

Shipbuilding Dimensional Control Solutions & Survey Proposal

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About Samin

Samin's core competency is over 10 years of R&D in *Dimensional Control and 3D precision survey*.

Built based on practical use, Our Dimensional Control solution is *up to 50% faster* than other solutions in the world on large scaled heavy industry projects.

Since our establishment in 2006, *Zero accuracy errors* working with *150 customer companies* such as major EPC companies and small/midsized fabrication yards.

SAMIN strives to offer better ways of precise data acquirement and accurate analysis under any situation. With Samin, *you'll always receive Accurate Dimensional Control and 3D Precision survey* faster and under budget.

Head Office located in
#505 Centum SH Valley,
35 Centum Dong Rd.
Haeundae, *Busan, Korea*



China Office located in
#1517 Yuandong Building,
No.1206, Pudong South Rd.
Shanghai

Our Business

World's #1 Dimensional Accuracy Control Technology



Accurate

- +/- 1mm (1/24") Accuracy
- "0" failures in First Time Fit



Fast

- 50% faster than other leading technologies



Know-How

- 10 years of consulting in Dimensional Control and Dimensional Control ONLY

Onshore Plant

Offshore Plant & Shipbuilding

Buildings & Steel Structures

Fabrication
Dimension Check

Block Erection Simulation
Goal for "One Time Setting"

3D Design vs As-Built
Comparison

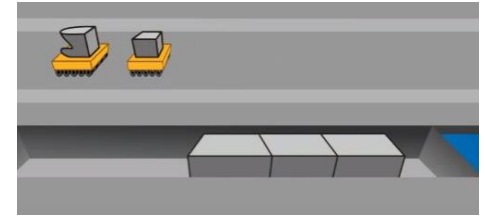
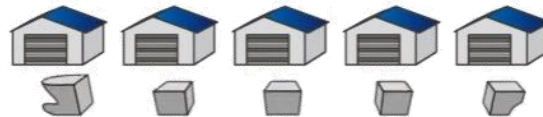
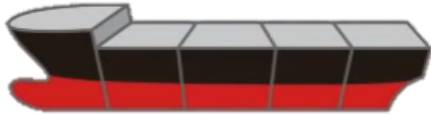
As-Built and As-Built/
As-Built vs. As-Built

Why is Dimensional Control so important?

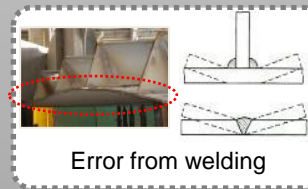
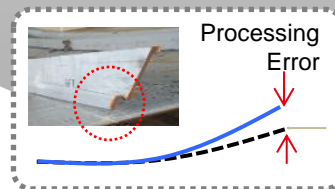
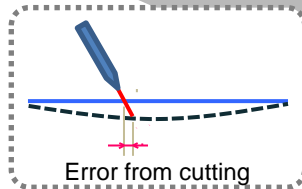
- Small accuracy errors accumulated during pre-fabrication lead to huge problems during erection.
- Re-work on block erection stage increases danger of industrial accidents, and causes decline of work efficiency.

Without Dimensional Control

<Shipbuilding – Block Construction Method>



Creates Multiple Problems



***Leads to increased cost, prolonged dock usage
and increased safety hazard***

Why is Dimensional Control so important?

Most common error of traditional method : Misconception of measurement

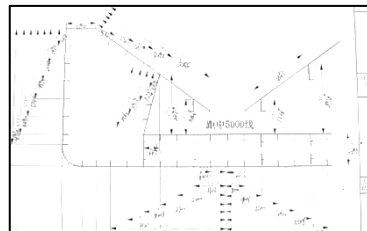
Manual Data – 2D Manage



Plumb

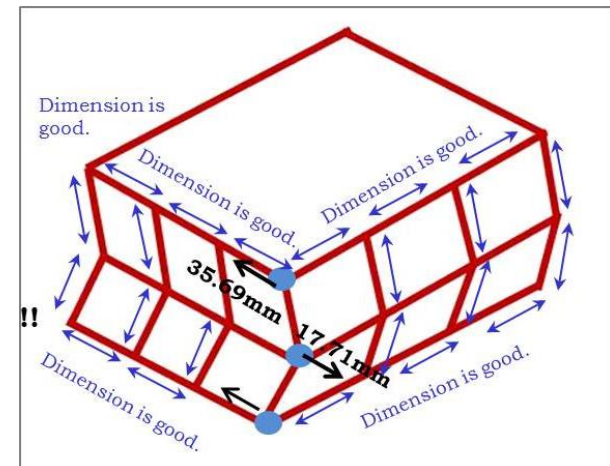
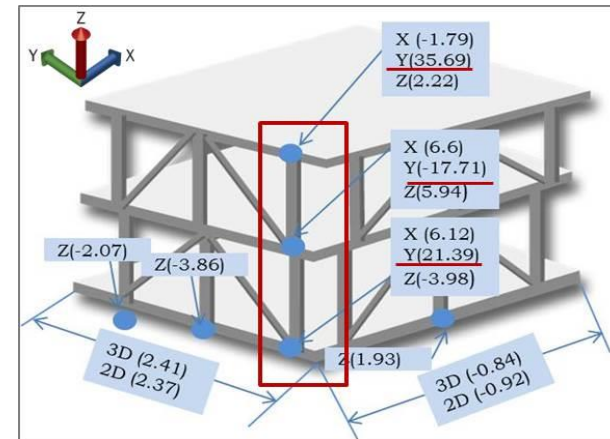


Ruler/Tape line



Simple dimension check report

Believe that measurements are good and within tolerance.



In reality, the structure has been deformed and cannot be detected using traditional method →

Benefit of Using “SAMIN” Dimensional Control System

Theoretically speaking...

**You can save \$10 Million+ on direct costs &
Shorten Dock Usage by at least 30 days per year!**

The shipyard without Dimensional Control **per vessel**:

- Ship Size : 35,000 Ton
- Dock Usage : 35 days
- Average number of Modifications During Erection: 200
- Extra Cost : \$93,000

	Man Hour	Cost per Hour	Total
Cutting & Welding	480	25	12,000
Painting	700	20	14,000
Erection Personnel Wait Time	1600	20	32,000
Sub Total			US\$ 58,000
Material Cost	Q'ty	Unit Cost	Total
Paint	5,000 L	7	35,000
Sub Total			US\$ 58,000
Total Direct Cost per Vessel			US\$ 93,000

Cost of Equipment usage, safety hazard and other benefits not included!

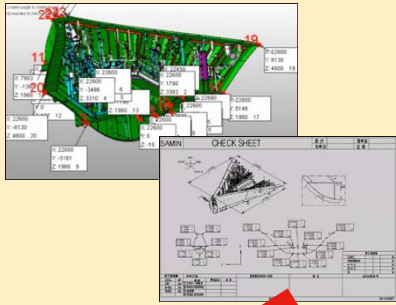
Dimensional Accuracy Control in Shipbuilding

- The following is the general workflow of dimensional accuracy control for the block fabrication and erection.
- SAMIN use the specialized software which is developed our own technology.

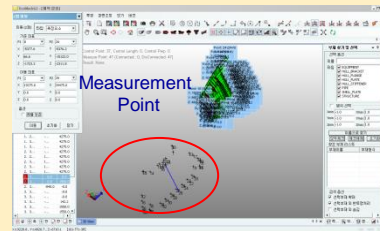
for Block Fabrication

<Single Block Dimension Check>

- ① Generate check sheet of each production stage (Mid-assembly /Assembly/P.E/Erection) after loading 3D design model in the software.



- ③ Analyze the deviation comparing 3D design and "EcoMES" measurement data, and create the report.



- ② Measure the block based on the check sheet.

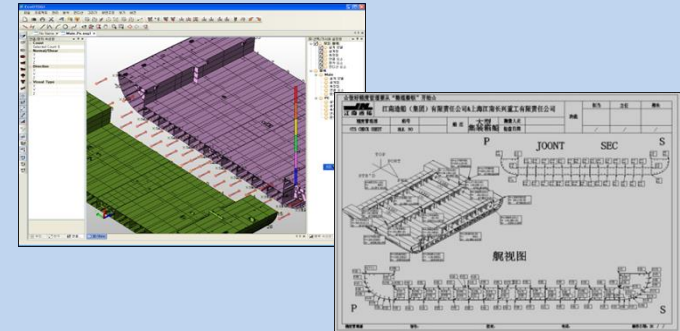


<Measurement - At site>

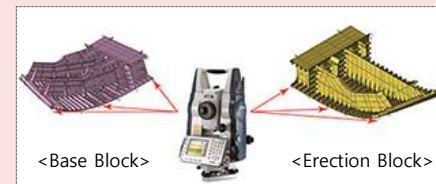
for Block Erection

<Block Erection Simulation>

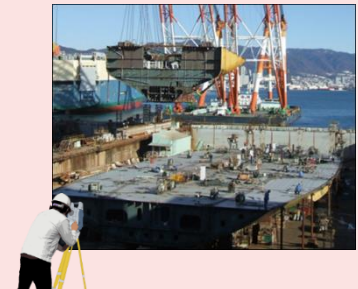
- ⑤ P.E/Erection simulation, and create the work order for the first time fit erection.



- ④ Measure the interface of block join

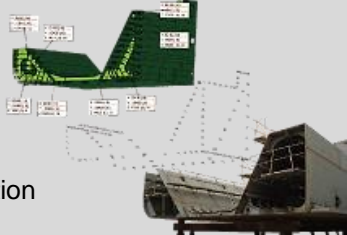
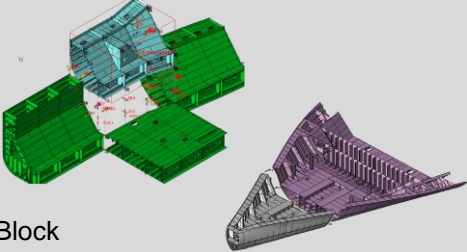


- ⑥ Survey for the block setting.



Dimensional Accuracy Control in Shipbuilding

Most measurements are taken without stopping work process

Construction Phase	What We Offer (Software & Survey Services)	How Fast We Do It
 <p>Block Fabrication</p>	Dimension Check <ul style="list-style-type: none">• Design vs. Build control to minimize errors in fabrication	<ul style="list-style-type: none">① Check Sheet(Office) : 30mins-40mins/1 Block② Block Measurement(Fabrication Shop/Yard) : 1 hours /1 Block③ Dimensional Analysis & Report – Comparison of 3D Design and AS-Built : 40mins
 <p>Block Erection</p>	Block Alignment Check <ul style="list-style-type: none">• Forecast the block alignment condition to achieve the first time fit during the erection.	<ul style="list-style-type: none">④ 2 Blocks Interface Check : 2 hours /2 Blocks⑤ Block alignment check (Erection Simulation) : 30-40mins/ 2 Blocks

- Block Fabrication : Average of Error Occurrence – 16~37%, 3 or 4 times of dimension check is recommended for one block fabrication → Errors are caught and corrected without interruption.
- Block Erection : Without Dimensional Accuracy Control angle error, positioning error occurs 99% of time → Errors are caught and corrected before erection for the “First Time Fit Setting”

Our Reference & Case Studies

Customers & Partners



We have around 150 customer companies in Asia Pacific area.

Korea : HHI, SHI, GS E&C, DAELIM, and 8 companies more.

Japan : Sumitomo Heavy Industries and 15 shipyards more.

China : CSSC, CSIC, DSIC and 80 companies more.

Taiwan : CSBC

Singapore : Keppel Singmarine, ST.Engineering

Indonesia : NOV

Vietnam : SBIC (Halong Shipyard), Hongha Shipbuilding, Triyard(Saigon)

Taiwan : CSBC

Our Experience

Technical Training for (12M)
Improvement of Work Process



Technical Training for (18M)
2400 TEU Container Vessel PJT
: Provided Software Solution.



Technical Training for (10M)
Establish Internal Work Process for
Dimensional Control



Technical Training for (12M)
8800 TEU Container Vessel PJT
: Provided Software Solution.



Technical Training for (3M)
Improvement of Work Process

Our Experience

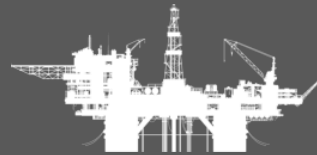
Clash Check : Topside Module integration to hull

- Project Range : 12 Modules & 1 Flare Tower
- Utilization of 3D Laser Scanning & SAMIN S/W

Floating LNG



Offshore



Semi-Sub



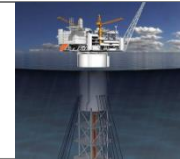
Jackup Rig



FPSO-Turret



Spar-Hull (Pilot)



- **Technical Training** for Preparing Dimensional Control Procedure & Field Application of 3D Dimensional Control Solution
- Providing 3D Dimensional Control Solution

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- Providing 3D Dimensional Control Solution

Lower Turret Installation Simulation

- Gap and Clash Check When Lower Turret is located to the certain critical elevation.
- Utilization of 3D Laser Scanning & SAMIN S/W

Spar Hull Dimensional Error Analysis and Erection Simulation

- 50m Diameter sized Cylinder Structures Dimension Check and Structure Alignment Check
- Utilization of 3D Laser Scanning & SAMIN S/W

Our Experience

LNG Plant Module and Vessel Dimensional Error Analysis

- Dimension Check for 600ton, 2000ton, Column
- Module and Vessel Installation Simulation

LNG Plant(Pilot)



Onshore



S-OIL RUC Project



CBDC Plant(Pilot)



Large Column (External/Internal) Dimensional Inspection

- Flatness of Skid Base, Nozzle Orientation, Straightness, Roundness & Internal Tray Dimensional Accuracy comparing 3D Design and 3D Laser Scanning Data

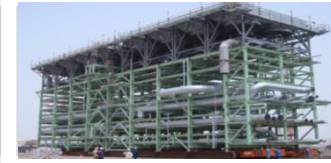
Gorgon LNG Plant



Providing 3D Dimensional Control Solutions and Laser Scanner

- Technical Training for Shop and Site Survey using Laser Scanner and Total Station
- Technical Training for Dimensional Error Analysis using Software Solution

LNG Plant - Piperack(Pilot)



Dimensional Tolerance check and assembly simulation

- Utilization of 3D Laser Scanning & SAMIN S/W

Our Experience

As-Built 3D Modeling Project

- Compare the existing drawing and present state.
- Verify the area need to be replaced and added.
- Utilization of 3D laser scanning

Display Factory



Building and others



Dimensional Inspection
for mega sized offshore crane equipment.

Megasized Crane



Shanghai Tower



Providing Software Solution

- Utilizing 3D Dimensional control software for Shanghai landmark dimensional quality control

Macau Hotel Tower



Providing 3D Dimensional control inspection service for building module dimensional error analysis

Steel Bridge



Providing Software Solution

- Utilizing 3D Dimensional control software for China railway bridge dimensional quality control

Case 1. Shipyard in Japan

Overview

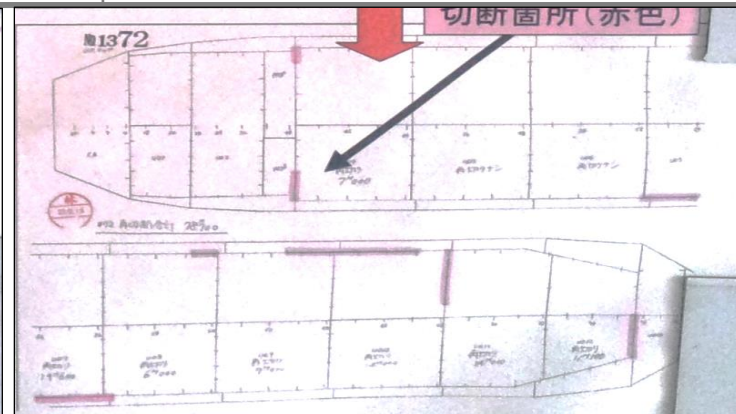
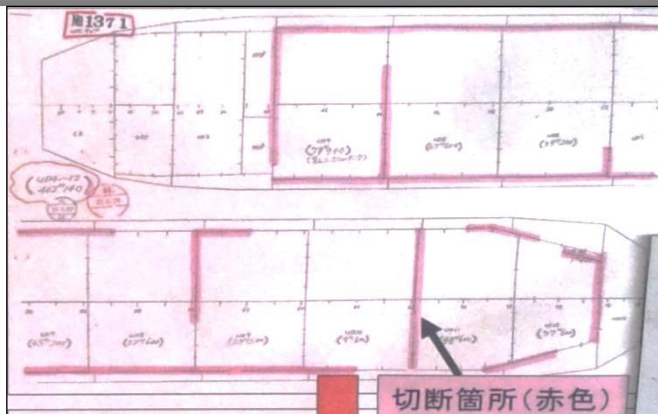
Item	Details	
Provided Service	• Software and Technical Training	
Year of Introduction	• 2011	
Background & Goal	<ol style="list-style-type: none">1. Minimize extra “mm” of each block. 400m were cut during erection for fixing dimensional errors.2. Burn damage on the upper deck painting due to re-cutting during the erection3. Need standardization process in case of dock master’s retirement (Big generation gap)	
Application Project	• Aframax Tanker (Series Vessel)	
OJT Term	• 4 Weeks	
Training Details	• 2 Weeks : Beginning of Introduction S/W	<ul style="list-style-type: none">• Software Operation• Establish Dimensional Control Process utilizing Software
	• 1 Week : After 6 Month introducing S/W	<ul style="list-style-type: none">• Monitoring Field Application• Field Application Training
	• 1 Week : After 1 Year Introducing S/W	<ul style="list-style-type: none">• Dimensional Control Data Statistics

Case 1. Shipyard in Japan

Effectiveness of SAMIN Dimensional Control

After utilizing 3D simulation for the erection, the working hours and cutting range for “1372” vessel has been decreased tremendously compared to previous series vessel “1371”.

Item	1371 Project (Before Introducing Solution)	1372 Project (After Introducing Solution)
Hours Crane Use	• 6 Hours	• 2H (If the block was not able to cut) • 0.5H (Block cutting before erection)
Cutting Range	• 402 m	• 79 m
Training Details		• Less burning on Hold part • Less scaffoldings after the erection • More ground work



Case 2. Shipyard in China

Overview

Item	Details
Provided Service	<ul style="list-style-type: none">• Technical Training , Technical Professional Dispatch & Software
Year of Introduction	<ul style="list-style-type: none">• 2011
Goals	<ol style="list-style-type: none">1. Dimensional Control Team Organization2. Establish Dimensional Control Process for each process (Steel cutting to Erection)3. Establish Dimensional Quality Goal4. Standardize Documentation5. Improve Manual Work (Introduction digital instruments and software)6. Statistics Defect rate of Dimensional Control7. Make up Defect Report8. White Paper for Dimensional Control
Application Project	<ul style="list-style-type: none">• 115K BC and 4,600 TEU Container Vessel
OJT Term	<ul style="list-style-type: none">• 12 Month

Case 2. Shipyard in China

Effectiveness of SAMIN Dimensional Control

; Decreased Accuracy Error Rate

	Item	Before		After	
		Target	Achievement	Target	Achievement
Mtrl Preparation	Accuracy Error ($\pm 1\text{mm}$)	28%	43.7%	15%	25%
Assembly	Mis-Alignment Error ($\pm 2\text{mm}$)	30%	52.3%	20%	37.6%
	Dimensional Error ($\pm 5\text{mm}$)	20%	34.1%	10%	13.4%
	LEVEL Error ($\pm 5\text{mm}$)	20%	35.4%	10%	17.4%
	Verticality Error ($\pm 5\text{mm}$)	15%	25%	10%	12.5%
Erection	Accuracy Error($\pm 5\text{mm}$)	30%	60%	20%	40%
Aver.			44.3%		26.1%



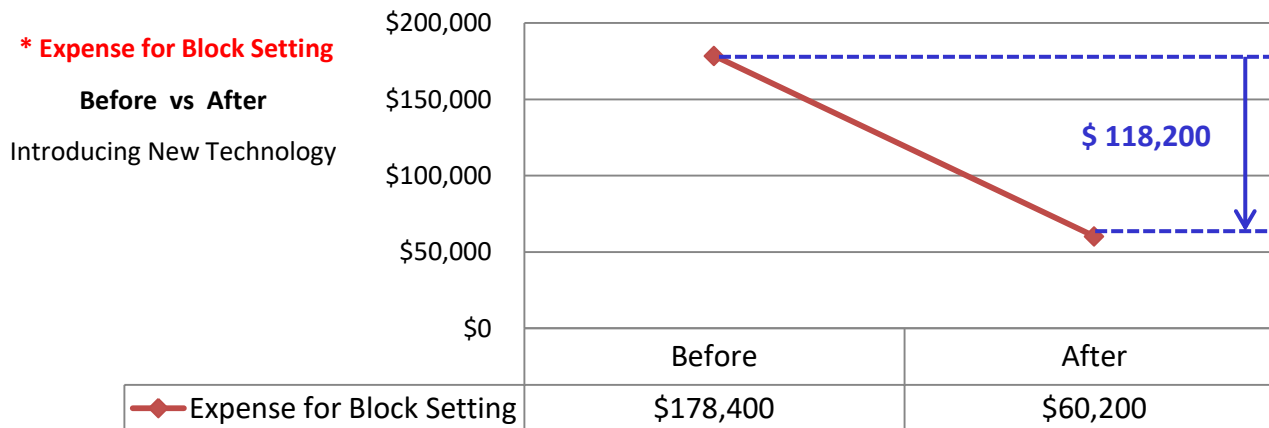
Case 2. Shipyard in China

Effectiveness of SAMIN Dimensional Control

; Decreased Block Setting Time (Container Vessel)

Block Type	Before Introducing Solution & Training		After Introducing Solution & Training		Time Save (for 1 Block Setting)	Total Number Of Block	Time Save (for Total number of block)
	Working Hours / 1 Block Setting	Manpower / 1 Block Setting	Working Hours / 1 Block Setting	Manpower / 1 Block Setting			
Bottom	5 h	10	2 H	6	3 h	11	33 h
Bulkhead	6 h	10	2 H	6	4 h	12	48 h
Side Shell	7 h	10	3 H	6	4 h	12	48 h
Bow (PE)	12 h	10	4 H	6	8h	1	8 h

Total : 137 Hours Save



※ Remark

- Expense for block setting per hours : \$ 800 (10 manpower based) → \$ 700 (6 manpower)
1 manpower : \$15/Hour
- The expense includes Block Setting and dimensional error fixing rate .
1m error fixing : \$35
- Including electricity charge for using equipment for cutting/welding/crane etc.
- Including depreciation cost for all equipment and machinery using.
- If 900~1,000 Ton goliath crane or Floating crane is used, the expense will be higher.
e.g. The electricity charge for 1 hour 1,000 Ton goliath crane : \$700

※ The price calculated is average amount within the general case of block setting and fixing errors.

Thank you

삼인정보시스템(주)
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YouTube : www.youtube.com/saminisen