

차세대 한국형 조선 CAD 시스템 TTM(Timetec Marine)

(주) 타임텍

김승석 상무

차세대?

- **Lean Construction**
- **JIT**
- **Connected**



**낭비 요소
제거**

제조 혁신?

- Industry 4.0
- Smart Factory

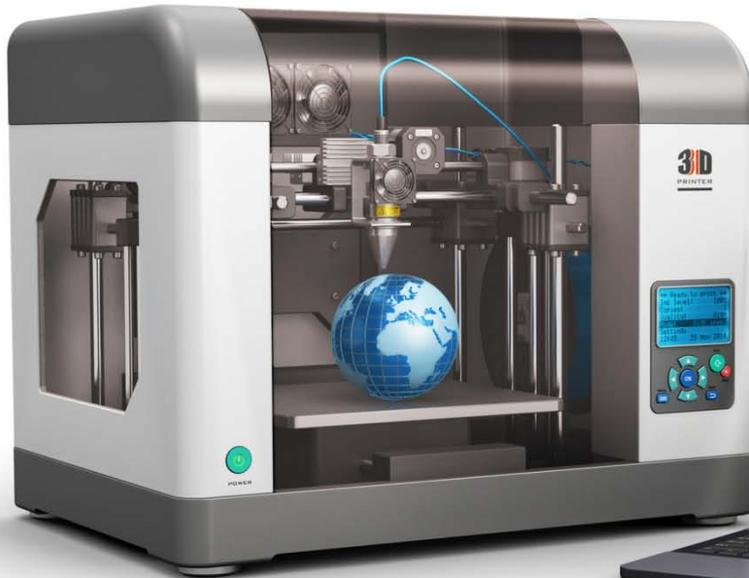


**일관 시스템
(TIA)**

TIA (Totally Integrated Automation)

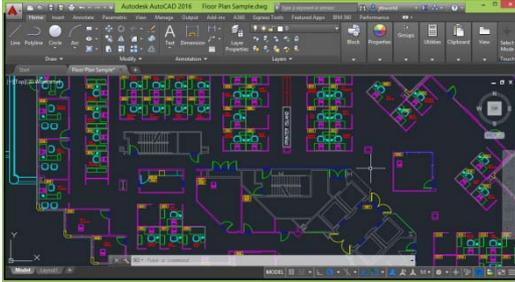
3D 프린팅?

Connected

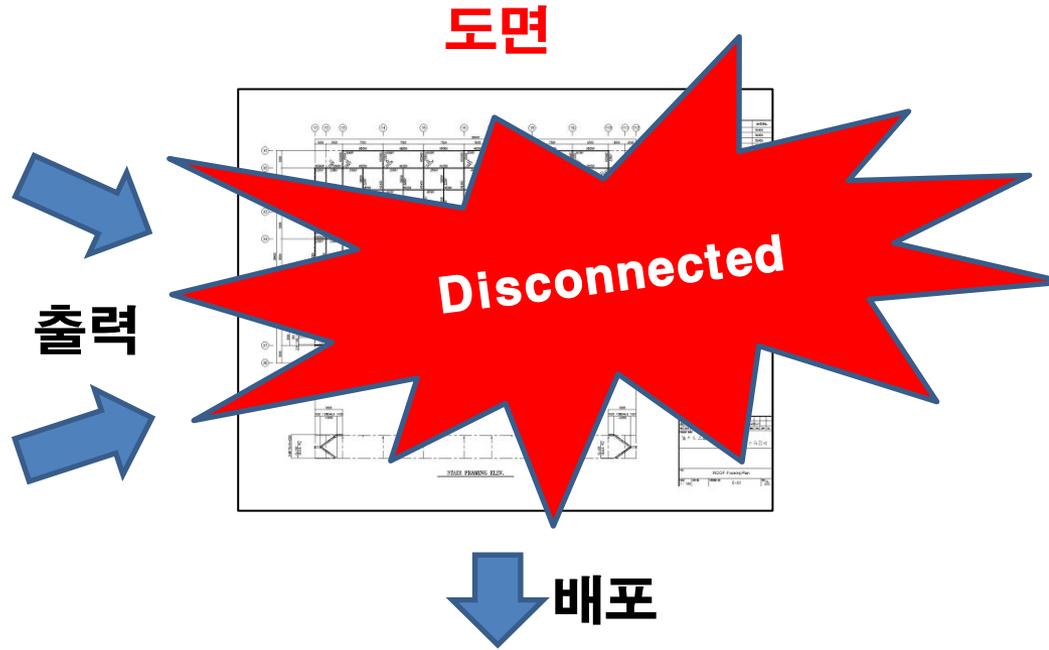
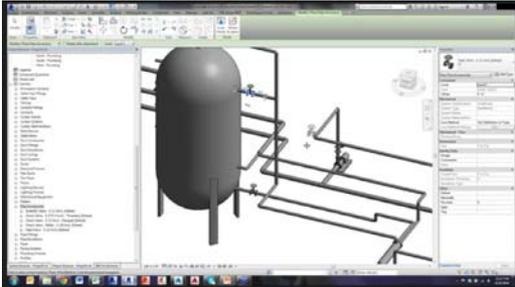


현실?

2D
CAD



3D
CAD



제품화



조선소 현실



기본설계

상세설계

생산설계

생산부

2D 기본도



2D 상세도

견적서



사도



생산정보

3D 생산 Model

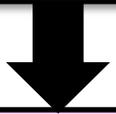


선박제작



NC Data

도면제작



도면



사도

바람직한 조선소

Connected

기본설계

상세설계

생산설계

생산부



개념설계

상세설계

생산정보

작업상황



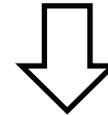
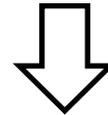
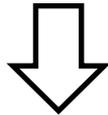
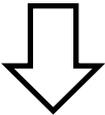
3D 기본 모델

3D 상세 모델

3D 생산 모델

3D View 모델

추출



견적서

승인도

발주물량

종일정 계획

선박제작



Connected CAD System

기본설계

상세설계

생산설계

생산부

T* CAD

3D 생산 모델

3D View 모델

A* CAD

3D 상세 모델

3D 생산 모델

3D View 모델

Timetec TTM CAD

3D 기본 모델

3D 상세 모델

3D 생산 모델

3D View 모델

TTM CAD → Connected

기본설계

상세설계

생산설계

생산부

3D 기본 모델

3D 상세 모델

3D 생산 모델

3D View 모델

ISD

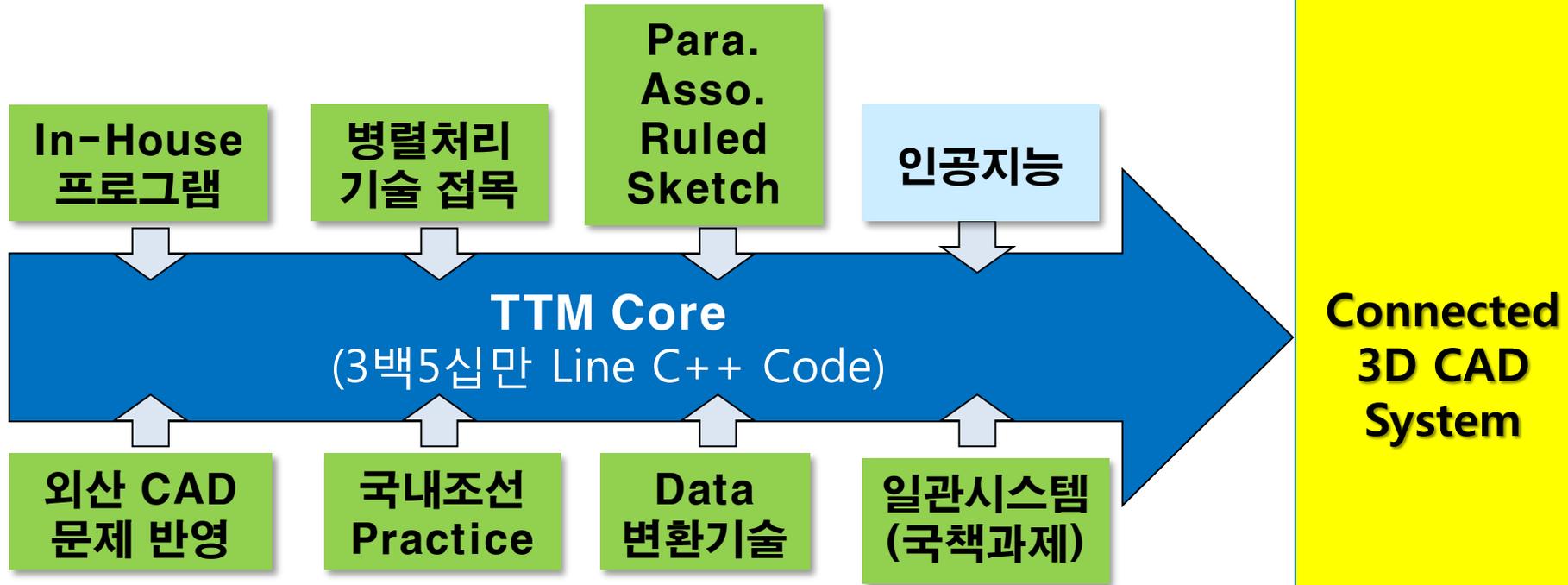
HPD

IOD

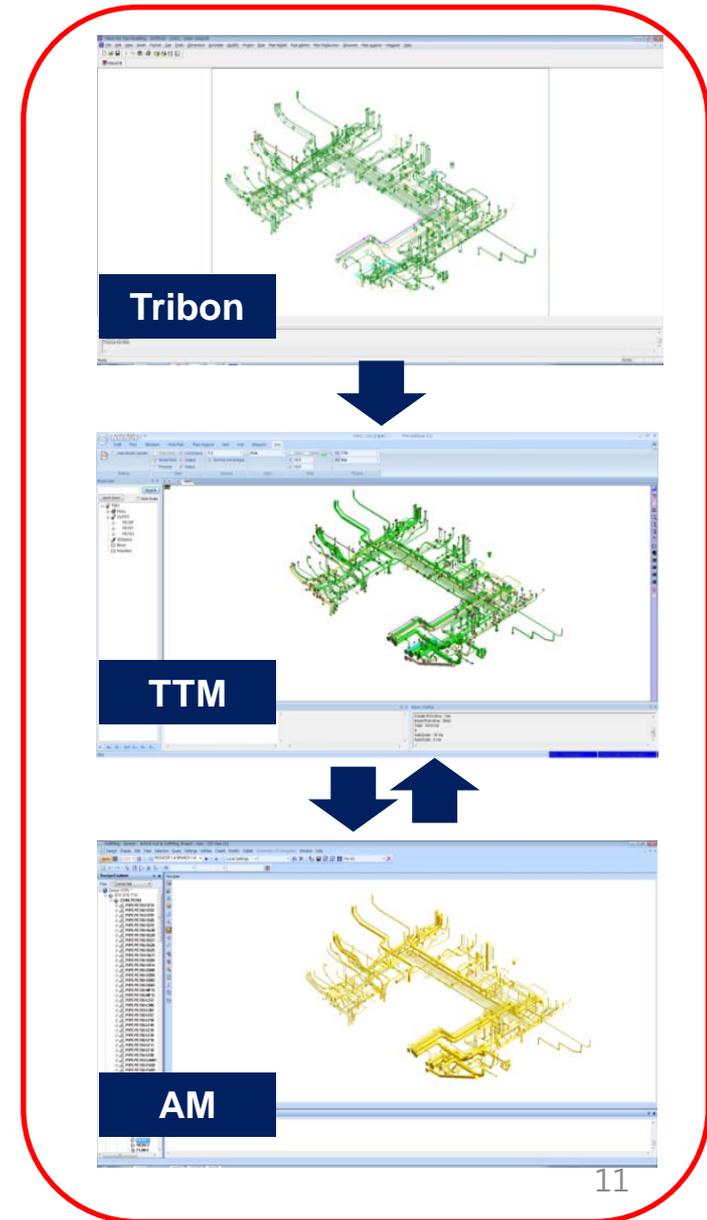
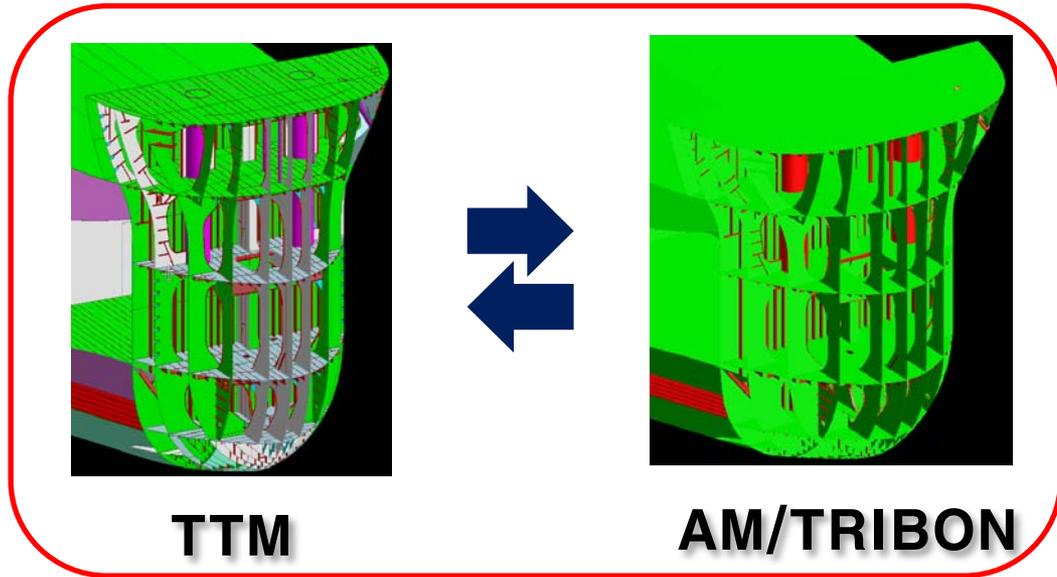
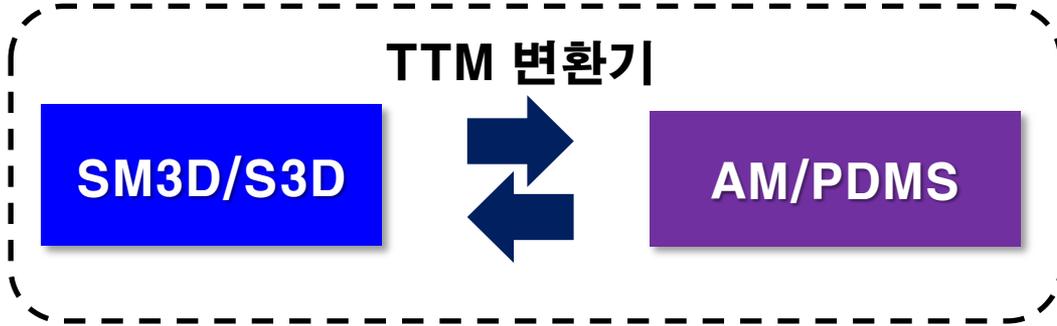
PIPE/STRUC/CABLE
/VENT

VIEW

TTM 방향



CAD Data 변환



Sketch 기반 모델링

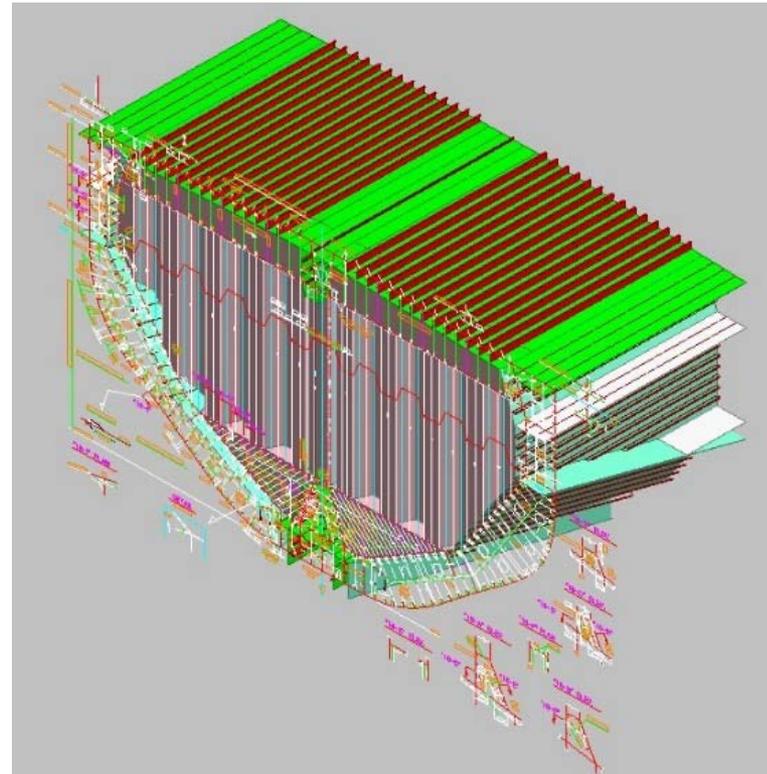
AutoCAD 도면



Import

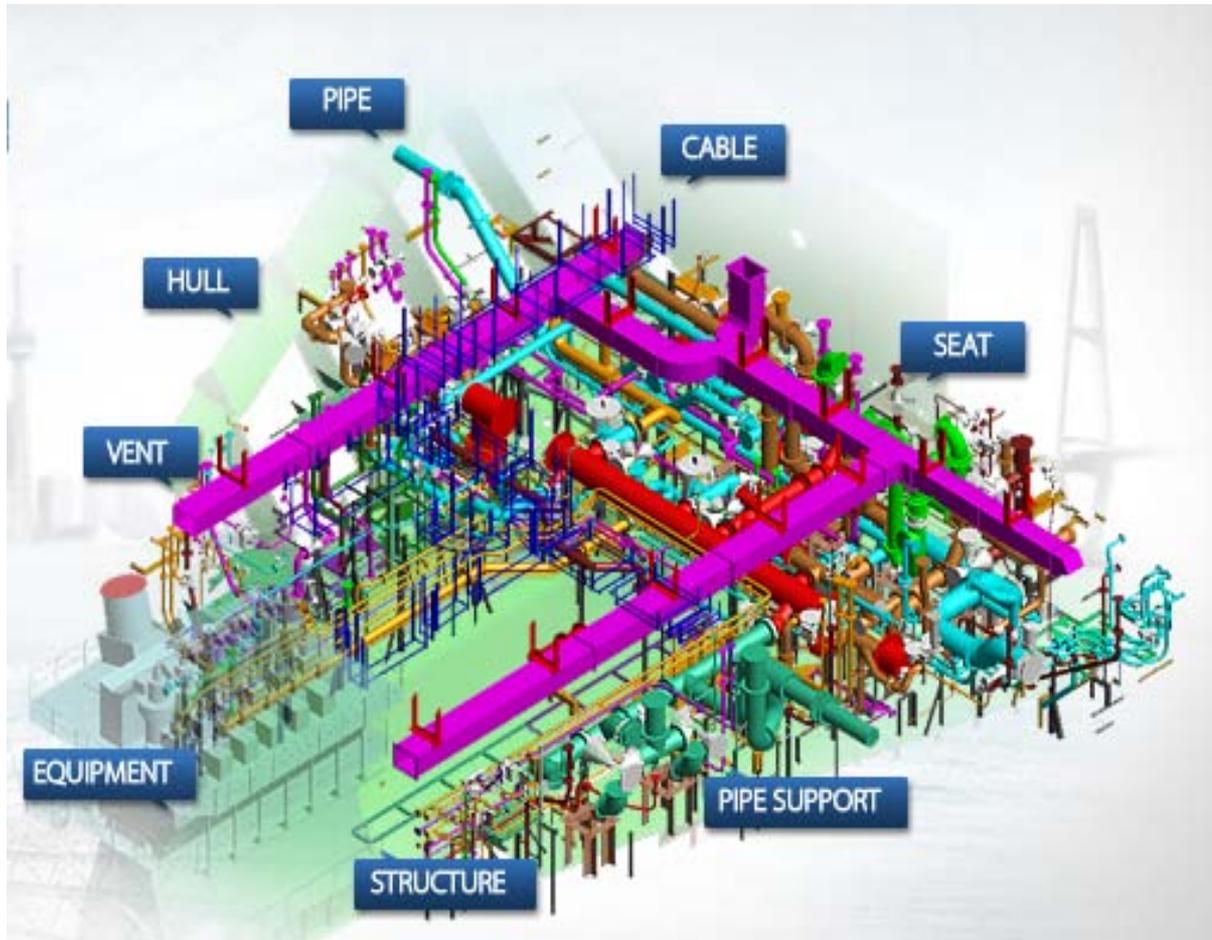


3D Model 환경



2D Section 도면활용 3D Modeling

TTM 철학



- **AEC CAD**

 - ✓ 조선/플랜트
 - ✓ 원자력/건설

- **국산 CAD**

 - ✓ 자체 Kernel
 - ✓ Parametric
 - ✓ Associative
 - ✓ Sketch driven
 - ✓ Ruled driven

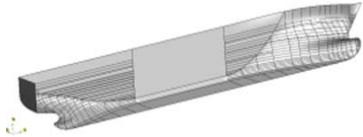
- **Easy CAD**

 - ✓ 일관 시스템
 - ✓ 빠른 속도
 - ✓ 즉시 사용
 - ✓ 편집 설계

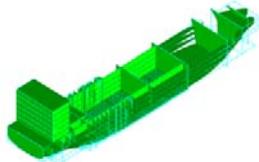
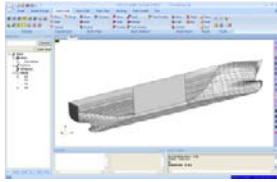
TTM ISD/HPD

FEM

외부 Surface

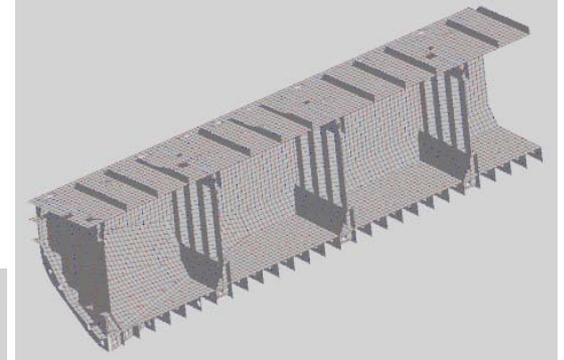
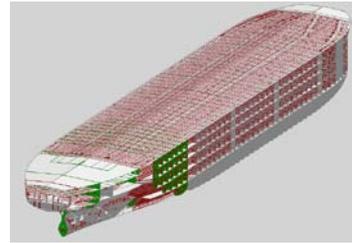


ISD



Surface + Compartment

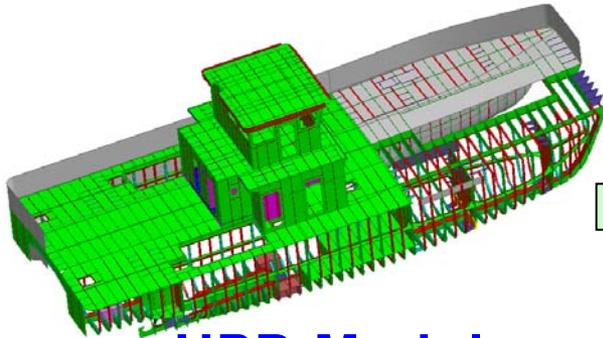
ISD Model



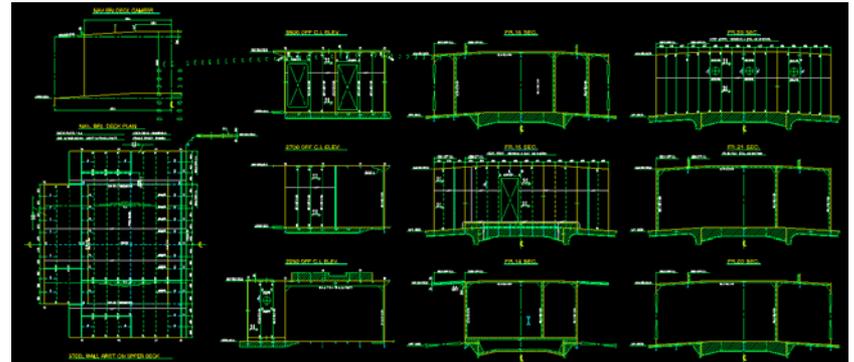
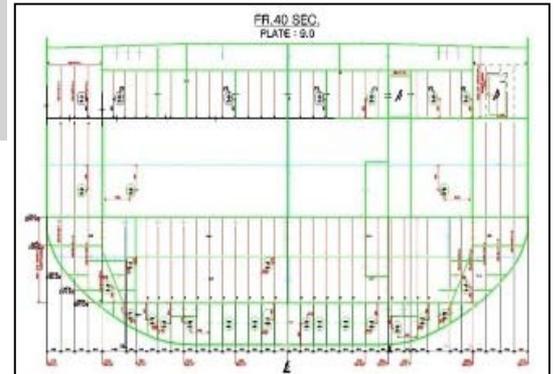
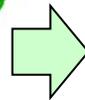
Connected



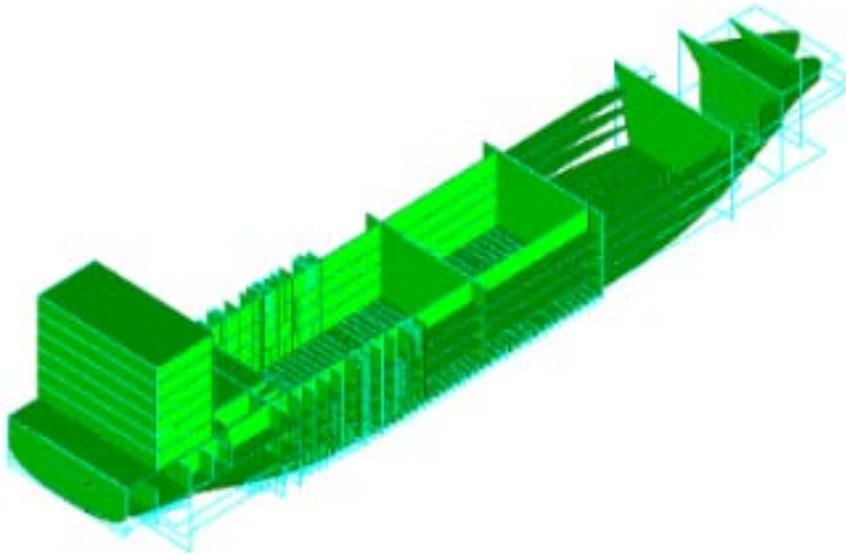
HPD



HPD Model



TTM IOD



Compartment 분할 작업

TANK 용량 검증

- Compartment 검증/수정

2D 기반 MA 작업

- 2D ↔ 3D 양방향 수정)

Auto Routing

- P&ID 연계 Auto Routing
- Ruled Support



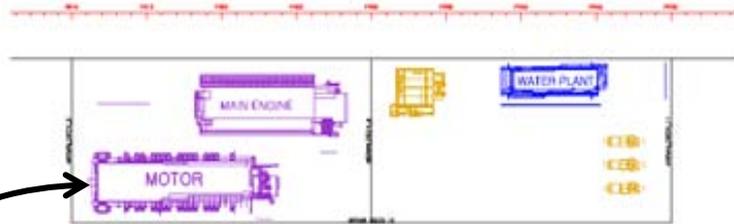
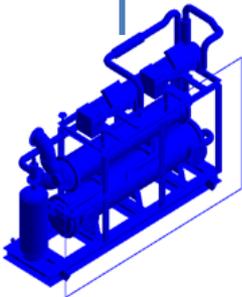
정확하고 빠른 건적 산출

2D 기반 MA 작업

Symbol 형상

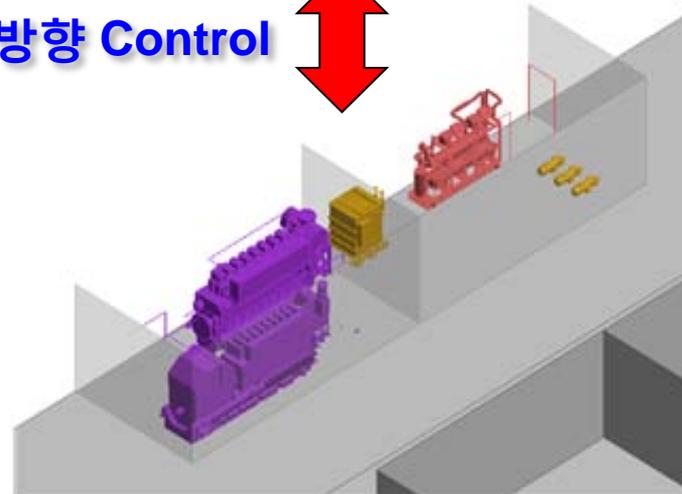


3D Equipment



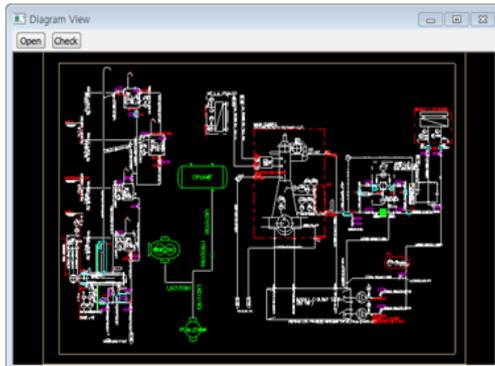
2D PLAN 작업

양방향 Control

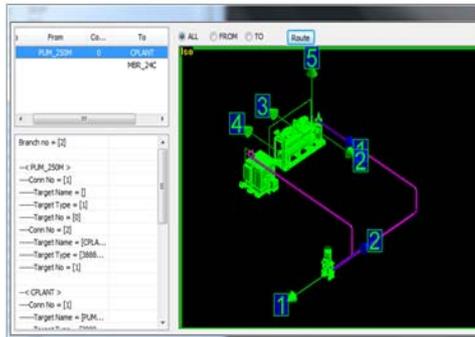
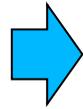


3D Model

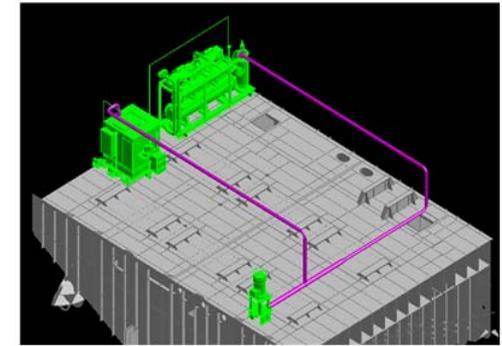
Auto Routing



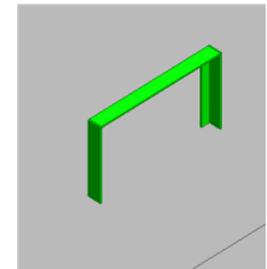
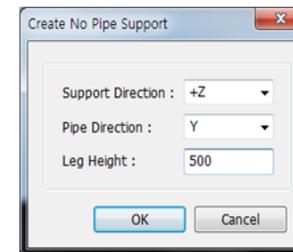
P&ID



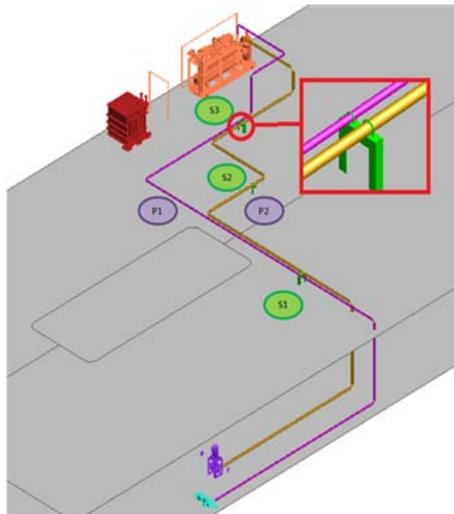
Preview Dialog



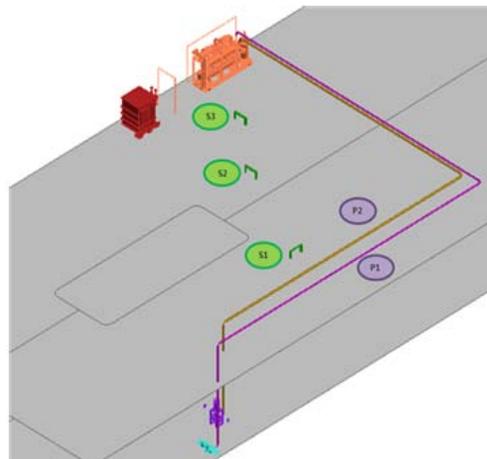
Auto Route



**Routing Path
(Ruled Support)**



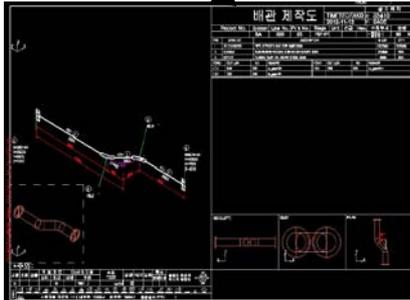
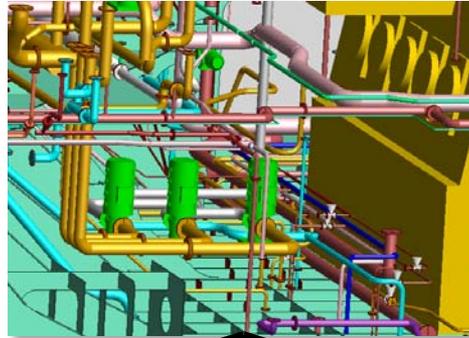
Pipe Re-Route



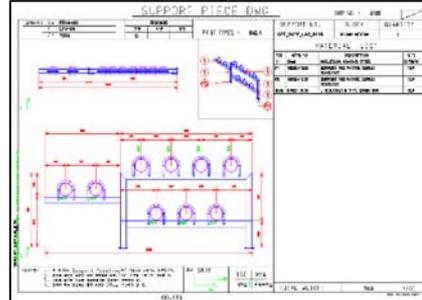
Support 생성



TTM PIPE



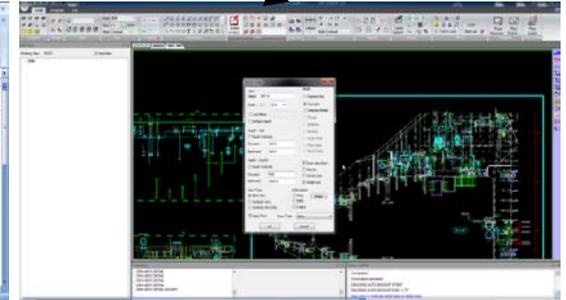
PIPE 제작도



Support 제작도

NO	DE. NO.	MATERIAL	QTY	WEIGHT	REMARK
1	PIPE	PIPE ALUMINUM 304 100 DIA 10000	14.30	81.15kg	
2	FLANGE	FLANGE ALUMINUM 304 100 DIA 100	1.00	0.15kg	
3	PENETRATOR	PENETRATOR ALUMINUM 304 100 DIA 100	1.00	0.15kg	

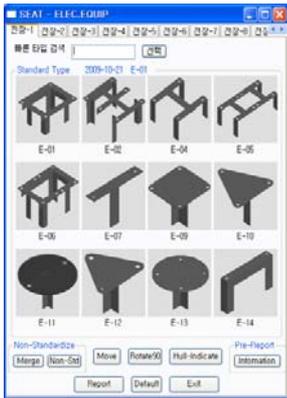
BOM



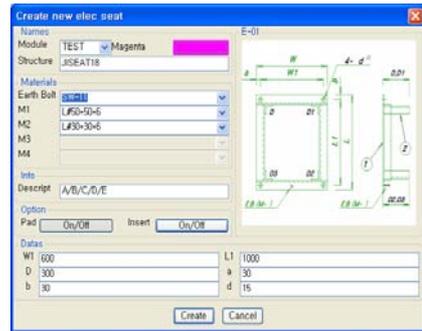
배관 설치도

TTM STRUCTURE

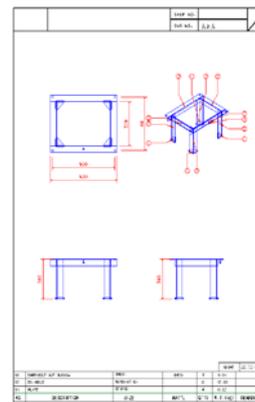
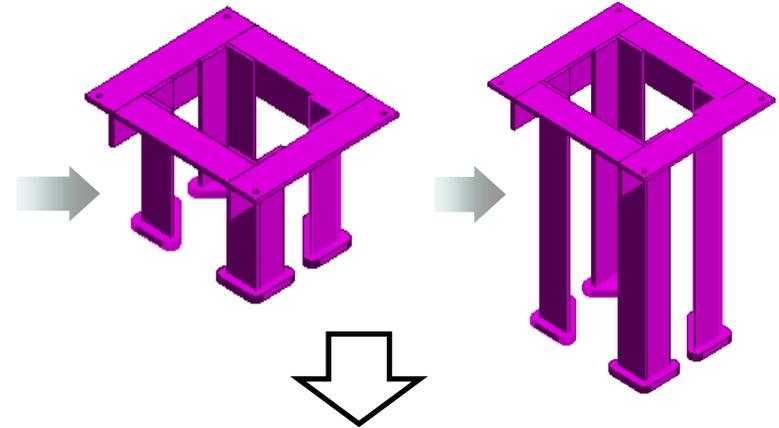
Type선택



Parameter 입력



Parametric



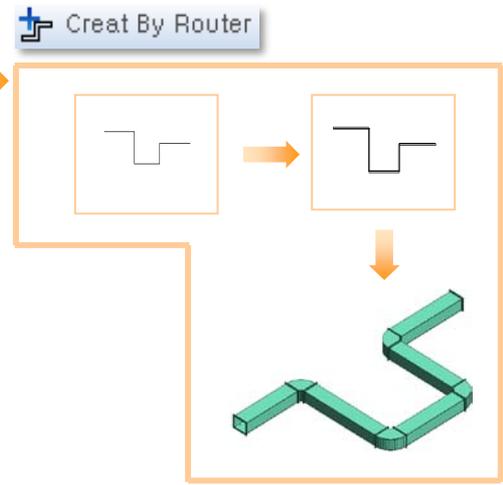
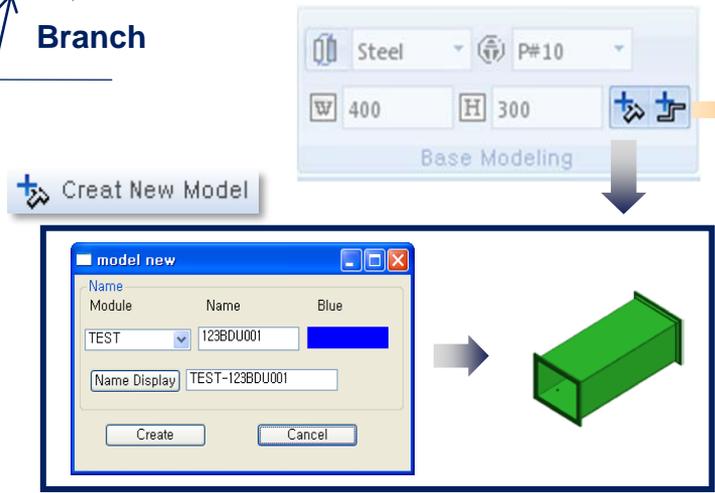
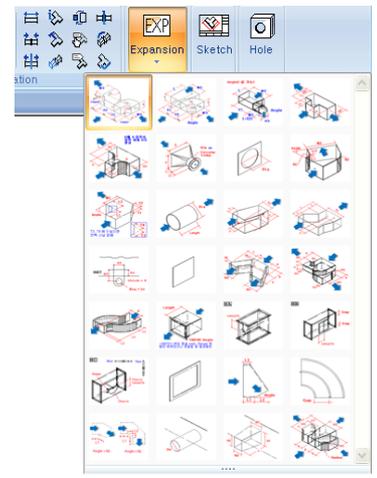
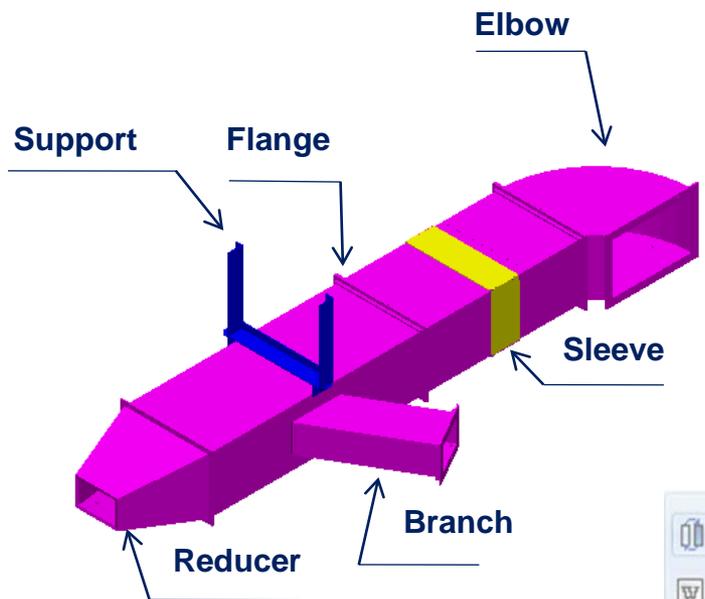
제작도

설치 자재 목록표

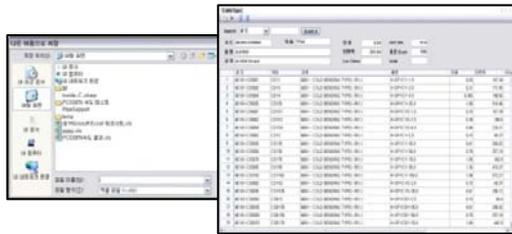
PROJ.NO	STAGE (BLOCK)	작업내용	도면번호	REV.	작성일자	작성자																	
-	-	ELEC EQUIP FOR SEAT	AAA	-	2009-04-03	-																	
NO	CODE NO.	SEAT NO.	SEAT TYPE	DESCRIPTION	UNIT	MAK	ER	SEAT DIMENSION (MM)				MATERIAL	WEIGHT (KG)										
					CO	NO.		W1	W	D	L1	L	b	c	a1	EE	1	2	3	(TOTAL)			
1	-	LY51	E-01	-				500	530	15	400	430	14	200	13	-	SHAW	3	0	-	11	22.7	
2	-	LY53	E-02	-				400	440	20	200	430	15	100	10	-	C	C	-	1	6.6		
3	-	LY55	N8-S	-				-	-	-	-	-	-	205	10	-	C	-	-	1	2.4		
4	-	LY56	2E-20	-				-	-	-	900	-	-	-	-	-	SHAW	C	-	-	1	17.5	
5	-	LY57	2E-20	-				500	530	15	100	130	15	50	5	-	C	-	-	1	17.6		
6	-	LY58	2E-27	-				-	-	-	-	-	-	500	-	-	SHAW	I	K	-	1	44.0	
7																							
8																							
9																							
10																							
11																							
12																							
13																							
14																							
15																							
TOTAL																	6	110.6					
NO	DESCRIPTION	WT(KGM)	NO	DESCRIPTION	WT(KGM)	NO	DESCRIPTION	WT(KGM)															
A	38 x 4T FLAT BAR	1.79	D	100 x 100 x 10T EQUAL ANGLE	14.9	M	SPP 6SA	5.34															
E	50 x 5T FLAT BAR	2.36	H	4.5T STEEL PLATE	35.4	N	SPP 6SA	8.49															
C	40 x 40 x 4T EQUAL ANGLE	2.95	I	6T STEEL PLATE	47.1	O	19 ROUND BAR	1.58															
D	50 x 50 x 5T EQUAL ANGLE	4.43	J	SPP_32A	3.47	P	19 ROUND BAR	2.22															
E	65 x 65 x 5T EQUAL ANGLE	5.91	K	SPP_40A	4.1	Q	22 ROUND BAR	2.98															
F	75 x 75 x 5T EQUAL ANGLE	8.85	L	SPP_50A	5.42	R	100 x 75 x 10R UA	13															

BOM

TTM VENT



TTM CABLE

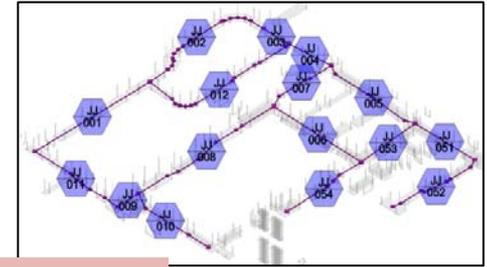
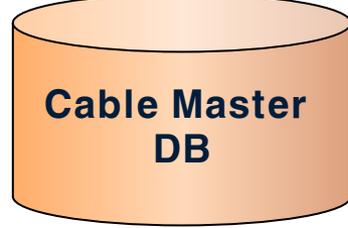
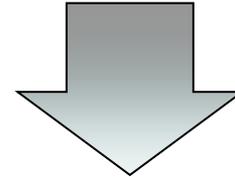


CABLE MANAGER

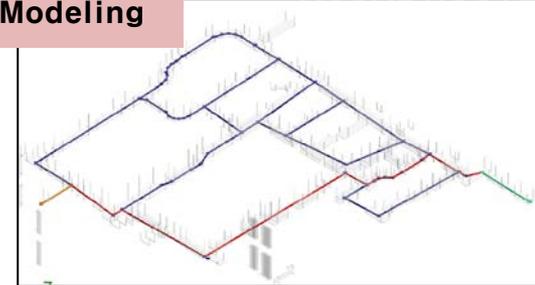
Cable Schedule

NO	REVISION	SYSTEM	CABLE NAME	FROM EQUIP	TO EQUIP	LENGTH	Equipment
1	0	0	320H-SPIC-4B	B.C.C.	ACR07	3X-BAND RADAR	ACR08
2	0	0	320H-SPIC-1B	B.C.C.	ACR08	3DOPS NAVIGATOR	ACR09
3	0	0	320H-SPIC-4B	B.C.C.	ACR09	3X-BAND LI	ACR10
4	0	0	320H-SPIC-01	MA-B-LI	ACR10	4-NO.1 GEN. TB	ACR11
5	0	0	320H-SPIC-01	B.C.C.	ACR11	3P-JB-EMCY	ACR12
6	0	0	320H-SPIC-01	P-JB-EMCY	ACR12	3NO.1 GEN. TB	ACR13
7	0	0	320H-SPIC-4B	B.C.C.	ACR13	3X-BAND LI	ACR14
8	0	0	320H-SPIC-4B	MA-B-LI	ACR14	4-E.C.C.	ACR15
9	0	0	320H-SPIC-4B	B.C.C.	ACR15	3-E.P. TELEGRAPHICAL	ACR16
10	0	0	MSTR-MFPCS-1B	B.C.C.	ACR16	3X-BAND LI	ACR17

CABLE DIAGRAM



VISUAL ROUTER



Cable way/Tray
Modeling
Equipment Modeling

Single Routing
Multiple Routing

Ship : S2031 Cable List

S2031호선 Cable 소요량 Report

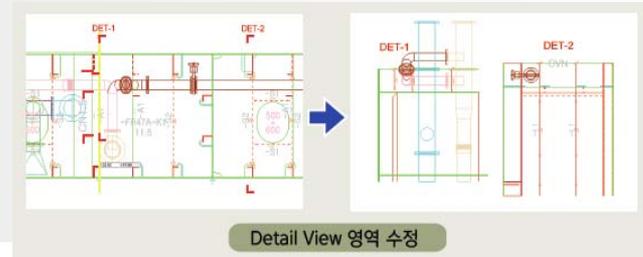
No	Cable	Type	From Equipment	To Equipment	Unit	Qty	Unit	Qty
1	320H-SPIC-4B	B.C.C.	ACR07	ACR08	3X-BAND RADAR	1	3X-BAND RADAR	1
2	320H-SPIC-1B	B.C.C.	ACR08	ACR09	3DOPS NAVIGATOR	1	3DOPS NAVIGATOR	1
3	320H-SPIC-4B	B.C.C.	ACR09	ACR10	3X-BAND LI	1	3X-BAND LI	1
4	320H-SPIC-01	MA-B-LI	ACR10	ACR11	4-NO.1 GEN. TB	1	4-NO.1 GEN. TB	1
5	320H-SPIC-01	B.C.C.	ACR11	ACR12	3P-JB-EMCY	1	3P-JB-EMCY	1
6	320H-SPIC-01	P-JB-EMCY	ACR12	ACR13	3NO.1 GEN. TB	1	3NO.1 GEN. TB	1
7	320H-SPIC-4B	B.C.C.	ACR13	ACR14	3X-BAND LI	1	3X-BAND LI	1
8	320H-SPIC-4B	MA-B-LI	ACR14	ACR15	4-E.C.C.	1	4-E.C.C.	1
9	320H-SPIC-4B	B.C.C.	ACR15	ACR16	3-E.P. TELEGRAPHICAL	1	3-E.P. TELEGRAPHICAL	1
10	MSTR-MFPCS-1B	B.C.C.	ACR16	ACR17	3X-BAND LI	1	3X-BAND LI	1

Cable List
포설 Deck Report
Cable 소요량 Report
전로 폭 산출 Report

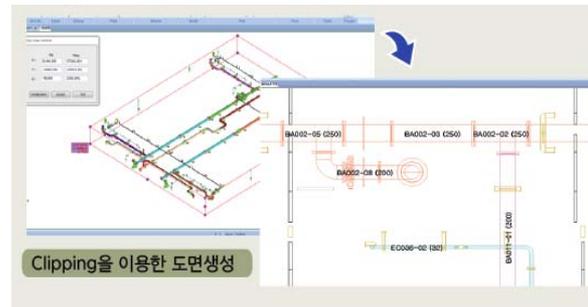
TTM DRAFT

주요 특징

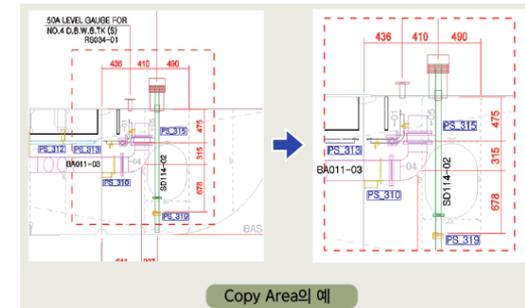
- AUTOCAD와 유사한 직관적인 Geometry 생성 수정
- 3D Model의 2D 도면화를 위한 기능 최적화
 - Wire Frame View 생성 : Sliced View, Symbolic View
 - 고품질 Hidden Line Removal
 - 우수한 Detail View 및 Area Copy 기능
 - Associative Dimension & Label
 - Pipe/Cable 등 설치도 작성 기능
- MDI : 여러 도면 동시 편집
- 화면 분할 및 Floating Window 지원
- DXF/DWG file import & Export
- Undo/Redo & Crash Save
- Excel, Word, Bitmap 등의 Copy & Paste
- PDF file 생성기능



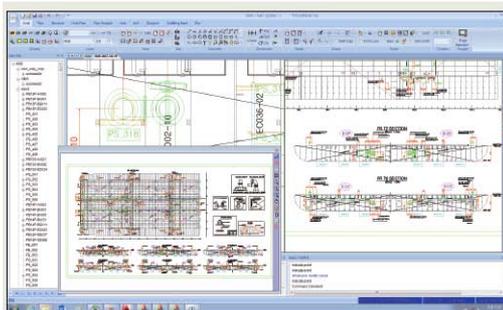
Detail View 영역 수정



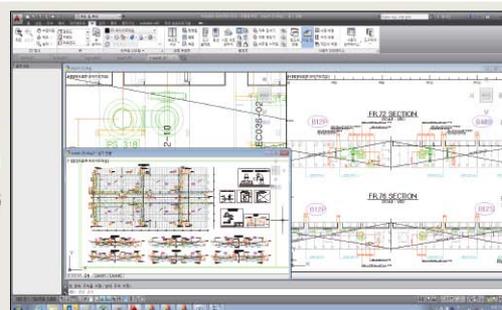
Clipping을 이용한 도면생성



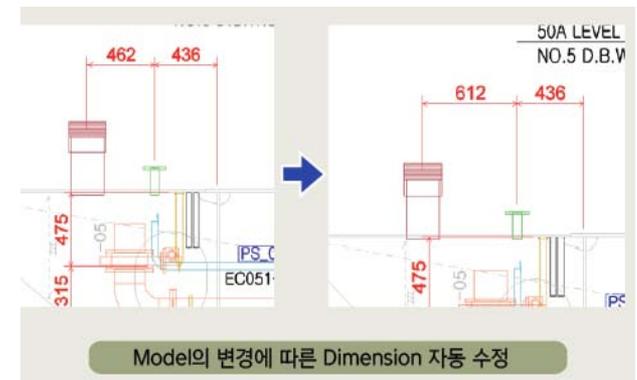
Copy Area의 예



TTM Draft (화면 분할/Floating window)



TTM에서 생성된 DWG File을 AUTOCAD에서 Open



Model의 변경에 따른 Dimension 자동 수정

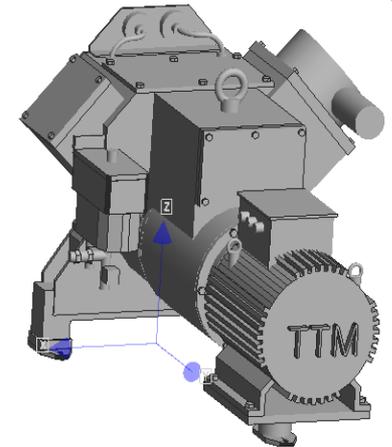
TTM VOLUME

Volume 생성

- 주요 형상의 Primitive로 제공
- Hole 생성 등 Structure 기능 상속으로 보다 쉽게 정교한 Volume 생성 가능
- Template : 하나의 Volume Template 로 다른 Size의 Volume으로 사용

Modify

- Copy, Transform 등의 수정작업
- Snap기능을 이용한 Transform
- Parametric 수정
- Undo/Redo 기능 제공



Pipe
Cylinder
Cone
Torus
General Cylinder
Rotate Cylinder
Text3D
Bar

Primitive

Copy **Mirror Copy** **Transform**

Snap Transform

Modify

VALVE-TEST

General
Material No :
Material Code :
Weight : 0.00
Description :
Template : Template 1/1
Name : VALVE-TEST 08
Detail level : 1

Connection Data

	Conn1	Conn2	Conn3	Conn4
Pipe Dia				
Nom Dia				
Out Dia				
Thickness				

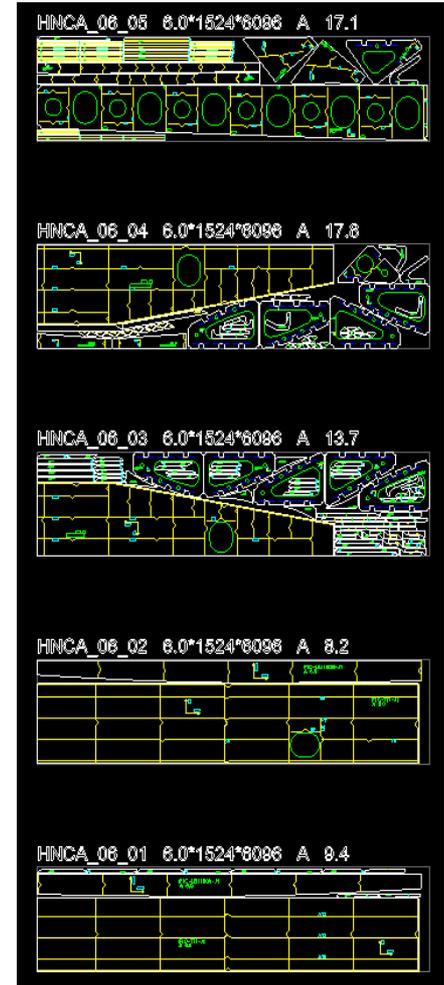
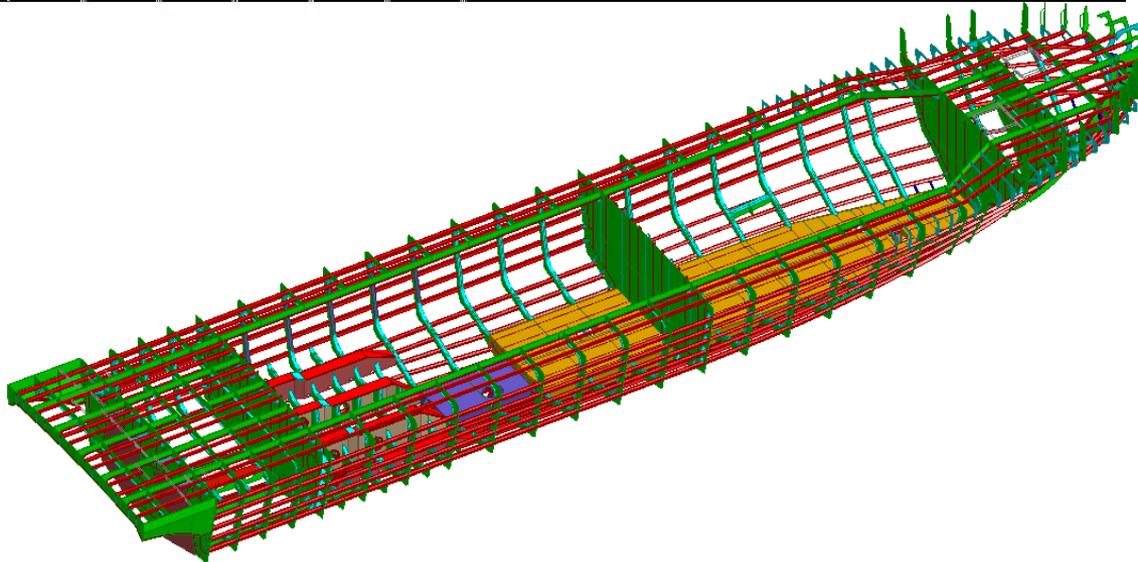
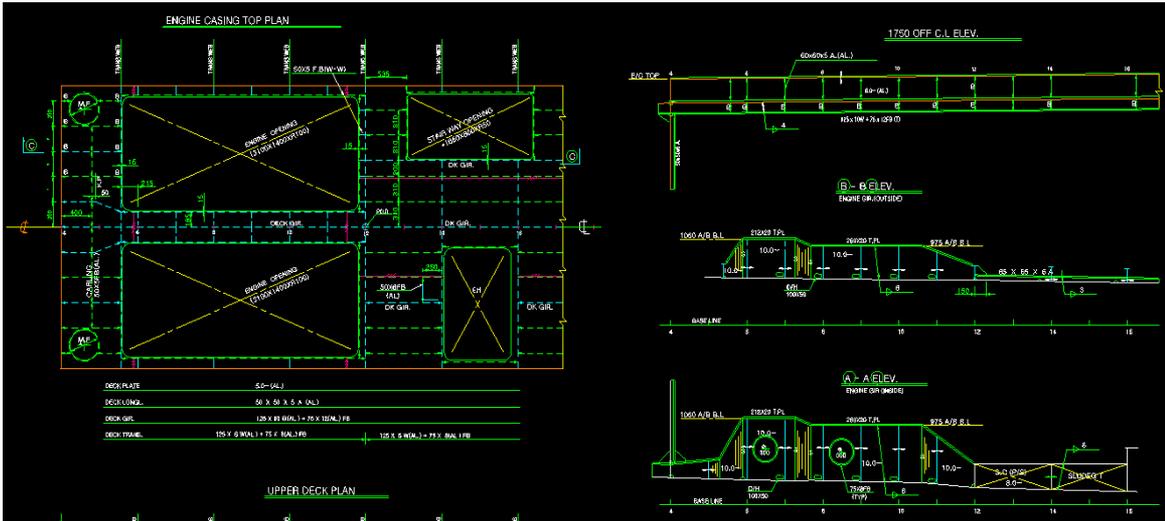
Sketch :
Parameter
L1: 200.000 L2: 200.000
A: 200.000 B: 200.000 C: 150.000

Pipe Ref

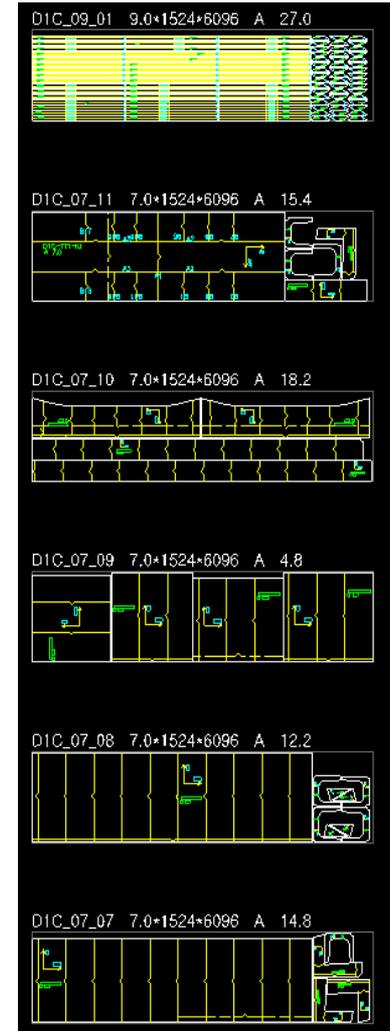
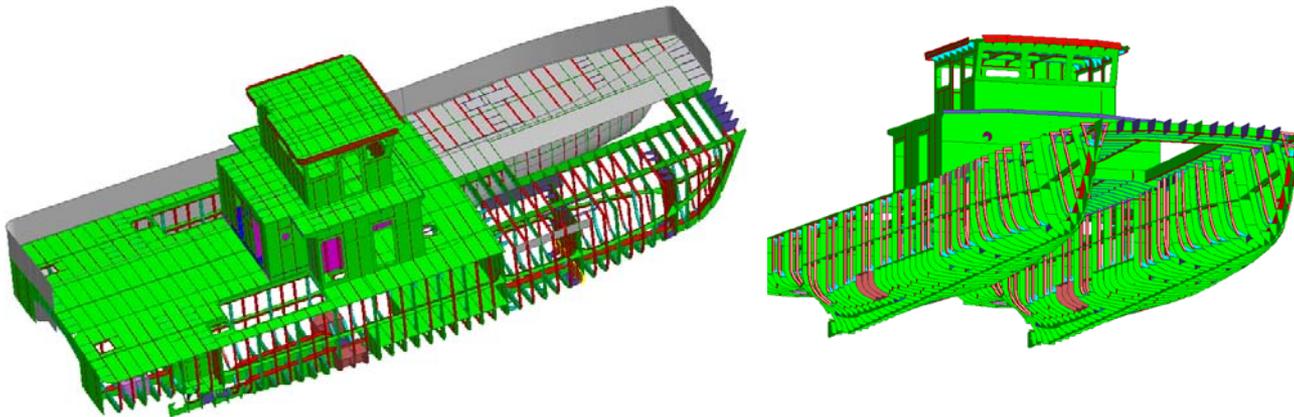
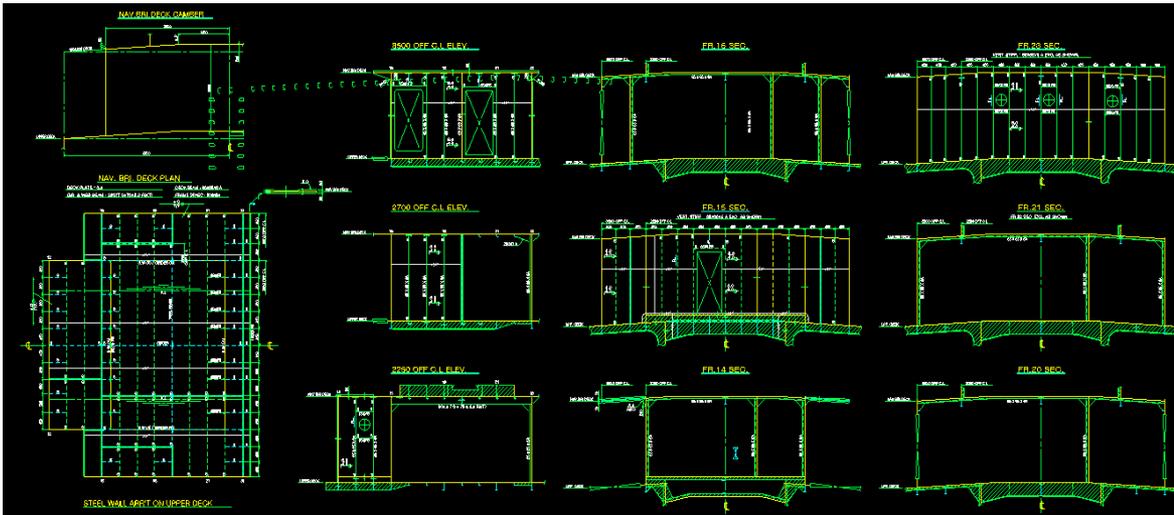
Save Cancel

TTM Component

TTM 적용 사례 – 어업 지도선

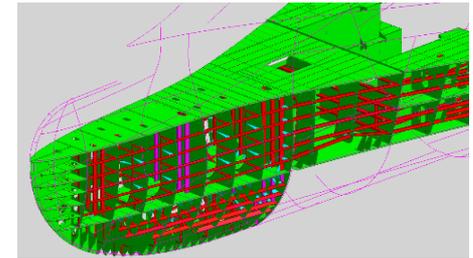


TTM 적용 사례 – 해상 방제선



TTM 개발 의의

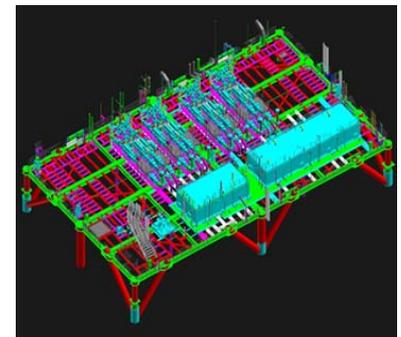
- **기술 독립**
 - 조선 세계 1위에 맞는 CAD 국산화
 - AEC 분야 적용 확대
- **조선/플랜트 경쟁력 강화**
 - 생산 비용 절감(30% 설계 생산성 향상)
 - 중소 조선소 경쟁력 강화
- **외화 절약**
 - 조선소 연간 500억원 외화 유출 방지
 - TTM으로 교체, 자금 국내 유보
 - 외산 CAD 독과점 개선 및 조건 개선



조선



해양/플랜트/발전/건설



회사 소개

❖ 회사 개요

- ✓ (주) 타임텍 (Timetec)
- ✓ 2003년 설립 벤처 회사
- ✓ 부산시 해운대구 우동 CSP빌딩 16층



- ✓ 10년간 조선/플랜트용 3D CAD TTM 개발
- ✓ 2025년 세계 1위 CAD 개발사 목표
- ✓ 한국, 일본, 중국 시장점유율 50% 목표



Thank You!