A Project Stage I Presentation on

DESIGN AND ANALYSIS OF ROCKER PANEL

By

Group Number : 17

1)Abhijeet Dilip Chavan 2) Abhishek Shriram Raut
3)Ahamad Rasul Shaikh 4) Alishan Ajim Shaikh

Guide
Prof.N.K.Gaudgaon

Department of Mechanical Engineering

Sinhgad College of Engineering, Pune

Project Associate No - 1

Bio - Data : Personal Information	
Roll No	402D009
Name of Student	Abhijeet Dilip Chavan
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Class	Sem	Year of Admission	% Marks	Remark
F. E.	I	NA	NA	NA
	II	NA	NA	NA
S. E.	I	2019-20	71.3%	First class
	II	2019-20	79.5%	First class dist.
T. E.	I	2020-21	-	
	II	2020-21	87.7%	First class dist.
B. E.	I	2021-22		

Project Associate No - 2

Bio - Data : Personal Information	
Roll No	402D045
Name of Student	Abhishek Shriram Raut
Date of Birth :-	20-02-2000
Address:	Rajgurunagar, tal. Khed, dist. Pune
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Class	Sem	Year of Admission	% Marks	Remark
F. E.	I	2018-19	65.4%	First class
	II	2018-19	65.4%	First class
S. E.	I	2019-20	75.60%	First class dist.
	II	2019-20	75.60%	First class dist.
T. E.	I	2020-21	-	First class dist.
	II	2020-21	86%	First class dist.
B. E.	I	2021-22		

Project Associate No - 3

Bio - Data : Personal Information	
Roll No	402D048
Name of Student	Ahamad Rasul Shaikh
Date of Birth :-	04-02-2000
Address:	At post Balsur, tq-Omerga, dist. Osmanabad 413604
Email ID & Mobile No	shaikhahamadrasul786@gmail.com , 9561638593

Class	Sem	Year of Admission	% Marks	Remark
F. E.	I	NA	NA	NA
	II	NA	NA	NA
S. E.	I	2019-20	70.90%	First class
	II	2019-20	84.90%	First class dist.
T. E.	I	2020-21	-	
	II	2020-21	92.60%	First class dist.
B. E.	I	2021-22		

Project Associate No - 4

Bio - Data : Personal Information	
Roll No	402D049
Name of Student	Alishan Ajim Shaikh
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Class	Sem	Year of Admission	% Marks	Remark
F. E.	I	NA	NA	NA
	II	NA	NA	NA
S. E.	I	2019-20	61.7%	First class
	II	2019-20	71.7%	First class
T. E.	I	2020-21	-	
	II	2020-21	84.32%	First class dist.
B. E.	I	2021-22		

Details of Meetings

Total number of meetings attended with guide:- Prof . N. K. Gaudgaon

Name of Student	Dates of Meetings Conducted						Total Attended/ Scheduled
	1	2	3	4	5	6	
	Finalization of Topic 2-7-2021	Searching for research papers 28-7-2021	Prepare and final chapter 1 11-8-2021	Prepare and final chapter 2 15-9-2021	Searching for rocker panel details 1-10-2021	Searching for rocker panel in market 20-10-2021	
Abhijeet Chavan	P	P	P	P	P	P	6/6
Abhishek Raut	P	P	P	P	P	P	6/6
Ahamad Shaikh	P	P	P	P	P	A	5/6
Alishan Shaikh	P	P	P	P	P	A	5/6

Details of Meetings

Total number of meetings attended with guide:- Prof . N. K. Gaudgaon

Name of Student	Dates of Meetings Conducted						Total Attended/ Scheduled
	7	8	9	10			
	Dimensions taken using reverse engineering 10-11-2021	Working on CATIA model 22-11-2021	Working on Analysis on ansys 1-12-2021	Stage 1 final report 13-12-2021			
Abhijeet Chavan	P	P	P	P			4/4
Abhishek Raut	P	P	P	P			4/4
Ahamad Shaikh	P	P	P	P			4/4
Alishan Shaikh	P	P	P	P			4/4

Table of Content

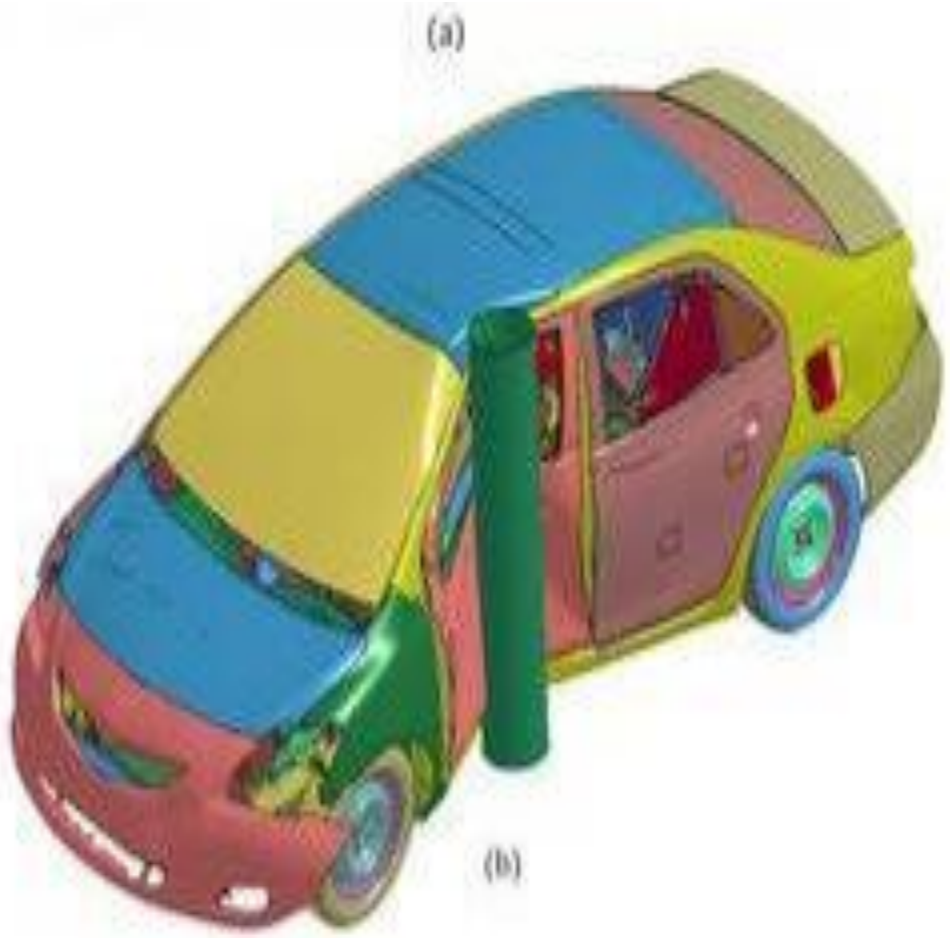
Abstract

It is not easy to acquire the same bending performance as that of a rocker panel by merely replacing it with composite material and increasing the wall thickness. Therefore, reinforcements were employed to improve the bending performance of the rocker panel .This study aimed to redesign one of the most important components of the side structure of a vehicle, the rocker panel, with carbon fiber and E-glass fiber .

Introduction

What is rocker panel or sill ?

Need of Rocker Panel..


(a)
(b)


ANCAP
HOLDEN
COMMODORE
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Need

- Passenger safety
- Weight optimization

Problem Statement

In order to meet the challenges of making the rocker panel more sustainable by reinforcement of composite material on the rocker panel of existing material. The original panel is made of Steel. we need to improve the reaction force of the rocker panel.

Aim

Strength Improvement and weight optimization of the rocker panel in the vehicle by reinforcement of E-glass fiber or carbon fiber so as to improve the passenger safety compared to front and rear sides .

Objectives

- To propose an optimized model this will have better strength and reduced weight..
- To perform static structural Analysis of optimized 4-wheeler rocker panel specimen in ANSYS workbench.
- Comparative Analysis between rocker panel , carbon fiber reinforced rocker panel and E-glass fiber reinforced rocker panel
- Comparative Analysis between Experimental & Analysis results.

Literature Review

SR NO	TITLE	AUTHOR NAME	DESCRIPTION
1	Bending Performance and Reinforcement of Rocker Panel Components with Unidirectional Carbon Fiber Composite	Huili Yu, Hui Zhao and Fangyuan Shi	Unidirectional carbon fiber composite material is one of the most common types of composites employed in vehicles, and its bending performance plays an important role in crash safety, especially in side pole impact.
2	Design of crown pillar thickness using finite element method and multivariate regression analysis	Kumar Hemant, Deb Debasis, Chakravarty D.	In this literature author explain about FEA of crown pillar with multivariate regression analysis. Analyses are conducted with the results of 108 non-linear numerical models considering Drucker-Prager material model in plane strain condition.

SR NO	TITLE	AUTHOR NAME	DESCRIPTION
3	Experimental and numerical crushing analysis of circular CFRP tubes under axial impact loading	Corin Reuter, Kim-Henning Sauerland, Thomas Tröster	In this paper, a prospective simulation method for composite crushing under axial crash loading is presented. To this end carbon fibre-reinforced plastic (CFRP) circular crash tubes are investigated in drop tower tests.
4	Evaluation of the survivability of CFRP honeycomb-cored panels in compression after impact tests	Oleg A. Staroverov, Elena M. Strungar, Valery E. Wildemann	This paper is oriented to the experimental research of the mechanics of the CFRP sandwich plates, glass and carbon fiber sample panels with a large-cell honeycomb core.
5	Design, Testing, Analysis, and Material Properties of Carbon Fiber Reinforced Polymers	Andrew Miner, Simon Jones	In this article author explain about CFRP material properties. Rose-Hulman Institute of Technology excels in many fields, however in the field of Carbon Fiber Reinforced Polymers (CFRPs) there is a significant lack of knowledge.

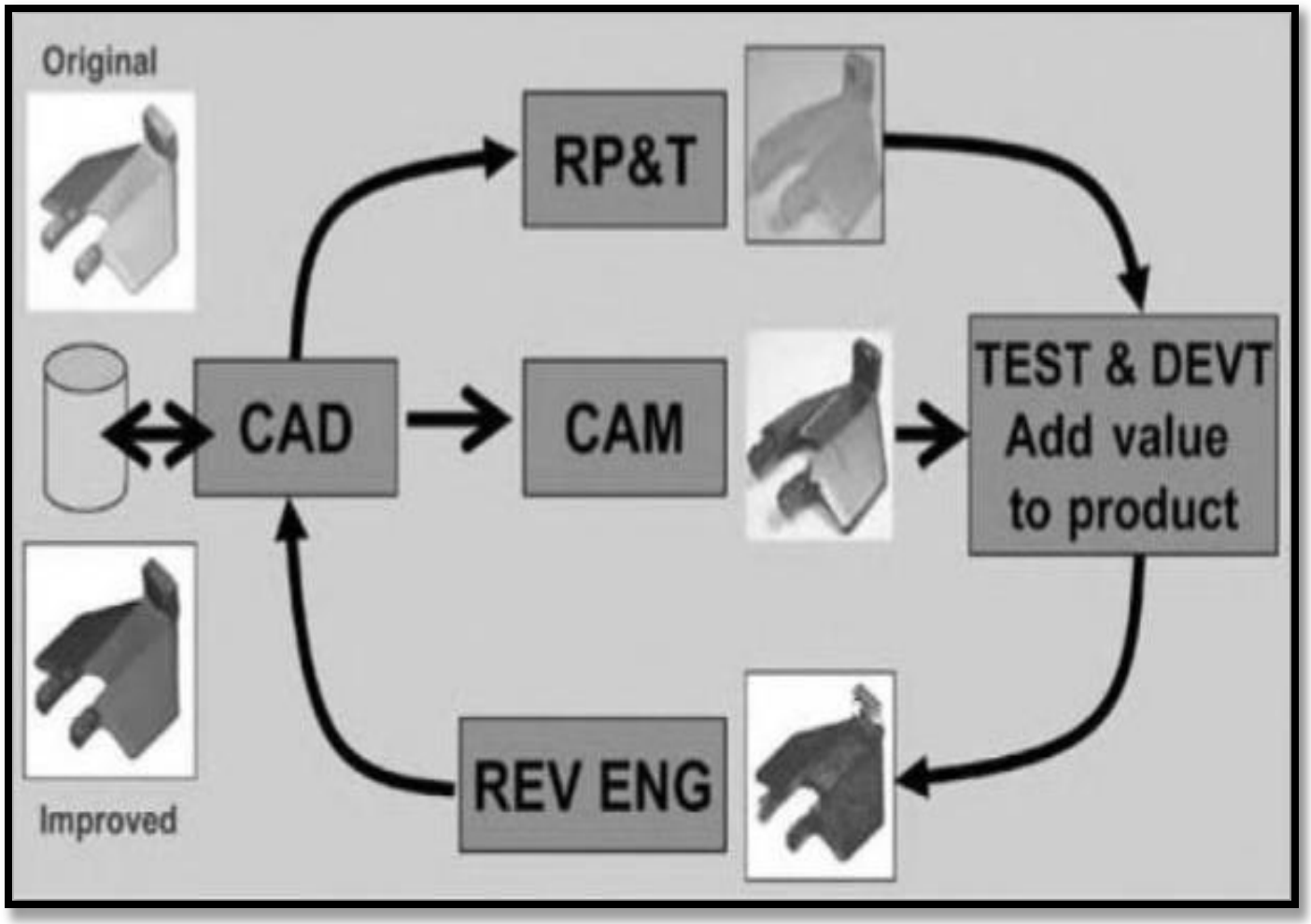
SR NO	TITLE	AUTHOR NAME	DESCRIPTION
6	Predicting the axial crush response of CFRP tubes using three damage-based constitutive models	Aleksandr Cherniaev, Clifford Butcher, John Montesano	This paper describe about crush response of CFRP. Recent studies indicate that automobiles account for about onequarter of overall carbon dioxide emissions, a major contributor to the greenhouse effect.
7	Automation in Spot Welding Mechanism of Rocker Panel in Automobile body shop	Ketan Deshpande, Prof. Dr. N.R. Rajhans, Nimesh Shah, Ameya Pathak	In this article author explain about spot Welding Mechanism of Rocker Panel in Automobile body shop. The simple automation technique is used to automate the spot welding gun instead of using welding robots and highly expensive servo-systems, as per requirement of operation to be performed.

Project Methodology

- IDENTIFICATION OF NEED
- FINDING RESEARCH PAPERS AND DEVELOP LITERATURE SURVEY
- DEVELOP CAD MODEL USING RESEARCH PAPER AND MARKET SURVEY
- ANALYSIS OF EXISTING CAD AND OPTIMIZED CAD USING ANSYS SOFTWARE
- EXPERIMENT VALIDATION

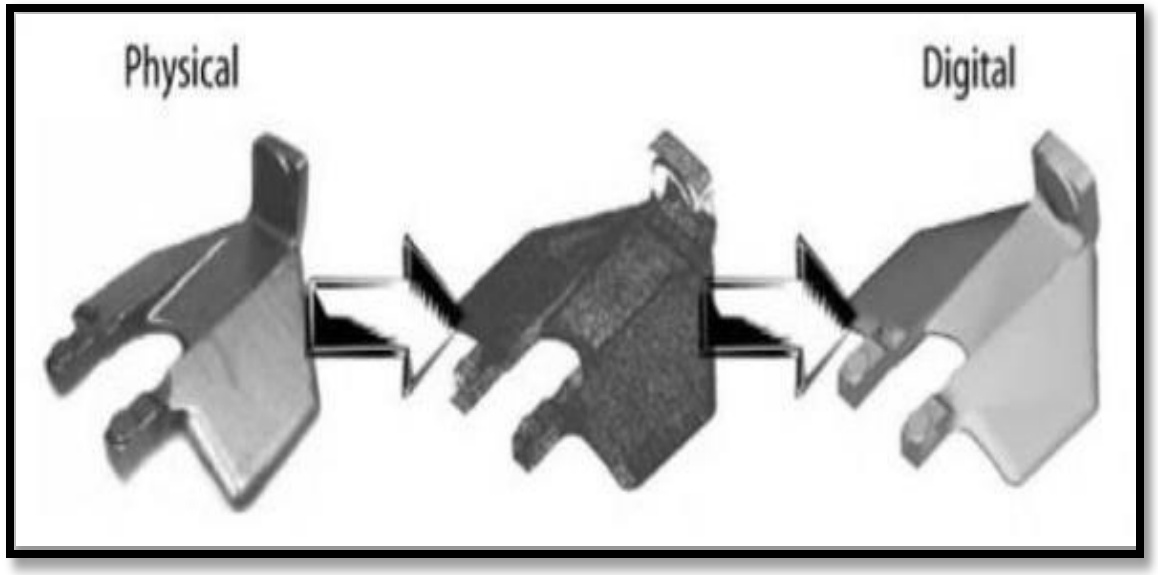
REVERSE ENGINEERING

Product development cycle-



REVERSE ENGINEERING

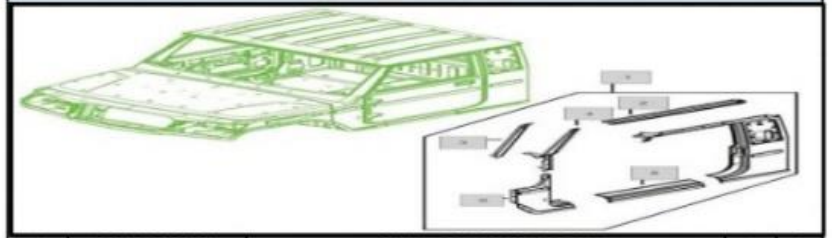
Physical to digital process -



Position of Rocker Panel in Mahindra Bolero vehicle-

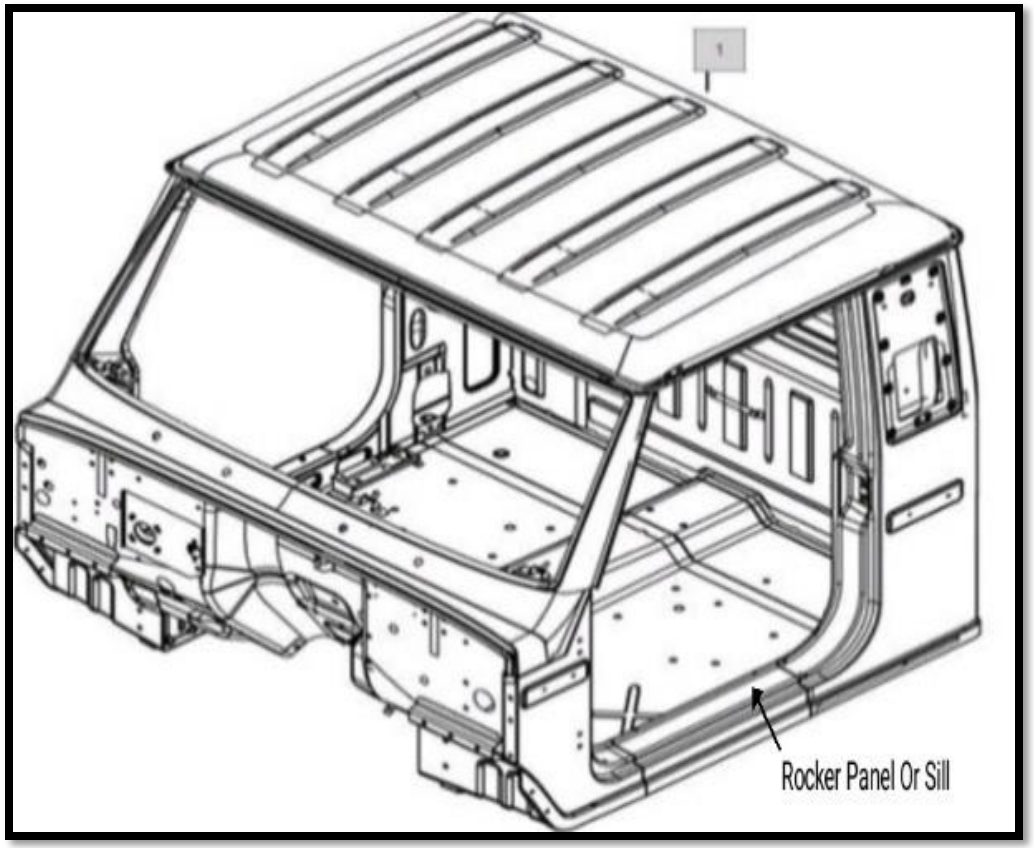
From Bolero PICK-UP Spare parts Catlogue

BODY SIDE STRUCTURE

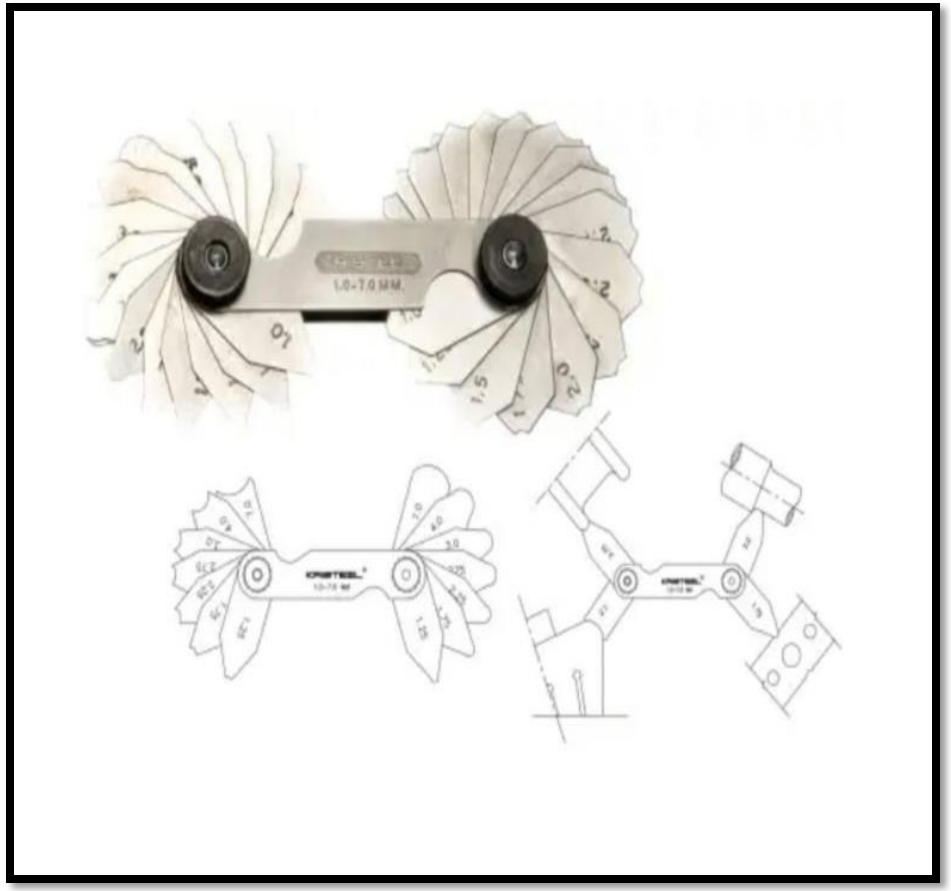


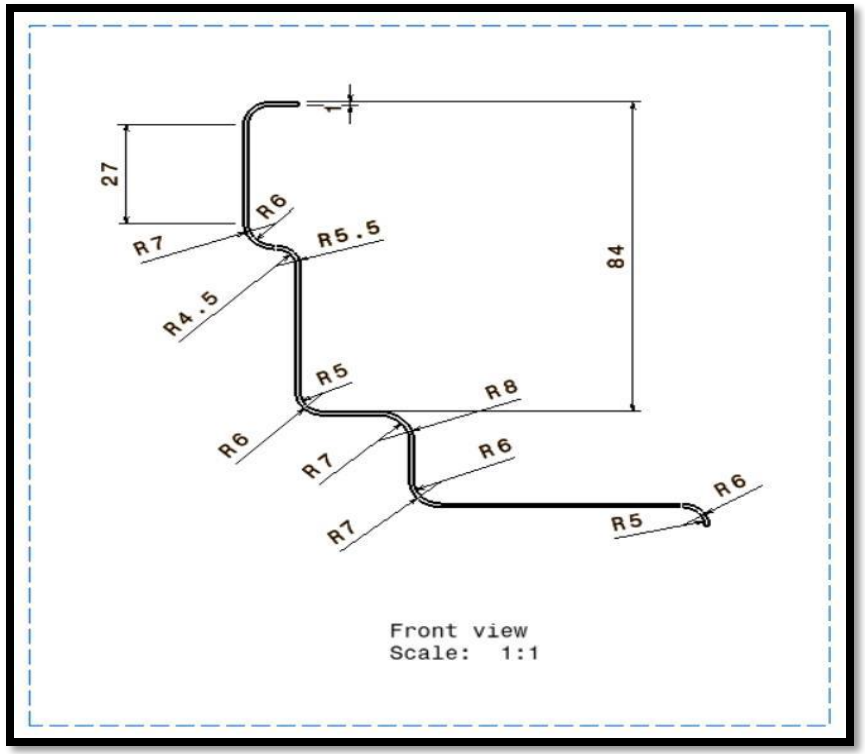
1	0101EAF02930N	PANEL ASSY BODY SIDE LH	1	S
1	0101EAF02920N	PANEL ASSY BODY SIDE RH	1	S
2	0101EAF02850N	PANEL DRIP RAIL SIDE RH	1	S
2	0101EAF02860N	PANEL DRIP RAIL SIDE LH	1	S
3	0W33212CED	FRONT PILLAR OUTER LH	1	S
3	0W33211CED	FRONT PILLAR OUTER RH	1	S
4	0028446CED	PANEL ASSY FRONT PILLAR INNER RH	1	S
4	0028445CED	PANEL ASSY FRONT PILLAR INNER LH	1	S
5	0W34121CED	SILL SIDE OUTER RH & LH - CED	2	S
6	0101CAF01870N	COWL ASSY SIDE OUTER LH	1	S
6	0101CAF01860N	COWL ASSY SIDE OUTER RH	1	S

5.Outer Rocker Panel or Outer Sill
Part No : OW4121CED

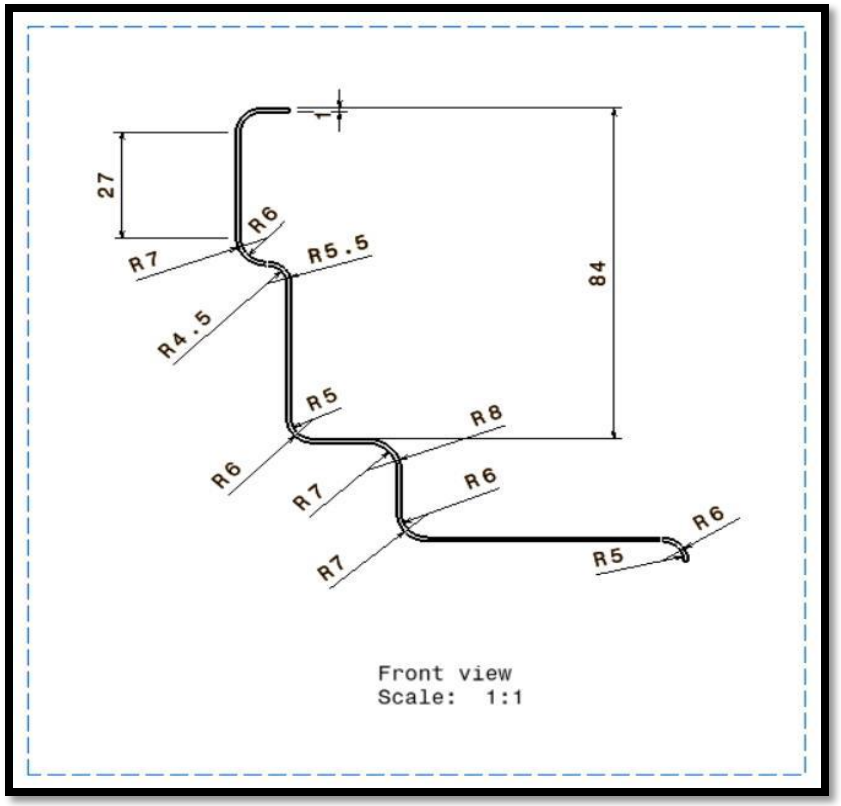


Radius Gauge-



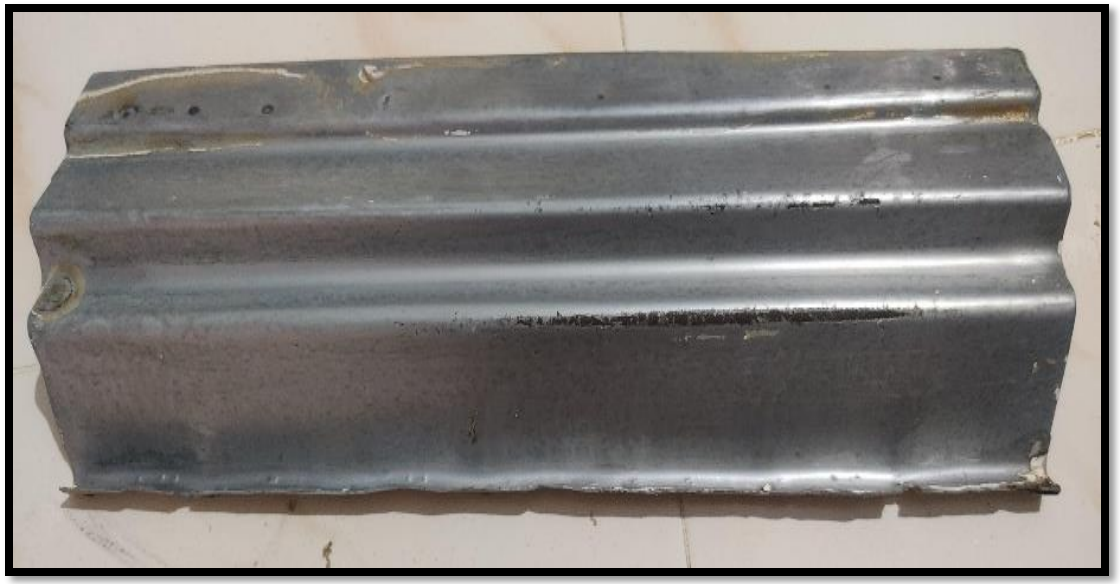


Height guage -

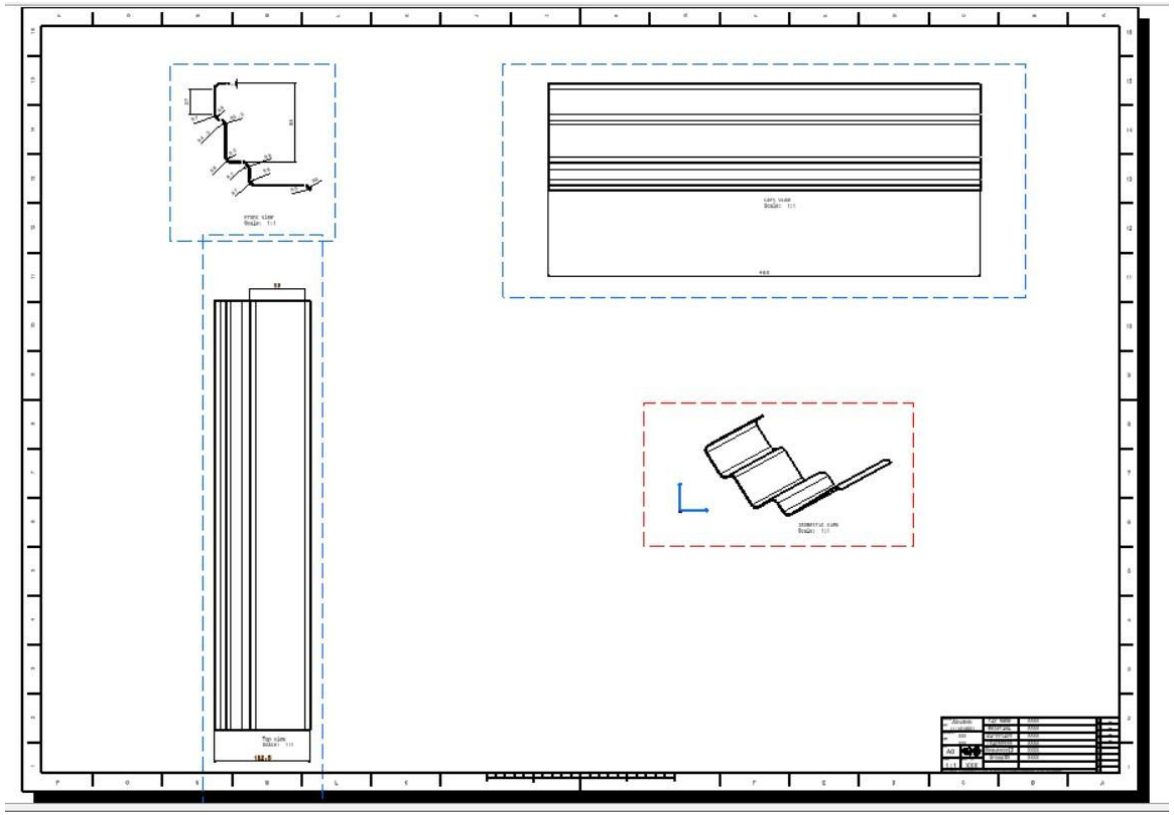


Micrometer-

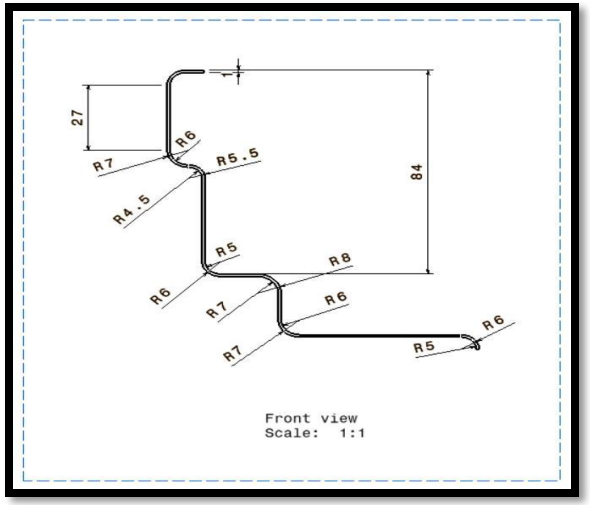
Rocker Panel (sill) -

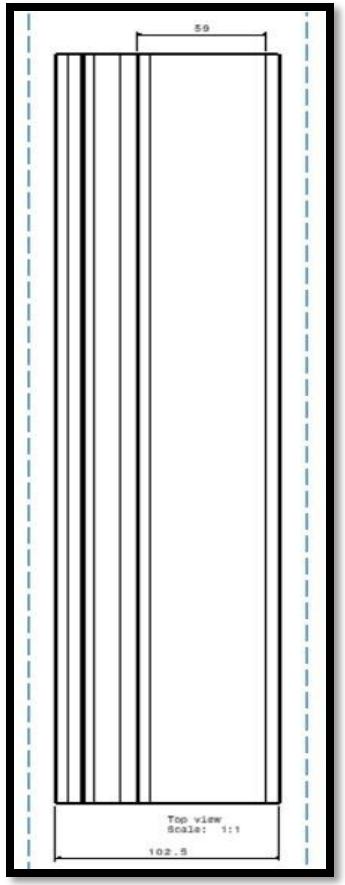


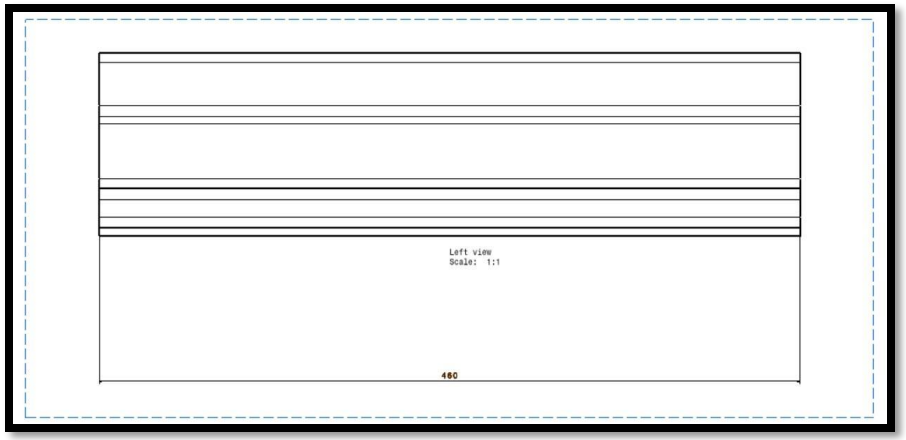
Rocker panel 2D model-



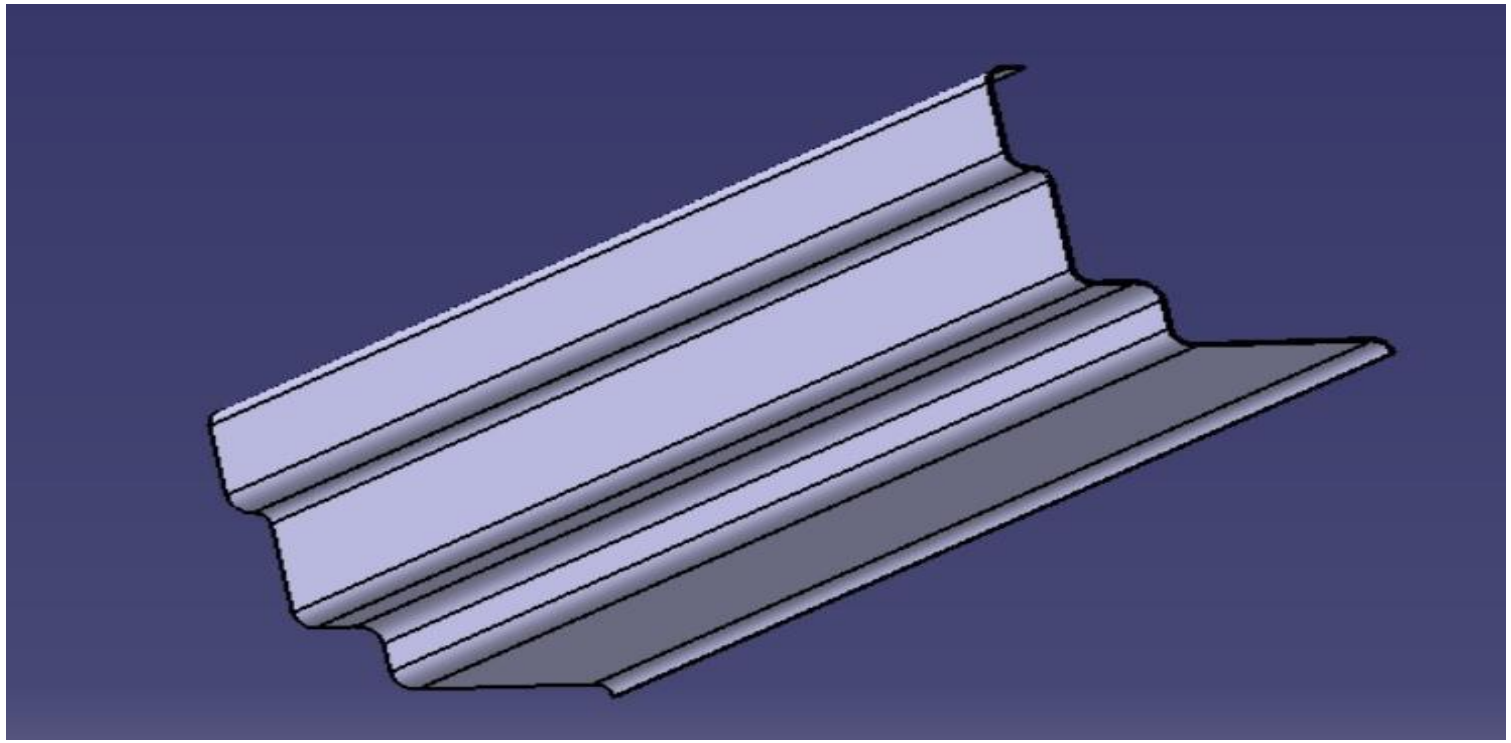
Rocker panel 2D model-



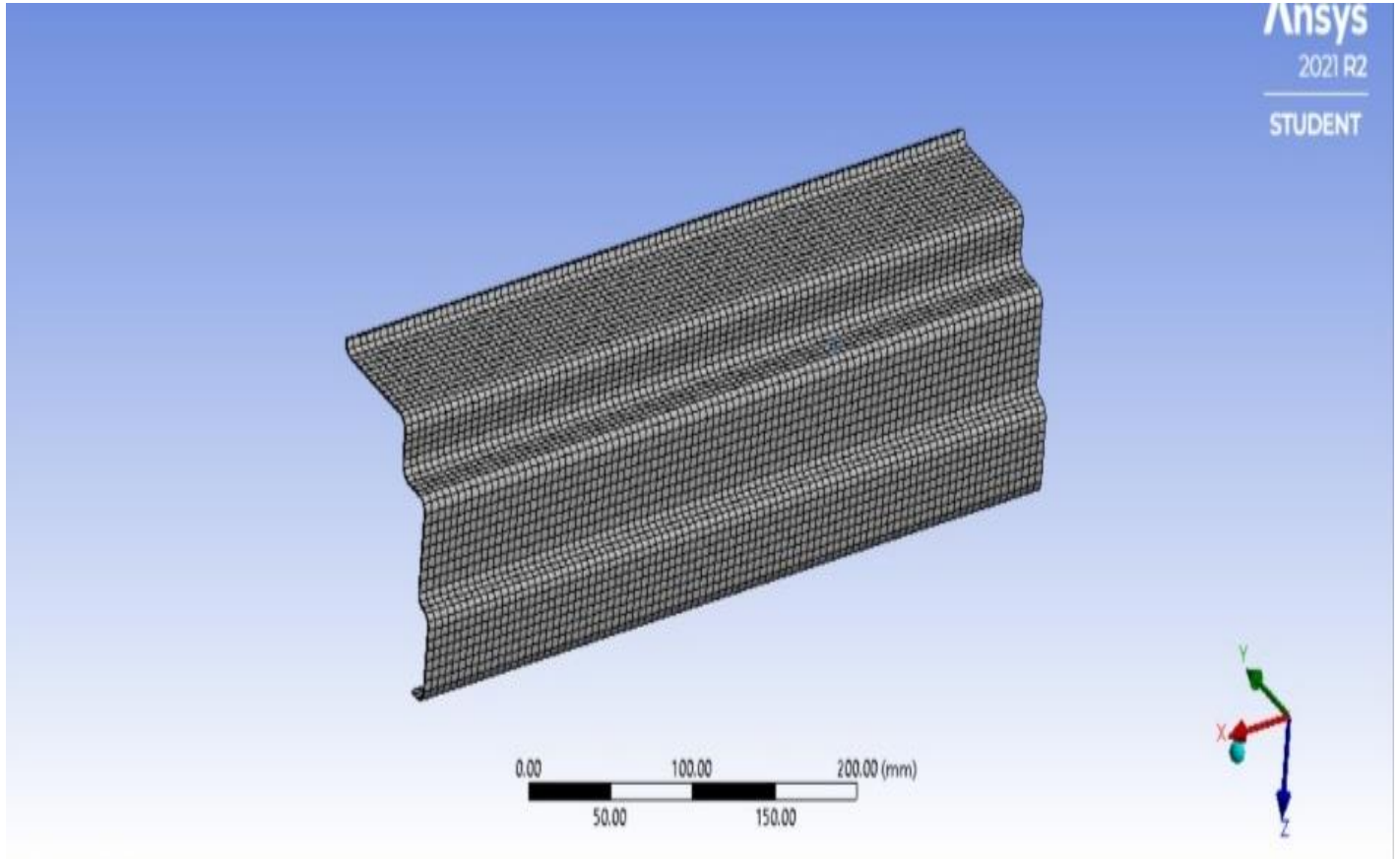




Rocker Panel 3D model-



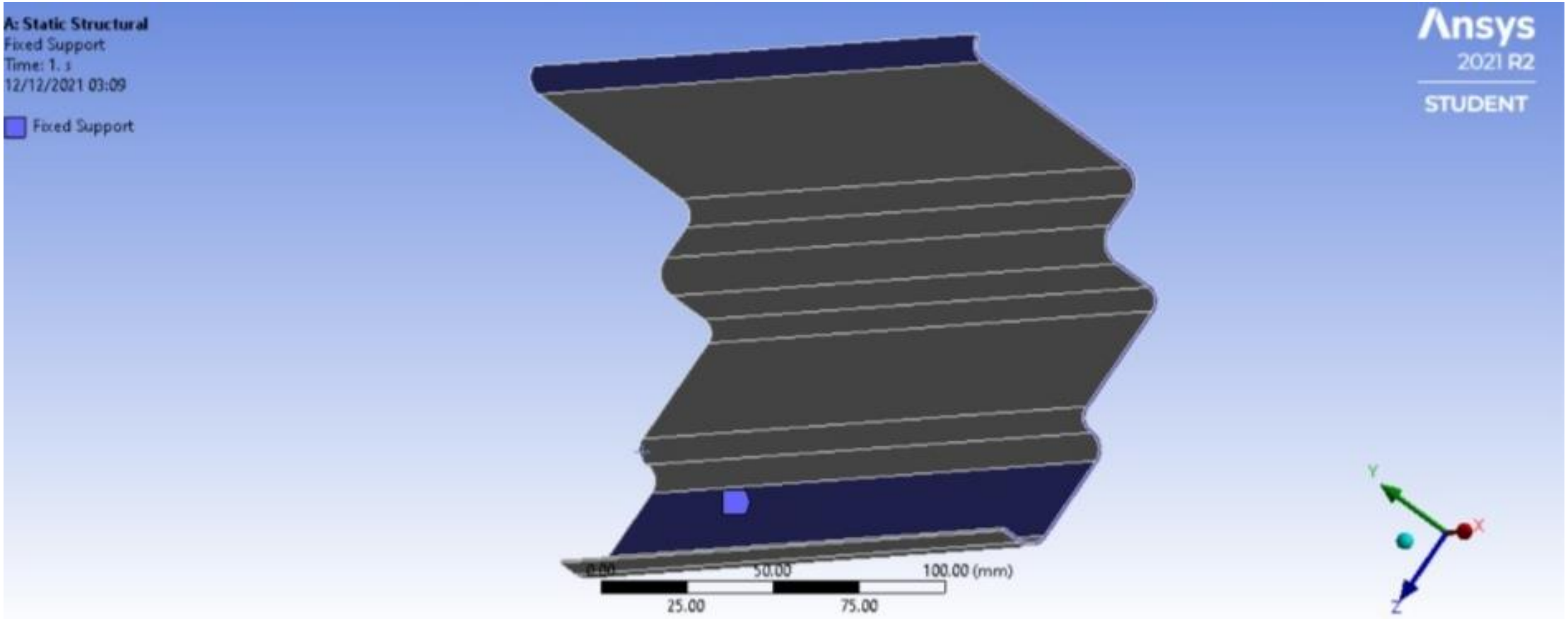
Meshing/sizing of rocker panel-



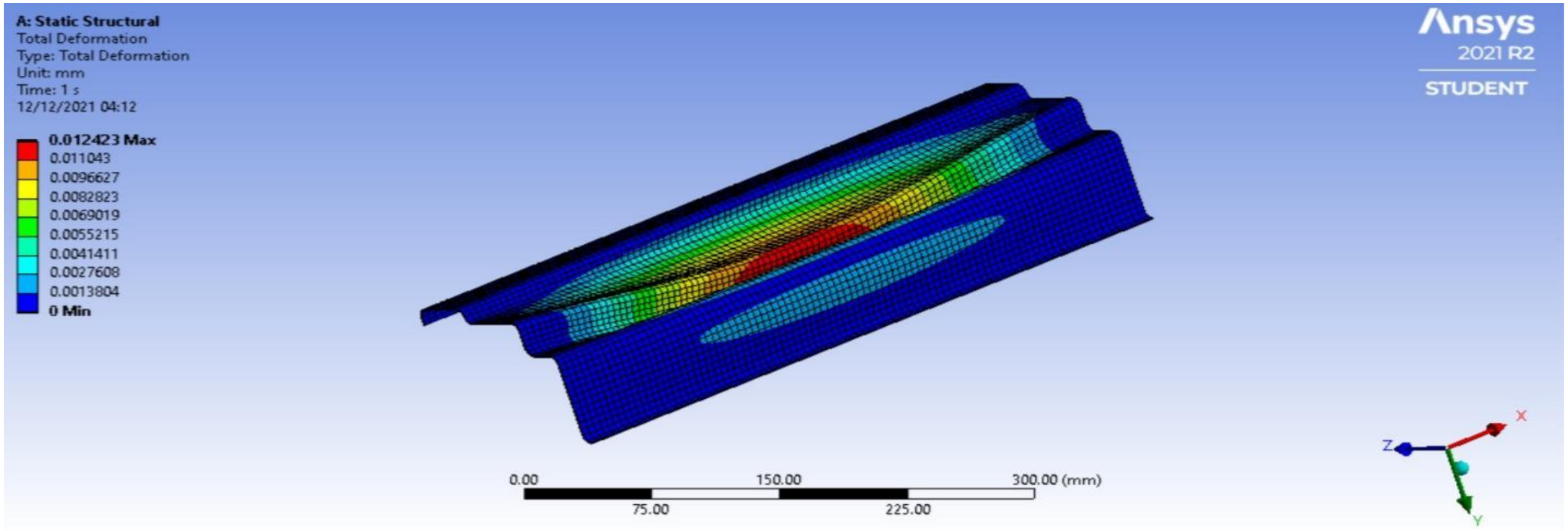
Details of "Body Sizing" - Sizing	
Scope	
Scoping Method	Geometry Selection
Geometry	1 Body
Definition	
Suppressed	No
Type	Element Size
Element Size	5.0 mm
Advanced	
Defeature Size	Default
Behavior	Soft

Properties	
Volume	96530 mm³
Mass	0.75776 kg
Scale Factor Va...	1.
Statistics	
Bodies	1
Active Bodies	1
Nodes	32264
Elements	4508
Mesh Metric	None

Boundary Conditions-

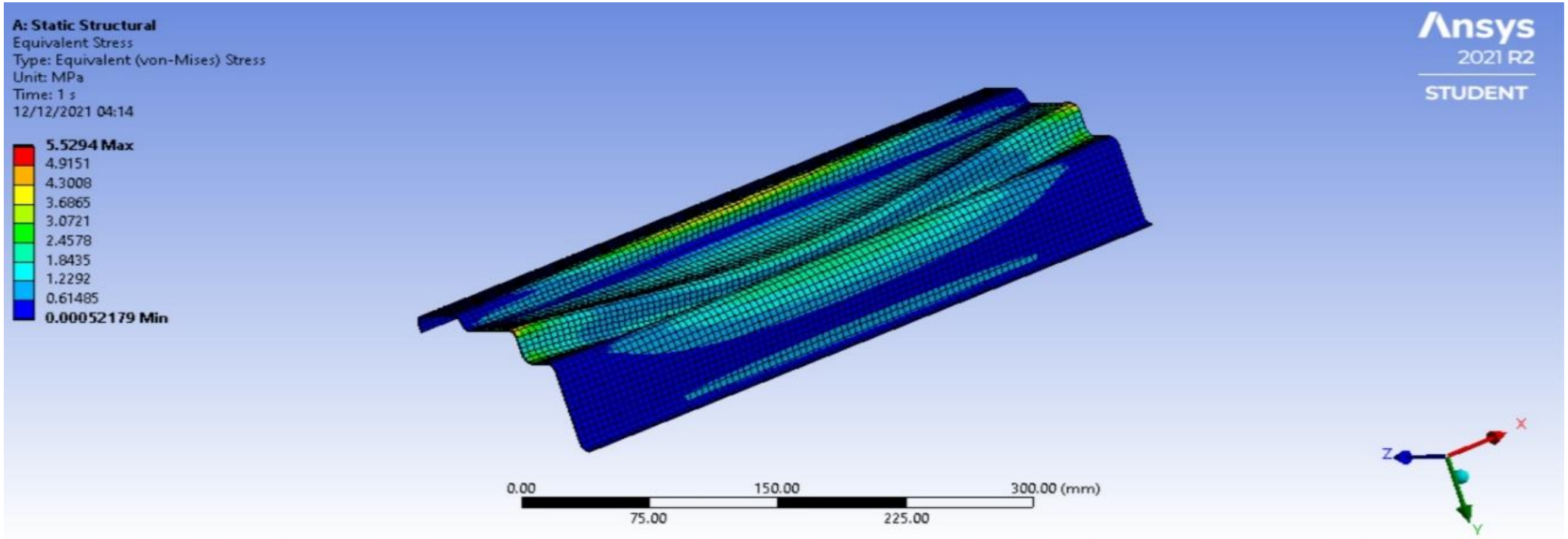


Total deformation -



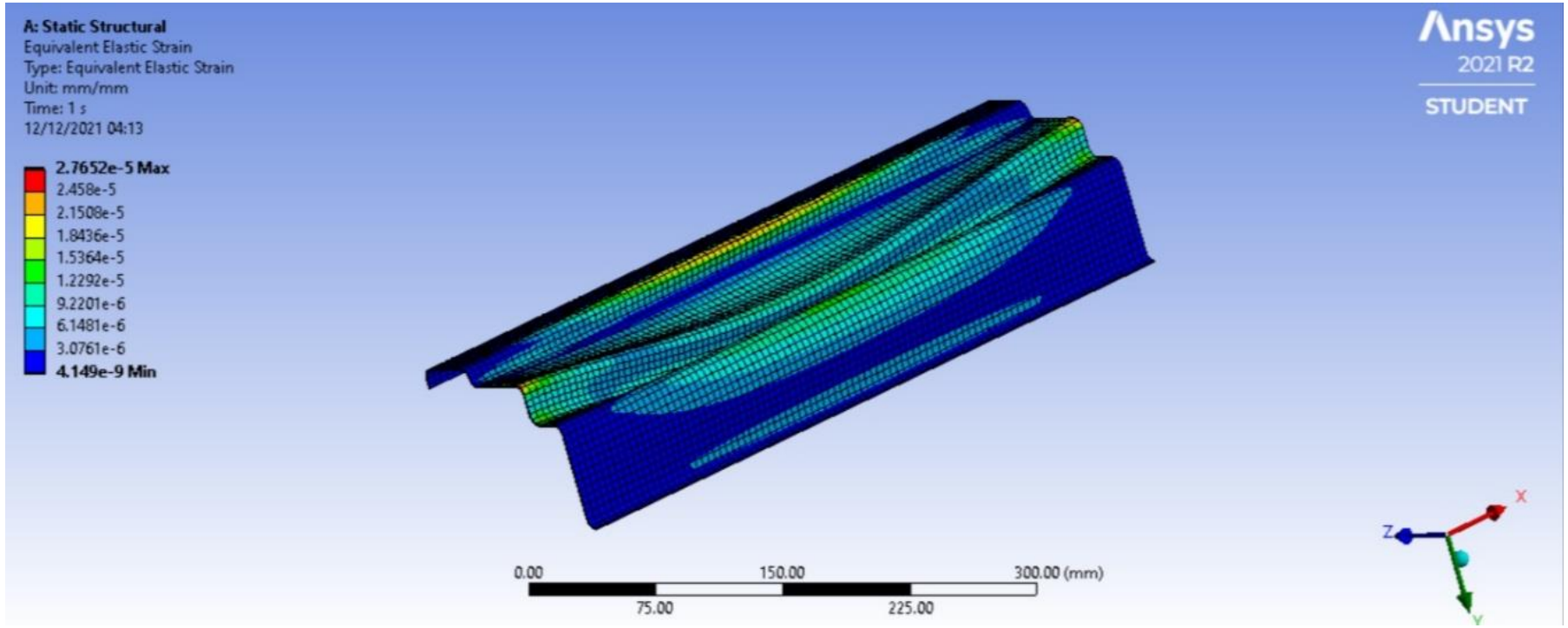
Results	
Minimum	0. mm
Maximum	1.2423e-002 mm

Equivalent stress -



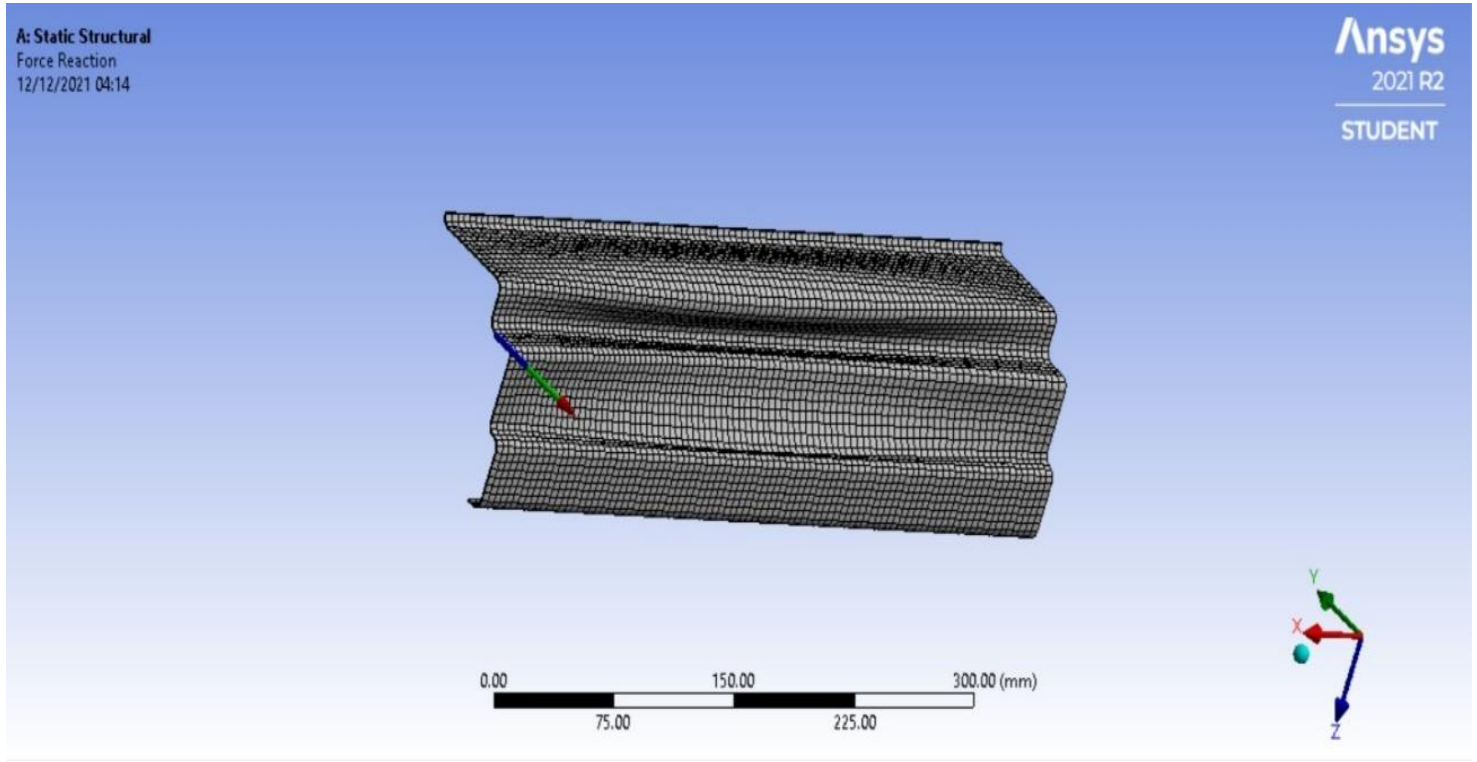
Results	
Minimum	5.2179e-004 MPa
Maximum	5.5294 MPa
Average	0.87168 MPa

Equivalent elastic strain -



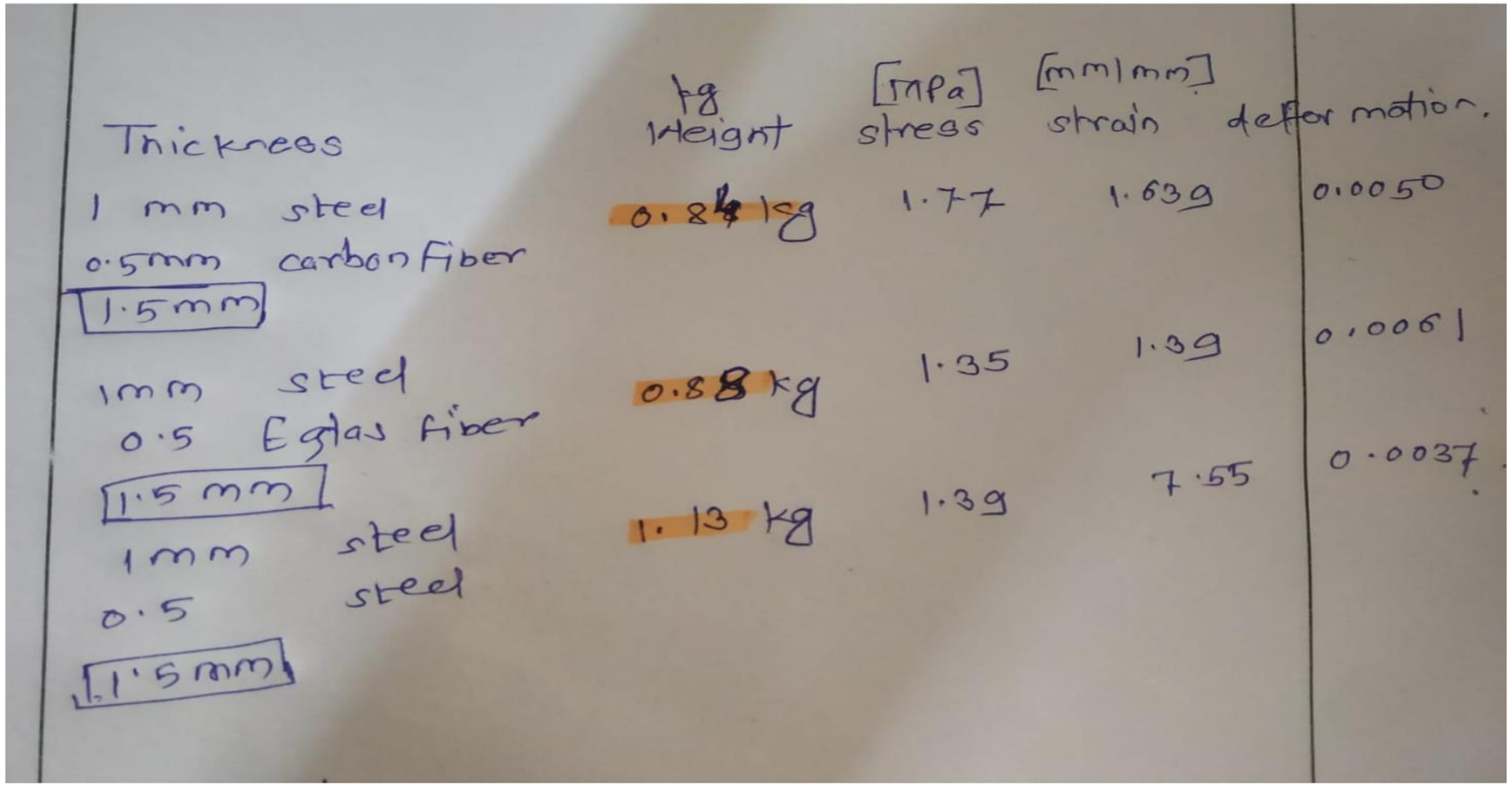
Results	
Minimum	4.149e-009 mm/mm
Maximum	2.7652e-005 mm/mm
Average	4.9457e-006 mm/mm

Force reaction -



Results	
Maximum Value Over Time	
X Axis	9.3302e-009 N
Y Axis	-200. N
Z Axis	8.7039e-008 N
Total	200. N
Minimum Value Over Time	
X Axis	9.3302e-009 N
Y Axis	-200. N
Z Axis	8.7039e-008 N
Total	200. N

COMPARATIVE ANALYSIS BETWEEN ROCKER PANEL , E-GLASS FIBER, CARBON FIBER :



Time Sheet

Duration	Activity Planned
June	Group Formation
July	Finalization of project
August	discussion with project co-ordinator and submission of synopsis
September	Submission of Literature review
October	Searching for rocker panel in market and taking dimensions using reverse engineering
November	Drafting rocker panel in CATIA, Design and Analysis of Project
December	Report Submission

Summary

- In this project analysis of rocker panel of bolero pick-up made up of steel is done in ANSYS SOFTWARE.
- In this analysis results are total maximum deformation is 0.012423 mm, maximum equivalent stress is 5.5294 Mpa and maximum elastic strain is 2.652 .
- Then we will conduct the analysis of rocker panel reinforced with E-glass fiber and carbon fiber respectively in ANSYS.

References

1. Kumar Hemant, Deb Debasis, Chakravarty D. “Design of crown pillar thickness using finite element method and multivariate regression analysis”.
2. Corin Reutera,, Kim-Henning Sauerlandb, Thomas Tröstera “Experimental and numerical crushing analysis of circular CFRP tubes under axial impact loading”.
3. Huili Yu, Hui Zhao and Fangyuan Shi “Bending Performance and Reinforcement of Rocker Panel Components with Unidirectional Carbon Fiber Composite”.
4. Oleg A. Staroverov, Elena M. Strungar, Valery E. Wildemann “Evaluation of the survivability of CFRP honeycomb-cored panels in compression after impact tests”.
5. Andrew Miner, Simon Jones “Design, Testing, Analysis, and Material Properties of Carbon Fiber Reinforced Polymers”.
6. Aleksandr Cherniaev, Clifford Butcher, John Montesano “Predicting the axial crush response of CFRP tubes using three damage-based constitutive models”.

THANK YOU

Cost Details

Rocker panel : 1000/-

E-glass fiber : 650-1500/-

Carbon fiber : 1000-2000/-

Total : around 3000-4000/-