



PROVEN MODULAR ENGINEERING

A MODERN APPROACH TO ENGINEERING, DESIGN AND CONSTRUCTION

TRADITIONAL ENGINEERING APPROACH

- REDESIGN THE EACH PLANT TO MEET ITS PRODUCTION REQUIREMENTS
- SELECT BETWEEN VENDORS WITH DIFFERENT CRITERIAS OR SPECIFICATIONS
- WAIT FOR SUBSTANTIAL COMPLETION OF ENGINEERING PRIOR TO PREPARING RFQ'S AND A FIRM BUDGET
- RISK DESIGN CHANGES (CHANGE ORDERS) DURING CONSTRUCTION OR POST START UP

WHY MODULAR DESIGN & ENG.

➡ MINIMIZE ENGINEERING EFFORT

➡ REDUCE REDESIGN RISKS

➡ COST AND TIME EFFICIENT

WHAT IS MODULAR ENGINEERING

- A SYSTEM OF **STANDARDIZING EQUIPMENT LAYOUT** THAT IS SCALABLE TO MATCH ANY **REQUIRED PLANT PRODUCTION** AND AVOIDS REDESIGNING FROM SCRATCH
- VENDORS AND CONTRACTORS **SELECTED** EFFECTIVELY USING STANDARDS AND EXACT MATERIAL BILL OF MATERIALS
- A BASED ON PROVEN DESIGN AND EQUIPMENT

MODULAR APPROACH

PLANT LAYOUT

INFRASTRUCTURE:
STEEL

SECONDARY
EQUIPMENT:
METERING BIN

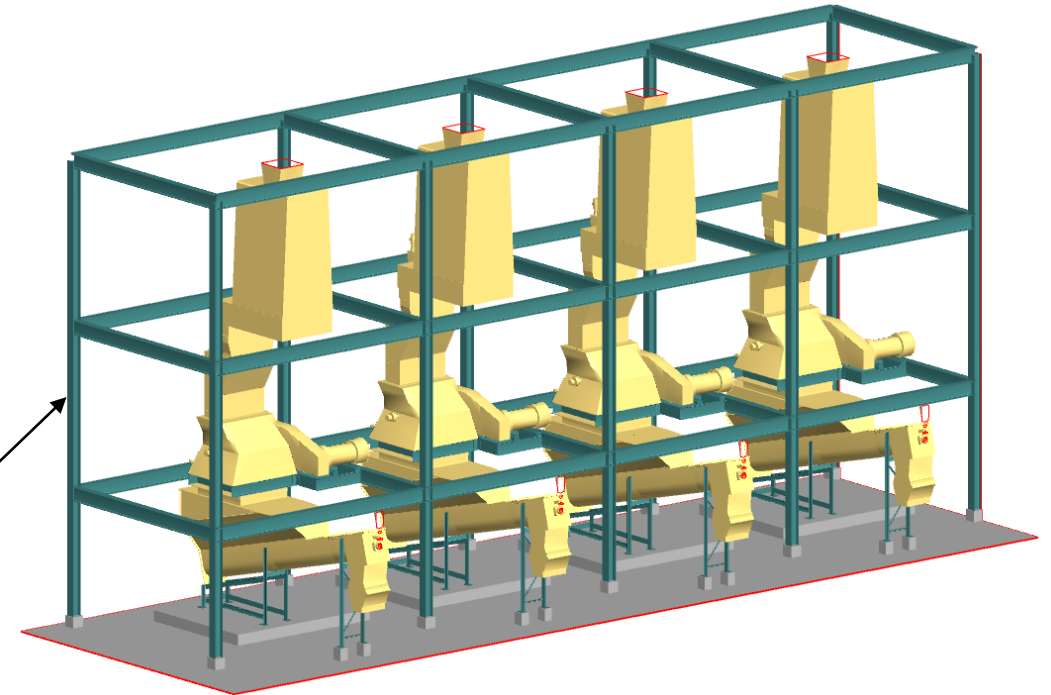
PRIMARY
EQUIPMENT:
HAMMERMILL

SECONDARY
EQUIPMENT:
PLENUM WITH
AUGER

INFRASTRUCTURE:
CONCRETE

MODULAR ENGINEERING:
ONE ASSEMBLY UNIT

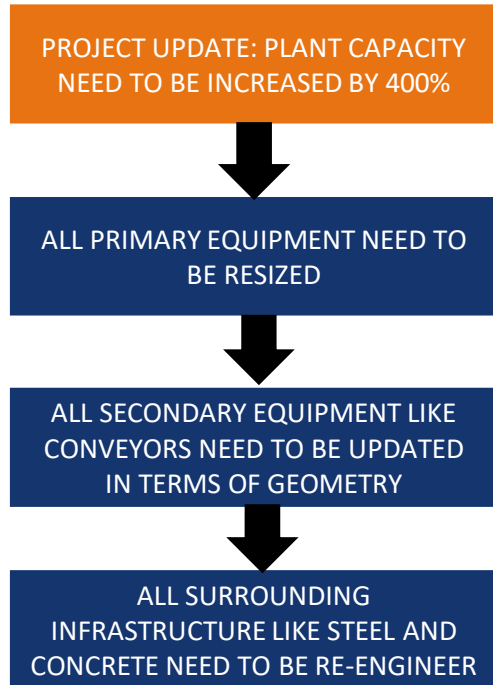
THE ENGINEERING
DESIGN BASED ON
ONE FULLY
DESIGNED
ASSEMBLY EASILY TO
SCALED UP AND
DOWN WITHOUT
NEED TO REDO ANY
ENGINEERING
CALCULATIONS



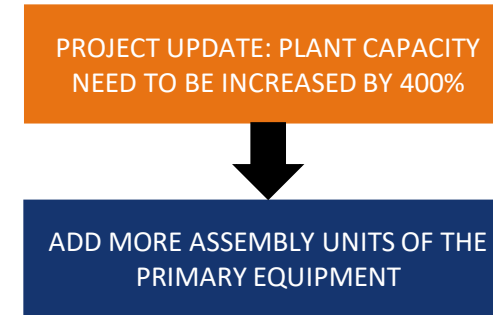
MODULAR ENGINEERING:
LAYOUT CHANGE TO MEET
DESIRED CAPACITY

TRADITIONAL VS MODULAR

PLANT LAYOUT



TRADITIONAL



MODULAR



TRADITIONAL VS MODULAR

PROJECT BUDGET DEVELOPMENT



TRADITIONAL



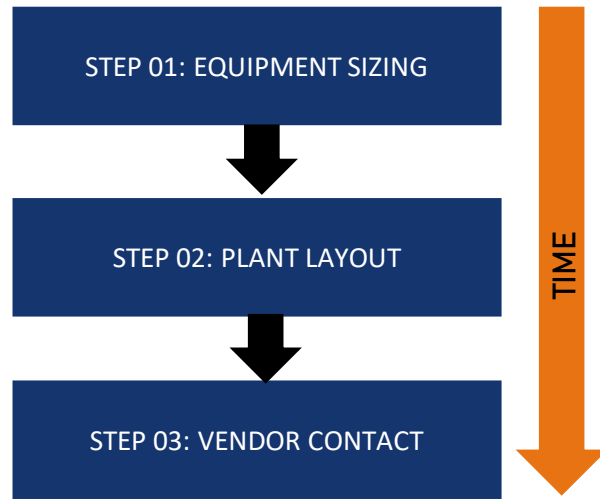
MODULAR

BY USING A MODULAR ENGINEERING APPROACH, IT IS NOT NECESSARY TO REDO ALL ENGINEERING CALCULATIONS AND DESIGN ALL THE EQUIPMENT ASSEMBLIES IN ORDER TO CREATE A PROJECT BUDGET TOGETHER



TRADITIONAL VS MODULAR

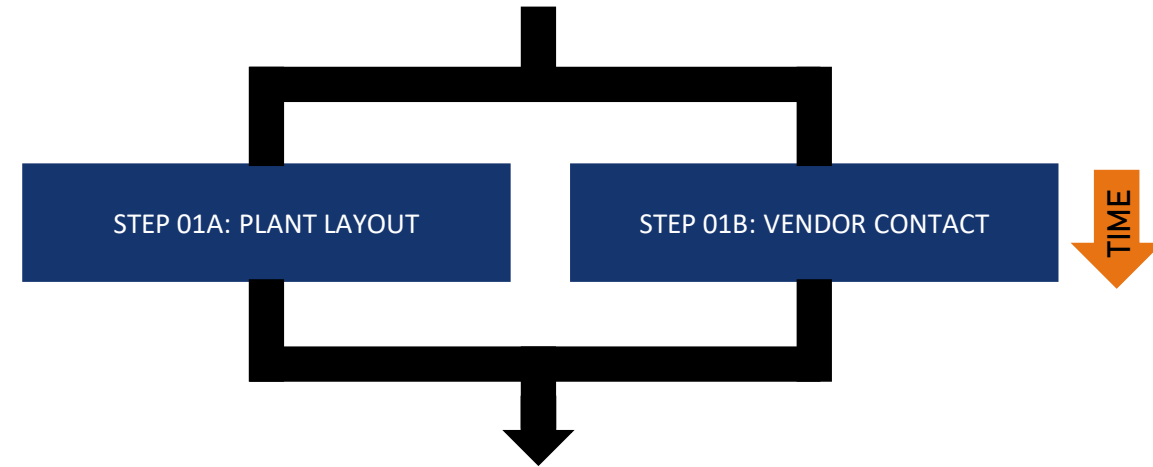
VENDOR CONTACTS



TRADITIONAL APPROACH:

- STEP 01 TO 03 PERFORMED IN SERIES
- VENDORS CONTACTED ONCE THE EQUIPMENT SIZING AND PLANT LAYOUT ARE COMPLETED
- ENGINEERING TIME ADDED TO VENDOR BIDDING TIME.

TRADITIONAL



MODULAR APPROACH:

- THE PLANT LAYOUT AND THE VENDOR CONTACT CAN BE DONE IN PARALLEL RATHER THAN IN SERIES
- ASSEMBLY UNITS DESIGNED
- VENDORS HAVE ALL THE NECESSARY INFORMATION TO BID.

MODULAR



MODULARITY BASED ON PROVEN DESIGN

SIMILAR APPROACH TAKEN IN 2020

- ➡ PLANT OPERATING WITH NO PROCESS ISSUES
- ➡ DESIGNED TO BE ADAPTED TO NORTHERN OR SOUTHERN CLIMATES
- ➡ 3D INTELLIGENT MODEL DESIGN

MODULAR 3D INTELLIGENT MODEL

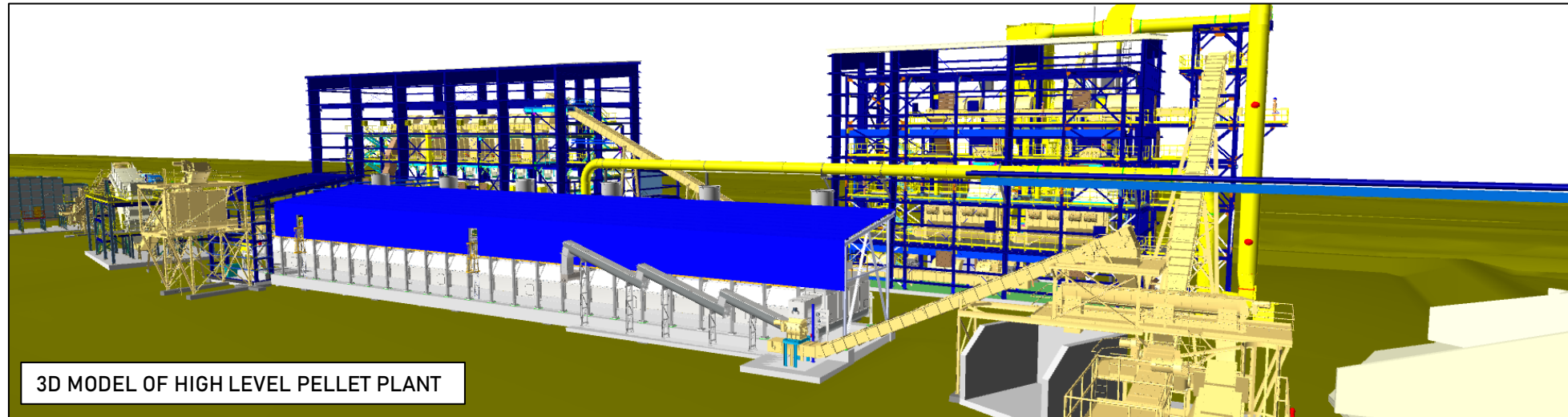
FULLY DETAIL DESIGNED

- 3D CIVIL MODEL WITH UNDERGROUND SERVICES
- 3D **INTELLIGENT** STRUCTURAL DESIGN TO FABRICATION
DETAIL C/W BOM
- 3D EQUIPMENT INTEGRATION
- 3D CABLE TRAYS, AIR PIPING, AND OTHER UTILITIES
- 3D MONARAIL AND FIRE PROTECTION INCLUDED



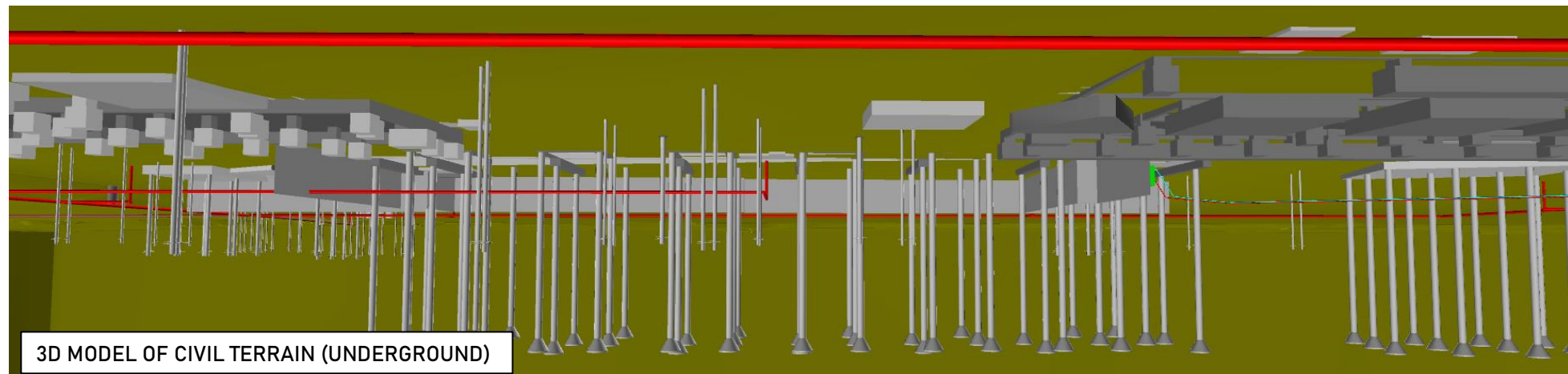
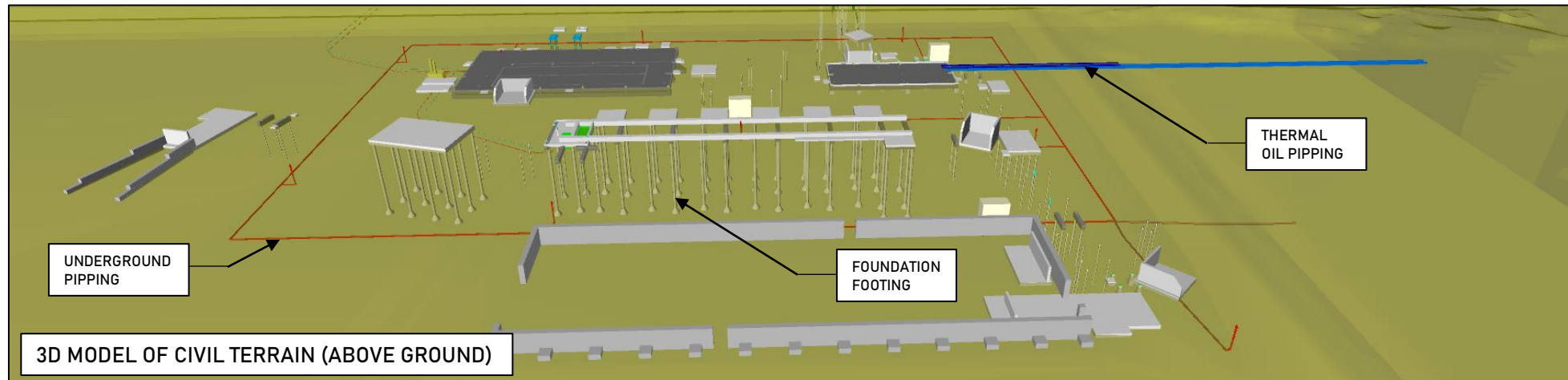
EXAMPLES OF MODULAR 3D DESIGNS

PLANT IN OPERATION SINCE 2020 - OVERVIEW



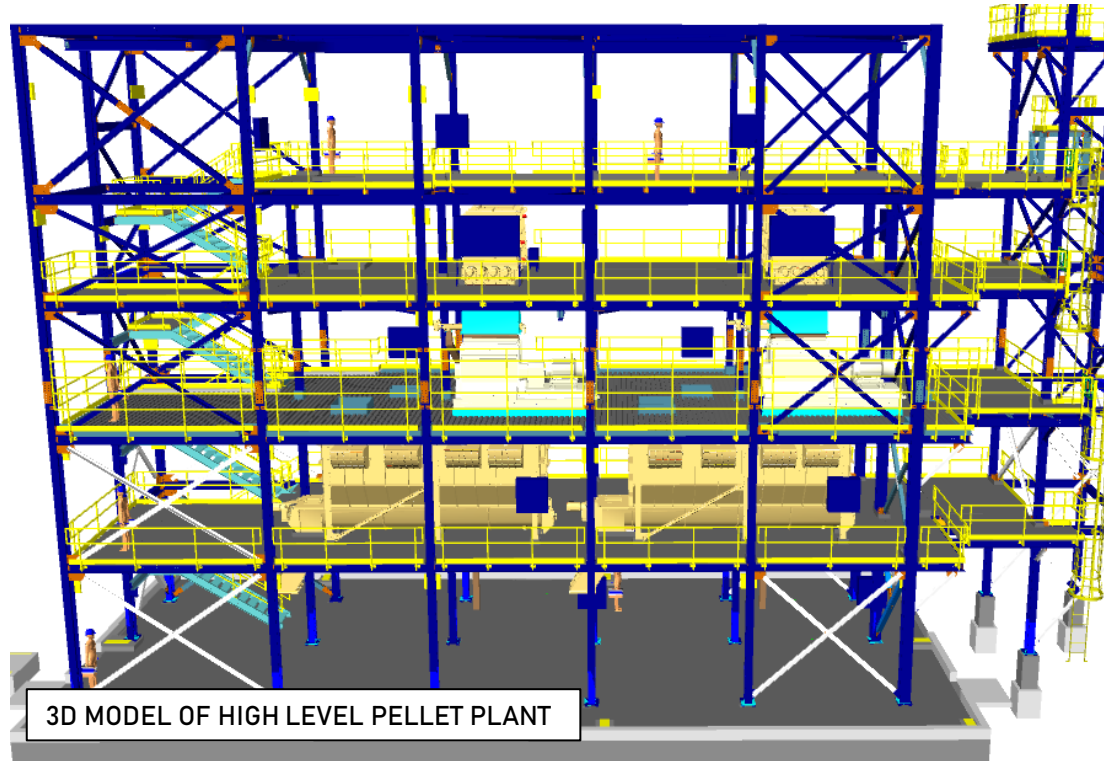
EXAMPLES OF MODULAR 3D DESIGNS

PLANT IN OPERATION SINCE 2020 – 3D CIVIL INTEGRATION



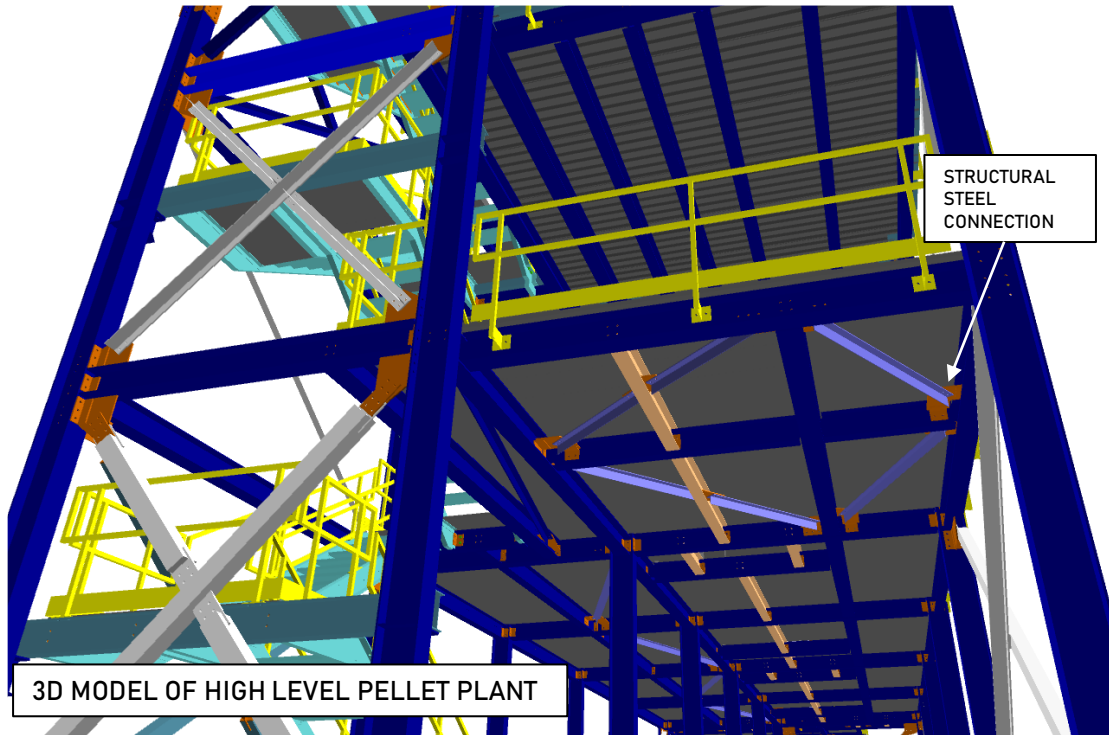
EXAMPLES OF MODULAR 3D DESIGNS

PLANT IN OPERATION SINCE 2020 – 3D STEEL DESIGN



EXAMPLES OF MODULAR 3D DESIGNS

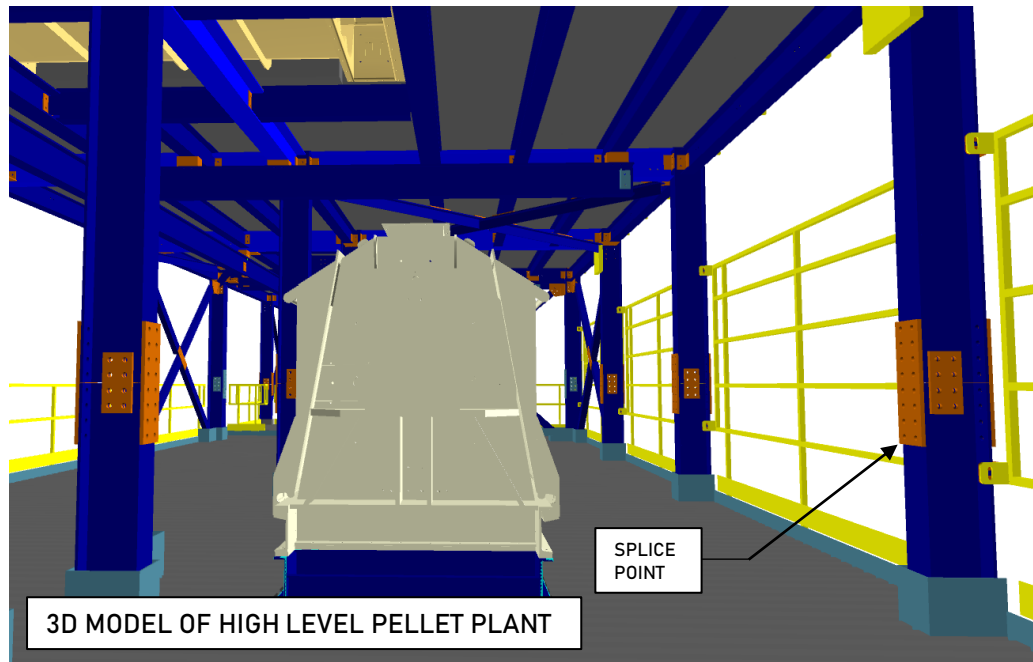
PLANT IN OPERATION SINCE 2020 – 3D STEEL DESIGN



EXAMPLES OF MODULAR 3D DESIGNS

PLANT IN OPERATION SINCE 2020 – 3D STEEL DESIGN

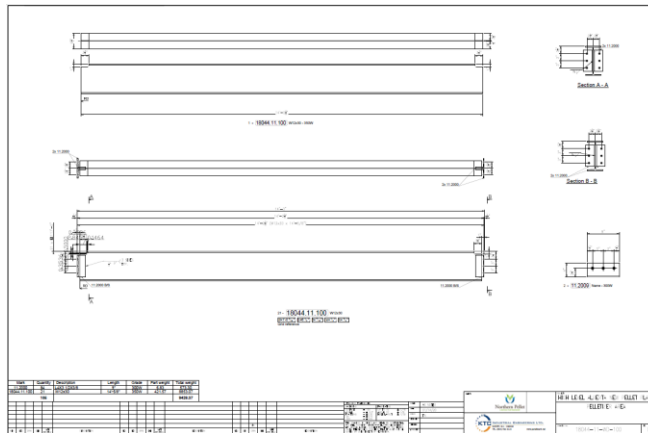
- MODEL INCORPORATES ALL LOADS (INCL. SEISMIC)
- MODEL INDICATE SPLICE POINTS FOR SHIPPING EFFICIENCY



EXAMPLES OF MODULAR 3D DESIGNS

PLANT IN OPERATION SINCE 2020 – 3D STEEL DESIGN

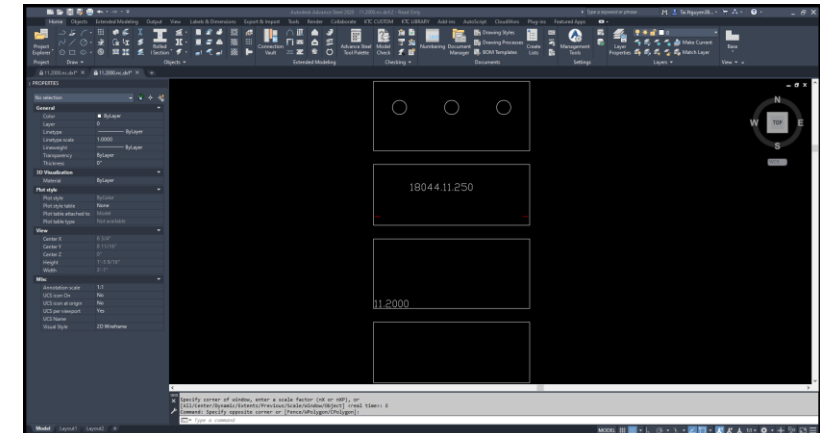
➡ FABRICATION DRAWINGS AND BILL OF MATERIALS
AUTOMATICALLY GENERATED



FABRICATION DRAWINGS

All Columns Beams & Plates Material List - Pelletizer						
Client: Northern Pellet			Job No: 18044-11			
Project: HIGH LEVEL NEW PELLET PLANT			Revision: 0			
			Date: 06-Mar-20			
Quantity	Mark	Description	Detailer: Length (inch)	Grade	Part weight pound	Total weight pound
L4X3 1/2X3/8						
954	11.2000	L4X3 1/2X3/8	9'	300W	6.83	6,511.06
720	11.2001	L4X3 1/2X3/8	6'	300W	4.55	3,276.01
86	11.2003	L4X3 1/2X3/8	9'	300W	6.83	596.95
15	11.2006	L4X3 1/2X3/8	6'	300W	4.55	68.25
88	11.2009	L4X3 1/2X3/8	9'	300W	6.83	600.60
9	11.2010	L4X3 1/2X3/8	6'	300W	4.55	36.40
30	11.2013	L4X3 1/2X3/8	9'	300W	6.83	204.75
9	11.2304	L4X3 1/2X3/8	6'	300W	4.55	40.95
1	11.2307	L4X3 1/2X3/8	6'	300W	4.55	4.55
1	11.2308	L4X3 1/2X3/8	6'	300W	4.55	4.55
15	11.2402	L4X3 1/2X3/8	9'	300W	6.83	102.38
13	11.2404	L4X3 1/2X3/8	6'	300W	4.55	68.25
15	11.2405	L4X3 1/2X3/8	9'	300W	6.83	102.38
7	11.2406	L4X3 1/2X3/8	6'	300W	4.55	31.85
4	11.8004	L4X3 1/2X3/8	6'	300W	4.55	18.20
1968	TOTAL		TOTAL	1281'		11,657.11
L3 1/2X3X3/8						
32	11.2004	L3 1/2X3X3/8	9'	300W	5.92	189.60
8	11.2014	L3 1/2X3X3/8	9'	300W	5.92	47.40
40	TOTAL		TOTAL	30'		237.00
L3 1/2X3 1/2X3/8						
4	11.2011	L3 1/2X3 1/2X3/8	6'	300W	4.28	17.00
4	11.2015	L3 1/2X3 1/2X3/8	9'	300W	6.37	25.50
List produced by AUTODESK Advance Steel						

BILL OF MATERIALS

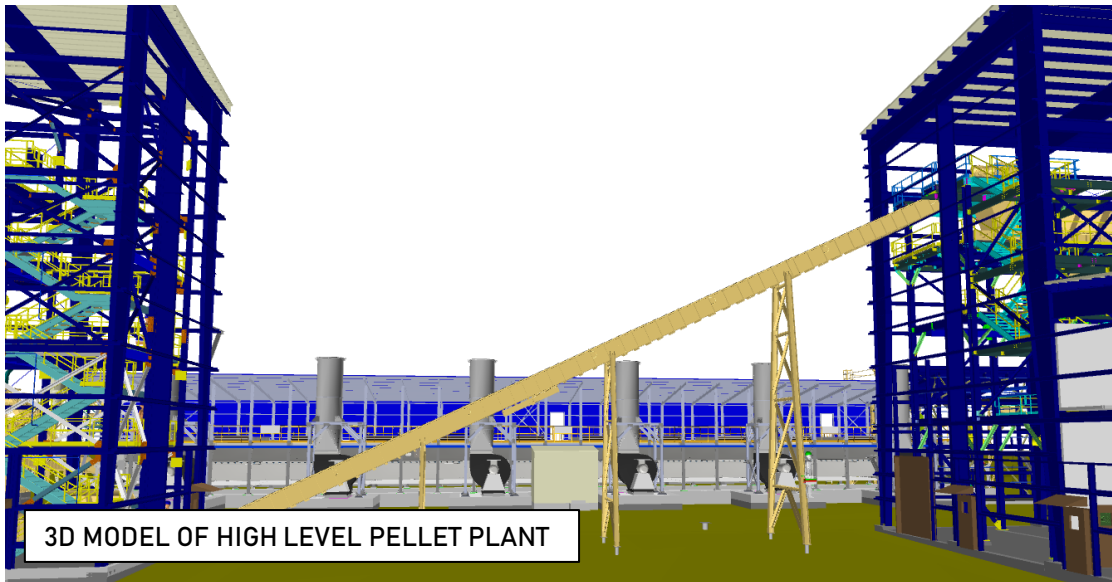


NC FILES



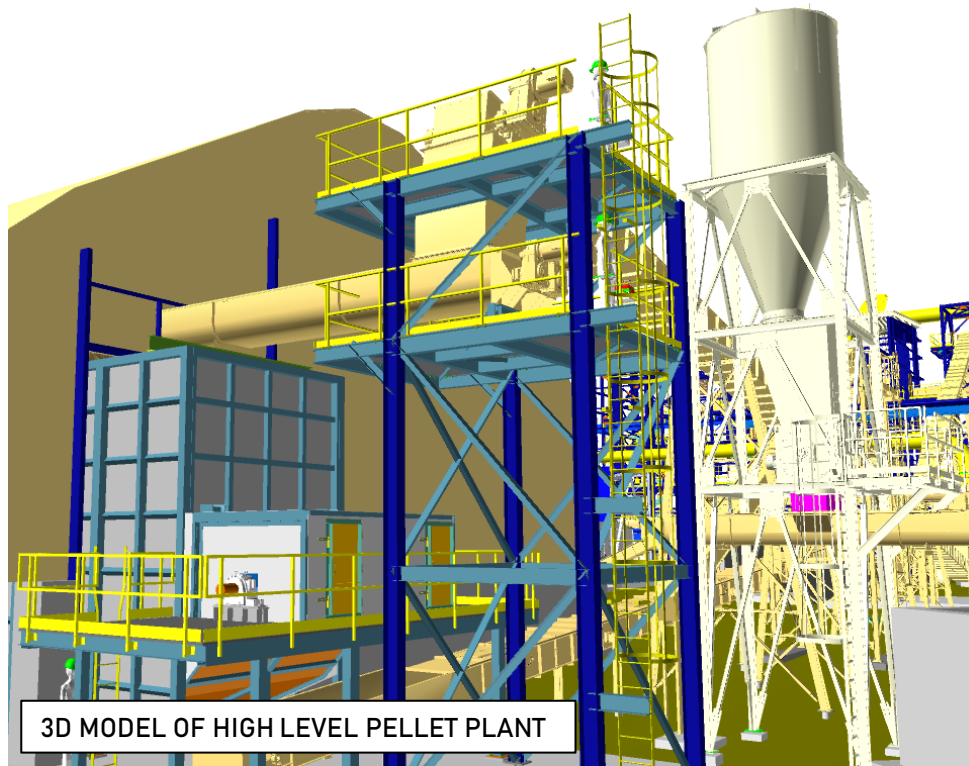
EXAMPLES OF MODULAR 3D DESIGNS

PLANT IN OPERATION SINCE 2020 – 3D EQUIPMENT INTEGRATION



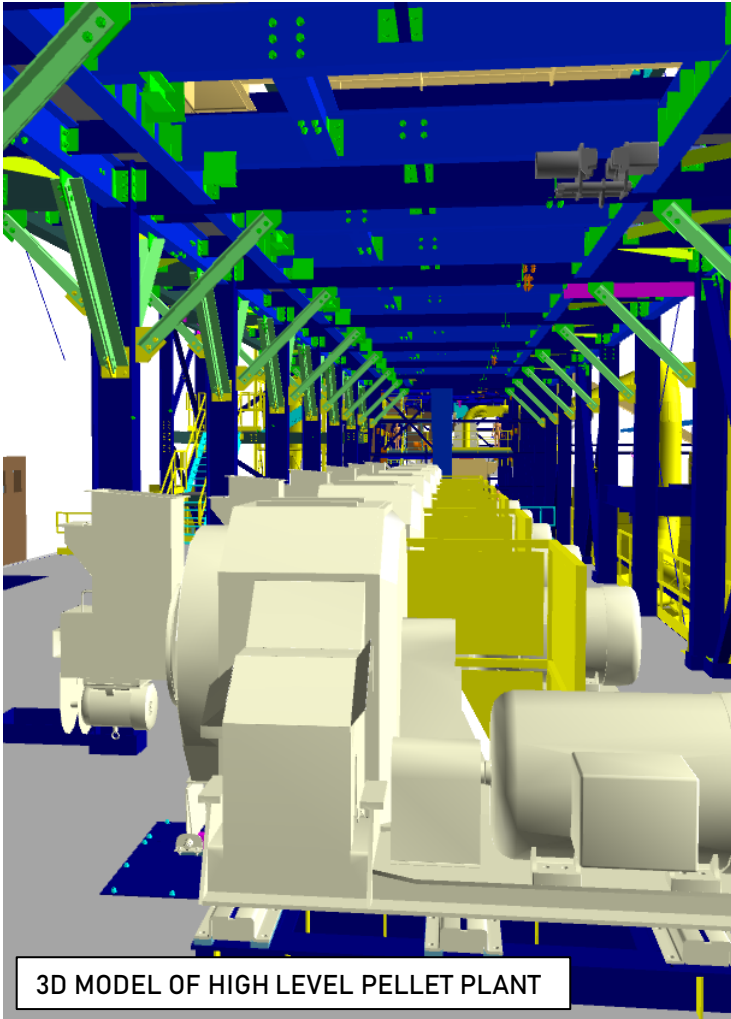
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PLANT IN OPERATION SINCE 2020 – 3D EQUIPMENT INTEGRATION



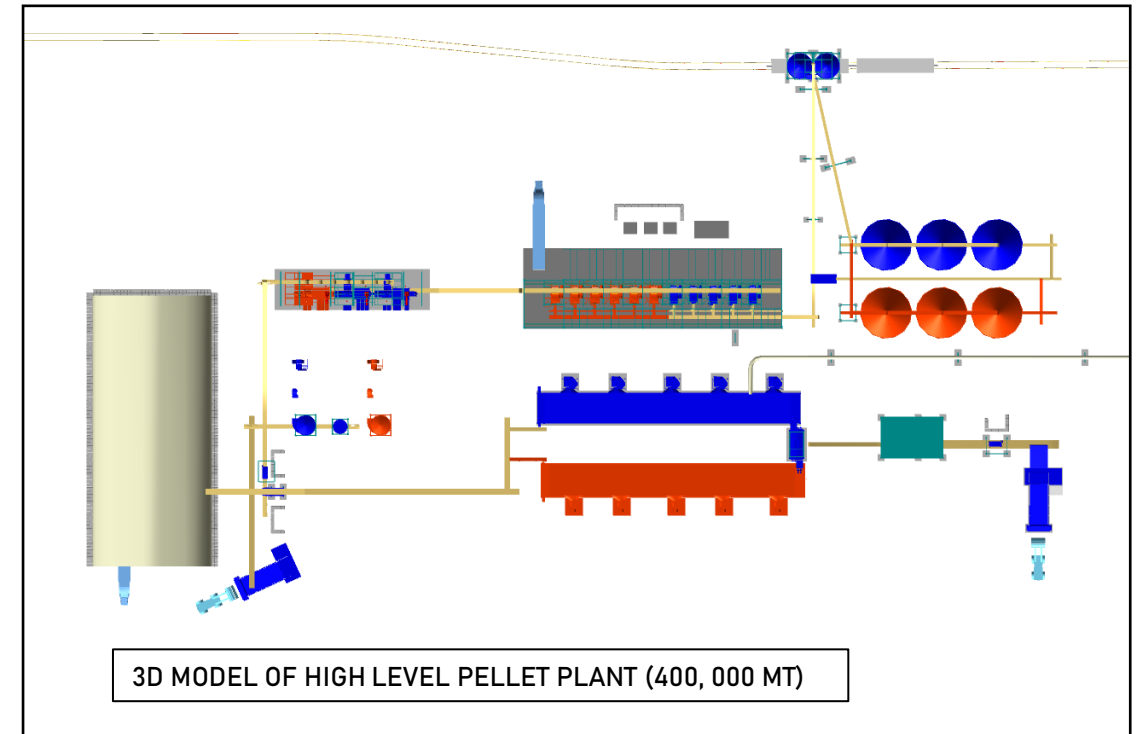
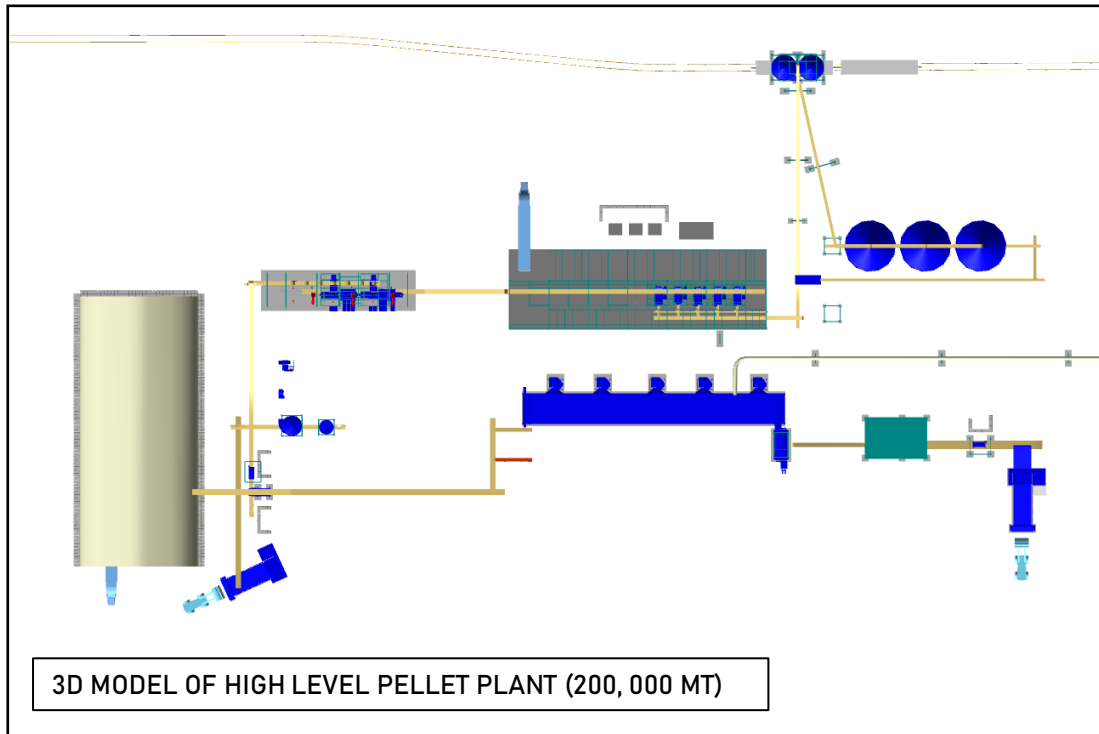
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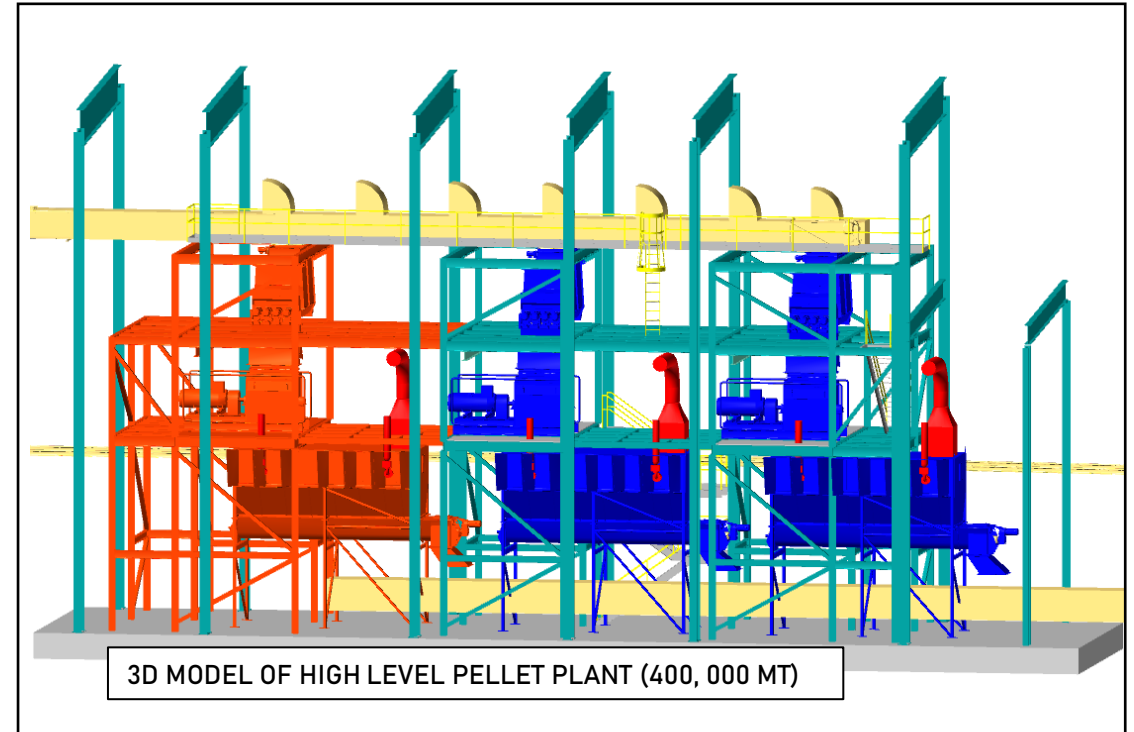
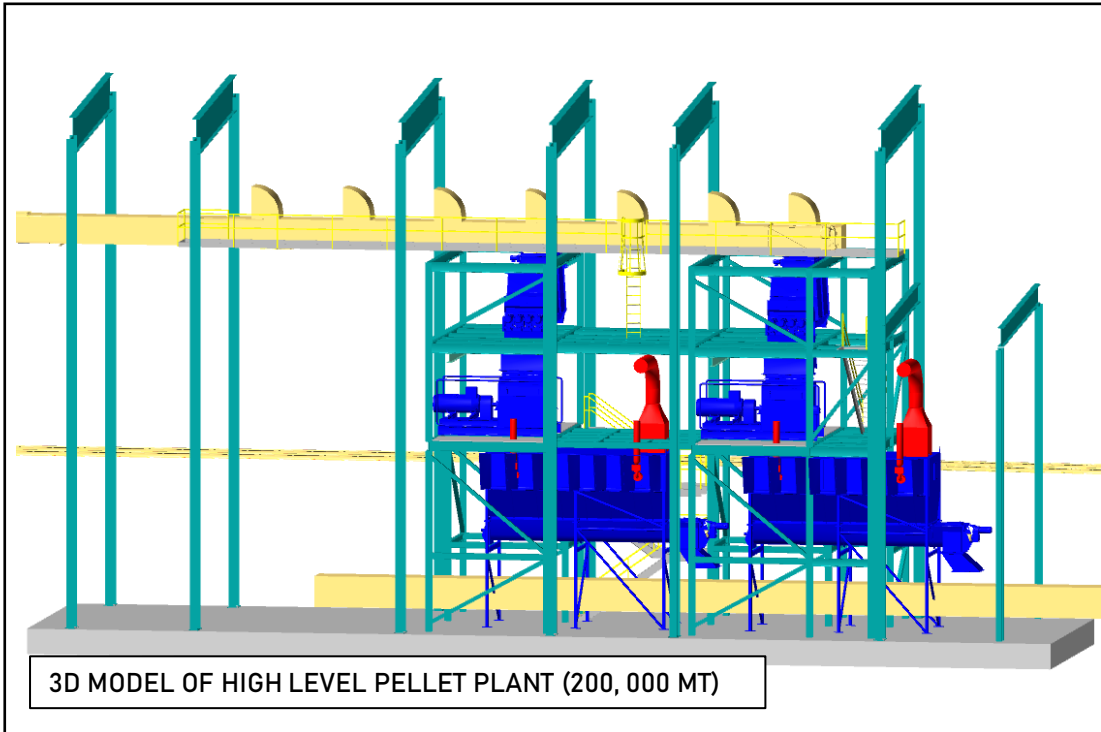
PLANT IN OPERATION SINCE 2020 – LAYOUT AT DIFFERENT PRODUCTION LEVELS



IN BLUE REPRESENTS THE LAYOUT DESIGNED FOR 200,000 MT ANNUALLY AND IN RED REPRESENTS THE LAYOUT DESIGNED FOR 400,000 MT ANNUALLY. BY USING MODULAR DESIGN, THE LAYOUT DID NOT NEED TO BE REDESIGNED AS IT WOULD HAVE IN TRADITIONAL ENGINEERING, BUT INSTEAD MORE ASSEMBLY UNIT OF PRIMARY EQUIPMENTS WERE ADDED IN ORDER TO MEET THE DESIRED CAPACITY

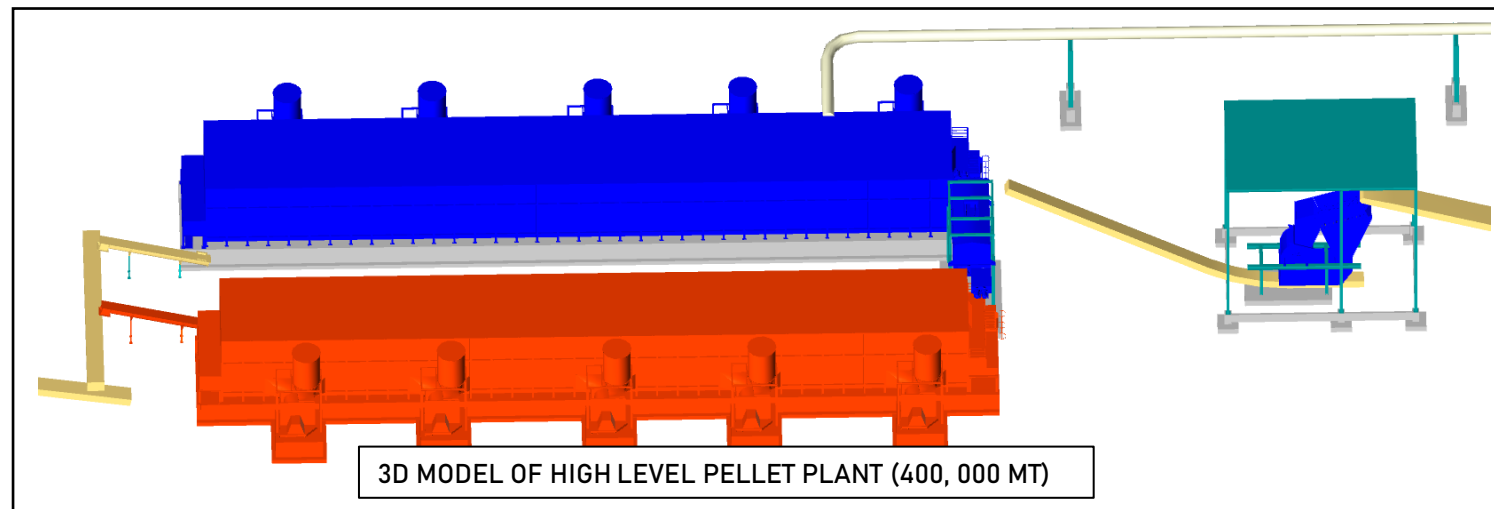
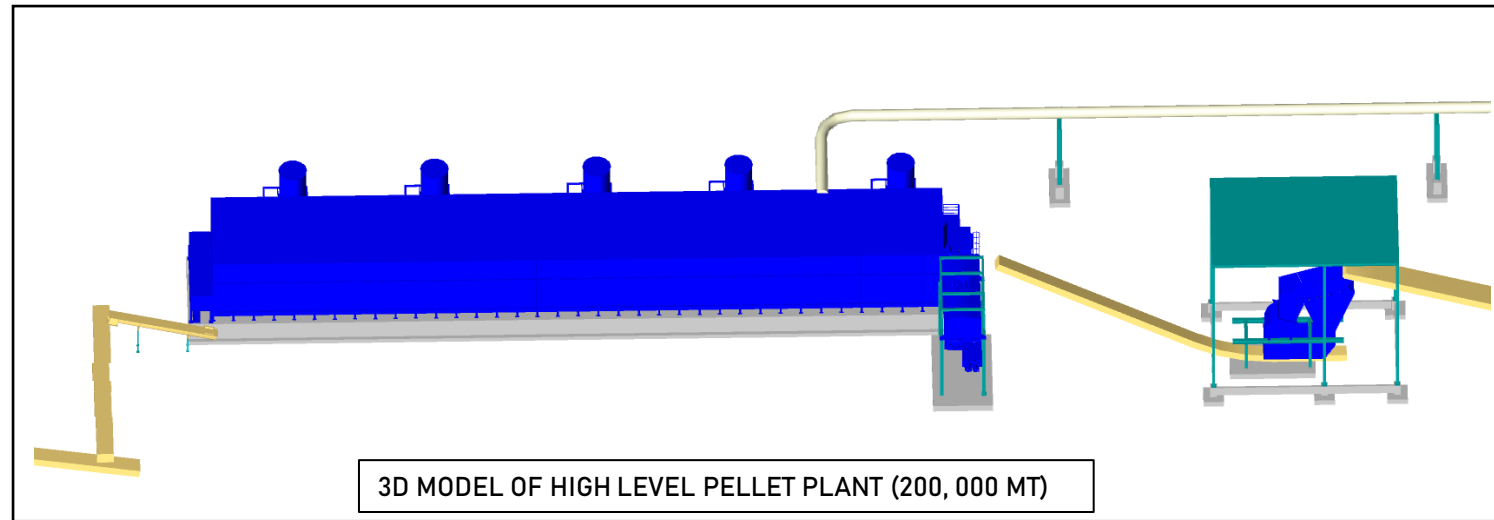
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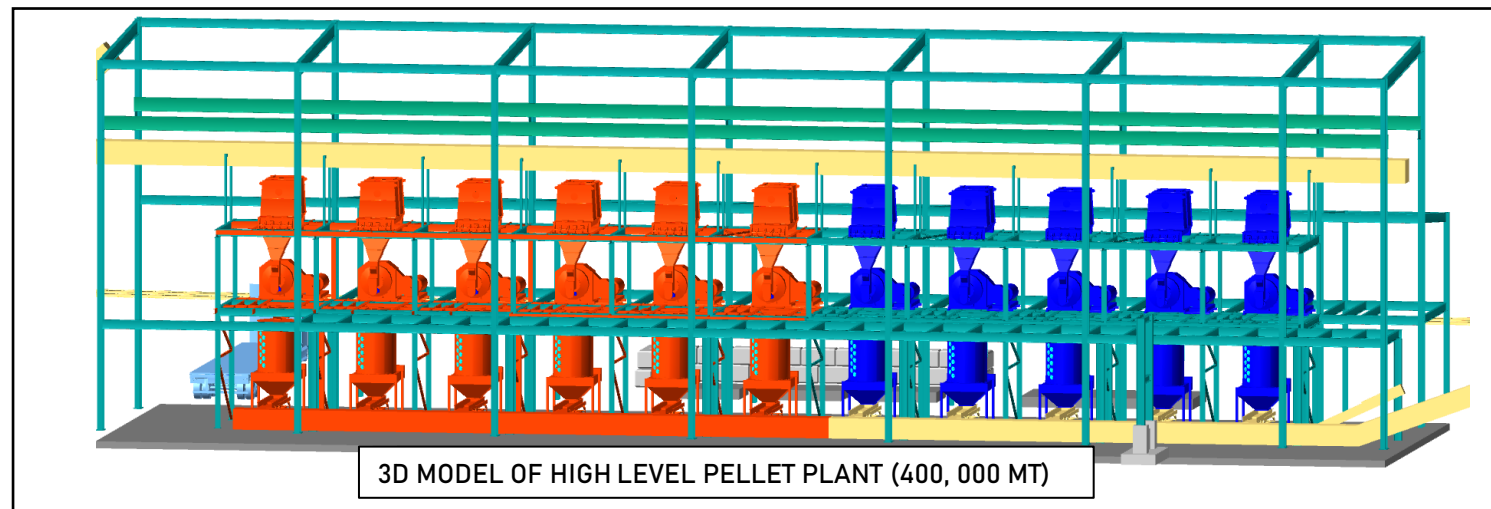
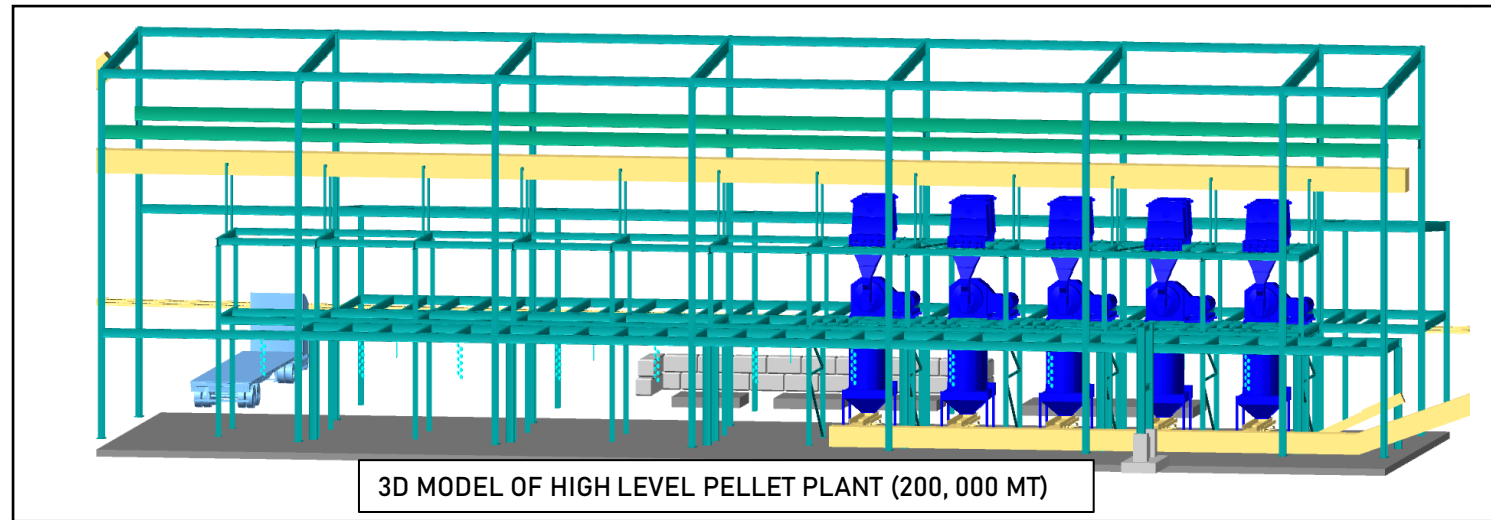
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