining, laser cutting, and plasma cutting.
- **Benefit of this file from 3D model**
  - DXF files are created directly from the model without any user intervention.
  - They can be easily re-created if the changes are made in model

BOLT LIST

```
BOLT LIST

PROJECT NAME:  ABC                                          Date: 10/30/2024
JOB NUMBER:  30601                                          Time: 05:41:18pm
-------------------------------------------------------------------------------

Shop bolts

       289-BOLT 3/4"DIA A325 2"
         9-BOLT 3/4"DIA A325 2"1/2
        20-BOLT 3/4"DIA A325 2"1/4
         2-BOLT 5/8"DIA A325 1"1/2

   ALL BOLTS CARRY W/ ONE HEX NUT & ONE HARDENED WASHER WITH EACH.
-------------------------------------------------------------------------------

Field bolts - 5% has been added to the field bolt totals.


        76-BOLT 1/2"DIA A325 1"1/2

       1012-BOLT 3/4"DIA A325 2"
        66-BOLT 3/4"DIA A325 2"1/2
       154-BOLT 3/4"DIA A325 2"1/4


       100-BOLT 5/8"DIA A325 1"1/2
         2-BOLT 5/8"DIA A325 2"



         ALL BOLTS CARRY W/ ONE HEX NUT & ONE HARDENED WASHER WITH EACH.

-------------------------------------------------------------------------------
                              END OF REPORT
```

- **Information provided in Bolt List**
  - Bolt list typically contains essential data about each bolt, which is crucial for construction, fabrication, and assembly processes.

- **Benefit of this Bolt list from 3D model**
  - Generating the bolt list from the 3D model ensures that the data is accurate and directly linked to the design. This reduces human errors that might occur when manually creating bolt lists.

MATERIAL MANAGEMENT REPORTS

MIS LIST

POWERFAB REPORT

EJE REPORT

- **Information provided in these reports**
  - They are used for improving material management and they help ensure that the right materials are procured, delivered, and used on time.

- **Benefit of reports from 3D model**
  - **MIS** List improves procurement and inventory management.
  - **PowerFab Report** streamlines steel fabrication and quality control.
  - **EJE** Report provides real-time tracking and facilitates engineering job execution.

SUMMARY

- Today we covered the evolution of the traditional flow of drawings and information, how new tools like 3D modelling, BIM and advanced material management can help streamline your processes, improve project efficiency and reduce errors.

- We also looked at real world examples of how these technologies can be applied in your projects.

THANK YOU

Holtec Consulting Pvt Ltd

Holtec Centre

A Block, Sushant Lok-I, Gurgaon, India

info@holtecnet.com

+91 124 4047900

www.holtecnet.com