

Industrial Design Internship Project

designing furniture for school

at Infiniti Modules Pvt. Ltd. Goa

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Declaration

I declare that this written submission represents my ideas in my own words and where others' ideas or words have been included, I have adequately cited and referenced the original sources. I also declare that I have adhered to all principles of academic honesty and integrity and have not misrepresented or fabricated or falsified any idea/data/fact/ source in my submission. I understand that any violation of the above will be cause for disciplinary action by the institute and can also evoke penal action from the sources which have thus not been properly cited or from whom proper permission has not been taken when needed.

Signature

Name of the student

Roll No.

Date:

Acknowledgment

I would like to thank Mr. Raj Kuleonkar for giving me the opportunity to work under his guidance; and more so for allowing me to explore my ideas on various materials. He had also been extremely kind to discuss with me my future interests and projects. It has been a wonderful satisfying experience. I would also like to thank all other workers of Infiniti Module Pvt. Ltd.



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Abstract

The internship was is an opportunity to put into practice all that was studied and to get a first hand experience of what actually happens in a company. The factors that influnce designing a product in a real scenerio.

The project involved firstly to understand the company departments, their contributions to the system and how all of them work together. The project task was to develop a new set of school furniture - table and chair. The furniture set was taken from the drawing board to production to finally bringing it into the market.

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1.Introduction

Internship was an opportunity to get a first hand experience of how products are designed and manufactured. With an Interest in Furniture design I had done my internship at Infiniti Modules P. Ltd, Goa. Infiniti Modules P. Ltd. is a world class furniture manufacturer, based in Goa, India; with a well equipped manufacturing facility. The company offers contemporary, ergonomic and high quality furniture products in India for the office and school. Strategic alliances with world leaders offer a complete suite of products.

The company uses the best raw materials and processes under stringent Quality Control standards to ensure superior products. Infiniti also supplies high volume OEM components like shutters, drawers etc .Successful office and school projects have been executed across the country, and the company has substantial exports as well.

2.About the company



Infiniti Modules P.Ltd.

Infiniti Modules is the sole and exclusive partner for VS Furniture (Germany) in India for manufacturing and marketing their school furniture.



VS has over 100 yrs of focused experience in this industry, and is the largest school furniture manufacturer in Europe. The Classroom furniture has been improvised over the last many decades, based on extensive interaction with the medical and teaching fraternities. This is to help prevent postural damage, which could begin in childhood and afflict more severely in adults. DIN-ISO-Standard 5970 There are several sizes of tables and chairs for kindergarten through university, based on detailed ergonomic studies, conforming to DIN standards. Durable The construction and designs are extremely rugged, and can endure the most severe usage. The tables can be provided with a special LIGNOdur® worktop that is almost indestructible



OMP Components P. Ltd.

OMP Components P. Ltd. is a sister company of Infiniti Modules. OMP s.p.a., Italy, a world-class manufacturer of chair and furniture components, has now established a company in India to cater to chair manufacturers in the region. With over twenty-five years of experience, and four large manufacturing facilities, OMP exports annually, over two million components all over the world, to some of the largest chair brands. OMP also provides raw frames for infinti.

3.Products manufactured by Infiniti

Office furniture

Panel, desks, conference, storage, seating



Seating

Executive, operative, hospitality, seminar



School Furniture

Desks, chairs ,classrooms ,storage ,library, canteen, hostel, office

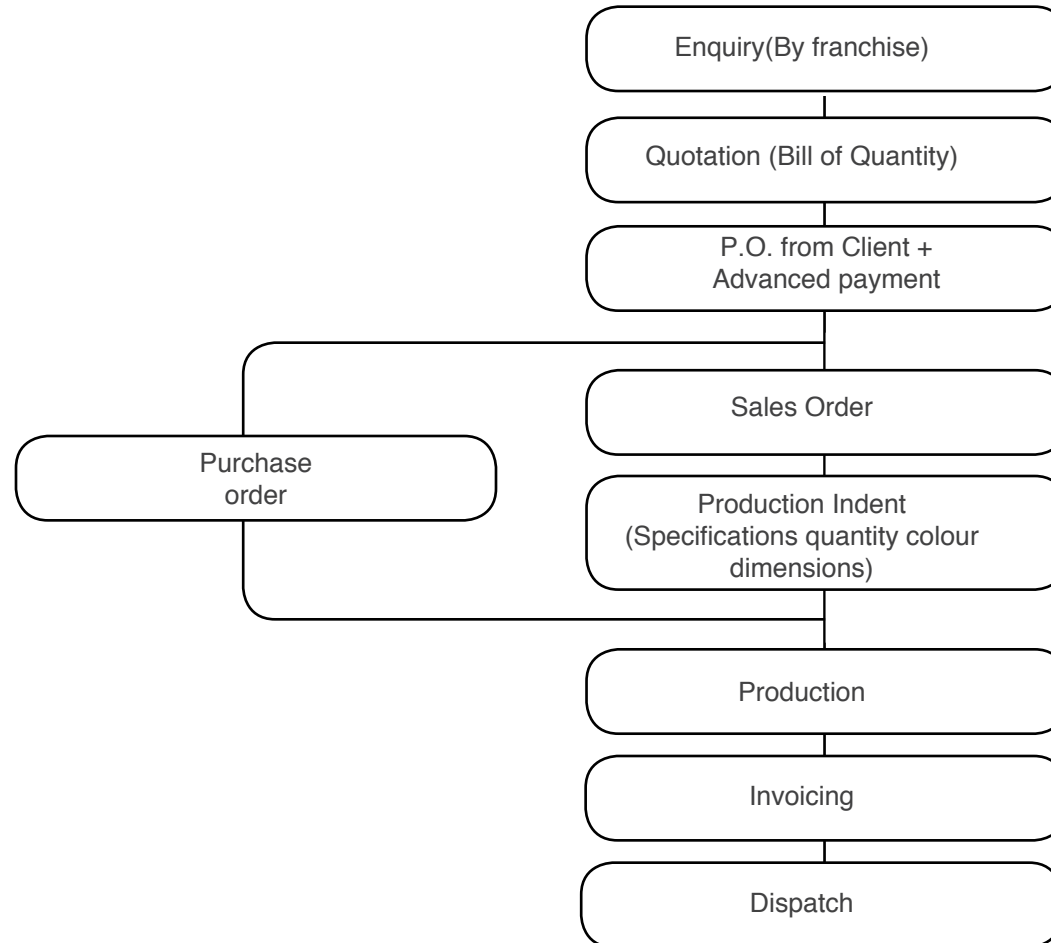


4. Understanding the working of the company

My internship started with a thorough understanding of the various departments and their contribution.

- Infinity is a small company consisting of a total 40 workers.
- They work from development of new products to the marketing and transporting their products to the clients.
- The company includes various departments of development, purchase, manufacturing, quality, marketing, accounts, HR, administrative and maintenance.
- Infinity is a B2C company. 93% of their profit is made only through projects from organizations.
- They use a network of franchise around India to spread as a marketing tool. Other marketing tools used by the company are web sites, mails and magazine prints. 'Mentor' is one such magazine which are dedicated development of schools.
- Their major area of work are schools and offices. The decision making done for schools are the organization. The furniture being the last steps in setting up of a school. Cost becomes an issue. Whereas in offices the architects are the decision makers.
- The furniture manufactured are designed and tested by their Italian company VS. The products are developed at Infinity to adopt to the Indian standards. Their major components are imported.

5. Workflow of the company



6.Understanding the company

Furnitures developed for homes, offices and school require to be durable and lasting. The company's manufacturing strength lies in metal tube structures, particle board pressing and sheet metal.

Machines used in factory

Infiniti

- Circular Saw
- Pneumatic Lamination Press
- Drilling m/c
- Routing m/c
- Edge Binding

OMP

- Automatic/ Manual Cutting
- Automatic Polishing
- Manual/ Automatic Bending
- Press
- Manual Drilling
- Mig Welding

7. Understanding school furniture

A study of various school furniture and their usage in schools were studied in their environment was done visiting schools.



*photos from Don Boscho
School, Panjim Goa*



necessary features of school furniture

- Low Cost
- Ergonomic
- Sizes – 2,3,4,5,6,7
- Sturdy in use
- Requisite Stiffness
- Tamper proof
- No sharp edges/corners/points
- Stable
- Aesthetic
- Life span – min 10years
- Should not scratch the floor
- Minimum number of components
- Easy to assemble on site
- Table Top flat/inclined
- Provision for pencil holder
- Provision for bag (Hook on desk)
- Provision for books(Shelf)

8.Ergonomic Considerations

While developing school furniture, The company has kept standards to include the various sizes. 6 Standard sizes have been developed. The main dimensional parameters kept in mind while developing school furniture is.

Sizes	Table Height	Chair Height
2	520	300
3	580	340
4	640	380
5	100	420
6	160	460
7	820	500

There are two mould moulded parts of two different sixes to accommodate the 6 sizes of chair height and table height.

9.Design brief

Redesign of 'OMP chair'



OPM Chair

A present model of OMP had stopped production because of problems complaints from clients. There was a situation where the whole batch was returned to the company causing a major loss to the company. The purpose of the project is to redesign the 'OMP chair' to resolve the existing problems and to bring the chair back into production. The brief also included to develop a table of the same family.



10.Problems of Existing' OMP Chair'

1. Use of slotted screw
2. Scratches on seat top during stacking
3. Peeling of paint during stacking of chair



Scratches on seat top during stacking



Peeling of paint during stacking of chair



use of slotted screws

11.Parts of existing OMP school chair

	Part	Material	Process of manufacture	No.of parts	Manufactured by	Attachment
1	Seat	poly propylene	Injection molded	1	Imported	screw
2	Back rest	poly propylene	Injection molded	1	Imported	rivet
3	Frame	MS round + oval(30x50) tubes	Injection molded	1	Outsourced (OMP)	-
4	Round Glides	ABS	Injection molded	2	Outsourced	permenant snap fit
5	Oval Glides	ABS	Injection molded	2	Outsourced	permenant snap fit

Parts of the chair



*seat base
poly propylene, injection moulded*



*back rest
poly propylene, injection moulded*

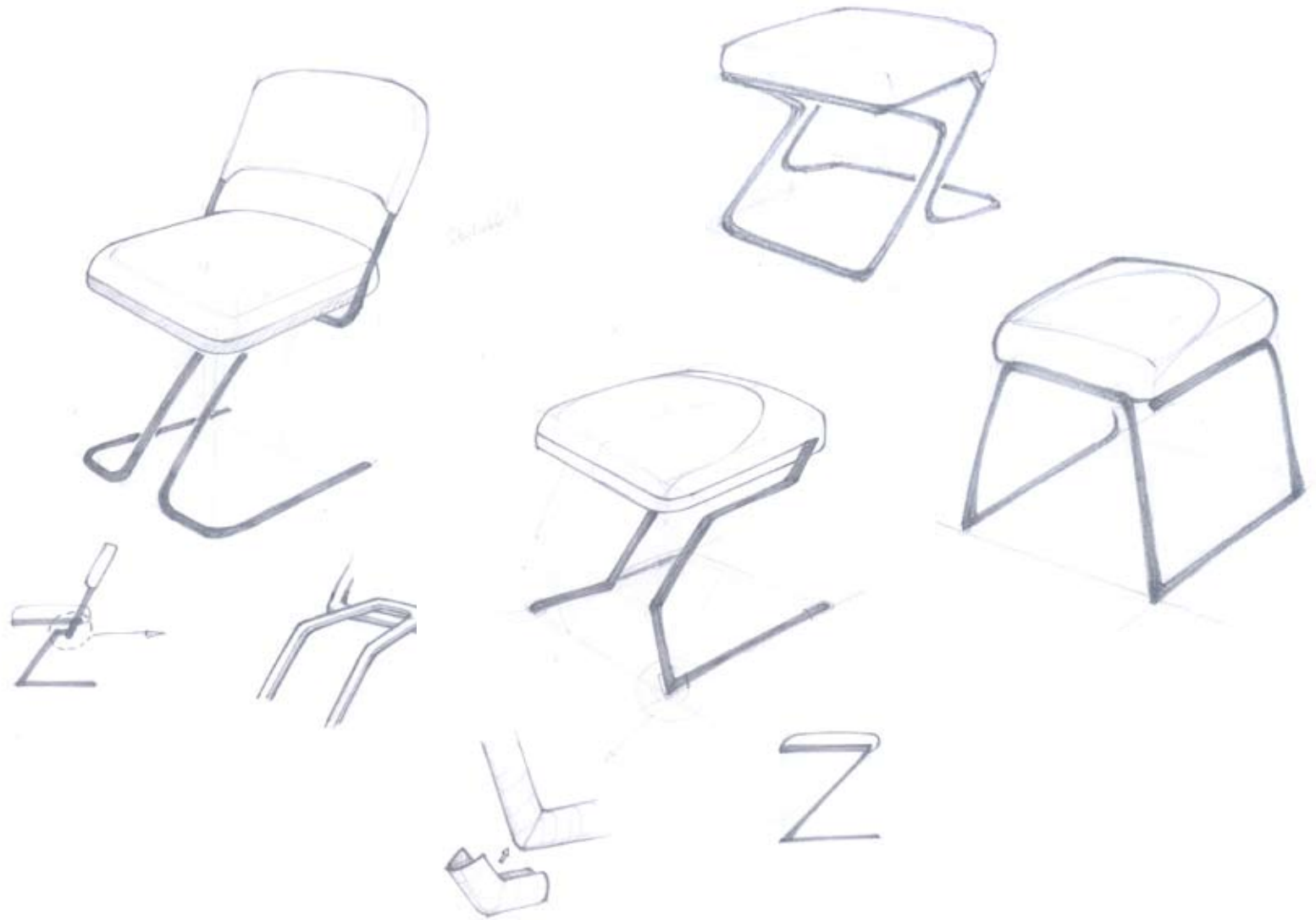


*pegs and glides
ABS, injection moulded*

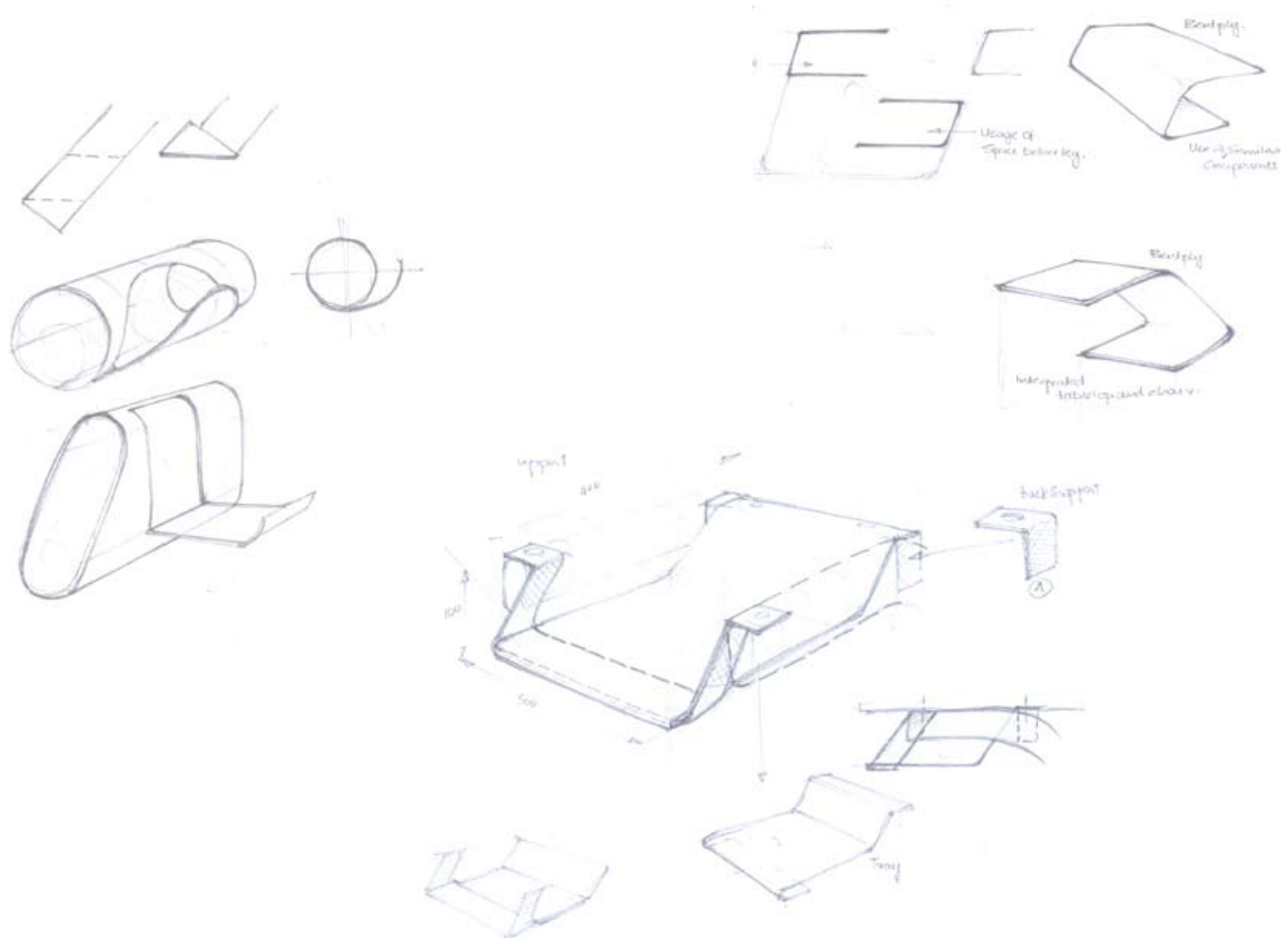
12. Ideations of chair



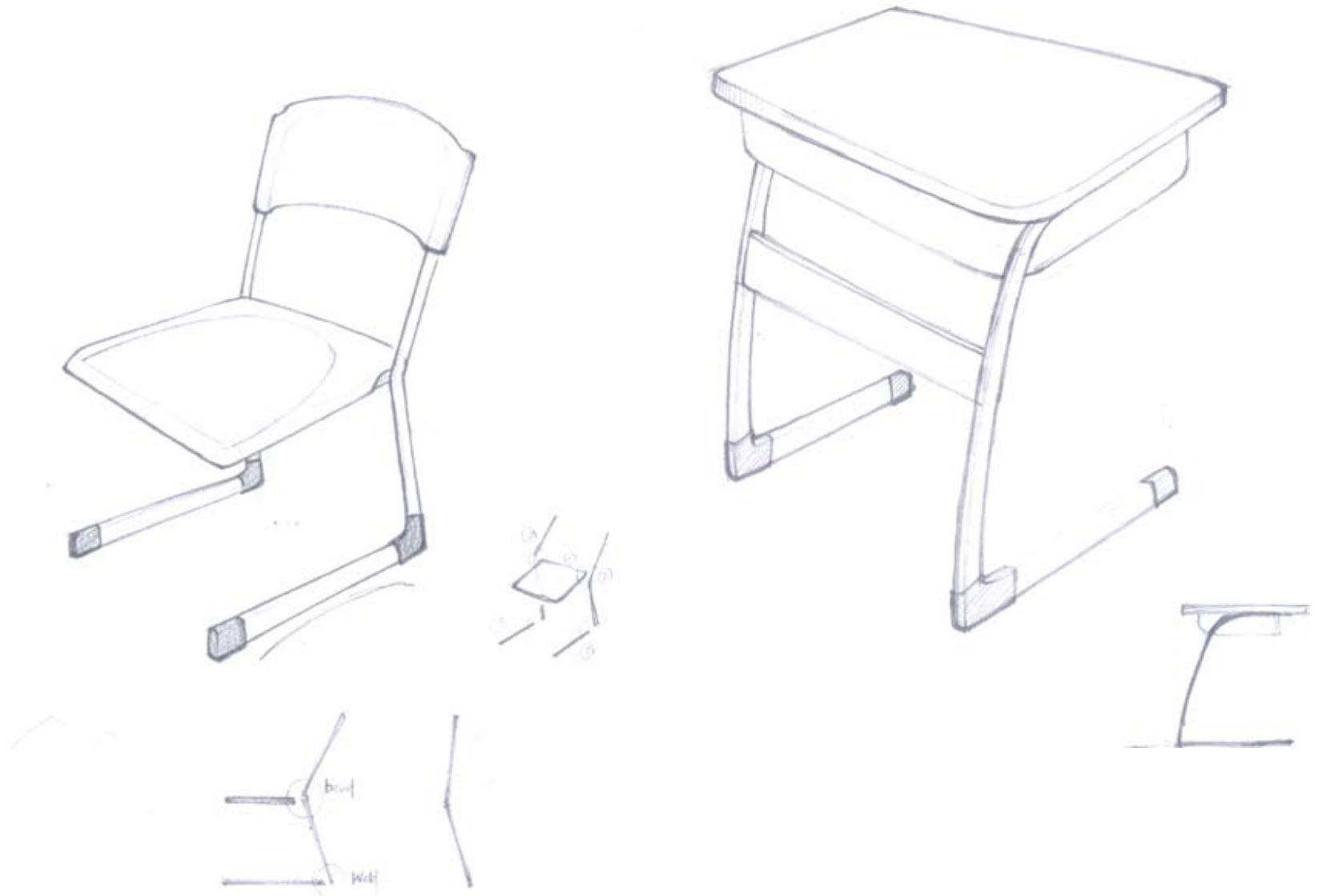
Ideations of chair



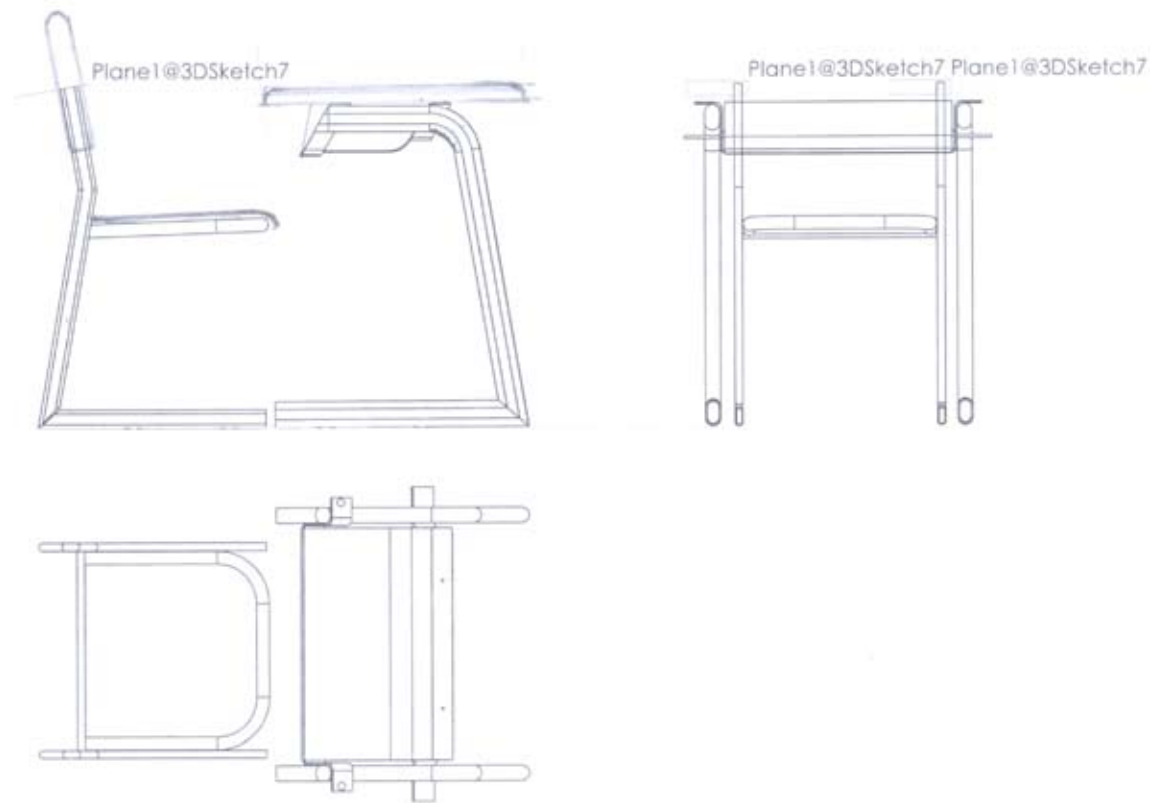
Ideations of table



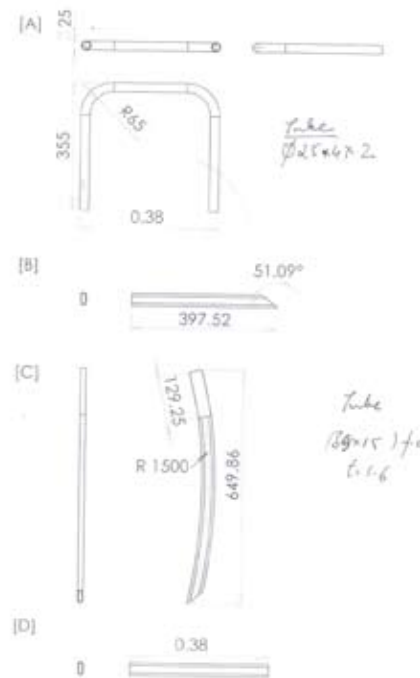
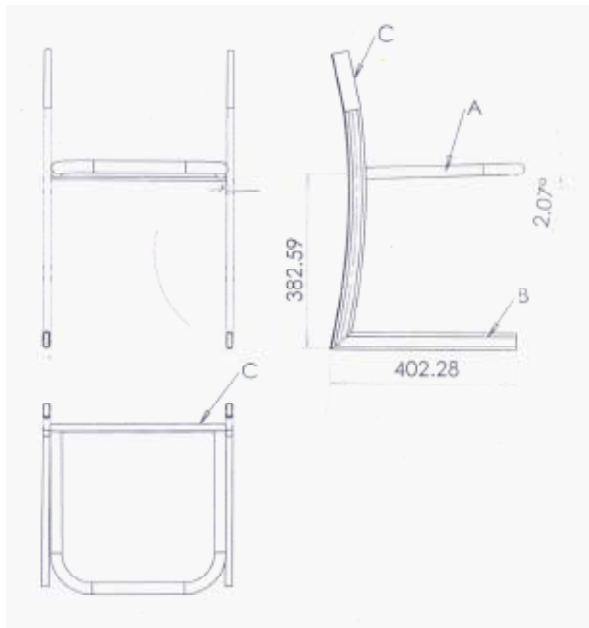
13.Final Concept



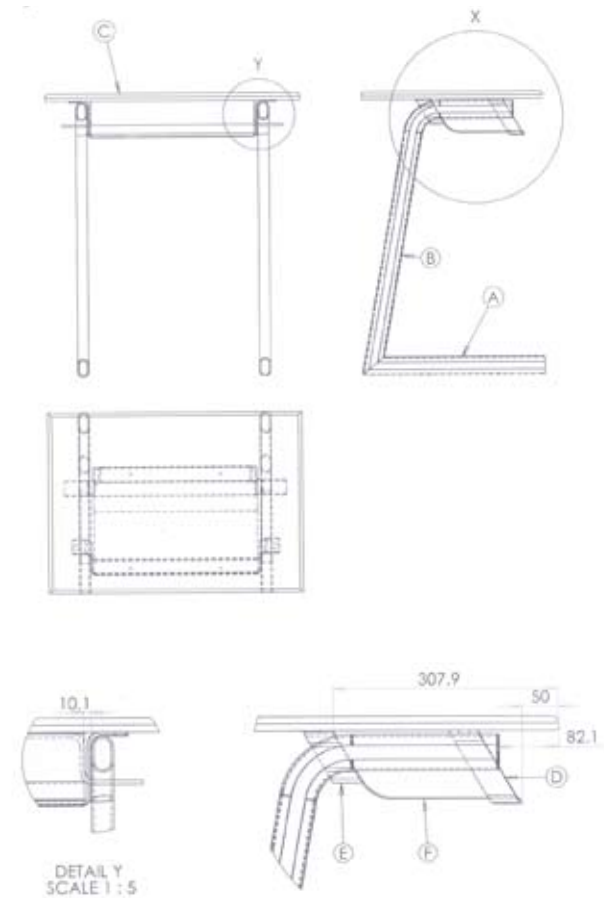
14. Drawings of Table and Chair



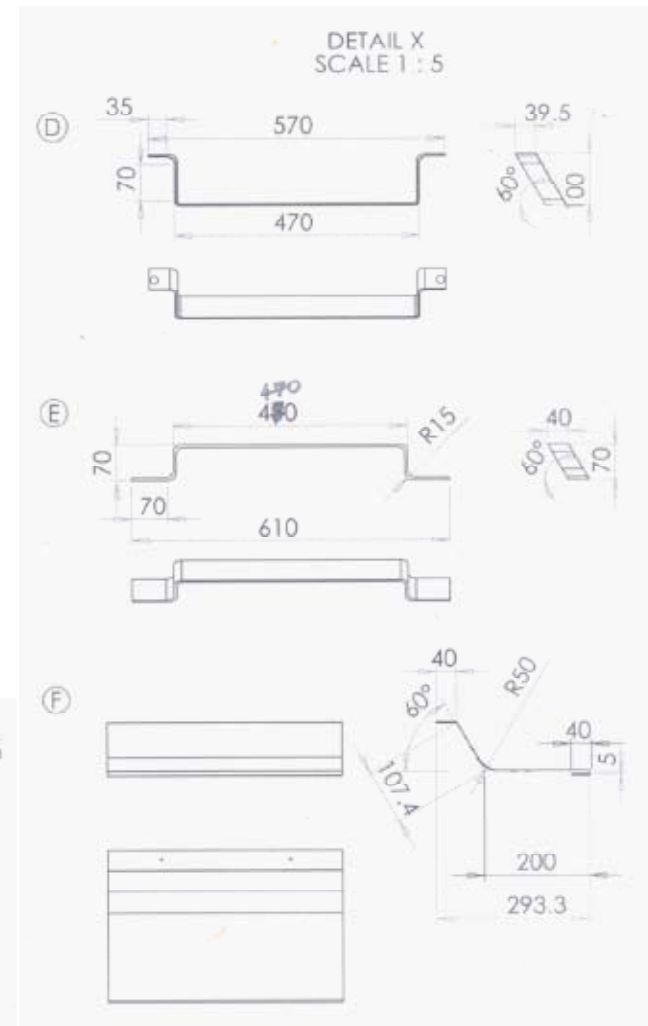
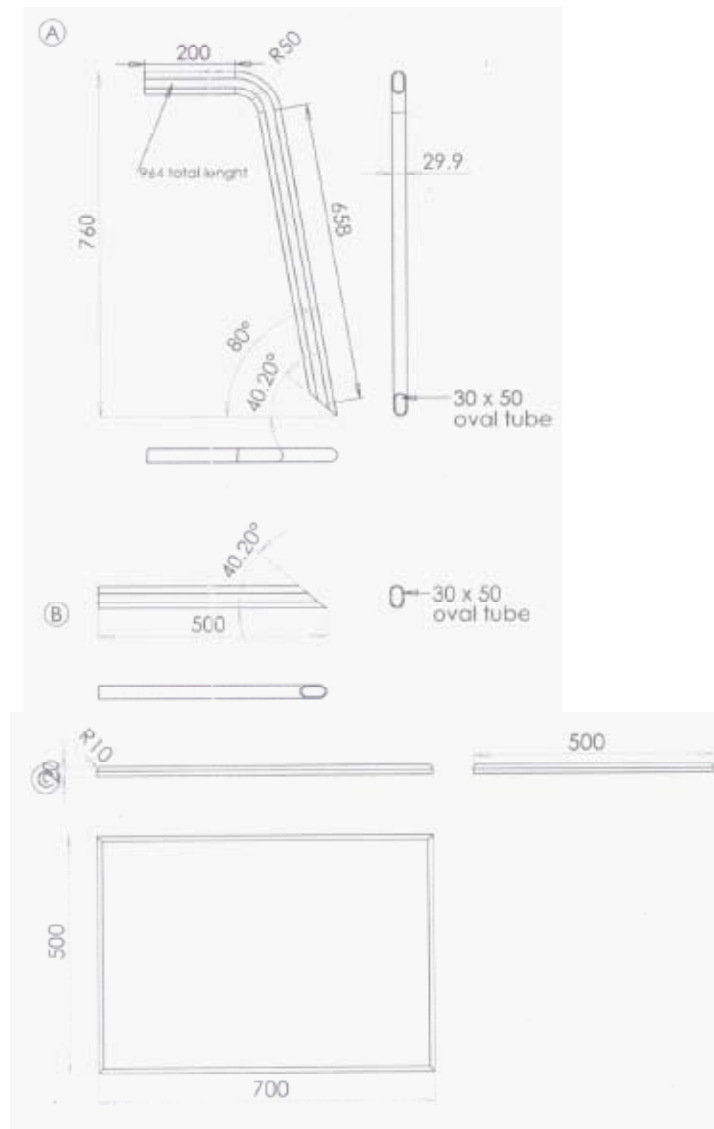
Detailed dimensioning of chair



Detailed dimensioning of table tray



Detailed dimensioning of chair



15.Manufacture

Size 4 Chair

Raw Material :

- MS Oval Tubes (30mm x 50mm)
- MS round tube (20mm dia)
- Particle board (20mm)

Process used :

- Cutting, Bending, Punching, Welding (Mig),
- Grinding, Powder coating, Lamination, Edge Binding, Routing



parts prepared and welded





final assembly of frame before powder coat



powder coating of frame



16.Final product



Special Features



table



stackability of chairs



mounting chair on table for easy floor cleaning



Improvements in the new design

The newly designed table and chair includes various features such as

- It resolves all the problems of the previous design of paint scratching and sharp corners
- Stack ability of the chair is maintained for easier transportability and storage
- New features include mounting of chair on to the desk for easier floor cleaning in classrooms
- Aesthetics of the chair and table has been improved
- A new system for storage in the table, which integrates the shelf and pencil rack

Suggestions

- The following suggestions were provided to the company for improving the performance of the product
- Changes to the mould - rivet positioning of the dye to incorporate the new design
- adding texture to the surface of the seat base and back rest
- Developing new glides for the chair and table

17.Conclusion

The Project was complete in a month. The internship gave me a better picture of how products are developed in industries and the various factors that influence the design procedure. At the end of the internship a new model of school chair and table was developed. the model was developed further and brought to manufacturing level by Infiniti. It is now available in the market.