



Department of Mechanical Engineering  
Senior Graduation Project

Design of a **Hospital Bed** Low Cost  
To be Manufactured in Saudi Arabia

Done by the Students:

**Raja A. Alkhalidi - 200700649 | Ali Almari - 200800905**

**Khalid Alkhalidi - 200700386 | Mohammad Alobayyed - 200801352**

Under the supervision of:

**Dr. Emad Y. Tanbour**





*Every person has to be treated with respect and dignity.  
Especially people in need of care.  
We think develop and design with this in mind.*





# Statement of Purpose

To Apply our knowledge and skills in (CAD) SolidWorks program and in other course that we take during our study in the university

To design a hospital bed with low cost to be manufactured and used in Kingdom of Saudi Arabia



# Out Line

- ❖ Introduction
- ❖ Design Approach
- ❖ Project duration (Gantt Chart)
- ❖ Objective of the project
- ❖ Demand of hospital bed in Saudi
- ❖ Anthropometric Data (Human Measurements)
- ❖ Selecting the Best Bed Design
- ❖ Hospital bed Prototype
- ❖ Conclusion



# Introduction

- ❖ Designing a hospital bed
- ❖ Duration of one semester
- ❖ project requires solidWorks (CAD)
- ❖ visiting hospitals, and workshops for Medical Equipments
- ❖ Basically main process involved in the conceptual drawing of the bed, stress analysis, and studying the motion and enter furnace of the parts
- ❖ The project prerequisites are good designing skills



# Design Approach

Group Brainstorming



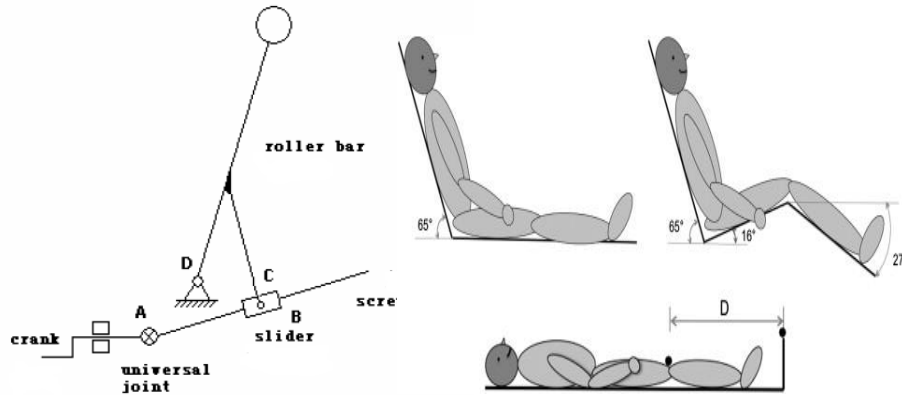
Prototyping by CAD Solidworks



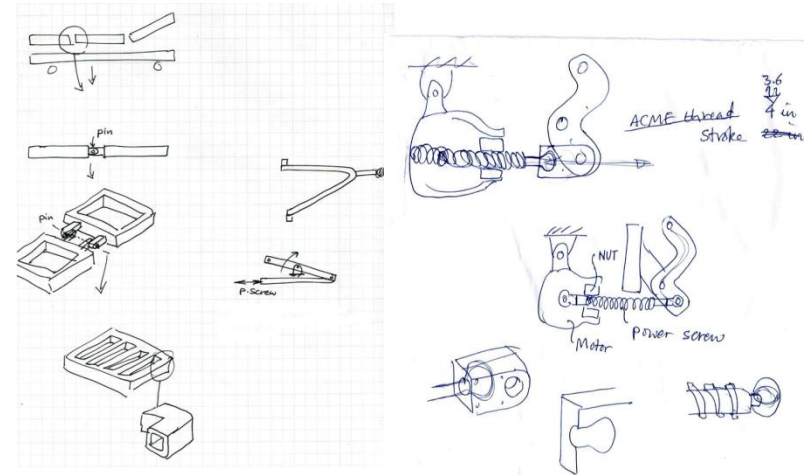
Gather Literatures from the web



Sizing and Strength Calculations



Design Conceptualization



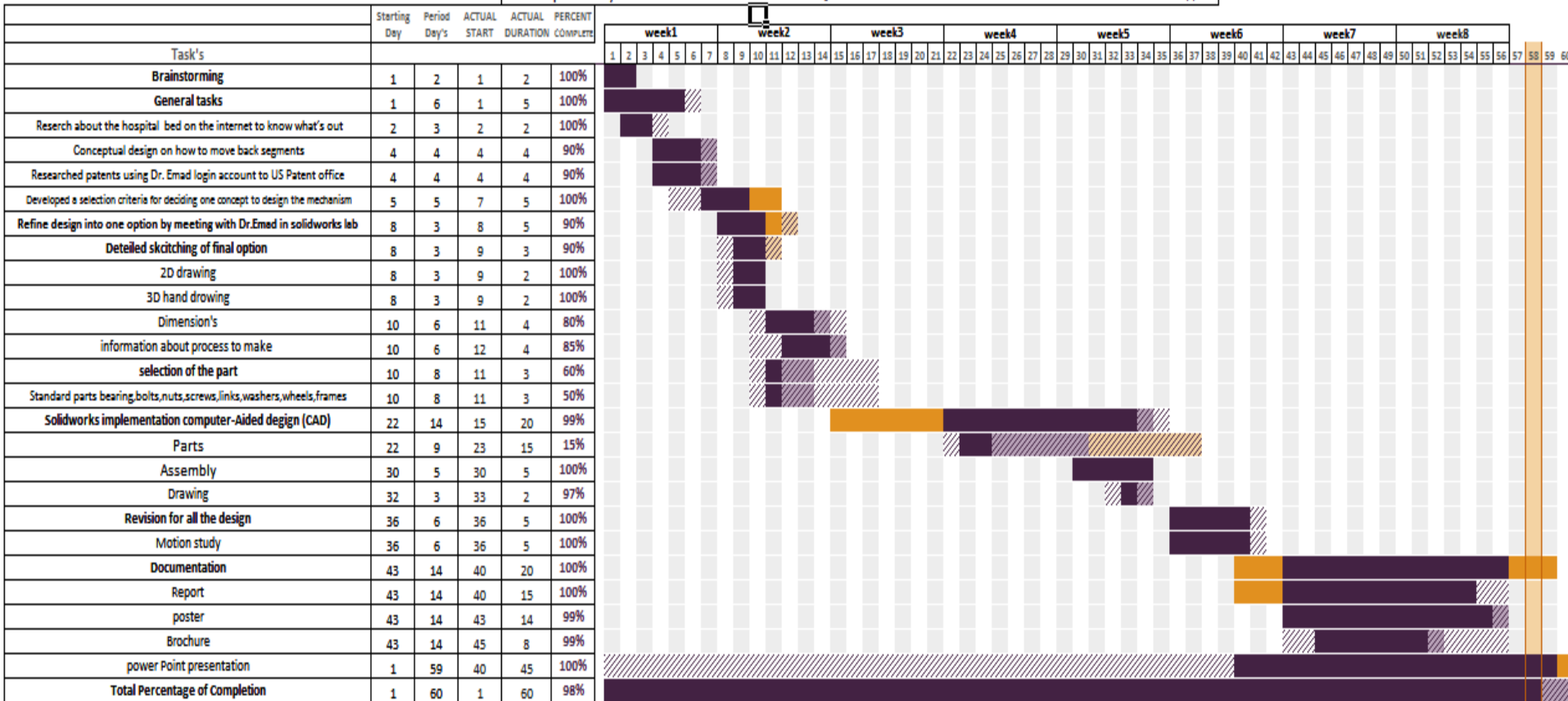


# Project duration (Gantt Chart)

Design of Hospital bed

Were we are: # Period Day's Actual % Complete Actual (beyond plan) % Complete (beyond plan)

Supervised by Dr. Emad Tanbour Team Leader: Raja Alkhalidi Members: Ali Almari Khalid Alkhalidi Mohammad Alobayyed





# WHY?

## Objective of the project

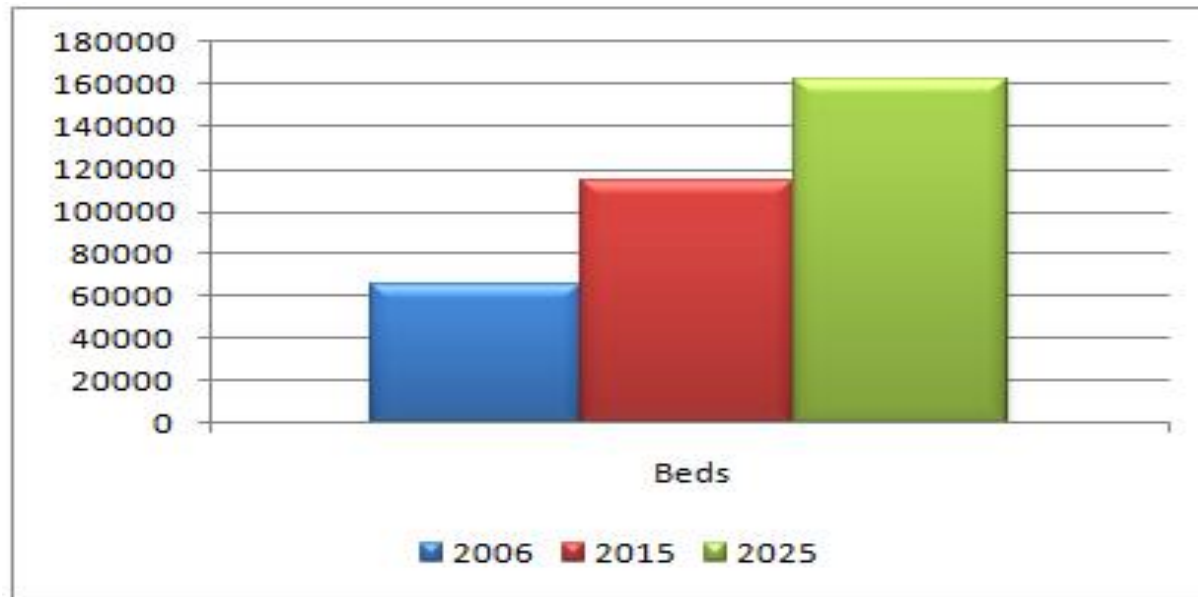
- ❖ To help middle income people to buy
- ❖ Push forward the production of Saudi economy
- ❖ Increase the average of careers by promoting the national industry
- ❖ Not rely on the West in all industries



# Demand of hospital bed in Saudi

Increasing awareness has raised patients' expectation levels in terms of quality care. The government is finding it difficult to meet the expected quality standards. According to a study, the demand for beds in Saudi will double by 2025, to reach nearly 162,000.

*Source: Gulf Cooperation Council Healthcare, Mckinsey Analysis*



**Figure 1: The Demand for Hospital Beds in Saudi**

# Anthropometric Data (Human Measurements)

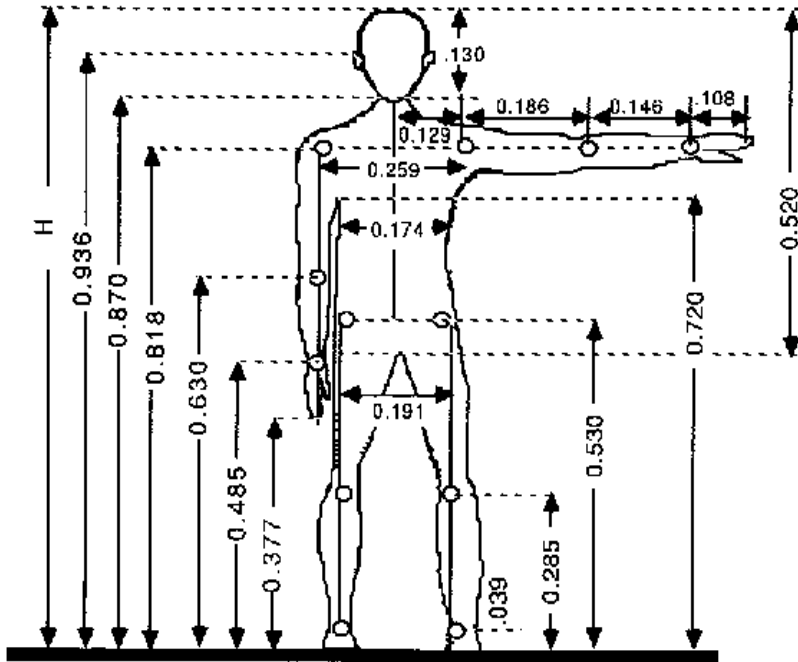


Figure 1: Anthropometric Data for a Person Standing

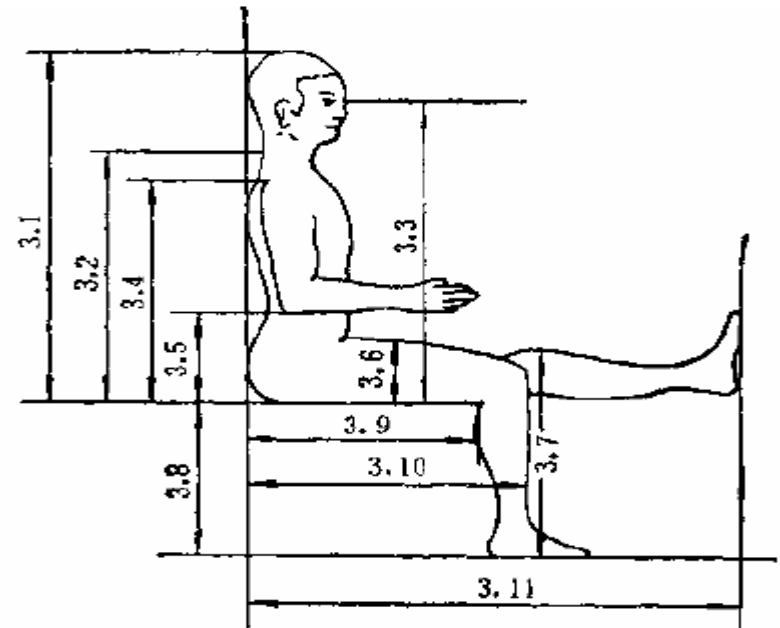


Figure 2: Anthropometric Data showing various human proportions

We used measurements 3.1, 3.9 and 3.6 on  
Error! Reference source not found

we find that the length from the top of a person's head to the bottom of a person's lower back is 47% of their total height



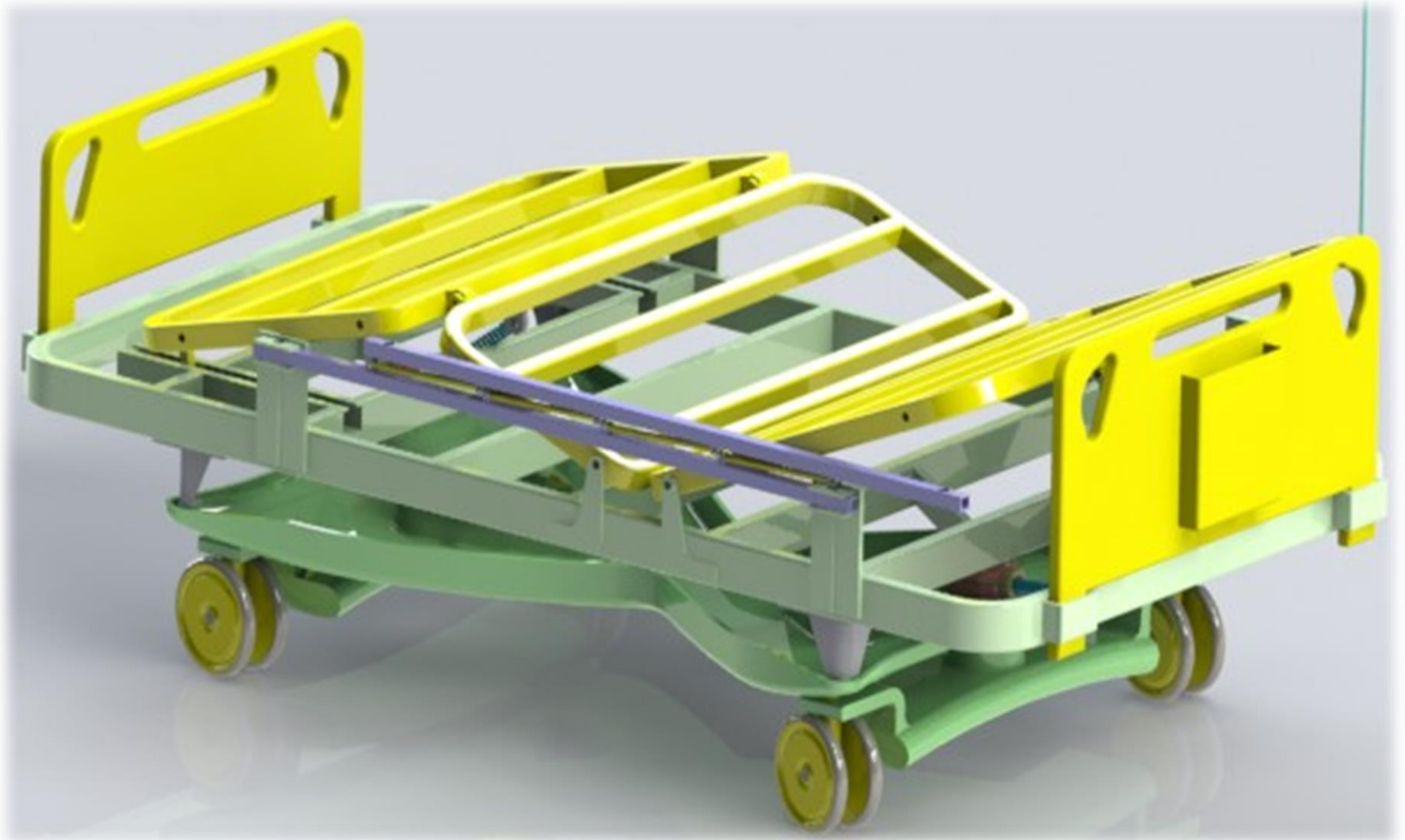
# Selecting the Best Bed Design

In order to properly assess a bed design for the demands of the Saudis hospital, we had to develop and appropriate matrix for evaluation:

- ❖ **Curatorial Industry Standards (20%)**
- ❖ **Durability (15%)**
- ❖ **Safety (15%)**
- ❖ **Ease of Manufacturing (15%)**
- ❖ **Cost (20%)**
- ❖ **Ease of Operation (10%)**
- ❖ **Electric Functions (5%)**



# Hospital bed Prototype





# Hospital bed Prototype



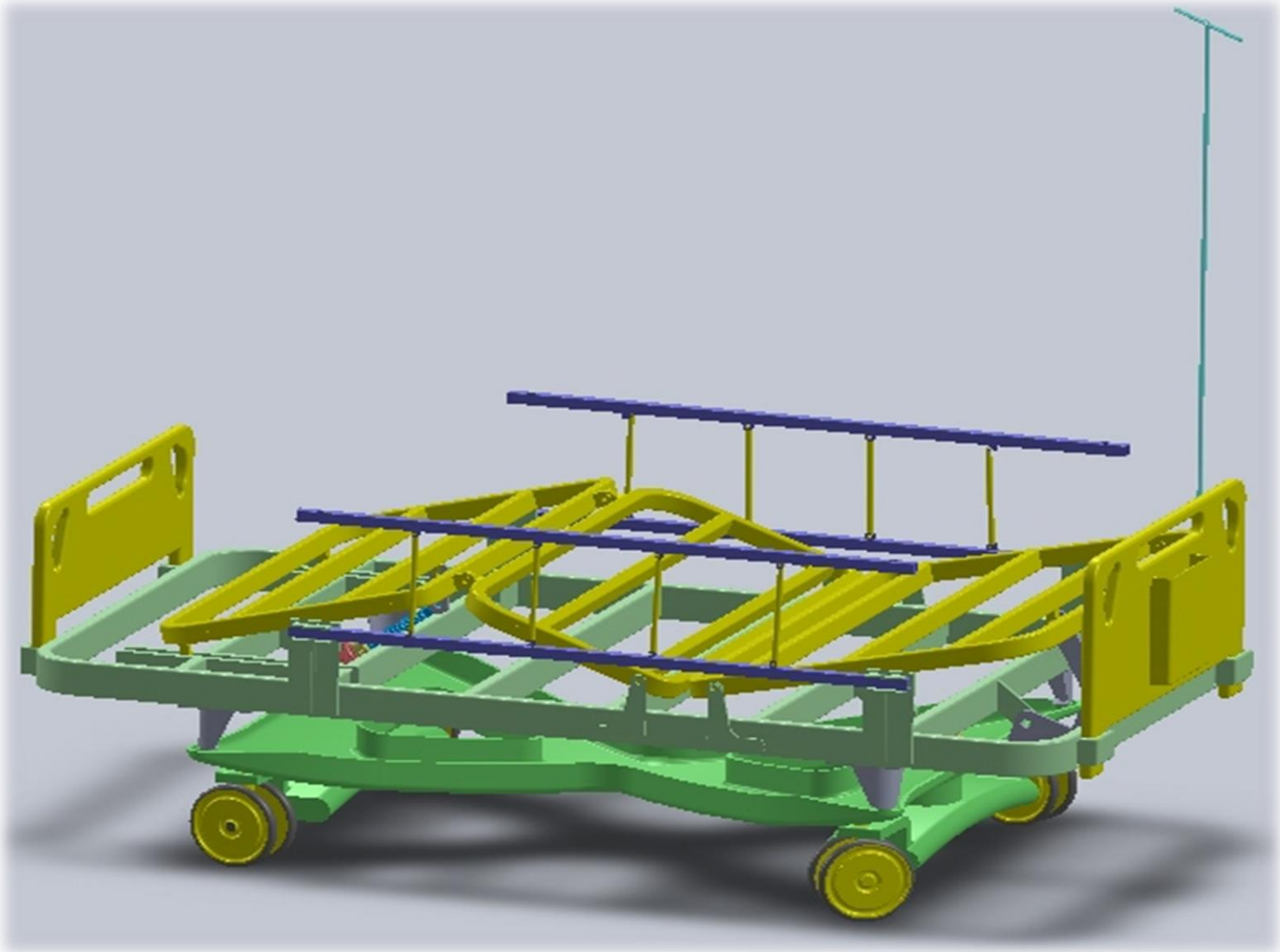


# Hospital bed Prototype

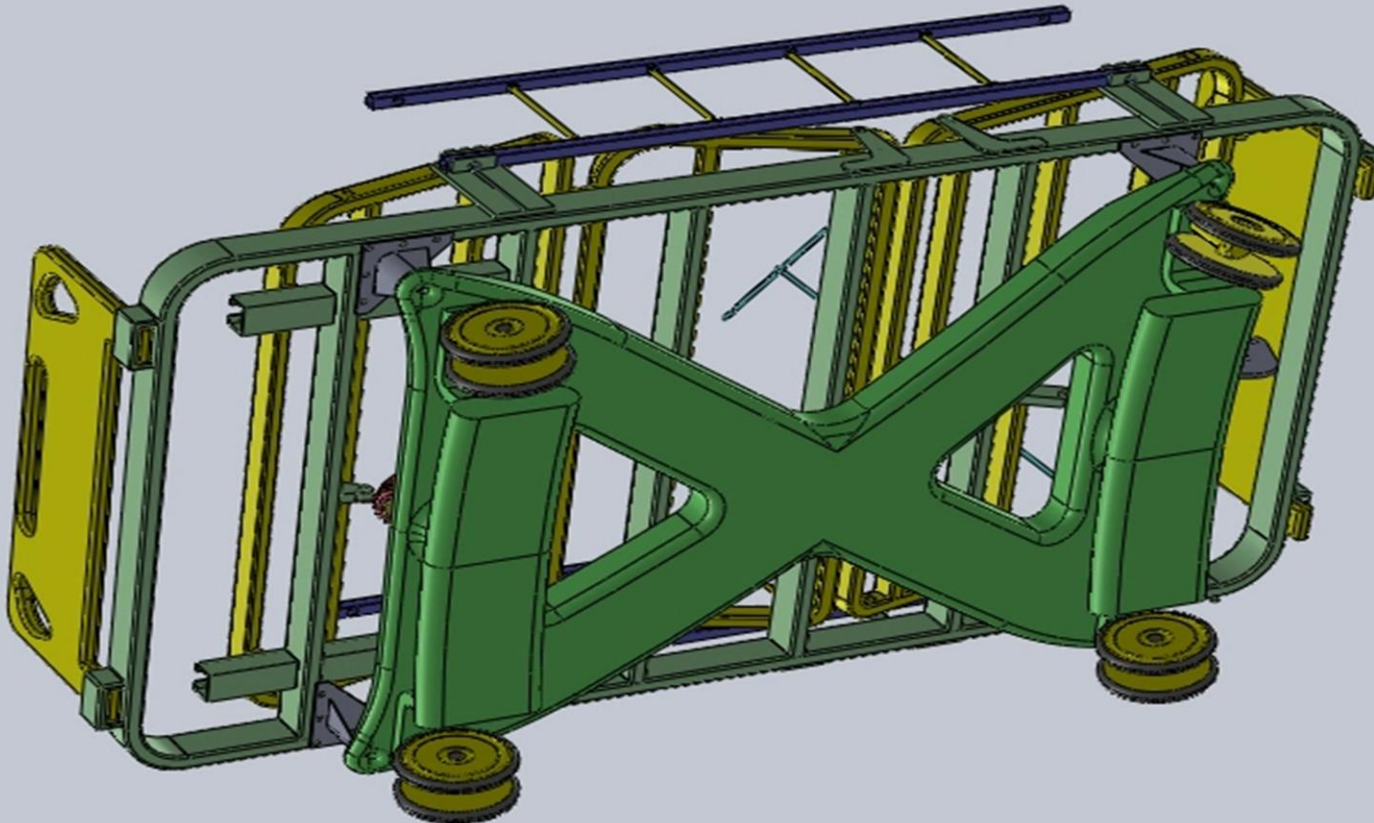


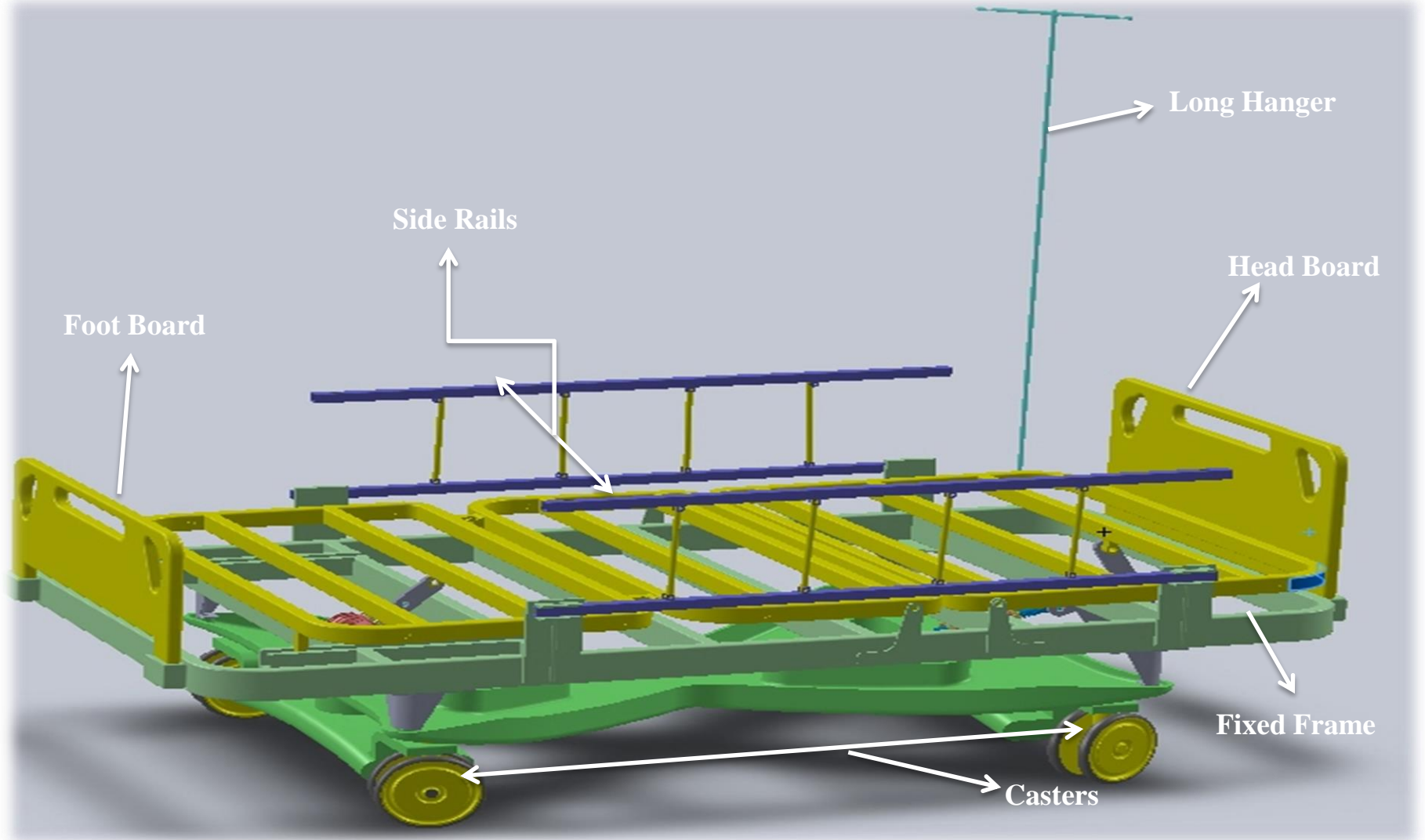


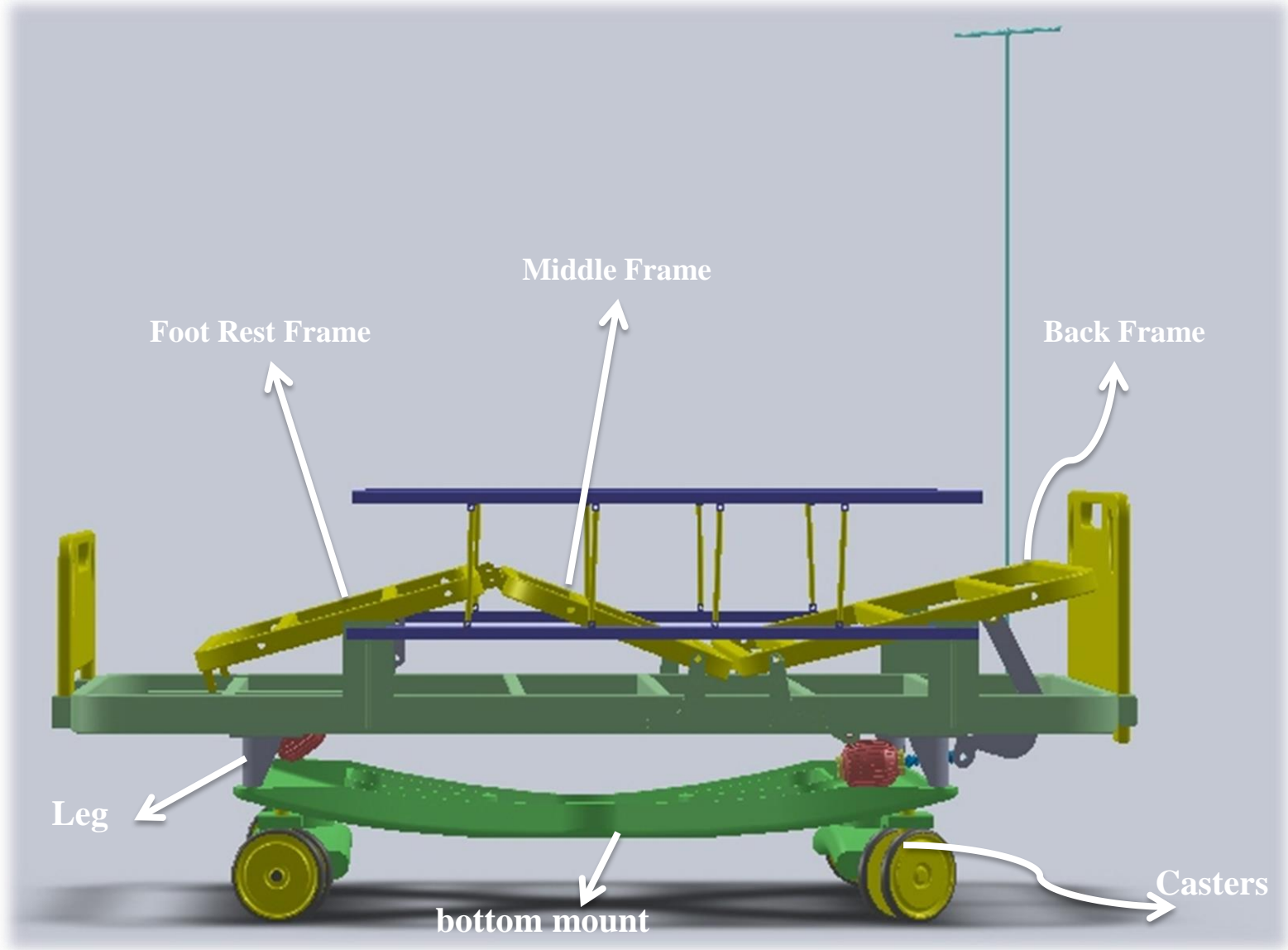
# Hospital bed Prototype



# Ground View

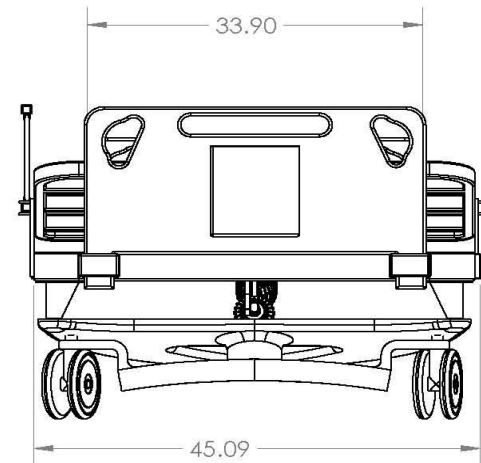
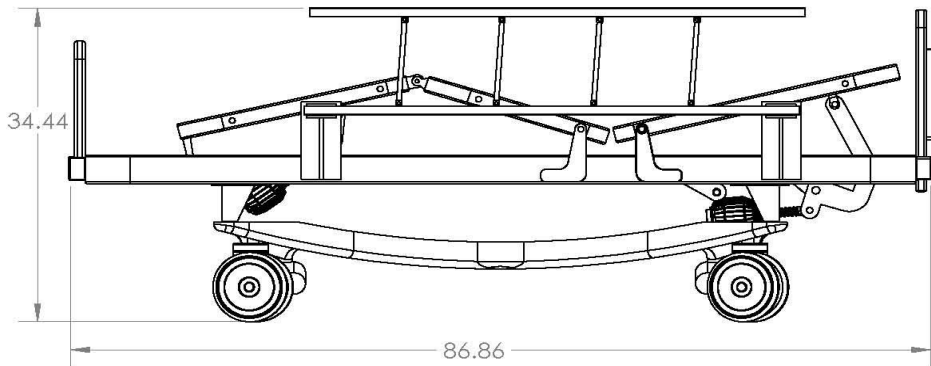
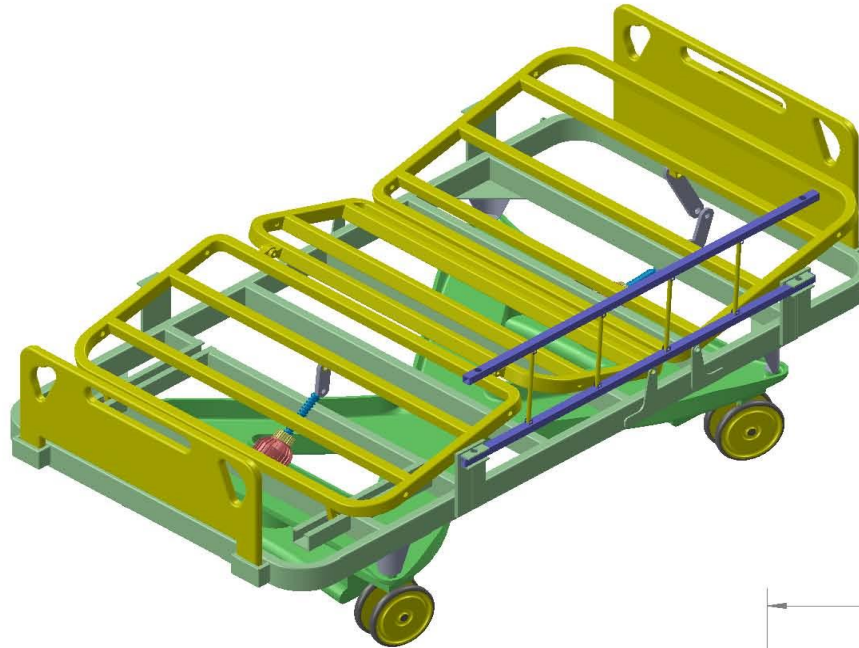






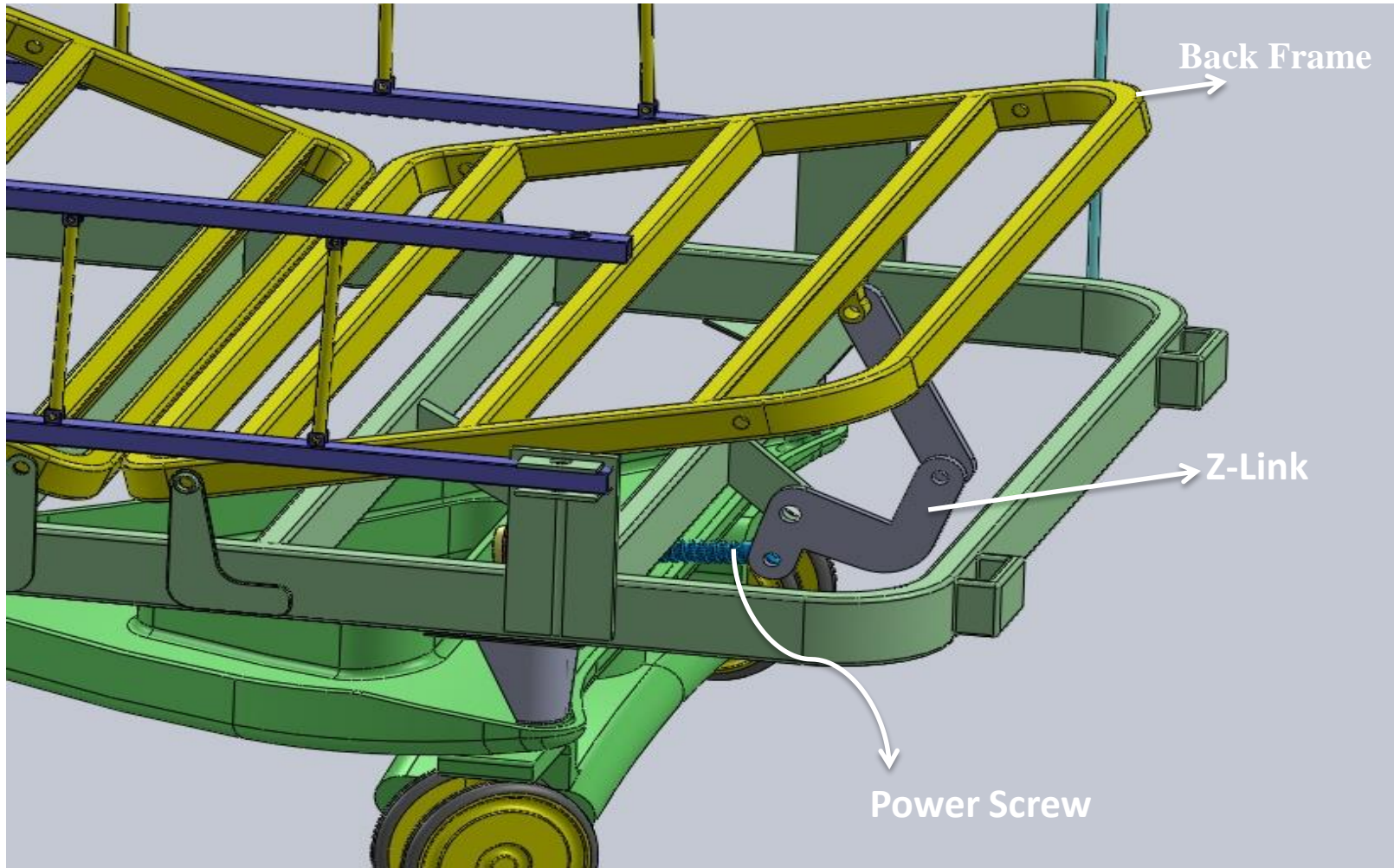


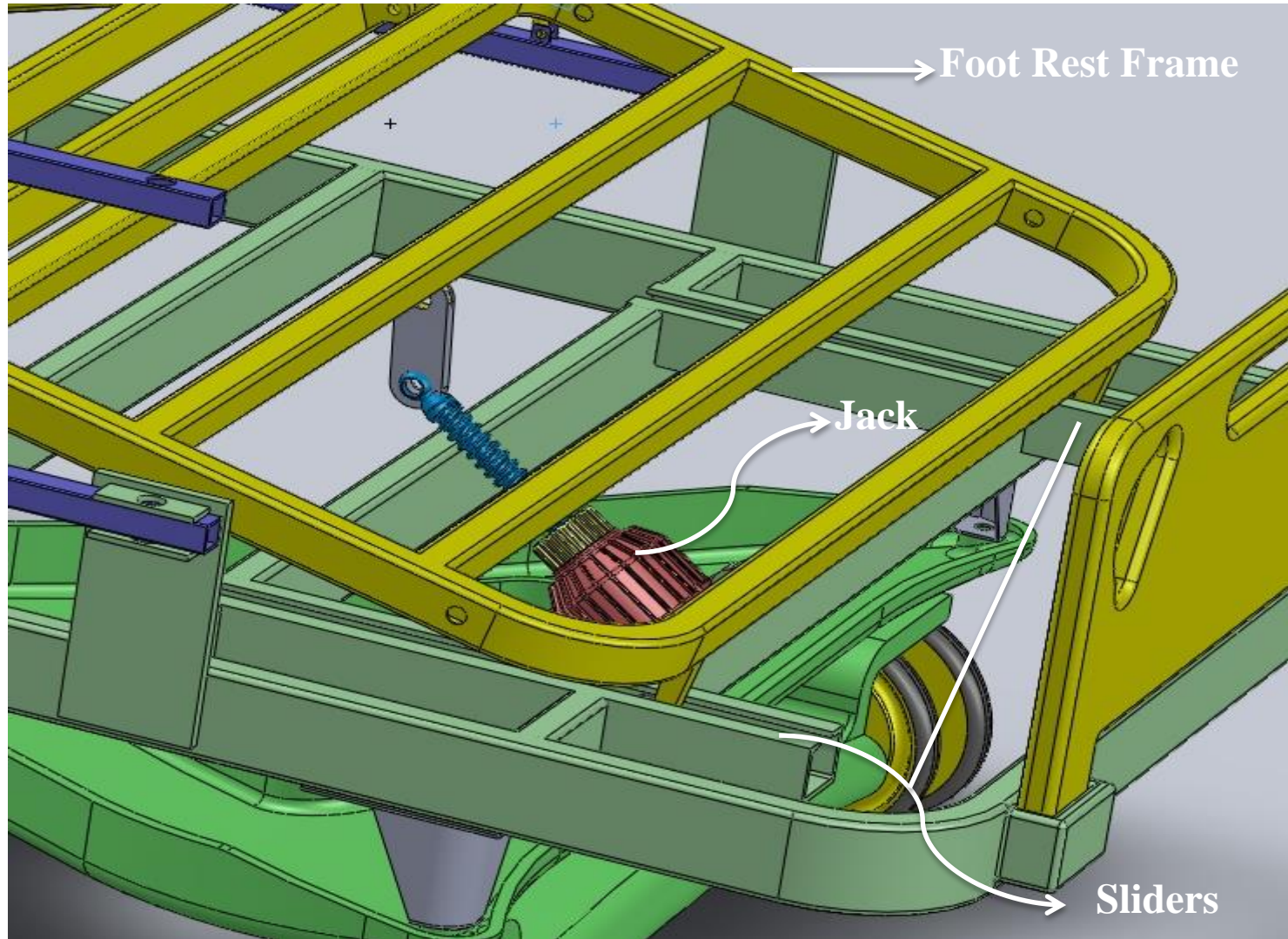
# Overall Bed Dimensions (inches)



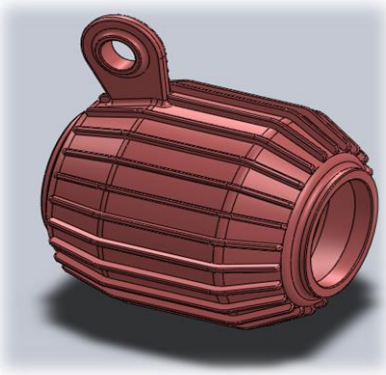
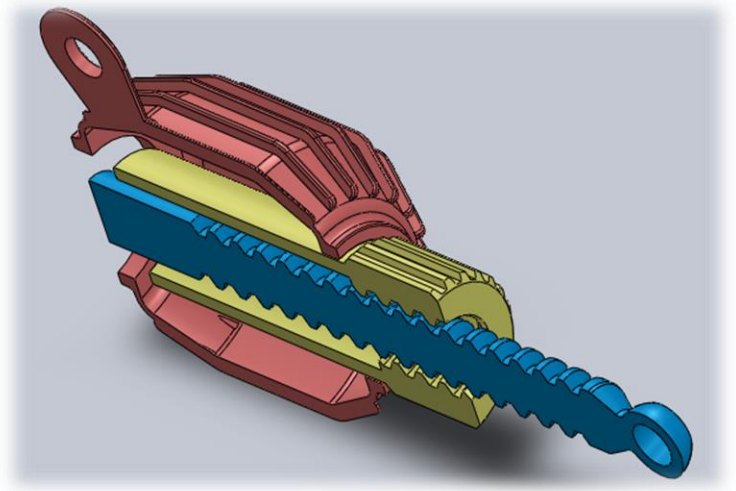
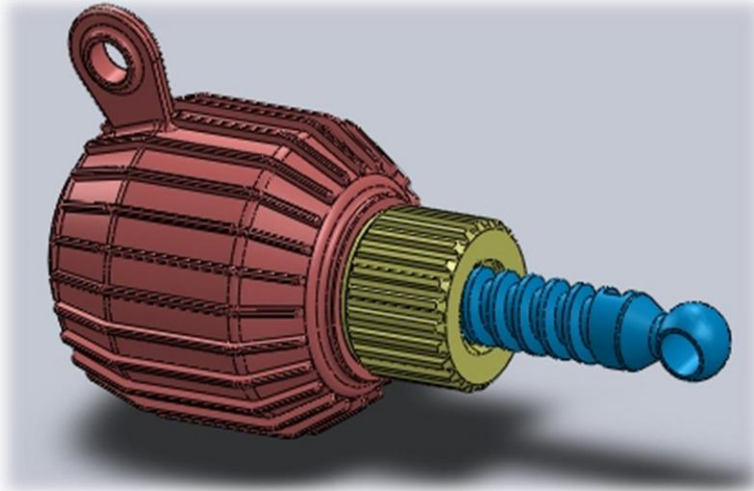




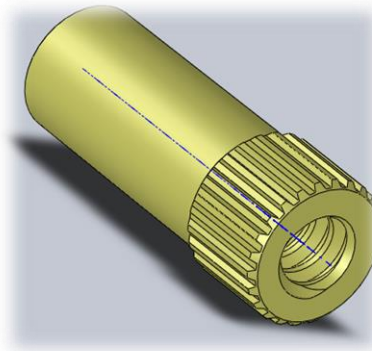




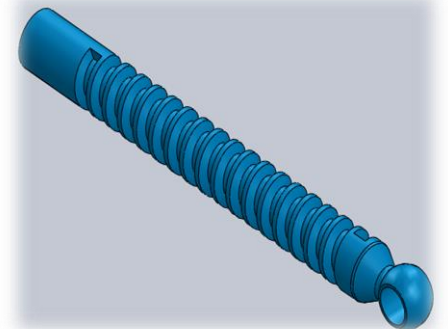
# Jack Screw



**power screw**



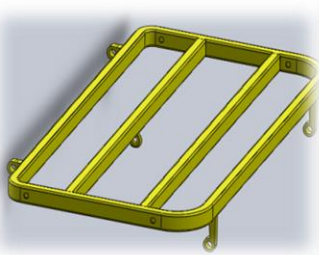
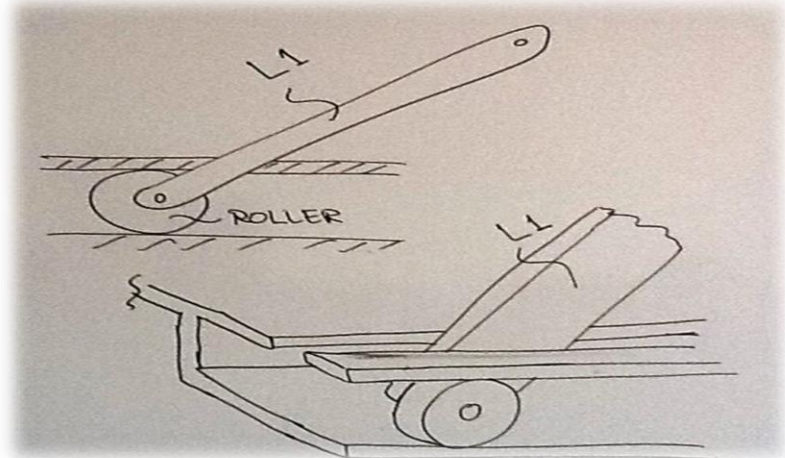
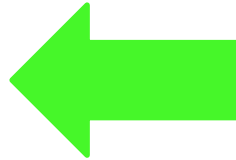
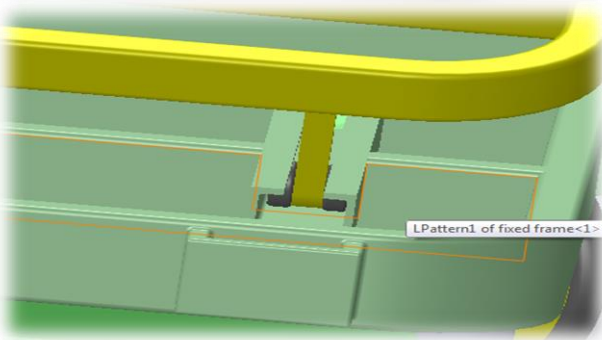
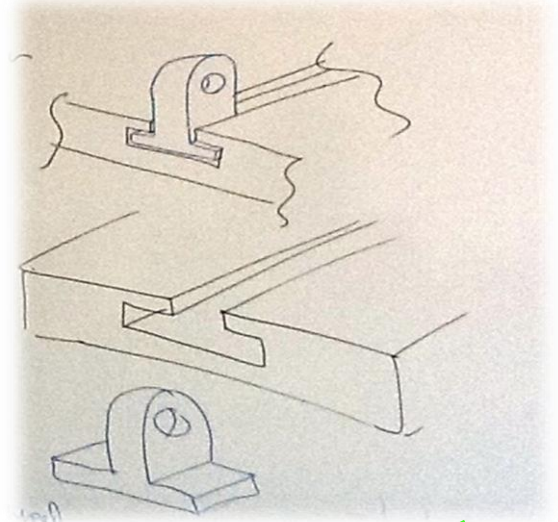
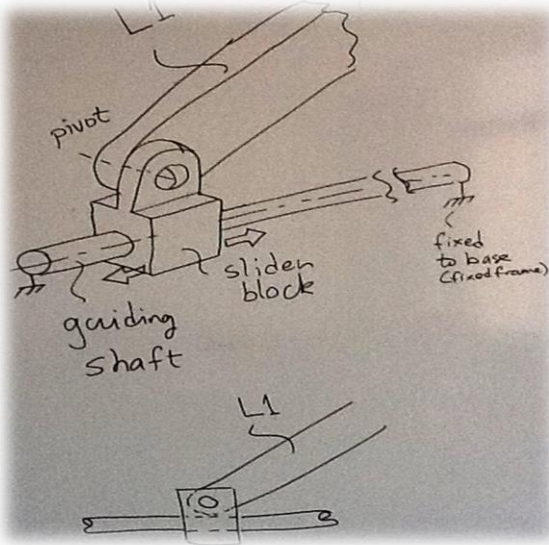
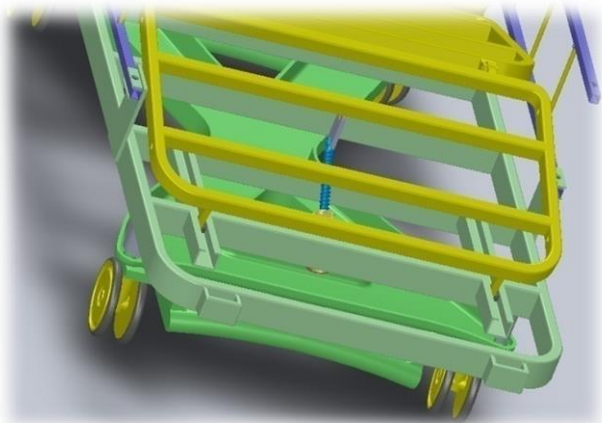
**power screw nut**



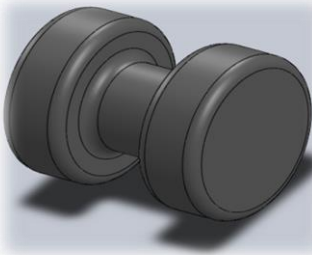
**power screw**



# Sliders

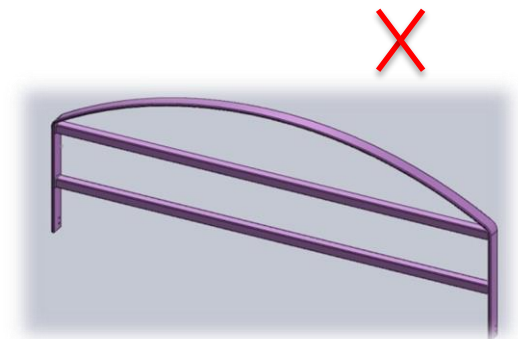
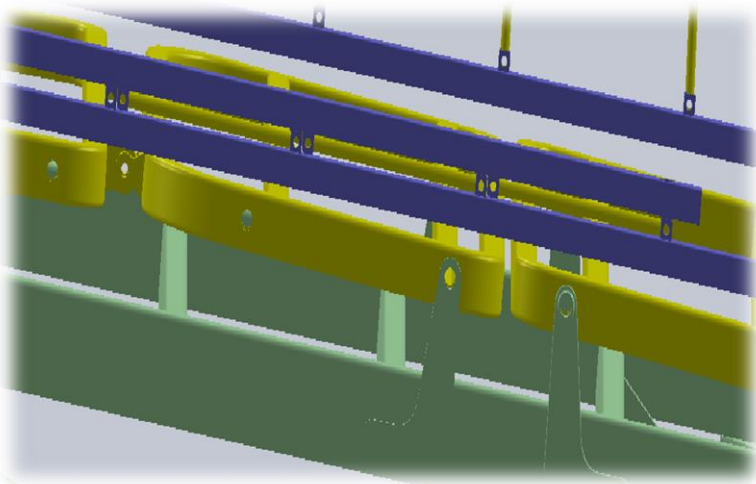
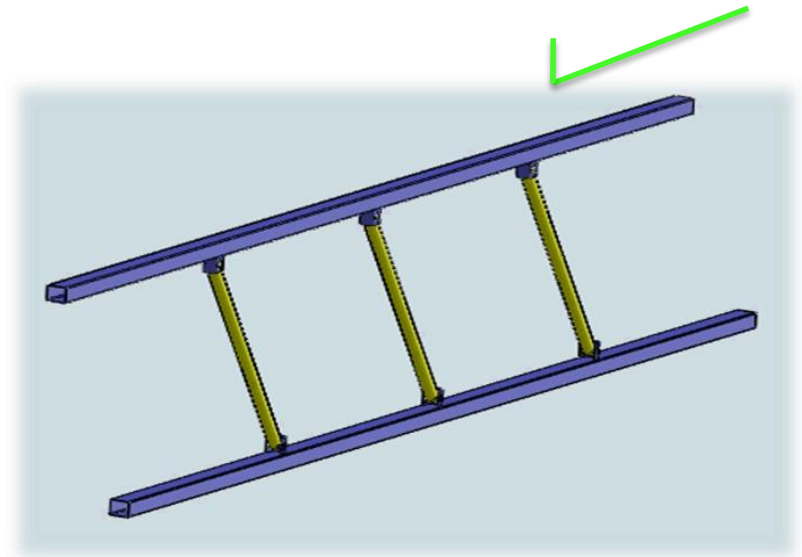
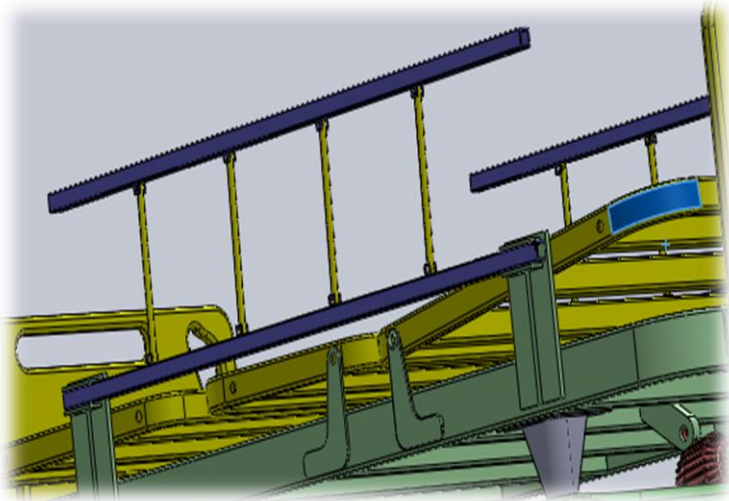


Foot Rest Frame



Wheel

# Side Rail

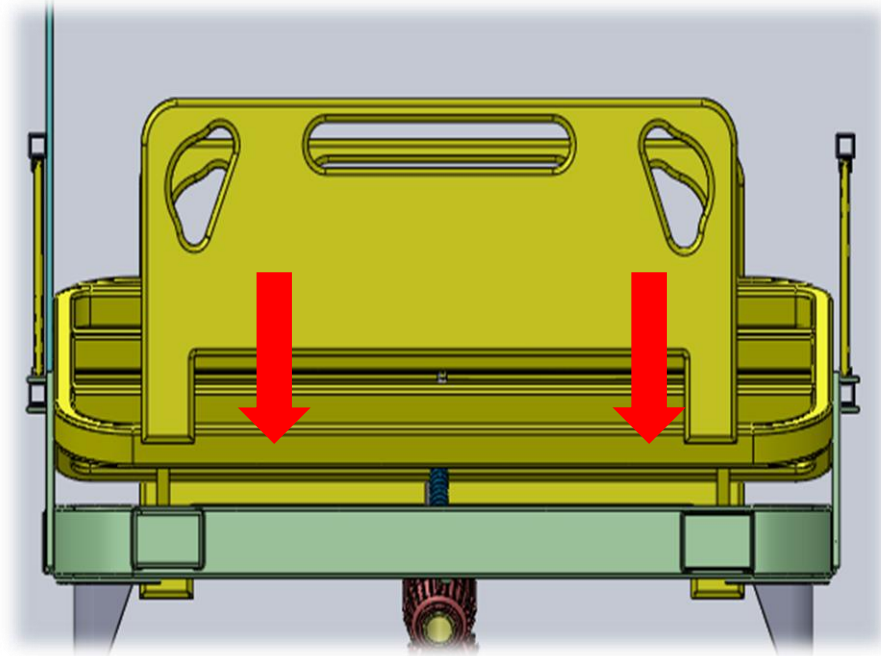
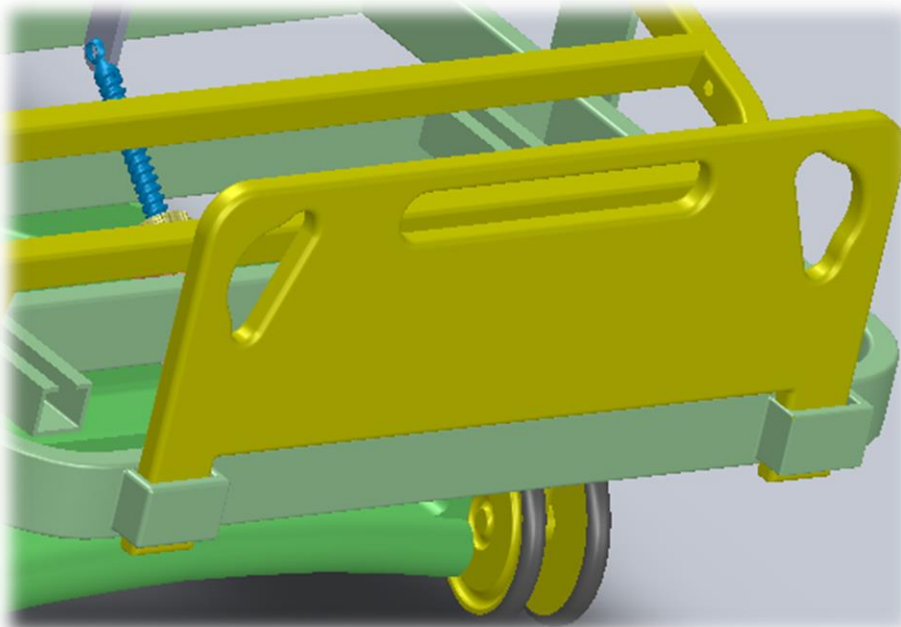


Rail avi.avi

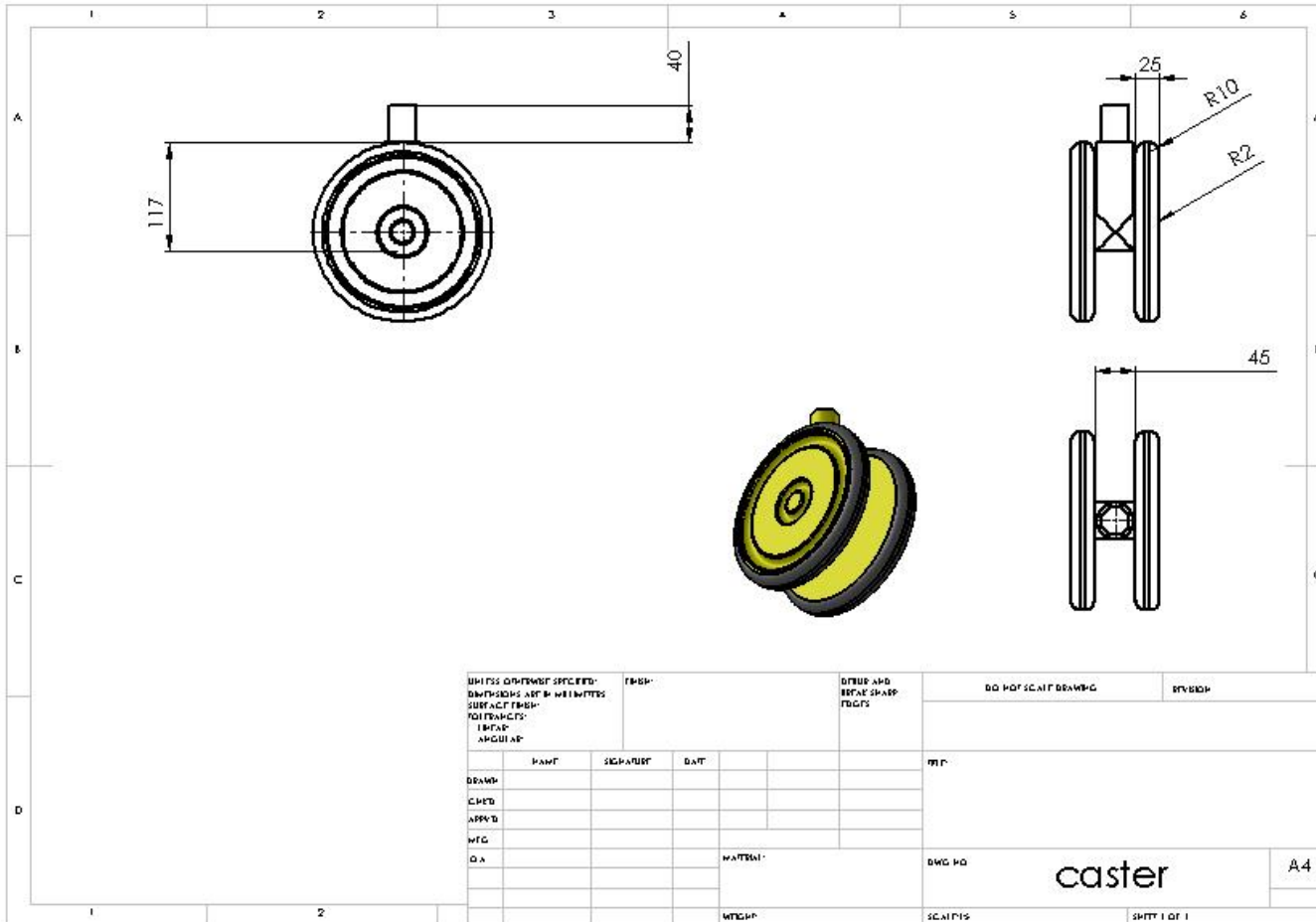
**Canceled Rail**



# Adjustable Boards



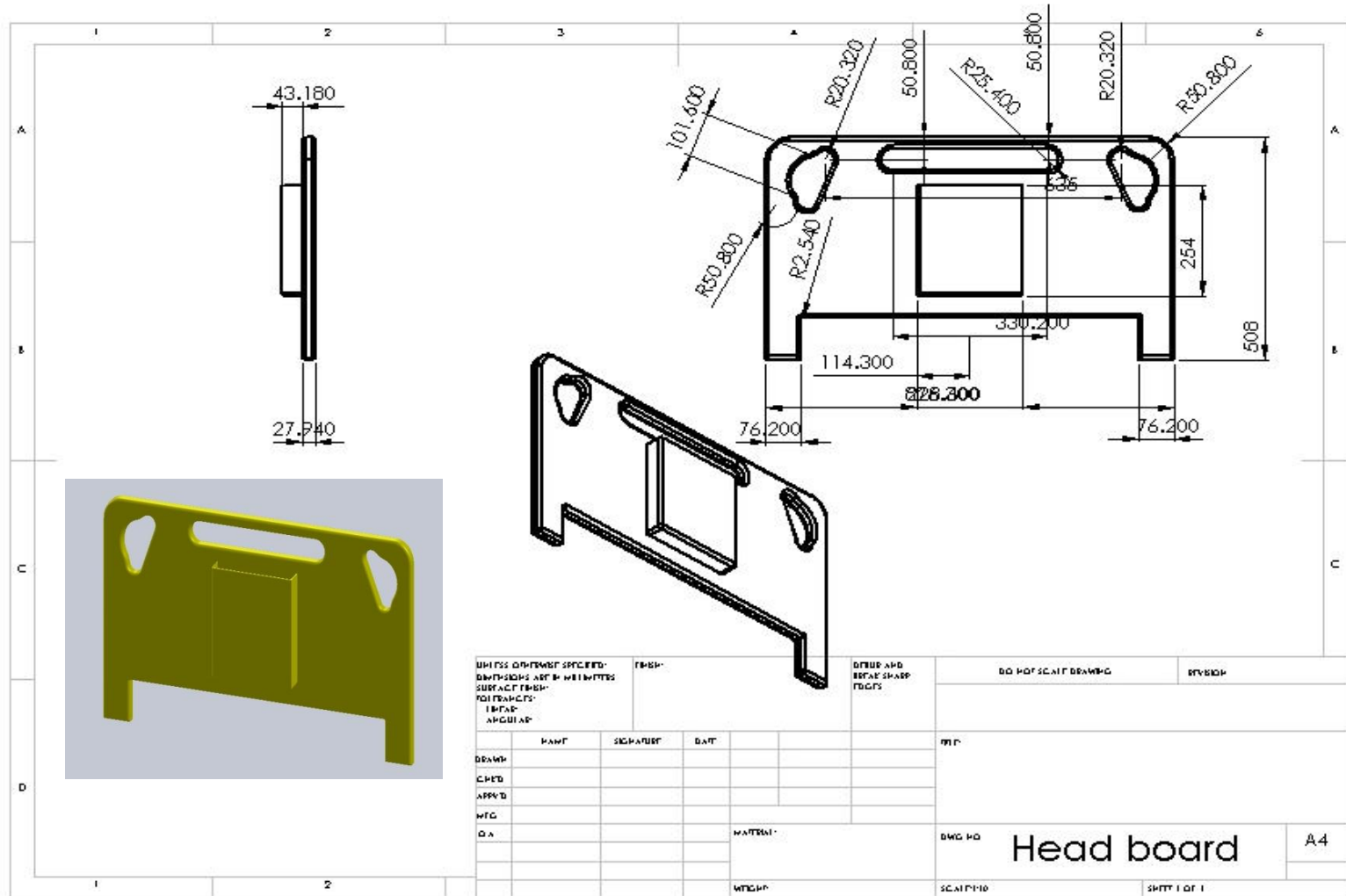


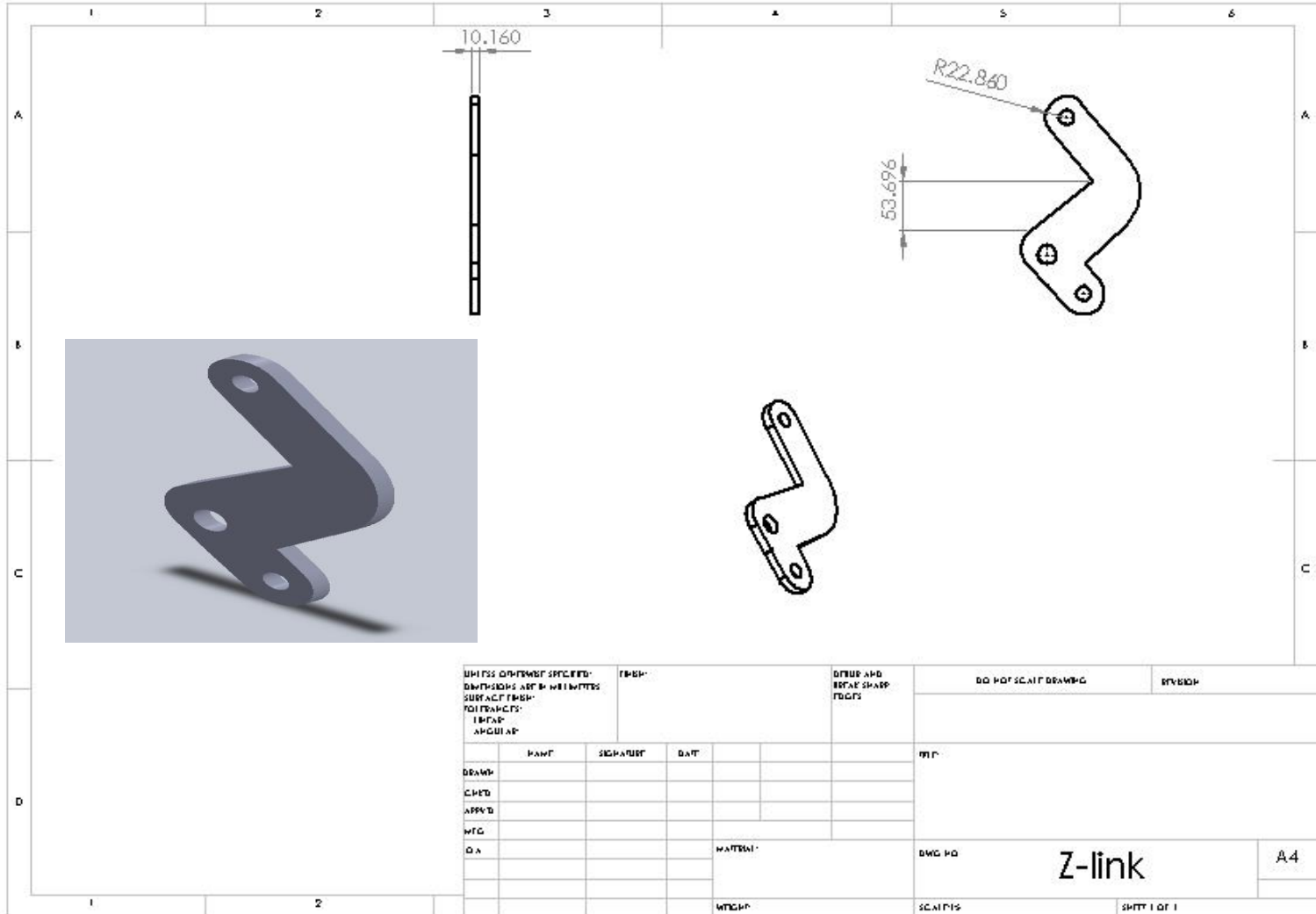




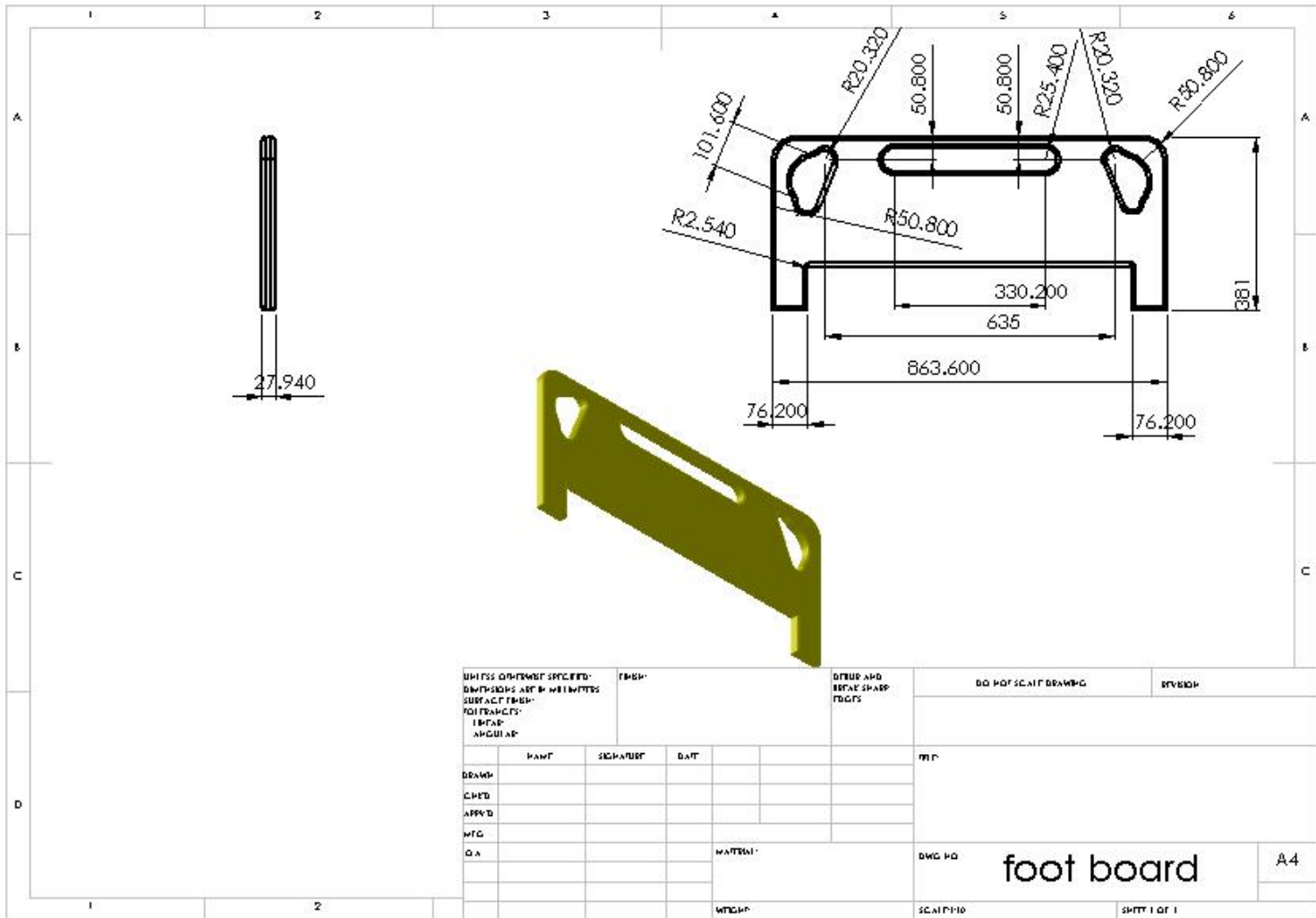


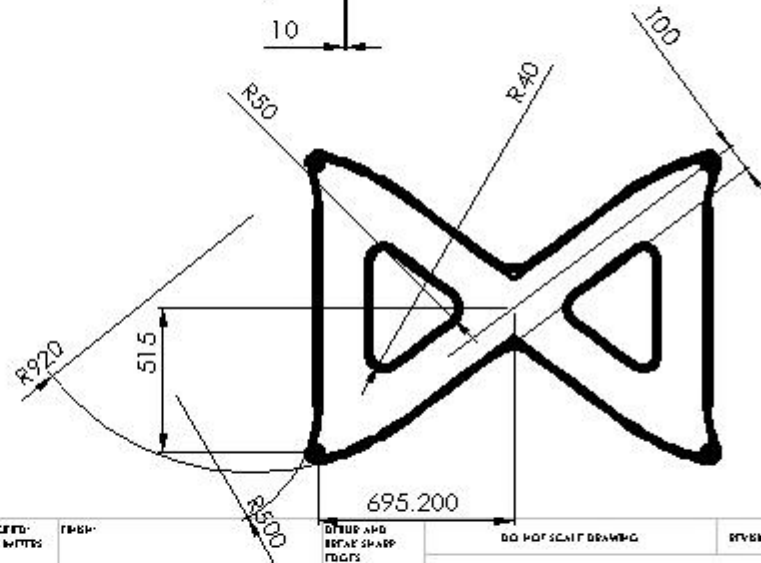
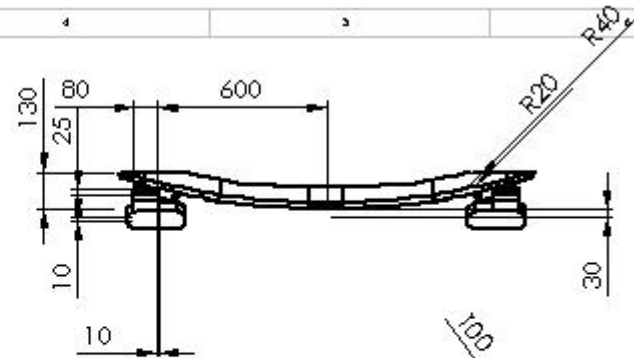
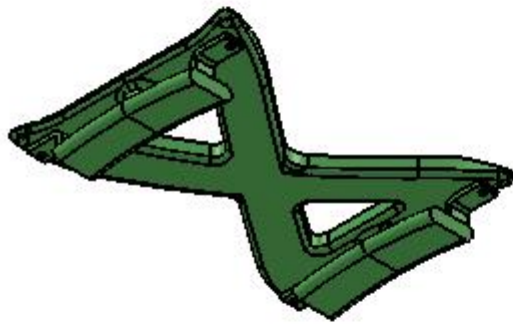






UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN MILLIMETERS SURFACE FINISH: FOLI FINISH: LINEAR ANGULAR				FINISH		DIMS AND EDGE SHARP EDGES		DO NOT SCALE DRAWING		REVISION	
DRAWN:				NAME		SIGNATURE		DATE		MFG	
CHECKED:											
APPROVED:											
MFG:											
D.A.								MATERIAL:		DWG NO	
										Z-link	
										A4	
								SCALE: 1:1		SHEET 1 OF 1	





UNLESS OTHERWISE SPECIFIED:  
DIMENSIONS ARE IN MILLIMETERS  
SURFACE FINISH:  
FOR FINISHES:  
LINEAR  
ANGULAR

FINISH

DRILL AND  
BREAK SHARP  
EDGES

DO NOT SCALE DRAWING

REVISION

	NAME	SIGNATURE	DATE		
DRAWN					
CHEK					
APPR'D					
MFG					
D.A.				MATERIAL	
				WEIGHT	

NO.	DATE	BY	REVISION

DWG NO: **bottom mount jpg** A4

SCALE: 1:100

SHEET 1 OF 1



# Conclusion

- ❖ Through the completion of this design project our group has concluded that there is still much the Saudis can do to advance their health care system.
- ❖ Additionally work must be done in the manufacturing area of the design.
- ❖ Our team feels that with a minimal amount of additional work this bed design would be an economical and effective alternative to the beds that are currently being used in Saudi.
- ❖ Our team feels that these steps would be worth perusing and that this bed design would allow for the continued expansion of Saudi's developing health care industry.



*Thank*

*You*

*For Listening Any Question*