SAMIN
ENGINEERING & SERVICES

3D Dimensional Control in Shipbuilding & Plant Project

NewMethodology

www.saminis.com

01 About SAMIN

World's #1 in Dimensional Control

Shipbuilding » **Offshore Plant** » **Buildings** » **Refinery, Chemical and other Plant**

2006 삼인정보시스템(주) SAMIN INFORMATION SYSTEM CO.,LTD.

2018 SAMIN ENGINEERING & SERVICES

Software Solutions

▶ 3D Dimensional Control Software
▶ Laser Scan Data based Analysis Software
▶ Laser Scan Data based Simulation Software
▶ Smart Pen Solution
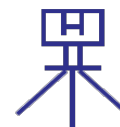▶ Production Management Solution

3D Survey & Analysis Services

▶ Client's 3rd Party Dimensional Inspection
▶ Verification of 3D As-built Dimension
▶ Total Station based Dimensional Survey at Fabrication & Installation Phase

Training & Consulting

▶ Dimensional Control Planning
▶ Dimensional Control Methodology
▶ D.C Execution & Reporting

3D Laser Scanning

▶ 3D Scanning for Plant, Building, Ship and Offshore
▶ Installation, Hook Simulation
▶ Scan Data Registration

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Objective of Dimensional Control is to find and fix all errors to achieve First Time Setting

- Dimension Quality Management is all activities related to fabricated objects meeting pre-defined tolerances

- Dimension Control can be approached in two ways :

  - Active Approach: Measures taken to prevent module/block deformation during production

  - Adaptive Approach: Management of controlling deformations occurred during fabrication or installation

- **Always better to fix everything before leaving the shop**
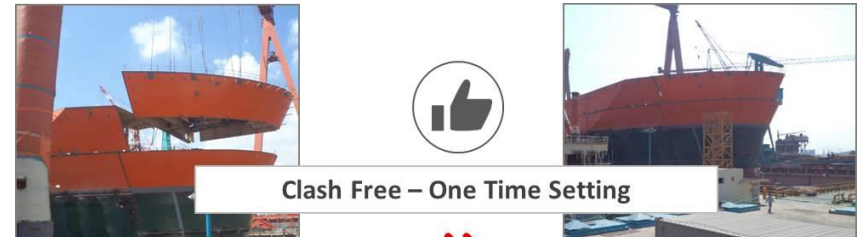
Find and Fix errors during Fabrication

Run 3D Installation Simulation to preempt problems during installation
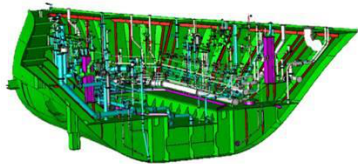
<3D Design>

	Item	Tolerance
①	Length(3D)	±5mm
②	Width(Height)	±5mm
③	Level	±5mm
④	Verticality	±3mm
⑤	Difference on the edge	±2mm
⑥	Welding Reserve	Standard
⑦	Edge B/H	0~+2mm
⑧	LONG. Angle	±3mm

<Production Block>

< Dimensional Control Standard >

Clash Free – One Time Setting

< Erection>

<Erection>

<Extra work for the error correction>

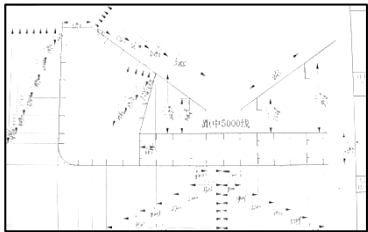Cost   Delay   Productivity

3D Dimensional Control

- Getting measurements in 2D using ruler, plumb or even total station doesn't provide enough information to understand deformation of structures.
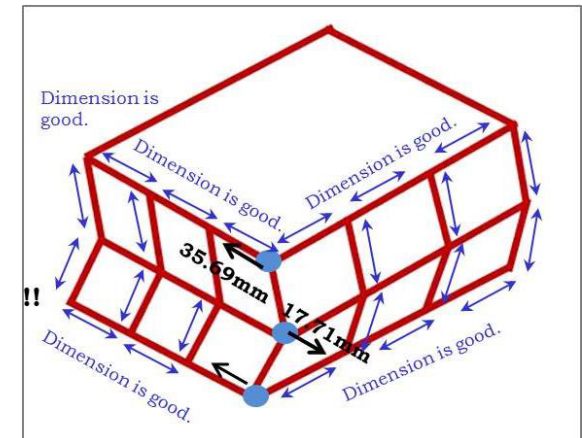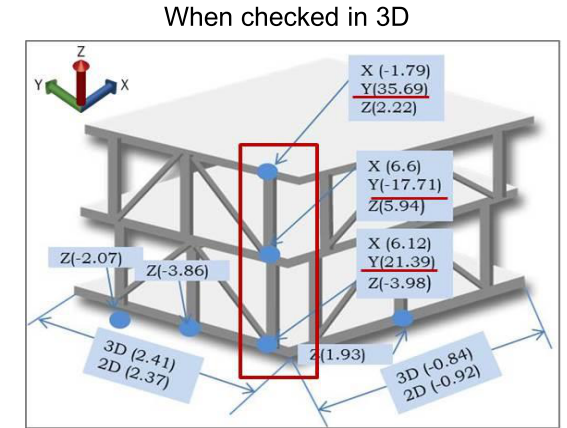

2D Measurement

Plumb
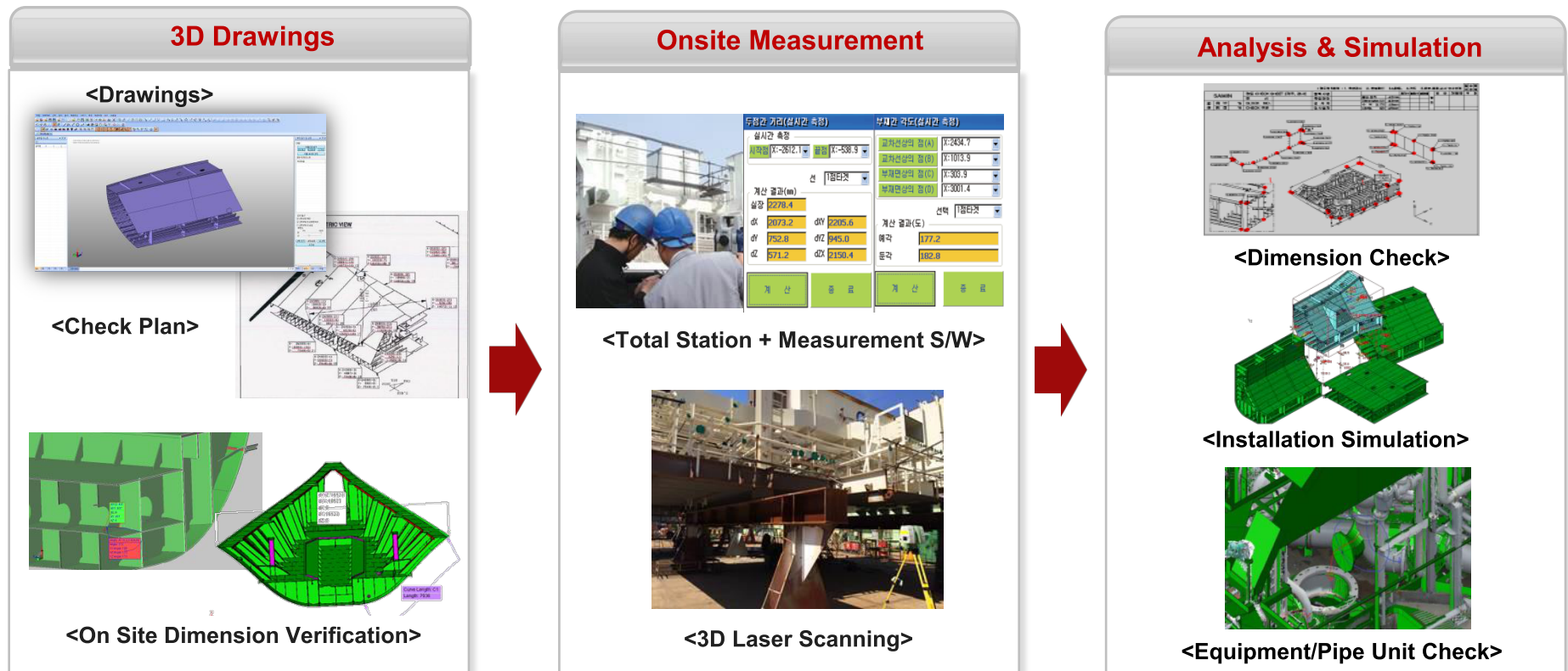
Ruler/Tape line

Only checks lengths

Lengths might be correct but..

When checked in 3D

X (-1.79)
Y(35.69)
Z(2.22)

X (6.6)
Y(-17.71)
Z(5.94)

X (6.12)
Y(21.39)
Z(-3.98)

Z(-2.07)

Z(-3.86)

Z(1.93)

3D (2.41)
2D (2.37)

3D (-0.84)
2D (-0.92)

Dimension is good.
Dimension is good.
Dimension is good.
Dimension is good.
Dimension is good.
Dimension is good.

35.69mm   17.71mm

!!

The module is actually deformed

Core of 3D Dimensional Control Methodology is Accuracy & Speed

- Plan – Quickly generate Check Plan using 3D Drawings
- Measure – Measurements using our own S/W can accurately measure large structures fast!
- Analyze – Check dimensions or run simulation in minutes

3D Drawings

<Drawings>

<Check Plan>

<On Site Dimension Verification>

Onsite Measurement

<Total Station + Measurement S/W>

<3D Laser Scanning>

Analysis & Simulation

<Dimension Check>

<Installation Simulation>
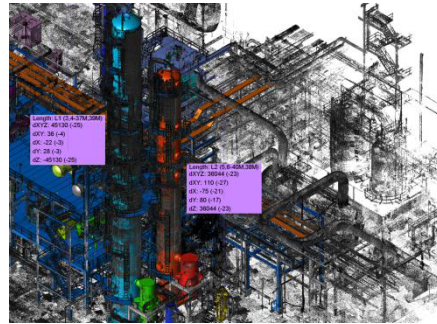
<Equipment/Pipe Unit Check>

World's #1 Proprietary Software for analyzing large structures using point cloud data

- Design vs As-Built: Comparison of 3D Drawings with Actual Measurements

- As-Built vs As-Built: Comparison of Actual Measurements with another Actual Measurements
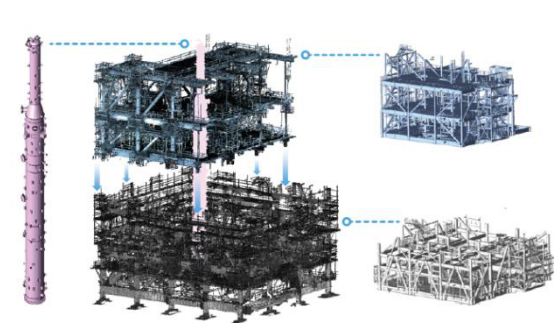
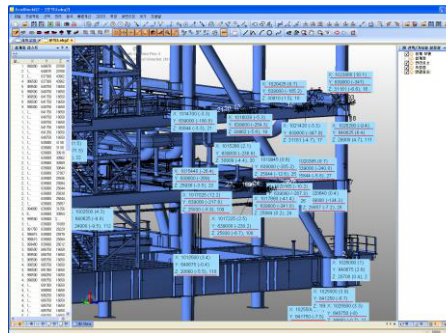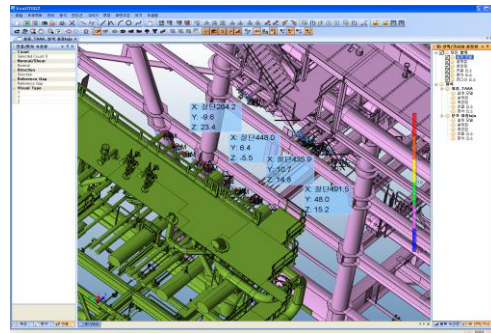| 3D Laser Scanner	Design vs. As-Built	As-Built vs. As-Built

Total Station	Design vs. As-Built	As-Built vs. As-Built

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SAMIN's proprietary 3D Scan data based analysis solution

More than 200% Faster

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Analysis : Min. 0.5 Days

1 Day	1 Day	**Not Needed**	0.5 Day	0.5 Day

Client Request	Laser Scanning (500GB)	Registration & Data Export	**3D Modeling**	Dimensional Analysis &Simulation	Report

Others

1 Day	1 Day	2~4 Days	1~2 Days	0.5 Day
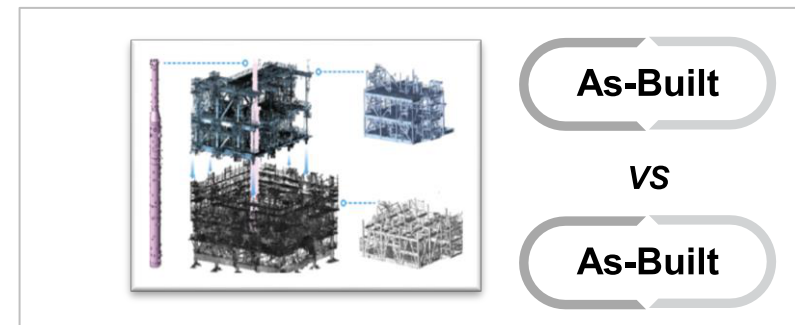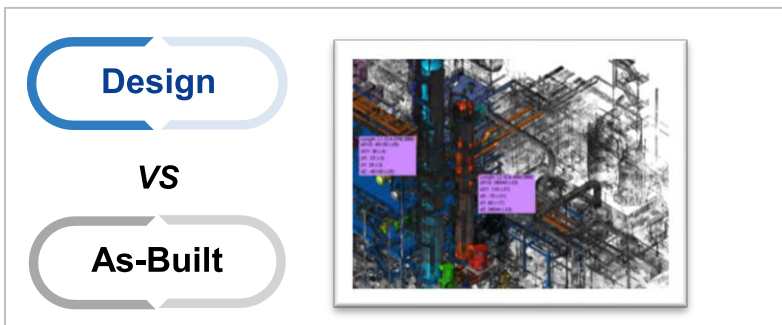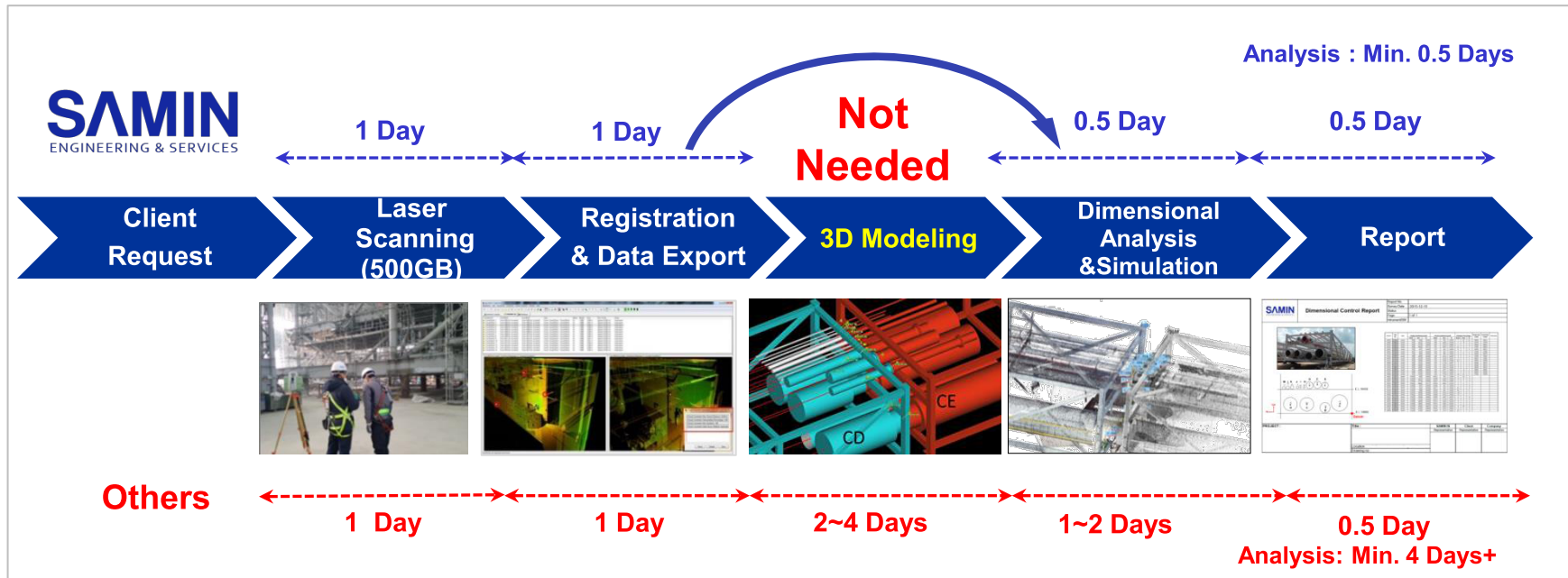
Analysis: Min. 4 Days+

Design

VS

As-Built

As-Built
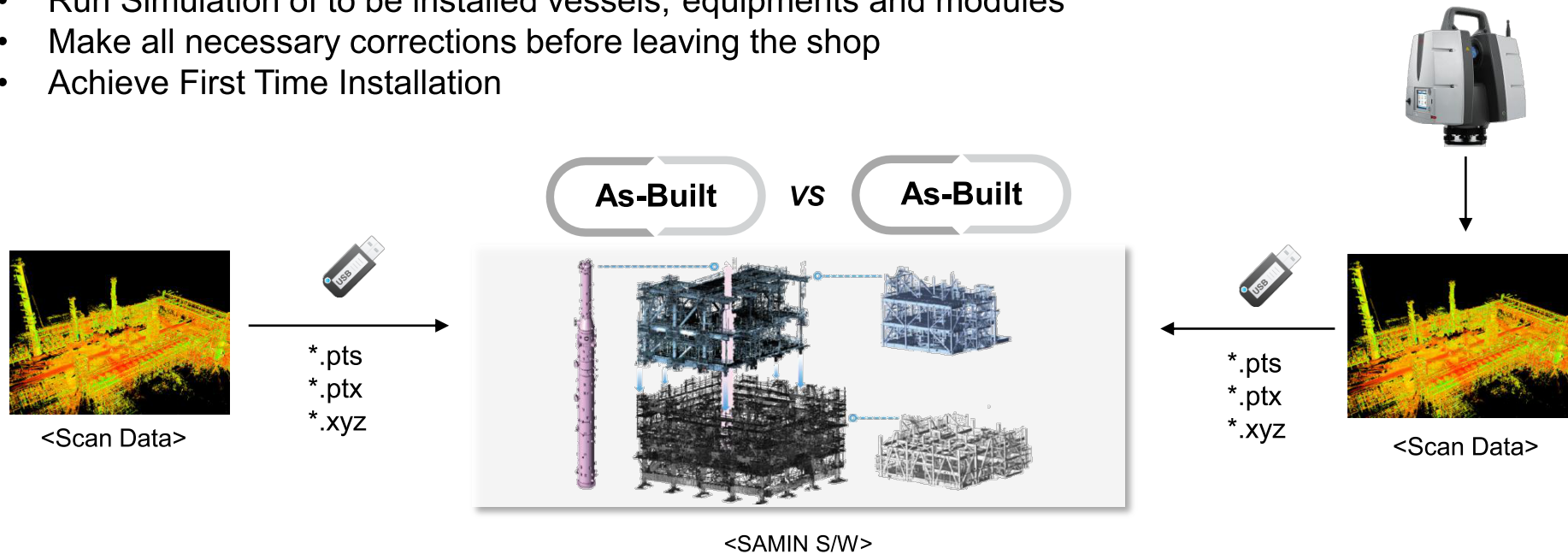
VS

As-Built

Laser Scan data based dimensional quality control using 3D Design and As-Built Data
- Check vessels, plant modules, and equipments against 3D Model
- Make all corrections before leaving the shop

Design **VS** As-Built

3D CAD
*.dxf
*.sat   + more
*.dgn
*.iges

+

*.pts
*.ptx
*.xyz

\<Scan Data\>

\<Automatic Analysis using SAMIN S/W\>

\<Equipment Analysis\>

\<Existing Plant Analysis\>

\<Existing Plant vs. To-be Installed\>
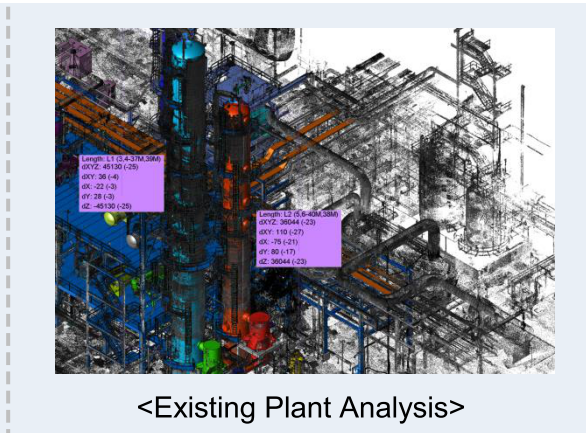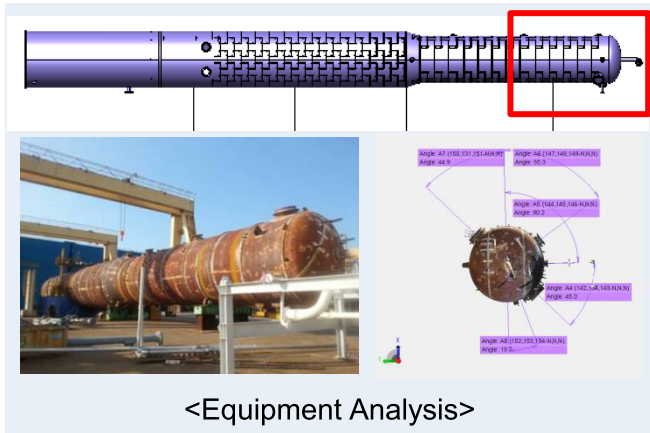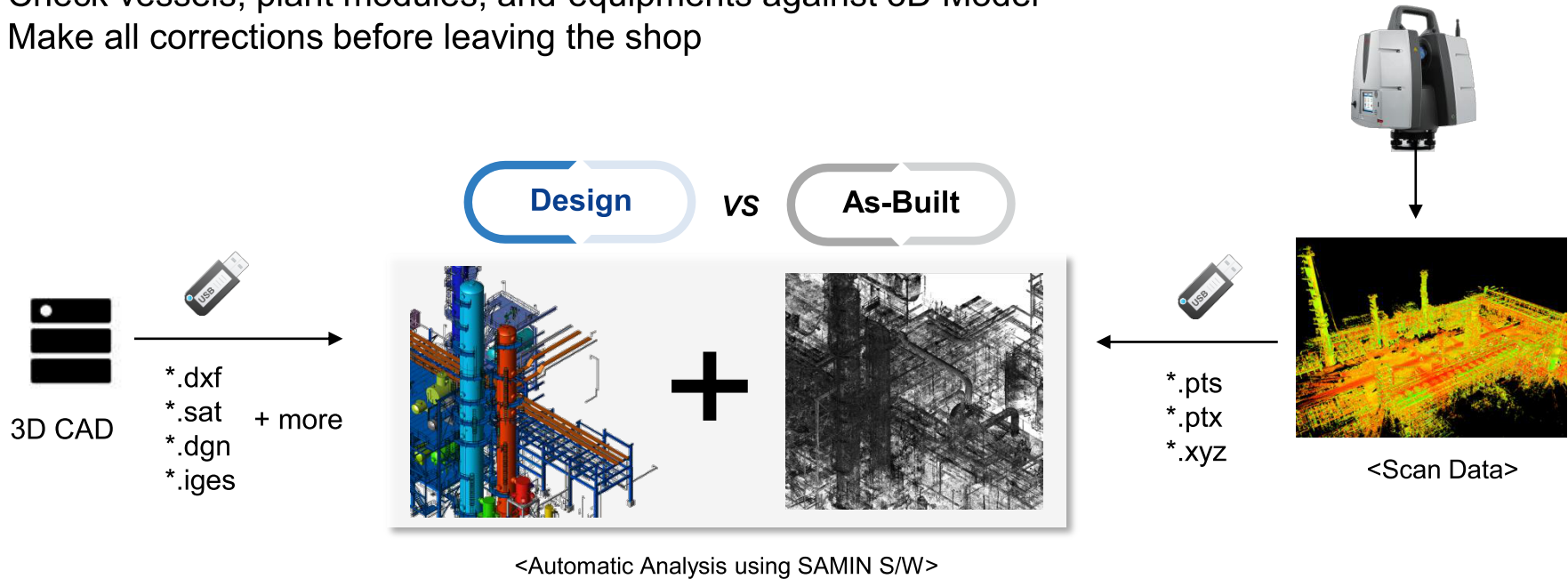
Laser Scan data based installation simulation of As-Built vs As-Built Data
- Run Simulation of to be installed vessels, equipments and modules
- Make all necessary corrections before leaving the shop
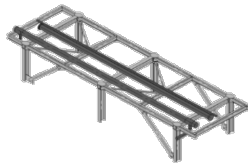- Achieve First Time Installation

As-Built **vs** As-Built

*.pts
*.ptx
*.xyz

*.pts
*.ptx
*.xyz

<Scan Data>

<Scan Data>

<SAMIN S/W>

<Equipment Installation Simulation>

<PAR Installation Simulation & Analysis>

3D Dimension Control of Fabricated Modules and Installation Simulation during production
3D Analysis for Operation, Maintenance, and Retrofit after production
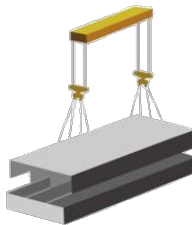
Production Phase

Operation Phase

Pre-Fabrication → Fabrication → Erection /Installation → Operation & Maintenance → Revamp & Retrofit

- 3D Dimension quality control in accordance with drawings
- Module/Equipment Installation Simulation to account for errors during installation
- Module/Equipment installation location verification

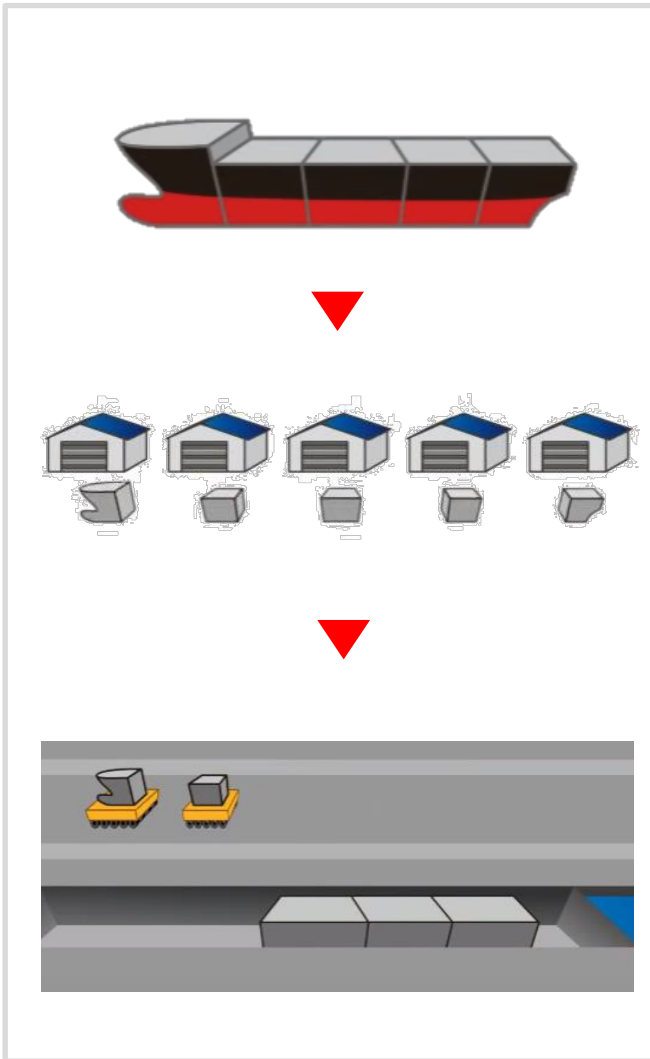- Acquisition of As-Built Data
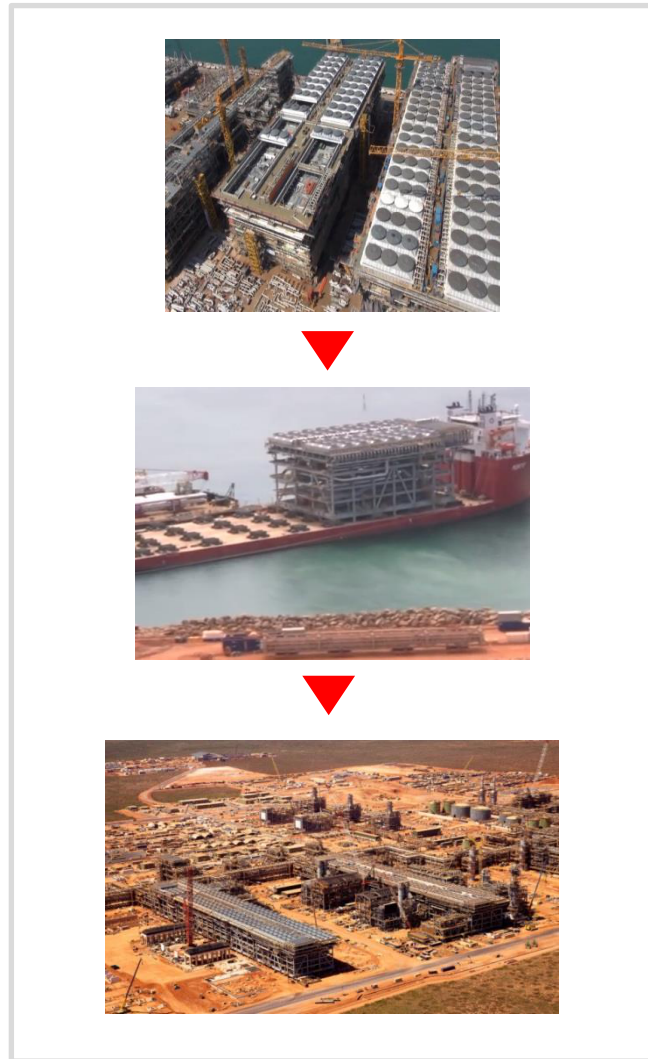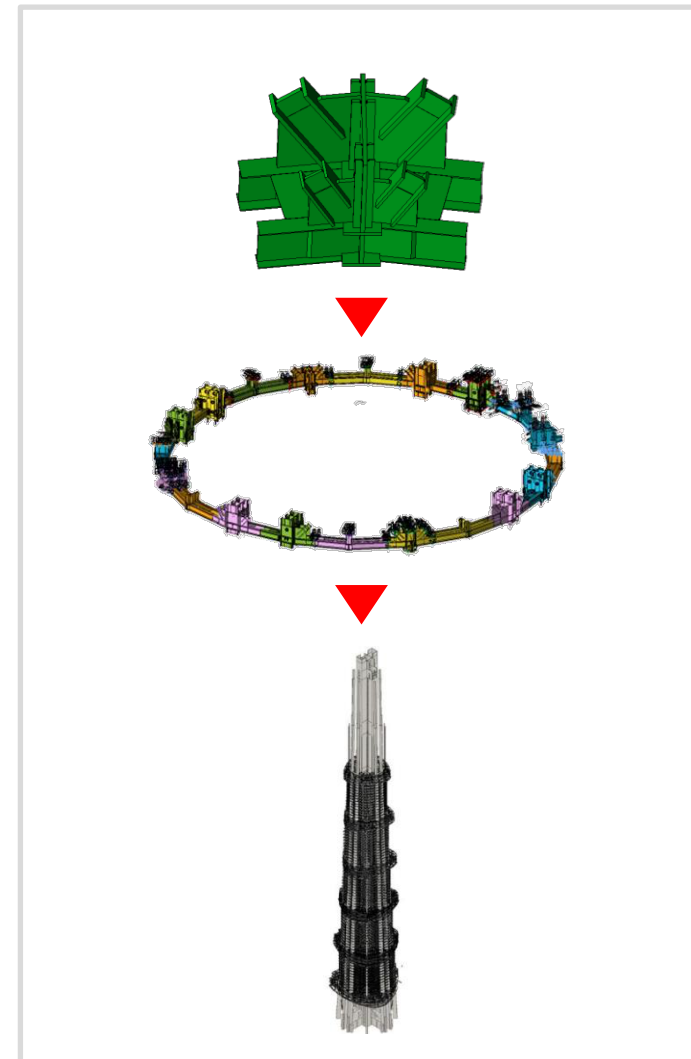- Deformation verification of structures
- Installation simulation during retrofit

<Shipbuilding – Block Construction Method>

<Plant – Modular Construction Method>

<Building – Modular Construction Method>

More than 120 satisfied clients and partners globally

- **KOREA**: HHI,SHI,GS E&C, POSCO A&C, SAMSUNG ENG,GS Caltex etc.

- **EUROPE :** JAN DE NUL

- **SINGAPORE:** Sembcorp, Keppel Offshore&Marine, ST Engineering

- **CHINA**: ZPMC, BaoSteel, CSSC, DSIC Group, and 80 other companies

- **JAPAN**: Sumitomo Heavy Industry, and 15 other companies

- **USA:** Keppel AmFELS

- **INDIA**: CEMS (Center of Excellence in Maritime and Ship Building)

- TAIWAN : CSBC, Lung Teh Shipbuilding.

SAMIN U.S.

SAMIN China

Japan

Europe

India

Singapore

Brazil