

Project 2

Design of furniture for students in home environment

Guide Prof. K. Ramachandran

Pragati Kapur
08613804
Product Design 08-10
IDC, IIT Bombay
Mumbai

7/1/2010

INTRODUCTION

Definition and importance of furniture

Furniture may be referred to as any movable thing that can possibly support and carry the human body, give storage for objects, or hold them on a flat or level plane above floors (eg. chairs, desks, cabinets, closets, etc.)

Furnishings make a room or other area ready for occupancy

Furniture is an important facility that helps in providing a conducive, convenient, comfortable and functional environment for students at home. The comfort and functional utility of the furniture depends on its design in relationship to the biomechanics of human body.

Classification of student furniture on the basis of purpose

Sitting furniture includes chairs and benches

Writing furniture includes tables and black boards

Display furniture includes pin up boards, display boards and show cases

Storage furniture includes cupboards, shelves and lockers



VALIDATION and NEED

Almost 30% (or more, including lower middle class) population of India falls under the middle class category.

Schools and also homes are workplaces for students where they spend a major part of the day.

They work with books, notebooks, stationary etc. Middle class homes lack provisions to make space useful for student activities; hence children adapt to strange postures and have insufficient space for their activities.

These homes have no or little furniture designed for children to study, because of lack of space and resources but middle class supports a more sustainable growth model.

Furniture available for students includes computer tables and desks and chairs which are also are not designed for mass manufacture and are mostly imported.

Therefore, looking at the Indian scenario, the need is to explore the possibility of furniture systems that can be mass manufactured and accommodated in small homes, giving the user the flexibility and control over use.

The scope is to design a system that facilitates better organization, flexibility of use and personalized environment.

Centre for Policy Research, New Delhi:

By the end of the twentieth century 30 percent--some 300 million--of India's population will be middle class.

DATA COLLECTION

The study included feedback from potential users for understanding key issues related to the study environment at home.

The data collection includes following aspects

Case study

To study the student environment at home

Questionnaire

To get proper feedback from potential users

Market survey

To have an insight of the market scenario

Ergonomic standards

To get the relationship of user and the furniture

Case Study

Sample size - 10 houses

Number of children interviewed: 8

Children in the age group of 11 to 15 years

Houses visited were in the following places

- IIT Bombay campus
- Satluj Apartments, Kandivili
- Houses outside IIT Bombay main gate, Powai

Approximate area of the houses: 350 sq.ft. to 600 sq.ft

Storage scenario in small houses



Entertainment centre used for storing clothes



3 cupboards in a row for storing clothes/books



Computer table used to store old newspapers



Storage for books below the window sill



Loft to store things which are not in use



Carom board kept behind the head end of the diwan

Problem identification

In small, middle/lower middle class* houses in cities like Mumbai, a common problem encountered by children is lack of adequate study space which leads to difficulty in organizing their stuff and causes problems such as lack of concentration, postural problems etc.



Clutter in the room, no space for storage of bags, books falling off the shelves



Two tables kept next to each other which hinders usability of both of them



Use of corner table as a study table



Computer cum study table lying next to the washing machine ruining the study environment



Low table height. Child has to bend to an uncomfortable posture to write



Bad posture while studying on bed, causing back ache

Typical cases from the study



Shivani

12 years old – 7th grade

Studies on the bed or floor, without back rest (mostly), books scattered every where

Reasons – No better place to sit

TV is in the same room

Problems – Back ache

If guests come over, she has to go to either the terrace or to a friend's place, to study



Prateek

13 years old – 8th grade

Does not use the folding table in the kitchen

Reasons – Kitchen is not a study friendly environment

The table top is loose and comes down with weight of books

Problems - Has to study in noisy living cum bedroom

No privacy

Not enough place to keep books while studying

Inferences from interaction with parents and children

Some of the insights obtained are:

- Parents look at affordability and ease of maintenance
- Mobility of furniture is a concern - Movable/portable furniture preferred
- There is very less space for storage
- Organization of the material inside the cupboards is a problem as the children grow up
- Most of the children's time is spent between school and tuitions
- There are 3 sets of books and two sets of note books for each child in the house for each subject

Measures taken by people to make most of the space available



Enclose shelves behind doors



Make it hide – glass furniture occupies no visual space



Over head storage



Think tall- maximise wall space with tall cases



Fold it – folding tables can be slid under the bed



Look up

Products existing in the market

Products in the market, both international and domestic, were studied to find out what furniture is available for the students.

The search for the existing products was done by

- Visiting furniture shops in Mumbai city
- Speaking with parents and children
- Searching the Internet.

There is no organized sector manufacturing furniture for students in India

Ice cubes – typical mass manufacturing plant

ICE CUBES, a new venture of Magppie offers personalized modular kitchens and wardrobes
Ice Cubes facility is set up in Sonapat, Haryana, with all machinery and technology from Italy & Germany.
Materials used

Base material – Boiling Water Resistant (BRW) ply

Countertops – Corian (from Dupont)

Door finishes – Laminated, veneered, lacquered



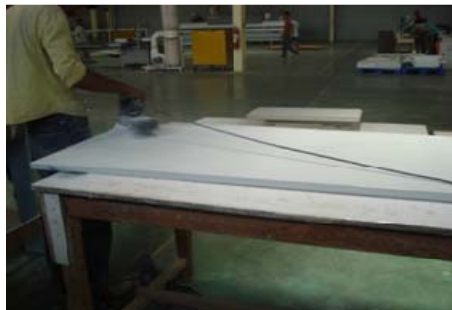
Veneer sheet rolls



Parting of hinges from a long strip



Pressing of board after application of veneer



Polishing wooden surface



Trimming off edges



Rounding off edges of board

Indian product solutions for students



Furniture for school
For primary school kids in rural India
Student project at IDC, IIT Bombay

7/1/2010



The designer to these frames, Mukul Mandey,
Originally three pieces of furniture or three modular units, these can be made into

- three study tables to work with a laptop or while on a group study
- a comfortable chair or
- a single bed.

Products for students in the international market

Flux e-desk

Modern school/work desk, designed for use with laptops.



This personal desk/chair unit was specially designed for use with a laptop. It features power cable management to get the wires out of the way. While the hard shell exterior is adequate to handle even the most powerful of keyboard typists. Padding on the underside of the desk helps against soreness developed from leg and knee impacts

Tok & Study by Helder Filipov

It is a furniture capable of making the environment conducive for studies, combining comfort and dynamism. It fits both the study with traditional materials and the study with notebooks, while sitting on the couch or lying on a bed.



7/1/2010



Examples of contemporary storage solutions



Can Onart, Elissa Myres and Bethany Casperite

Using bending technique for moulding the 8 layers of industrial gray felt (stuck with epoxy resin) and 2 layers of veneer, this piece could be used as a table



Elastico book case

The Elastic Bookshelf is made of wide elastic bands stretched over wall-mounted pegs

Exploration of materials

Wood



Plastic is extensively used for making furniture
Made from black or colored acrylic



Metal



7/1/2010

Glass furniture



Design Brief

To design furniture for students in the age group of 11 to 15 years of age, serving two or more functions. The product shall be used in home environment, in middle class homes (Approx. area = 500-600 sq. ft.) and shall provide solution in terms of personal space and should be safe, easy to use and handle and affordable. The product shall be designed such that it can be mass manufactured. This will be achieved by the type of materials and manufacturing techniques used.

IDEA GENERATION

Study environment can be made more productive with proper use of furniture which provides comfort and space for the student for his various activities

The ideation process started with rough sketches and doodles during data collection

One concept has been taken for development and prototyping.

The concepts are based on the attributes listed below

The key words helping the ideation are:

PRODUCT

Flexible

Compact

Multi use

Personalized

USER

Comfort

Control

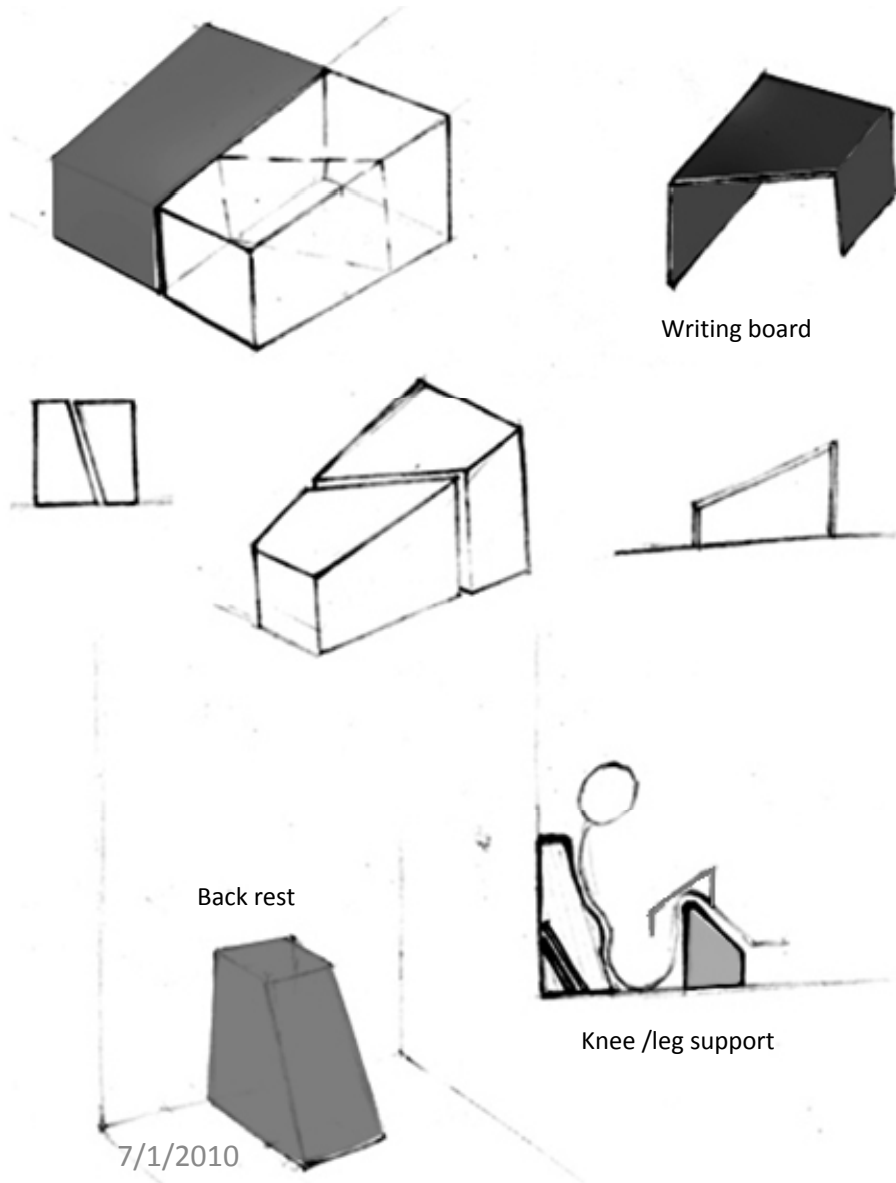
ENVIRONMENT

Informal

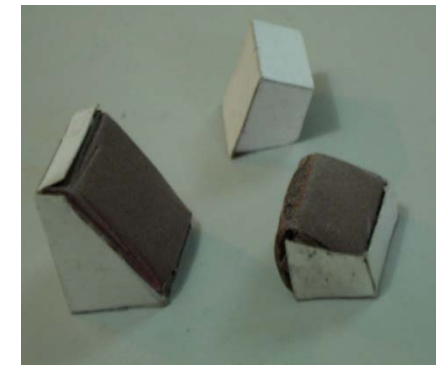
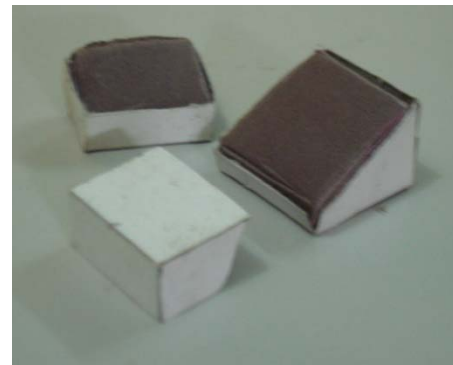
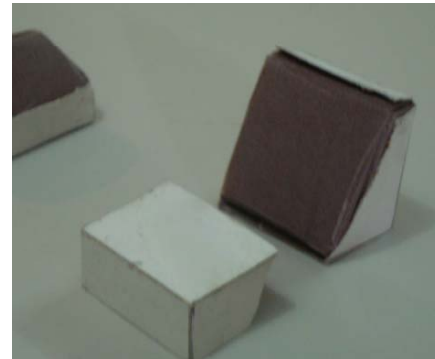
Safe

Warm

Ideas based on squatting posture

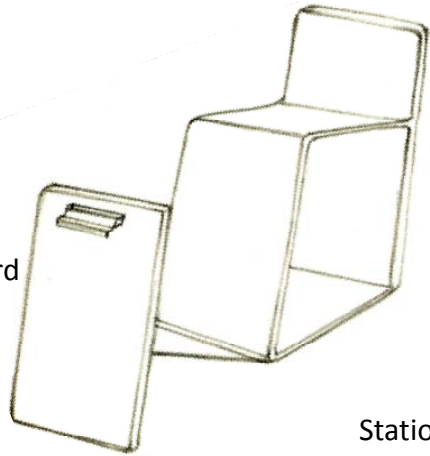


Writing board

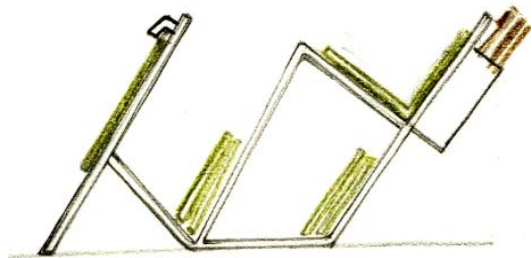
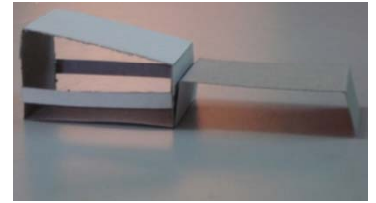


Unit which can be separated into 3 different components and brought together again

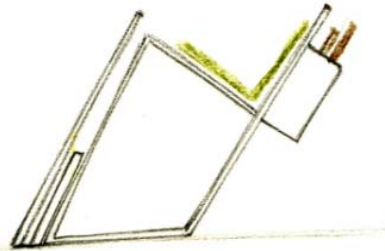
Book mounted on board



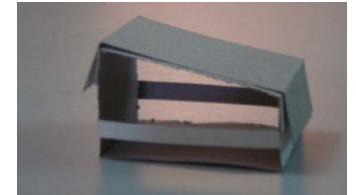
Stationary storage



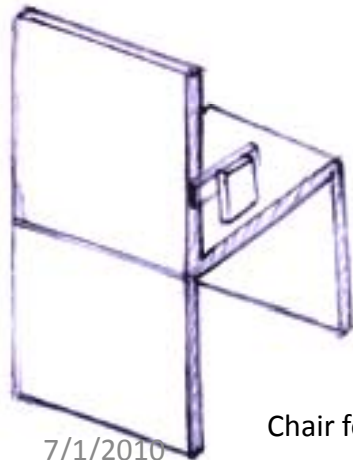
Unit folds and compacts



Storage for books

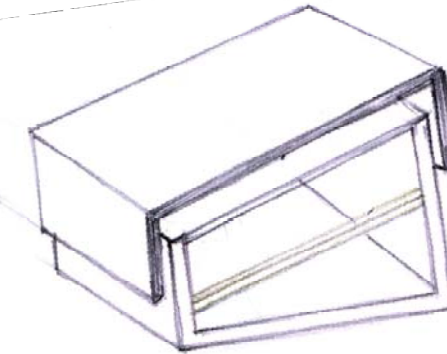
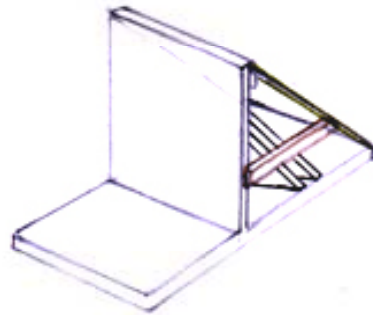


Various configurations possible with the unit



7/1/2010

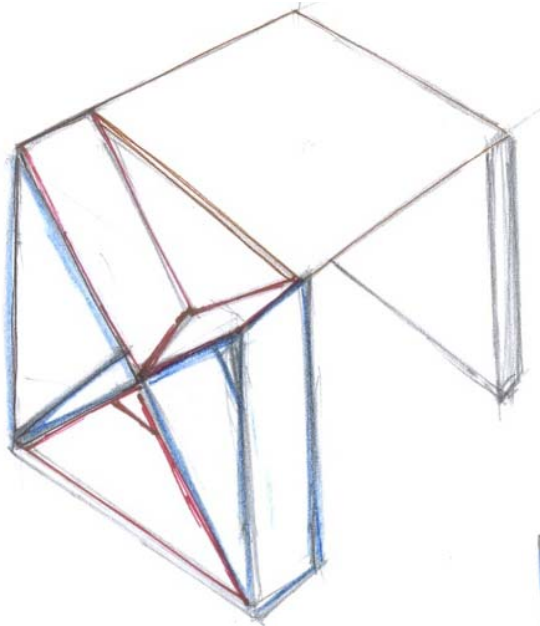
Chair folds to form writing surface and storage



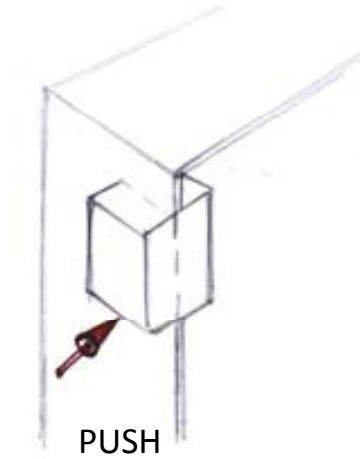
Separable stool

Storage for books cum writing surface

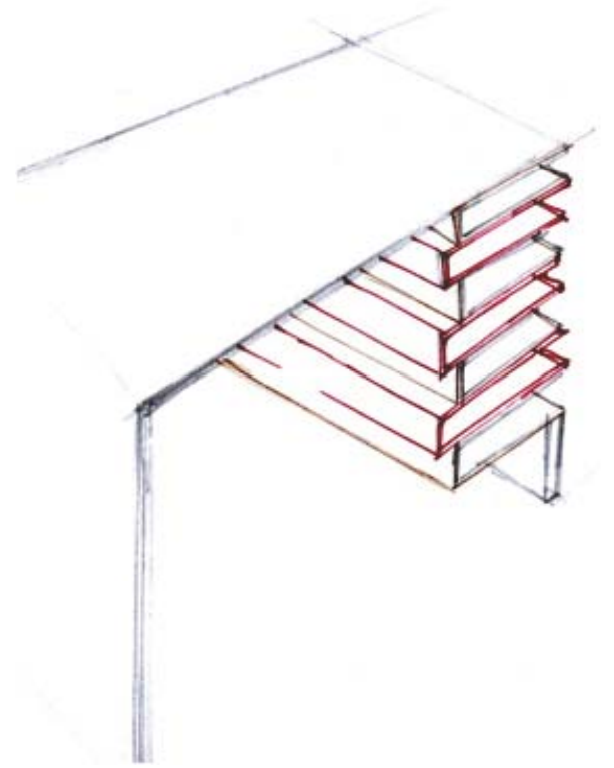




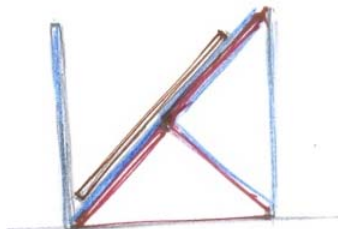
Storage with adjustable flaps



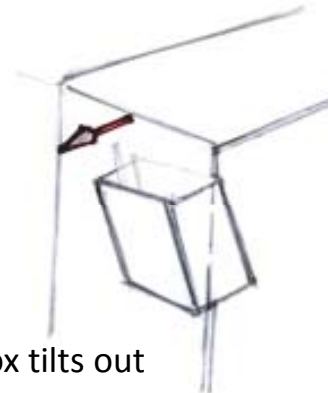
PUSH



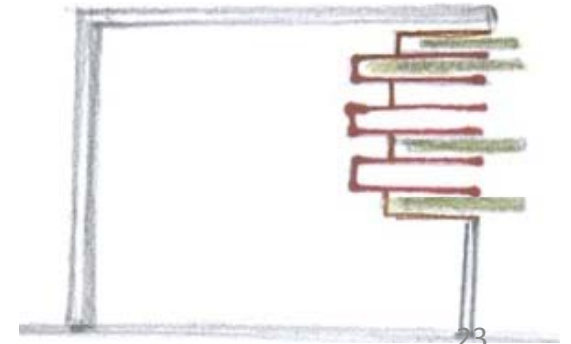
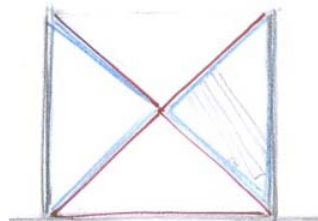
Storage of books in table side

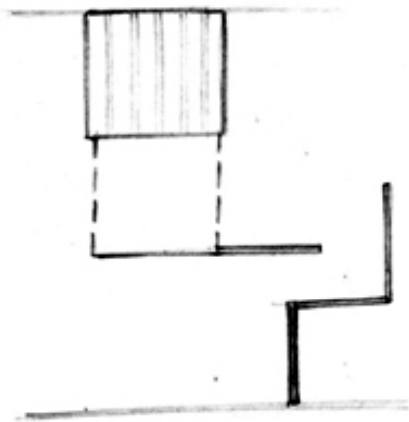


Box tilts out

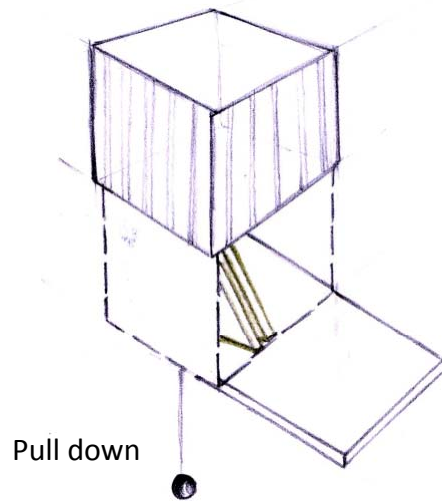


Stationary box in table



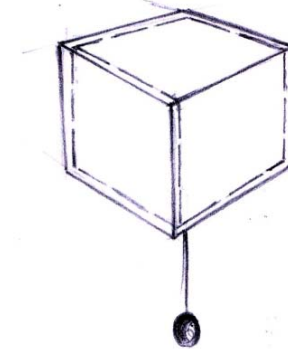


Ceiling mounted storage

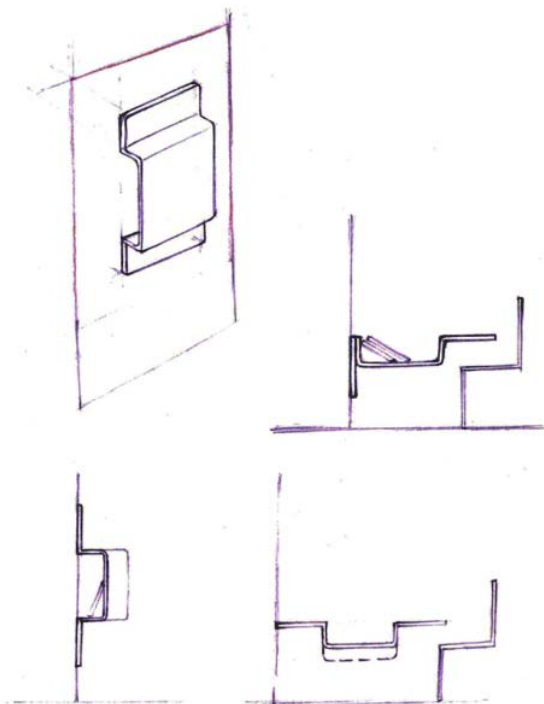


Pull down

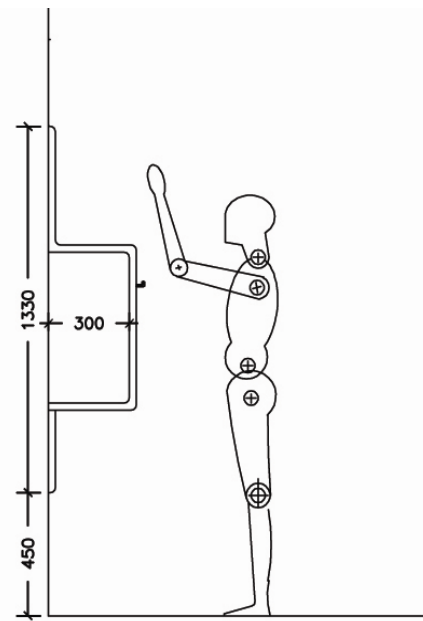
Flap opens – writing surface



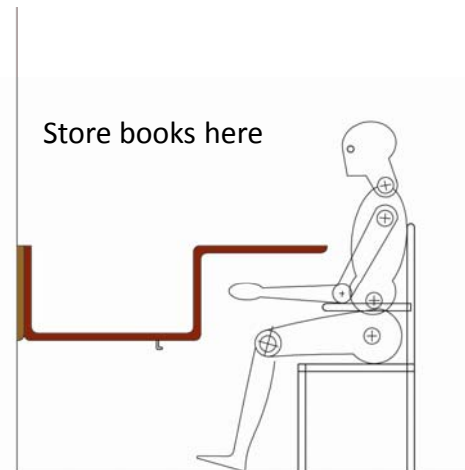
Lamp on ceiling when not used



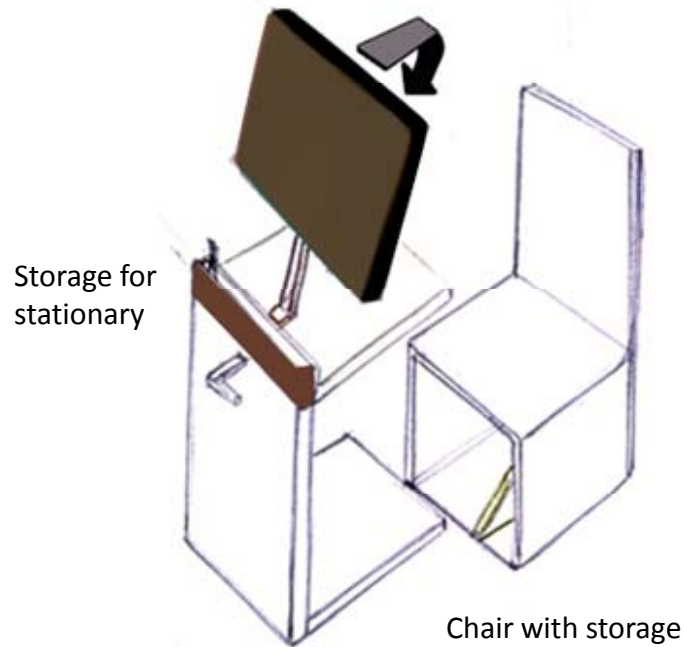
7/1/2010
Wall mounted table cum storage unit



Closed – put against the wall



Folding pin board



CONCEPT 1

Floor area occupied = 3.6 square feet

This concept is based on the sitting posture

The chair folds into the table, which saves floor space

The pin board folds down to form a writing surface

Disadvantages

Folding of the back rest of chair and putting it under the table is a difficult task

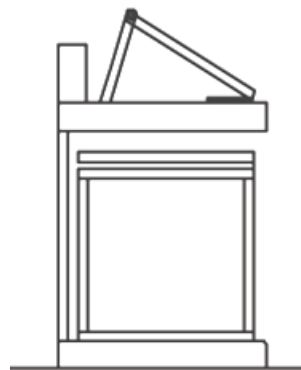
The furniture looks very table chair like which does not attract students

There is no play or interest in the form

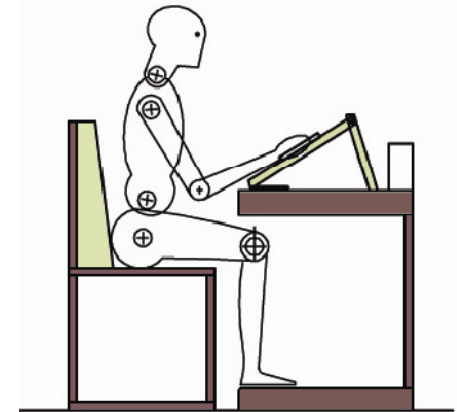


Pin board folds to make writing surface

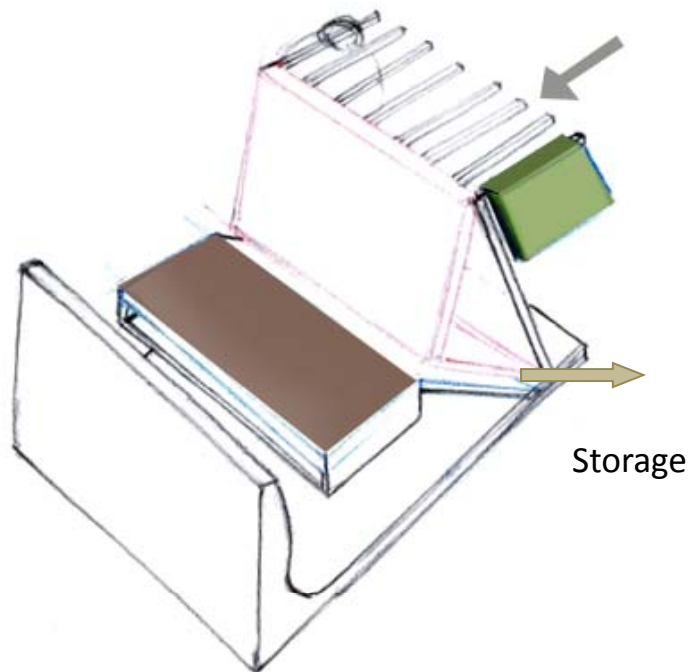
7/1/2010



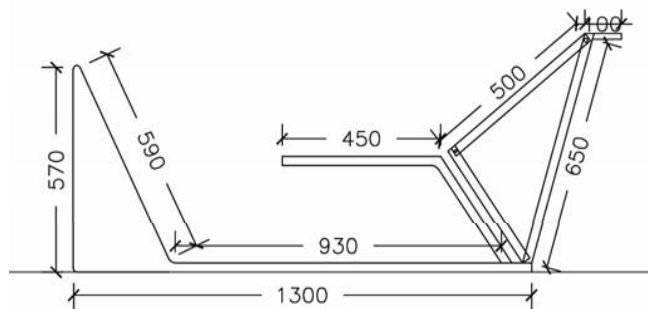
The chair inside the table



Hooks as books marks and for hanging things



Storage



7/1/2010

CONCEPT 2

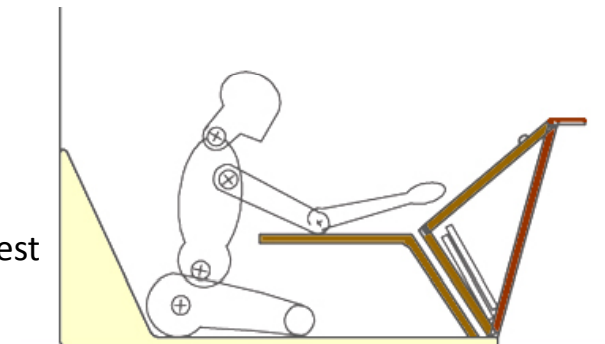
Floor area occupied = 10.8 square feet

This concept was derived from the squatting posture
The unit is complete in itself incorporating seating,
storage and a writing surface
The unit can be carried around in the house

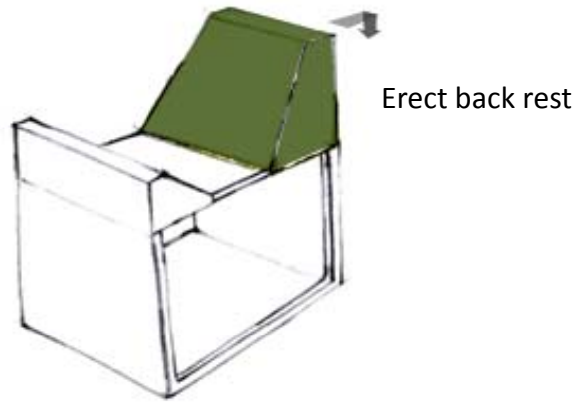
Disadvantages

The unit would get heavy with the weight of the books and
the unit itself
It is rigid and no configurations possible
The children do not find it interesting

Inflatable back rest

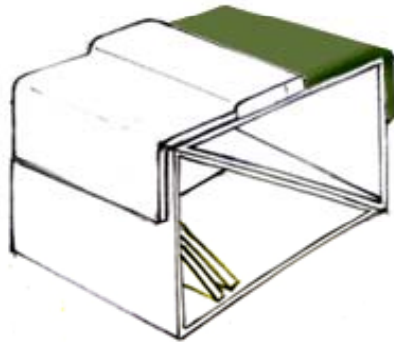


Can be put against the wall

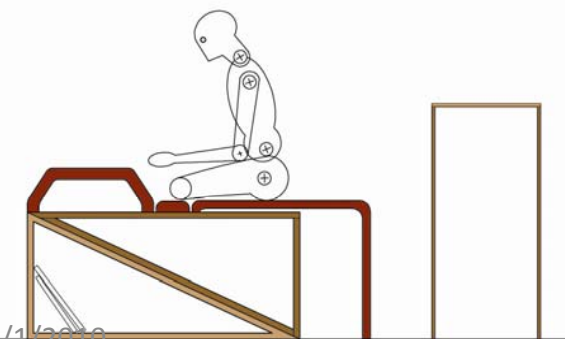


Erect back rest

Back rest falls to become a flat bed



Storage for books under the seat



7/1/2010

CONCEPT 3

Floor area occupied

Open = 11.95 square feet

Closed = 9.5 square feet

The back rest can be made upright or can fall back to become a small bed

This concept can be used both for squatting and sitting postures

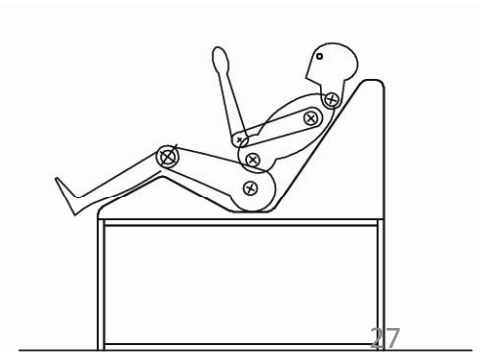
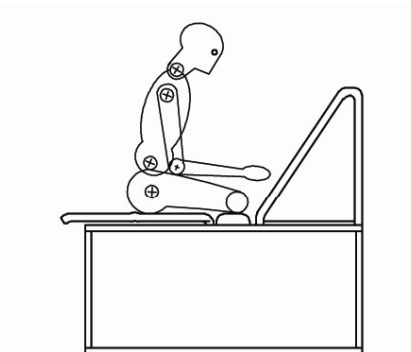
The space below the seat can be used for storage of books etc

The unit also has a folding table, which folds under the seat and can be taken out

Disadvantages

Occupies a lot of floor area when open

Operation and functions look very complicated

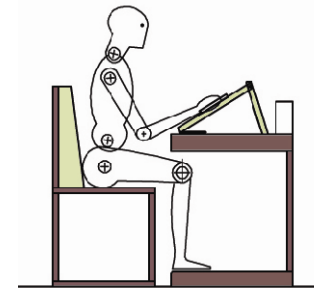


Weightage %	Attribute	1	2	3
40 %(*0.4)	Storage	8	8	5
60 %(*0.6)	Area occupied	7	5	6
70 %(*0.7)	Ergonomics/ comfort	8	7	7
50 %(*0.5)	Handling	8	8	8
		17	15.1	15

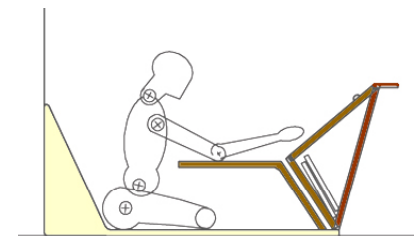
Ranking is from 1 to 9 from average to good

Concept 1 was chosen for further detailing after evaluation was done based on user feedback.

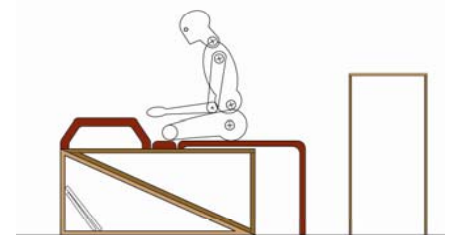
7/1/2010



1

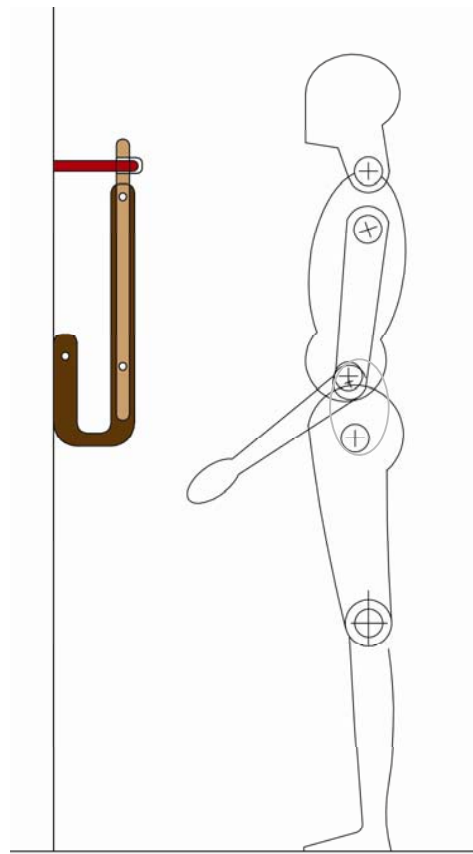


2



3

Refinement of concept 1



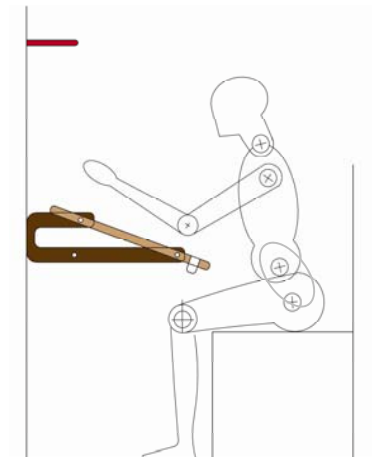
Unit against the wall when not in use

The following changes were made to concept 1 to make it more efficient

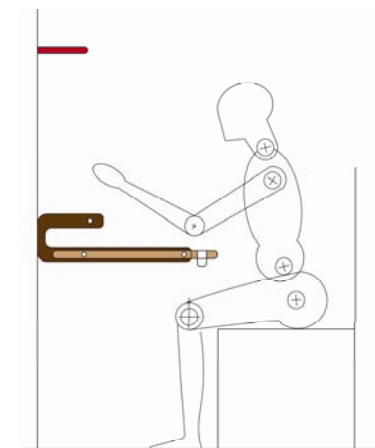
- The table was wall mounted instead of being kept on the floor. This saves space. Only the chair has some foot print
- Storage for books and belongings incorporated into the table
- The working of the unit made interesting. There is motivation for students to keep things in place after using the table to hide their belongings from siblings etc.

Disadvantages

- No space for storage of books or belongings
- Changing the angle of the writing board for reading and writing is not required

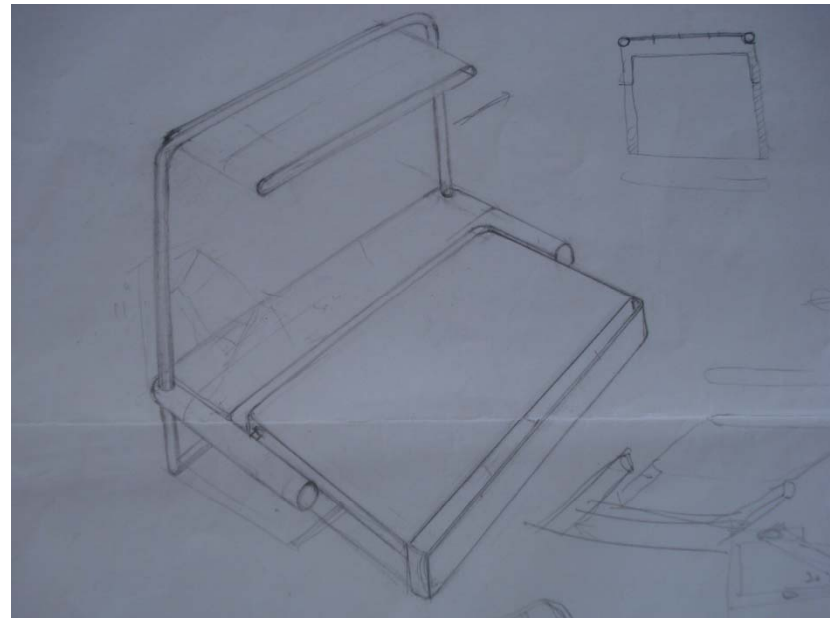
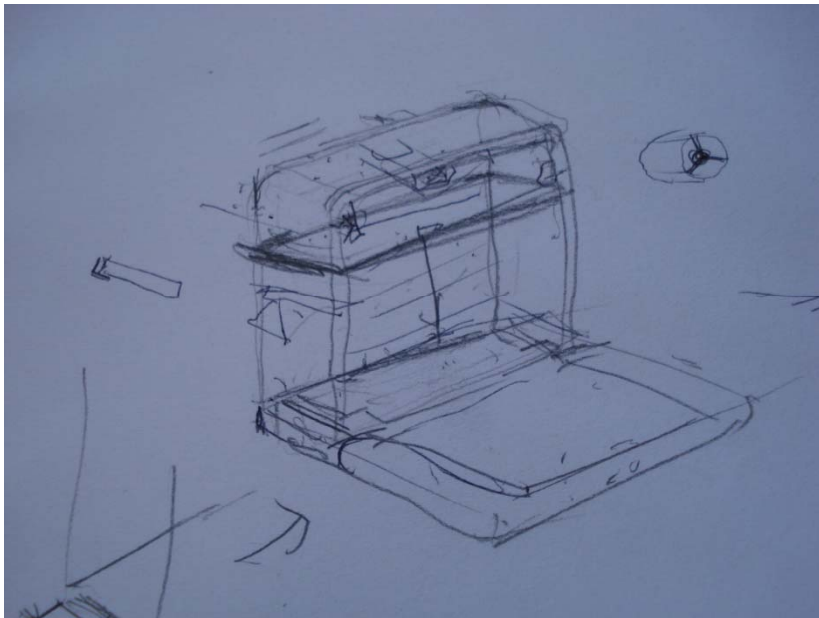
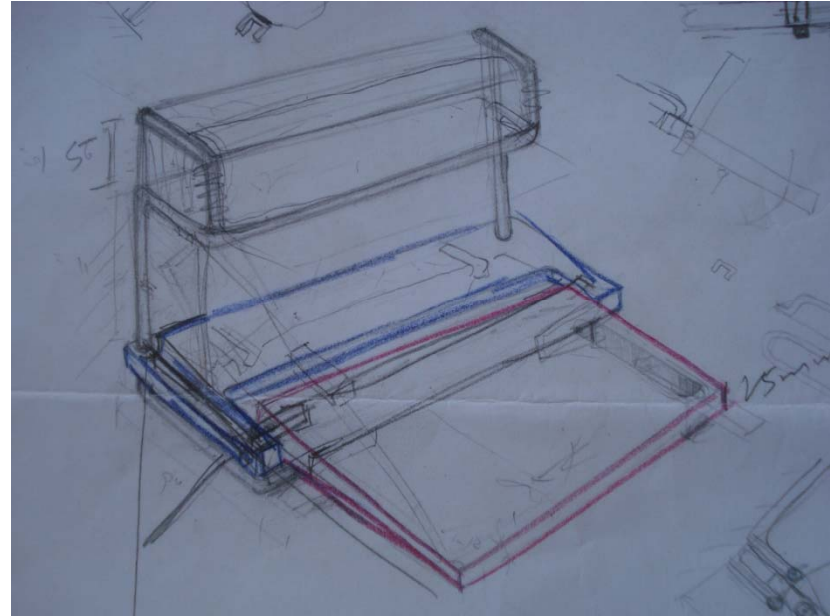
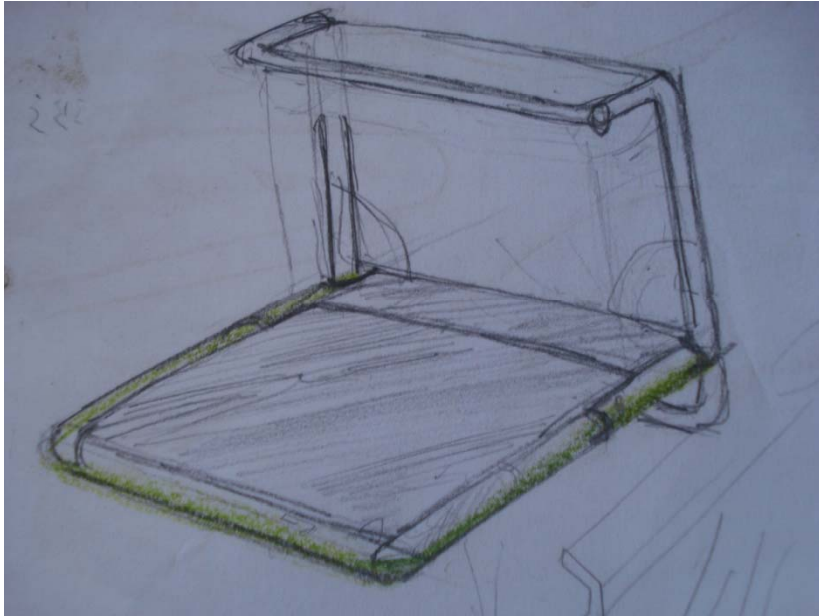


Horizontal position of the table



Inclination between 10 to 20 degrees- ideal for writing

Towards the final concept



7/1/2010

Mock ups



Books kept horizontally



STORAGE FOR BOOKS

Books kept vertically



Space for personal belongings



Height can be adjusted as the child grows up



Unit fixed on wall - closed

1. Store pens
storage for stationary can be accessed even when the unit is closed

2. Easy closing
Magnets are embedded inside for ease of closing



3. Space for personal belongings
belongings apart from books can be stored here

4. Translucent acrylic skin
occupies less visual space
things kept inside can be seen

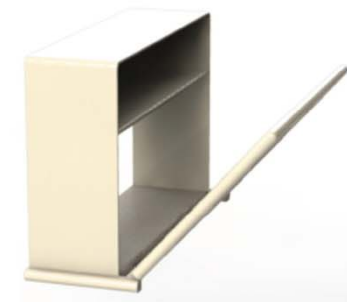
5. Wall hung
protrudes only 7" when closed

6. Storage for books
books can be stored horizontally/vertically

7. Space floor space
the unit is wall hung, hence has no foot print



8. Customizable
the plastic edge moldings can be changed according to the choice of the child



9. Child friendly design
generous radius has been provided every where
no sharp edges

10. Light weight structure
Honey comb sheet used instead of ply to reduce weight

Child interacting with the furniture

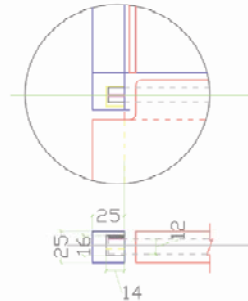


7/1/2010

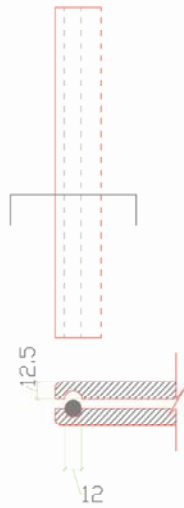


7/1/2010

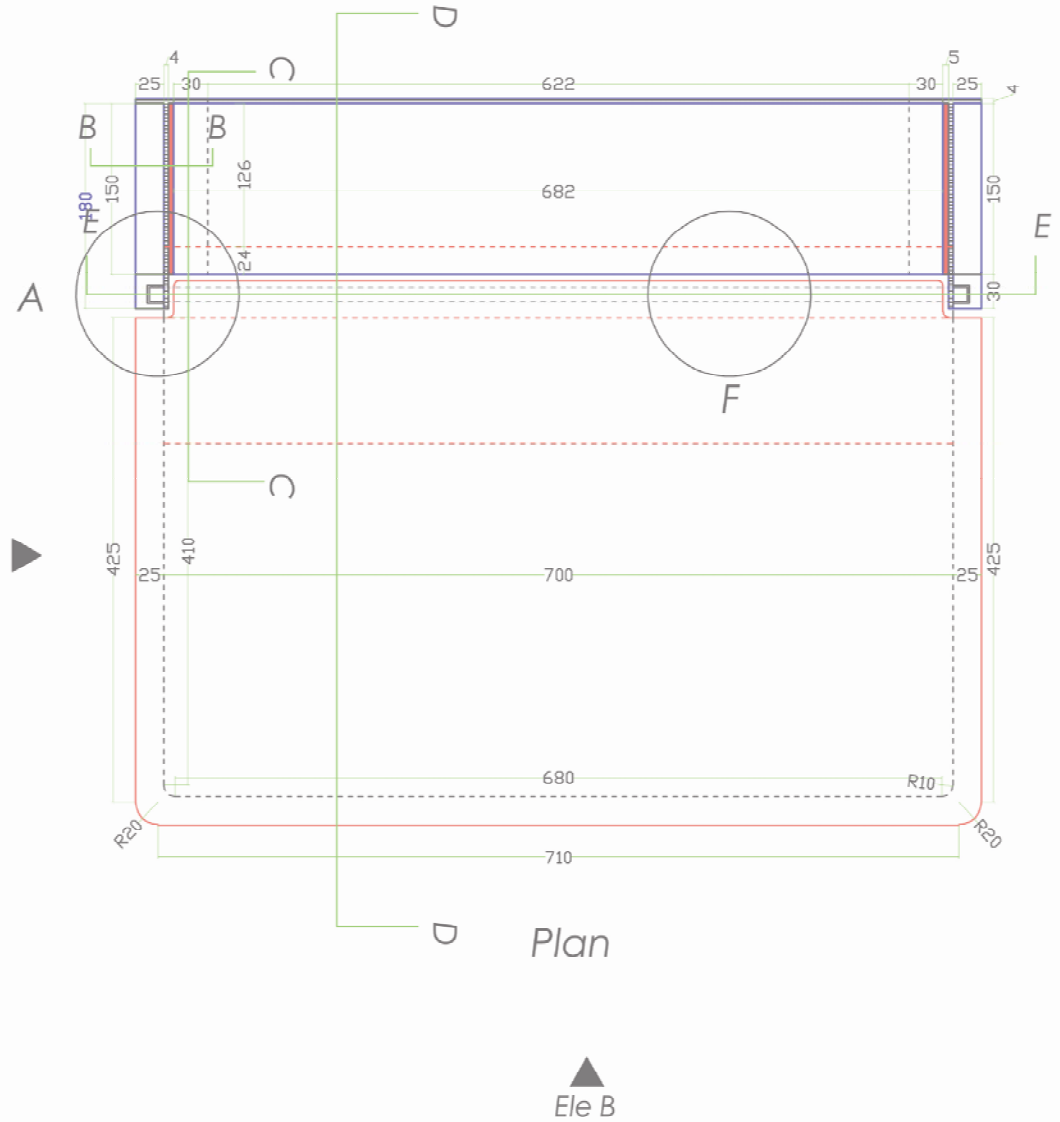




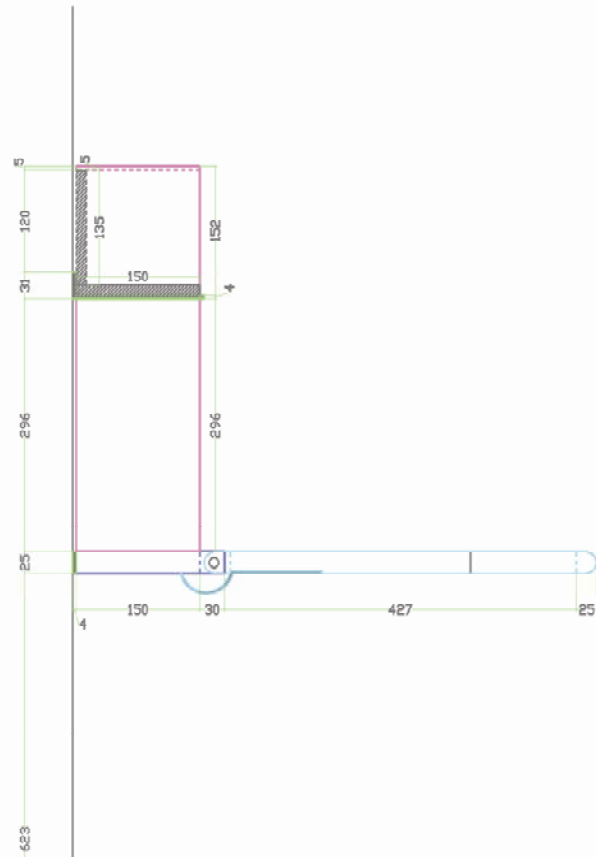
Section through the pivot



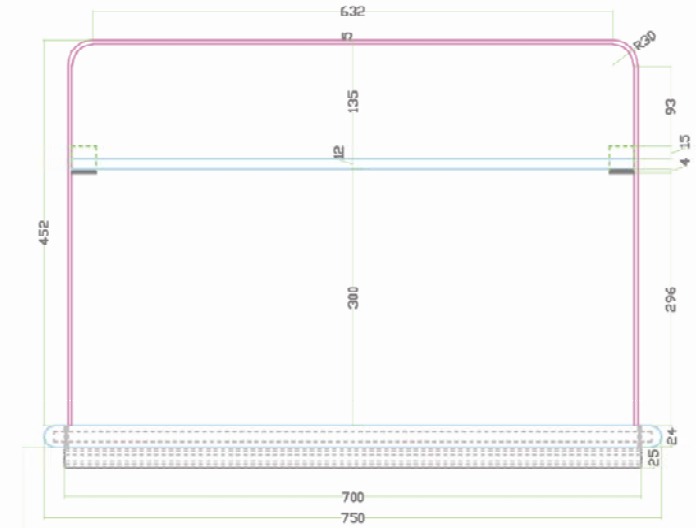
Detail F



All dimensions are in mm



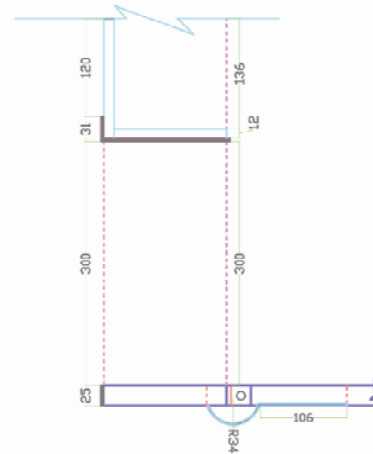
Elevation A



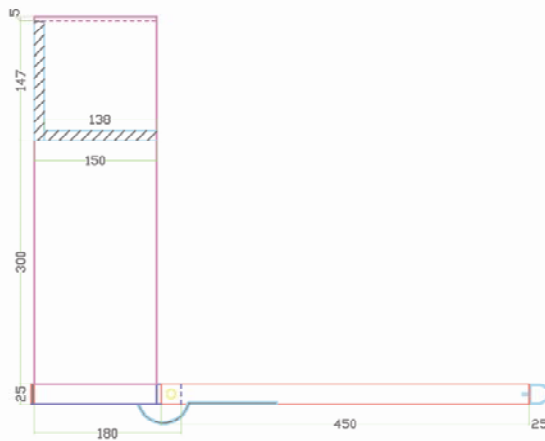
Elevation B



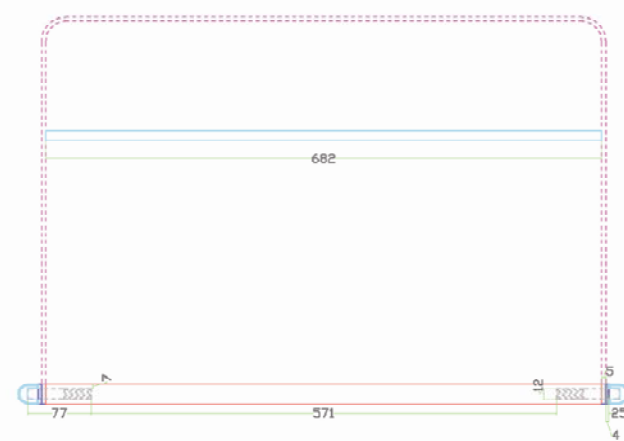
B-B



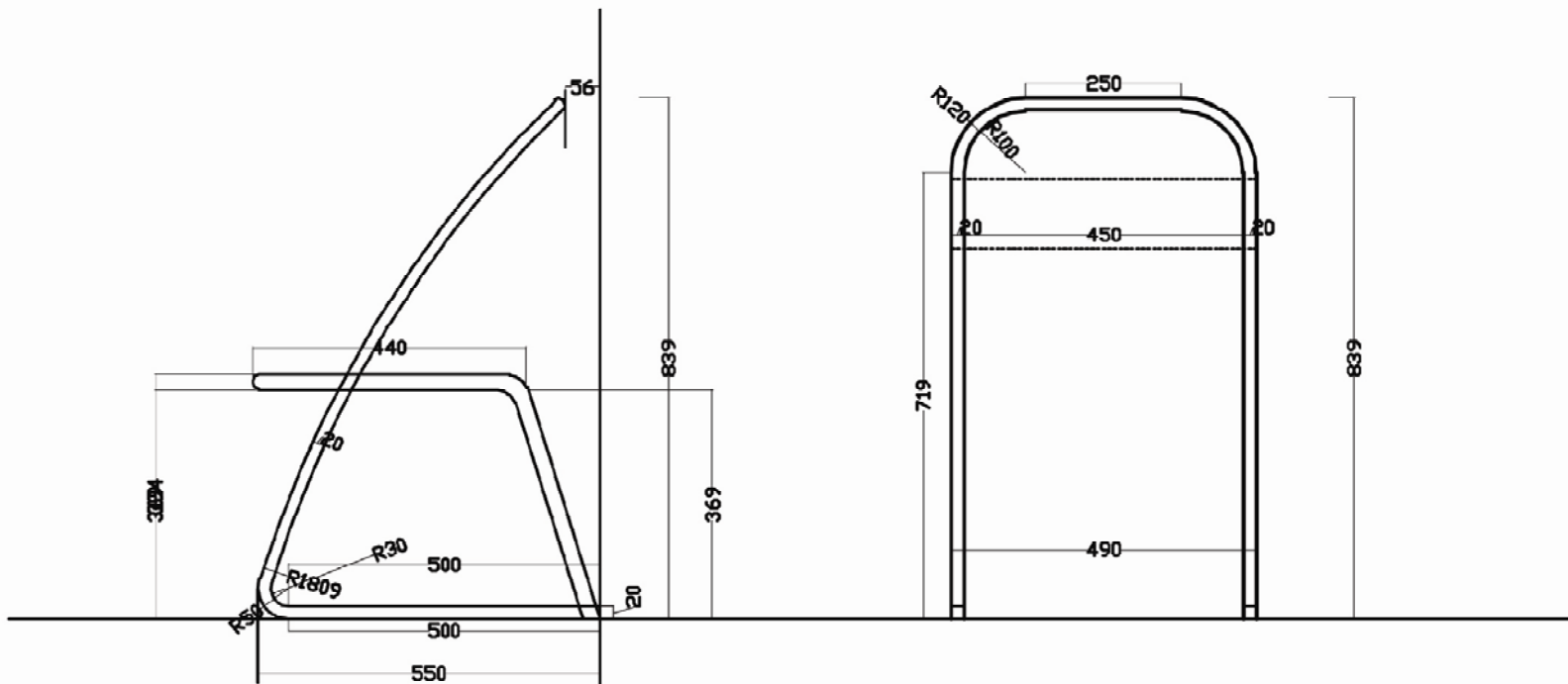
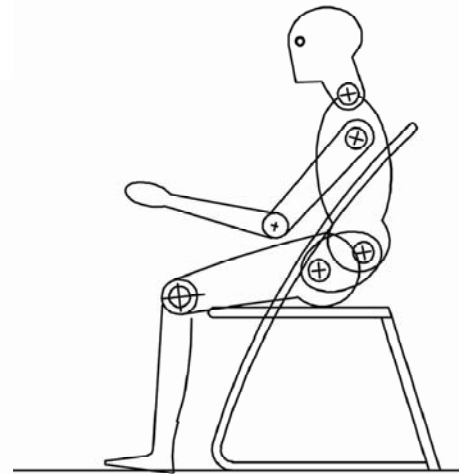
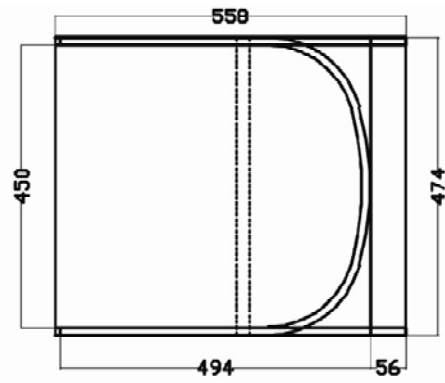
C-C



D-D



E-E



Thank you..