

The slide features a dark blue background with a teal gradient in the center. It is decorated with several white circular shapes of varying sizes and a lime green vertical bar in the top right corner. The text 'TOCTOC' is centered in white, and the names '김태완' and '도경민' are positioned in the bottom right in lime green.

TOCTOC

김태완  
도경민

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# 팀명소개

톡톡?!(TOCTOC) : Top Optimized Car





# 설계목표

OBJECT : **Optimized** relation between **Mass condition** and **Maximized Stiffness**

VARIABLES : Beam Topology and Cross-section measurement

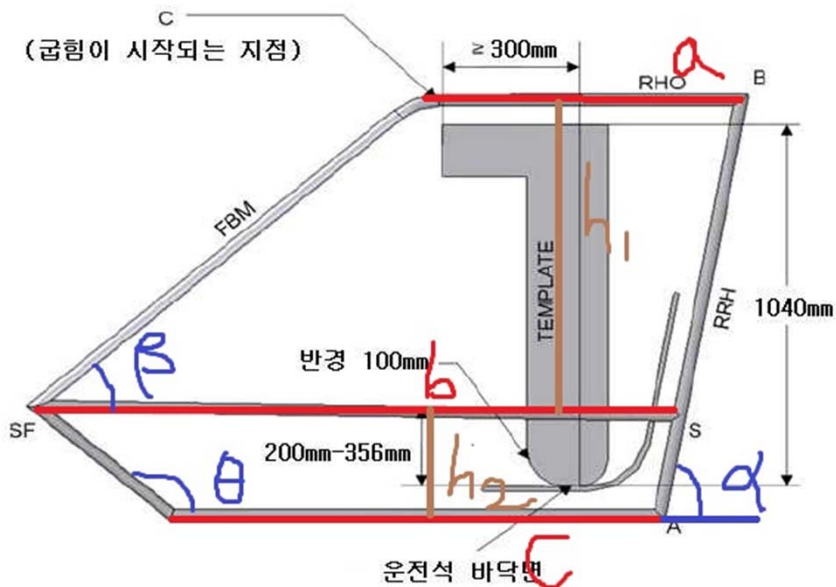
PERFORMANCE REQUIREMENTS :

$W < 55\text{Kg}$ ,  $K_{bending} > 7000\text{N/mm}$ ,  $K_{bending} > 12000\text{N/mm}$ , Frequency  $> 40\text{Hz}$

# 설계과정

ROLLCAGE

## Notation and Criteria



**a** : 설계변수

**b, c** : 종속변수

**α** : 앉을 때 가장 편안함을 느끼는 75°

**B** : 저항을 가장 덜 받는 45°

**θ** : 발목의 145°

**h<sub>1</sub>, h<sub>2</sub>** : 임의의 설정 값 1050, 250

# 설계과정

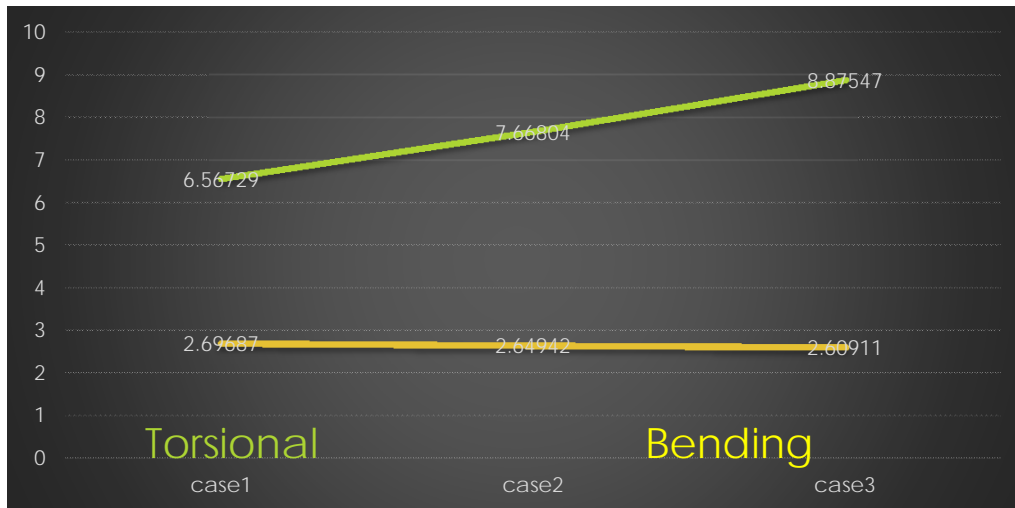
ROLLCAGE

## SAMPLING

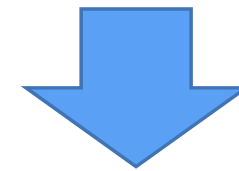
Case1. a=800mm

Case2. a=900mm

Case3. a=1000mm



a의 길이의 변화에 따른 Torsional displacement의 변화가 Bending displacement의 변화보다 더 크므로 Torsion이 더 Dominant함



$$\tan^{-1} \frac{x}{w} = \theta, \quad \frac{T}{\theta} = K$$

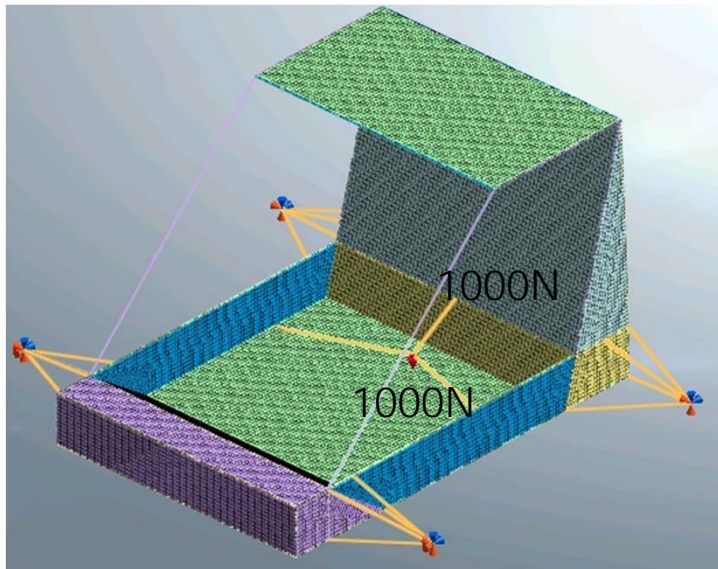
**Case 1 결정!**

# 설계과정

TOPOLOGY

## LOADINGS AND CONSTRAINTS

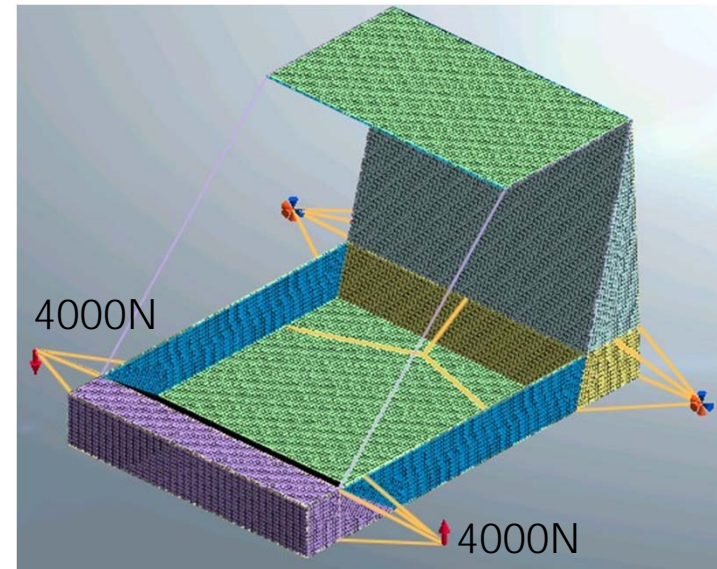
<BENDING>



앞바퀴  
고정구속

뒷바퀴  
Tx를 제외한  
5자유도 구속

<TORSION>

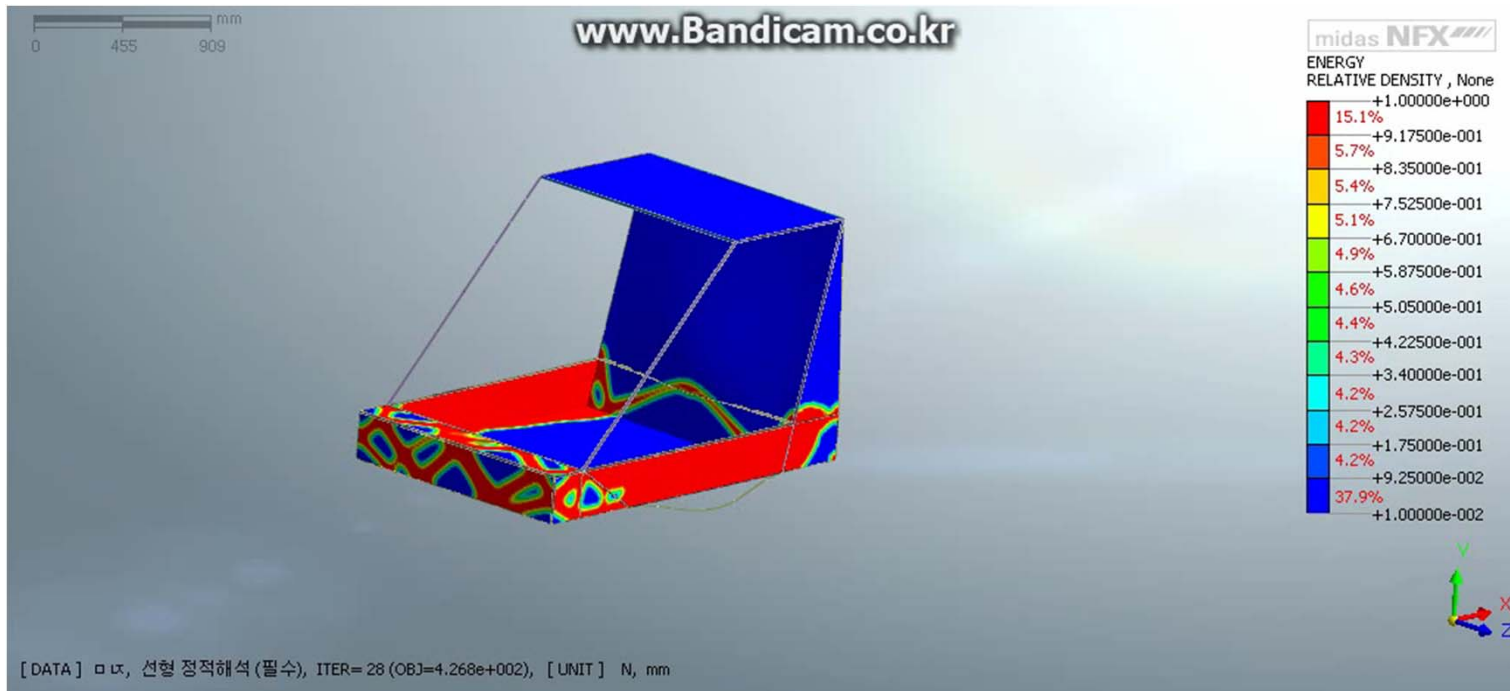


뒷바퀴  
Rx를 제외한  
5자유도 구속

# 설계과정

TOPOLOGY

## ANALYSIS

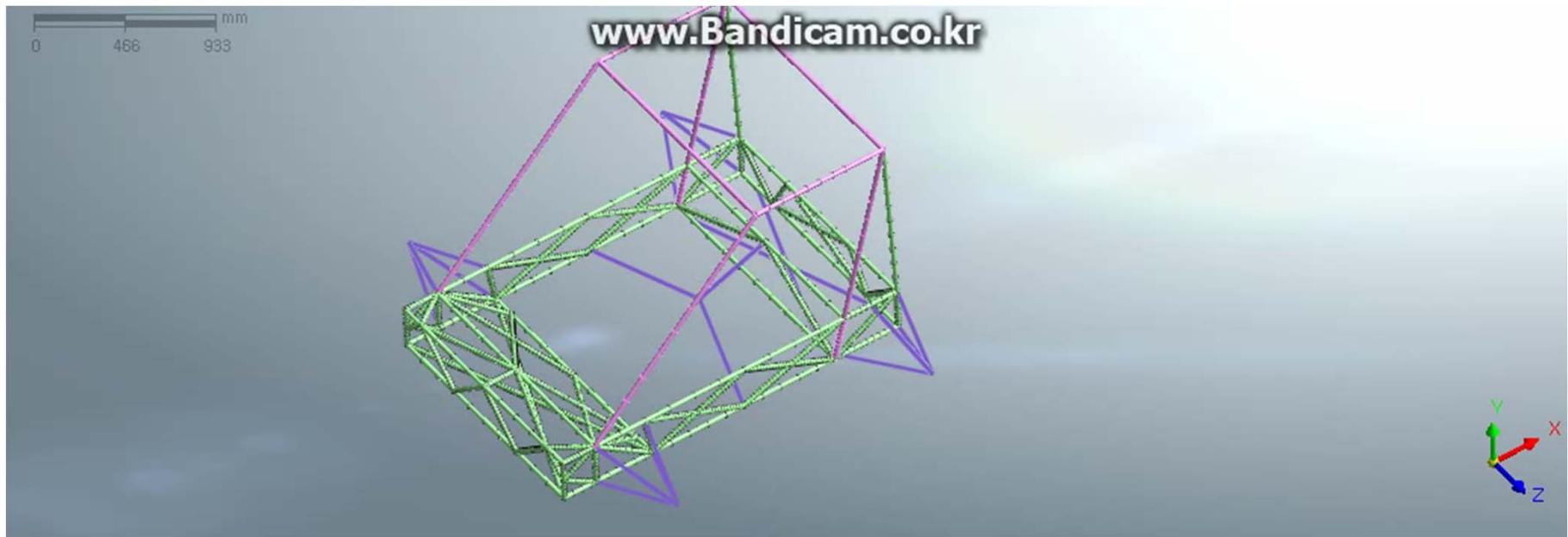




# 설계과정

TOPOLOGY

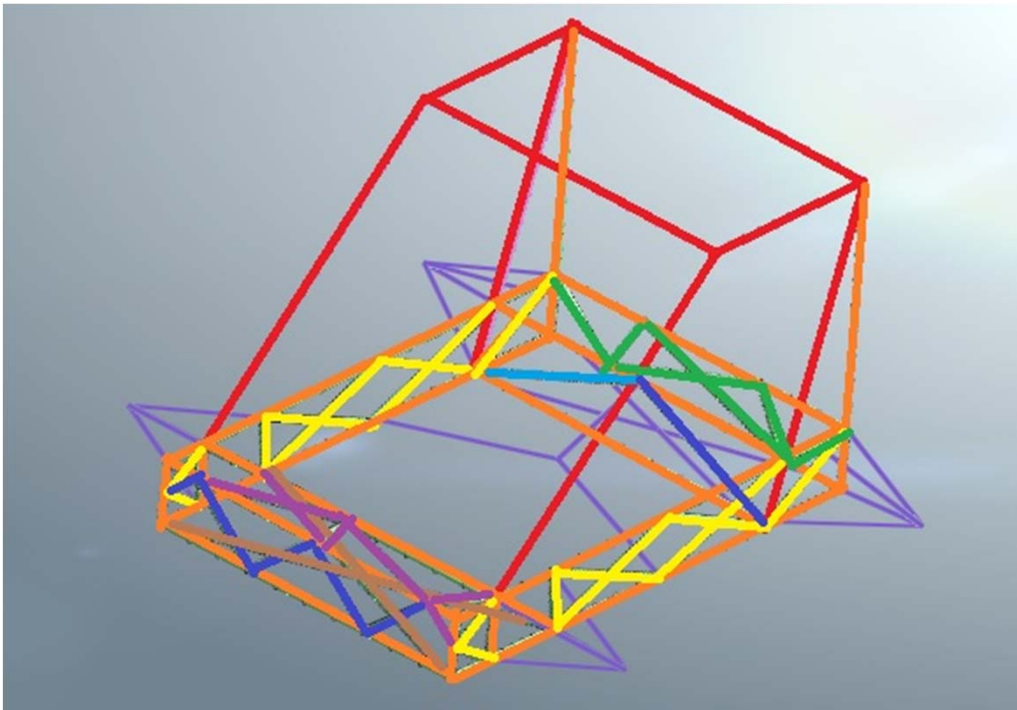
FINAL



# 설계과정

SIZE

## VARIABLE MESHES



1. 10.5mm
2. 11mm
3. 11.5mm
4. 10.2mm
5. 9.13mm
6. 10.4mm
7. 11.1mm
8. 11.1mm

# 설계과정

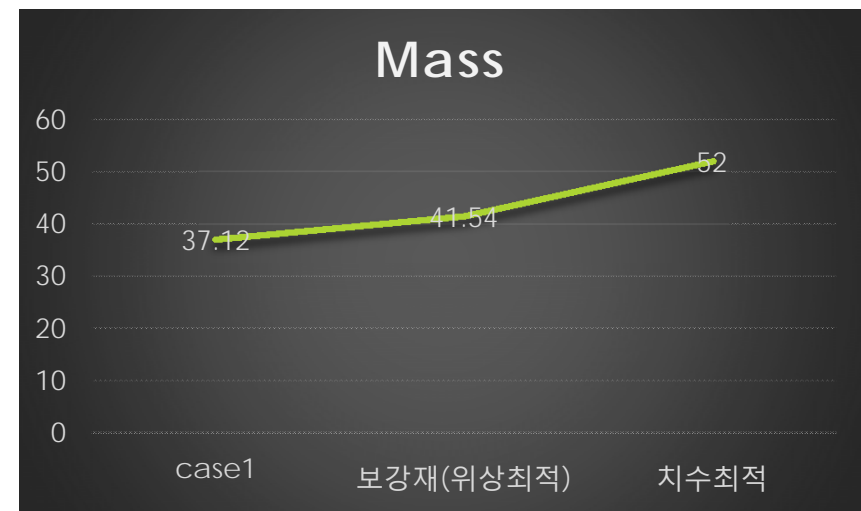
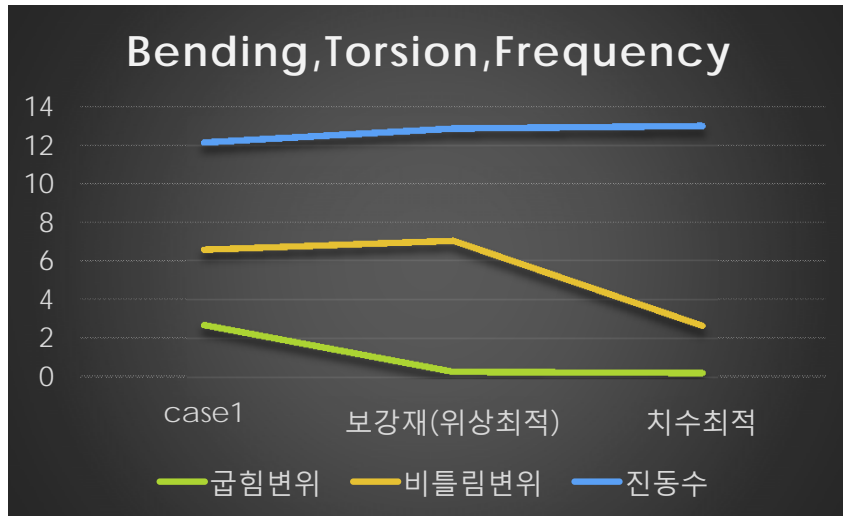
SIZE

Process table

번호	유형	설계변수-1	설계변수-2	설계변수-3	설계변수-4	설계변수-5	설계변수-6	설계변수-7	설계변수-8	부피	금인	도선
78	LHD	8.213210e+	2.854060	4.331710e+0	1.671470e	6.993170e-0	3.813720e+000	2.088830e+000	3.088070	2.521990e	4.67258	1.121810e+000
79	LHD	8.274420e+	8.425530	1.020400e+0	1.301830e	1.202100e+0	8.995450e+000	2.874970e+000	4.318840	2.318980e	8.97484	1.420500e+000
80	LHD	8.394900e+	4.251370	9.862710e+0	4.751370e	1.099350e+0	2.387330e+000	6.293150e+000	2.725440	2.348190e	4.47455	1.164050e+000
81	LHD	8.519990e+	1.063240	5.945760e-0	1.298260e	1.115230e+0	6.196680e+000	1.743570e+000	7.280500	1.705460e	8.21780	2.570920e+000
82	LHD	8.676010e+	7.109470	4.831590e+0	4.374900e	3.547540e+0	8.708860e+000	1.152990e+001	5.900160	1.865380e	5.45586	1.671650e+000
83	LHD	8.710180e+	2.812320	8.841730e+0	9.773430e	9.957370e+0	5.708870e+000	8.127180e+000	1.497440	2.251980e	5.28728	1.171010e+000
84	LHD	8.809100e+	3.915280	8.086100e+0	1.120490e	8.491970e+0	3.011800e+000	7.517630e+000	2.483870	2.092700e	6.17767	1.279710e+000
85	LHD	8.964810e+	9.895310	5.741610e+0	6.067050e	1.445970e+0	7.797960e+000	1.142070e+001	5.180610	1.461550e	7.54043	2.448290e+000
86	LHD	9.037550e+	5.711130	6.115650e+0	1.396760e	7.859190e+0	1.142240e+001	5.162900e+000	8.293090	2.053960e	5.45686	1.433790e+000
87	LHD	9.129970e+	8.379530	8.229290e+0	5.520080e	7.713880e+0	2.941550e+001	8.623010e+000	3.228910	1.712030e	7.44550	1.748330e+000
88	LHD	9.232850e+	1.296420	1.180500e+0	8.964340e	2.792340e+0	4.320080e+000	1.657890e+000	7.822090	2.493210e	4.29340	1.068810e+000
89	LHD	9.414720e+	4.447480	2.236150e+0	6.458280e	1.072060e+0	9.463510e+000	7.128180e+000	4.826770	2.169050e	4.57184	1.220070e+000
90	LHD	9.507490e+	1.081170	1.029210e+0	4.446200e	2.267020e+0	6.494830e+000	1.069930e+001	9.465200	1.105920e	1.41277	3.525200e+000
91	LHD	9.608640e+	5.266540	9.153540e+0	8.850490e	1.018200e+0	1.341070e+001	1.165070e+000	8.997280	2.038870e	7.40582	1.502020e+000
92	LHD	9.677880e+	6.127520	1.947350e+0	1.046270e	6.183090e+0	1.751460e+000	7.265800e+000	3.290400	2.442790e	4.26170	1.092160e+000
93	LHD	9.776160e+	9.484850	7.175420e+0	4.802200e	3.508470e+0	3.526550e+000	8.742010e+000	1.153450	1.409900e	7.64760	2.577770e+000
94	LHD	9.951850e+	1.022700	4.521580e+0	2.239220e	6.462620e+0	1.071160e+001	9.408150e+000	7.096830	1.414500e	7.78399	2.479820e+000
95	LHD	1.000990e+	2.401540	6.276490e+0	2.776890e	9.522550e+0	2.607290e+000	6.672630e+000	9.790420	2.189530e	5.15325	1.292170e+000
96	LHD	1.009290e+	6.736190	9.314460e+0	1.057320e	6.552520e+0	2.224890e+001	1.046590e+000	8.223510	1.860050e	7.95588	1.562470e+000
97	LHD	1.027230e+	8.525940	3.004270e+0	7.531050e	2.485540e+0	5.948580e+000	4.590280e+000	6.542570	1.811770e	5.80156	1.882520e+000
98	LHD	1.034700e+	3.963280	1.107820e+0	6.753300e	9.308090e+0	1.084240e+001	8.147840e+001	2.238760	1.971490e	1.28968	1.771880e+000
99	LHD	1.045870e+	5.199730	8.285010e+0	7.980810e	8.902150e+0	5.515960e+001	3.623430e+000	1.128220	1.917620e	6.52316	1.644110e+000
100	LHD	1.051980e+	5.873040	7.348680e+0	7.452410e	9.991180e+0	8.389160e+000	8.129470e+000	5.487420	1.891830e	6.02457	1.409490e+000

# 설계결과

FINAL RESULT



# 설계결과

## DISCUSSION

강성, 질량 조건 만족 진동수 불만족

넓은 폭에 비해 밑 높이가 낮은 것이 원인인 듯

Q&A



NAVER