

# PENTA

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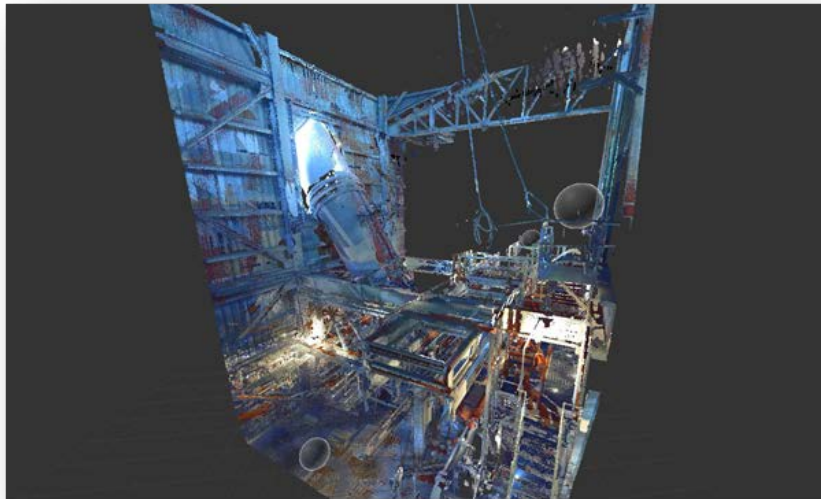
Engineers for Industry

[www.penta.net](http://www.penta.net)

**TECHNOLOGICAL  
CAPABILITIES, APPLICATIONS  
AND PROCESSES**

## LASER SCANNING

- PENTA's state of the art 3D scanner captures the existing conditions of the project site
- This technology lets PENTA accurately and efficiently gather data and the condition of existing buildings, equipment, storage piles, mining areas, and other plant assets
- Simultaneously takes panoramic photos of the project site
- Collects data at +/- 2mm accuracy within 130m range



SCAN DATA



PANORAMIC PHOTO

## LASER SCANNING

- Records existing conditions with great accuracy
- Minimal manpower needed to produce scans
- Powerful tool for multiple departments (maintenance, engineering, records, etc) and future projects
- Reduces conflicts during Construction



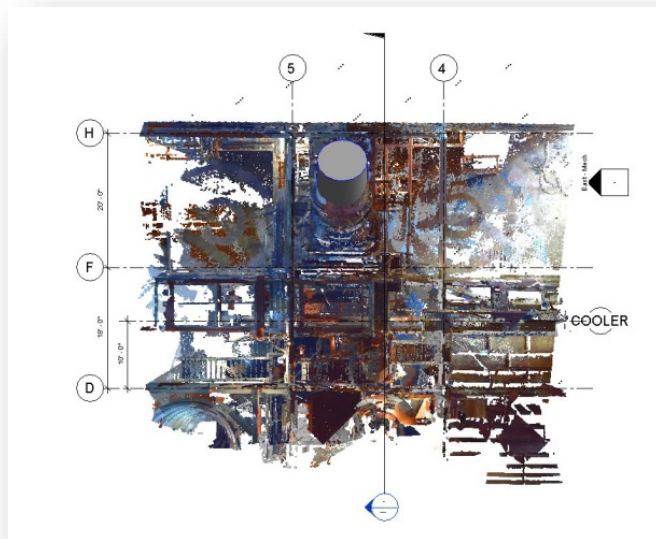
SCAN DATA



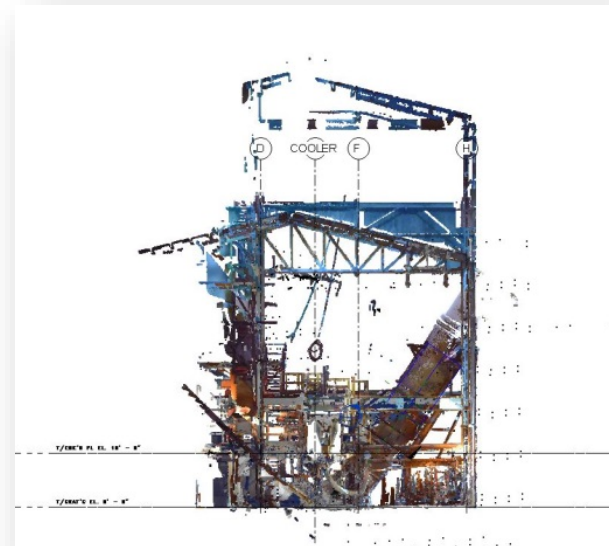
PANORAMIC PHOTO

## LASER SCANNING

- PENTA uses scan data during the design and engineering process, ensuring accuracy in construction.
- Very effective when working with existing structures and equipment
- Multiple uses ranging from an entire facility to a specific piece of equipment
- Data collected is used directly in design software, for every discipline



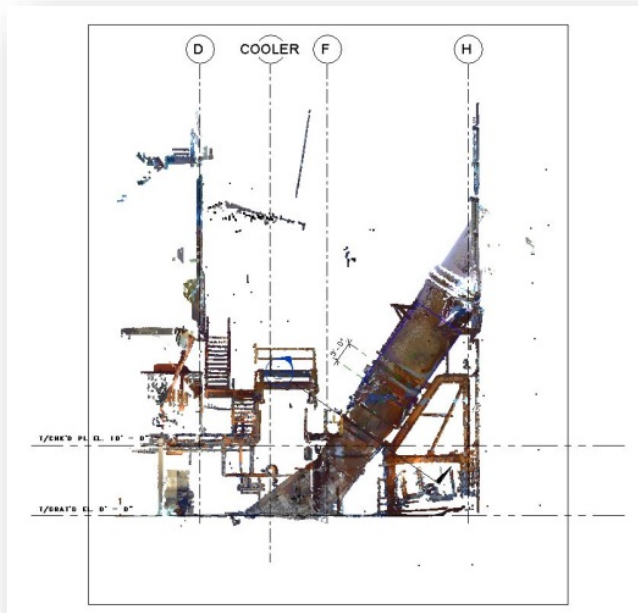
PLAN VIEW OF SCAN



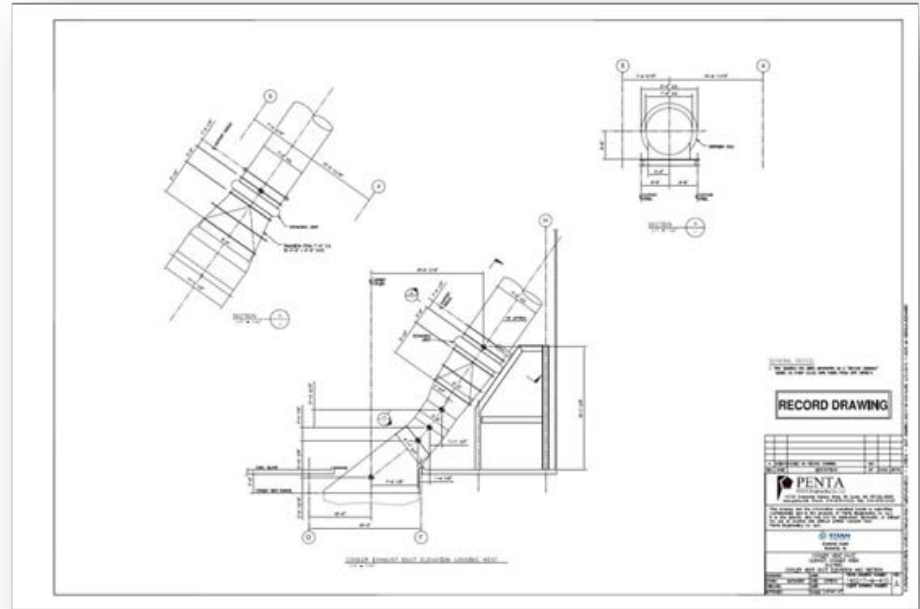
ELEVATION VIEW OF SCAN

## LASER SCANNING

- Reduces risk of injury to staff attempting to collect data
- Access to electronic project/plant data on PC
- Reduces travel costs
- Reduces amount of equipment needed to collect electronic data in the field



SECTION VIEW OF SCAN



2D RECORD DRAWING  
OF SCANNED EQUIPMENT



## LASER SCANNING

### Laser Scanning Benefits

- Accurately measure +/- 2mm at a range of 130m, 360° from scan location, and collects roughly 1 million points per second
- Scan model used in design 3D design process to ensure the most cost efficient constructability.
- Documented panoramic images of all scanned areas
- Ensured up to date conditions of plant and/or project site, and can eliminate the issue of inaccurate or out of date information.



FULL SITE SCAN INTEGRATED WITH CURRENT DESIGN

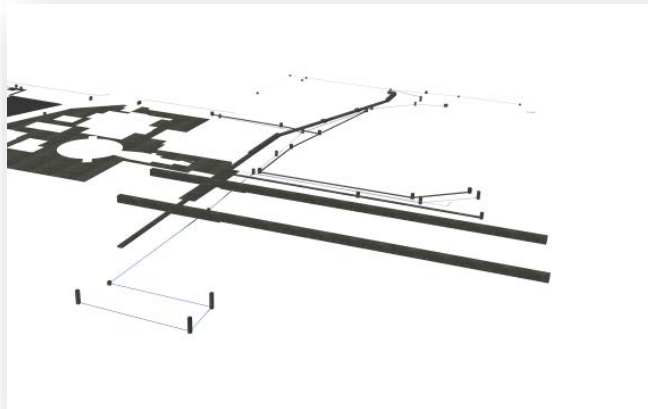
## LASER SCANNING



EXTERIOR SITE SCAN

## CIVIL/MINING 3D SOFTWARE

- PENTA uses state of the art civil design software for site specific engineering tasks
- Model based volume and quantity takeoff for cut and fill, concrete, storage piles, mining locations
- Easily works with drilling info, survey data, and GIS (Geographic Information Systems) data plus more
- Robust utility design package for water, sewer, cable, pressurized pipes, with conflict detection in a 3D environment



UG UTILITY NETWORKS

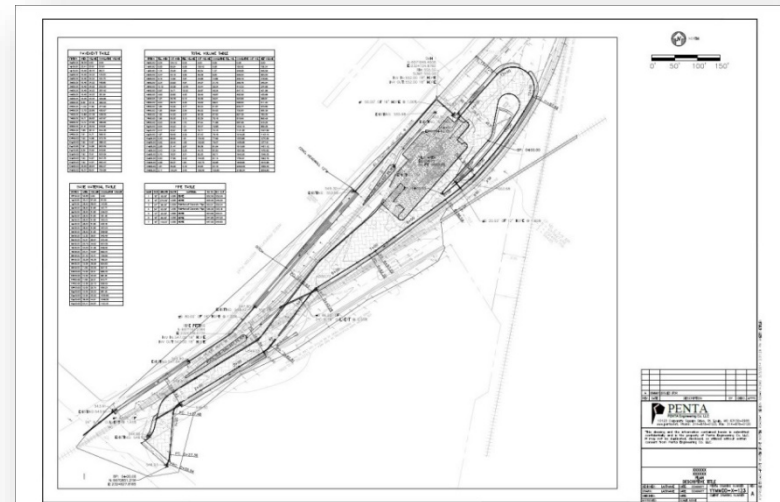
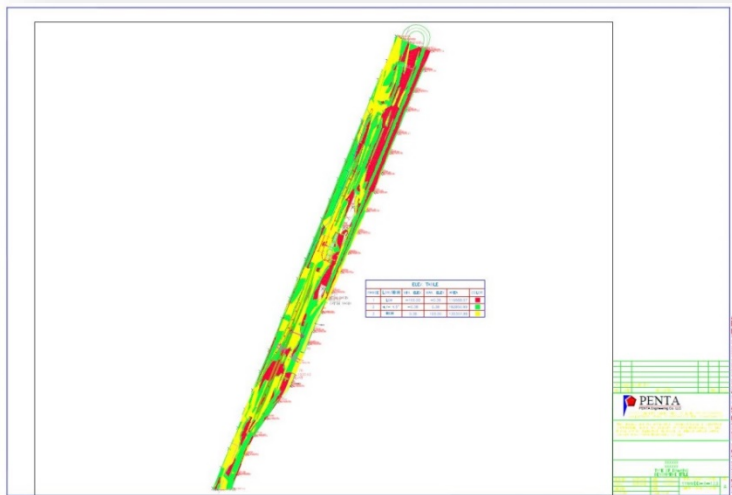


PLANT SITE VISUALIZATION



## CIVIL/MINING 3D SOFTWARE

- Integration with scan to provide quantities for mining and storage
- Storm water analysis for SWPPP and SWMM submittals
- Automatic updates to construction documentation
- GPS support during construction for earth moving equipment
- Design to site comparison analysis, to ensure civil construction accuracy



DESIGN/ CONSTRUCTION COMP. GRADING AND PAVEMENT PLAN

## CIVIL/MINING 3D SOFTWARE

### Civil Modeling and Analysis Benefits

- Instant, accurate and up to date material takeoff for roadway, pavement, and earthwork
- Instant reporting for storm, sanitary and utility networks regarding properties and takeoff
- Integrated storm water analysis
- Automatic updates to drawings via Model
- Visualization
- Field integration with GPS navigated equipment
- Integration of Laser Scanning
- Integration with structural and mechanical model
- Field stakeout and location and elevation field verification

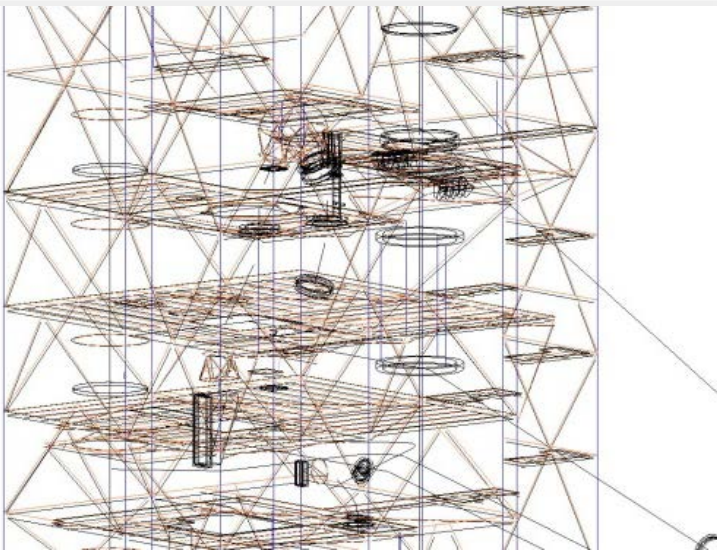
## CIVIL/MINING 3D SOFTWARE



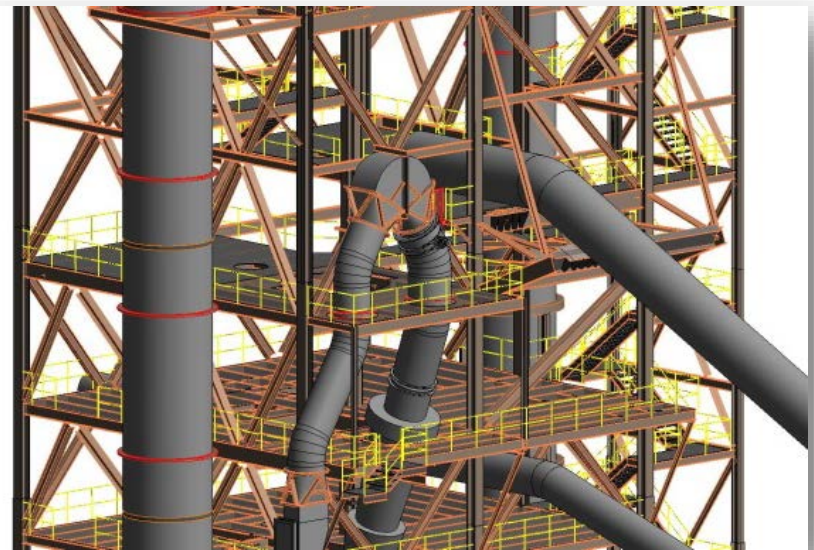
PLANT SITE VISUALIZATION

## MECHANICAL/STRUCTURAL 3D SOFTWARE

- PENTA uses state of the art software for both its Mechanical and Structural design needs
- Model integration improves team communication
- Improves project coordination
- Integration with engineering software.
- Automatically updates construction drawings for any model update



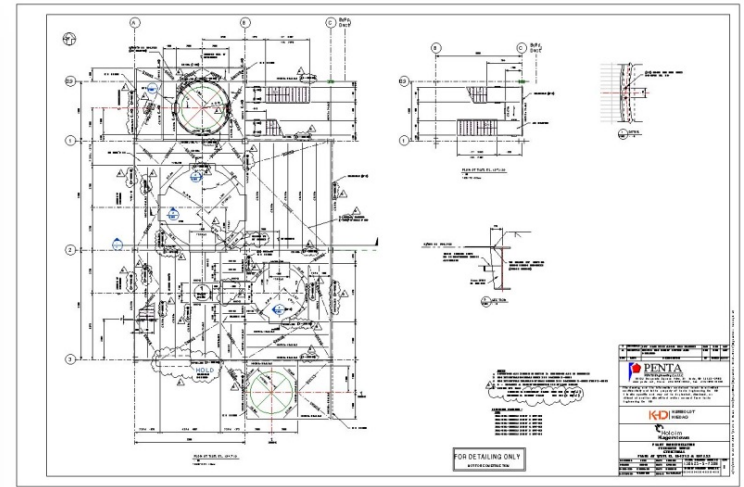
ANALYTICAL MODEL



PHYSICAL MODEL

## MECHANICAL/STRUCTURAL 3D SOFTWARE

- Quantity takeoff for steel, concrete, grating, etc
- Integration with coordination software to identify issues in design model
- Visualization to convey project intent to non technical personnel
- Reduces drafting effort extensively

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## QUANTITY TAKEOFF

## STRUCTURAL PLAN

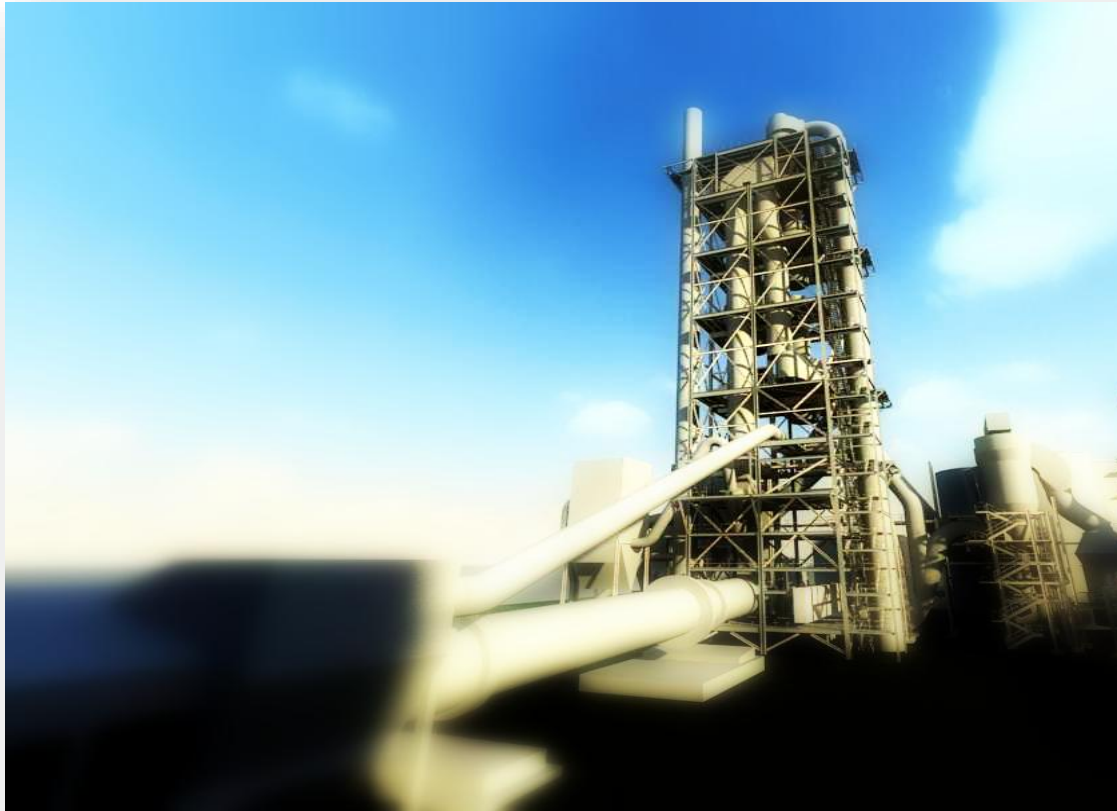


## MECHANICAL/STRUCTURAL 3D SOFTWARE

### Modeling/BIM benefits

- Integrated mechanical and structural model enhancing communication and accuracy
- Quantity takeoff
- Visualization
- Automatically updated construction documents
- Integration with engineering software platform
- Collision detection

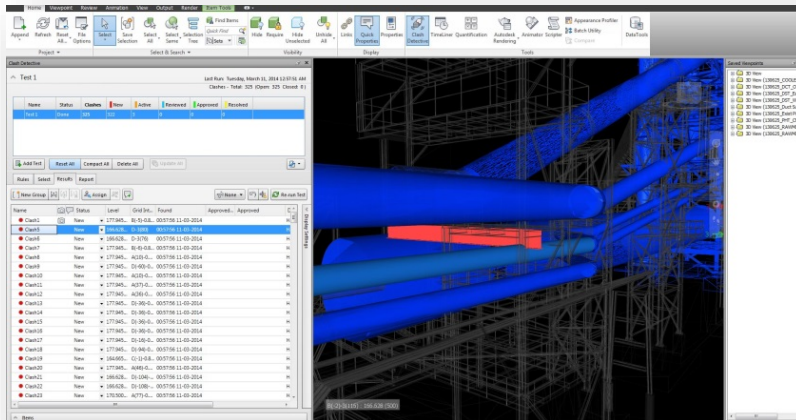
## MECHANICAL/STRUCTURAL 3D SOFTWARE



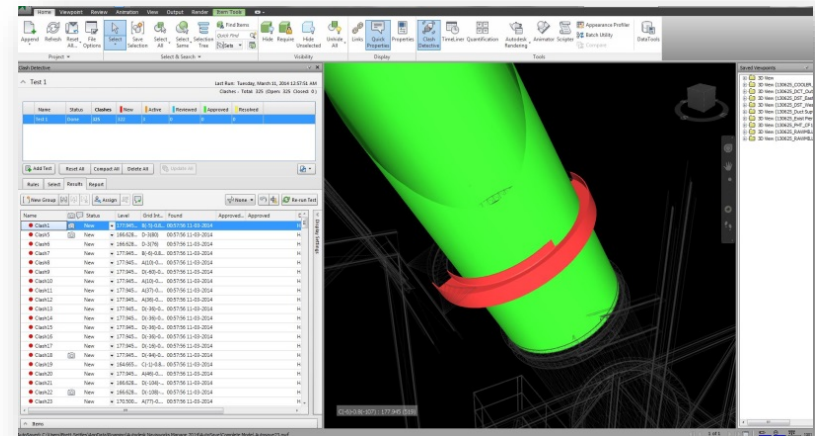
PREHEATER TOWER RENDERING

# COORDINATION/COLLISION/PRESENTATION 3D SOFTWARE

- Allows confirmation of correct positioning for all disciplines
- Creates large site renderings for mining and plant locations
- Creates clash detection reports for all aspects of project
- Eliminates many costly construction issues
- Integration with design software enables user to fix issues quickly
- Creates project animations



COLLISION WITH EXISTING DUCT



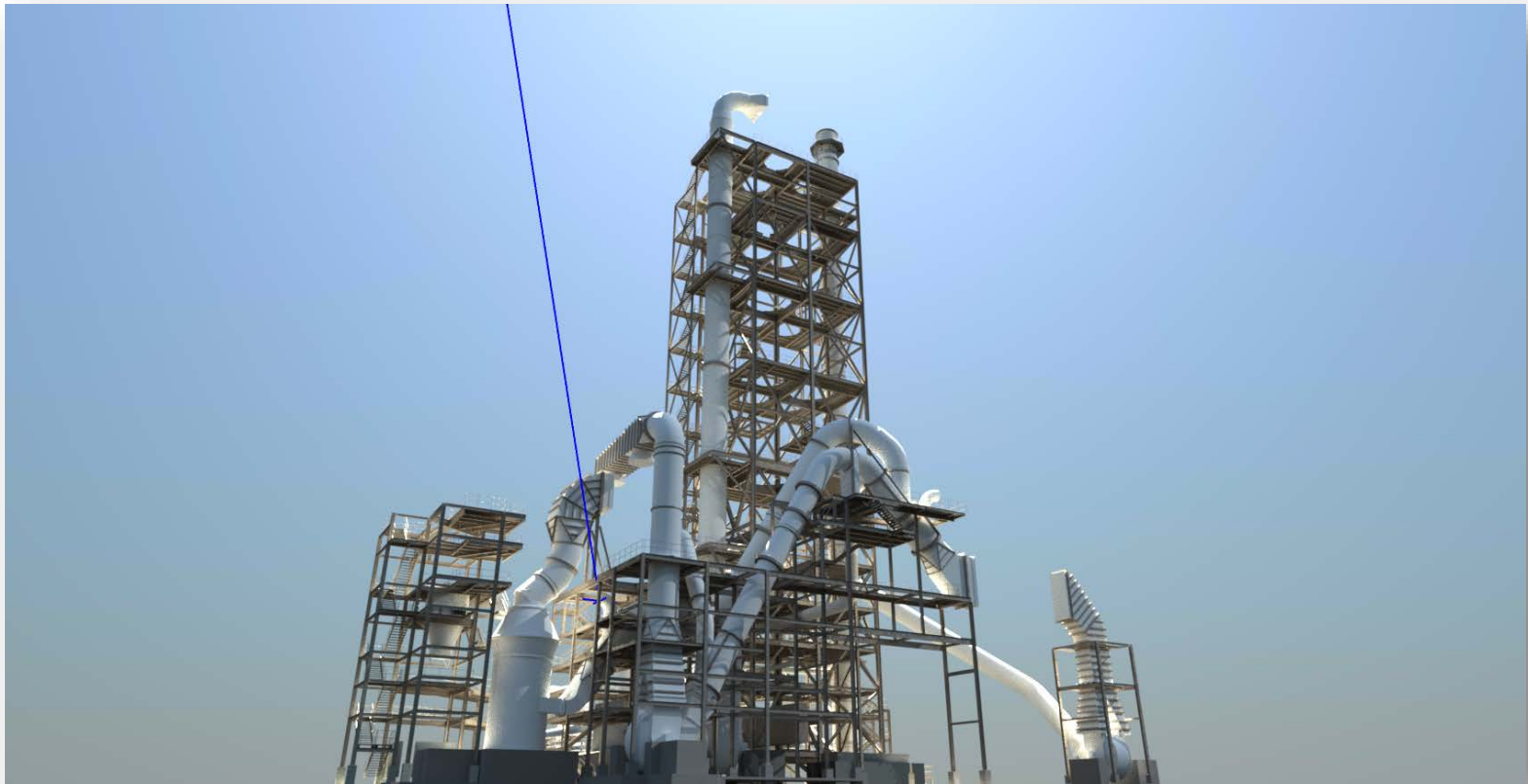
COLLISION OF NEW DUCT  
WITH SUPPORT RING

## COORDINATION/COLLISION DETECTION/PRESENTATION

### Collision Detection and Presentation Benefits

- Detecting construction issues before it appears in the field
- Save clients money on costly change orders
- Ensure accuracy in design
- Convey project intent to non technical personnel
- Confidence in location and fit of new project

## COORDINATION/COLLISION DETECTION/PRESENTATION

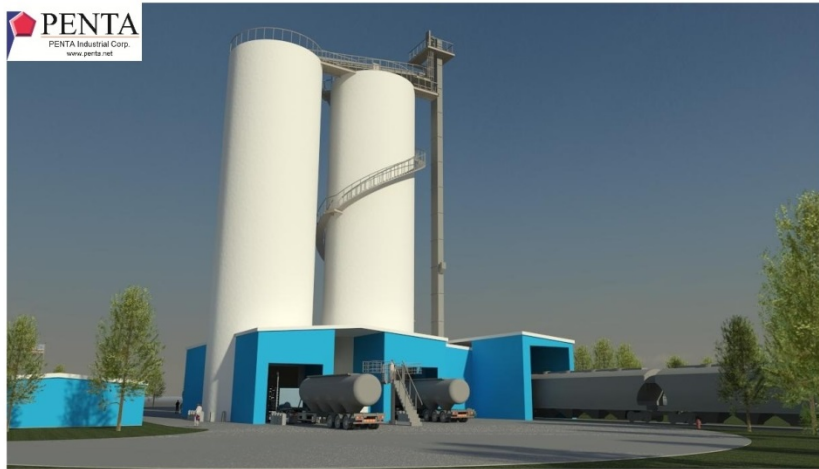


PREHEATER TOWER RENDERING



## PROJECT VISUALIZATION/RENDERING

- PENTA is also available to assist in conveying project intent through visualization
- Show project intent
- Public relations
- Stakeholder/Owner meetings



CEMENT TERMINAL

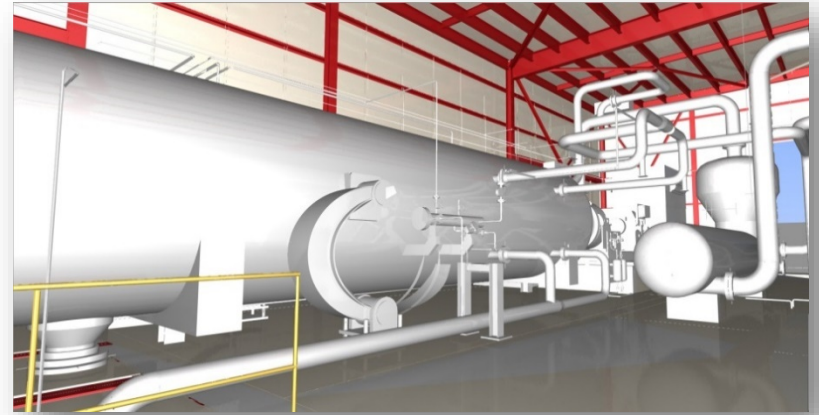


SALT STORAGE/SHIPPING  
FACILITY

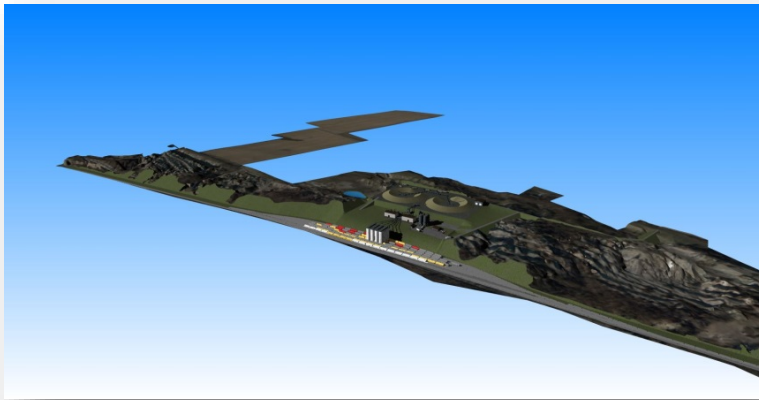
## PROJECT VISUALIZATION/RENDERING



CLINKER COOLER



ORC AREA

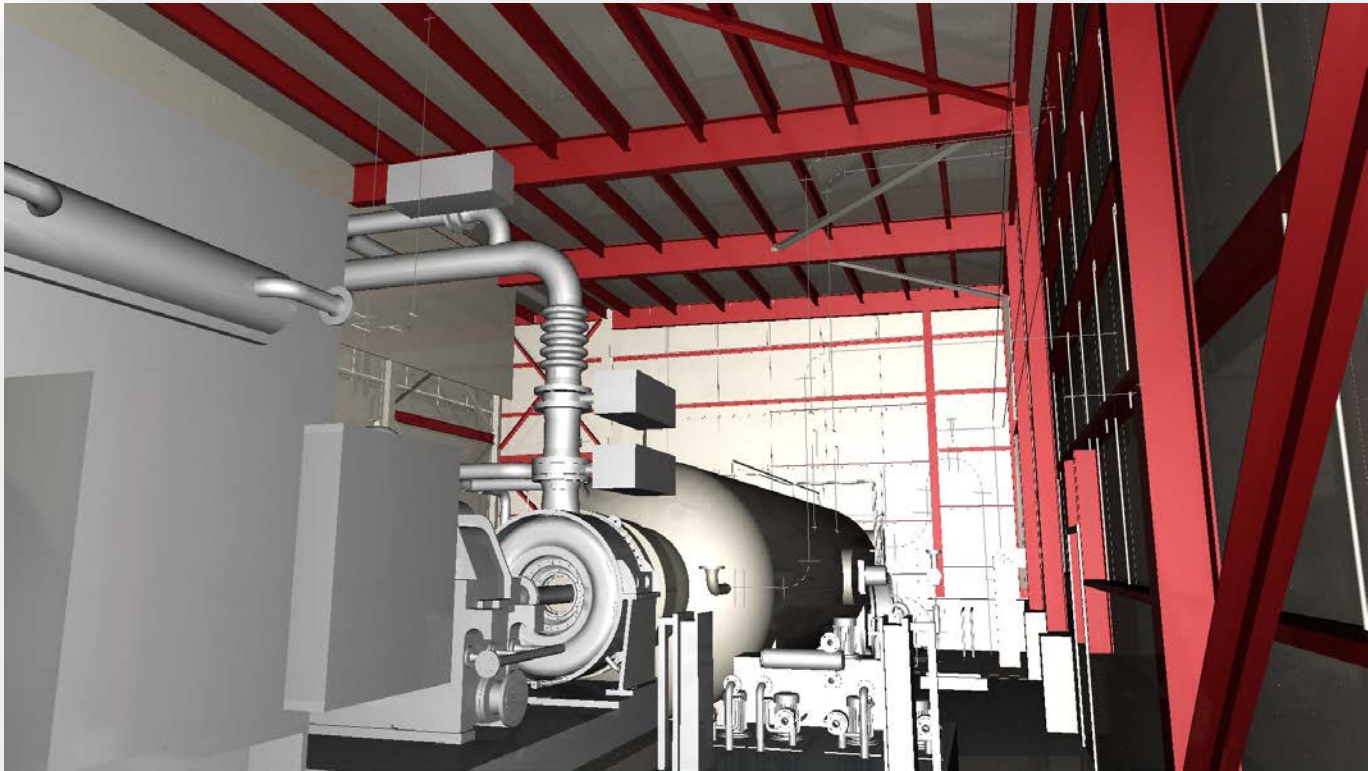


FRAC SAND MINING SITE



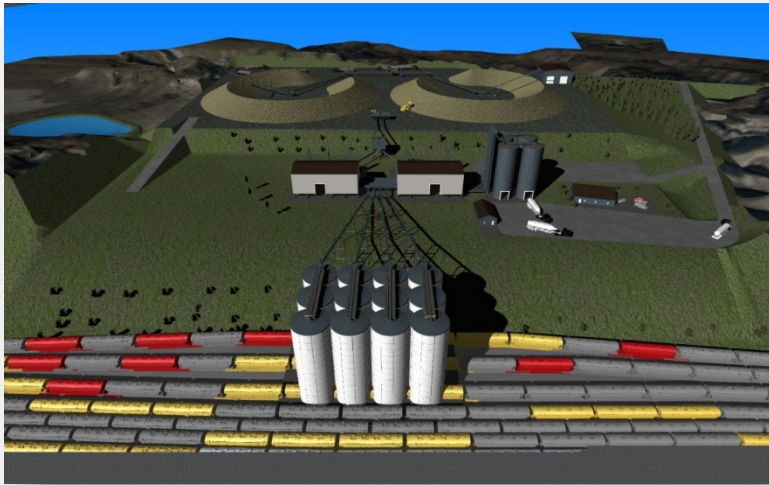
MODEL SECTION OF CEMENT TERMINAL

## PROJECT VISUALIZATION/RENDERING



EQUIPMENT

## PROJECT VISUALIZATION/RENDERING



SOUTHEAST VIEW  
FRAC SAND PLANT

NORTH VIEW  
FRAC SAND PLANT

