

Applications of 3D scanning in large industrial facility projects

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Class summary

This class will explore different applications of 3D scanning in large industrial facilities. First we will discuss some practicalities. A typical project requires a lot of planning and involves vast amounts of data. How to manage this data, together with some practical tips are explained in this class.

We will see how 3D scanning can be of aid in the various stages of engineering: concept phase, detailed engineering, construction, even after construction is completed.

Key learning objectives

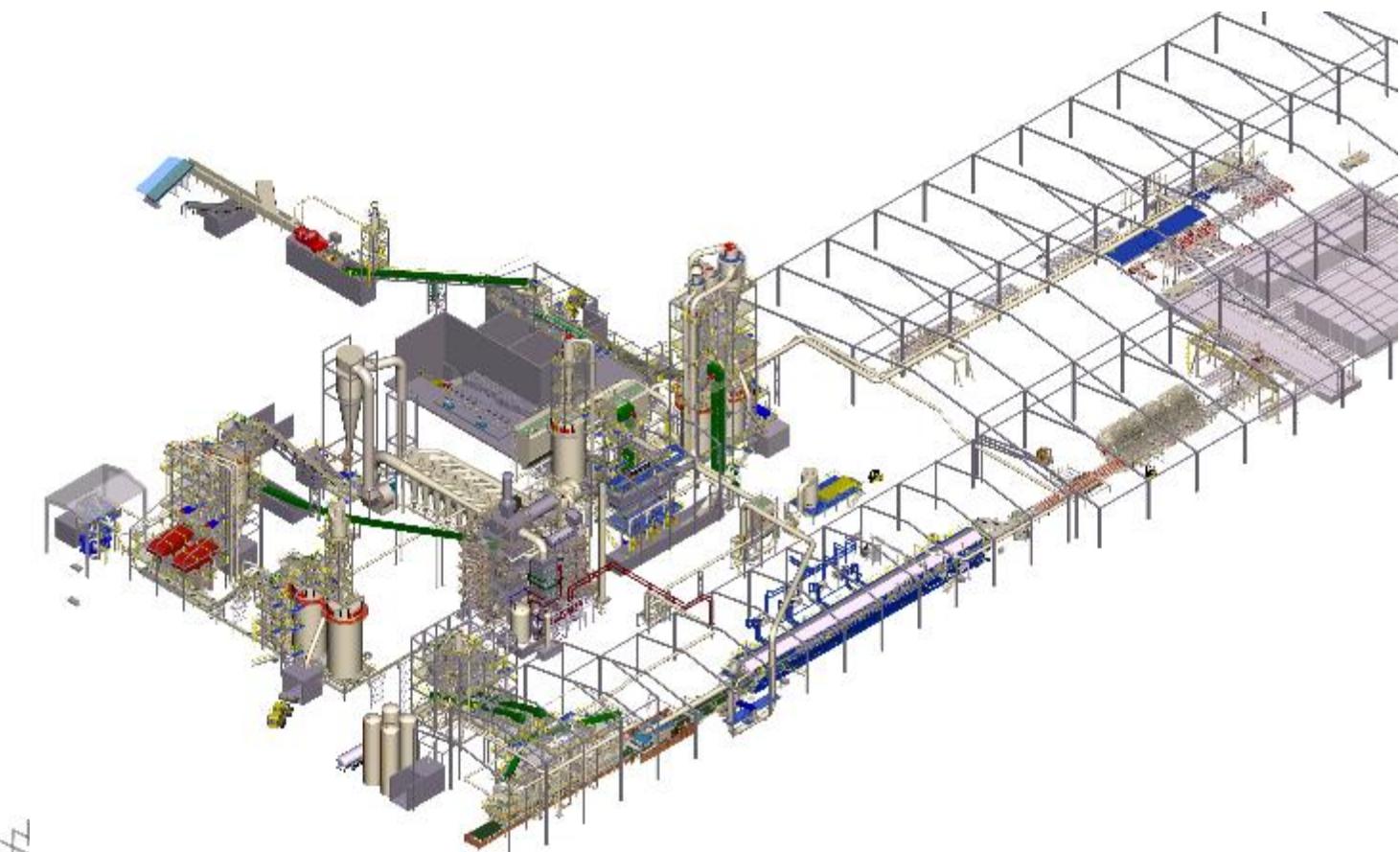
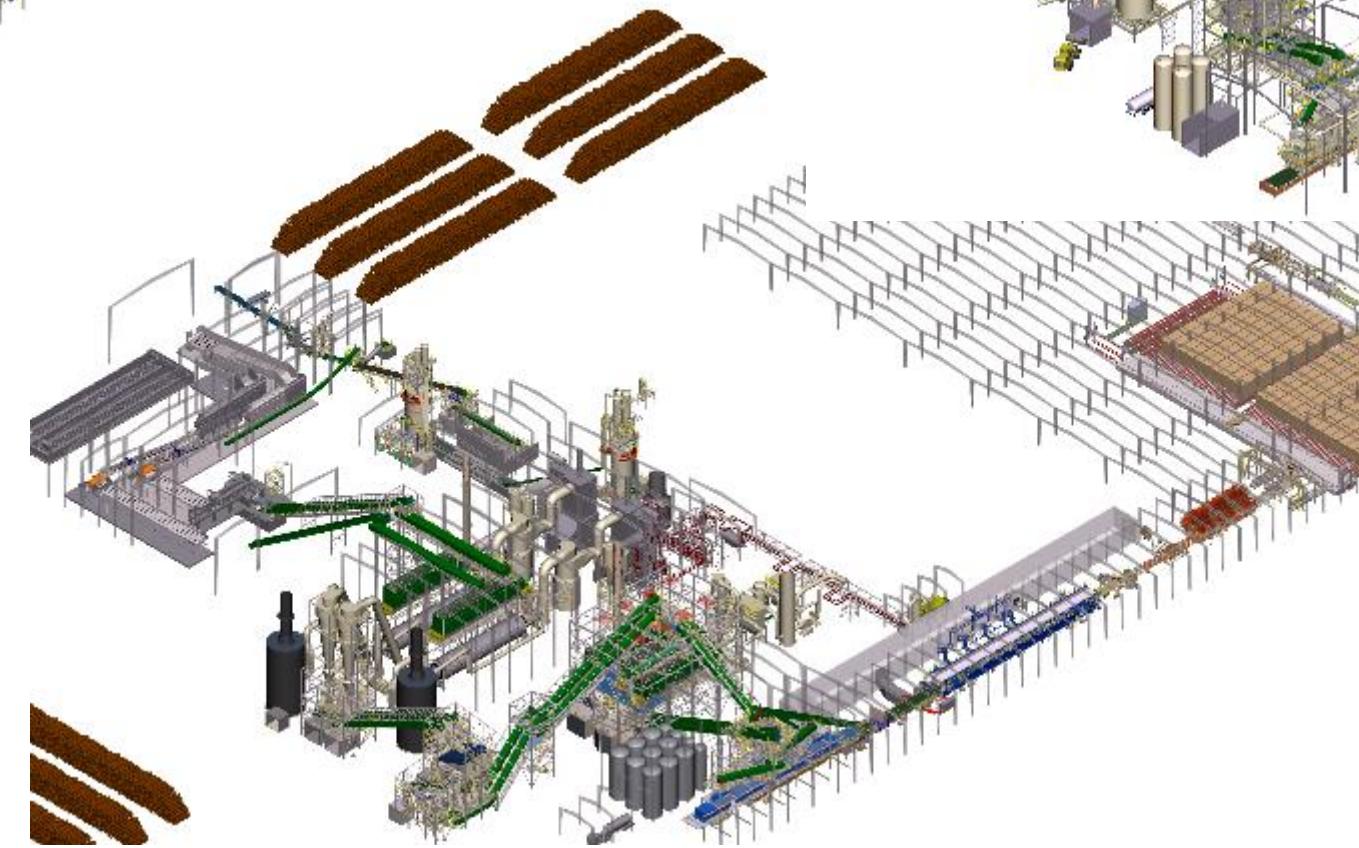
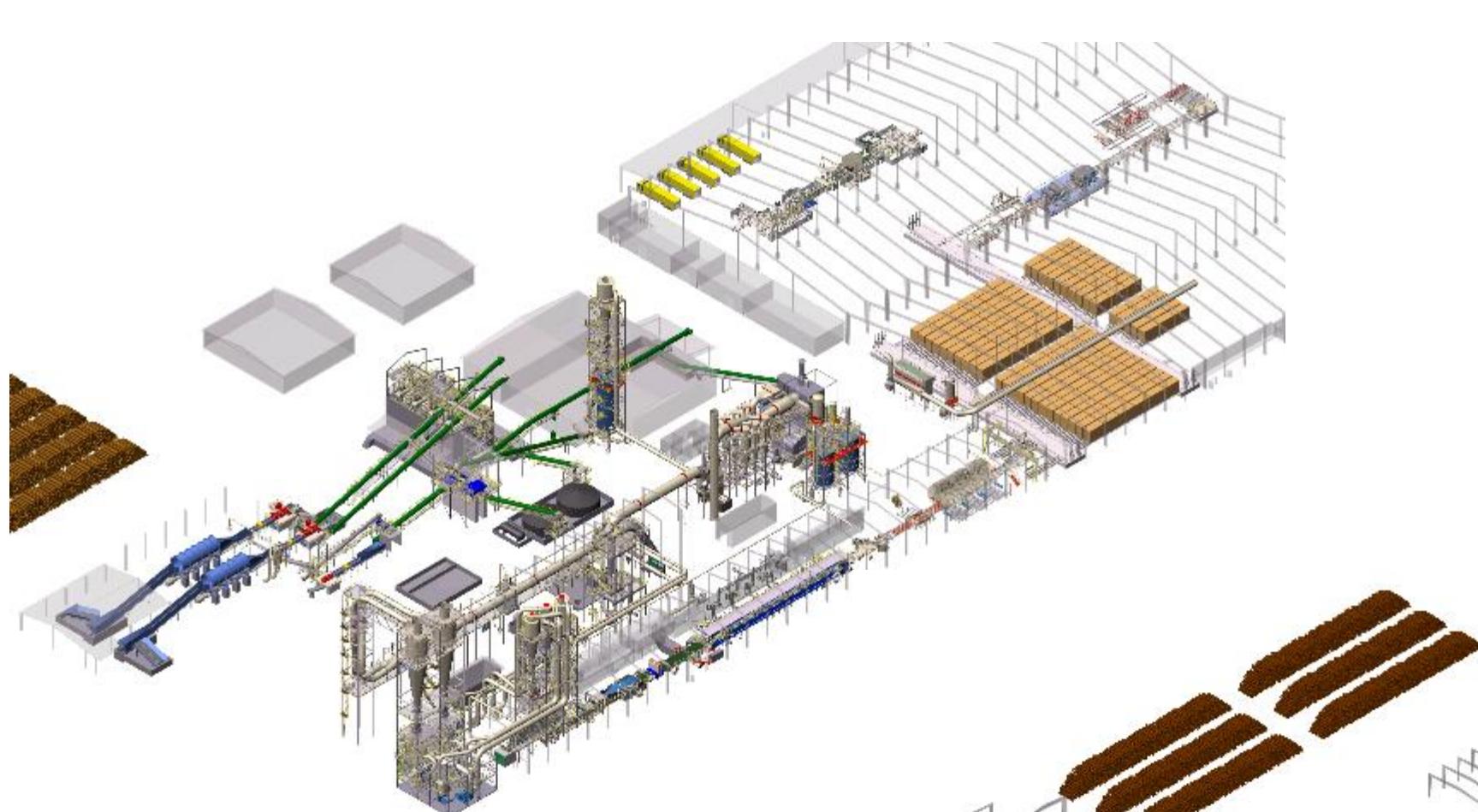
At the end of this class, you will be able to:

- Know different applications of 3D scanning in large industrial facilities
- Smart cleaning and splitting of large point clouds into manageable datasets
- Combine point clouds with 2D/3D models

The background features a complex, organic wireframe mesh pattern composed of thin gray lines forming a series of interconnected polygons. This pattern is set against a solid white background at the top and a solid blue background at the bottom, which has a subtle gradient effect.

Sicoplan?

Sicoplan, subsidiary of Siempelkamp Group



Sicoplan, subsidiary of Siempelkamp Group



650 million € (2015)



3000 employees (2015)



Siempelkamp

Maschinen- und Anlagenbau

Siempelkamp Maschinen- und Anlagenbau
GmbH



CMC TEXPAN

CMC S.r.l.



Pallmann Maschinenfabrik GmbH & Co. KG
Zweibrücken



Siempelkamp

Logistics & Service

Siempelkamp Logistics & Service
GmbH



BÜTNER

Büttner Energie- und
Trocknungstechnik GmbH



Siempelkamp

Maschinenfabrik

Siempelkamp Maschinenfabrik GmbH



Sicoplan

Engineering

Sicoplan N.V.



ATR

ATR Industrie-Elektronik GmbH



hombak

Maschinen- und Anlagenbau

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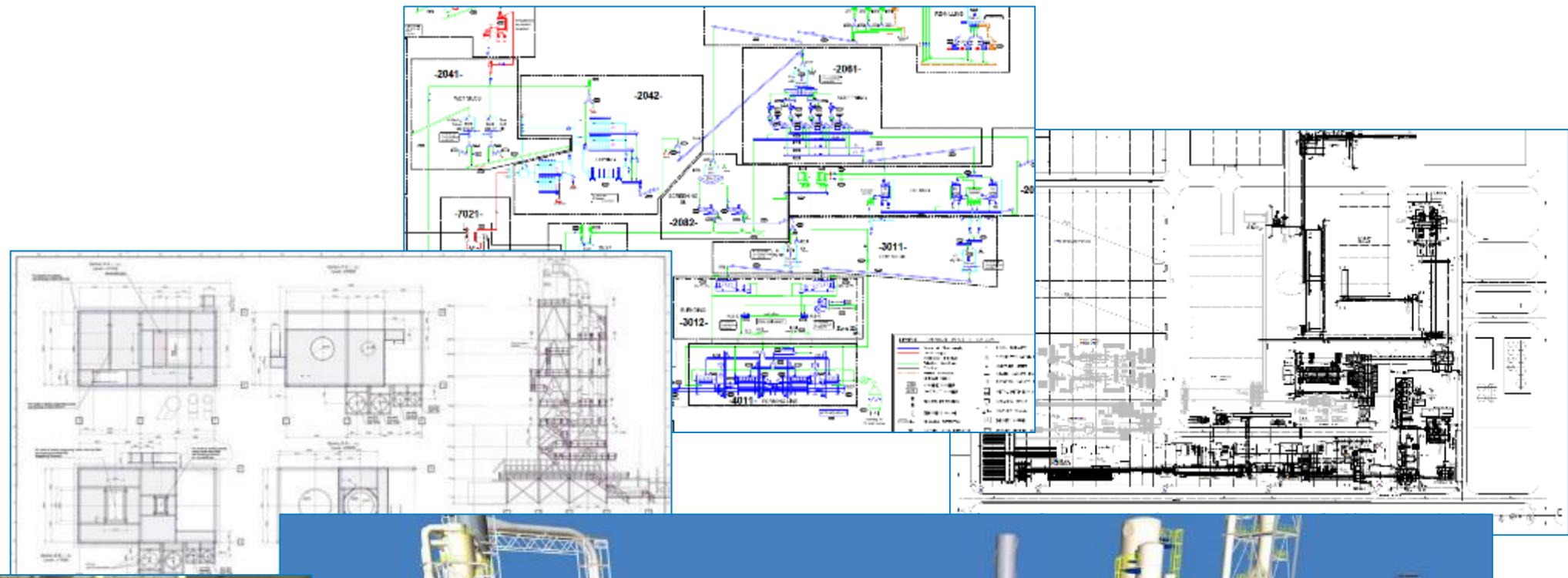
Machines & Handling

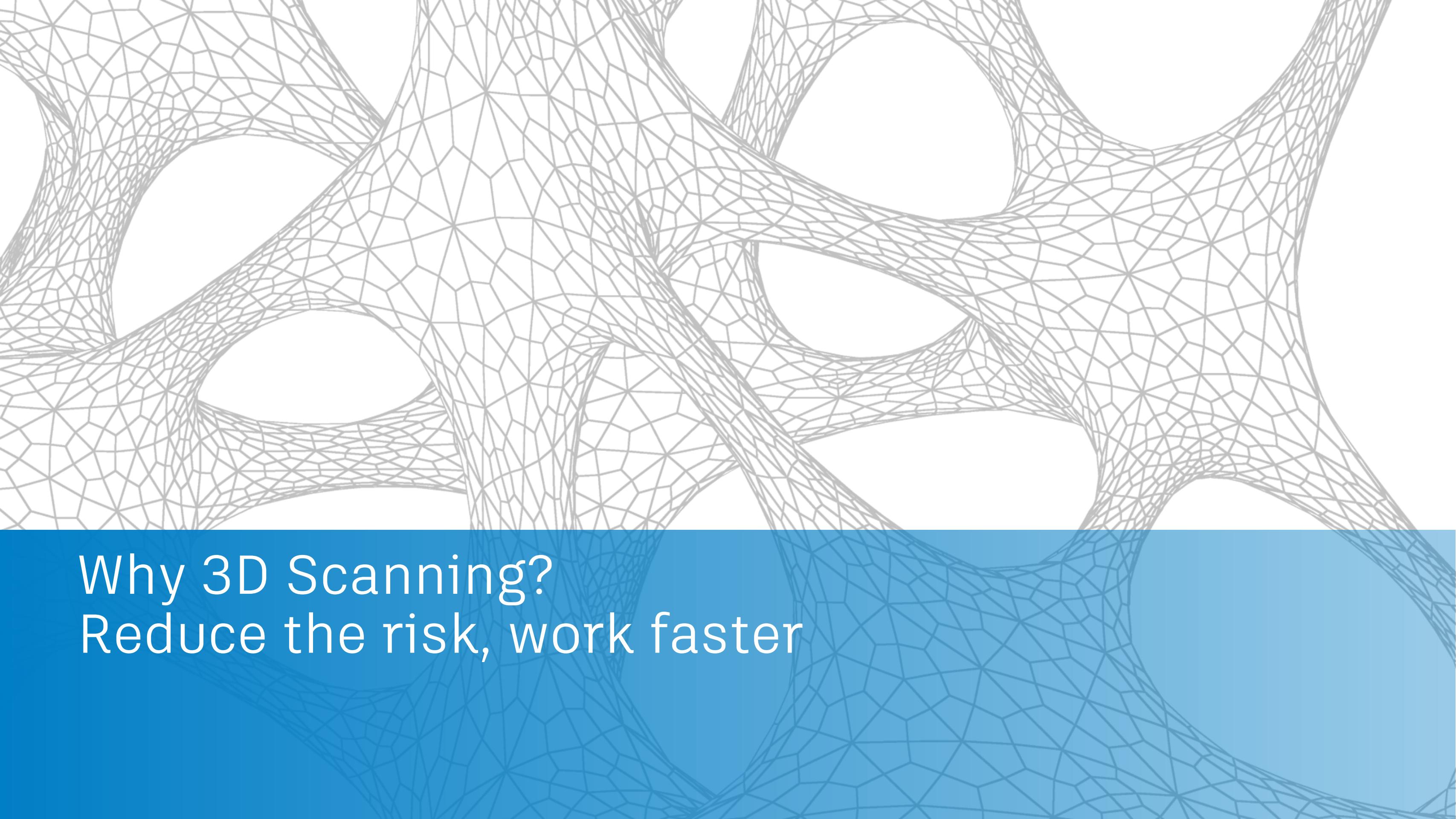
Strothmann Machines & Handling
GmbH

Sicoplan, subsidiary of Siempelkamp Group

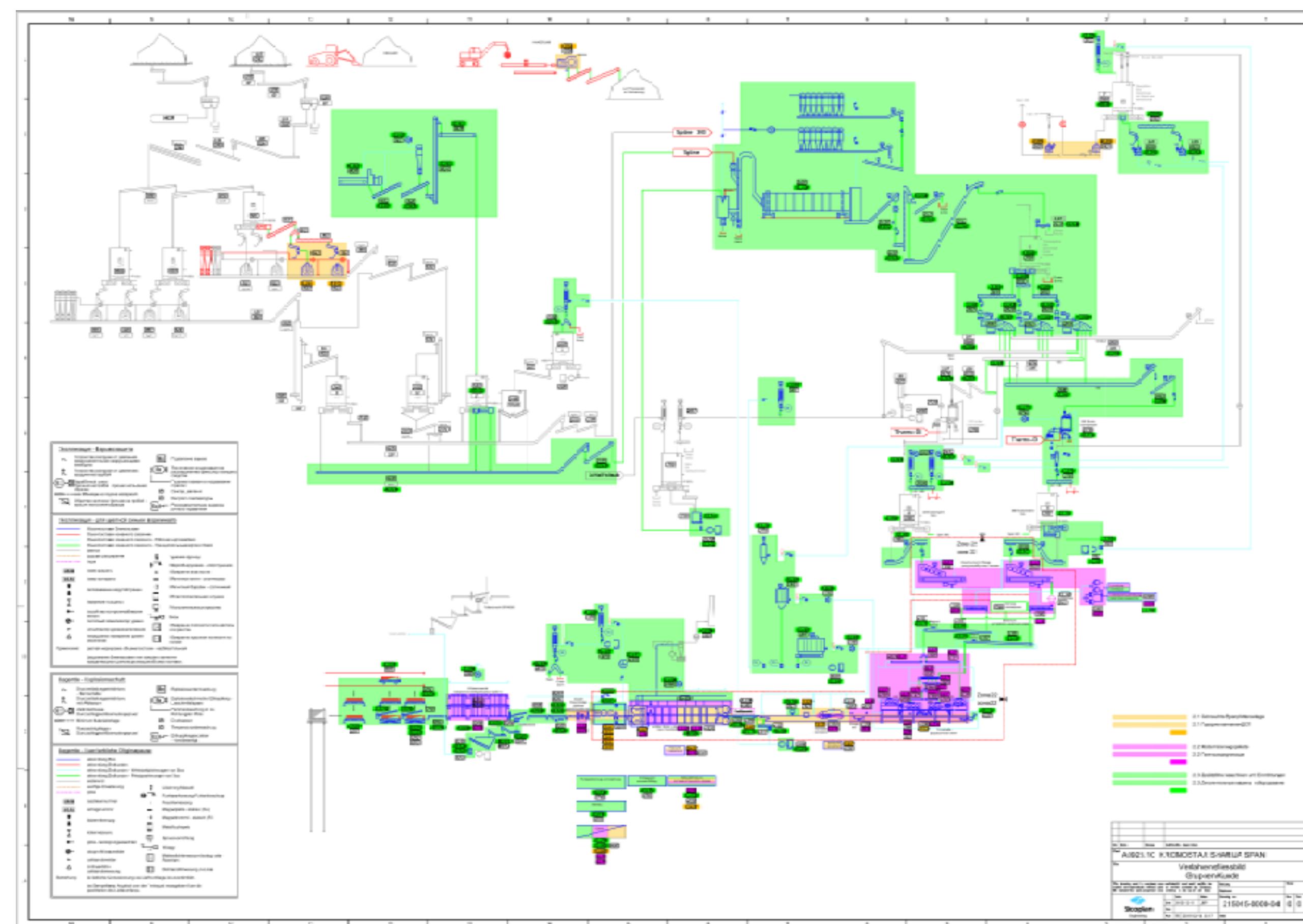


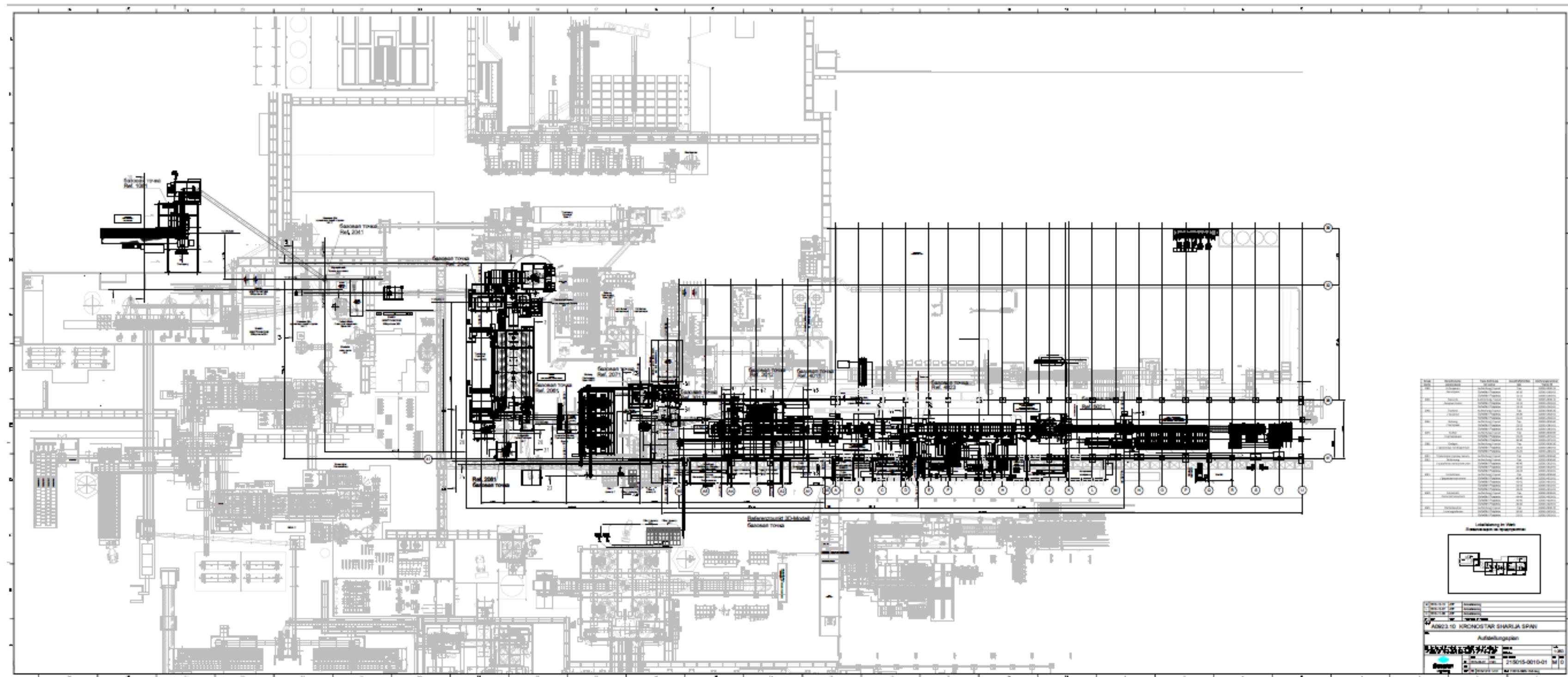
Sicoplan
Engineering

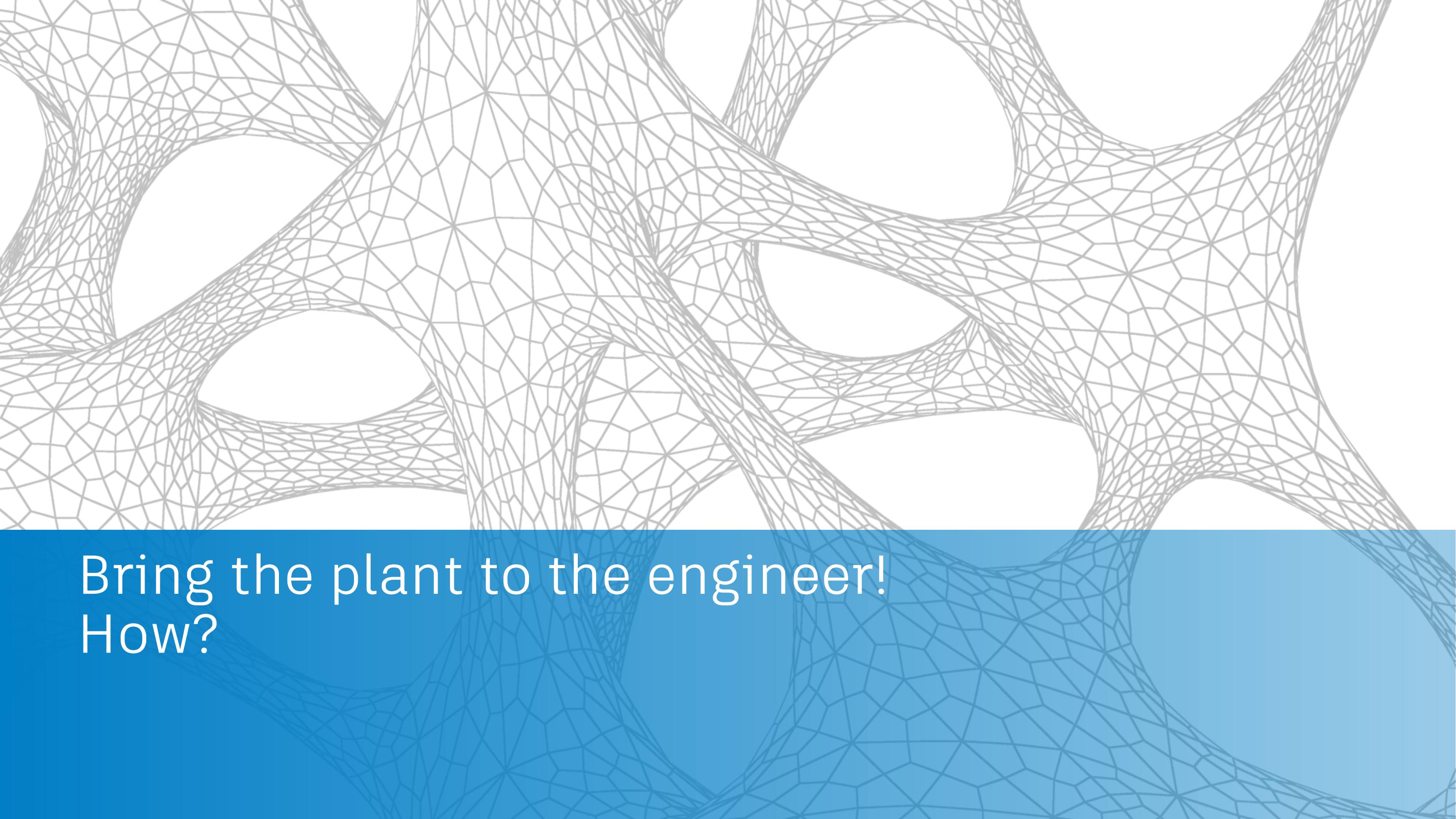




Why 3D Scanning?
Reduce the risk, work faster







Bring the plant to the engineer!
How?

Equipment



Faro Focus3D X130 laser scanner

- light weight, easy handling
- accuracy 2 mm
- range 130 m

carbon fiber tripod



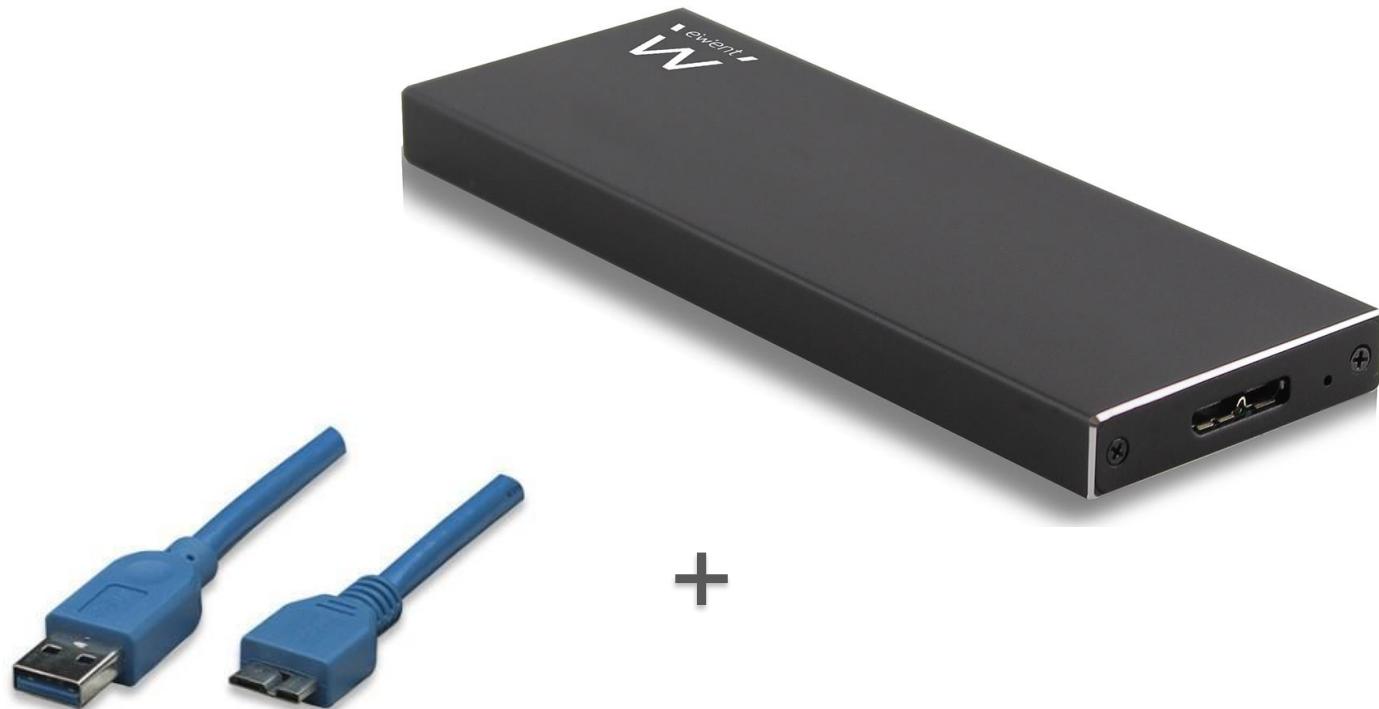
Equipment



High performance laptop

- 64 GB RAM
- 1 TB SSD
- 4.0 GHZ PROCESSOR

Equipment



+



Memory Stick

- SSD: 1 TB M.2 Crucial MX 300
- Enclosure: EWENT USB 3.1

Total Price: approx. 300\$

- Transferrable
- Fast access, work directly on mem stick
- Reliable.

Software

- Autodesk Recap
- Autodesk Navisworks
- Faro Scene

Planning: best practice tips



Google
Earth



Workflow on site

- Schedule 2 people on site
- Make sure the scanner is always scanning
- Position your scanner and targets effectively
- Discuss the workflow in advance with all involved
- Communication on site (cellphone, walkie talkie,...)



Manage the data

Layered point cloud

- Simplified and structured data management
- Similar setup to the process flowsheet
- Clearer to view
- Useful for collision detection
- Remove noise during cleaning

Layered point cloud

standard solution Autodesk: ‘regions’ functionality of Recap

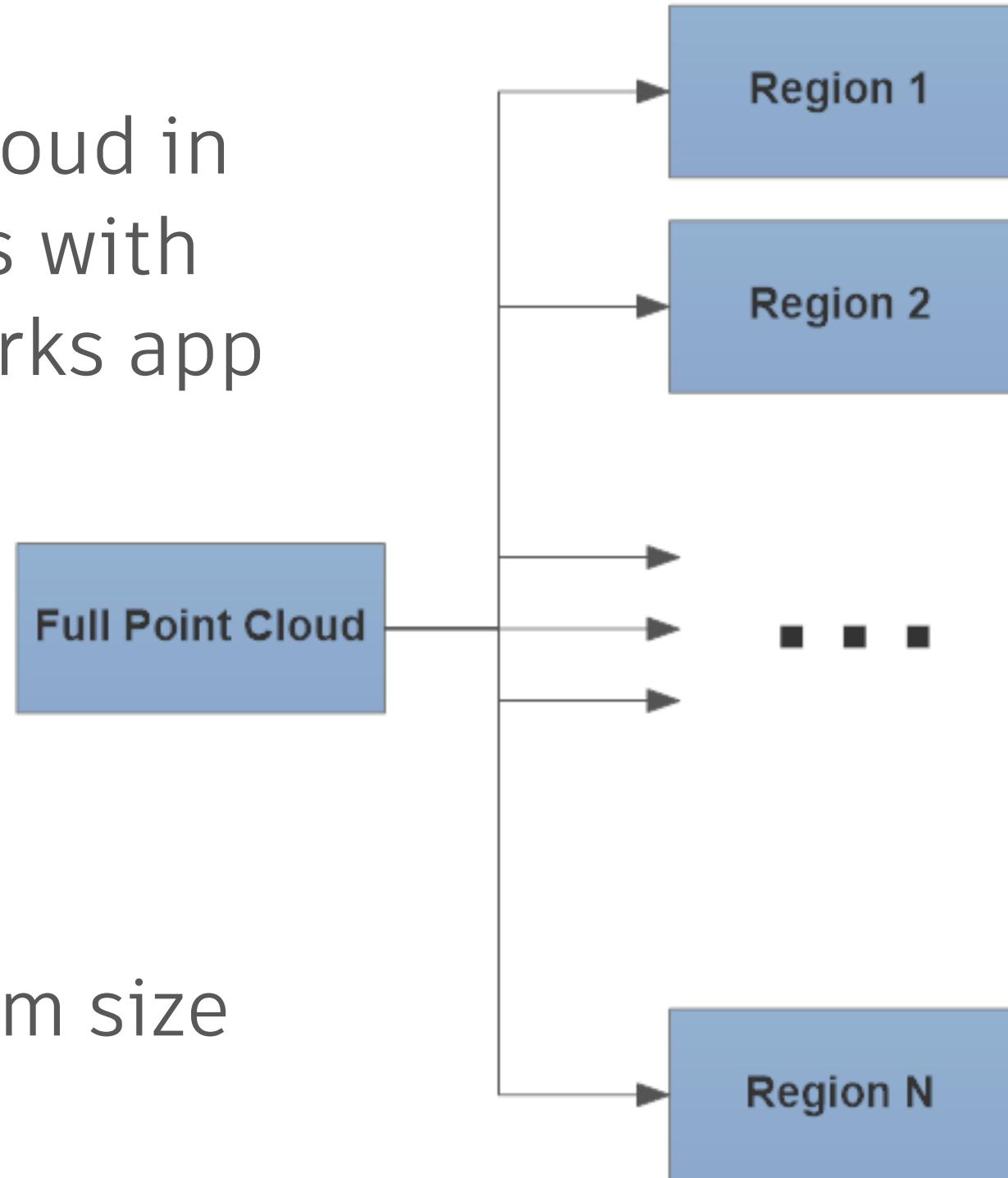
Limitations with ‘regions’ for large point clouds:

- Maximum 60 regions can be selected and exported
- Slow performance with multiple regions in large point clouds
- Exporting .RSC file can take a long time with large point clouds

Workflow layering point cloud

Step 1

Divide complete point cloud in N simple shaped regions with self-developed Navisworks app and Recap.

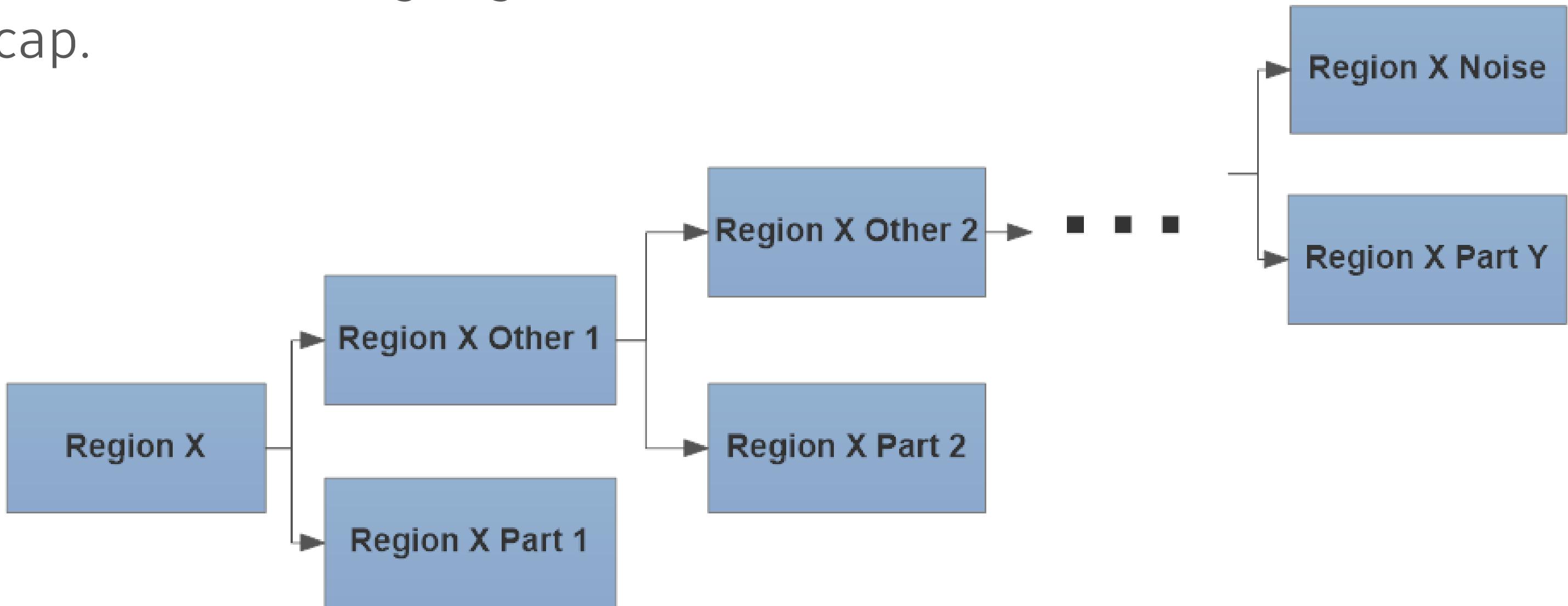


Strive to have a maximum size of 1 GB per region

Workflow layering point cloud

Step 2 (Optional)

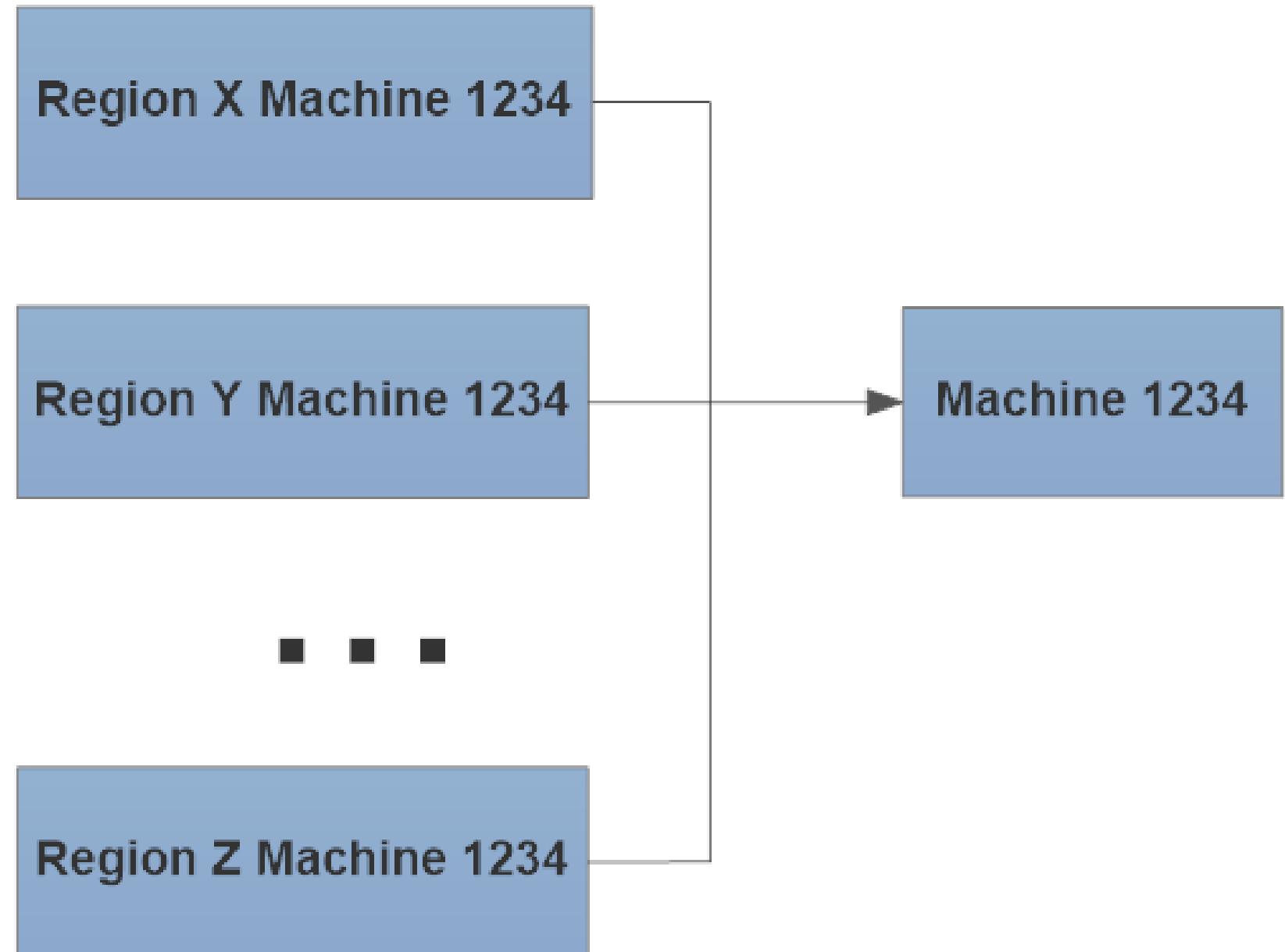
Refine the resulting regions in
Recap.



Workflow layering point cloud

Step 3 (Optional)

Combine different parts of same layers to one region in Recap.



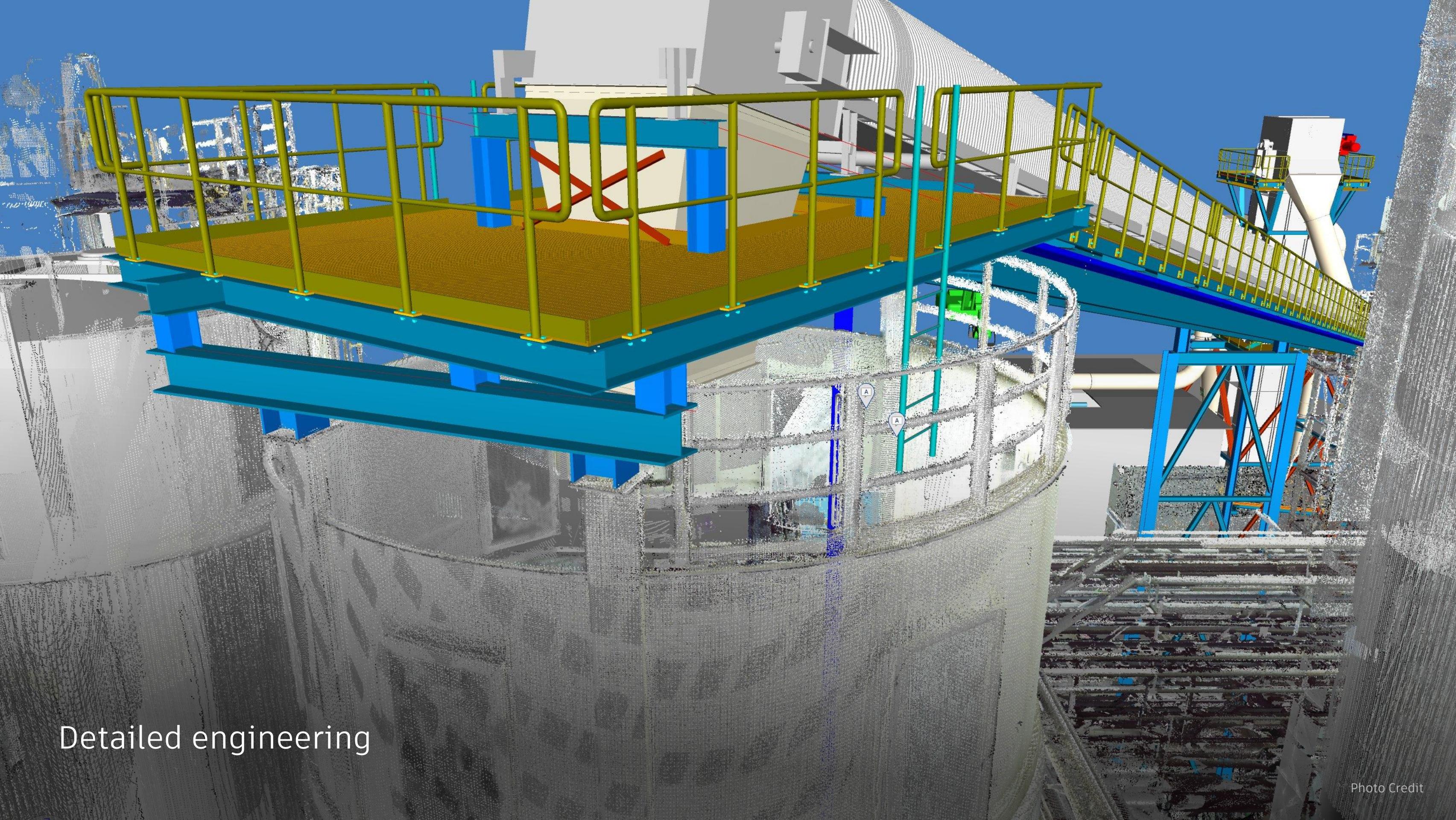


Scanning put to practice

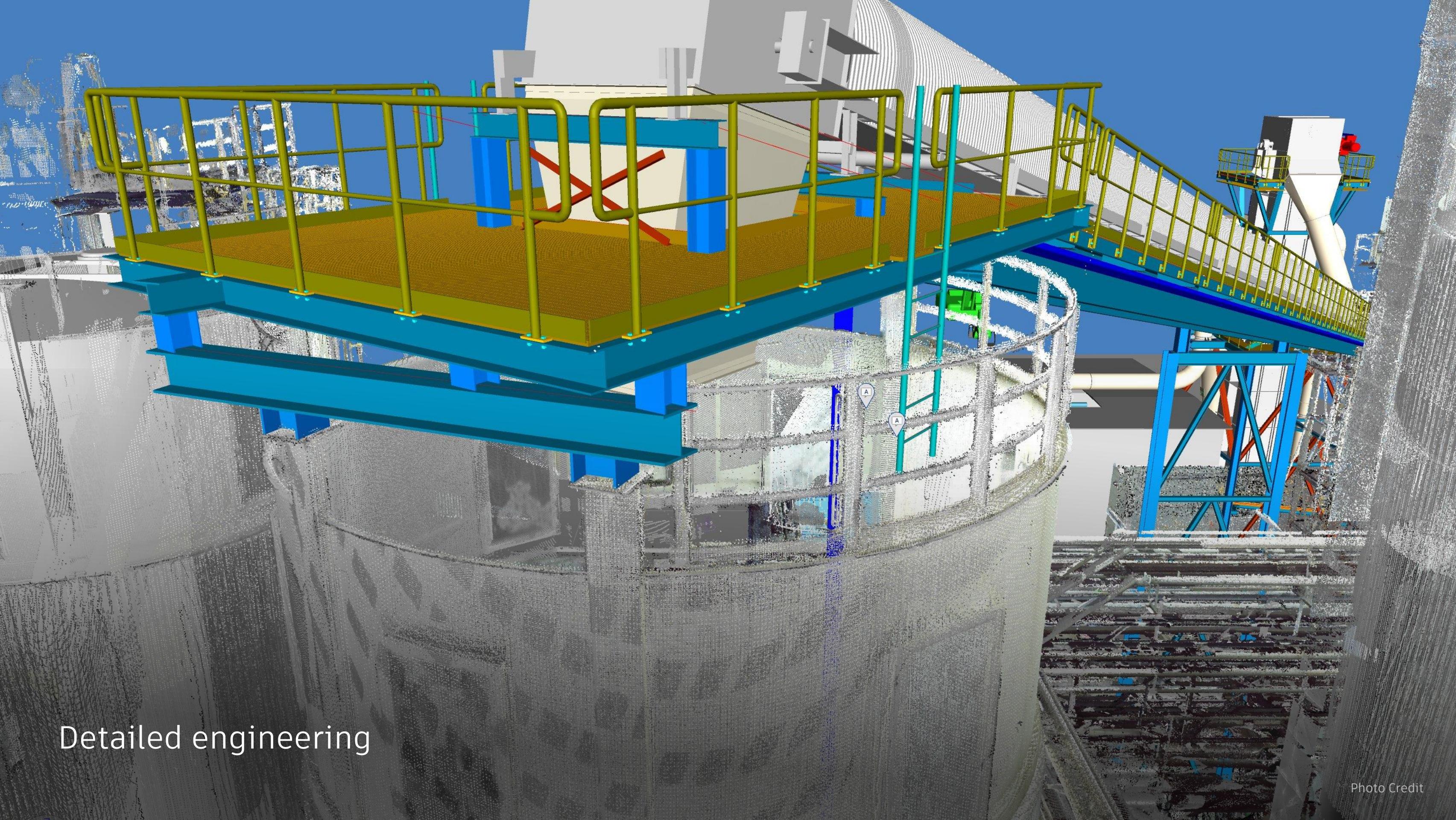


Concept phase

Photo Credit

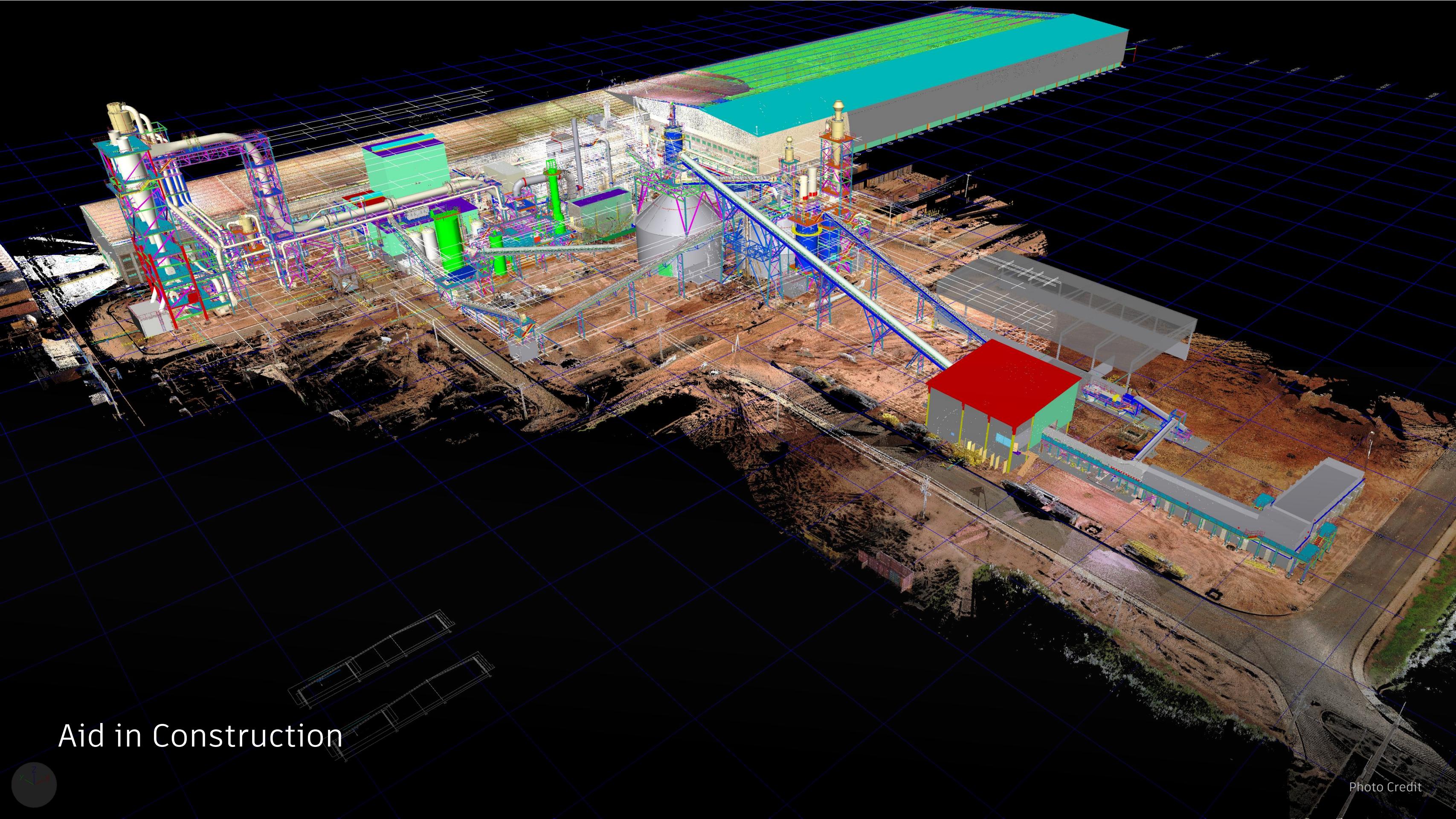


Detailed engineering



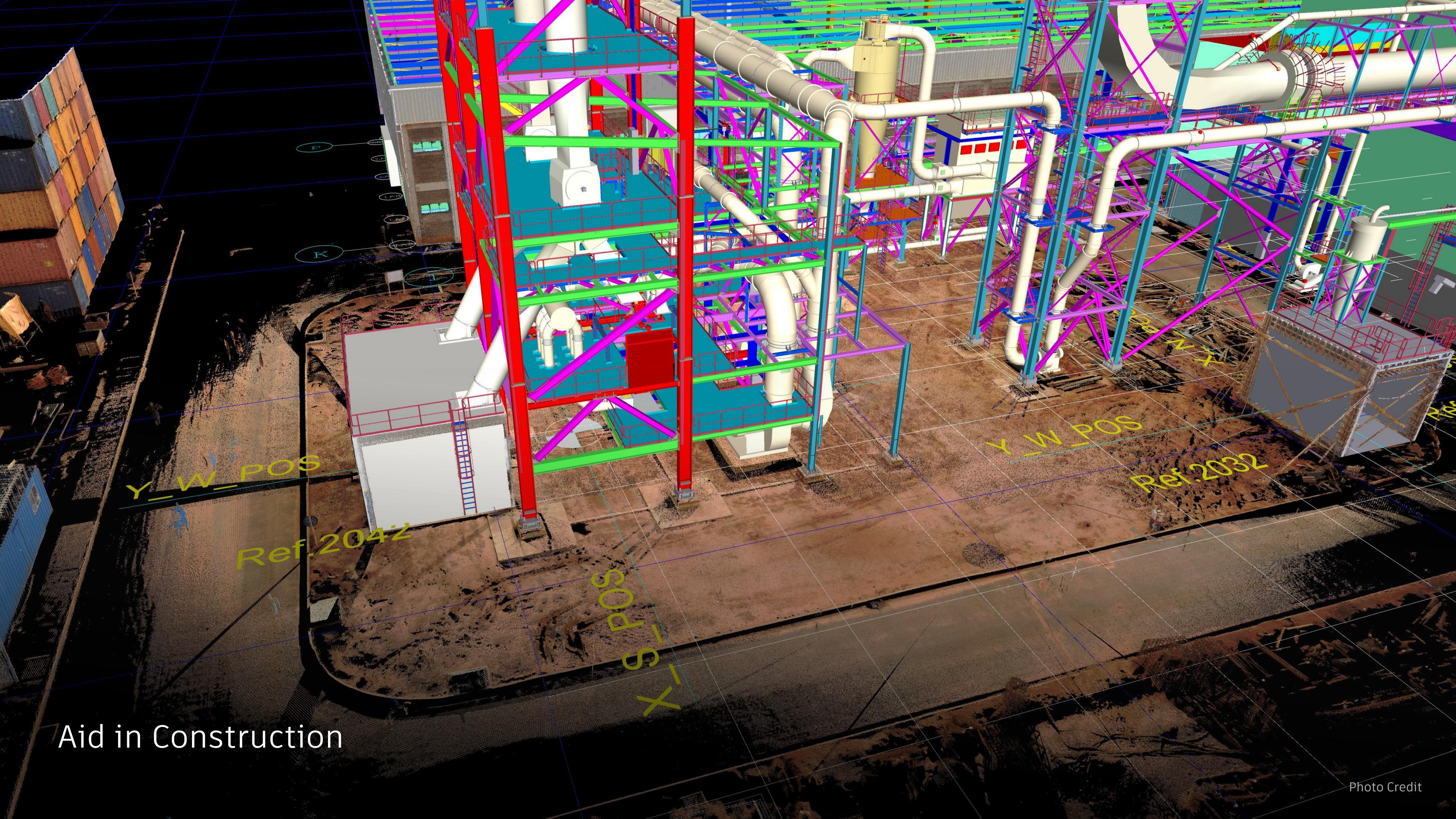
Detailed engineering

Photo Credit



Aid in Construction

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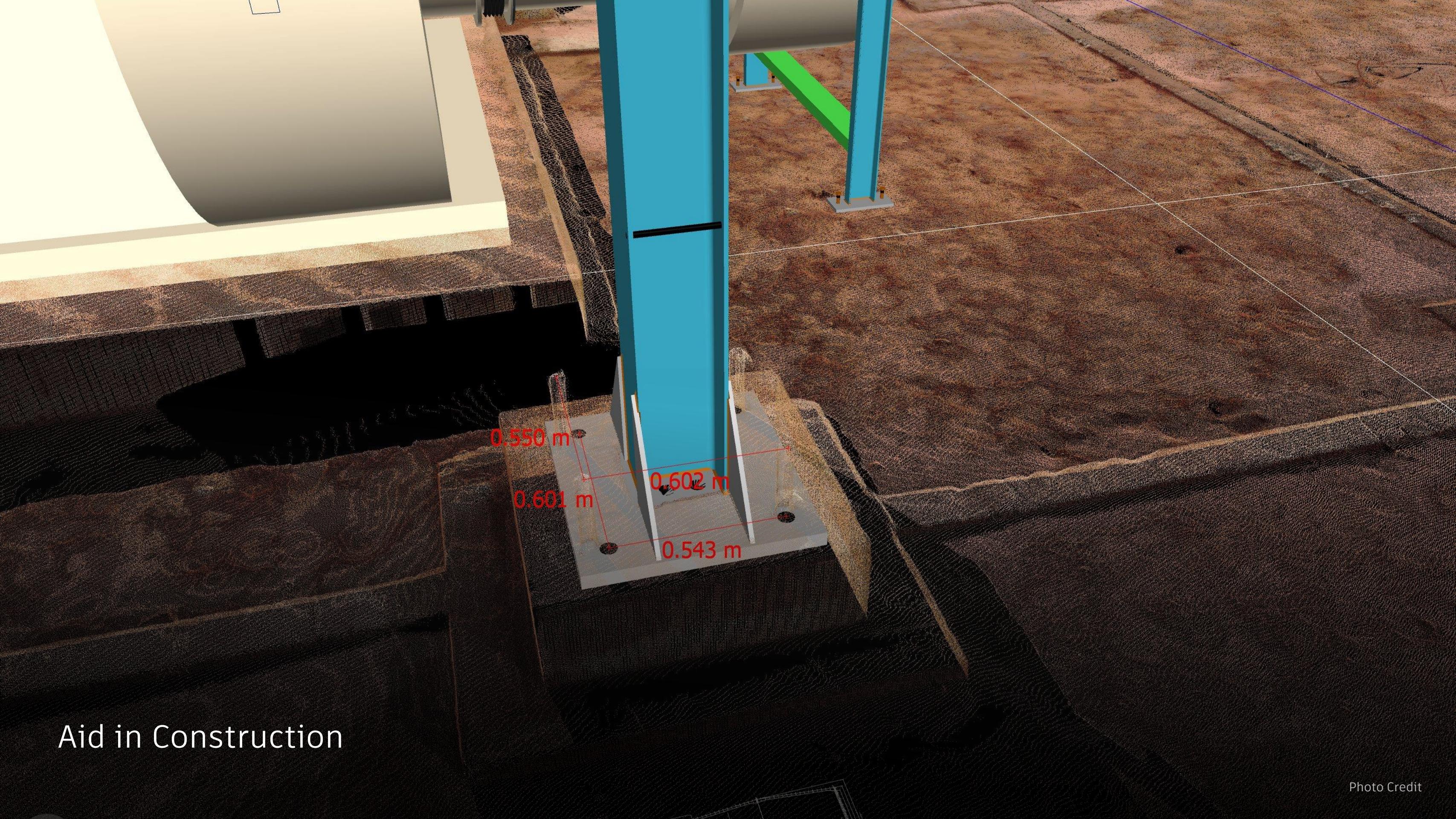
Aid in Construction

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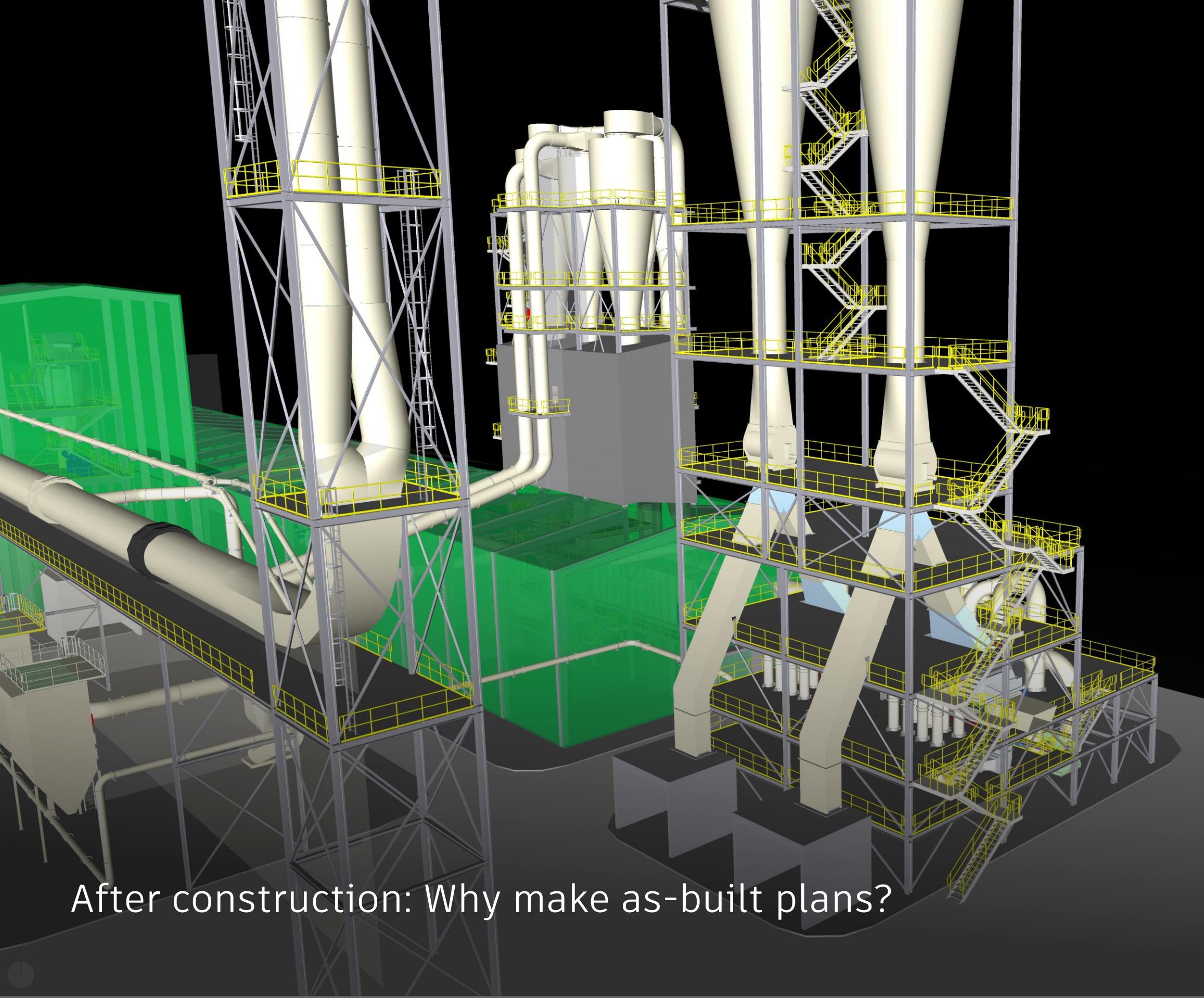
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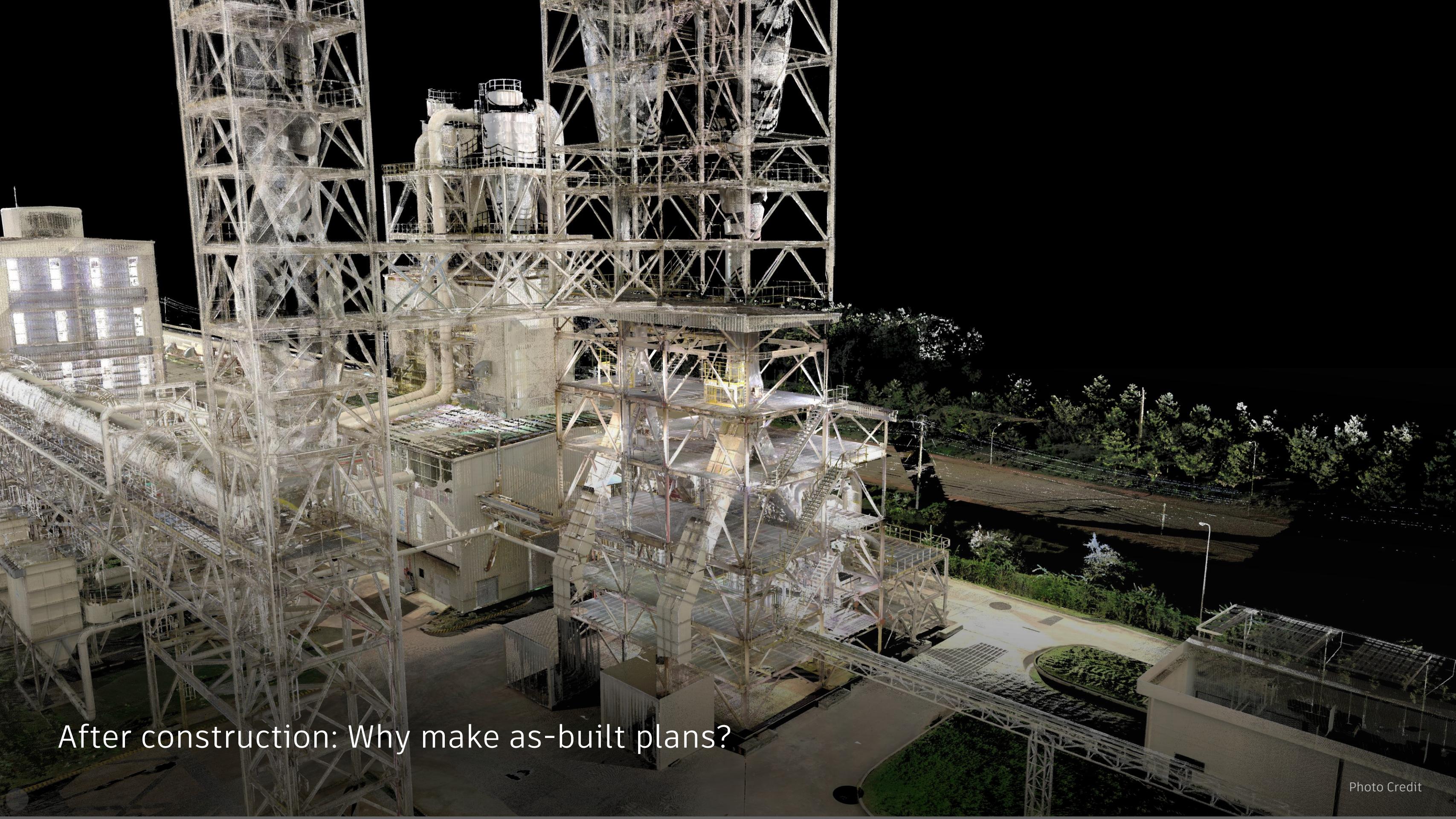


Aid in Construction

Photo Credit



After construction: Why make as-built plans?



After construction: Why make as-built plans?

Photo Credit



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