

2nd Year Mechanism Design

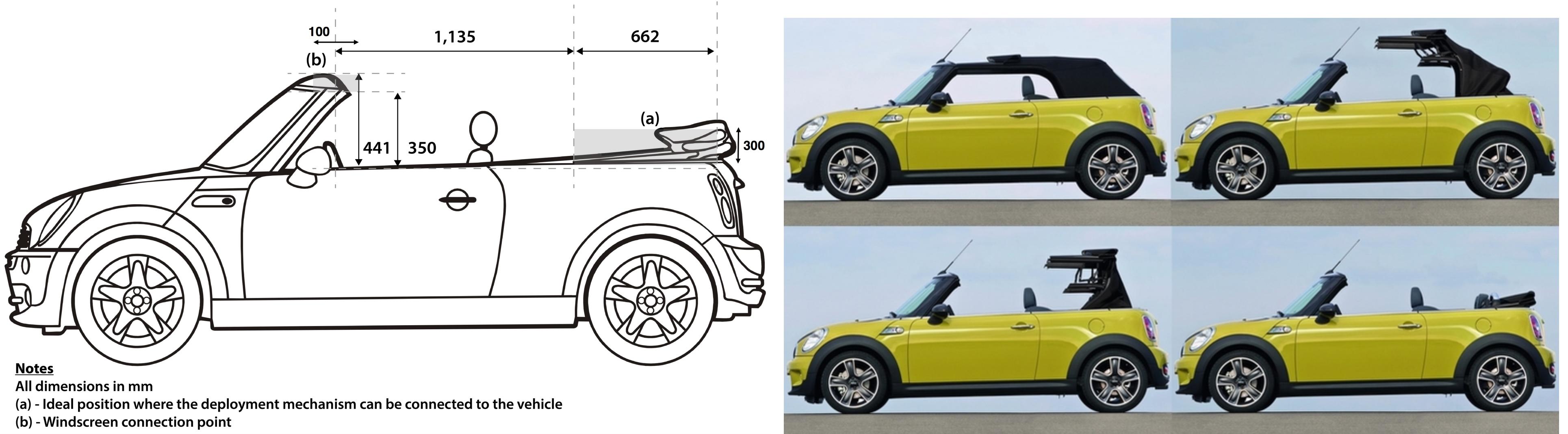
Engineering Design & Manufacture Group

University of Bath, UK

Design Brief

You will be working in groups of **two** to design a mechanism that will open and close a roof for the convertible car shown in Figure . This is an open-ended feasibility exercise with a high level of uncertainty. There are many ways that one could solve the problem. Your report should detail the:

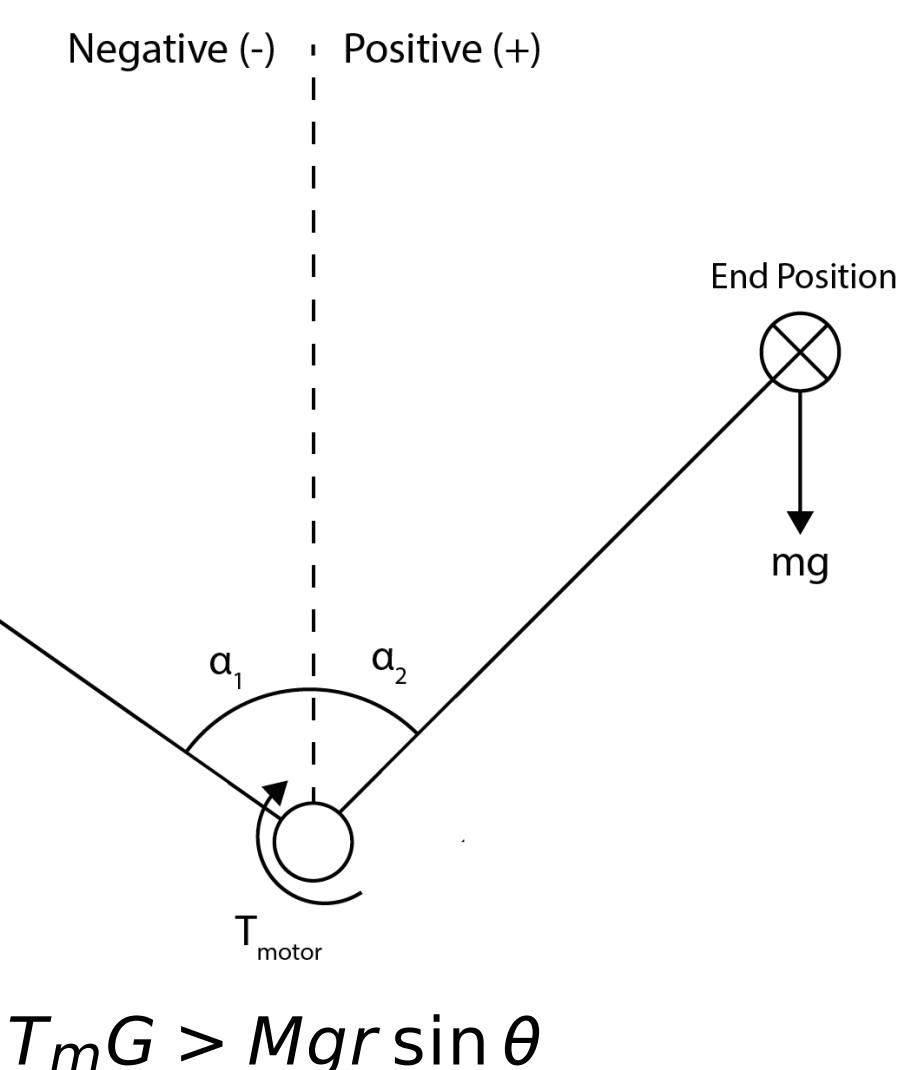
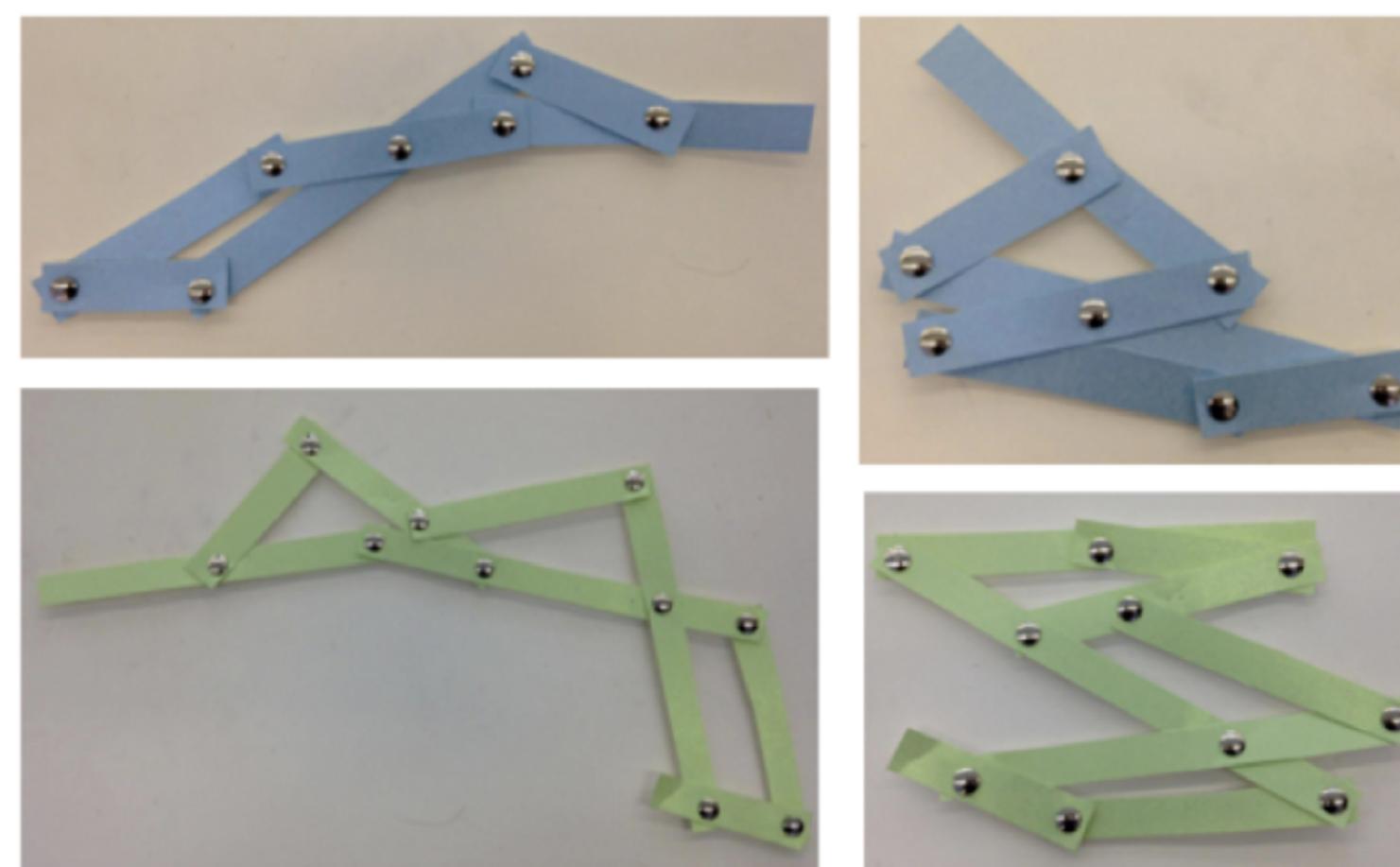
- design process you have gone through;
- assumptions made and their implications; and,
- justification for your design decisions.



Requirements Capture, Concept Generation & Initial Calculations

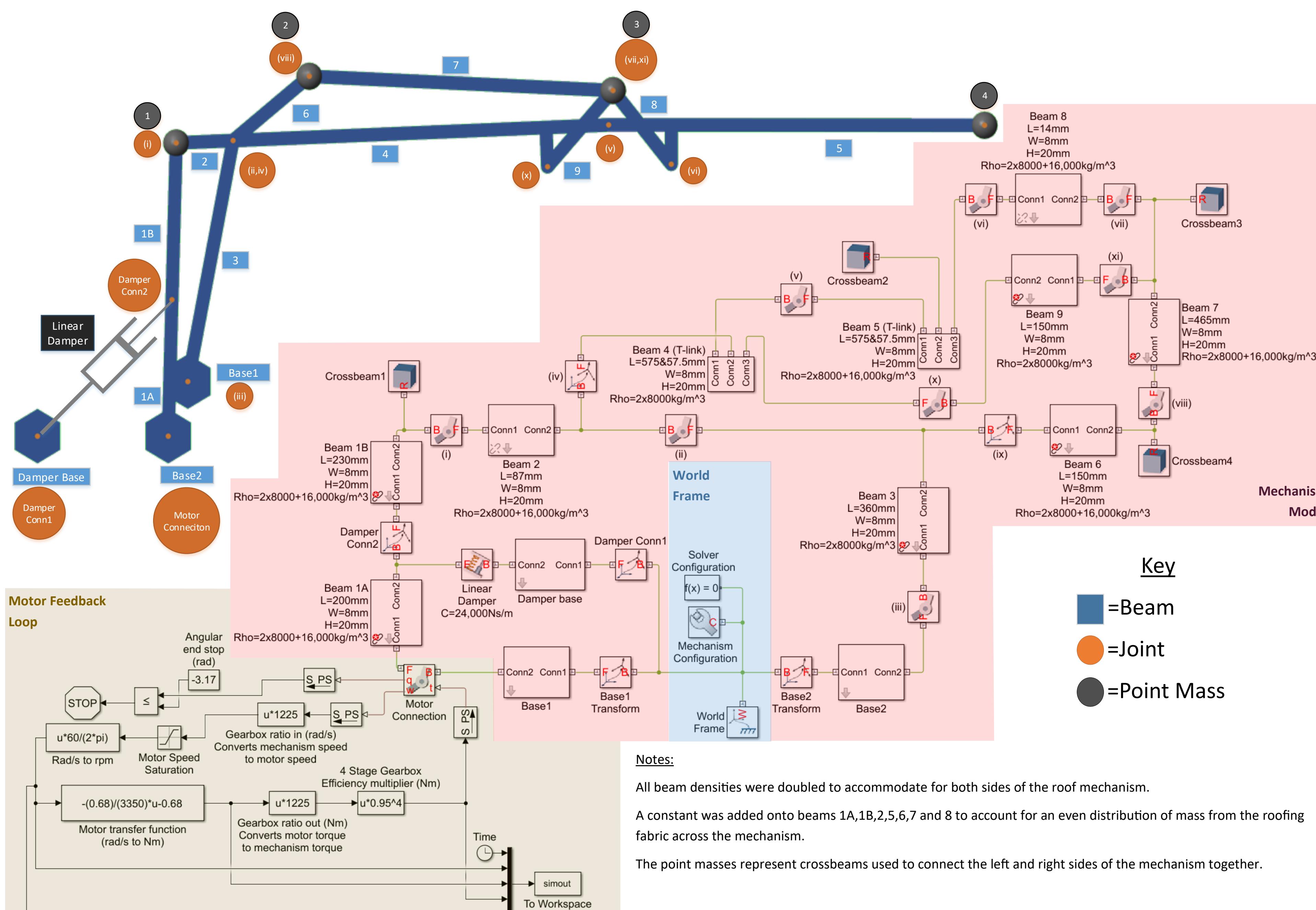
Students work in groups to research engineering resources (such as, anthropological data) and perform competitor analysis to build a set of requirements that their design must meet. They then continue into the development of some concepts using a number of digital and physical tools. This is followed by a quantitative and qualitative assessment of their concepts against their requirements.

no.	Requirement	must/wish	Method of Assessment	Success Criteria	Will be assessed during the feasibility stage
System					
1	Minimise Cost	W	Sum of material and parts costs	N/A	No
Mechanism					
2	Safety	M	Simulink Model Analysis	Does not fold into the interior of the car	Yes
3	Minimise mass of the convertible roof	W	Simulink Model Analysis	< 50kg (5)	Yes, in concept selection
4	Minimise Deployment time	W	Simulink Model Analysis	<=10 sec (6)	Yes, in damping and gear ratio selection
5	Minimise Packing area	M	Simulink Model Analysis	< 662 x 300 mm (7)	Yes, in concept selection
6	Maximise internal area	W	Simulink Model Analysis	> 4e5 mm^2	Yes, in concept selection



Full Deployment Simulation

The students then continue to build a full parametric systems model of the mechanism along with the gearbox and motor that will power it. The exercise develops both their analytical and numerical reasoning skills in a practical design exercise.



Results

Using this model, the students evaluate how changing bar positions, motor, gear ratios and damping effect the performance of their convertible roof concept.

