

FEGATE FOR SHIP

Raonx Solutions(주)

CONTENTS

- 개발 배경, 목적
- GUI & HOTKEY
- Fine mesh
- Functions
- Script를 이용한 하중 생성
- Script를 이용한 Result combine
- 보고서
- POST

개발 배경

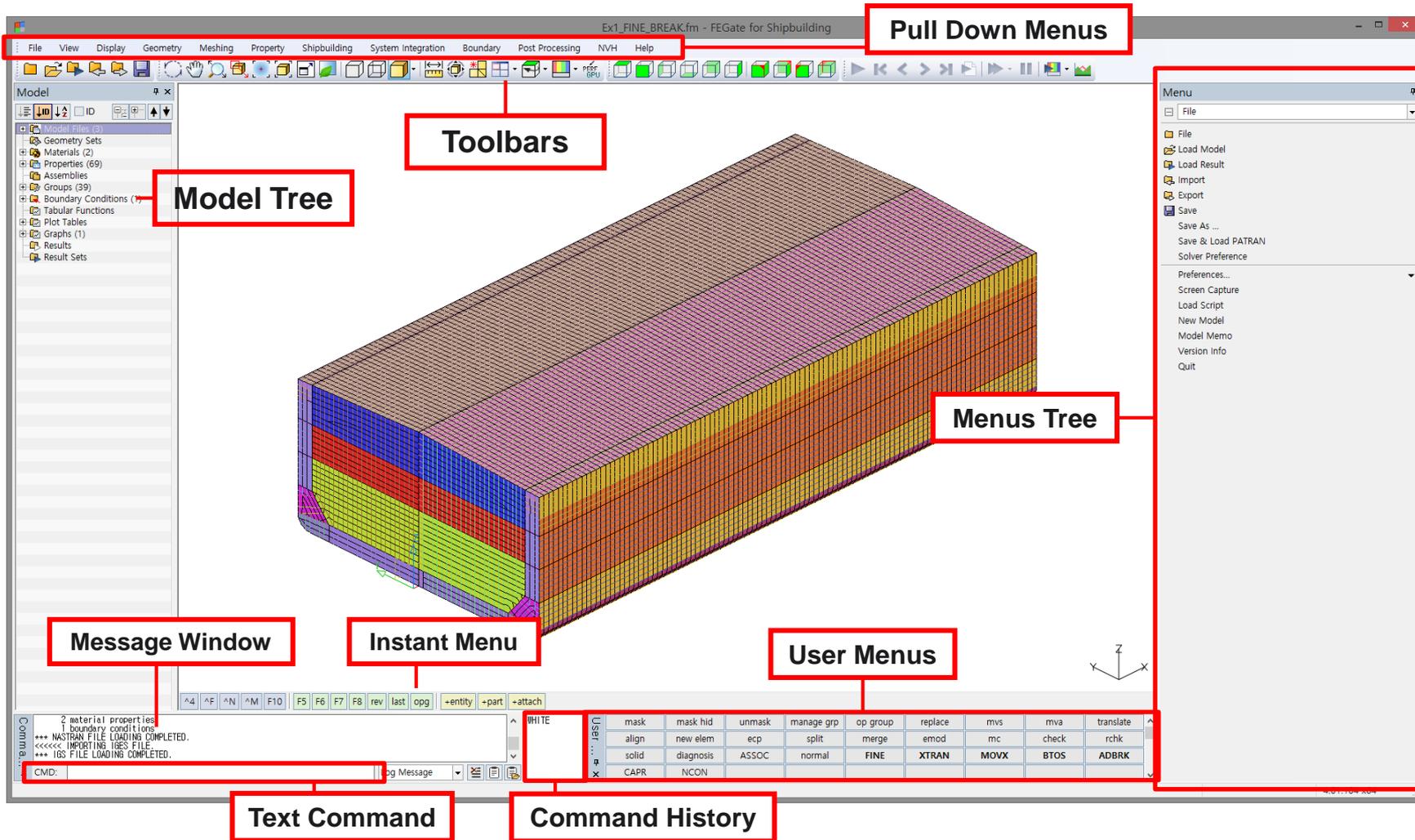
- ※ 급변하는 Pre/Post processor 시장에서 조선분야에서 주로 사용하는 MSC.Patran을 뛰어 넘을 프로그램의 요구가 급증함
- ※ CSRH에서는 더 많은 관심영역 요구에 따라 많은시수증가 예상
- ※ 수백만 개의 요소를 원활하게 작업할 수 있는 프로그램이 필요
- ※ FEGate for ship은 RaonX 와 SVD가 공동으로 개발한 조선 전용 Pre/Post Processor
- ※ 조선분야의 해석 업무에 요구되는 기능 및 해석 기술을 집약하고, 자동화 하여 FEGate For ship 개발
- ※ Raonx만의 조선분야 특화 기능 노하우 접목

개발 목적

- ※ 더 빠르고 더 간편하게 구조해석을 수행
- ※ 다양한 자동화 기능을 통하여 시수 절감
- ※ 수백만 개의 요소를 원활하게 컨트롤 가능
- ※ 고객의 Needs 반영

GUI & HOTKEY

GUI



ICON

✦ 처음 사용자를 위한 Icon

Instant menu / picking



Geo



Mesh



Material, Property

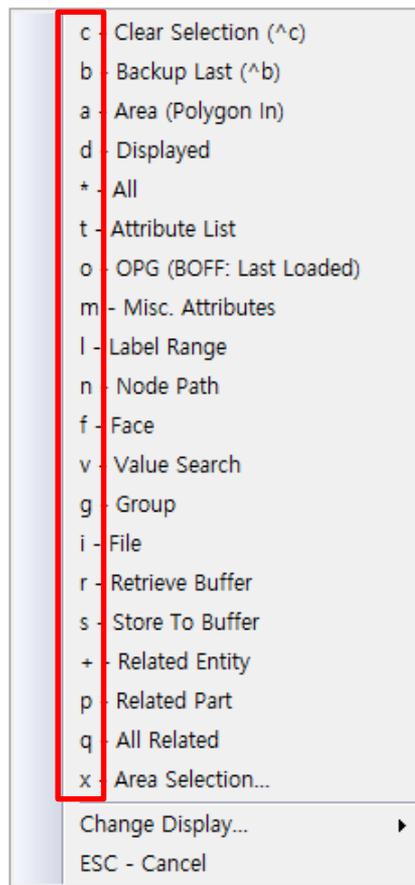
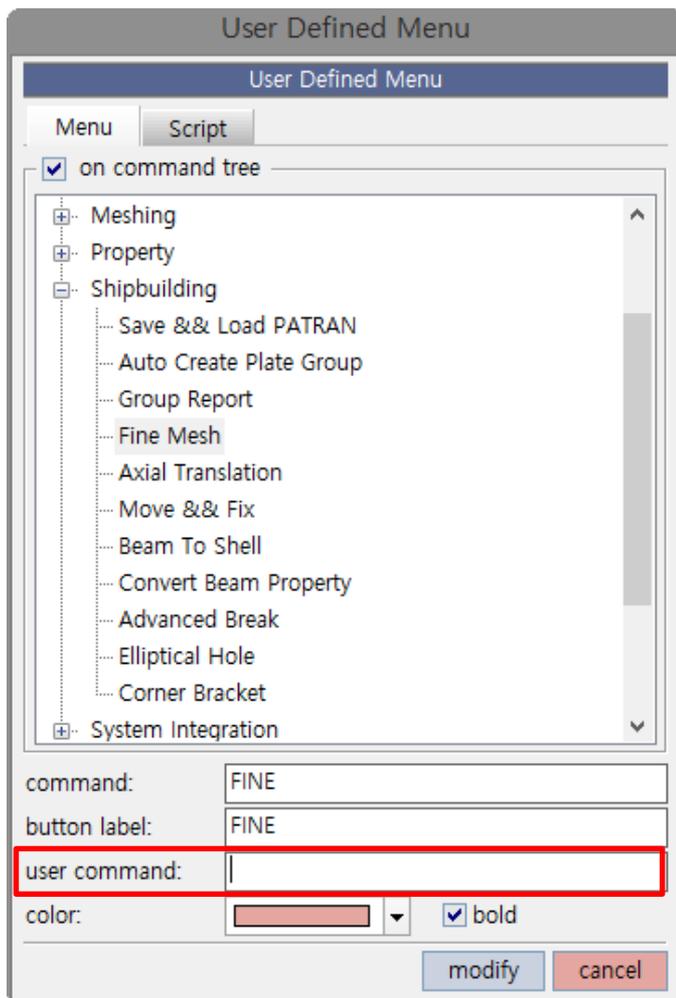


Shipbuilding



HOTKEY

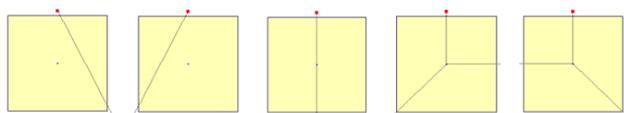
- ✧ 대부분의 기능에 Command 및 Hotkey 존재



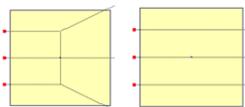
FINE MESH

ADVANCED BREAK (ADBRK)

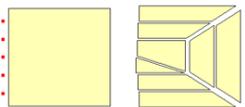
- ❖ 자동으로 Node 검색
- ❖ 위치와 개수 파악하여 분할



Node = 1



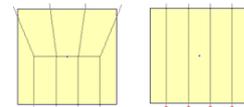
Node = 3



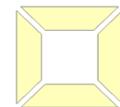
Node = 5



Node = 2



Node = 4



Quad Hole

Advanced Break

break mode

at node lies on edge

equal division (create node)

auto select edge

keep pressure bc

break type

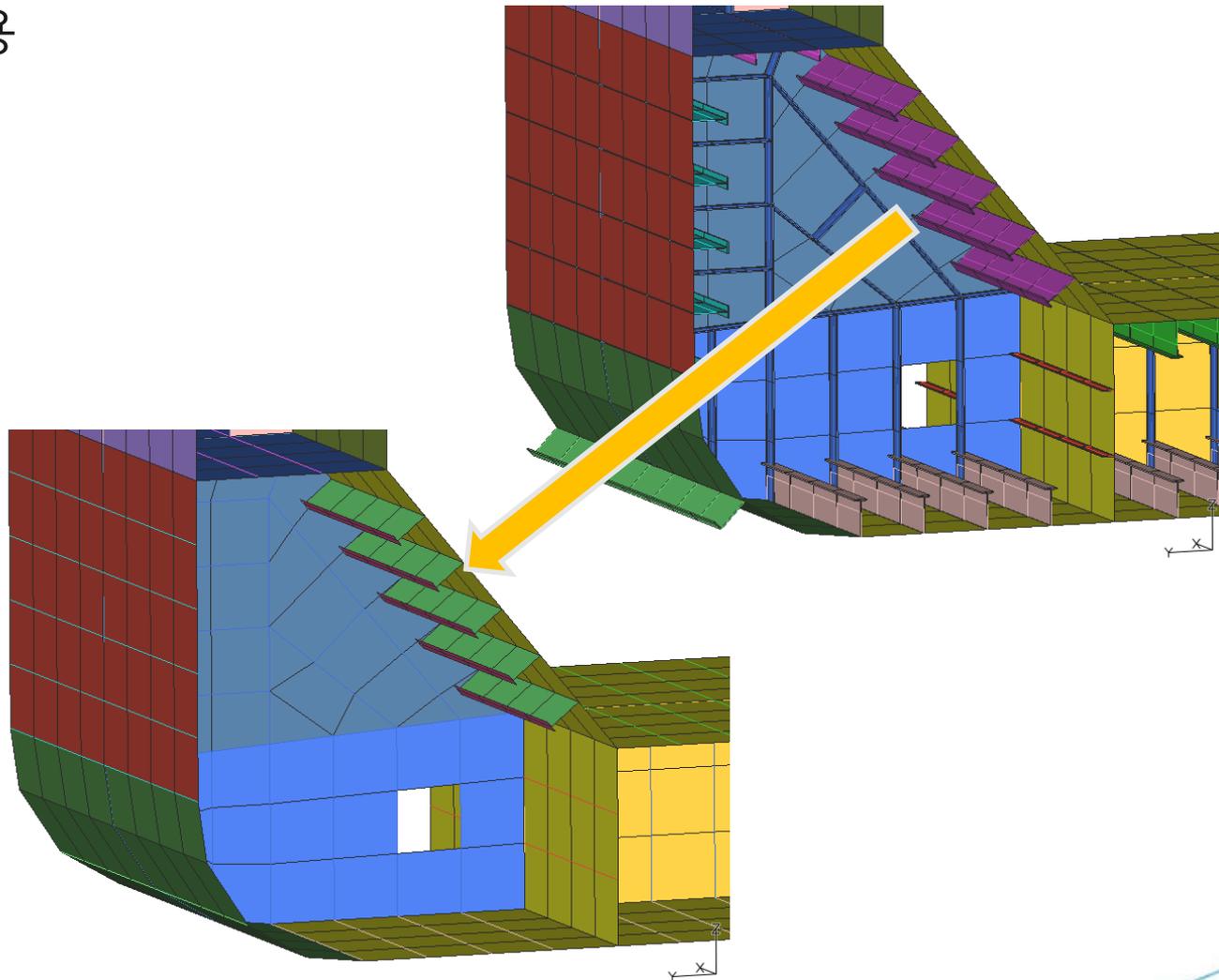
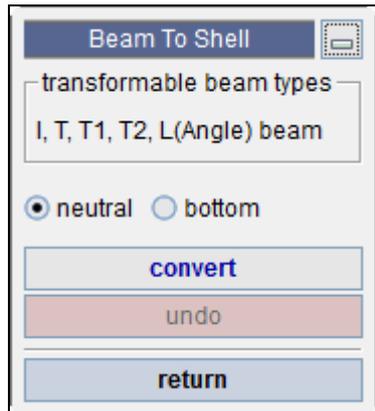
AUTO

reset undo

split element... merge element...

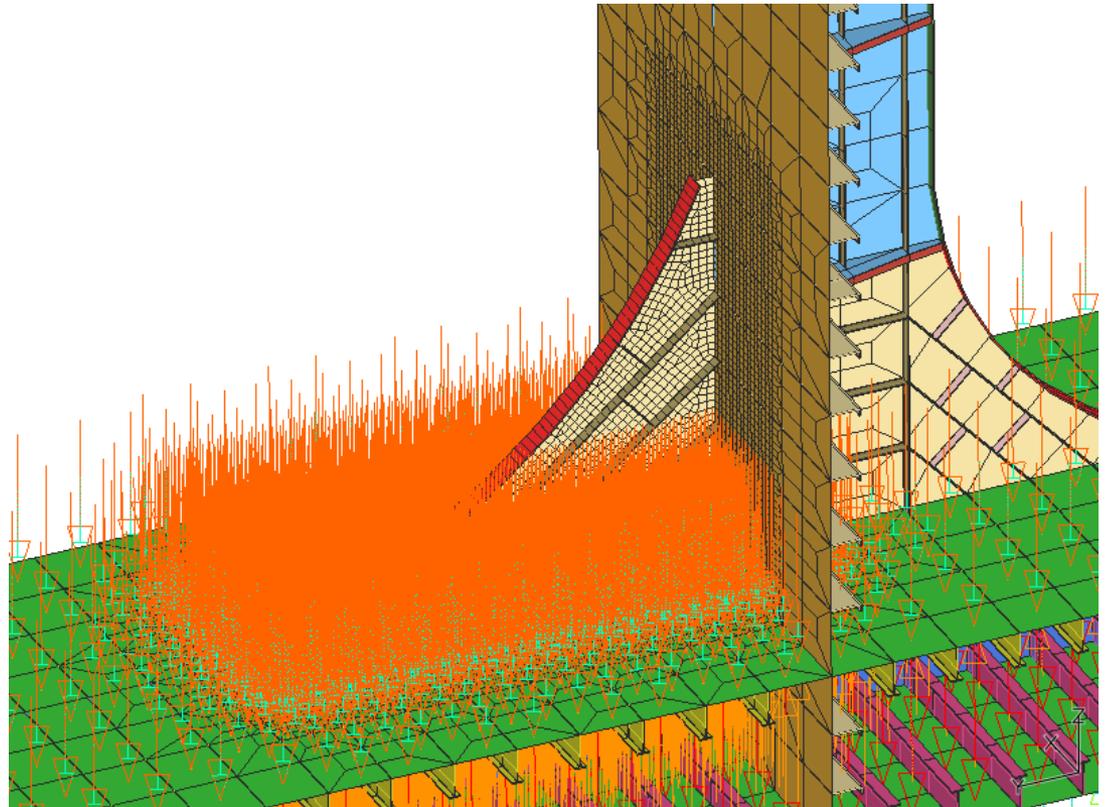
BEAM TO SHELL (BTOS)

- ❖ 1D – 2D 요소 변경
- ❖ Property 자동 적용



FINE MESH (FINE)

- ❖ 사용자 정의 Size로 분할
- ❖ Mesh quality 향상



MAKE CORNER BRACKET (COBR)

- ✦ 3point로 Corner bracket 생성 가능

Make Corner Bracket

instruction

Make corner bracket using 3 points

radius: 3000.0

toe A: 50

toe B: 50

mesh size: 100

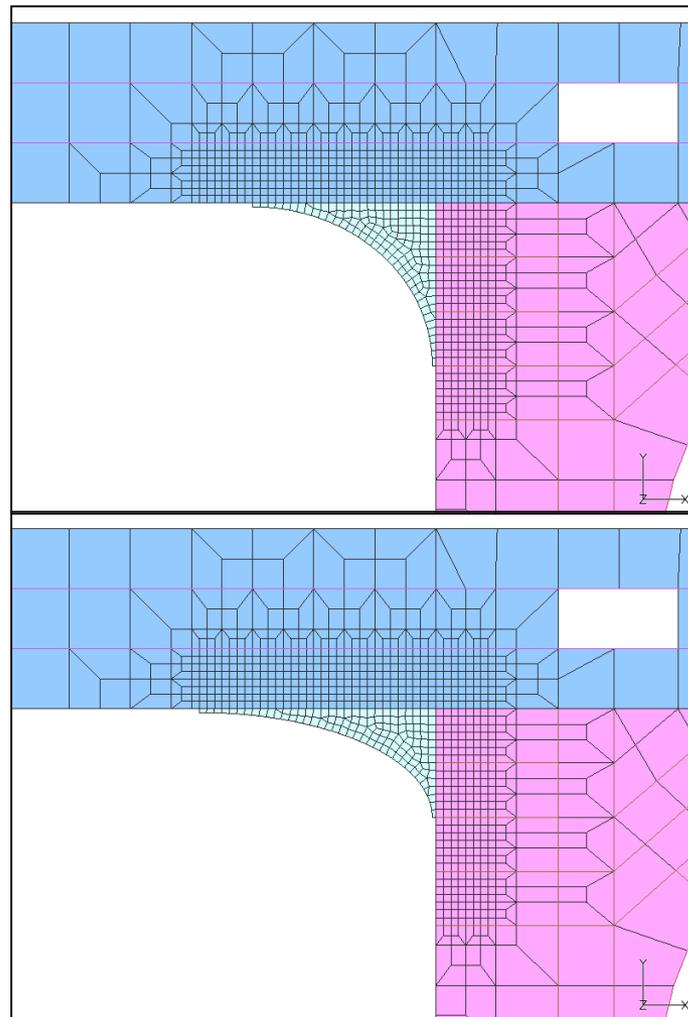
shell property

2: 12.0_T

create edge 1D beam

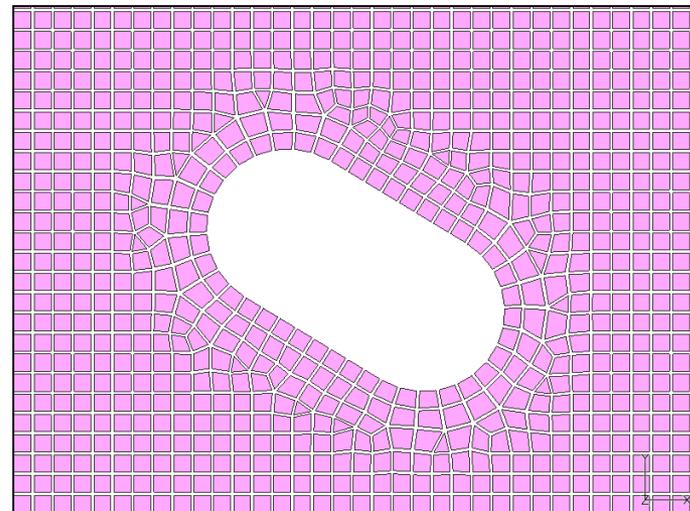
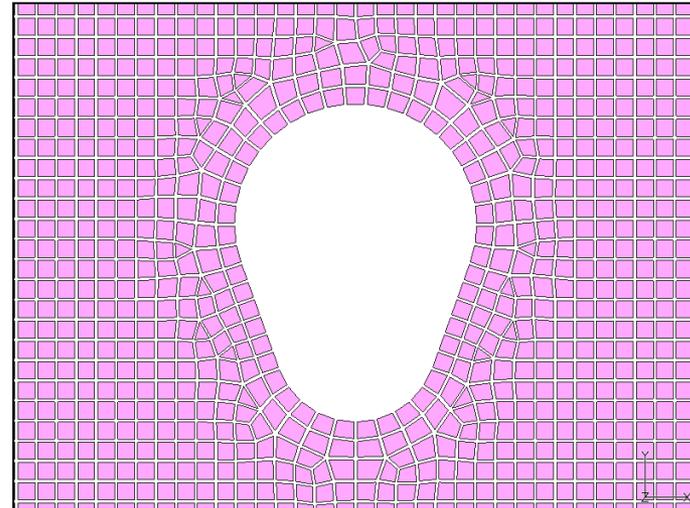
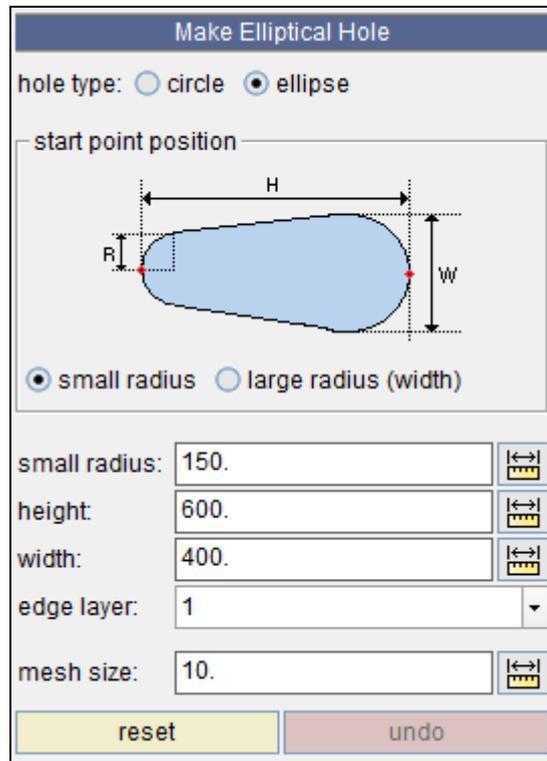
edge 1D property

8: Beam_150x12FB_mx



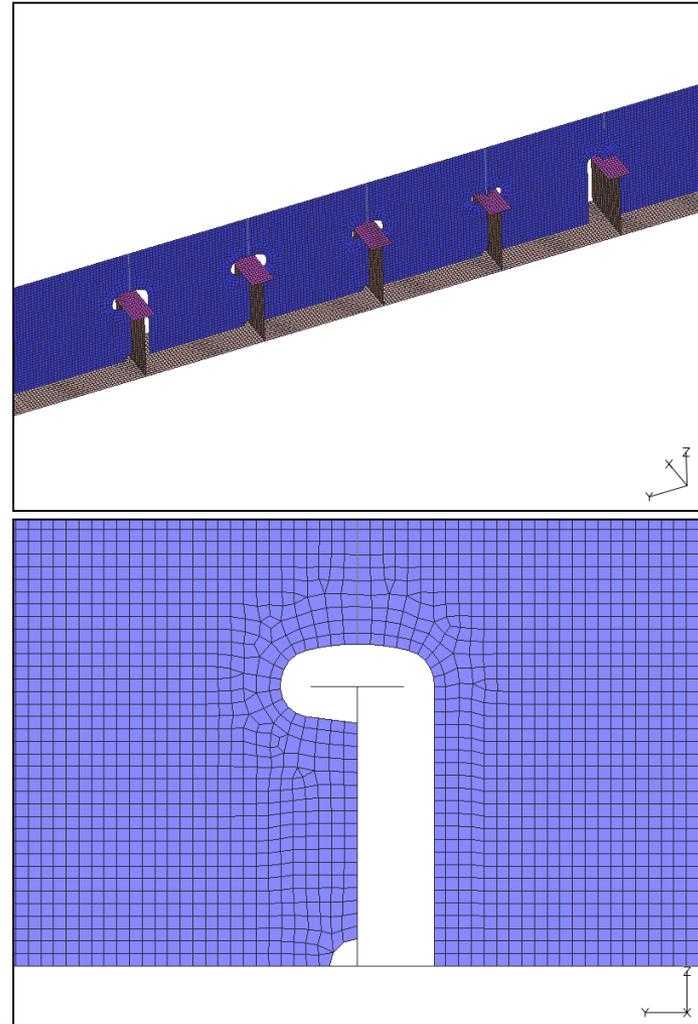
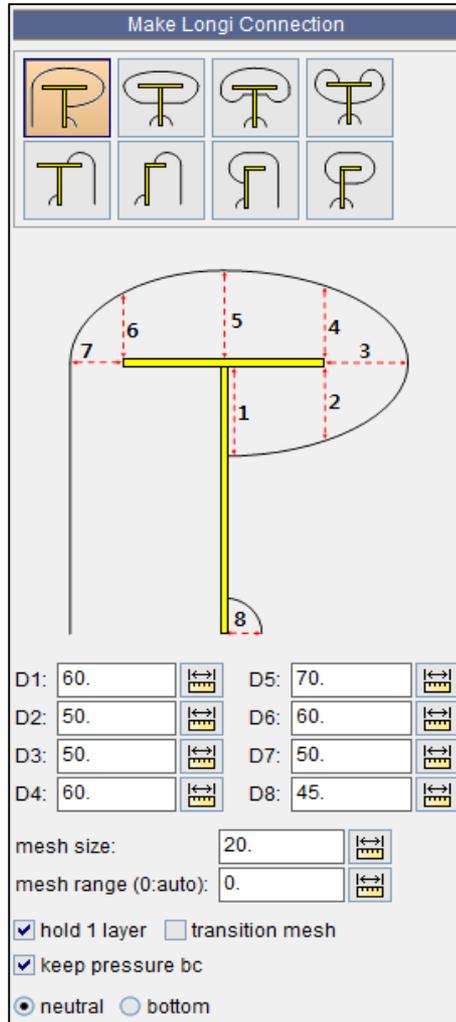
MAKE ELLIPTICAL HOLE (EHOLE)

- 3point로 Elliptical hole, circle 생성 가능



MAKE LONGI CONNECTION (LONGI)

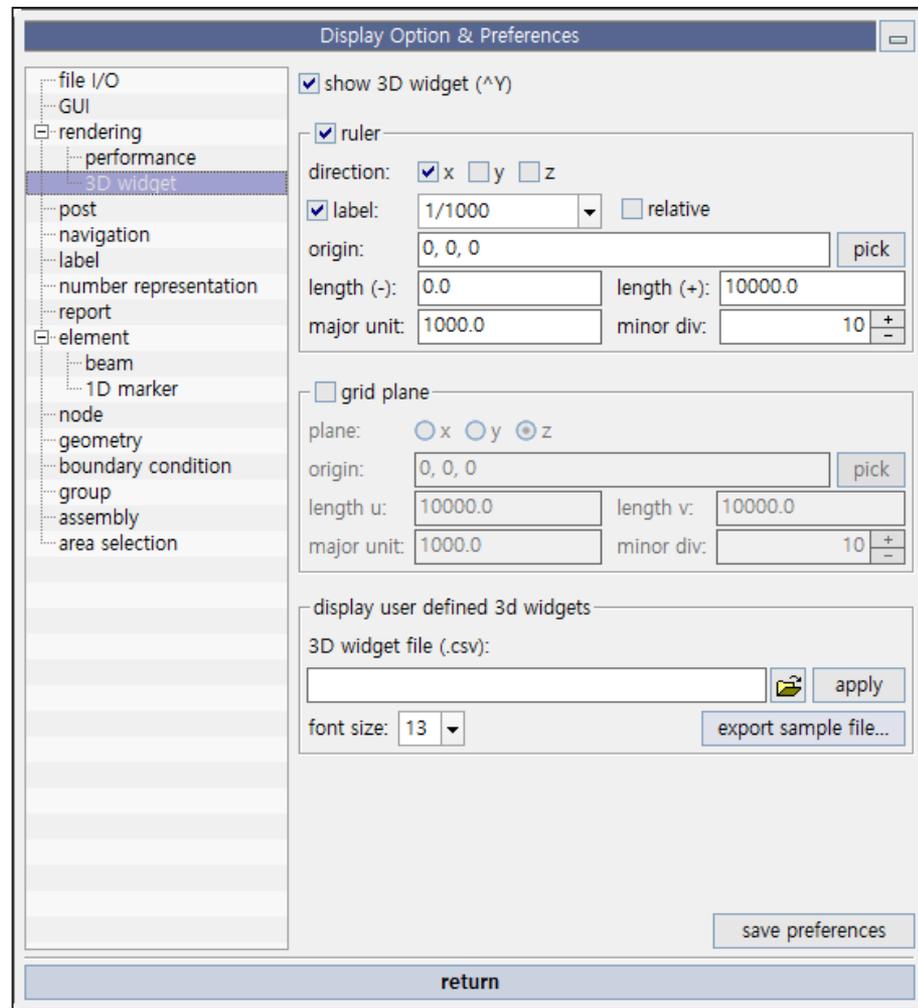
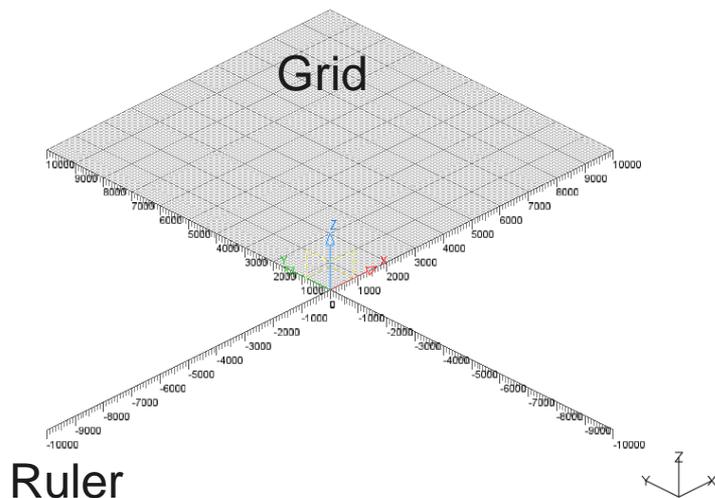
- ❖ Longi connection 자동화 기능
- ❖ 기존 6~8시간 소요 시간을 획기적으로 감소



FUNCTIONS

3D WIDGET (^Y)

- 가상의 point로 사용 가능한 Grid, Ruler widget



AUTO CREATE PLATE GROUP (AUTOG)

- ✧ 각각의 Plane을 찾아 자동 Grouping
- ✧ Section number, BHD 구분 및 자동 작성
- ✧ 폴더 분류 및 Summary report 출력

Auto Create Groups For Ship

plate group compartment

method: auto manual

instruction: _____

create groups for

x section: Section

y elevation: Elevation

z plan: Plan

shell: Shell

erase existing groups in folder

x section numbering

method: by base location (SECT_FR.#)

base location: -100000. pick

base section number: 1

z plan numbering (downward)

method: z coordinate

min size: length < 5000.

break angle: 5.

area/mass summary

generate

reset undo

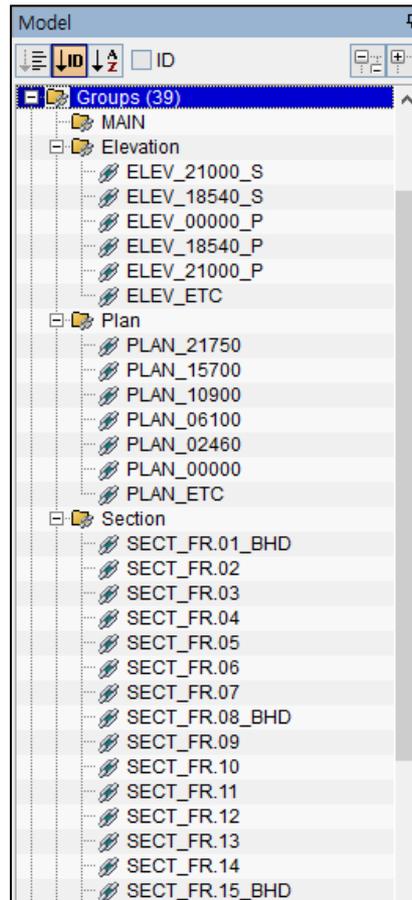


Plate Group Area/Mass Summary

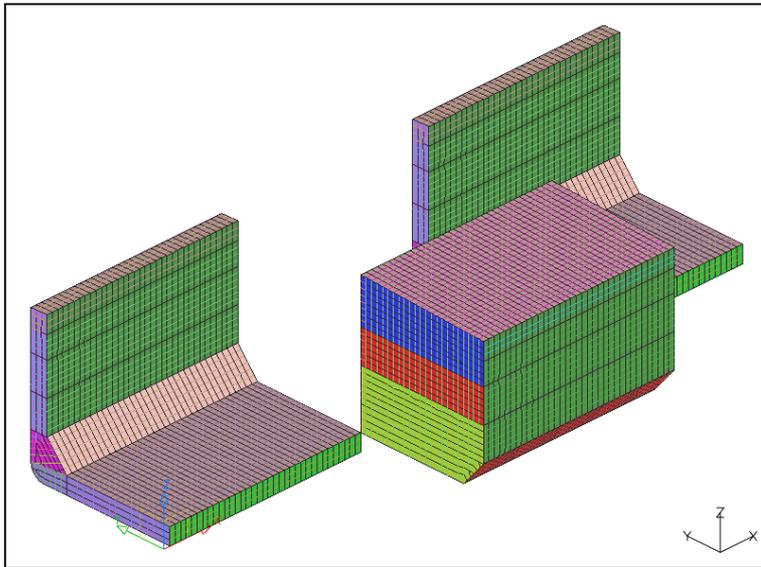
FOLDER / GROUP NAME	AREA	MASS
Section / SECT_FR.01_BHD	9.116E+8	174.3537
Section / SECT_FR.02	3.52E+8	47.91651
Section / SECT_FR.03	3.494E+8	47.61002
Section / SECT_FR.04	3.494E+8	47.61002
Section / SECT_FR.05	3.494E+8	47.61002
Section / SECT_FR.06	3.494E+8	47.61002
Section / SECT_FR.07	3.494E+8	47.60977
Section / SECT_FR.08_BHD	9.116E+8	174.3537
Section / SECT_FR.09	3.52E+8	47.91651
Section / SECT_FR.10	3.494E+8	47.61002
Section / SECT_FR.11	3.494E+8	47.61002
Section / SECT_FR.12	3.494E+8	47.61002
Section / SECT_FR.13	3.494E+8	47.61002
Section / SECT_FR.14	3.494E+8	47.60977
Section / SECT_FR.15_BHD	9.116E+8	174.3537
Section / SECT_FR.16	3.52E+8	47.91651
Section / SECT_FR.17	3.494E+8	47.61002

export to file... launch external viewer

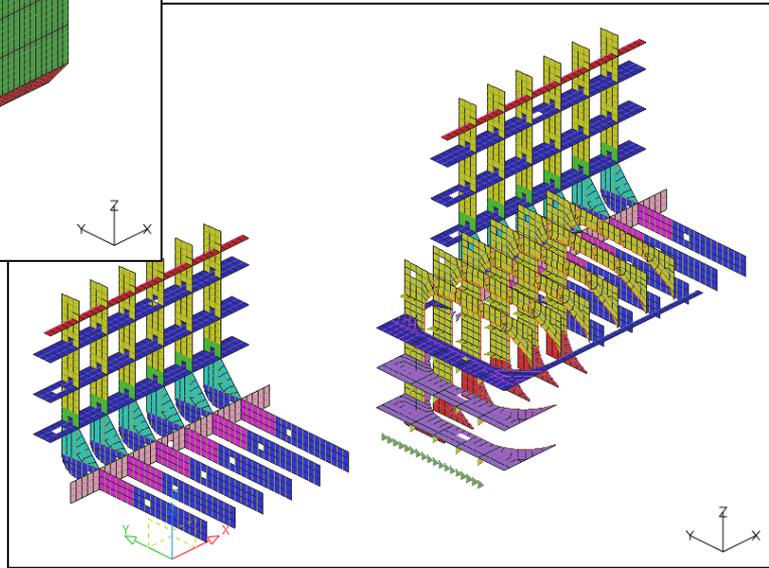
return

AUTO CREATE PLATE GROUP (AUTOG)

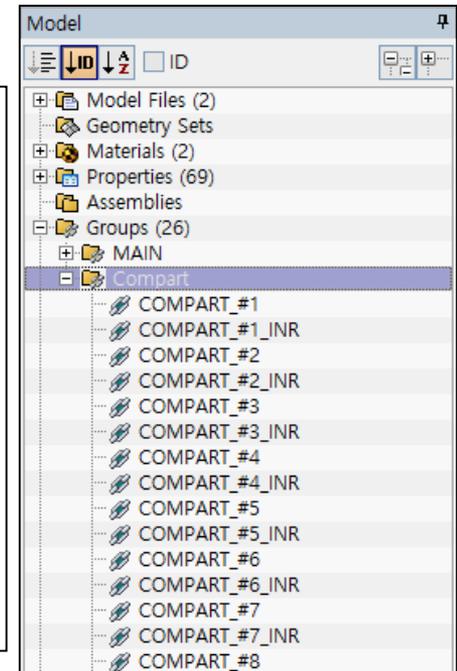
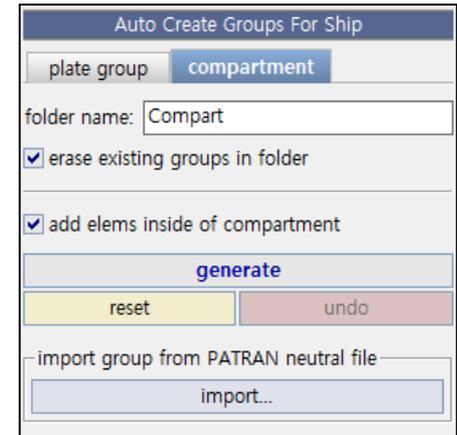
- ❖ Compartment 자동 Grouping
- ❖ 주부재는 shell 요소만 작성되며, Inner부재는 INR Group으로 따로 작성



COMPART_#no



COMPART_#no_INR



BEAM OFFSET (BOFF)

❖ Offset, Orientation 자동화

BOFF Beam Offset

modify offset attach to face

notification:
Option for attaching beam's top/bottom end to shell face works only for the beam elements defined by beam library, otherwise use 'more offset' to add offset.

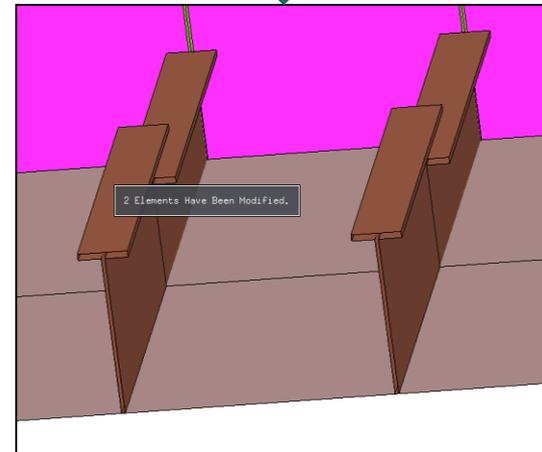
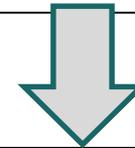
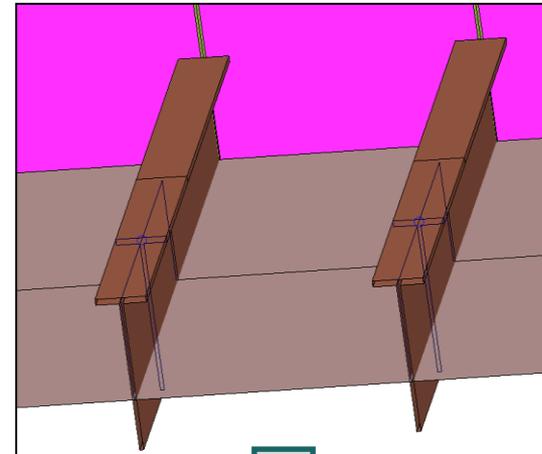
method:
 align vector & add offset
 align vector
 add offset

direction: (+) normal (-) normal
align axis: y vector z vector
attach to: bottom top
more offset:

select seed shell to guide beam vector
 attach to displayed shell only
 treat 'L' beam in reversed manner

undo
find unattached beams

display beam system



MODIFY PROPERTY NAME (PMOD, VE)

- ✦ Dimension을 이용하여 Property name 변경 가능

The image displays four instances of the 'Modify Physical Property' dialog box, arranged in two pairs. An orange arrow points from the first pair to the second pair, indicating a transition or comparison.

Left Pair (Initial State):

- Dialog 1 (SHELL):** Lists properties like '2: pshell.1', '3: pshell.6', etc. The 'rename method' is set to 'formatted pshell name' with an example '15.0T_Mild_(1.0Tc)'. A red box highlights the 'rename method' dropdown and the 'example' field.
- Dialog 2 (TAPERED BEAM):** Lists properties like '38: pbar1.12', '55: pbar1.13', etc. The 'rename method' is set to 'beam library to name' with an example 'T_450x11.5_150x18_(1.0Tc)'. A red box highlights the 'rename method' dropdown and the 'example' field.

Right Pair (Final State):

- Dialog 3 (all types):** Lists properties like '2: 12.0T_A', '62: 12.0T_A_(1.0Tc)', etc. The 'rename method' is set to 'formatted pshell name' with an example '15.0T_Mild_(1.0Tc)'. A red box highlights the 'rename method' dropdown and the 'example' field.
- Dialog 4 (TAPERED BEAM):** Lists properties like '92: A_250x90x12_16.0_(1.0Tc)_1', '115: A_250x90x12_16.0_(2.0Tc)_2', etc. The 'rename method' is set to 'beam library to name' with an example 'T_450x11.5_150x18_(1.0Tc)'. A red box highlights the 'rename method' dropdown and the 'example' field.

PROPERTY DATABASE (PDB)

✦ Bulb flats property는 아래 수식을 이용하여 L-type으로 제공

1.4.1 Stiffener profile with a bulb section

The properties of bulb profile sections are to be determined by direct calculations.

Where direct calculation of properties is not possible, a bulb section may be taken equivalent to a built-up section. The net dimensions of the equivalent built-up section are to be obtained, in mm, from the following formulae.

$$h_w = h'_w - \frac{h'_w}{9.2} + 2$$

$$b_s = \alpha \left(t'_w + \frac{h'_w}{6.7} - 2 \right)$$

$$t_s = \frac{h'_w}{9.2} - 2$$

$$t_w = t'_w$$

where:

h'_w t'_w : Net height and thickness of a bulb section, in mm, as shown in Figure 13.

α : Coefficient equal to:

$$\alpha = 1.1 + \frac{(120 - h'_w)^2}{3000} \quad \text{for } h'_w \leq 120$$

$$\alpha = 1.0 \quad \text{for } h'_w > 120$$

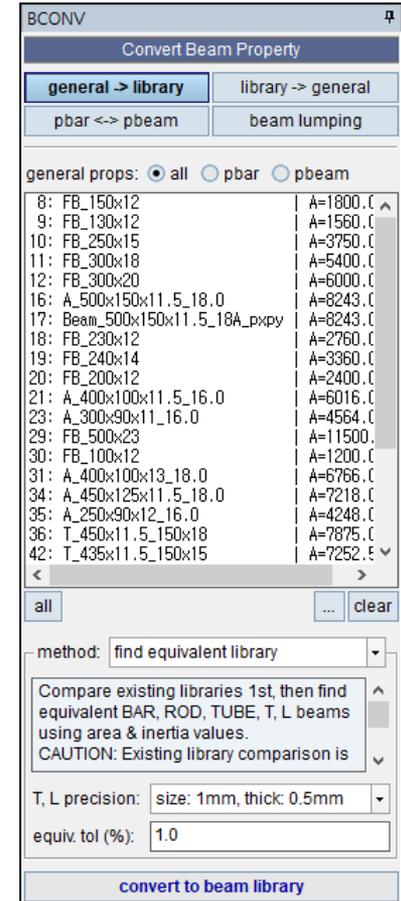
The image displays two software windows. The left window, titled 'Property Database', shows a list of bulb section properties. The right window, titled 'Create Physical Property', shows a list of property types and a 'create from database' button.

code	description
0: BULB	[BULB_50x4]
0: BULB	[BULB_60x4]
0: BULB	[BULB_60x5]
0: BULB	[BULB_70x5]
0: BULB	[BULB_80x5]
0: BULB	[BULB_80x6]
0: BULB	[BULB_80x7]
0: BULB	[BULB_90x5.5]
0: BULB	[BULB_100x6]
0: BULB	[BULB_100x7]
0: BULB	[BULB_100x8]
0: BULB	[BULB_120x6]
0: BULB	[BULB_120x6.5]
0: BULB	[BULB_120x7]
0: BULB	[BULB_120x8]
0: BULB	[BULB_140x7]
0: BULB	[BULB_140x8]
0: BULB	[BULB_140x9]
0: BULB	[BULB_140x10]
0: BULB	[BULB_160x7]
0: BULB	[BULB_160x8]
0: BULB	[BULB_160x9]

property type	code
LINEAR ROD	PROD
LINEAR BEAM	PBAR
LINEAR BEAM LIB	PBARL
TAPERED BEAM	PBEAM
TAPERED BEAM LIB	PBEAML
SHELL	PSHELL
COMPOSITE	PCOMP
SHEAR	PSHEAR
ACOUSTIC ABSORBER	PAABSF
ACOUSTIC INFINITE	PACINF
SOLID	PSOLID
RIGID BAR	
RBE2	
RBE3	
SCALAR SPRING	PELAS
SCALAR DAMPER	PDAMP
SCALAR MASS	PMASS
GAP	PGAP
BUSH	PBUSH
WELD	PWELD
VISCOUS DAMPER	PVISC
LUMPED MASS	
PLOT	
PLOT 2D PANEL	

CONVERT BEAM PROPERTY (BCONV)

- Instruction: 기존에 존재하는 property를 먼저 비교 함
(기존에 사용하는 Property를 PDB에 저장 후 general ↔ library convert 전
에
전체 생성한 후 수행 – 변환 속도 매우 빠름)
- Property가 존재하지 않을 경우 내부적으로 계산하여 library 생성
(Property가 있는 경우 대비하여 상대적으로 매우 느림)
- 해당 기능의 장점은 Corrosion을 적용한 경우에도 옵션을 0.1~0.05로 설정 시
변환이 가능함. 하지만 변환 시간은 오래 걸림
- Equiv. tol의 경우 2~3% 정도로 수행 시 가장 근사한 값을 찾을 수 있음.
하지만 가급적 변경하지 않는 것을 추천.
(%는 dimension 크기에 대한 % 값이며, 초기 1% 값은 1%이하의 크기 차이일
때 변경하는 것을 의미)
- 1mm → 0.5mm → 0.1mm → 0.05mm 네 단계로 검색이 가능함.
하지만 길이가 작아질수록 많은 시간이 소요될 수 있음
(ex. 0.05mm 옵션 사용 시 340.75와 같은 값을 찾는 것이 가능하다 한
property를 찾는 데 30초 이상 소요)



UNIT CONVERSION (UCONV)

❖ 완벽한 단위변환

UCONV □

Unit Conversion

update region:

fe-model geometry

element associated data

property values

bc loads

current unit:

N - m - kg

force: N

length: m

mass: kg

target unit:

N - mm - kg

force: N

length: mm

mass: kg

report summary

convert

undo



< UNIT SYSTEM CONVERSION SUMMARY >

UNIT SYSTEM (BEFORE) : N - mm - kg
 UNIT SYSTEM (AFTER) : N - m - kg

* CONVERSION FACTORS

FORCE: 1
 LENGTH: 0.001
 VELOCITY: 0.001
 ACCELERATION: 0.001
 MASS: 1
 AREA: 1E-06
 VOLUME: 1E-09
 MOMENT: 0.001
 PRESS/STRESS: 1000000
 MODULUS: 1000000
 MASS DENSITY: 1E+09
 NSM/LENGTH: 1000
 NSM/AREA: 1000000
 AREA MOI: 1E-12
 MASS MOI: 1E-06
 TRANS. K/B: 1000
 ROTAT. K/B: 0.001

* GEOMERTY CONVERSION

46161 NODE COORDINATES HAVE BEEN SCALED BY 0.001

* ELEMENT ASSOCIATED VALUE CONVERSION

* ELEMENT ASSOCIATED VALUE CONVERSION
 91216 BEAM OFFSET VALUES * 0.001

* MATERIAL PROPERTY VALUE CONVERSION

MAT	1 - YOUNG'S MODULUS	:	206000.0	---->	2.06E+11
	MASS DENSITY	:	7.8E-9	---->	7.8
MAT	2 - YOUNG'S MODULUS	:	206000.0	---->	2.06E+11
	MASS DENSITY	:	7.8E-9	---->	7.8

MODEL DIAGNOSIS (DIAG)

- ❖ 강력한 모델 체크 기능 (37개 항목)
- ❖ 해당 에러에 대한 수정기능 연동

Model Diagnosis

scope: shipbuilding model check

- part undefined
- isolated entities
- unattached beams
- dissimilar mesh
- internal free edge
- duplicated - within part
- duplicated - across parts
- dependency
- penetration check
- mesh quality
- free end - elas/damp/bush
- free end - rigid
- free end - beam
- rigid free leg
- rigid free center
- unbounded rbe3
- unbalanced rbe3
- invalid mass moi
- rigid-solid connection
- 1d/rbe3 local free motion

all [icon] clear

diagnose

skip masked entities

show output groups

show output messages

clear output results

manage group...

group display option...

Ex5_DIAG.fm - FEGate for Ship

File View Display Geometry Meshing Property Shipbuilding Boundary Post Processing Analysis Help

Model

Model Files (3)
Geometry Sets
Materials (3)
Properties (66)
Assemblies
Groups (25)
MAIN
DIAGNOSIS
chk:isolated entity
chk:dissimilar mesh
chk:internal free edge
chk:duplicated within part
chk:duplicated across parts
chk:dependency
chk:penetration
chk:zero length beam
chk:collapsed element
chk:shape check shell
chk:rigid free leg
chk:physical zero prop
chk:material zero prop

Boundary Conditions (6)
Formulas (21)
Tabular Functions
Plot Tables
Graphs (1)
Results
Result Sets

DIAG

DIAG

Model Diagnosis

scope: shipbuilding model check

- part undefined
- isolated entities
- unattached beams
- internal free edge
- duplicated - within part
- duplicated - across parts
- dependency
- penetration check
- mesh quality
- free end - elas/damp/bush
- free end - rigid
- free end - beam
- rigid free leg
- rigid free center
- unbounded rbe3

all [icon] clear

Find element duplicated across parts to check that the duplication is needed or not.

duplicated - across parts

skip masked entities

related commands

merge duplicated element...

colorize...

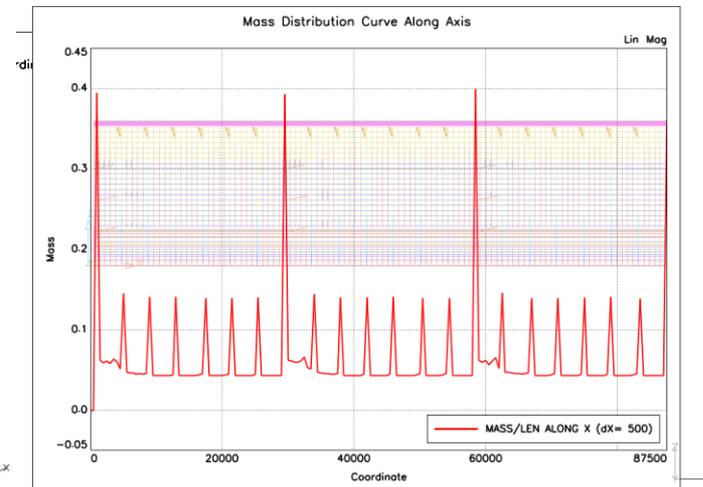
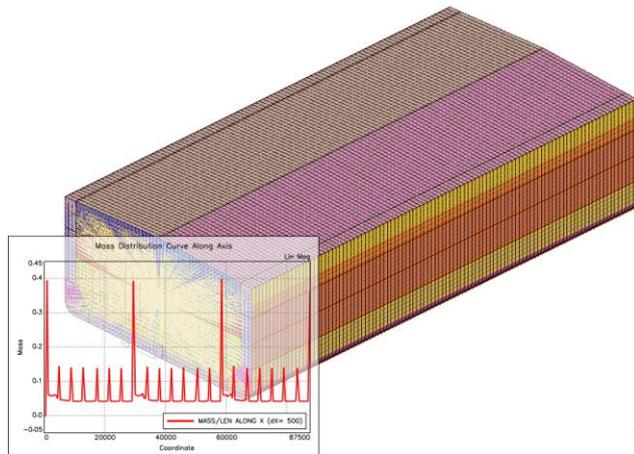
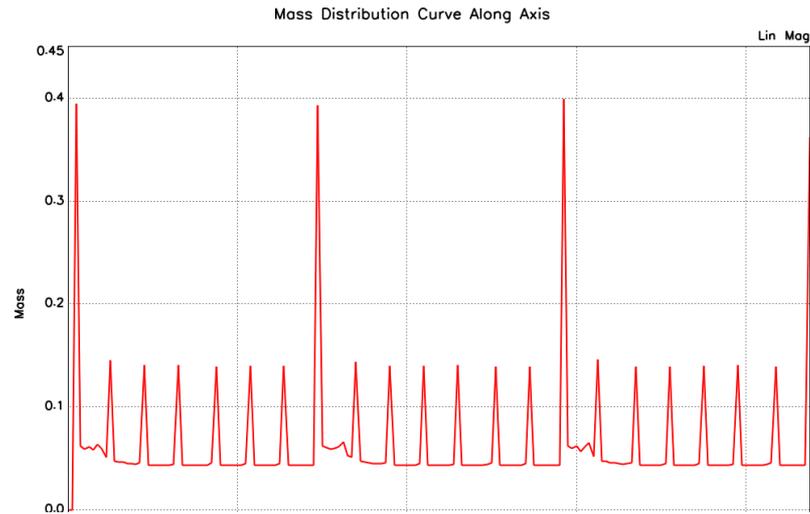
delete element...

return

6.101 fps * 4.02.151 x64

MASS GRAPH (SOLID)

❖ Mass 분포도 그래프로 작성



MASS TUNING (MTUNE)

Section 또는 Group을 이용한 Mass tuning

Mass Tuning

section group

instruction

Section coordinates must be entered in ascending order.
To skip tuning for a particular section, set the target mass to zero.

along axis: X Y Z

Coordinate	Target Mass
0.0	
42000.0	1000.0
85000.0	2000.0

scope: all selected

set actual mass as target

tune by: material density

tune target mass

reset

related commands

merge versions... solid property...

return

Mass Tuning

section group

groups: (dbl-click to add)

- 1: SECT_FR.01_BHD
- 2: SECT_FR.02
- 3: SECT_FR.03
- 4: SECT_FR.04
- 5: SECT_FR.05
- 6: SECT_FR.06
- 7: SECT_FR.07
- 8: SECT_FR.08_BHD
- 9: SECT_FR.09
- 10: SECT_FR.10

all add to list ... clear

target mass list

100.0	SECT_FR.01_BHD
0.0	SECT_FR.02
500.0	SECT_FR.03
200.0	SECT_FR.04

all remove ... clear

target mass: 200 set

set actual mass as target

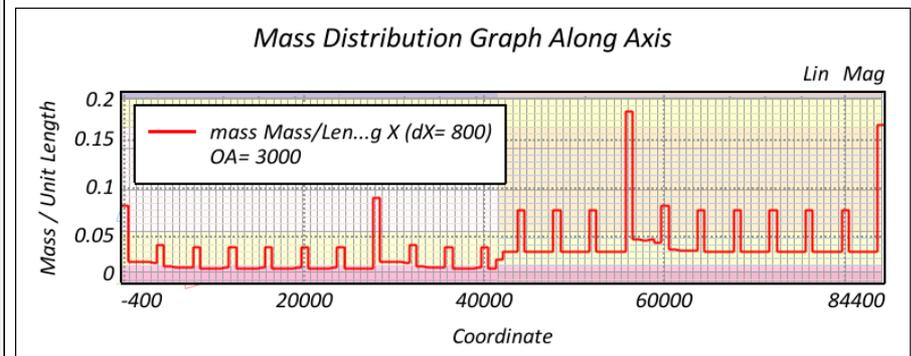
value to tune: material density

tune target mass

related commands

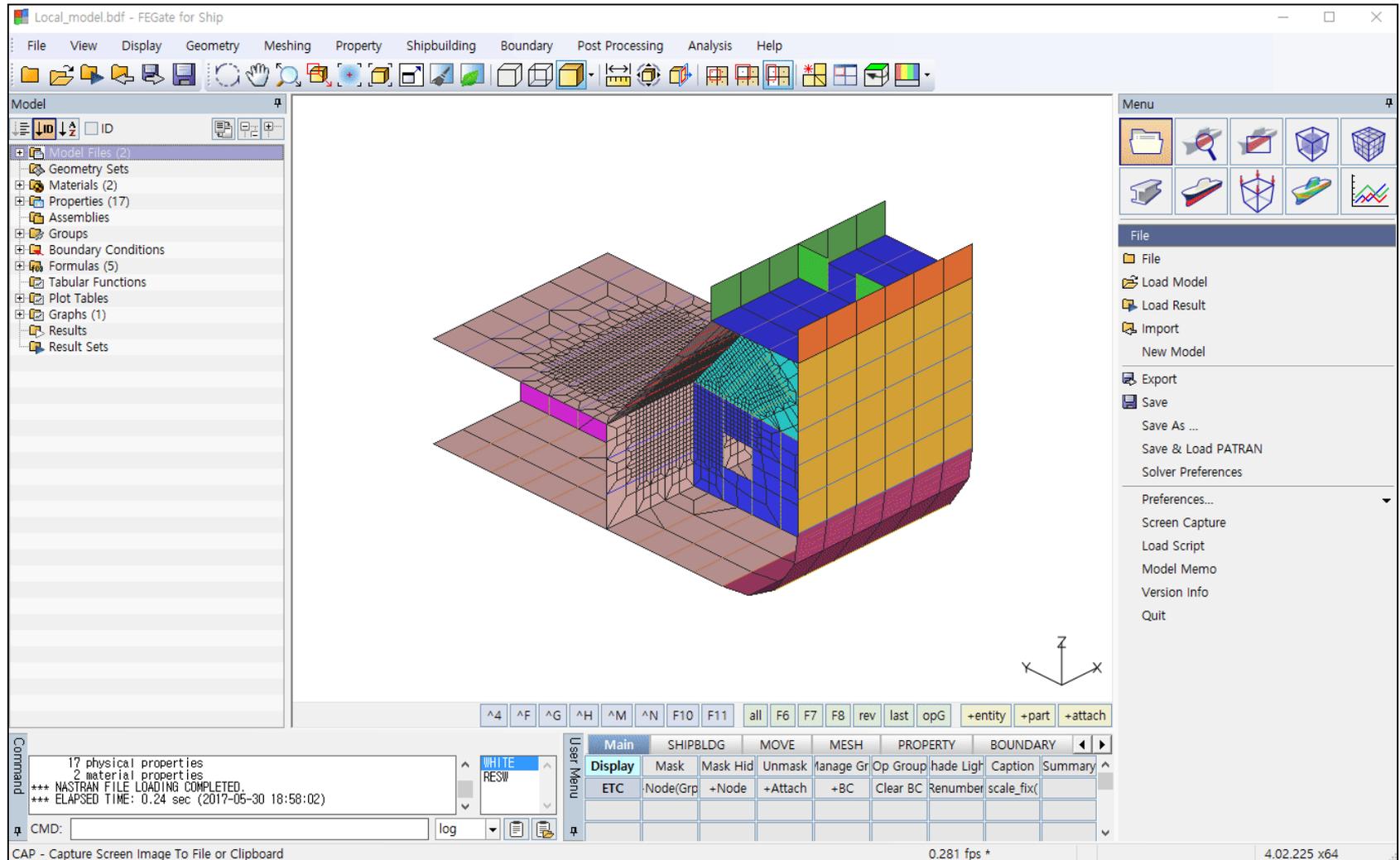
merge versions... solid property...

return



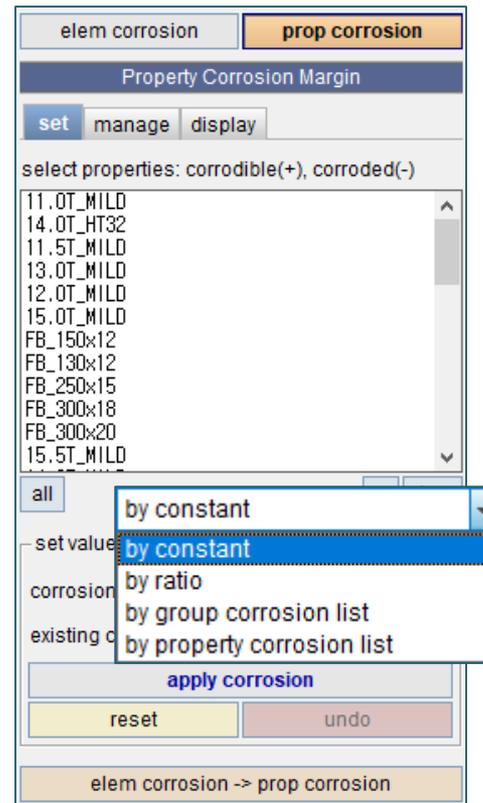
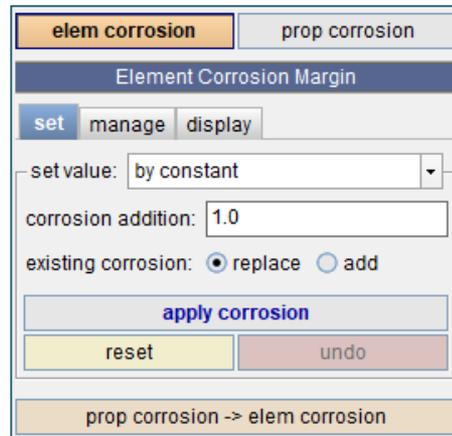
SUB-MODELING (SUBM)

✦ Sub-modeling 자동화 (gif 참조)



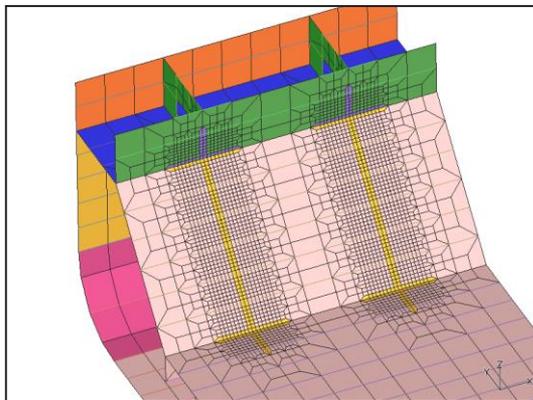
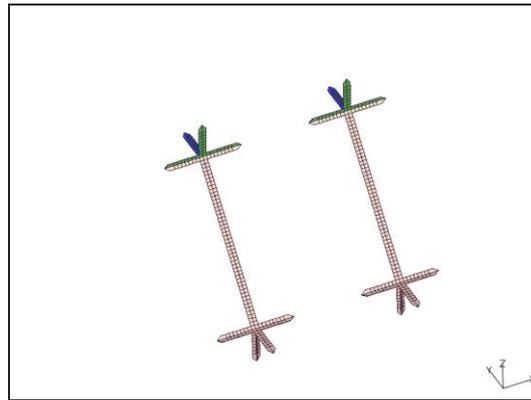
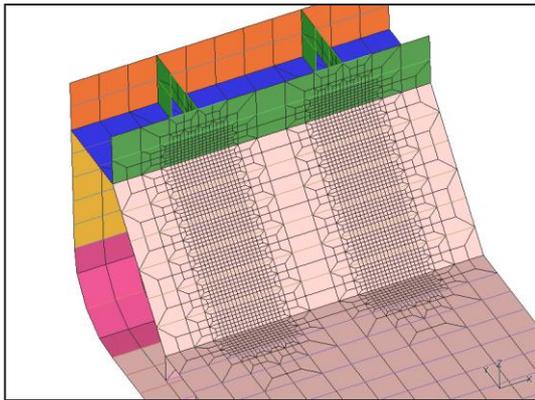
CORROSION MARGIN (CORR)

- 부식 여유치 적용 기능 (gif 참조)



WELDING JOINT PROPERTY (WJOIN)

- ❖ Welding Joint를 구분함과 동시에 별도의 Yield stress를 적용
- ❖ 사용자 지정 Mesh size 범위 내에 T-Connection을 자동으로 검색하고 material을 분리, 별도의 Yield stress를 지정하여 Welding Joint에 대한 평가에 편의를 제공



Welding Joint Material	Yield Stress
Mild (WJ)	235
HT32 (WJ)	315

Welding Joint Property

notification
Welding joint property is recognized by suffix name. Therefore, it is necessary to keep the name of the generated property.

suffix name: (WJ)

Welding Joint Material	Yield Stress
------------------------	--------------

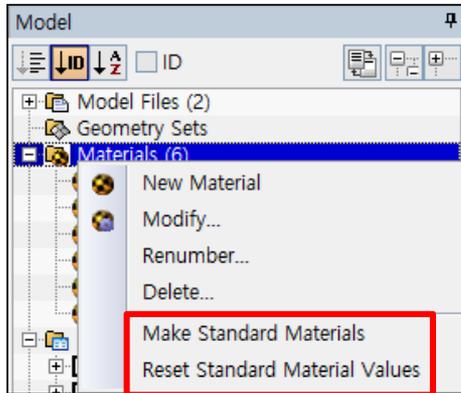
auto detection
mesh size < 200.0

auto select

add to group: Welding Joint

CREATE MATERIAL PROPERTY

- ❖ Default property 자동 생성
- ❖ Yield stress & K Factor는 Post에서 사용



Material Property (MAT1)

label: 2

name: MILD

card data

Young's Modulus: 206000.0

Shear Modulus: 0.0

Poisson's Ratio: 0.3

Mass Density: 7.85E-9

Thermal Expansion Coeff: 0.0

Reference Temperature: 0.0

Structural Damping Coeff: 0.0

Tension Stress Limit: 0.0

Compression Stress Limit: 0.0

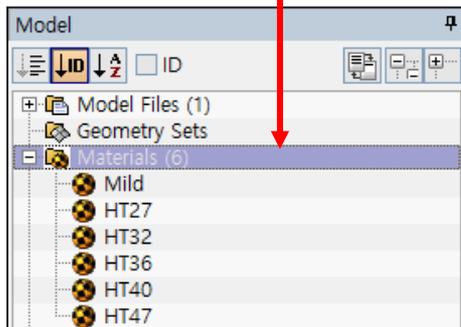
Shear Stress Limit: 0.0

Material Coord System: [dropdown]

Yield Stress & K Factor: 235.0 | 1.0

nonlinear stress dependent

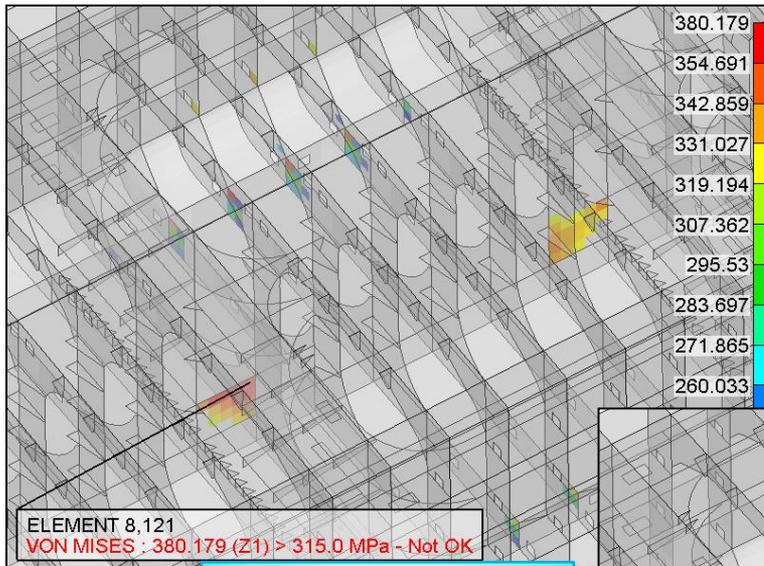
accept cancel



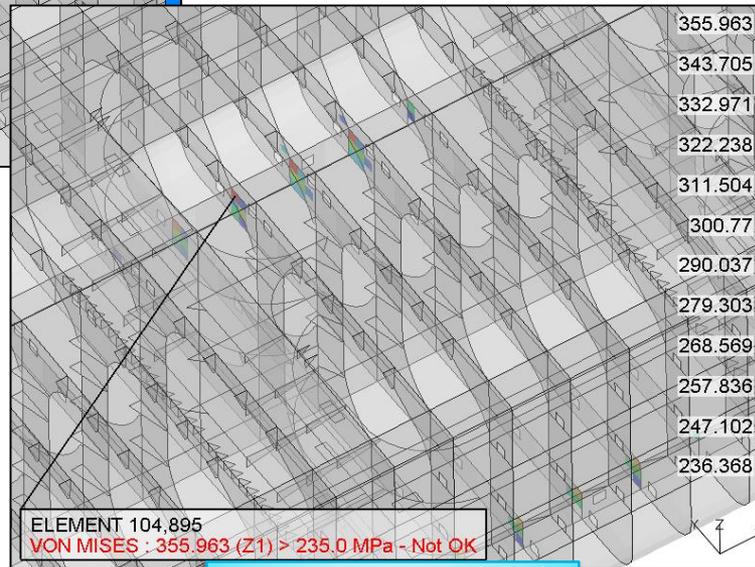
Material Name	Specified minimum yield stress in N/mm ²	K factor
MILD	235	1.0
HT27	265	0.92
HT32	315	0.78
HT36	355	0.72
HT40	390	0.68
HT47	460	0.62

CREATE MATERIAL PROPERTY

✦ Yield stress & K Factor는 Post에서 사용 예



Check over yield option



Check k factor option

Post Processing Option

ship static modal report & tools

subcase: all subcases (14)

deform: undeformed

contour: stress (14)

LC1_STATIC
LC2_DYNAMIC
LC3_
LC4_
LC5_
LC6_

deform/shape... contour option...

scale & color bar... value probe...

calculation: element

stress/strain

system: as is 0 pick

2D/3D tensor stress/strain

z1 von mises
z2 max

derived by formula...

apply more...

criteria eval / value filter / report

over yield | g.factor: 1.0 | k factor

value filter: none

min/max: 10.0 100.0

add... displayed reset more...

marker... detailed report...

format: auto decimal places: 2

return

MAP RESULT (MAPR)

- ✦ Global model의 결과를 Submodel로 Mapping 가능
- ✦ 모든 Result case(displacement)에 대해 일괄 생성 가능

Map Result

select deformation results

DISP 1, SUBCASE 1

all select marked ... clear

output node id:

current node id

original node id (for imported model)

connector only / use cid

search option:

average value closest value

search limit: 100. [icon]

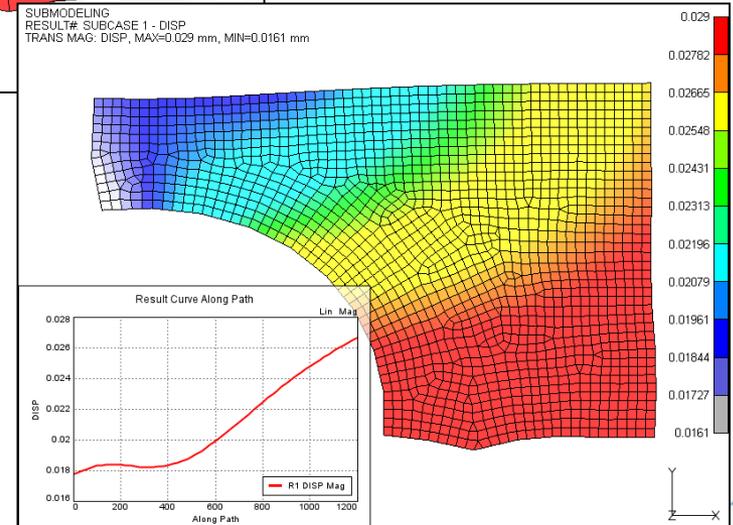
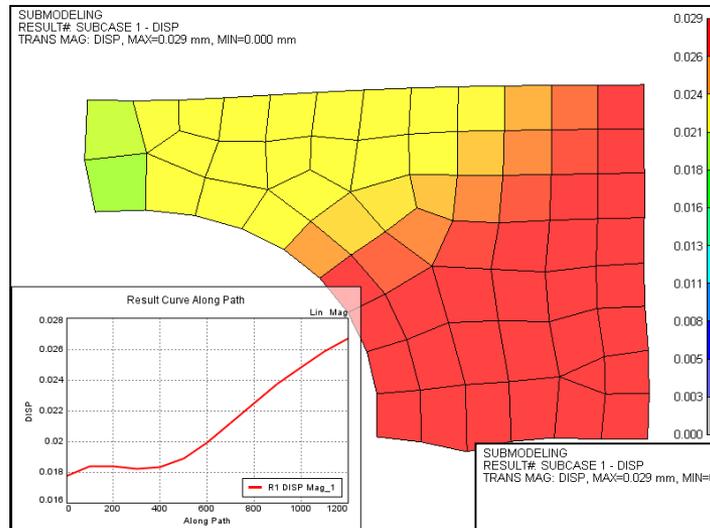
output binary file:

sub.bin [icon]

generate result

load result... connector...

return



SCRIPT를 이용한 하중 생성

SCRIPT를 이용한 하중 생성

Excel

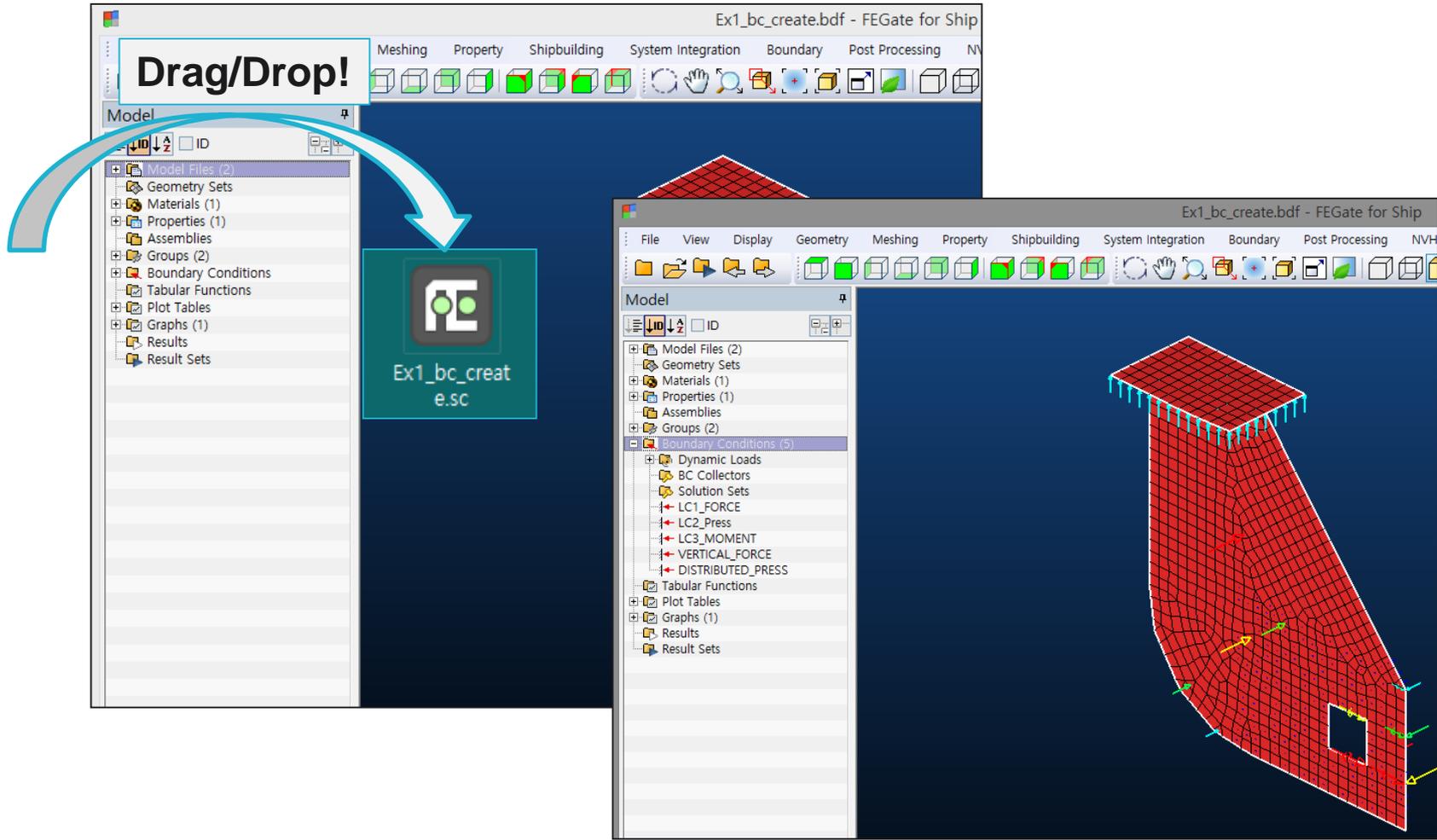
	1	2	3	4	5
1	LC Name	Entity ID	X	Y	Z
2	LC1_FORCE	10001	-100	0	0
3	LC1_FORCE	10002	-200	0	0
4	LC1_FORCE	10003	-300	0	0
5	LC1_FORCE	10004	-400	0	0
6	LC1_FORCE	10005	-500	0	0
7	LC1_FORCE	10006	-600	0	0
8	LC1_FORCE	10007	-700	0	0
9					
10	LC Name	Entity ID	Shell	Value	
11	LC2_Press	10001	1	100	
12	LC2_Press	10002	1	200	
13	LC2_Press	10003	1	300	
14	LC2_Press	10004	1	400	
15	LC2_Press	10005	1	500	
16	LC2_Press	10006	1	600	
17	LC2_Press	10007	1	700	
18					
19	LC Name	Entity ID	X	Y	Z
20	LC3_MOMENT	10001	0	-100	0
21	LC3_MOMENT	10002	0	-200	0
22	LC3_MOMENT	10003	0	-300	0
23	LC3_MOMENT	10004	0	-400	0
24	LC3_MOMENT	10005	0	-500	0

.sc (Text file)

```
0          10          20          30
|-----|-----|-----|-----|
1 *LOG ↵
2 ↵
3 *FORCE( FORMAT=(CSV,5), LIST=( ↵
4 LC1_FORCE,10001,-100,0,0 ↵
5 LC1_FORCE,10002,-200,0,0 ↵
6 LC1_FORCE,10003,-300,0,0 ↵
7 LC1_FORCE,10004,-400,0,0 ↵
8 LC1_FORCE,10005,-500,0,0 ↵
9 )) ↵
10 ↵
11 *PRESS( FORMAT=(TAB,4), LIST=( ↵
12 LC2_Press 10001 1 100 ↵
13 LC2_Press 10002 1 200 ↵
14 LC2_Press 10003 1 300 ↵
15 LC2_Press 10004 1 400 ↵
16 LC2_Press 10005 1 500 ↵
17 )) ↵
18 ↵
19 *MOMENT( FORMAT=(TAB,5), LIST=( ↵
20 LC3_MOMENT 10001 0 -100 0 ↵
21 LC3_MOMENT 10002 0 -200 0 ↵
22 LC3_MOMENT 10003 0 -300 0 ↵
23 LC3_MOMENT 10004 0 -400 0 ↵
24 LC3_MOMENT 10005 0 -400 0 ↵
25 )) ↵
```

Ctrl + C
Ctrl + V

SCRIPT를 이용한 하중 생성



SCRIPT를 이용한 RESULT COMBINE

SCRIPT를 이용한 RESULT COMBINE

CSV

	1	2	3
1	Subcase	Subcase	New Name
2	LC1_Static	LC2_Dynamic	LC1+LC2
3	LC2_	LC3_	LC2+LC3
4	LC4_	LC5_	LC4+LC5
5	LC6_	LC7_	LC6+LC7
6	LC8_	LC9_	LC8+LC9
7	LC10_	LC11_	LC10+LC11
8	LC12_	LC13_	LC12+LC13
9	LC14_	LC1_Static	LC1+LC14

Ctrl + C
Ctrl + V

RLIST

Result Set List

subcase: all subcases

deform: displacement (14)

contour: stress (14)

matching result sets:

- LC1_STATIC
- LC2_DYNAMIC
- LC3_
- LC4_
- LC5_
- LC6_
- LC7_
- LC8_
- LC9_
- LC10_
- LC11_
- LC12_
- LC13_
- LC14_

Search...

Unsorted

Sort By Label

Sort By Name

Reverse Order

Selected To Top

Export List

.sc (Text file)

```
0 10 20 30 40
|-----|-----|-----|-----|
1 *LOG
2
3 *COMB (
4 METHOD=(PAIR, SUM, REAL), CASE=1, ID=1,
5 FILE="Ex6_LC.bin",
6 NAME=OFF
7 FORMAT=(STRESS, COM1),
8 PAIR=(
9 LC1_Static,LC2_Dynamic,LC1+LC2
10 LC2_, LC3_, LC2+LC3
11 LC4_, LC5_, LC4+LC5
12 LC6_, LC7_, LC6+LC7
13 LC8_, LC9_, LC8+LC9
14 LC10_, LC11_, LC10+LC11
15 LC12_, LC13_, LC12+LC13
16 LC14_, LC1_Static, LC1+LC14
17 ))
```

SCRIPT를 이용한 RESULT COMBINE

Drag/Drop!

Ex2_result_combine.sc

STRESS 1, LC1_STATIC
STRESS 2, LC2_DYNAMIC
STRESS 3, LC3_
STRESS 4, LC4_
STRESS 5, LC5_
STRESS 6, LC6_
STRESS 7, LC7_
STRESS 8, LC8_
STRESS 9, LC9_
STRESS 10, LC10_
STRESS 11, LC11_
STRESS 12, LC12_
STRESS 13, LC13_
STRESS 14, LC14_

STRESS 1, LC1+LC2
STRESS 2, LC4+LC5
STRESS 3, LC6+LC7
STRESS 4, LC8+LC9
STRESS 5, LC10+LC11
STRESS 6, LC12+LC13
STRESS 7, LC1+LC14

ELEM 7359
STRESS : 170.408

보고서

THICKNESS PLOT 자동화

Group Report

summary report contour report

plot: thickness contour

graphic: auto view no light

show: name mass elem count

groups:

- 1: SECT_FR.01_BHD
- 2: SECT_FR.02
- 3: SECT_FR.03
- 4: SECT_FR.04
- 5: SECT_FR.05
- 6: SECT_FR.06
- 7: SECT_FR.07
- 8: SECT_FR.08_BHD
- 9: SECT_FR.09
- 10: SECT_FR.10
- 11: SECT_FR.11
- 12: SECT_FR.12
- 13: SECT_FR.13
- 14: SECT_FR.14
- 15: SECT_FR.15_BHD
- 16: SECT_FR.16
- 17: SECT_FR.17
- 18: SECT_FR.18
- 19: SECT_FR.19
- 20: SECT_FR.20
- 21: SECT_FR.21
- 22: SECT_FR.22_BHD
- 23: ELEV_20390_S
- 24: ELEV_18000_S

all display group ... clear

report format: word

large screen font image only

format/start/inc: Fig.# 1 1

generate report

return

Report mass : Mass 출력
Report elem count : Element 개수 출력
Auto view : 최적의 View 자동 검색
Disable light : Light source on/off

SHELL THICKNESS PLOT
GROUP: SECT_Fr.68_BHD
ELEMS: 1386 QUAD, 32 TRIA, 661 BAR, 697 BEAM
MASS: 174.3537

Figure number 자동 입력

THICKNESS PLOT 자동화

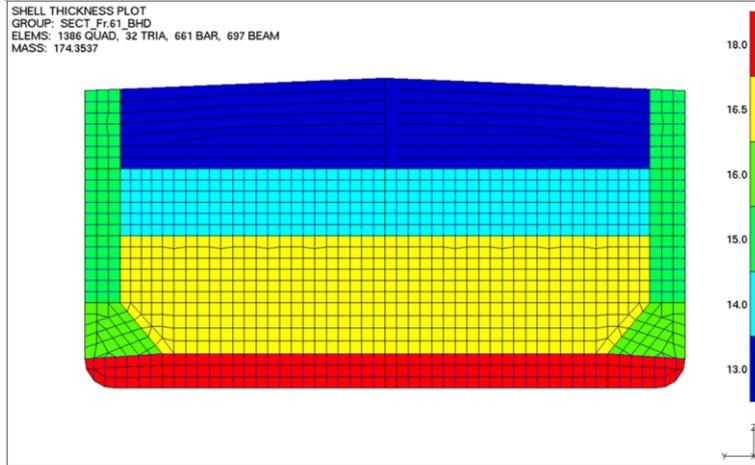


Fig.1.9. Group: SECT_Fr.61_BHD.

Group에 존재하는 Thickness 만 표시

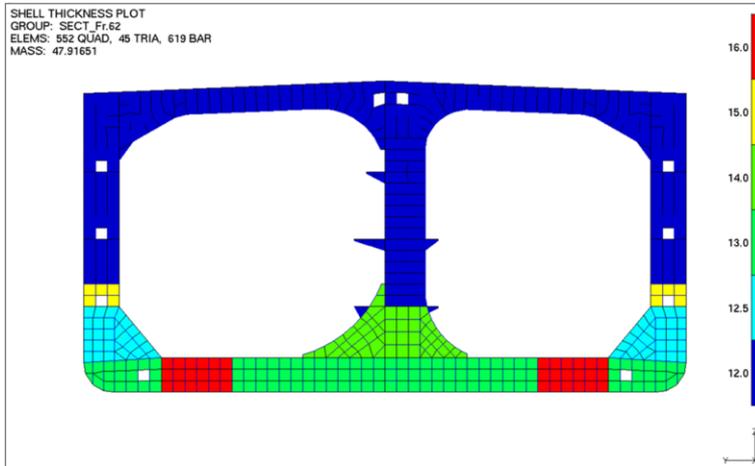


Fig.1.10. Group: SECT_Fr.62.

Figure number 및 Group name 자동 작성

최적의 View 자동 검색

RESULT PLOT 자동화

Group Report

summary report **contour report**

graphic: auto view no light

show: name header value probe

groups:

1: SECT_FR.01_BHD
2: SECT_FR.02
3: SECT_FR.03
4: SECT_FR.04
5: SECT_FR.05

all display group ... clear

subcase: all subcases (14)

deform: undeformed

contour: stress (14)

LC1_STATIC
LC2_DYNAMIC
LC3_
LC4_
LC5_
LC6_
LC7_
LC8_

all ... clear

tensor result option

system: as is

xx yy zz xy xz yz

current result type von mises

display: all 0.0

report format: word

large screen font image only

format/start/inc: Fig.# 1 1

generate report

return

Group 및 Subcase 선택

Tensor result 선택

Figure number 자동 입력

RESULT PLOT 자동화

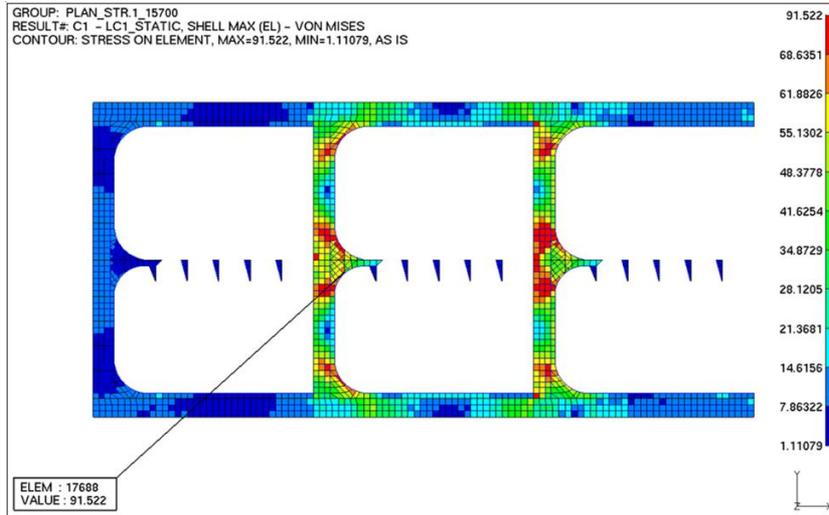


Fig.2.1. C1 - LC1_STATIC, SHELL MAX (EL) - VON MISES at PLAN_STR.1_15700.

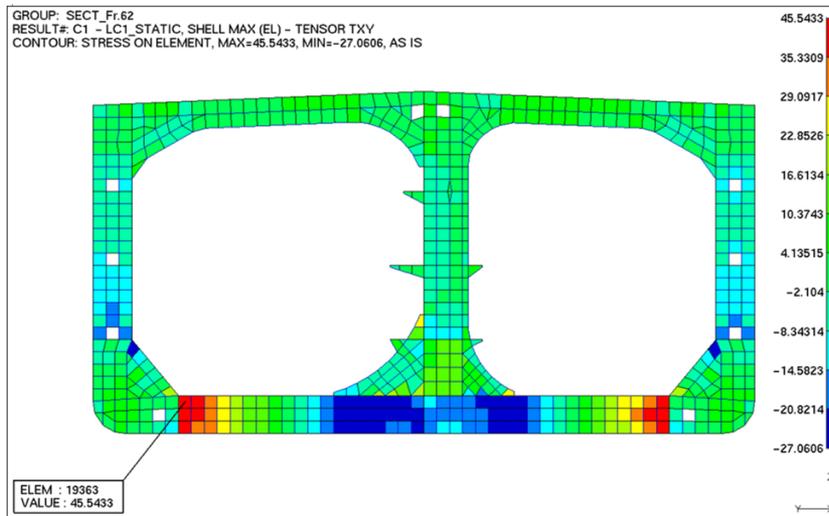


Fig.2.12. C1 - LC1_STATIC, SHELL MAX (EL) - TENSOR TXY at SECT_Fr.62.

최적의 View 자동 검색

Fig number, Subcase name, Stress,
Group name 자동 작성

CONTOUR REPORT – GROUP (CREP)

- ❖ Report 자동화의 Result plot 기능과 비슷함
- ❖ 다른 점은 결과 한 장, 전체 모델에서의 위치 한 장이 출력 됨

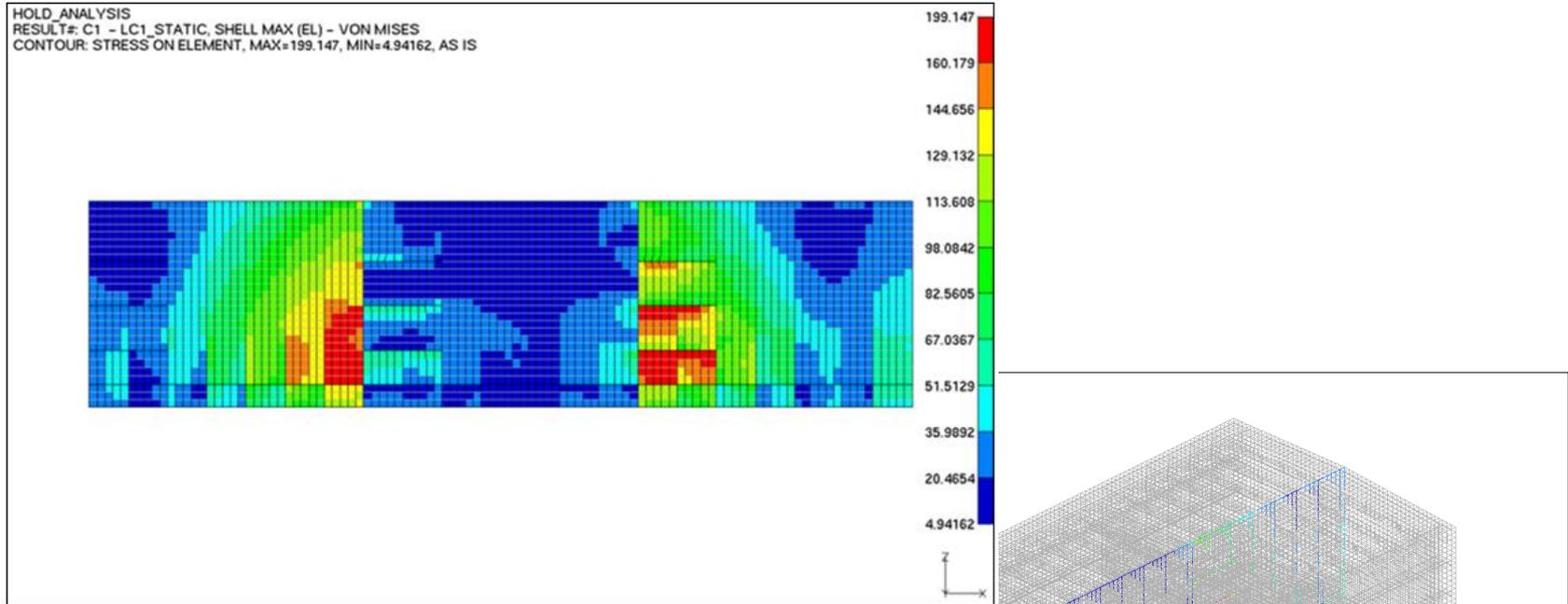


Fig.1. C1 - LC1_STATIC, SHELL MAX (EL) - VON MISES at ELEV_CL

CONTOUR REPORT – PART (CREP)

- ❖ Report 자동화의 Thickness plot 기능과 비슷함
- ❖ 다른 점은 결과 한 장, 전체 모델에서의 위치 한 장이 출력 됨

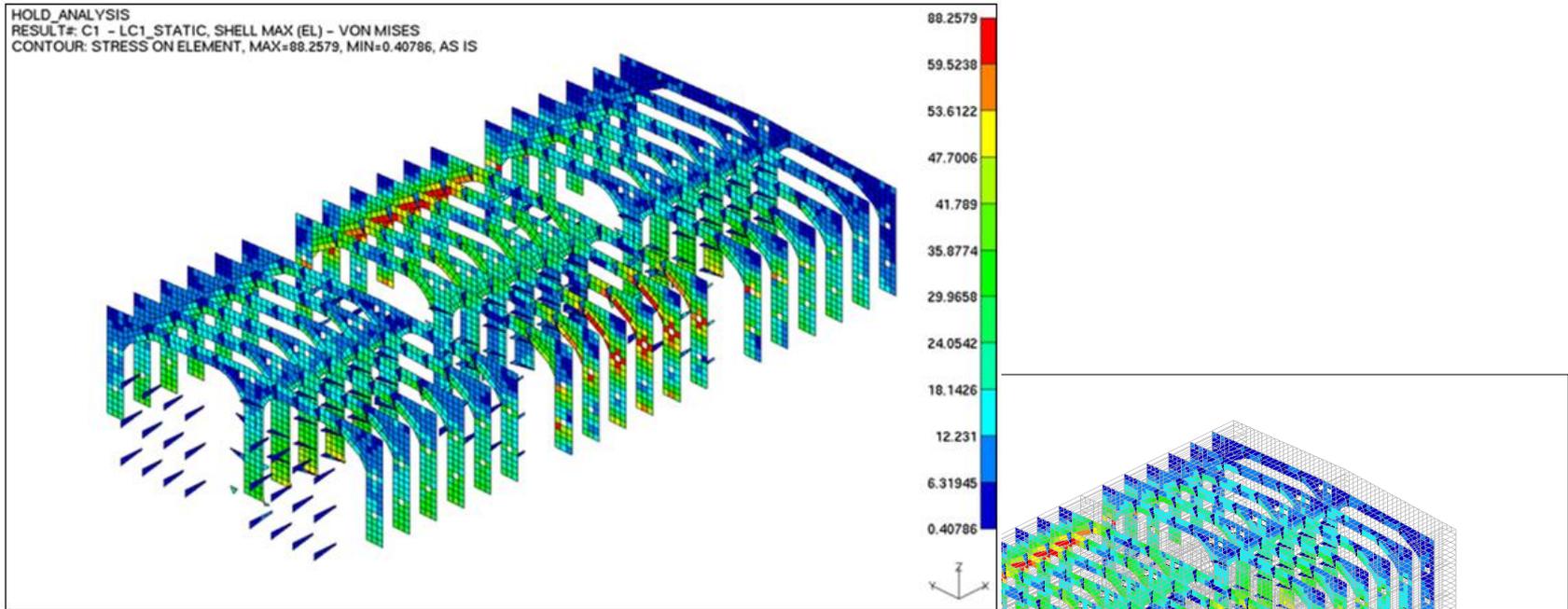
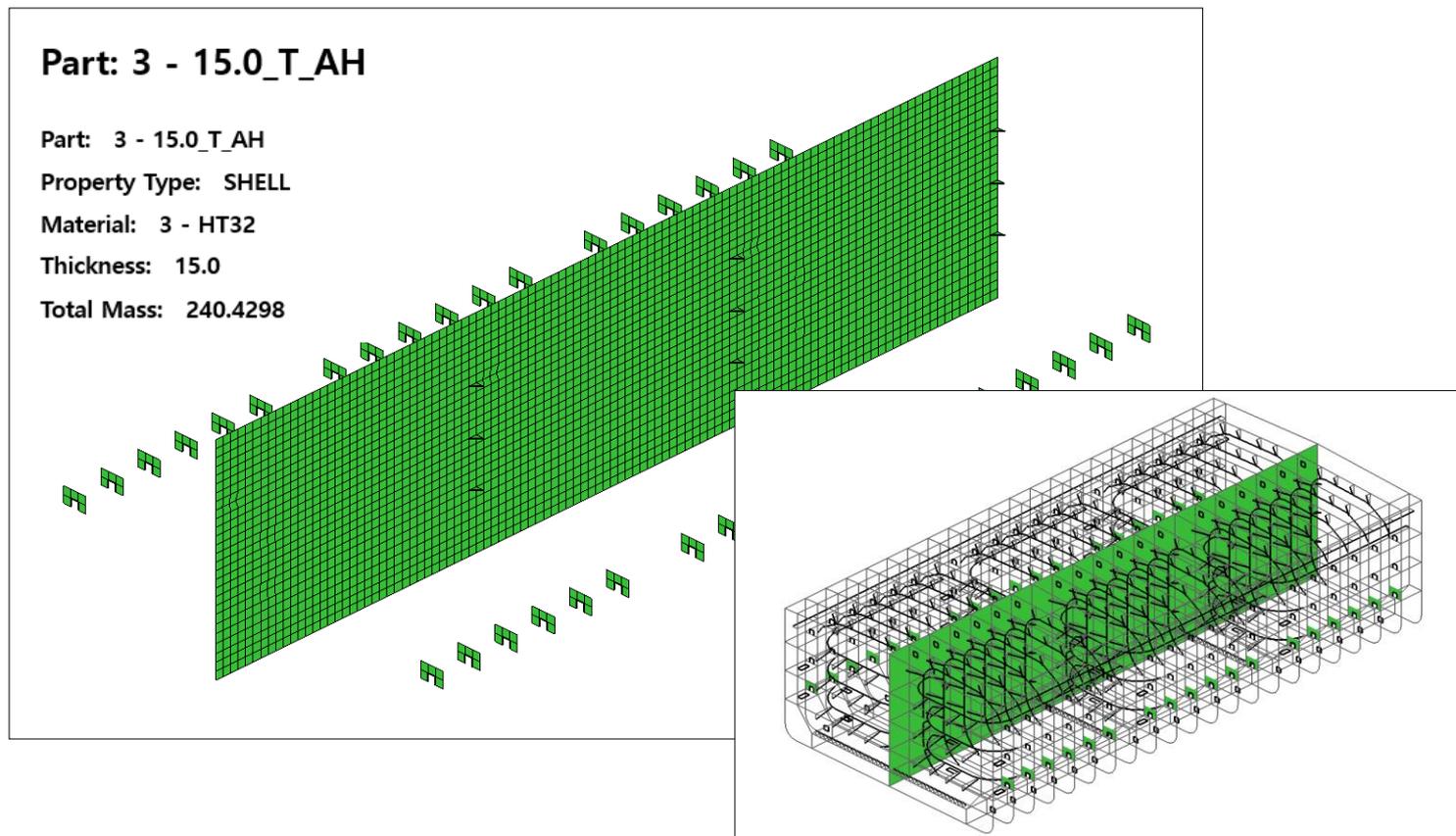


Fig.1.1. C1 - LC1_STATIC, SHELL MAX (EL) - VON MISES at P2 - 12.0_T

PART SUMMARY (PSUM)

- ❖ Thickness plot 기능 보다 더 자세한 정보를 출력
- ❖ 해당 Property의 모든 부재와 그 부재의 위치 파악 용이



POST

RANK REPORT (RANK)

- 해석 결과를 각 부재, 또는 Group 별로 통계적 계산을 수행
- 값의 순위를 매김

Ex2_result_combine.fm - FEGate for Ship

File View Display Geometry Meshing Property Shipbuilding System Integration Boundary Post Processing NVH Help

Model: HOLD_ANALYSIS
RESULT# C1 - LC1_STATIC, SHELL MAX (EL) - VON MISES
DEFORM: DISP, MAX=49.1319, MIN=21.08
CONTOUR: STRESS ON ELEMENT, MAX=199.147, MIN=0.0, AS IS

Result Rank Summary

--- rank of STRESS maximum ---
RESULT: STRESS 1, LC1_STATIC, ??
31 groups have been calculated.

RANK.	VALUE.	ID.	NAME
1.	1.9915E+02	18.	ELEV_CL
2.	1.2081E+02	20.	ELEV_SIDE_GIR
3.	1.1022E+02	41.	SECT_Fr.75_BHD
4.	1.0846E+02	29.	SECT_Fr.63
5.	1.0723E+02	30.	SECT_Fr.64
6.	1.0705E+02	24.	PLAN_STR.2_10900
7.	1.0703E+02	38.	SECT_Fr.72
8.	1.0650E+02	31.	SECT_Fr.65
9.	1.0570E+02	32.	SECT_Fr.66
10.	1.0189E+02	39.	SECT_Fr.73
11.	9.9393E+01	46.	SECT_Fr.80
12.	9.8620E+01	45.	SECT_Fr.79
13.	9.7622E+01	44.	SECT_Fr.78
14.	9.6910E+01	37.	SECT_Fr.71

undo edit export to file... launch viewer

return

ELEM 9066
STRESS : 199.147

RANK

STRESS MAXIMUM

- 1: ELEV_CL 199.147
- 2: ELEV_SIDE_GIR 120.807
- 3: SECT_Fr.75_BHD 110.223
- 4: SECT_Fr.63 108.458
- 5: SECT_Fr.64 107.227
- 6: PLAN_STR.2_10900 107.053
- 7: SECT_Fr.72 107.027
- 8: SECT_Fr.65 106.503
- 9: SECT_Fr.66 105.702
- 10: SECT_Fr.73 101.892
- 11: SECT_Fr.80 99.3934
- 12: SECT_Fr.79 98.6199
- 13: SECT_Fr.78 97.6225
- 14: SECT_Fr.71 96.9099
- 15: SECT_Fr.77 96.3329
- 16: PLAN_STR.1_15700 91.522
- 17: PLAN_STR.3_6100 87.4409
- 18: SECT_Fr.62 83.0369
- 19: SECT_Fr.74 75.2446

RANK

Rank Result

object: part group

select region

19: ELEV_ETC
20: ELEV_SIDE_GIR
21: PLAN_ETC
22: PLAN_INNER
23: PLAN_STR.1_15700
24: PLAN_STR.2_10900
25: PLAN_STR.3_6100
26: PLAN_UPPER
27: SECT_Fr.61_BHD
28: SECT_Fr.62
29: SECT_Fr.63
30: SECT_Fr.64
31: SECT_Fr.65

all clear

rank of: maximum

value at: element

calculation: element

scalar value: real value

show as inversed value

from displayed only

display: show all

list (N): 20

keep rank display (activate)

print list on display

display result

report list report table...

rescale displayed

return cancel

RANK < Step 1 > Select element groups in the list

27.	6.5179E+01	34.	SECT_Fr.68_BHD
28.	5.8119E+01	26.	PLAN_UPPER
29.	4.3599E+01	27.	SECT_Fr.61_BHD
30.	4.1312E+01	22.	PLAN_INNER
31.	7.9288E-12	48.	SECT_Fr.82_BHD

Command: Log Message

RESW mask mask hid unmask manage grp op group mvs

RANK mva translate align new elem ecp split

POPT merge emod mc check rchk solid

RESULT diagnosis ASSOC normal CAPR NCON boff

LOAD

RELO

57.471 fps * 4.01.249 x64

RANK REPORT - TABLE

- 하나의 Subcase가 아닌 전체 Subcase에서의 결과 확인 가능

Ex2_result_combine.fm - FEGate for Ship

File View Display Geometry Meshing Property Shipbuilding System Integration Boundary Post Processing NVH Help

Model: HOLD_ANALYSIS
RESULT# C14 - LC14 - SHELL MAX (EL) - VON MISES
DEFORM: DISP, MAX=18.7069, MIN=9.75959
CONTOUR: STRESS ON ELEMENT, MAX=43.6602, MIN=0.0, AS IS

STRESS MAXIMUM
1: SECT. Fr.70
43.6602
2: SECT. Fr.73
43.0033
3: SECT. Fr.63

CAPR
Report/Capture Results
output type: rank report

Result Rank Table

STRESS, 1	STRESS, 2	STRESS, 3	STRESS, 4	STRESS, 5	STRESS, 6	STRESS, 7	STRESS, 8	STRESS, 9	STRESS, 10	STRESS, 11	STRESS, 12	STRESS, 13	STRESS, 14	GROUP NAME
1.9915E+02	2.8639E+02	5.2501E+01	9.4399E+01	8.2939E+00	8.9972E+01	3.5095E+02	4.4363E+00	1.8184E+02	3.9237E+01	1.7525E+02	3.2904E+02	2.9989E+00	3.8194E+01	ELEV_CL
6.6454E+01	1.4227E+01	4.2968E+01	3.9294E+01	4.6372E+00	6.3404E+01	1.5532E+02	5.4932E+00	8.0173E+01	2.6527E+01	3.1300E+01	5.0954E+01	3.1970E+00	1.8510E+01	ELEV_ETC
1.2081E+02	1.5553E+02	4.4751E+01	8.0503E+01	8.0860E+01	4.5821E+01	1.6585E+02	5.4932E+00	8.5074E+01	2.5854E+01	1.2231E+02	2.1220E+02	3.2707E+00	3.2154E+01	ELEV_SIDE_GIR
6.8289E+01	9.8429E+01	4.8540E+00	8.7041E+00	2.3118E+00	6.7453E+00	1.1320E+02	1.1822E+00	6.8526E+01	6.5773E+00	1.2713E+01	2.0446E+01	5.5878E+00	4.5885E+00	PLAN_ETC
4.1312E+01	7.4124E+01	2.8035E+01	3.8159E+01	1.3989E+01	4.2735E+01	1.1651E+02	1.2158E+00	6.2900E+01	7.8015E+00	5.2205E+01	1.0367E+02	3.3722E+00	7.5919E+00	PLAN_INNER
9.1522E+01	1.1061E+02	7.0318E+00	2.3849E+01	3.3869E+01	2.0708E+01	1.1549E+02	4.2166E+00	8.5453E+01	2.1733E+01	1.9215E+01	5.6654E+01	2.6450E+01	1.7613E+01	PLAN_STR_1_15700
1.0705E+02	1.5013E+02	1.5859E+01	1.6085E+01	6.0387E+00	1.5456E+01	1.6185E+02	2.2155E+00	9.7723E+01	1.0394E+01	2.5327E+01	6.4311E+01	1.0180E+01	9.1561E+00	PLAN_STR_2_10900
8.7441E+01	1.3399E+02	2.8604E+01	2.7743E+01	9.6036E+00	3.0415E+01	1.4321E+02	1.0102E+00	7.7917E+01	4.5451E+00	7.8234E+01	1.0103E+02	3.6024E+00	6.1407E+00	PLAN_STR_3_6100
5.8119E+01	7.7172E+01	1.4407E+01	5.0949E+01	1.1462E+00	4.6840E+01	6.2855E+01	3.5046E+00	3.0286E+01	1.8372E+01	7.6851E+01	1.4633E+02	9.1475E+00	2.0457E+01	PLAN_UPPER
4.3599E+01	5.7722E+01	1.0034E+00	4.0965E+00	1.7580E+00	2.6633E+01	1.2631E+01	1.0368E+01	6.4261E+00	1.4155E+00	5.5773E+01	8.8354E+01	6.0943E+00	9.1886E+00	SECT_Fr_61_BHD
8.3037E+01	1.5451E+02	8.1734E+01	5.2362E+00	2.0282E+00	7.5478E+01	9.6953E+00	7.2634E+02	4.9564E+00	9.7801E+01	9.2503E+01	1.8626E+02	1.9570E+01	3.8586E+01	SECT_Fr_62
1.0845E+02	2.0526E+02	1.2041E+00	5.0632E+00	2.3435E+00	7.6729E+01	9.5151E+00	9.7749E+01	4.9967E+00	1.2300E+01	1.1964E+02	2.4106E+02	1.9976E+01	4.2894E+01	SECT_Fr_63
1.0723E+02	2.0765E+02	1.2840E+00	5.2579E+00	2.3028E+00	7.6389E+01	1.3424E+01	1.2891E+01	6.5659E+00	1.7258E+00	1.1934E+02	2.4590E+02	2.2419E+01	4.1505E+01	SECT_Fr_64
1.0650E+02	2.0730E+02	1.6435E+00	5.4413E+00	2.2796E+00	7.6079E+01	1.6594E+01	1.5209E+01	8.1323E+00	2.1783E+00	1.1966E+02	2.4779E+02	2.3203E+01	4.1577E+01	SECT_Fr_65
1.8570E+02	2.0339E+02	5.5084E+00	3.1811E+00	7.6235E+01	7.1925E+01	2.3430E+01	2.3914E+01	1.2624E+01	2.6334E+00	1.1952E+02	2.4532E+02	2.2691E+01	4.2697E+01	SECT_Fr_66
7.3299E+01	1.5304E+02	6.9978E+00	5.5378E+00	6.5901E+00	7.1965E+01	4.4243E+01	3.9983E+01	2.3201E+01	3.4431E+00	8.6977E+01	2.0048E+02	1.8721E+01	3.7335E+01	SECT_Fr_67
6.5179E+01	7.1825E+01	3.0181E+01	8.1533E+00	2.8391E+02	2.5374E+02	1.6828E+02	1.5587E+00	8.6977E+01	1.2663E+01	1.3423E+02	2.2939E+02	1.3985E+01	1.8840E+01	SECT_Fr_68_BHD
7.2004E+01	8.2404E+01	7.8769E+01	4.7612E+00	5.3018E+00	9.1127E+00	2.1980E+02	1.0739E+01	1.1235E+02	5.4420E+01	8.4868E+01	1.8899E+02	1.6304E+01	3.7315E+01	SECT_Fr_69
6.8291E+01	9.8346E+01	7.5816E+01	4.0124E+00	1.8605E+00	4.0881E+00	3.1730E+02	1.1828E+01	1.6270E+02	6.1826E+01	1.2152E+02	2.4768E+02	2.1135E+01	4.2660E+01	SECT_Fr_70
9.6910E+01	1.0540E+02	7.6002E+01	3.3478E+00	1.5143E+00	3.8246E+00	3.2865E+02	1.1345E+01	1.6948E+02	5.9932E+01	1.2157E+02	2.5228E+02	2.2960E+01	4.2422E+01	SECT_Fr_71
1.0703E+02	1.0944E+02	7.5740E+01	2.9205E+00	1.3281E+00	3.6160E+00	3.3265E+02	1.1293E+01	1.7895E+02	5.9632E+01	1.2102E+02	2.5199E+02	2.3419E+01	4.2254E+01	SECT_Fr_72
1.0189E+02	1.0974E+02	7.4657E+01	3.4800E+00	1.1753E+00	4.2242E+00	3.2943E+02	1.1619E+01	1.6995E+02	6.0867E+01	1.2014E+02	2.4739E+02	2.2794E+01	4.3003E+01	SECT_Fr_73
7.5245E+01	8.1502E+01	7.7925E+01	8.6544E+00	1.0578E+00	4.7082E+00	2.5438E+02	1.0655E+01	5.4120E+01	8.8534E+01	2.0181E+02	1.8761E+02	1.8761E+01	3.7889E+01	SECT_Fr_74
1.1022E+02	1.0041E+02	3.3772E+01	3.8317E+01	1.0252E+00	9.1123E+00	1.2814E+02	2.2407E+00	6.9295E+01	1.2936E+01	1.3017E+02	2.2215E+02	1.4013E+01	1.8308E+01	SECT_Fr_75_BHD
7.5052E+01	1.2153E+02	6.6877E+00	7.9581E+01	9.5576E+01	5.4023E+00	7.4966E+01	6.3962E+01	4.2876E+01	3.6281E+00	7.7594E+01	1.7744E+02	1.6324E+01	3.6502E+01	SECT_Fr_76
9.6333E+01	1.8490E+02	2.0146E+00	1.2787E+01	1.2787E+00	5.2502E+00	5.7137E+01	7.2670E+01	3.3827E+01	5.8666E+00	1.1519E+02	2.3497E+02	2.1121E+01	4.2645E+01	SECT_Fr_77
9.7622E+01	1.9172E+02	1.3923E+00	7.6916E+01	1.1770E+00	5.1472E+00	2.8841E+01	1.4690E+01	1.6674E+01	1.9708E+00	1.1337E+02	2.3522E+02	2.2836E+01	4.0945E+01	SECT_Fr_78
9.8620E+01	1.9449E+02	1.1119E+00	7.6411E+01	1.1248E+00	5.1192E+00	1.8373E+01	1.0671E+01	1.0544E+01	1.3853E+00	1.1118E+02	2.3087E+02	2.2994E+01	4.0462E+01	SECT_Fr_79
9.9393E+01	1.9296E+02	9.0331E+01	7.6275E+01	1.0029E+00	5.0854E+00	1.0233E+01	7.5232E+02	5.8761E+00	8.5698E+01	1.0940E+02	2.2363E+02	2.1888E+01	4.1202E+01	SECT_Fr_80
7.2036E+01	1.4540E+02	7.3733E+01	7.2987E+01	8.5818E+01	5.1200E+00	6.7627E+00	4.5707E+02	3.7067E+00	4.4489E+01	7.8286E+01	1.6081E+02	1.6327E+01	3.5305E+01	SECT_Fr_81
7.9288E+02	3.3669E+02	1.8190E+02	3.7689E+02	2.1467E+03	2.8422E+03	5.3614E+02	1.5292E+03	3.7979E+02	5.2407E+03	9.6252E+02	2.2054E+03	2.3076E+03	2.5319E+02	SECT_Fr_82_BHD

undo edit export to file... launch viewer

return

Command: 46161 DISP - loadcase 14 (deformation)
38046 STRESS - loadcase 14 (contour)
done.

CMD: Log Message

mva translate align new elem ecp split
merge emod mc check rchk solid
diagnosis ASSOC normal CAPR NCON boff

all select marked

start return

57.471 fps *** 4.01.249 x64

DETAILED REPORT (REPORT)

- ❖ 지정한 Element와 선택한 Subcase 결과를 Text로 확인 가능
- ❖ Max/Min/AVG 출력 가능

Report Result

value display marker **detailed report**

current result select results

subcase: all subcases (14)

deform: undeformed

contour: stress (14)

LC1_STATIC
LC2_DYNAMIC
LC3_
LC4_
LC5_
LC6_
LC7_
LC8_
LC9_
LC10_
LC11_
LC12_

all ... clear

result type: scalar contour

report type: maximum

select: node element face

report total sum
 report face area
 global min/max summary

report

Result Report

Result Report

Element, SHELL MAX (EL) - VON MISES
74937, 22.95735

Total SHELL MAX (EL) - VON MISES = 22.95735

Result: C7 STRESS 7, LC2_INTERNAL_PRESS_WB3
Entity: Element Scalar (stress)

Element, SHELL MAX (EL) - VON MISES
74937, 75.796

Total SHELL MAX (EL) - VON MISES = 75.796

Result: C8 STRESS 8, LC2_INTERNAL_PRESS_WB4
Entity: Element Scalar (stress)

Element, SHELL MAX (EL) - VON MISES
74937, 14.84304

Total SHELL MAX (EL) - VON MISES = 14.84304

----- Summary Information -----

< Result Names >

1. C1 STRESS 1, LC1_EXTERNAL_PRESS_SHELL
2. C2 STRESS 2, LC1_INTERNAL_PRESS_COT4
3. C3 STRESS 3, LC2_EXTERNAL_PRESS_P1_SHELL
4. C4 STRESS 4, LC2_EXTERNAL_PRESS_P2_DECK
5. C5 STRESS 5, LC2_EXTERNAL_PRESS_P2_SHELL
6. C6 STRESS 6, LC2_INTERNAL_PRESS_COT4
7. C7 STRESS 7, LC2_INTERNAL_PRESS_WB3
8. C8 STRESS 8, LC2_INTERNAL_PRESS_WB4

< Min/Max Values >

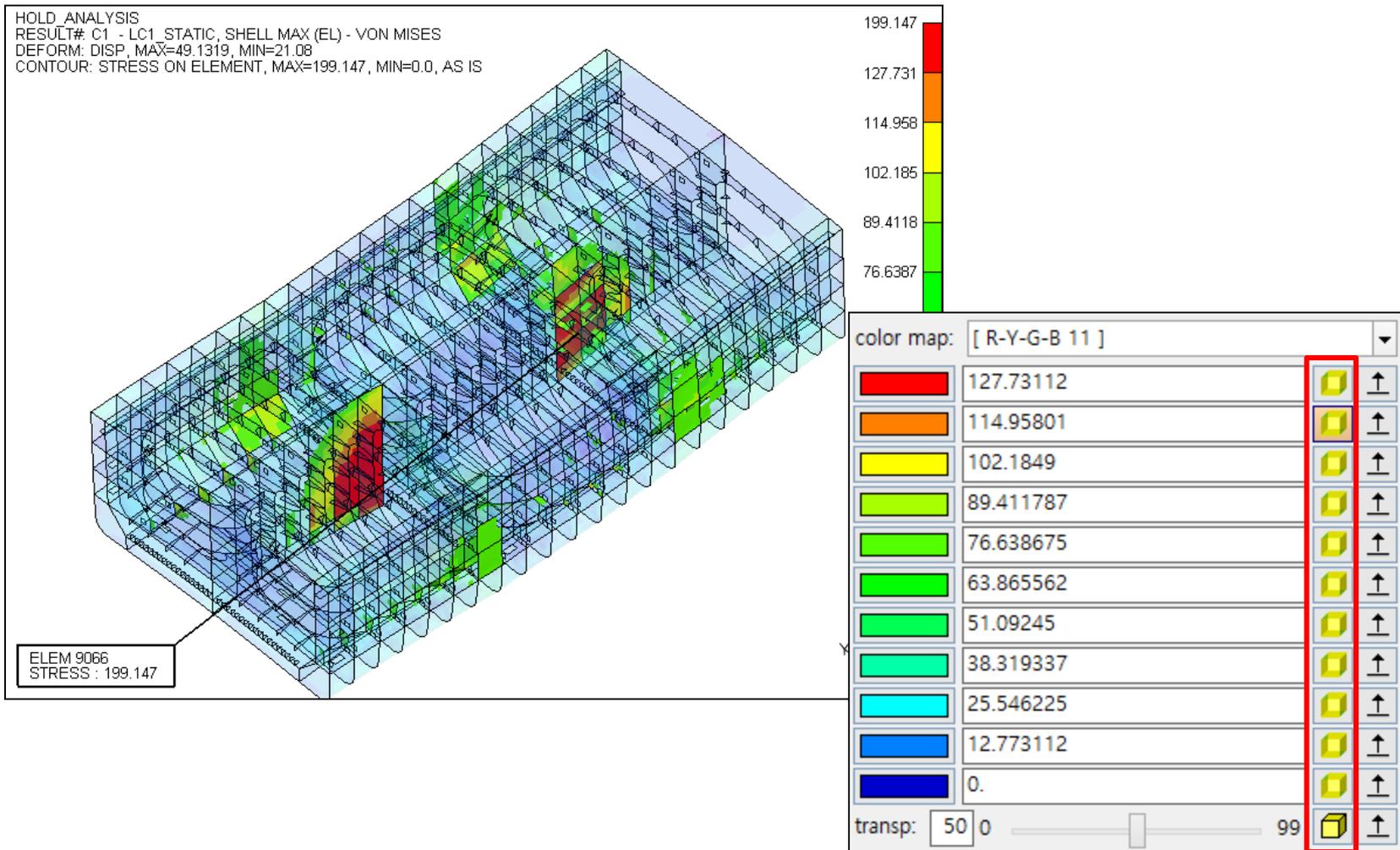
Result ID	Entity ID	Position	SHELL MAX (EL) - VON MISES
Min:	5	74937	13.88869
Max:	3	74937	150.4929

undo edit export to file... launch viewer

return

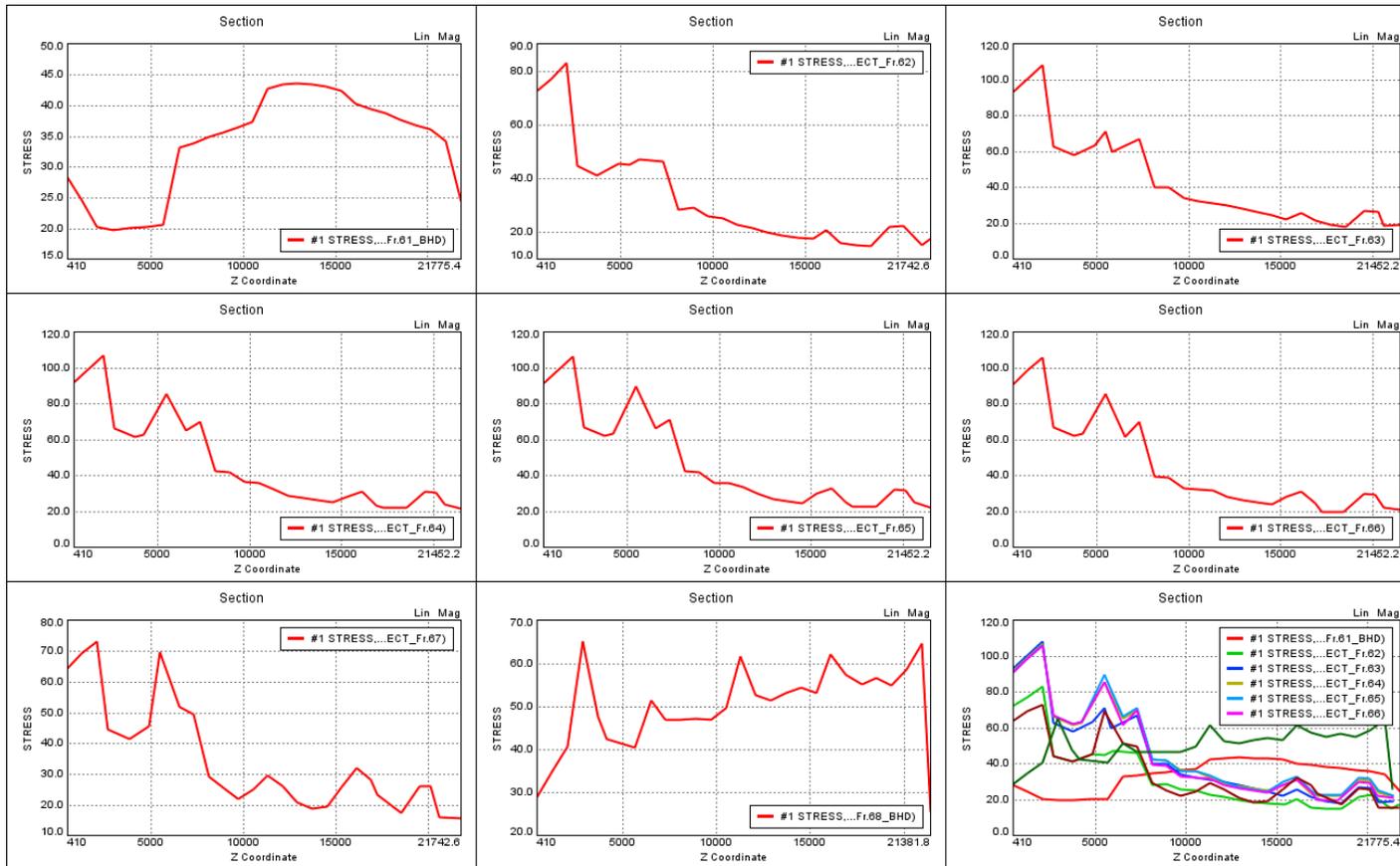
TRANSPARENCY (TPNC)

- 특정 Stress 값 보다 작은 요소의 투명도 조절 가능



GRAPH (PLOT)

- ❖ 여러 개의 Viewport를 이용하여 그래프 작성 가능
- ❖ 그래프 정보만 파일로 관리 가능



graph.gpf

BOUNDARY REPORT (BREP)

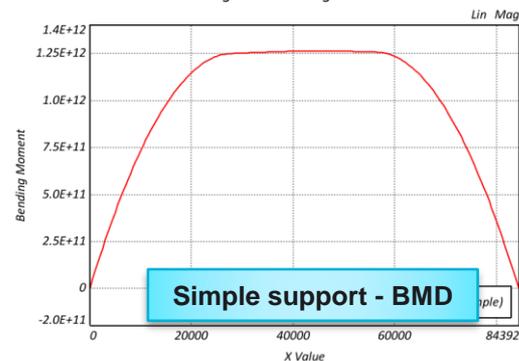
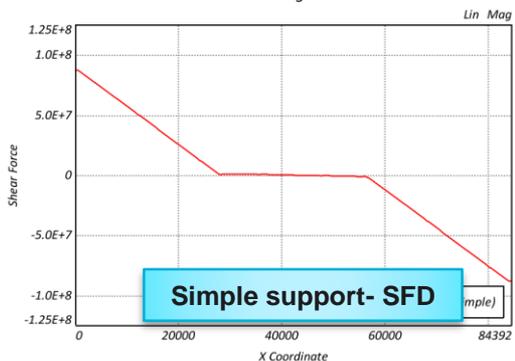
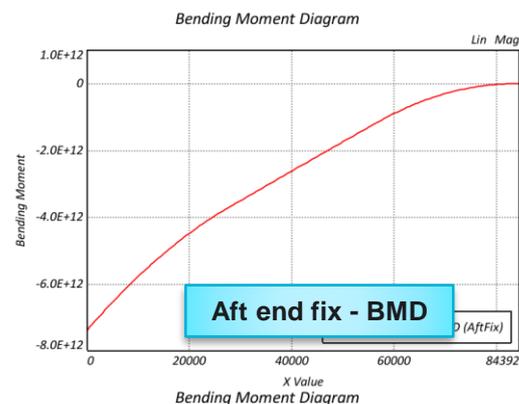
- ✦ Shear force & Bending moment diagram 작성 기능
- ✦ Aft end, Fore end, Simple support 지원
- ✦ Text report 출력 가능

Report Window

Vertical SFD & BMD

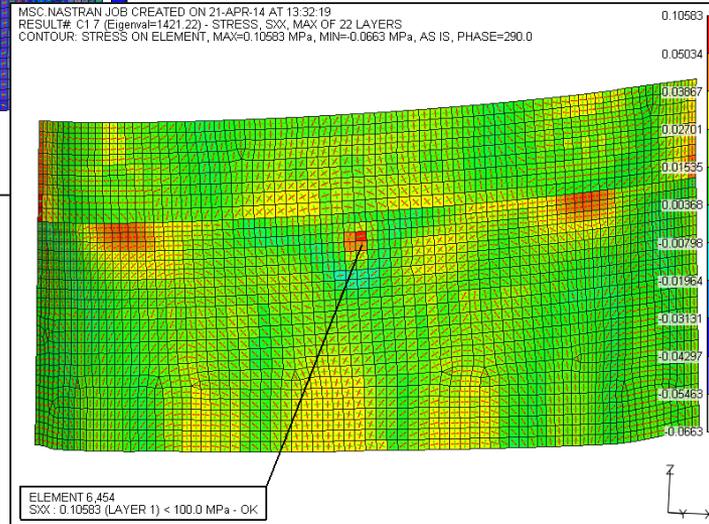
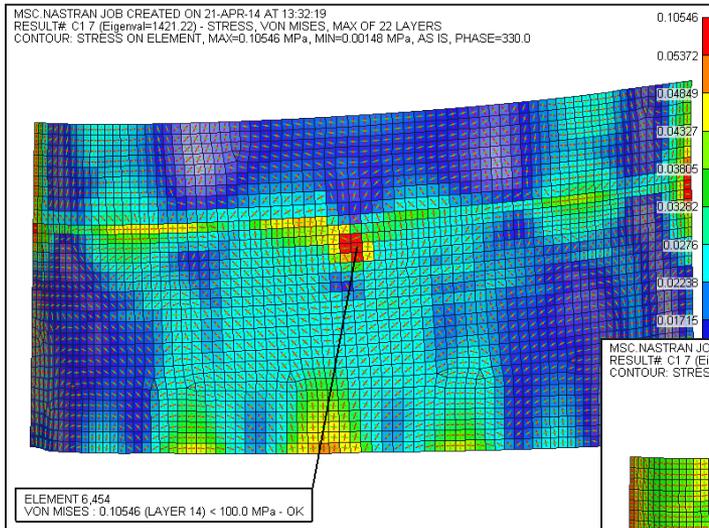
A	B	C
Subcase	LC1_Static	
Condition	Aft Fix	
X_Location	V.Shear_Force	V.Bending_Moment
0.0	175018093.	-7.3732E+12
500.0	174804082.	-7.2855E+12
1000.0	173235751.	-7.1985E+12
1500.0	171660595.	-7.1122E+12
2000.0	170085443.	-7.0268E+12
2500.0	168518056.	-6.9422E+12
3000.0	166973110.	-6.8583E+12
3500.0	165368213.	-6.7752E+12
4000.0	164002120.	-6.6929E+12
4500.0	162547745.	-6.6112E+12
5000.0	160918897.	-6.5304E+12
5500.0	159284873.	-6.4503E+12
6000.0	157648444.	-6.3711E+12
6500.0	156010448.	-6.2927E+12
7000.0	154369473.	-6.2151E+12
7500.0	152731432.	-6.1383E+12
8000.0	151342201.	-6.0623E+12
8500.0	149866680.	-5.987E+12
9000.0	148219477.	-5.9125E+12
9500.0	146572163.	-5.8388E+12
10000.0	144924848.	-5.7659E+12
10500.0	143277534.	-5.6938E+12
11000.0	141630220.	-5.6226E+12
11500.0	139986713.	-5.5522E+12
12000.0	138594648.	-5.4826E+12
12500.0	137118849.	-5.4136E+12
13000.0	135471535.	-5.3455E+12
13500.0	133824220.	-5.2782E+12

export to file... launch exte



POST PROCESSING OPTION (POPT) – ANIMATION CONTROL

- ❖ Complex stress/strain 결과를 지원
- ❖ Animation 수행 시 value text와 marker가 실시간으로 반영된다. ([Complex_Von.gif](#) 참조)



The screenshot shows the Post Processing Option (POPT) dialog box. The 'dynamic' tab is selected. The 'animation control' section is highlighted with a red box and contains the following settings:

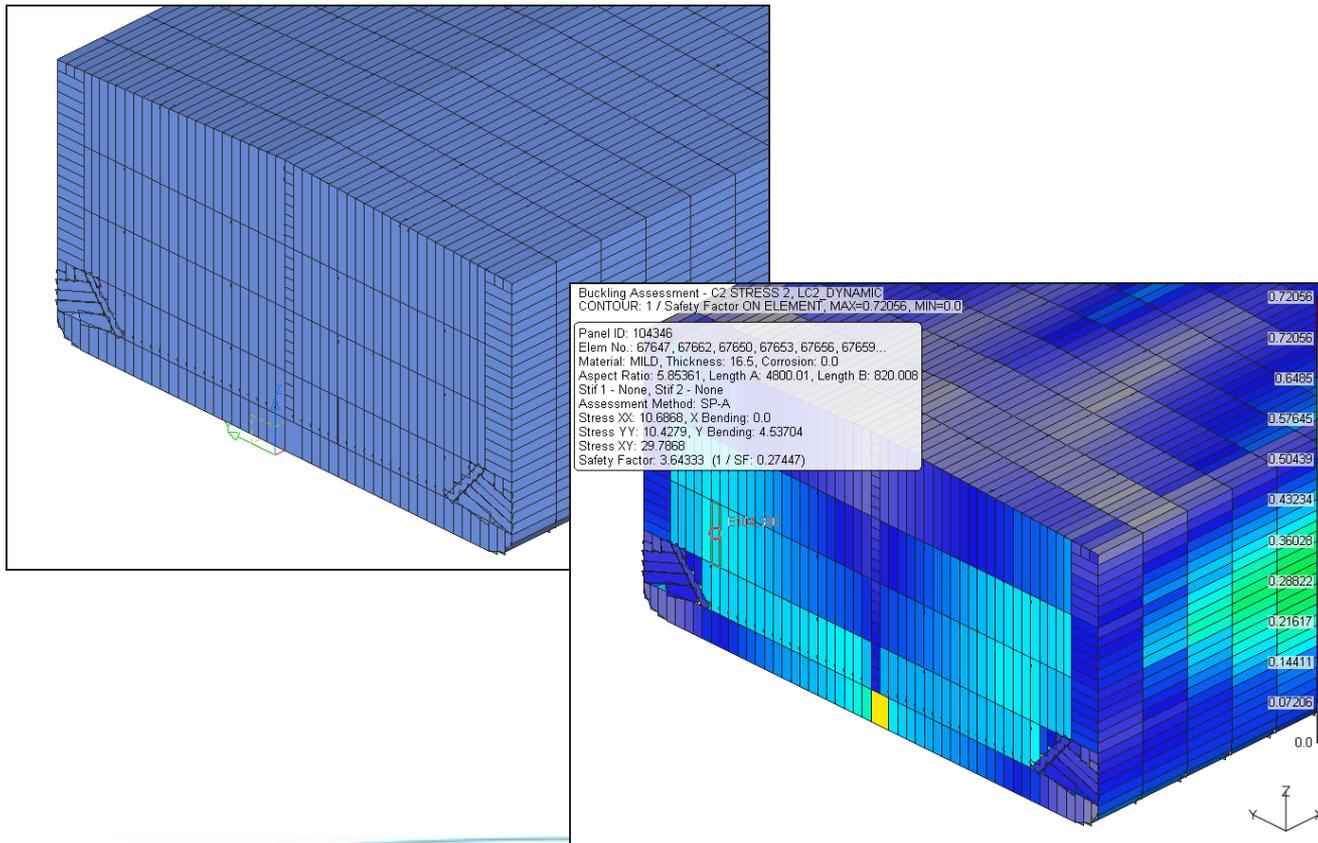
- frame: 24 1 (range 1 to 36)
- # frames: 36 (options: 8, 16, 24)
- delay (msec): 50 (options: 50, 100, 200)
- vary color: contour only

Other settings in the dialog include:

- ship: static, dynamic, report & tools
- subcase: C1 - LC_100
- deform: undeformed
- contour: stress (11)
- animation control: C1 mode 1 (0.0 Hz), C1 mode 2 (1.0 Hz), C1 mode 3 (2.0 Hz), C1 mode 4 (3.0 Hz), C1 mode 5 (4.0 Hz)
- calculation: element
- header... and value probe... are checked
- scale & color bar... is checked
- sync post, best deform view, flip phase (+180), and SPL mode ON are also visible.

BUCKLING ANALYSIS (BUCK)

- ❖ Lloyd's Register, CSRH 계산 지원
- ❖ Buckling panel 자동 생성
- ❖ Buckling report 자동화
- ❖ 뛰어난 계산 속도



Buckling Analysis

Lloyd's Register

create modify solve **post**

rule: Lloyd's Register

show: elem panel all auto

buckling results:

- Worst Case
- STRESS 1, LC1_STATIC
- STRESS 2, LC2_DYNAMIC
- STRESS 3, LC3_
- STRESS 4, LC4_
- STRESS 5, LC5_
- STRESS 6, LC6_
- STRESS 7, LC7_

result type: 1 / safety factor (eta)

cut range

lower cut < 0.0

upper cut > 0.0

value id system no light

screen monitor

elem info length info edge info

assessment stress xx stress yy

stress xy safety factor

table report

detailed summary