

The Design & Construction of a 96,000 tpd Copper Tailings Paste Thickener Plant

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Overview

- ◆ The Sarcheshmeh concentrator
- ◆ Water management plan
- ◆ Tailings disposal project
- ◆ Testwork
- ◆ Equipment selection
- ◆ Design
- ◆ Construction

The Sarcheshmeh Concentrator



The Sarcheshmeh Concentrator



Existing 122m Eimco Tailings Thickeners



Water Management

- ◆ Located in Kerman Province – Iran
 - ◆ Arid Climate
 - ◆ Mountainous region
 - ◆ Difficult terrain for tailings disposal

- ◆ Water is a scarce resource
 - ◆ Mining sits alongside local community
 - ◆ Agriculture
 - ◆ Domestic consumption

Water Management

- ◆ Original 40,000 tpd concentrator built between 1975-1980
- ◆ Phase 1 expansion of 28,000 tpd commissioned in 2003
- ◆ Phase 2 expansion of 28,000 tpd currently in progress and projected to start production in 2013
- ◆ Planned expansion to 96,000 tpd would put unacceptable strain on the available water resource
- ◆ Plan to improve water use on site in all areas – including tailings disposal

Thickened Tailings Options

- ◆ Increased water recovery
- ◆ Maximise dam capacity

Iranian Experience in TTD

- ◆ Miduk

- ◆ 4 x 16m Eimco DCT's
- ◆ Installed 2002
- ◆ 7 Mtpa

- ◆ MFR

- ◆ 1 x 14m Eimco DCT
- ◆ Installed 2007
- ◆ 2 Mtpa

Miduk Copper Tailings Down-Valley Gravity Discharge



MFR

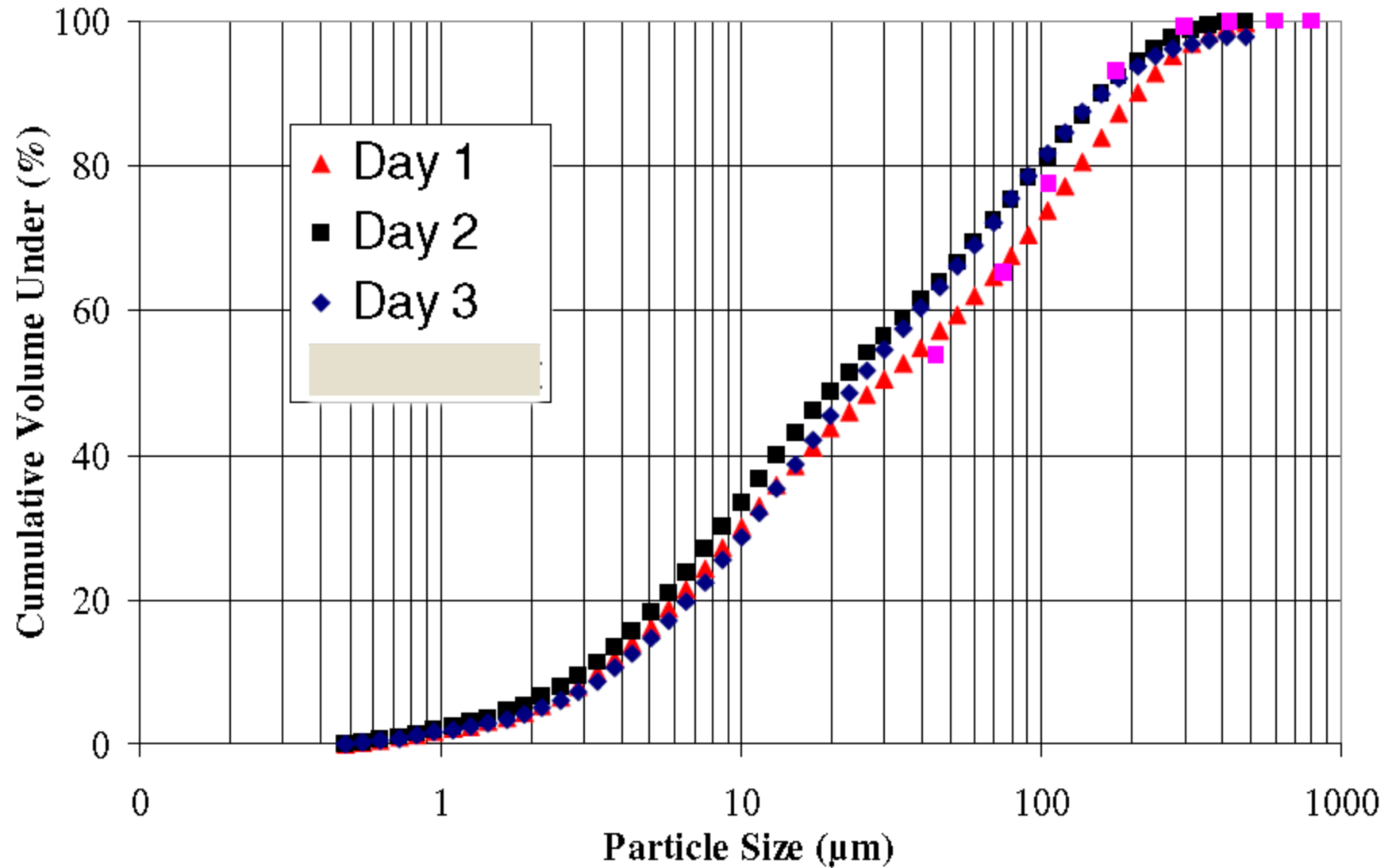


Testing

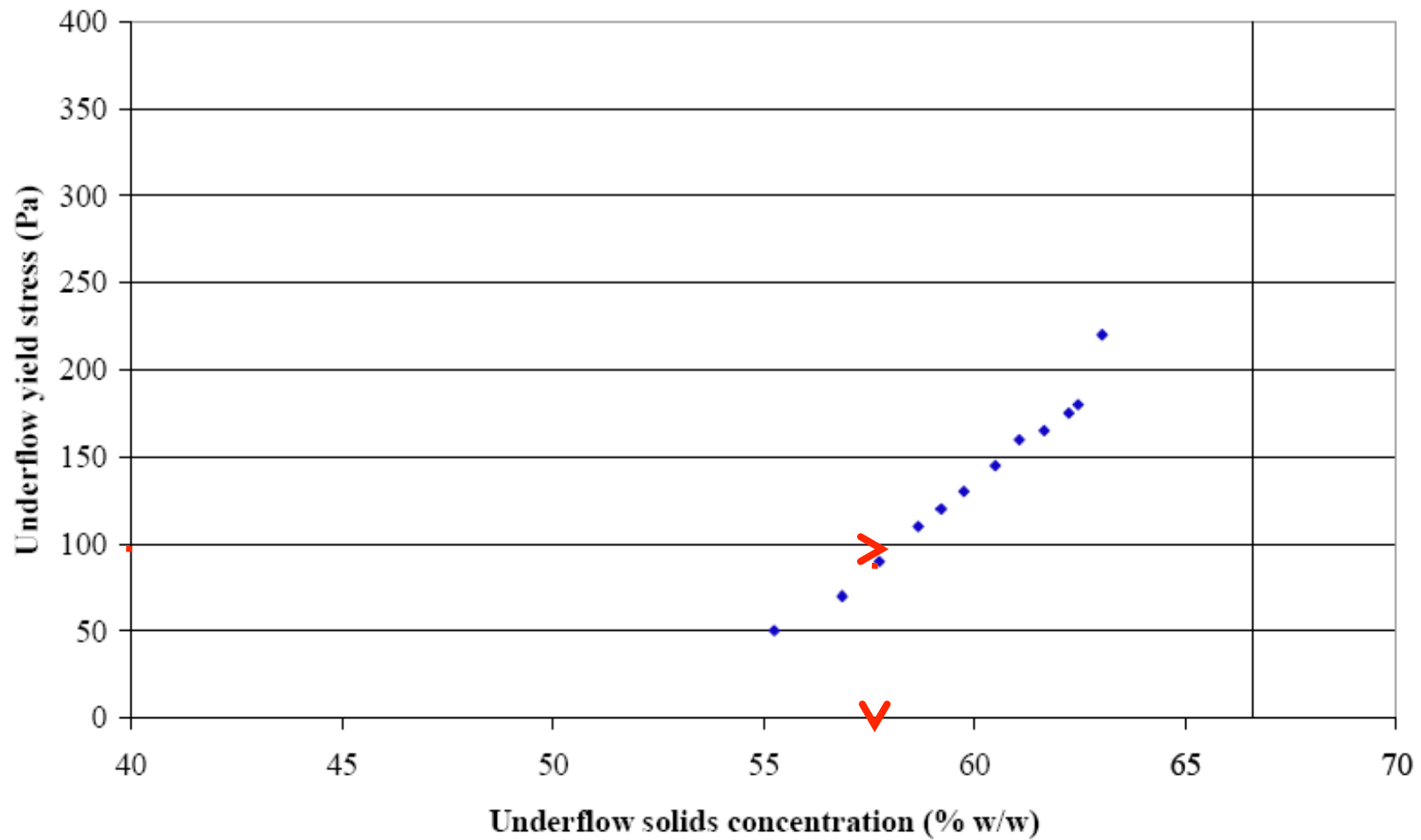
- Laboratory Testwork

- On site Pilot testwork

Feed PSD



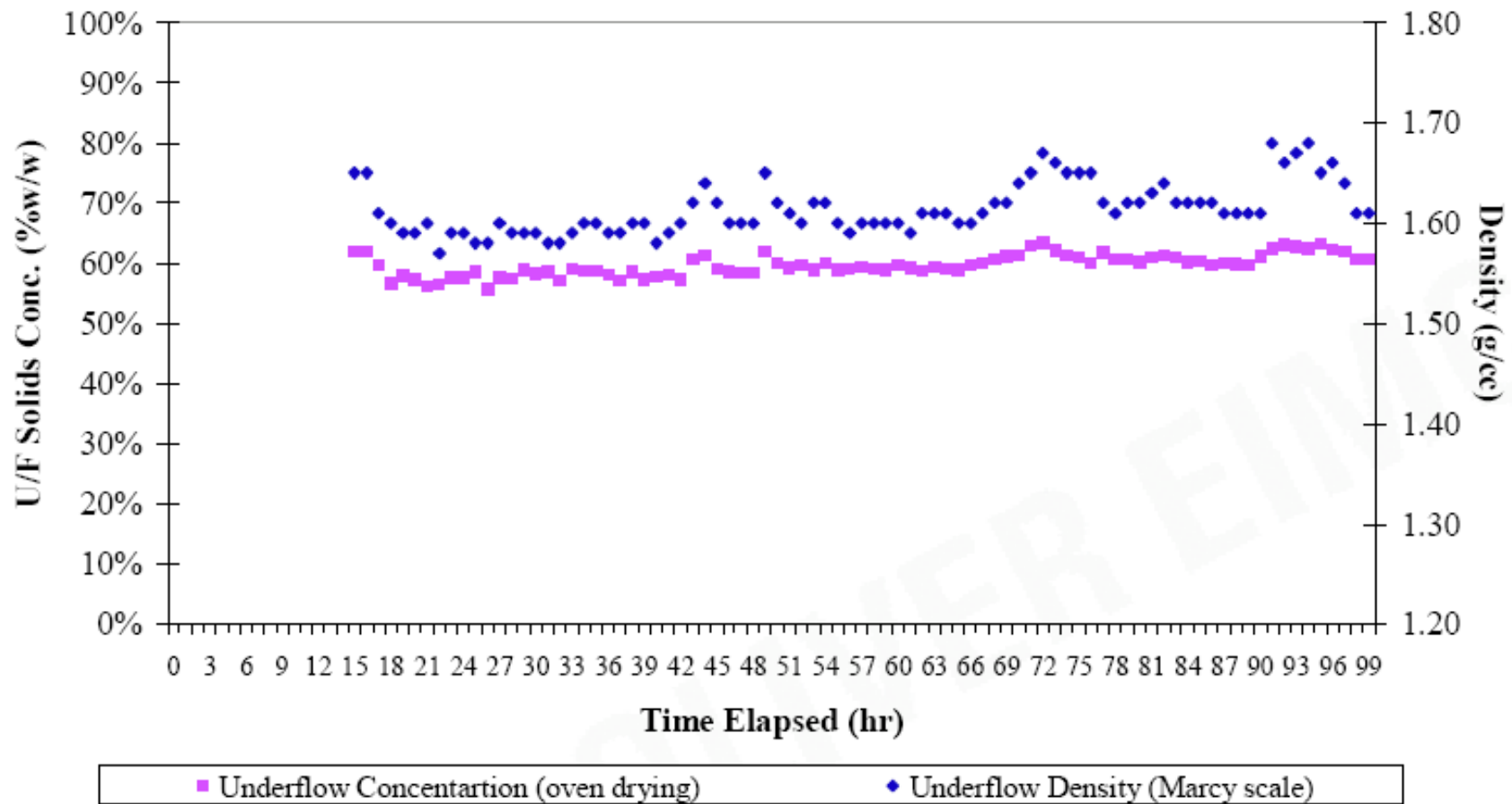
Lab Test Results



Pilot DCT at Sar Cheshmeh



Pilot Trials



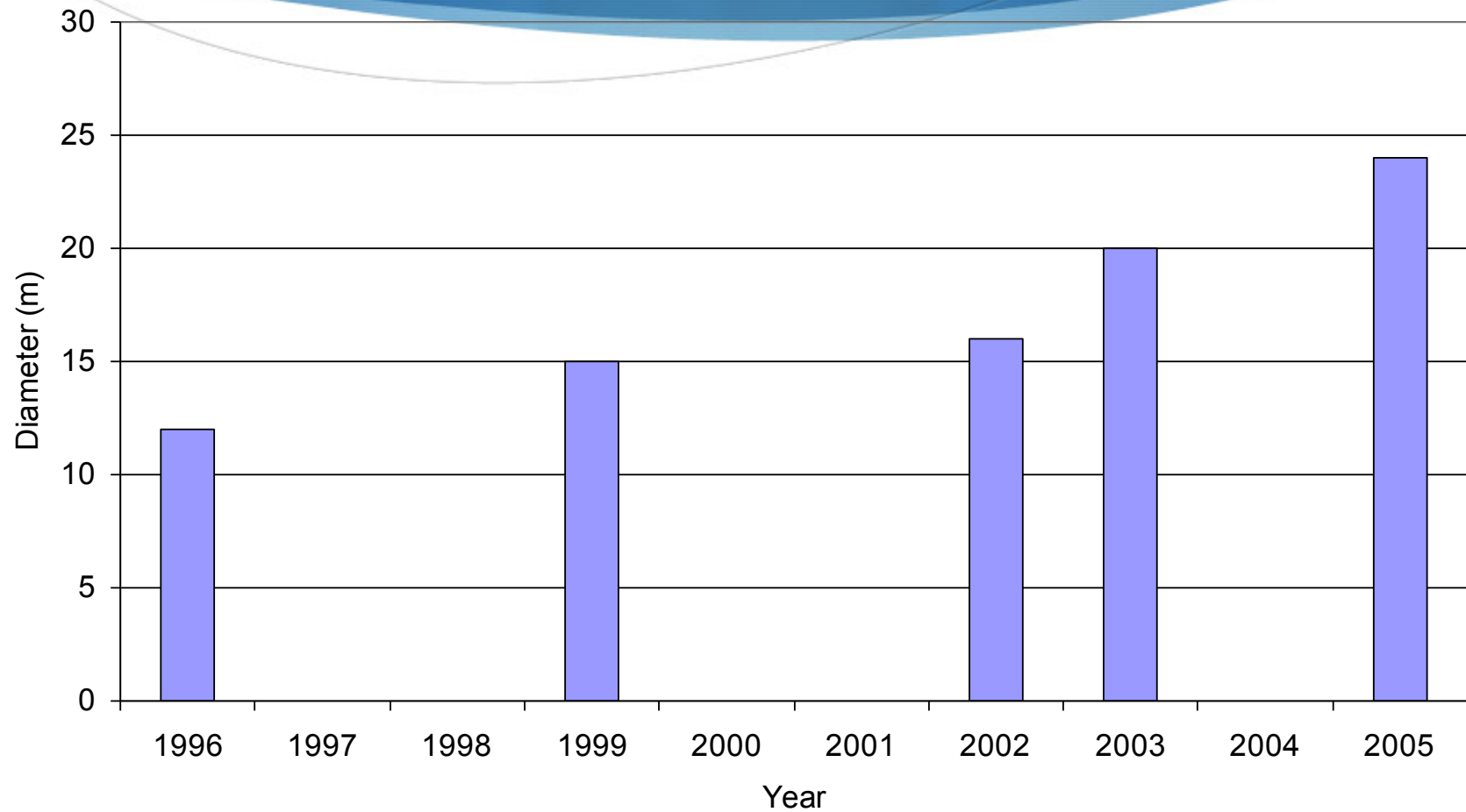
Pilot Testwork Conclusions

- ◆ 12 hour residence time was confirmed
- ◆ Floc dose of 25 g/t confirmed
- ◆ Average U/F density 59.9% over 73 hours running
- ◆ Highest U/F density 62% over 12 hours

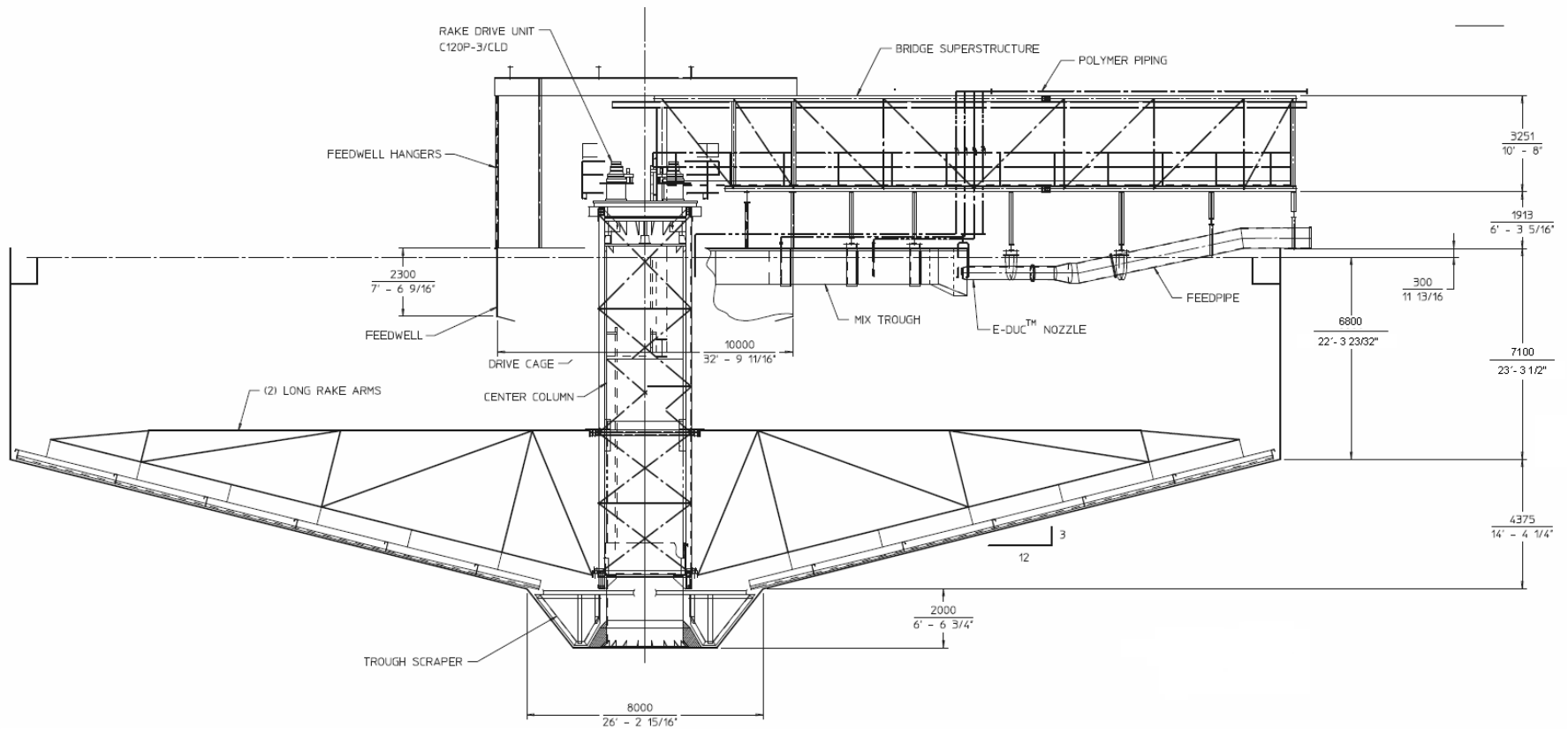
Equipment Sizing

- ◆ 96,000 tpd
- ◆ 40% solids w/w
- ◆ Target U/F 60% w/w
- ◆ Sizing:
 - ◆ 6 x 34m \emptyset Deep Cone Thickeners
 - ◆ 12 x 24m \emptyset Deep Cone Thickeners

Eimco DCT development



Large Diameter Paste Thickener



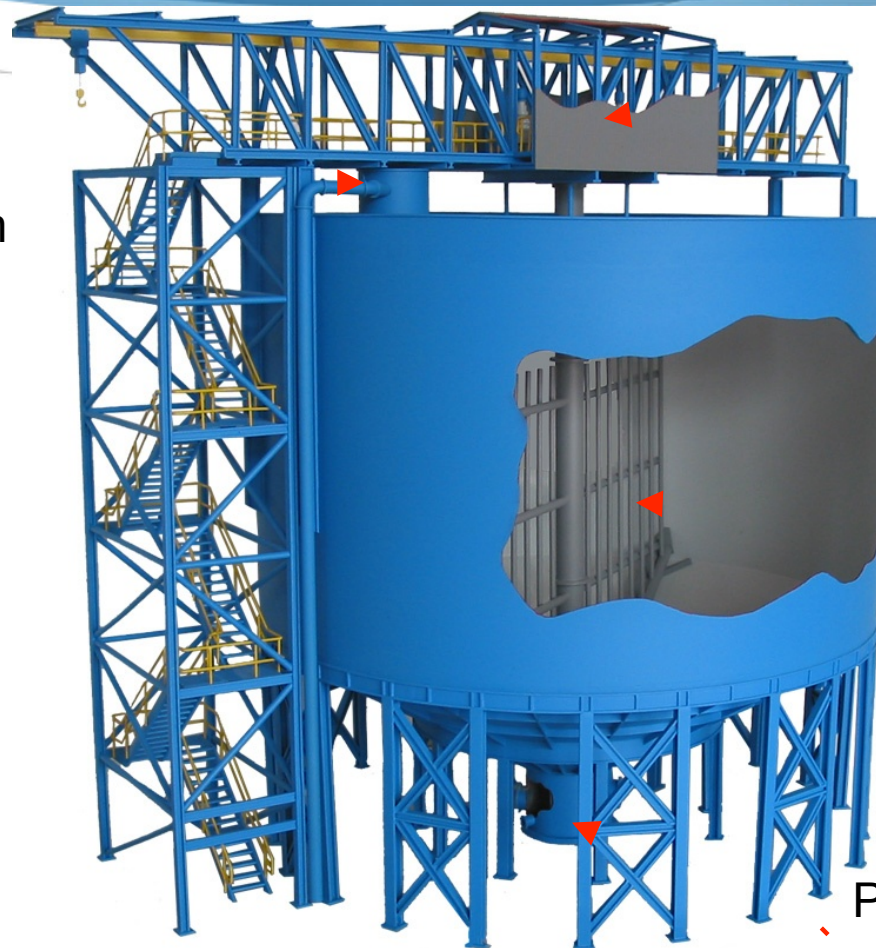
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Equipment Selection



Deep Cone[®] Paste Thickener

Patented E-Duc[®]
Feed Dilution System

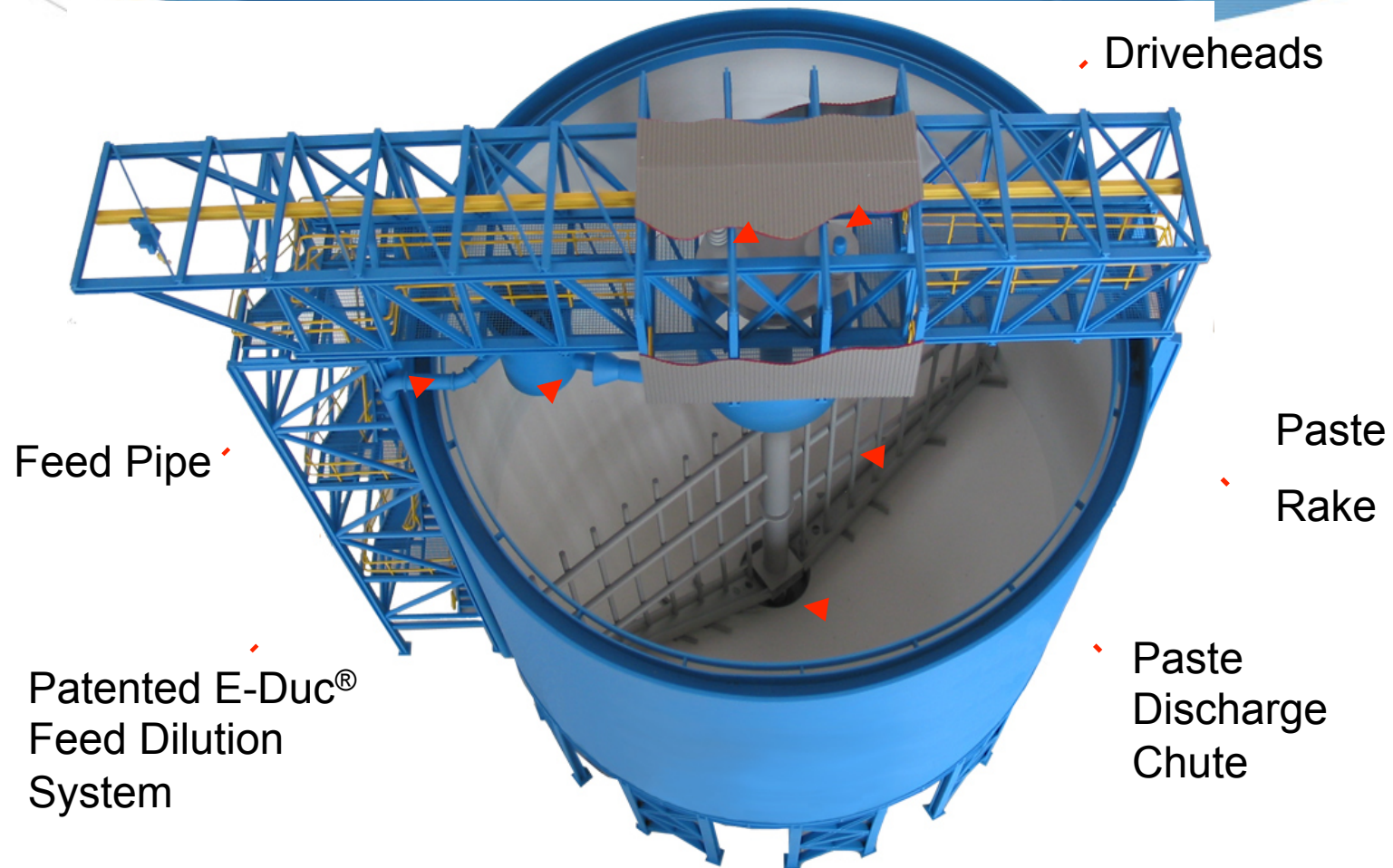


Drivehead

Rakes

Paste Discharge
Cylinder

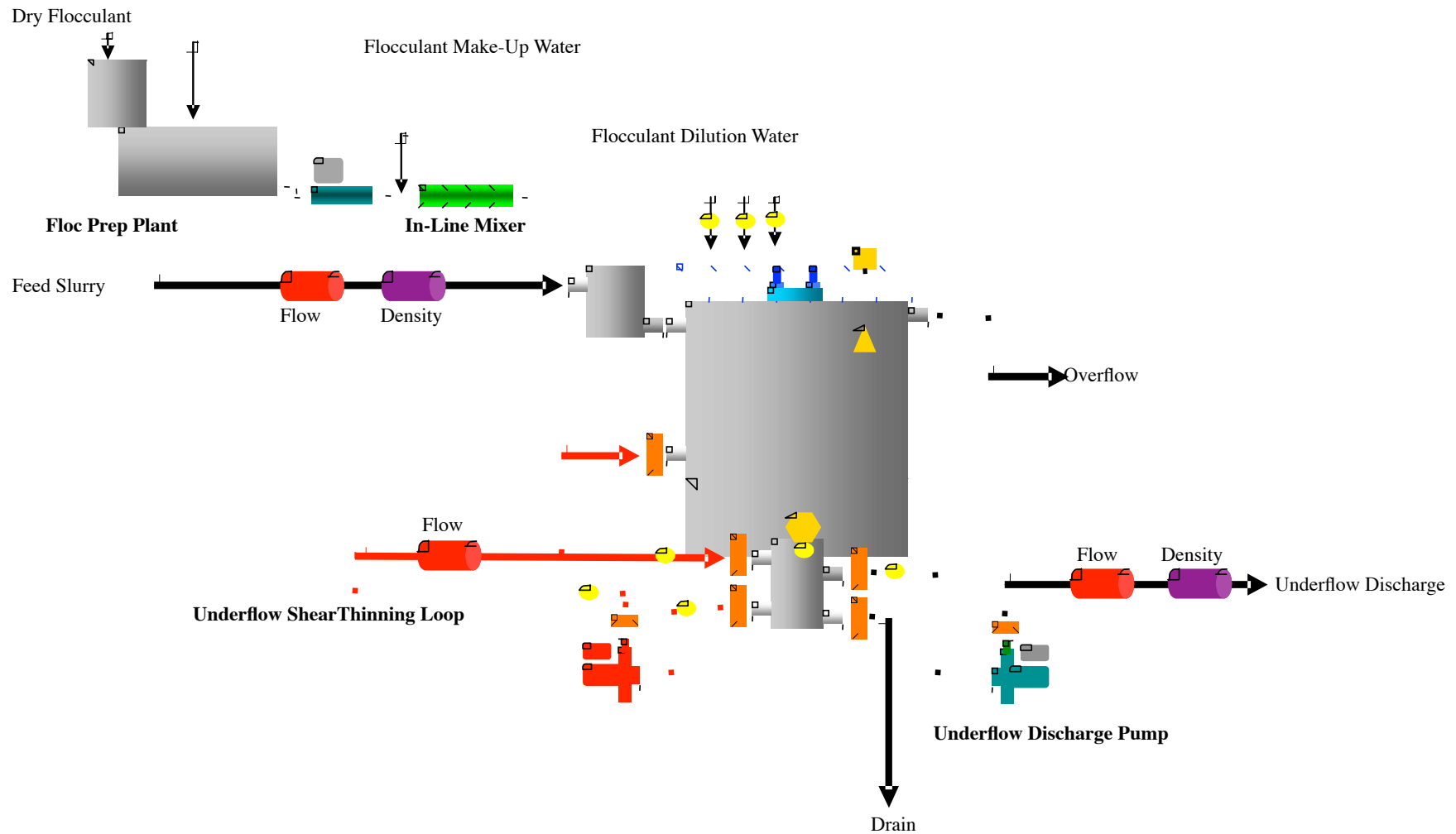
Eimco Deep Cone Thickener



Discharge Cylinder/Shear Thinning Loop

- ◆ Benefits of Rio Tinto Alcan patented Shear Thinning Design
 - ◆ Reduces torque in the discharge cylinder
 - ◆ Can recycle shear thinned mud to the tank knuckle and reduce the rake torque during shutdowns and upsets
 - ◆ Thinned material in the discharge cylinder helps in getting the thick mud out of the thickener
 - ◆ Thinned material in the discharge cylinder keeps things fluid and mixed during times when the discharge pumps are off

Paste Thickener Control



Flocculant Control

- ◆ Plant feed density measurement
- ◆ Individual thickener feed rate measurement
- ◆ Individual thickener flocculant control as g/t of actual feed

Plant location

Concentrator



• Dam

Plant Location

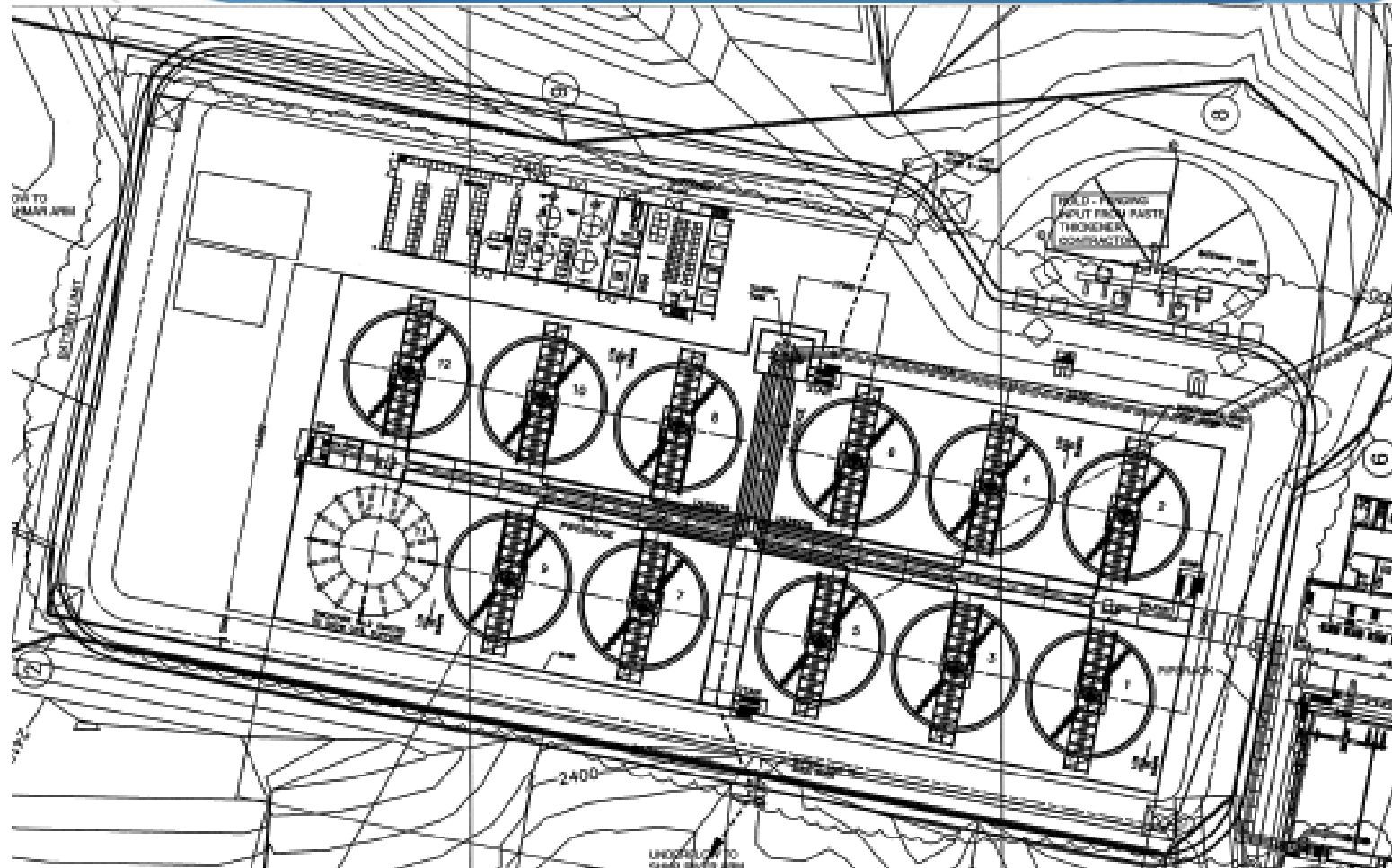
- ◆ Tailings flow by gravity to existing dam
- ◆ Channel design will not allow higher solids concentration to flow
- ◆ Remote thickener installation
- ◆ Locate thickeners at the dam and no requirement for pumping paste

Plant Layout

Plant
Services

Feed
Distributor

Outlet #1



Incoming
feed line

Return
Water
Pump
Station

Outlet #2

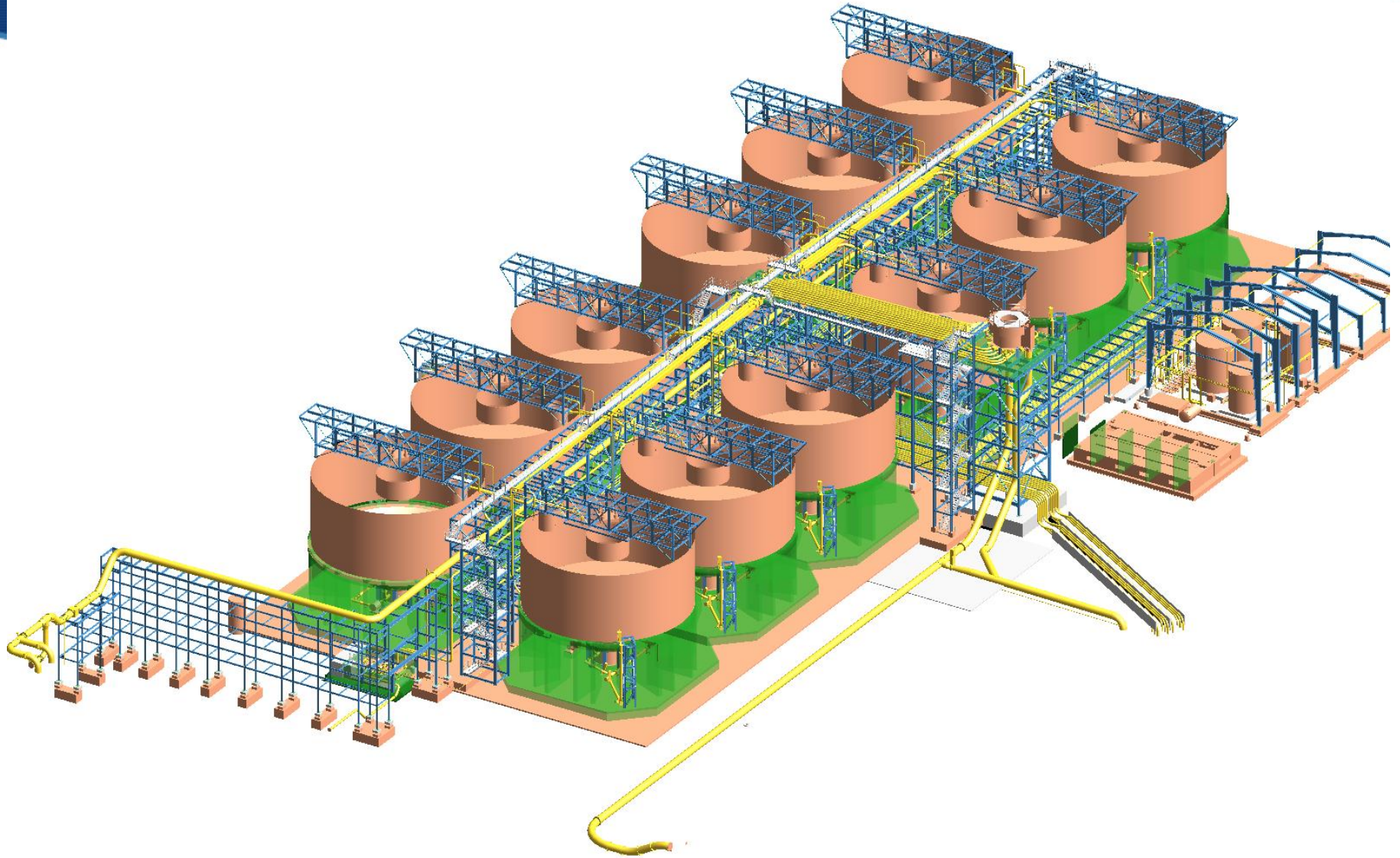
Feed distribution

- ◆ Single central distribution tower
 - ◆ Common feed density measurement
 - ◆ Individual feed rate measurement

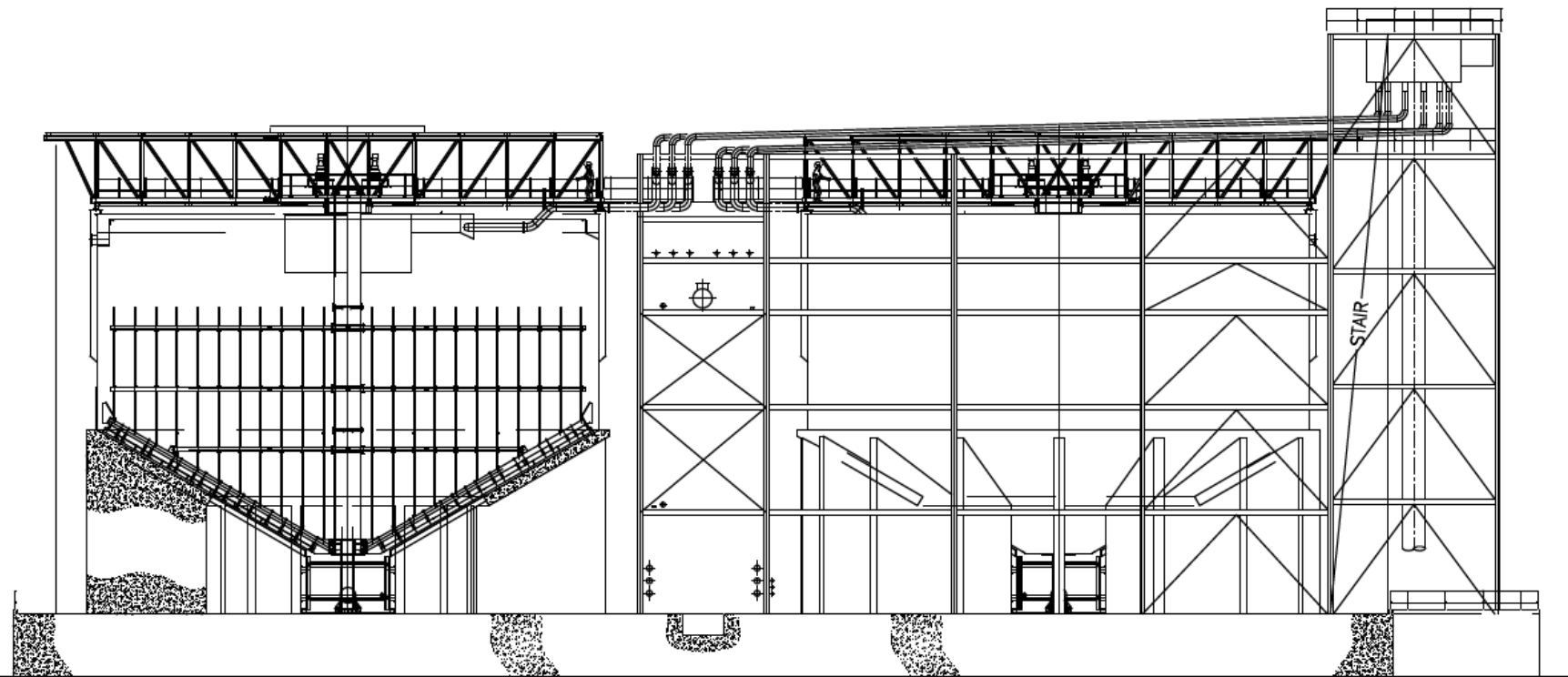
- ◆ Even flow to all thickeners
 - ◆ No matter how many are operating

- ◆ High flexible operation

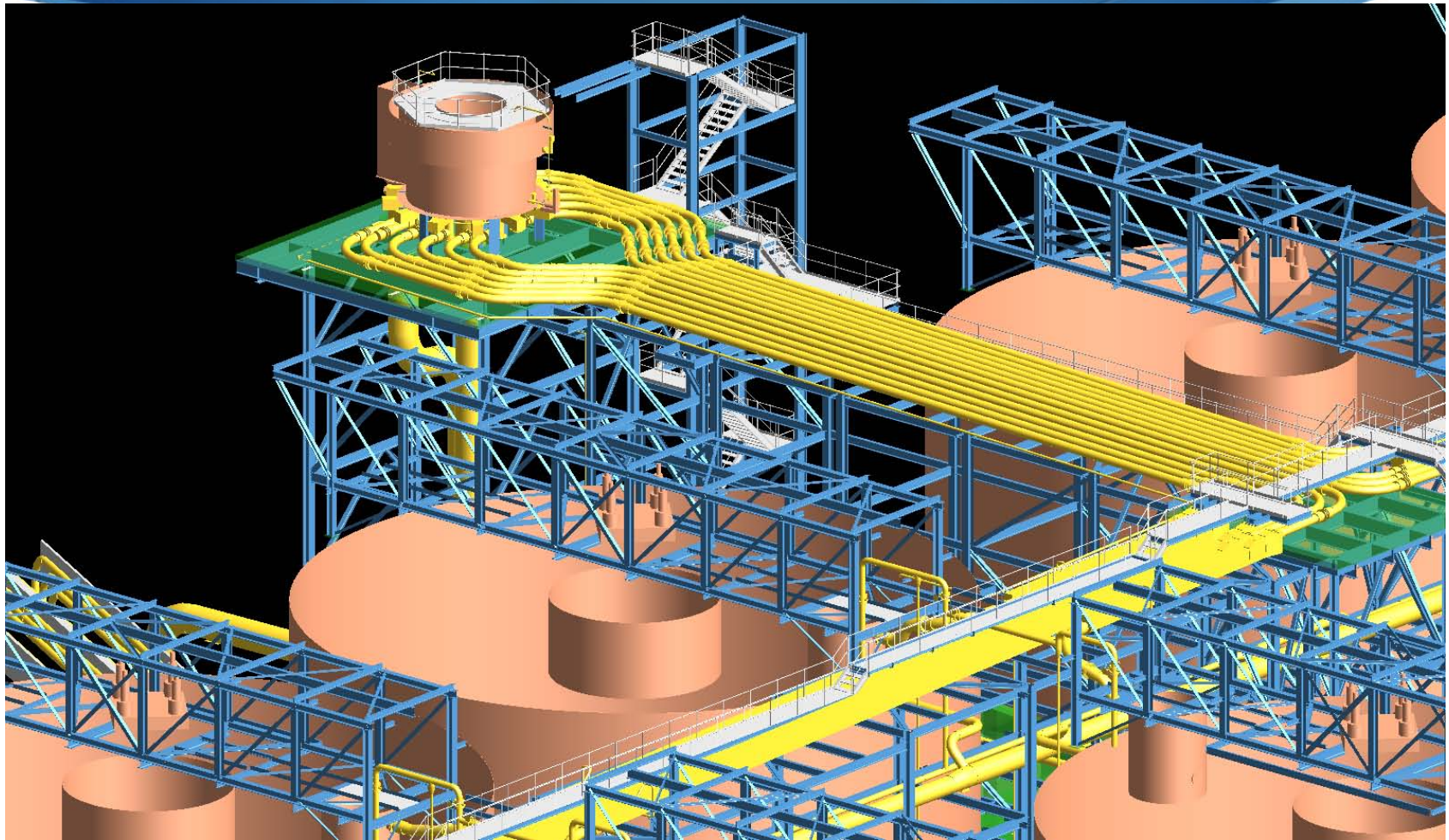
Feed Distribution



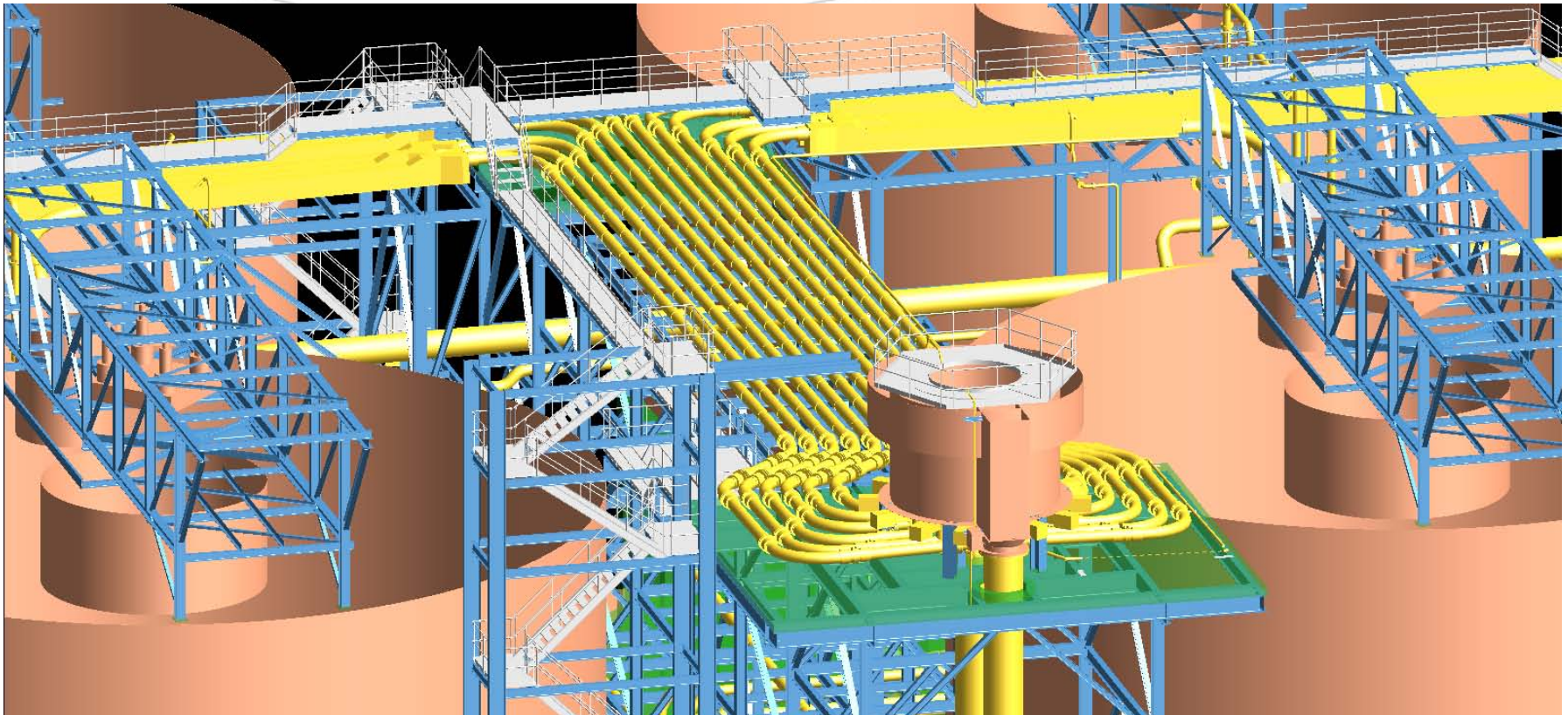
Feed distribution



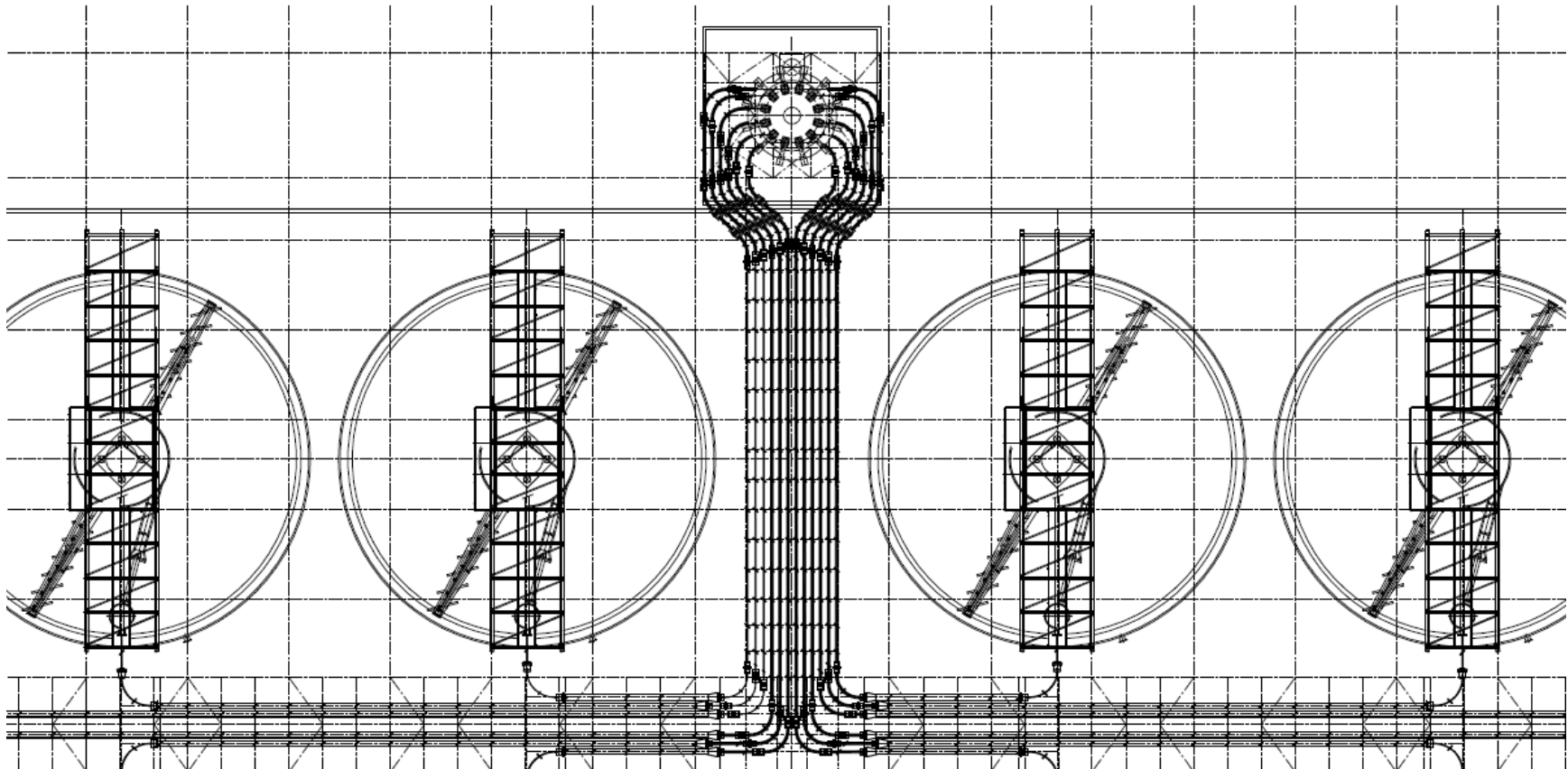
Feed Distribution



Feed Distribution



Feed Distribution



Construction



Construction

