



차체구조 프레임 카 설계

Finishing Le Mans

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2010009097 김준환

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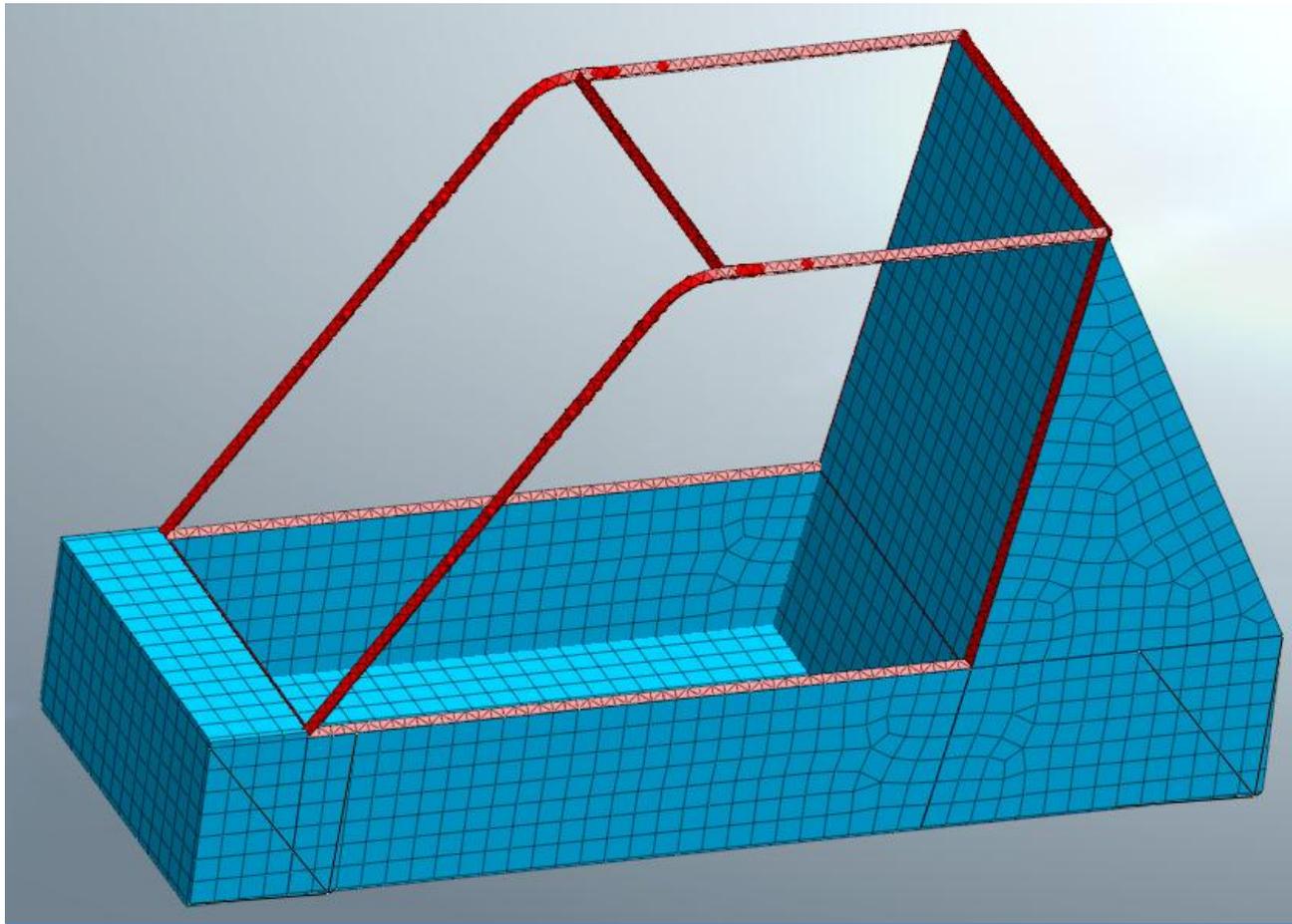
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1. 규격



AISI 1020

$E=200\text{GPa}$

$\rho=7.9\text{e-}6 \text{ kg/mm}^3$

인장강도 : 420 N/mm^2

폭

전장

축거

전고

750mm

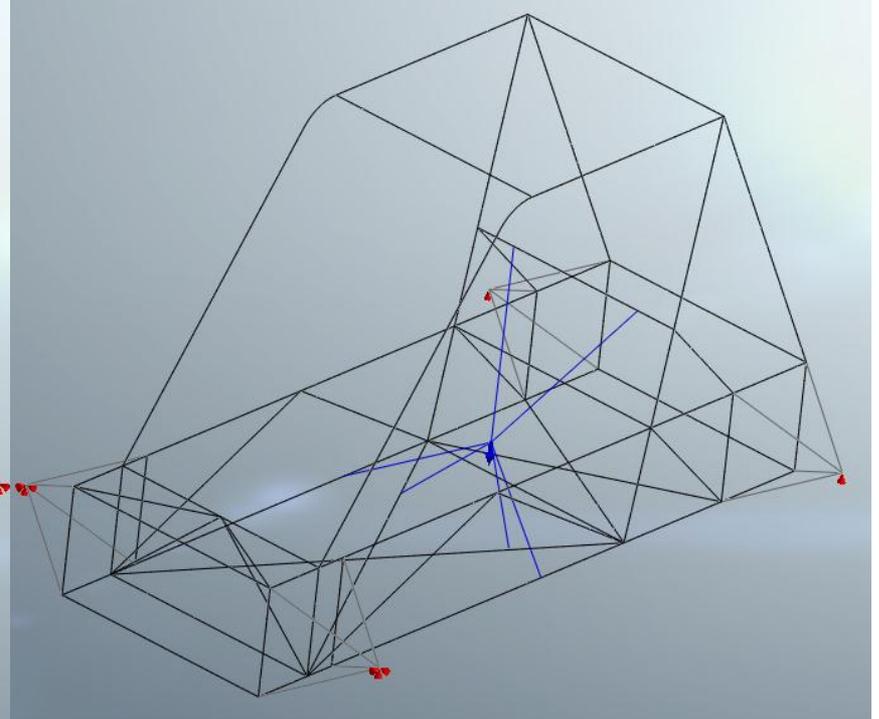
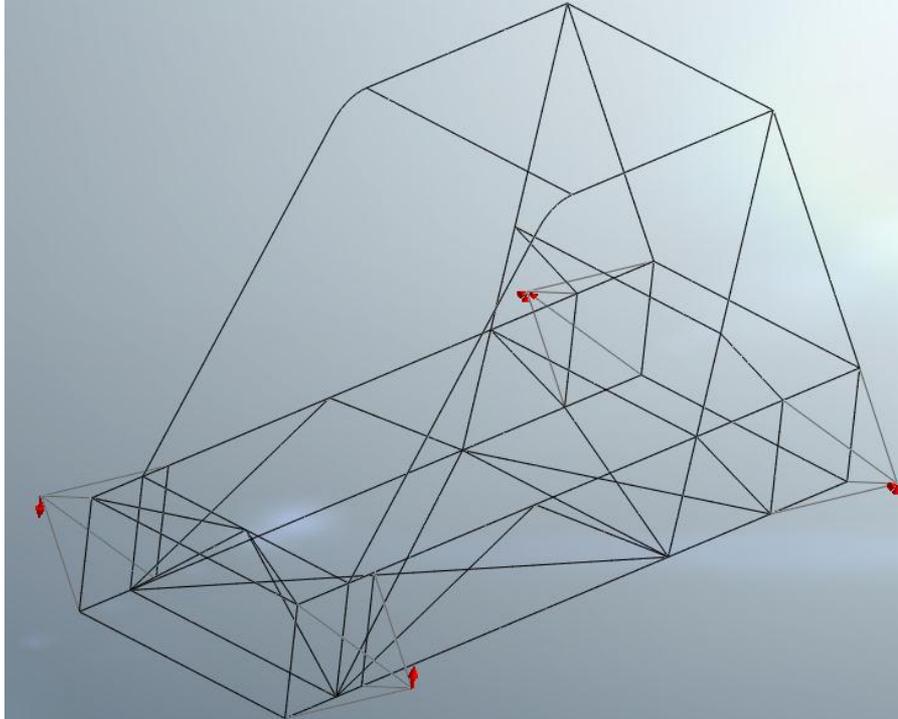
2200mm

1900mm

1300mm



1. 규격



비틀림 해석

구속조건 : 뒷바퀴 핀고정

하중 : 4000N

굽힘 해석

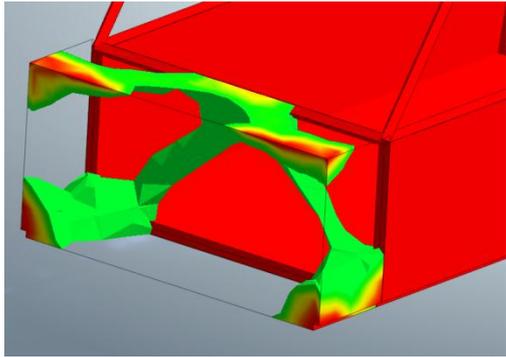
구속조건 : 앞바퀴 핀고정

뒷바퀴 dz고정

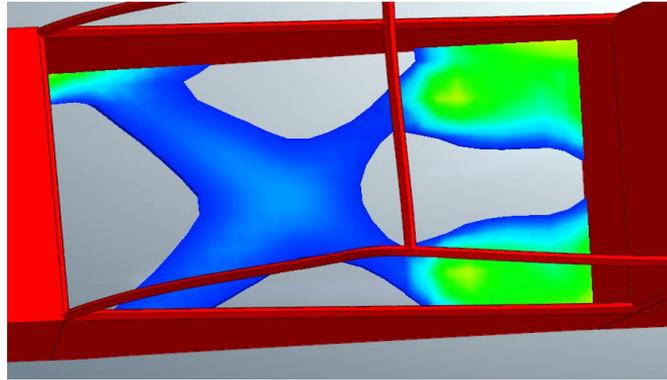
하중 : 리모트 하중 1500N



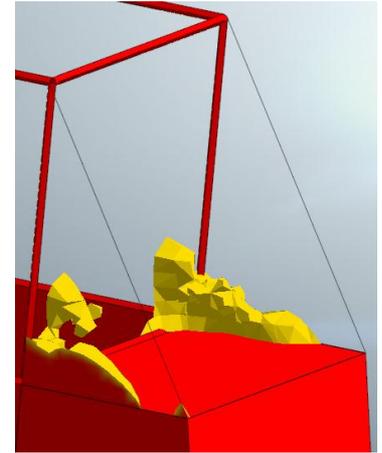
2. 위상최적화



Front

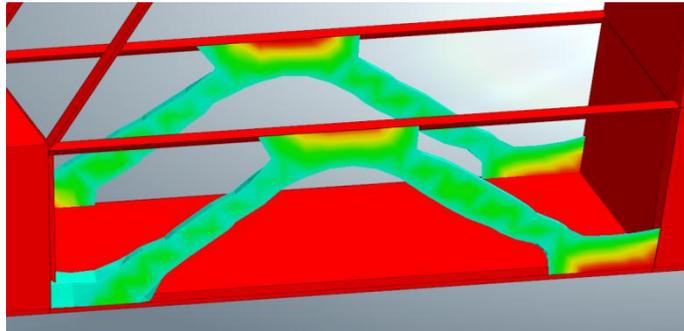


Bottom

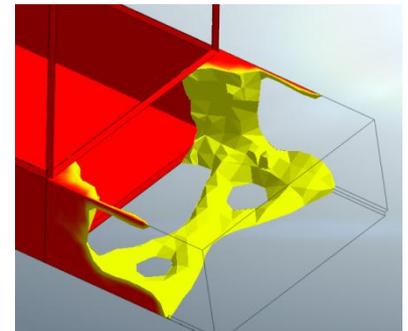


Rear up

목표 부피 : 15%



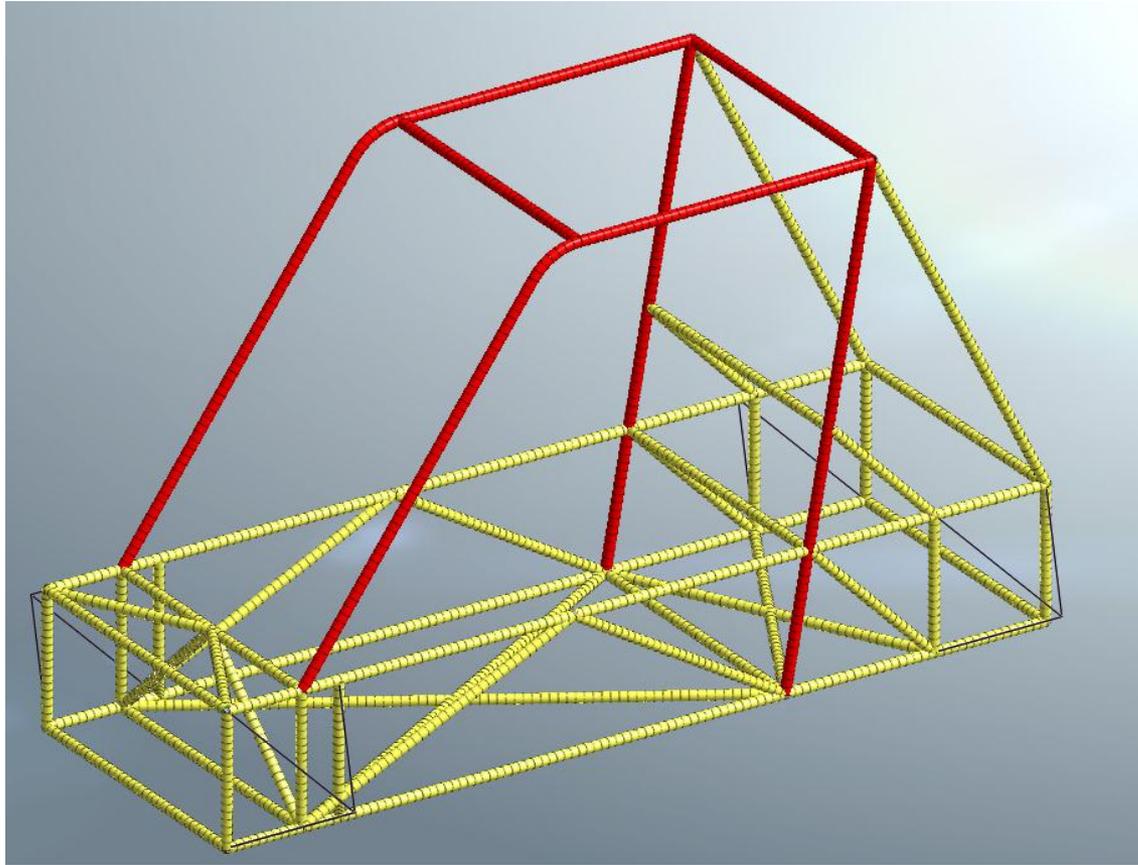
Side



Rear down



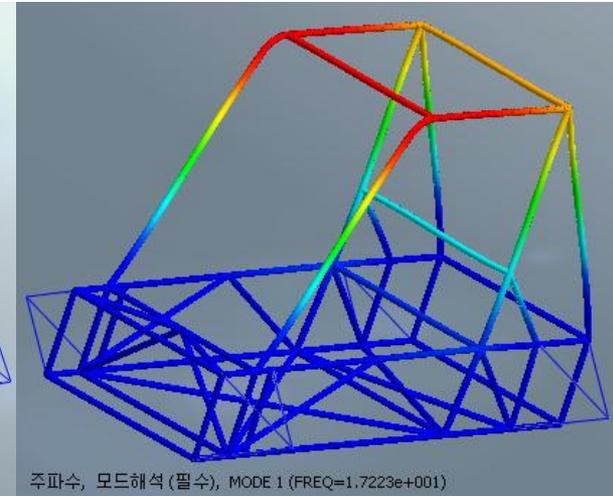
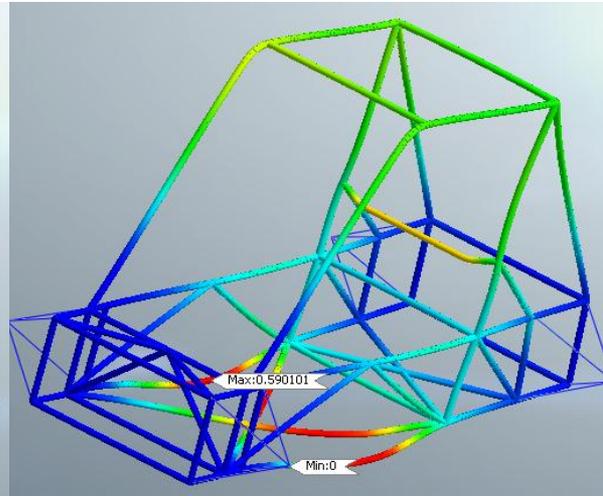
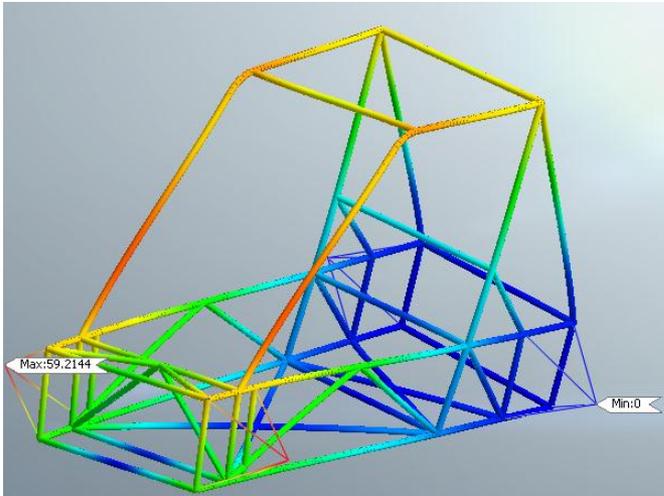
2. 위상최적화



	외경(mm)	두께(mm)
Roll Cage	27	2.9
Pipe	25	0.9



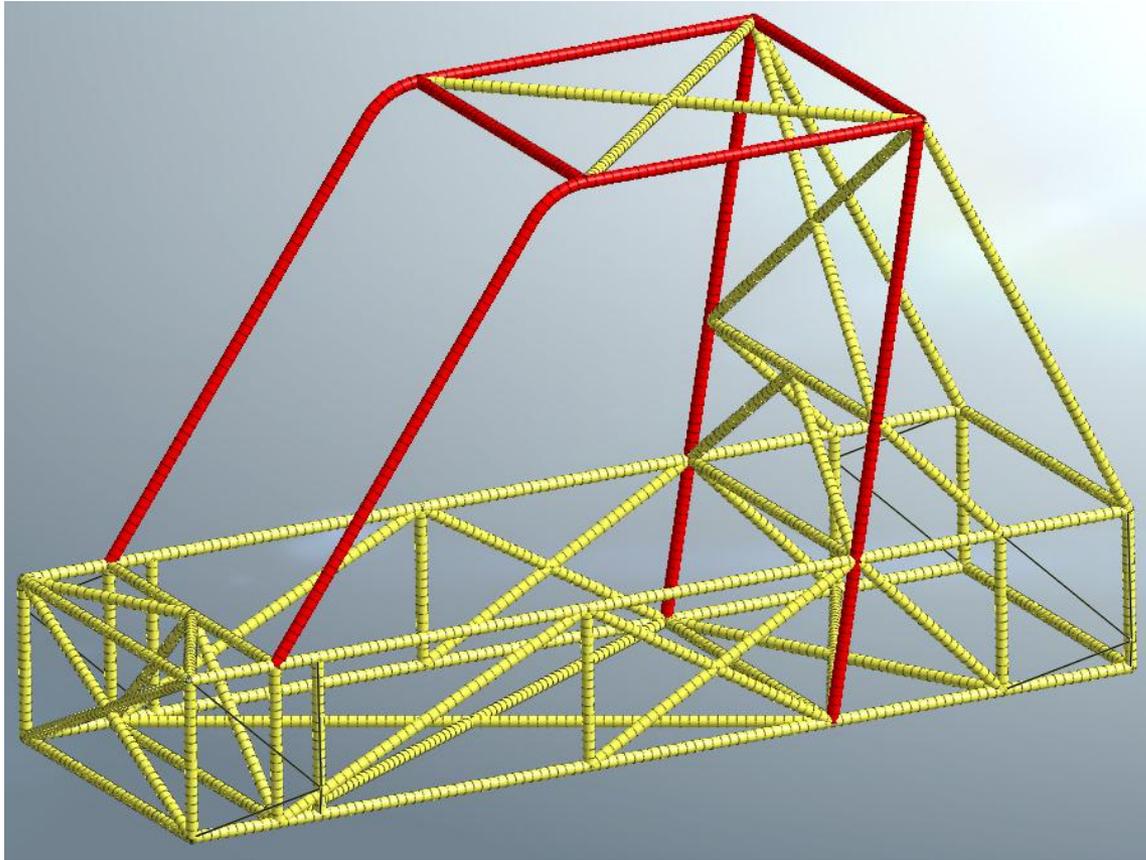
2. 위상최적화



비틀림 해석	굽힘 해석	모드 해석	무게
59.21mm	0.5901mm	17.22Hz	31.56kg
61,718kNmm/rad	2,542N/mm		



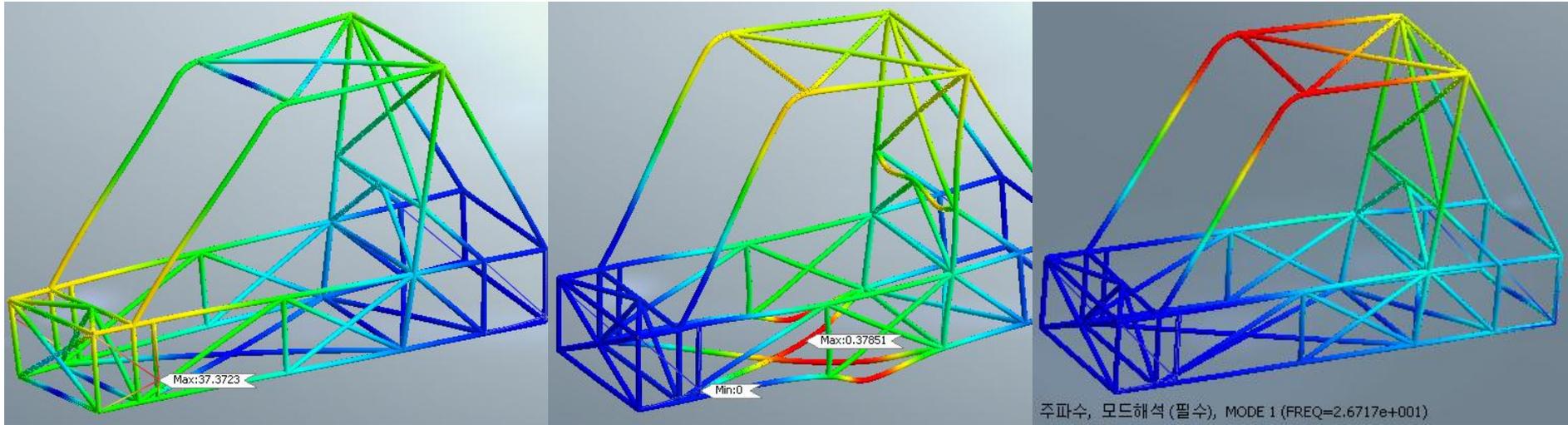
3. 보강재 추가



	외경(mm)	두께(mm)
Roll Cage	27	2.9
Pipe	25	0.9



3. 보강재 추가

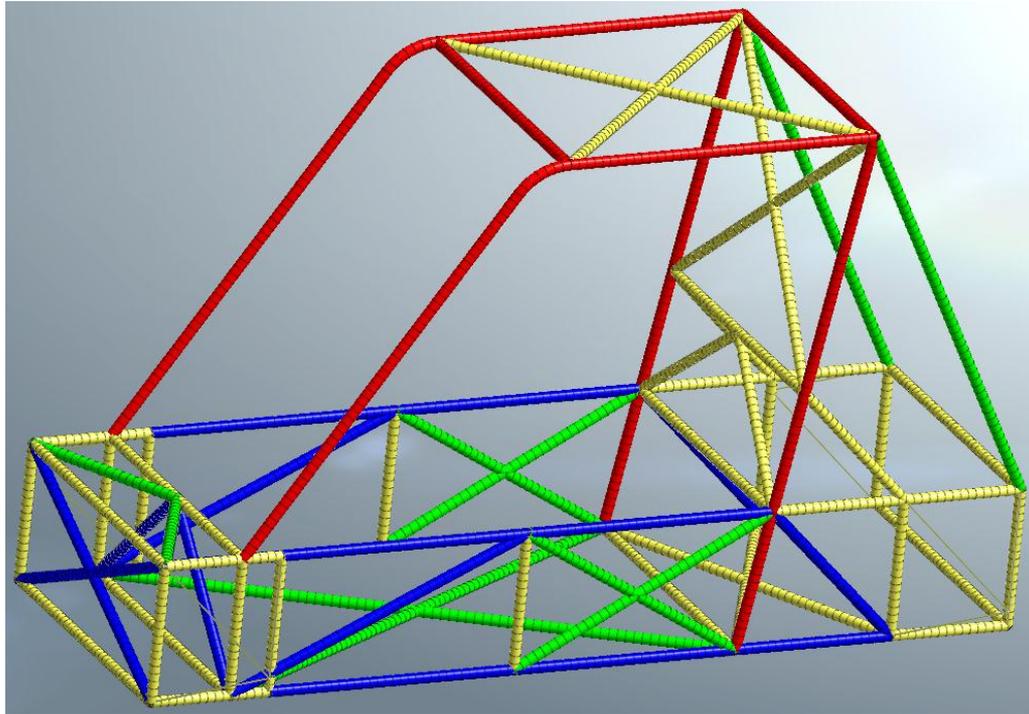


비틀림 해석	굽힘 해석	모드 해석	무게
37.37mm	0.3785mm	26.72Hz	36.42kg
108,486kNmm/rad	3,963N/mm		

46,768kNmm/rad증가 1,422N/mm증가 9.5Hz증가 4.86kg증가



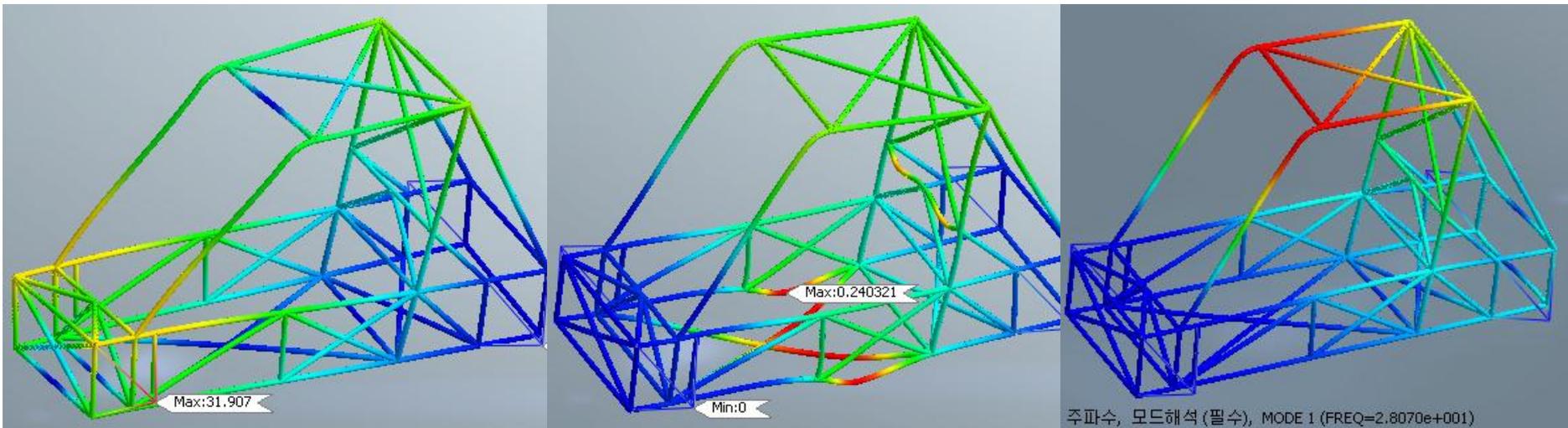
4. 단면적 증가



	외경(mm)	두께(mm)
Roll Cage	27	3
Pipe 1	25	0.9
Pipe 2	27	1.3
Pipe 3	27	1.8



4. 단면적 증가



비틀림 해석	굽힘 해석	모드 해석	무게
31.907mm	0.2403mm	28.07Hz	45.85kg
126,776kNmm/rad	6,242N/mm		

18,290kNmm/rad증가 2,279N/mm증가 1.35Hz증가 9.61kg증가



5. 결과비교

	비틀림 해석	굽힘 해석	모드 해석	무게
위상최적화	61,718kNmm/rad	2,542N/mm	17.22Hz	31.56kg
보강재 추가	108,486kNmm/rad	3,963N/mm	26.72Hz	36.42kg
단면적 증가	126,776kNmm/rad	6,242N/mm	28.07Hz	45.85kg

무게 14.29kg 증가

비틀림 강성 → **106% 증가**

굽힘 강성 → **146% 증가**

진동수 → **63% 증가**



Q&A

참고 : Baja차량기술규정집, 자작자동차대회 참가차량(2011)

