Summer Internship

To design and manufacture a system competitive to TN9 shelving system which will be manufactured locally befitting Indian scenario

CAEM ShelvingEngineering

Saurabh Nimsarkar
Mobility and Vehicle Design

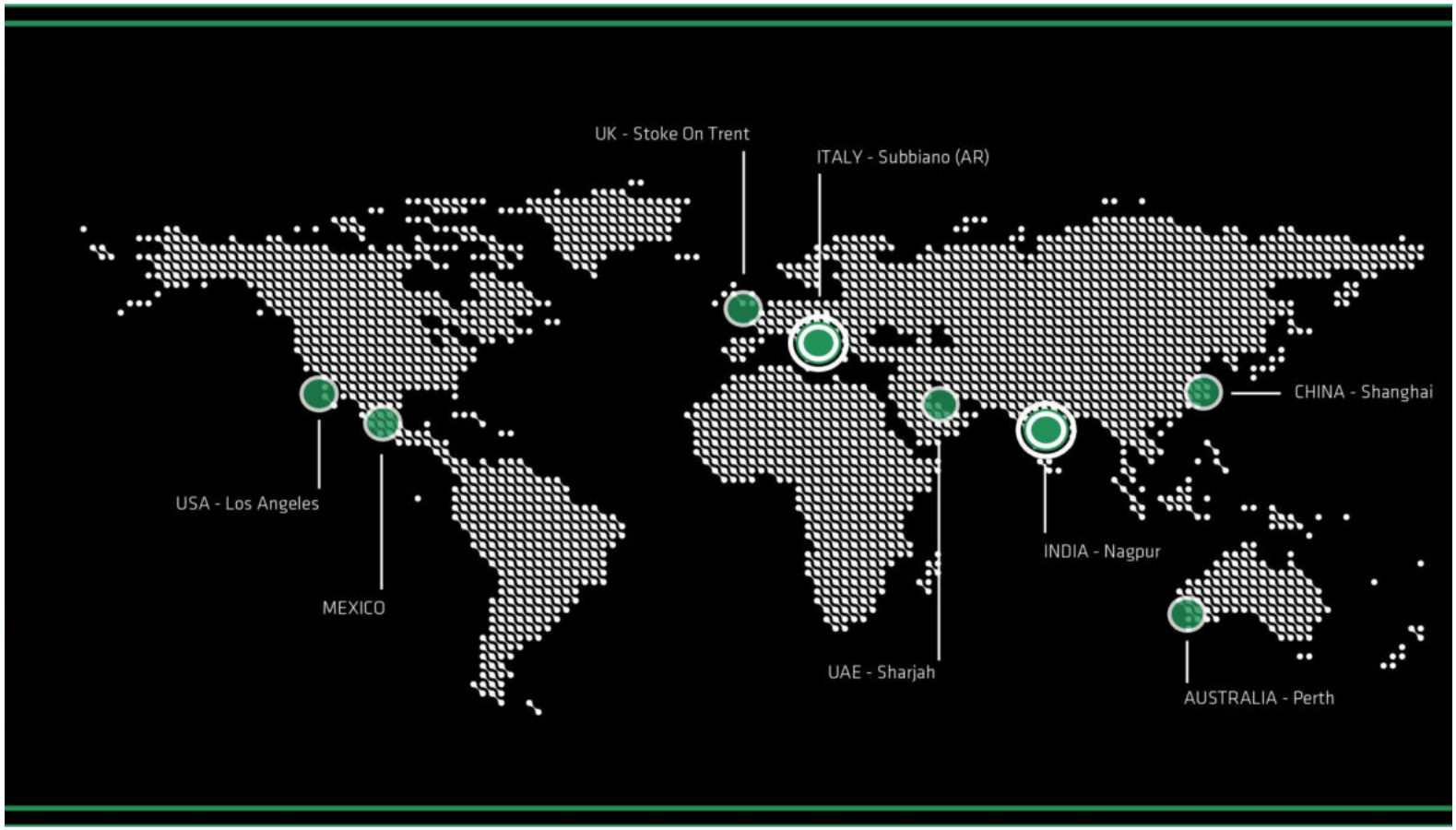
About CAEM Shelving

Design Brief and Work done

Result and Conclusion

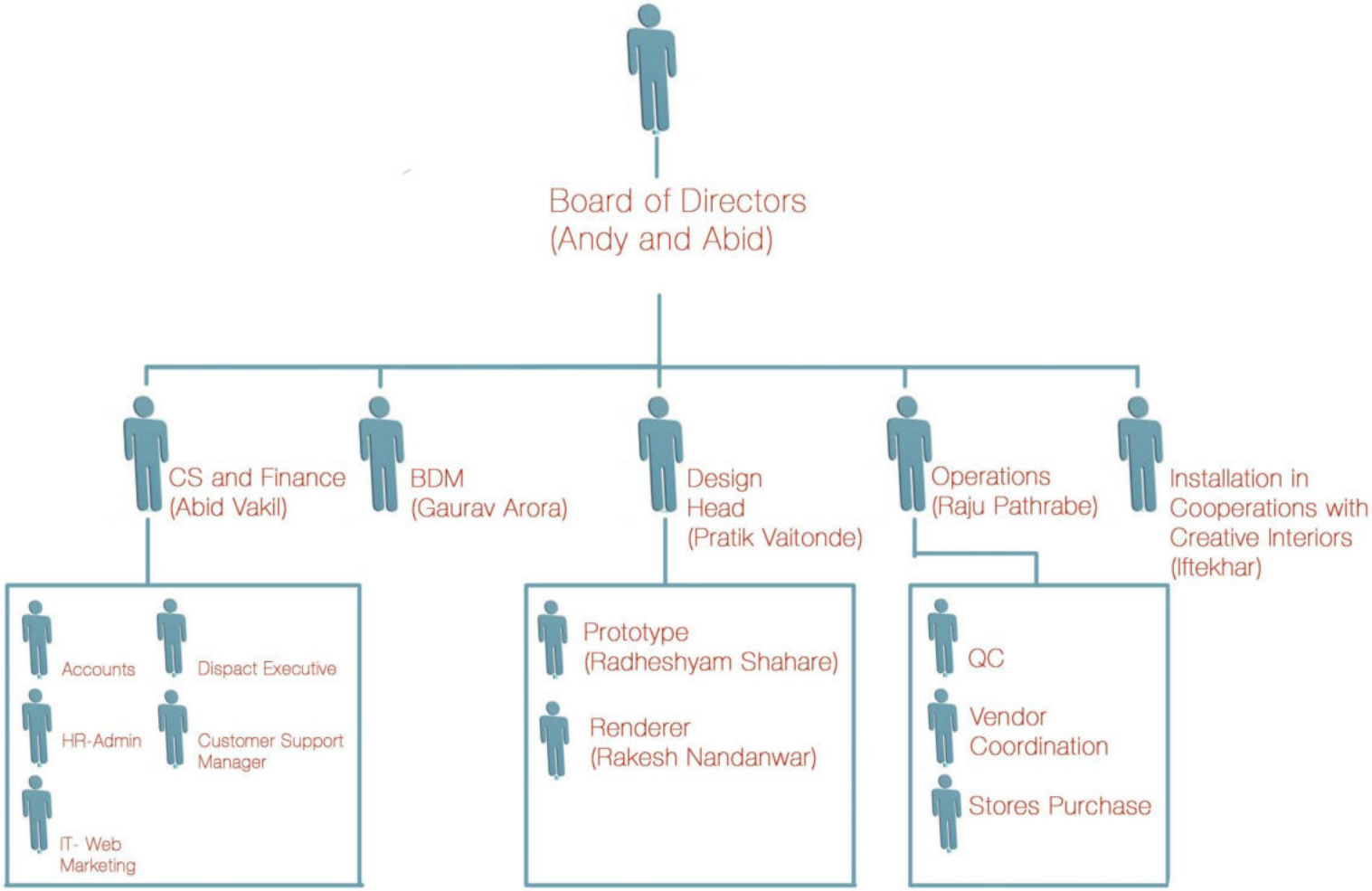
About CAEM Shelving

CAEM is a Global company for manufacturing and services related to the shopfitting and retail industry having headquarters in Subbiano Italy.

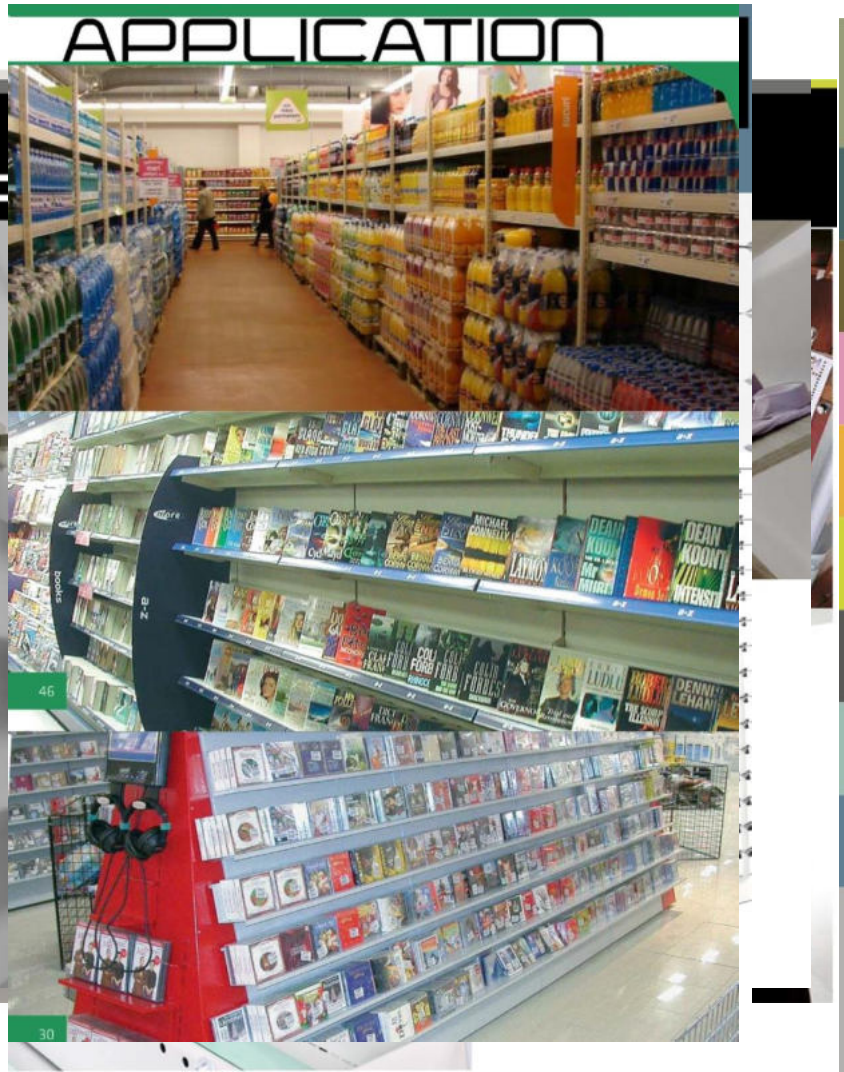


About CAEM Shelving

CAEM India Shelving Private Limited was established in India in 2005 and has around 30-35 employees



About CAEM Shelving



SYSTEMS

T25

TN9

S50

GP5

MAG

INFINITY

FIFTH AVENUE

MEDIDRAWER

RXDRAWER

PHARMACY/FOOD/ELECRONICS
NEWSAGENCY/DIY/FASHION

About CAEM Shelving

Design Brief and Work done

"To design and manufacture a system competitive to TN9 shelving system which will be manufactured locally befitting Indian scenario"

Goal and Mission of CAEM

The CAEM Global Group has more than 50 years experience in the manufacturing and services related to shopfitting and retail industry.

CAEM helps the retailer developing the most effective Shop Concept. Designers and experienced Shop Concept Consultants follow the process starting from - **business idea or remodelling needs** to **whole concept design**, guaranteeing independence in design and shop project.

CAEM designers develop unbelievable ideas for stunning business results akin to customers main concept, keeping in mind how things are done, delivered and installed.

“A Shop or system Concept is no good if you can’t rollout efficiently and cost effectively”.

Design Brief and Work done

Design Process of CAEM

The process which CAEM follows for Shop Concept Design & Consulting is:

Brief from customer to understand what customer have in mind, what's customer retail business idea, its key factors and success points.

Designers will determine what you require from us and chalk down multiple concepts pertaining –

1. Coordinated Corporate Image: from the logo to shop signs, from business cards to lettering, from clothing of staff to wall colours.
2. Concept Interior Design: typical or actual store design, with the deepest definition of materials and details.
3. Tariff, Merchandising, Visual Display of products on sale
4. Light technical design
5. Furniture Development: form the concept to actual products from different suppliers

Design Brief and Work done

Design Process of CAEM

Designers develop business idea into a book of facts that customer can finally rollout.

Designer make virtual prototype of concepts and CAD drawing are made for manufacturing. Components are made by state of an art manufacturing process and assembled.

Customers

Retail Industry giants like Reliance, Future Group, Clarks, Automobile industry showrooms - Hyundai ,Tata motors ,Mahindra.

Primary customers are retailer and user of the product is the general public who shops. Therefore to sell product to retailer cost is important. However in order to meet the business need of the retailer, product has to be designed satisfying the need of the shoppers.

For retailer primary user is Shoppers Secondary user is CAEM shelving.

Design Brief and Work done

Target Audience

Target customer for CAEM shelving are the retail giants like Future group, Reliance Retail, Pantaloons and other retails shop stores with main focus on the shopping experience of the end user i.e. purchaser.

Competitors

Kieder, Suntop, Retail India design, Wellworth-Veejay sales corporation ltd, Promenade, MF mini fabrication.

Design Brief and Work done

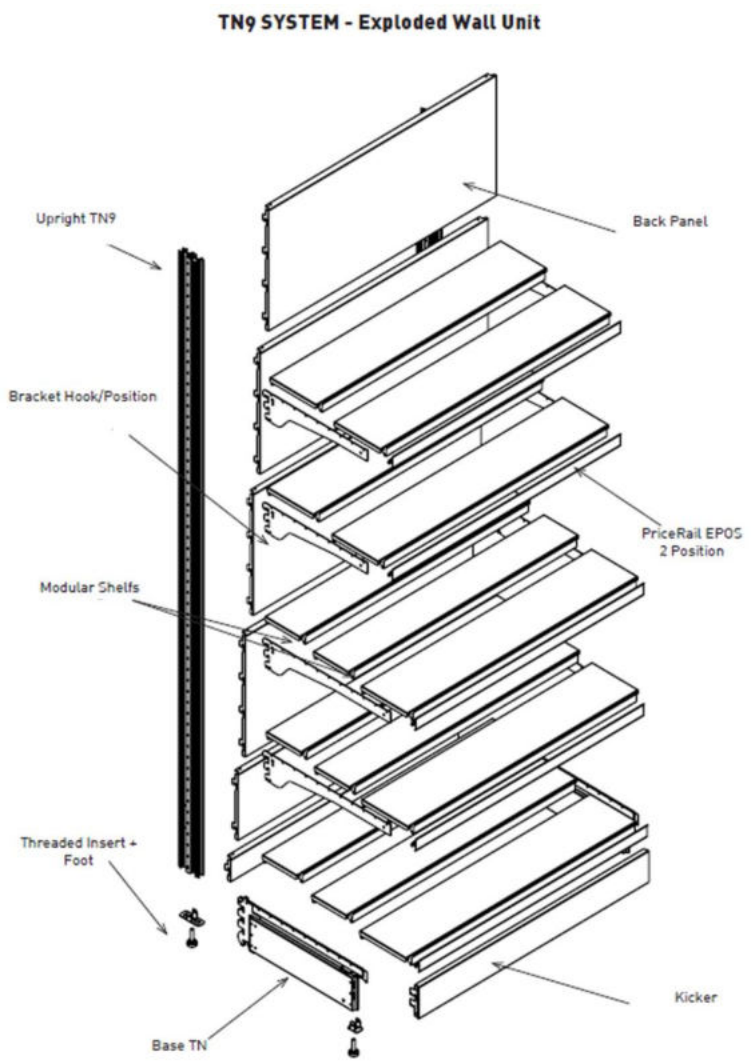
Product overview

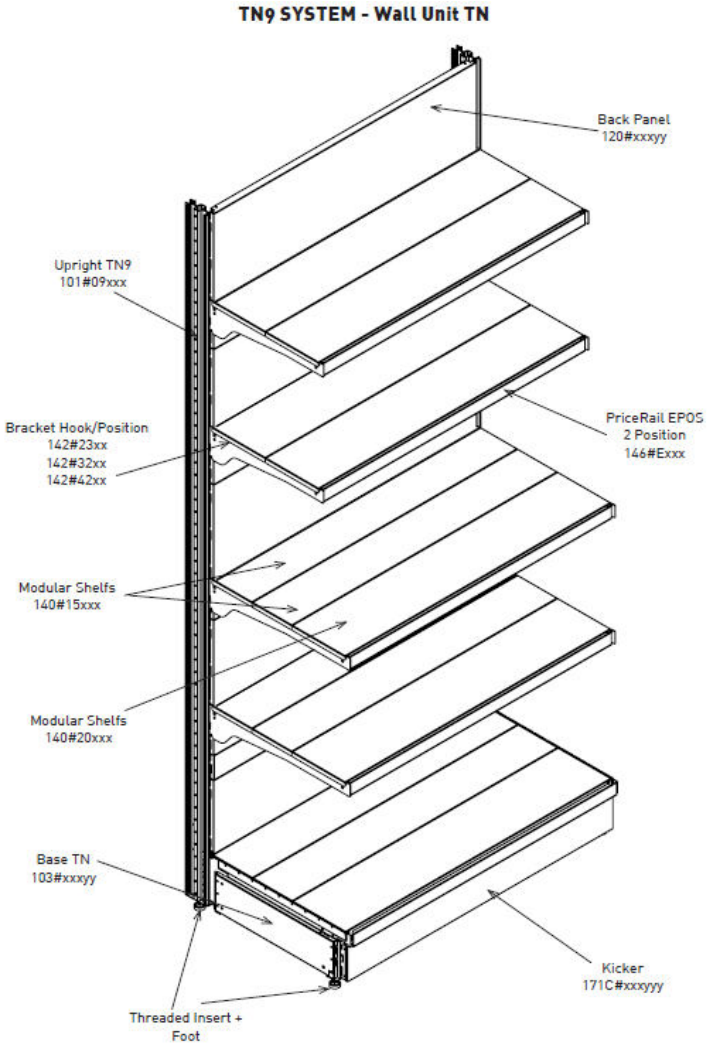
TN9, T25, S50, GP5, MAG, INFINITY, FIFTH AVENUE, MEDIDRAWER, RXDRAWER and Other Application.

Shelving system comprises of following basic units –

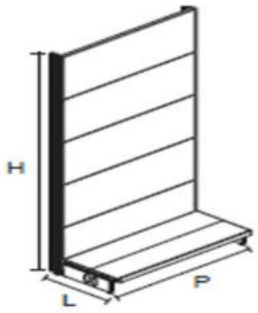
- Upright
- Base
- Brackets
- Shelves
- Back Panel
- Kicker plate
- POS display

Design Brief and Work done





Design Brief and Work done

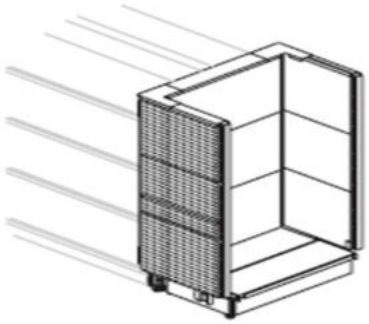


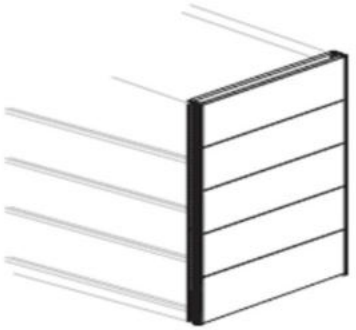
Wall Unit

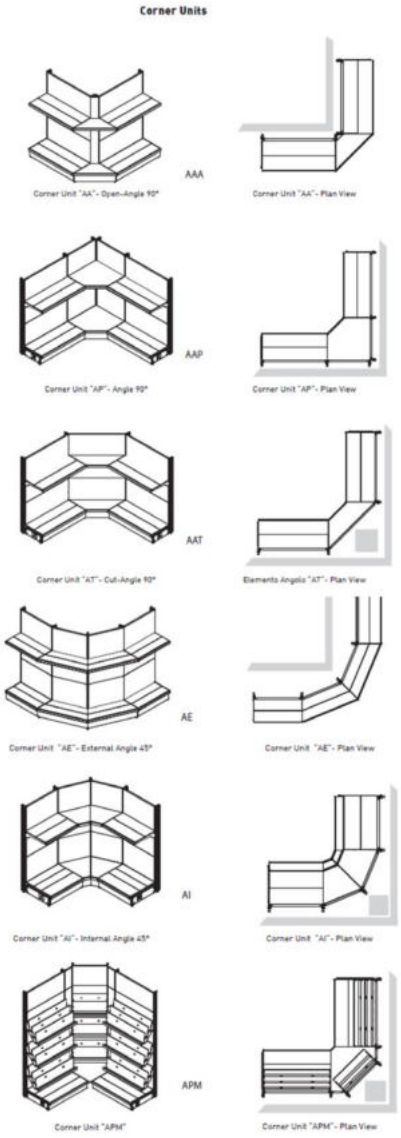

Gondola Unit


Gondola Units


Gondola End "TG"


Gondola End "SIDEY"


Gondola End "TN" (with or without base)



Design Brief and Work done

Objective and Goal of the Project

•In order to compete with local as well as global players of shelving system an alternate system has to be developed which can be manufactured locally and at reasonable cost.
•The new shelving system should cater the needs of Indian retailer without compromising on quality of built.
•The new system designed should be low cost, modular, suffice to manufacturing capabilities of local vendors and should be easy to store and transport.

Pertaining to above consideration project title brief is set -

"To design and manufacture a system competitive to TN9 system which will be manufactured locally befitting Indian scenario"

Design Brief and Work done

Challenges in Indian scenario for CAEM

The upright used in TN9 is patented and has proprietary manufacturing process.. The other components of shelving system (except the upright) like base, brackets, shelves and back panel ,kicker plate and pos are manufactured locally in India. They are modular and can be used in other shelving system of CAEM.

CAEM India imports TN9 upright from Italy .This increases the cost of shelving per unit in India.

Moreover there is a though competition from Chinese manufacturer as they are able sell shelving system to Indian retailer at a cheaper rate.

CAEM as it does not have manufacturing facilities and have to depend on local secondary manufacturing vendors. Design is therefore vendor driven and is constrained.

Design Brief and Work done

Scope of the project

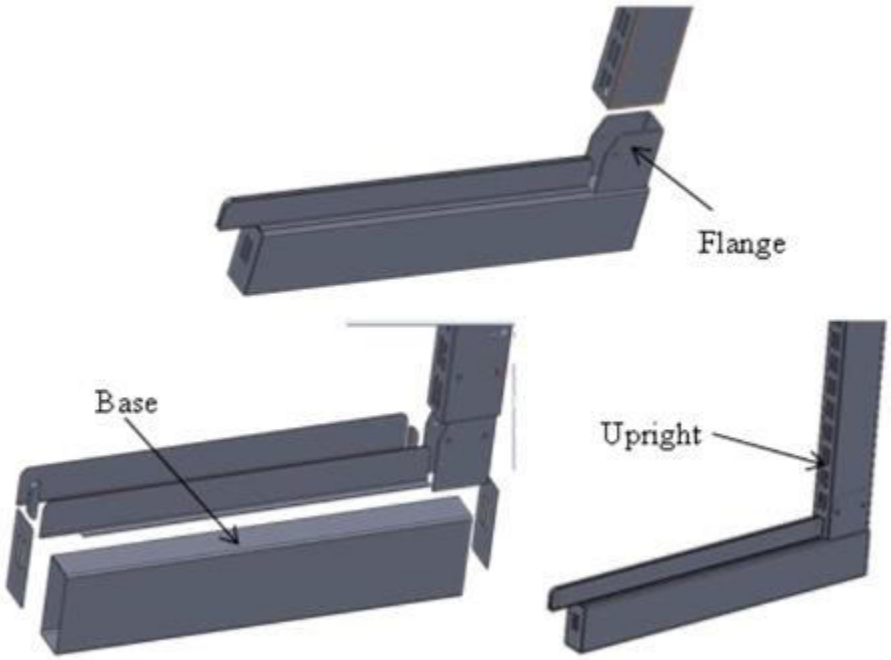
Scope of project will include –

- Generating multiple concepts of system
- Evaluation and approval
- CAD model of the system
- Virtual/mathematical load calculation
- Drafting of design for manufacturing
- Manufacturing Prototype
- Testing the prototype
- Prototype Evaluation
- Fine Tuning for production run

Design Brief and Work done

An attempt was made to develop a system known as I40 considering Indian scenario. However the system could not sustain the desired load and was discarded. Previous history of the project was studied to get cues on do's and don'ts to develop a foolproof system.

A flange of size 75x75x3mm thick is welded on the top of the base as shown. The upright is inserted vertically into the flange. Once the upright is inserted into the flange the assembly is tightened by the use of fasteners.



The system is put under a specific loading condition for certain duration of time.

Design Brief and Work done

Initial reasons of failures for the suggested design is observed are as follows:

1. The load acting on the upright has a reaction force on the base
2. The load acting on the upright is carried by the base.
3. The height of base is used as 8cm instead of 16cm for more than 200cm ht. of upright.
4. The thickness of pipe section for base & upright is used as 2mm instead of 2.5 to 3mm which normally used in other shelving system.

Design Brief and Work done

Design Brief and Work done

Design Brief and Work done

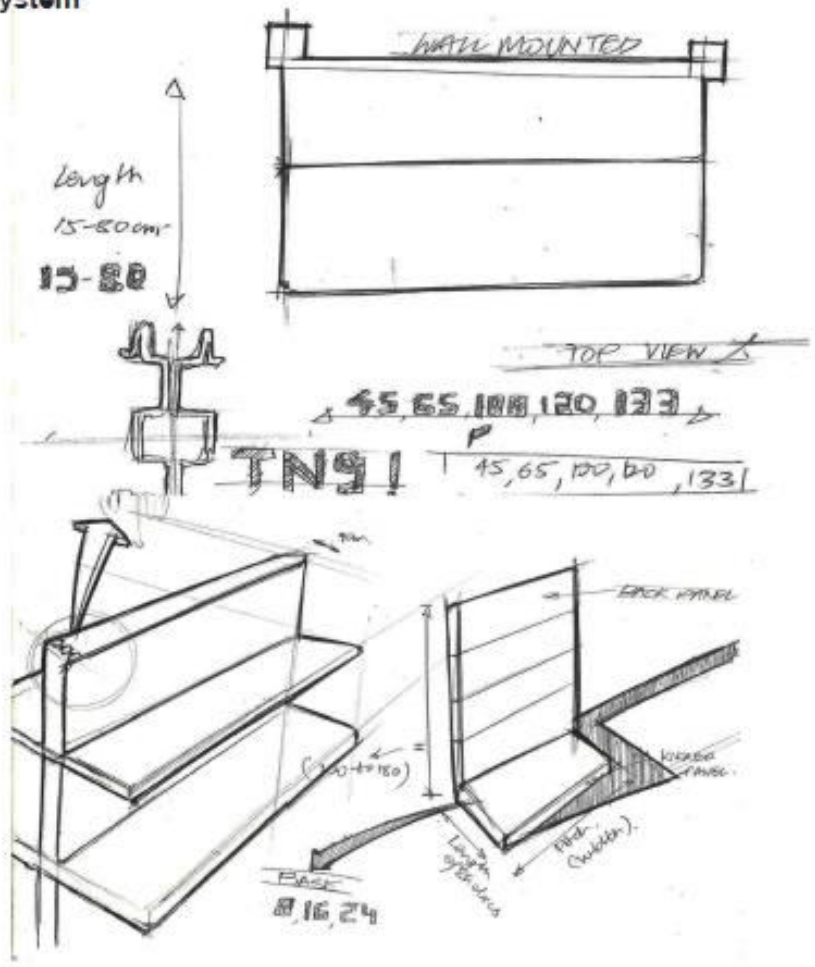
Design Direction

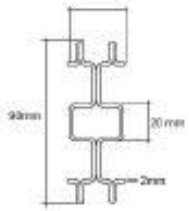
1. New design should be modular i.e. existing parts of the shelving should be compatible with new.
2. Care should be taken regarding easy storage and transportation of the new system.
3. System should be minimalistic and easy to manufacture.
4. Design should suffice wall and gondola system.
5. Cost of the unit should be reasonable having least components

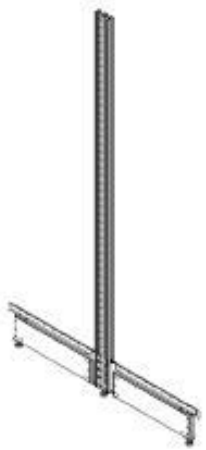
Design Brief and Work done

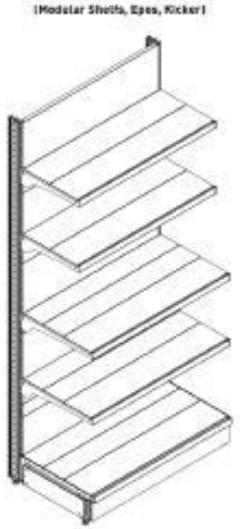
Ideation

Study of TN 9 System









KIT	KH#[EM][ZZ][MP][BBB][CHHH][LL][PPP]
d. [BBB]	016 - 024 - 808
[H. 944 H]	168 - 172 - 192 - 216 - 226 - 240 - 280
[H. L.L]	40 - 50 - 60 - 70 - 80
[PP P]	845 - 065 - 100 - 120 - 133
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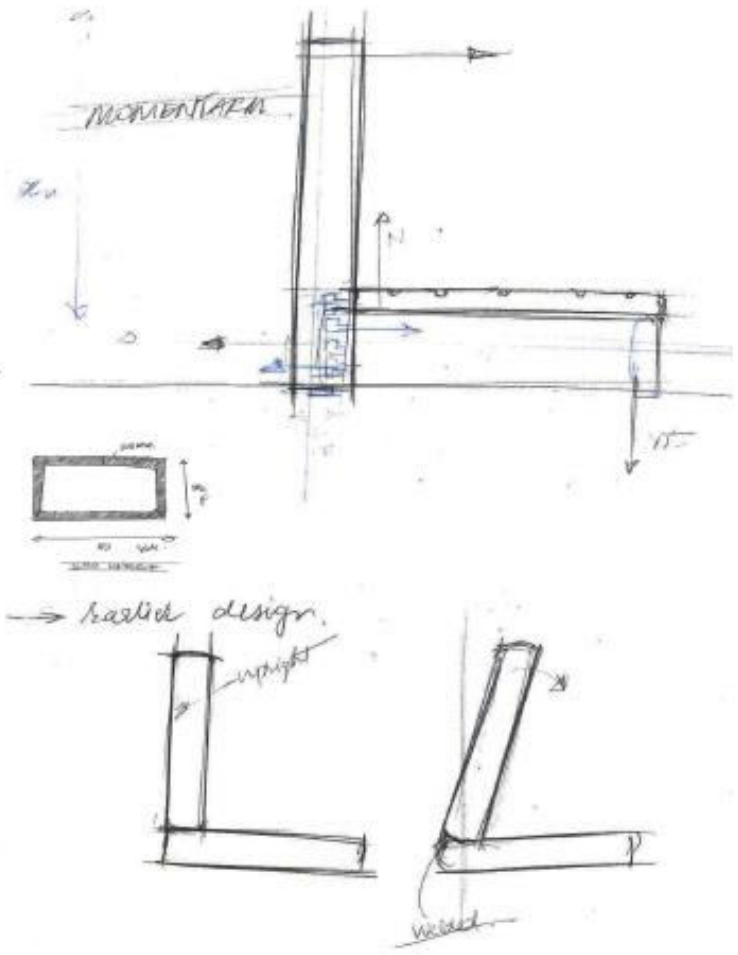
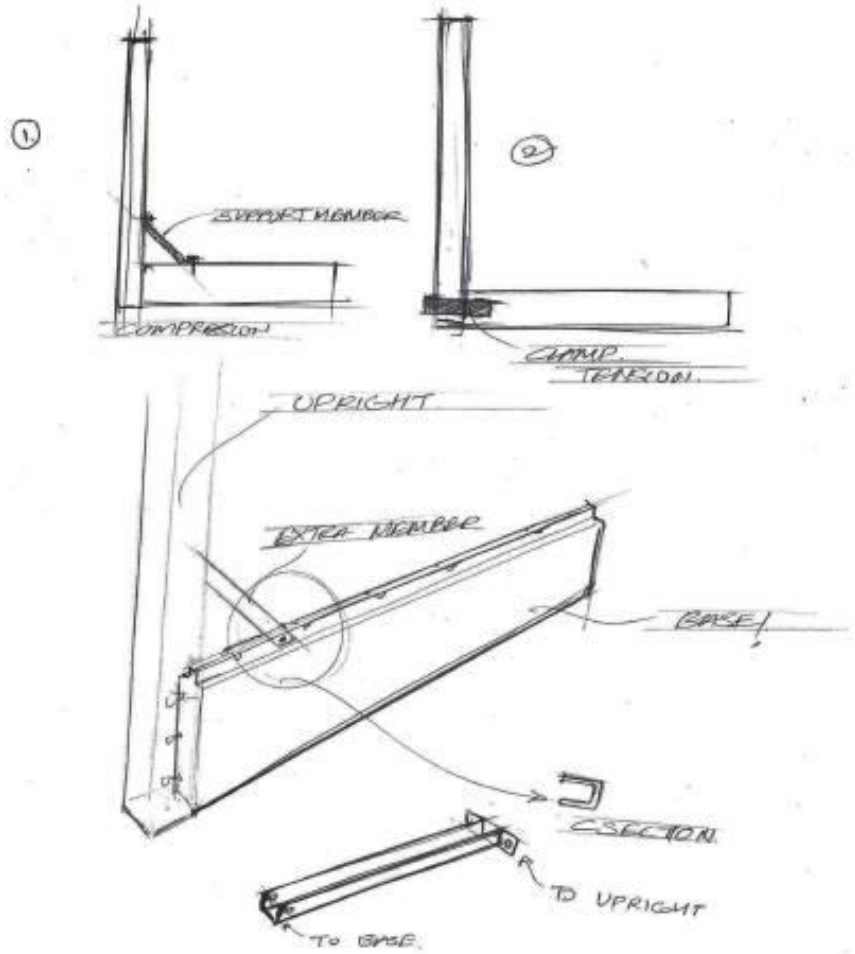
[EM]	F - M
[ZZ]	F - M

Design Brief and Work done





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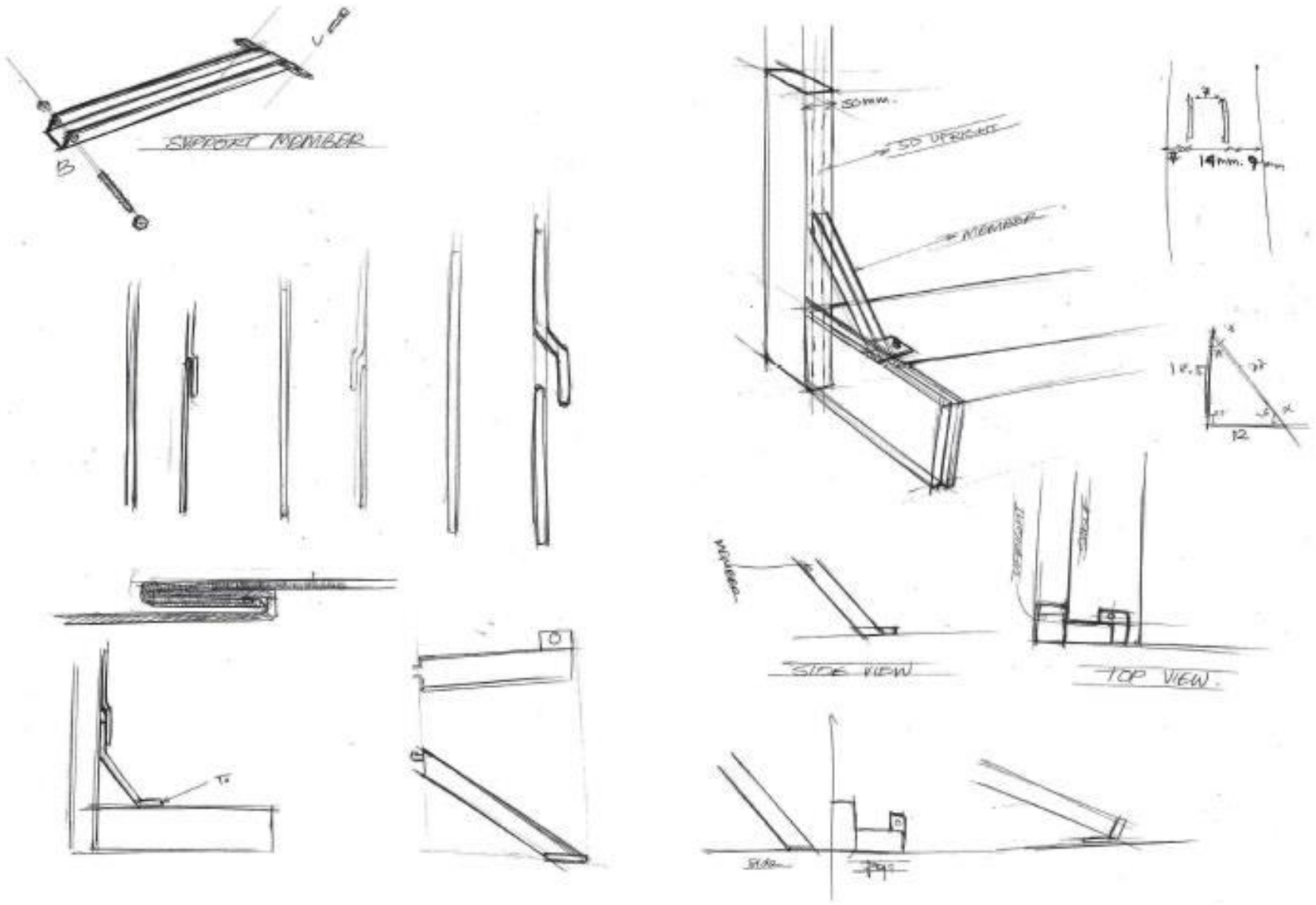

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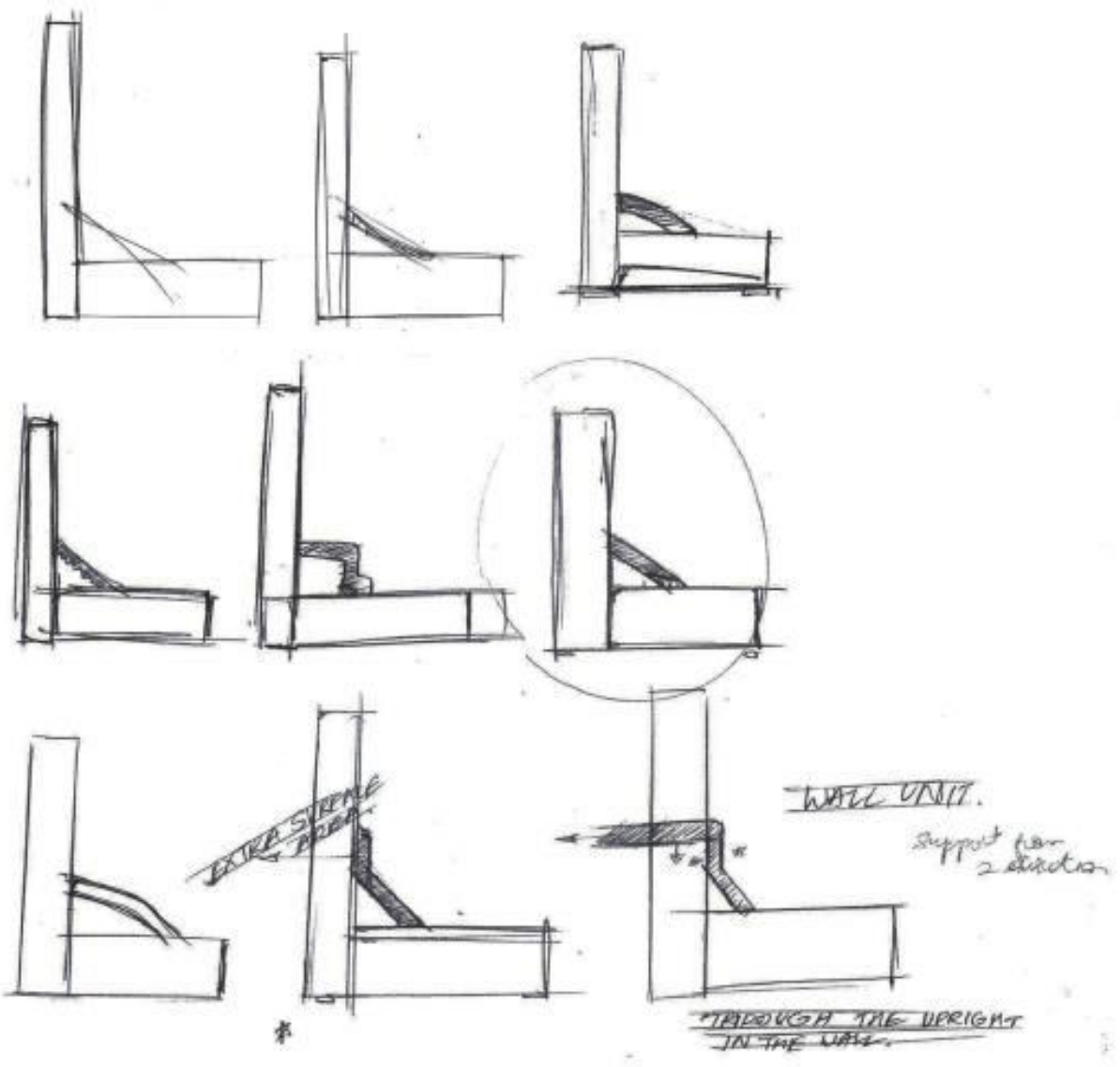

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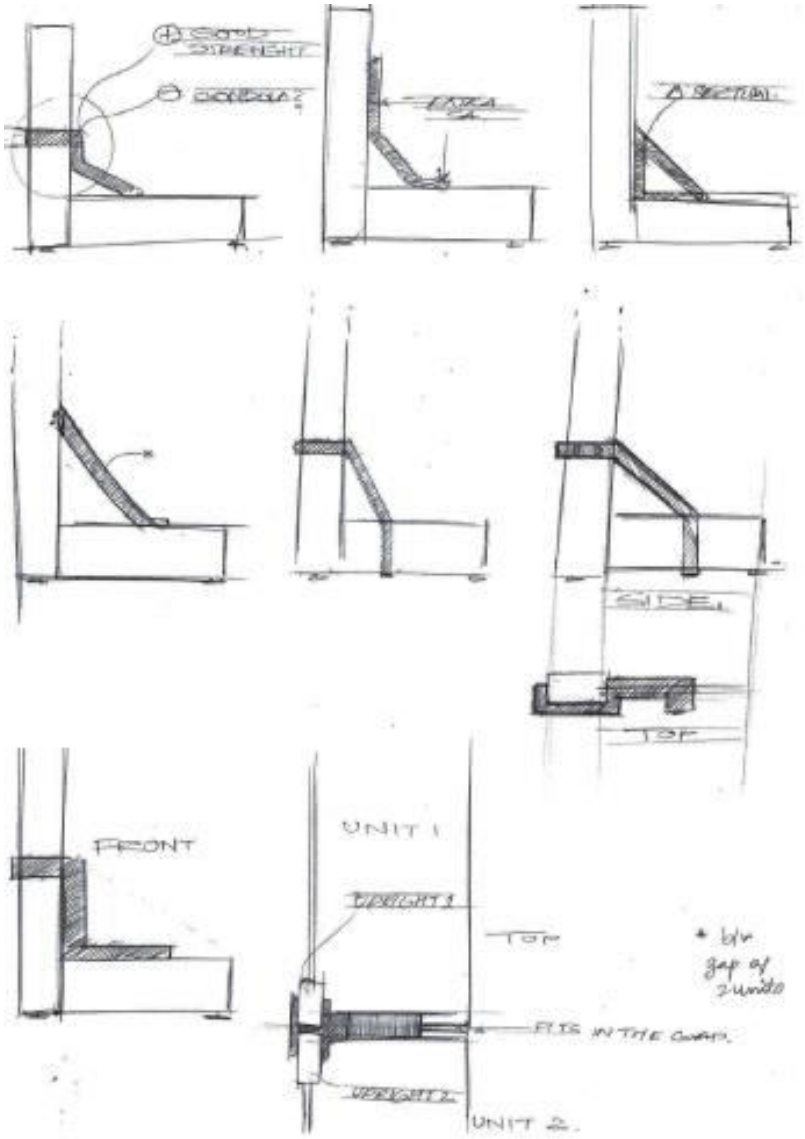
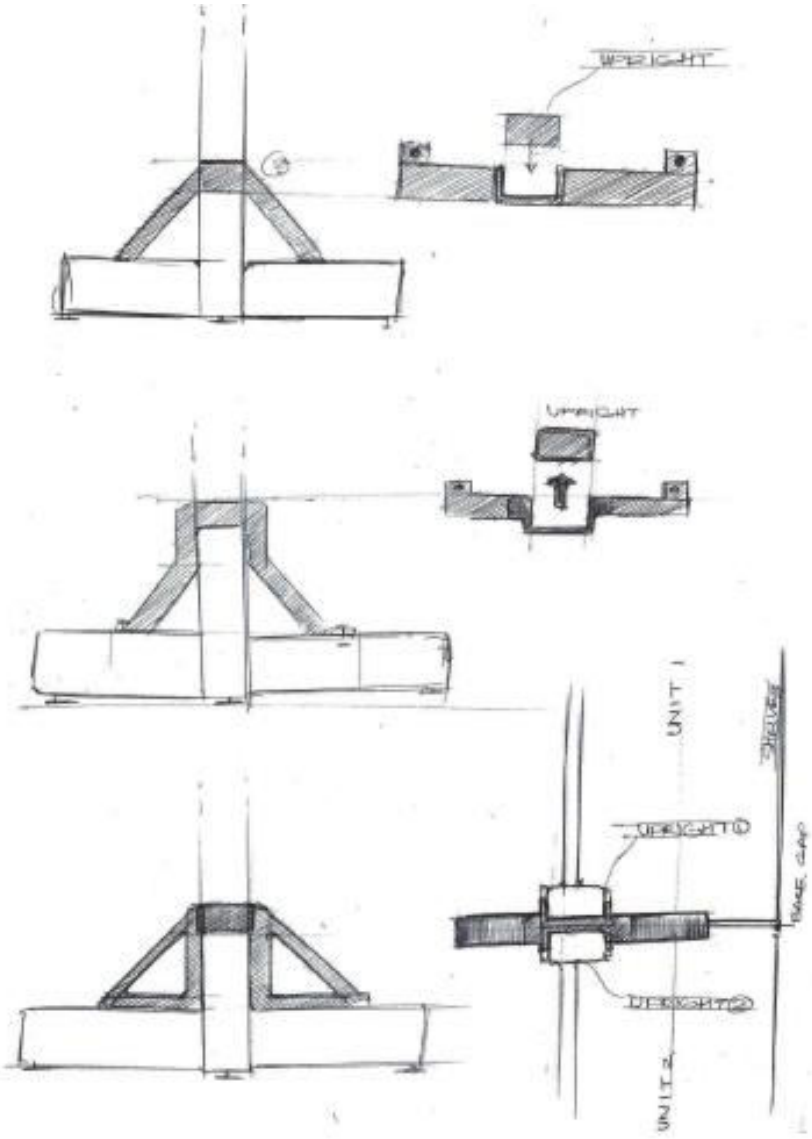




Design Brief and Work done

Design Brief and Work done

Discussion and Feedback

Pro's
- The support member will be cheaper to manufacture
- The system with support member idea is new and is not used in any systems worldwide

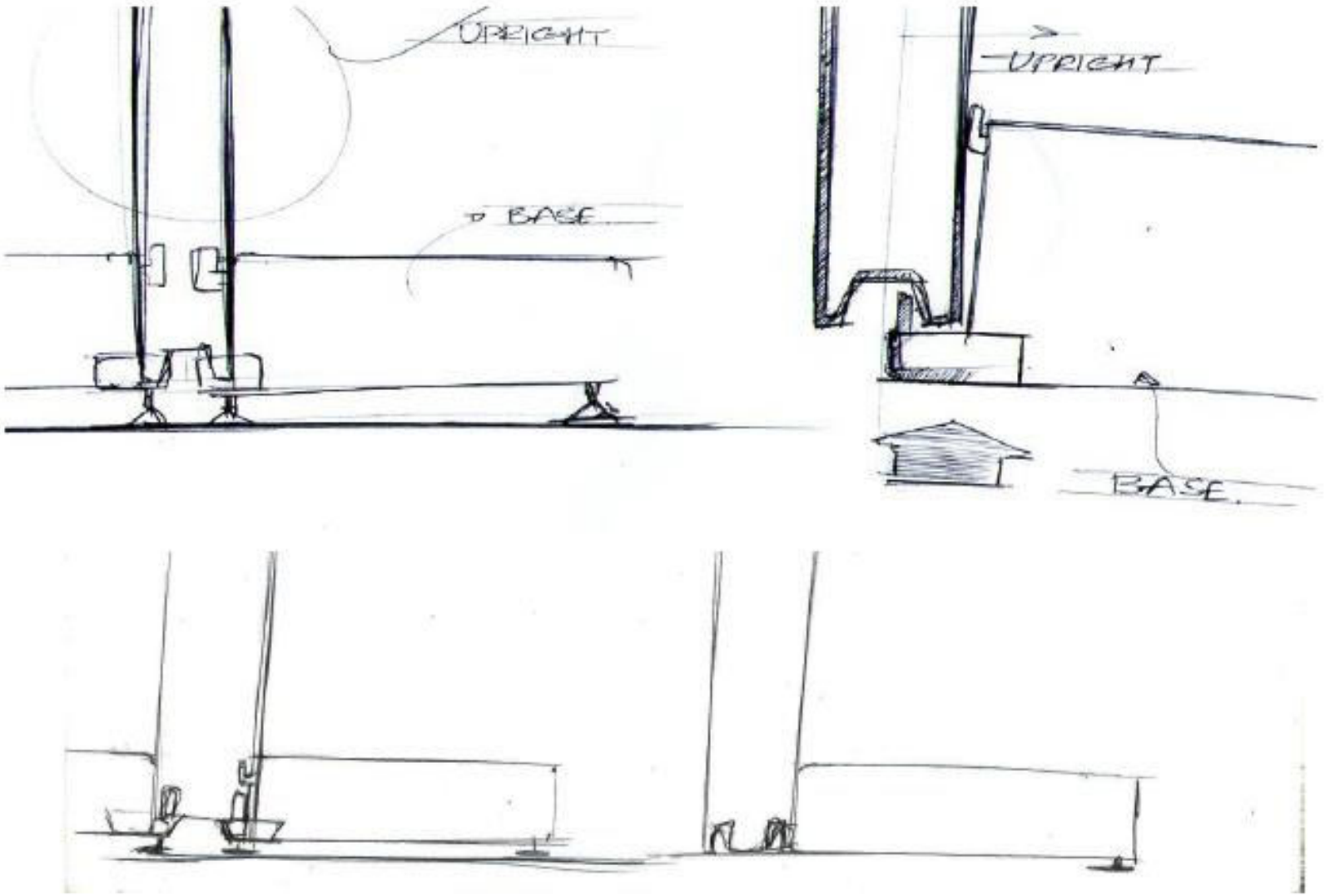
Cons
- Extra member will add transportation cost
- Support member will add storage and cost
- LH and RH member will add manufacturing and tool cost
- Support member will add restriction on the height of first shelf
- Aesthetic will be a concern

Conclusion

Instead of external component or entity which is visible an alternative concept has to be developed which will support the required load, preferably without changing the exterior of system.

- Support member can be customized for various shelving system
- Support member will cater the additional load and horizontal deflection

Design Brief and Work done



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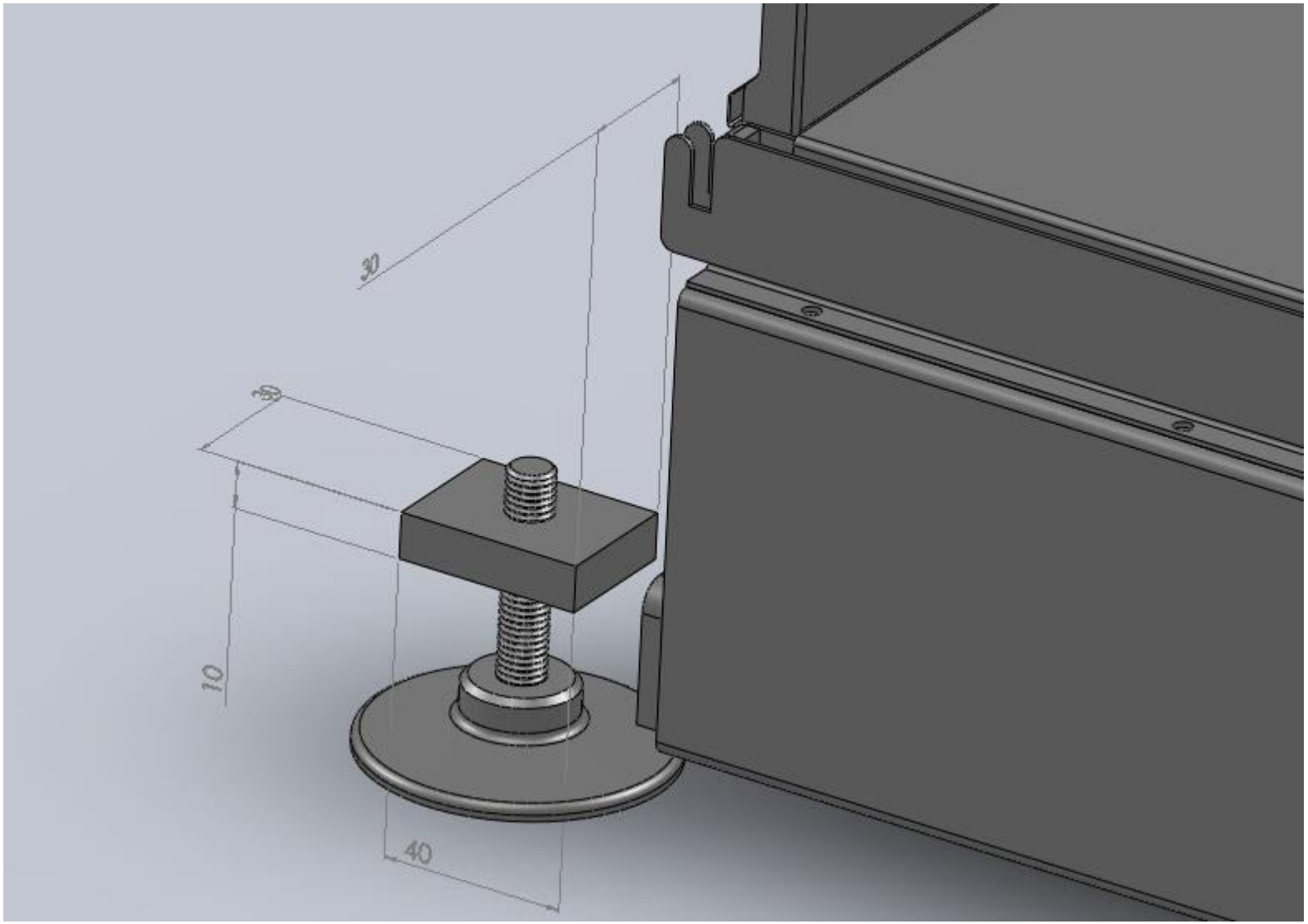

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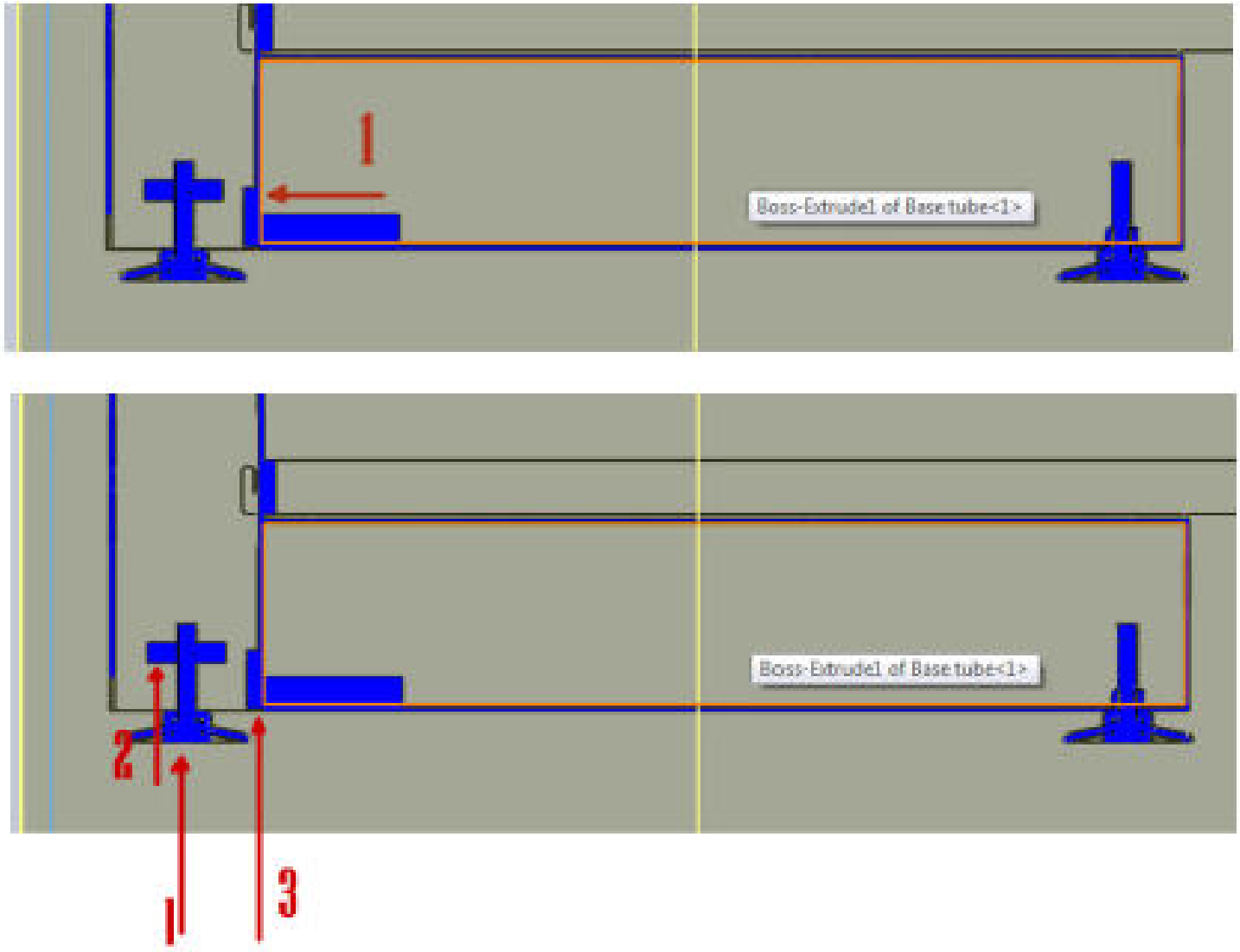

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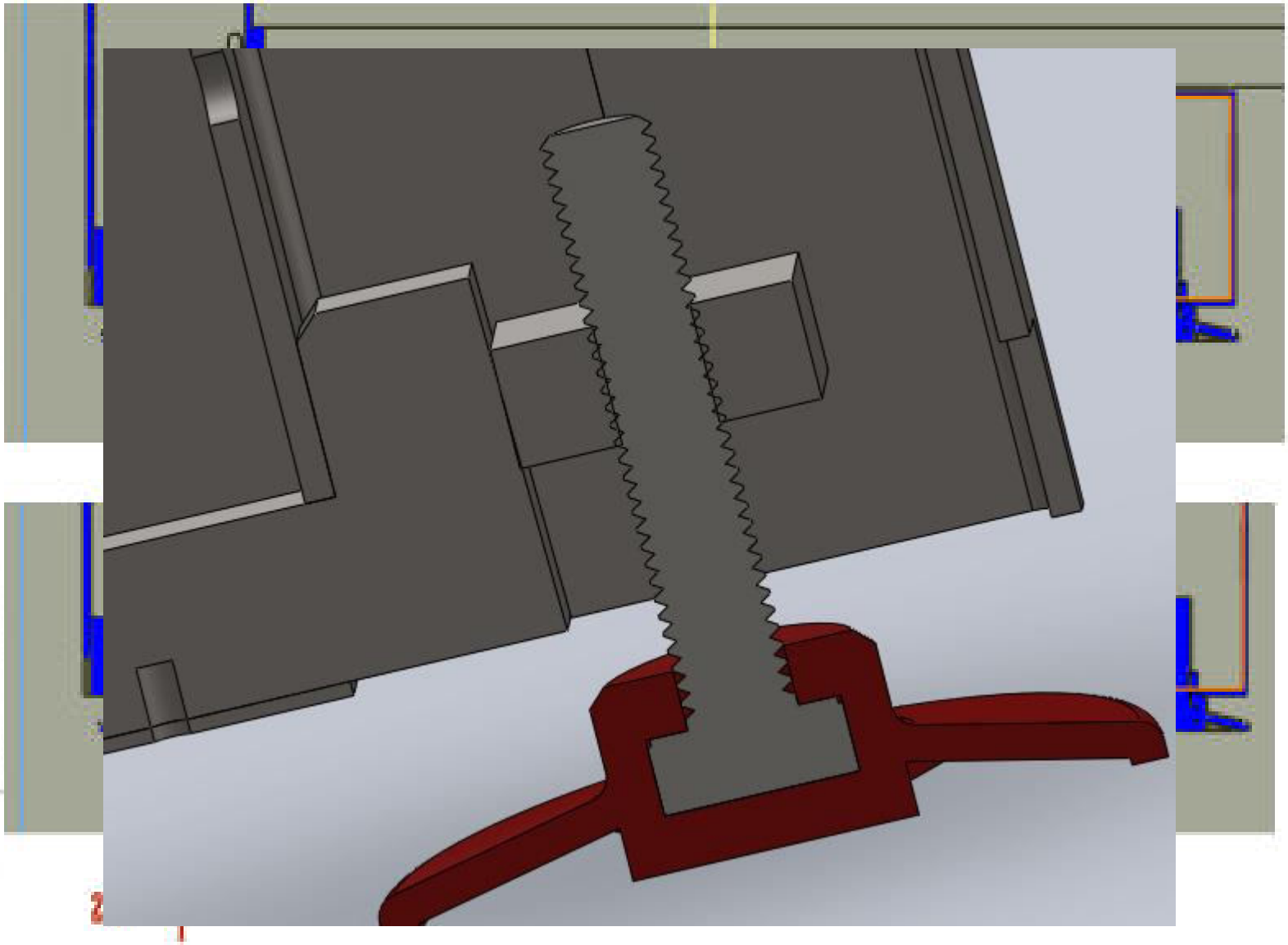


Design Brief and Work done

Conclusion and Inferences

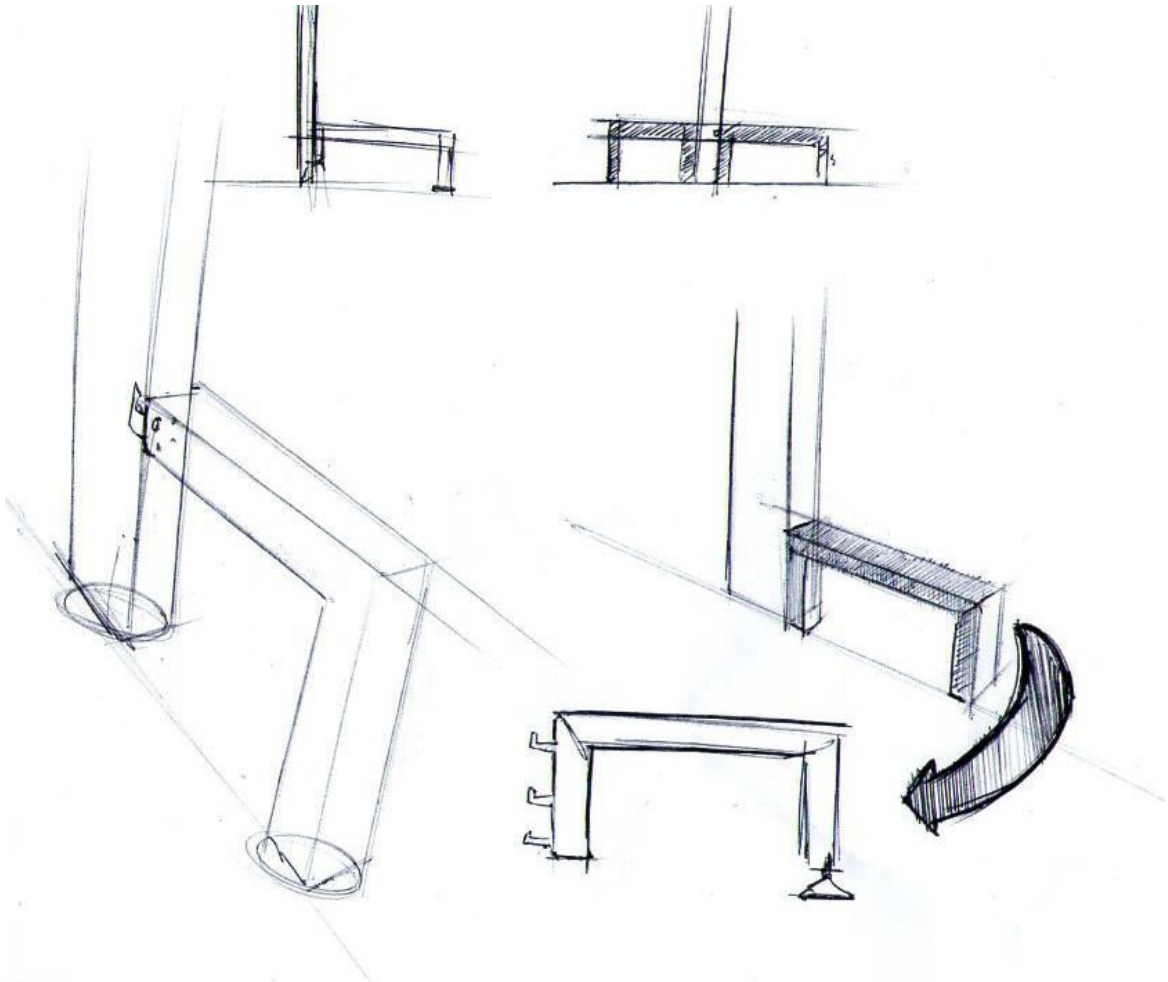
Ideation concept proposal after discussion with the team was considered as feasible. Concept of increasing dimension of leveller plate was logical and was viable in terms of cost of manufacturing and time.

The above concept was considered as practical. It had simple configuration, easy to manufacture and cost effective.

Therefore Concept B was given a go to develop CAD model and Drawing for manufacturing.

Design Brief and Work done

It was also decided to have one more concept so both the concepts can be manufactured at one go from same vendor.



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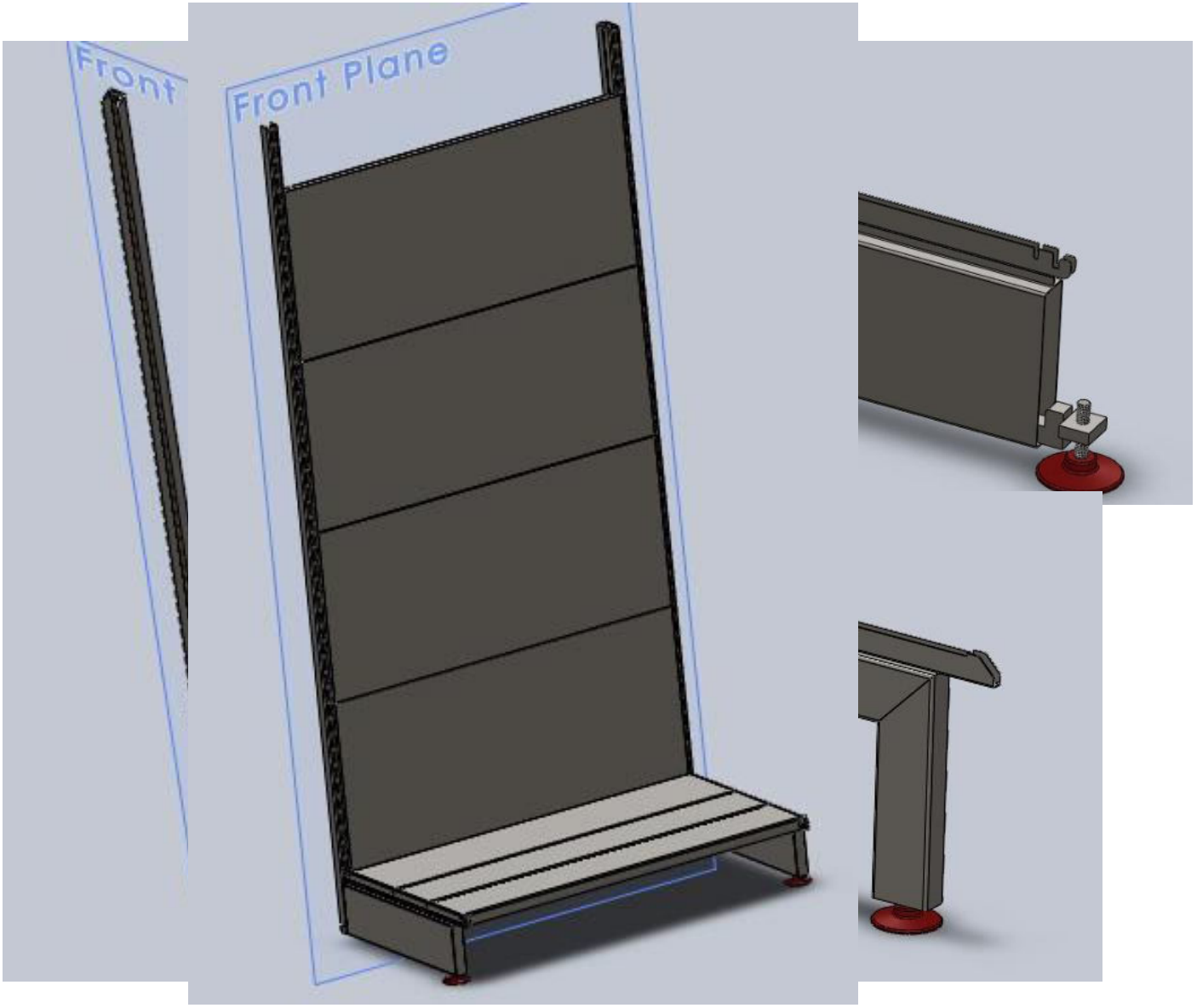

Design Brief and Work done

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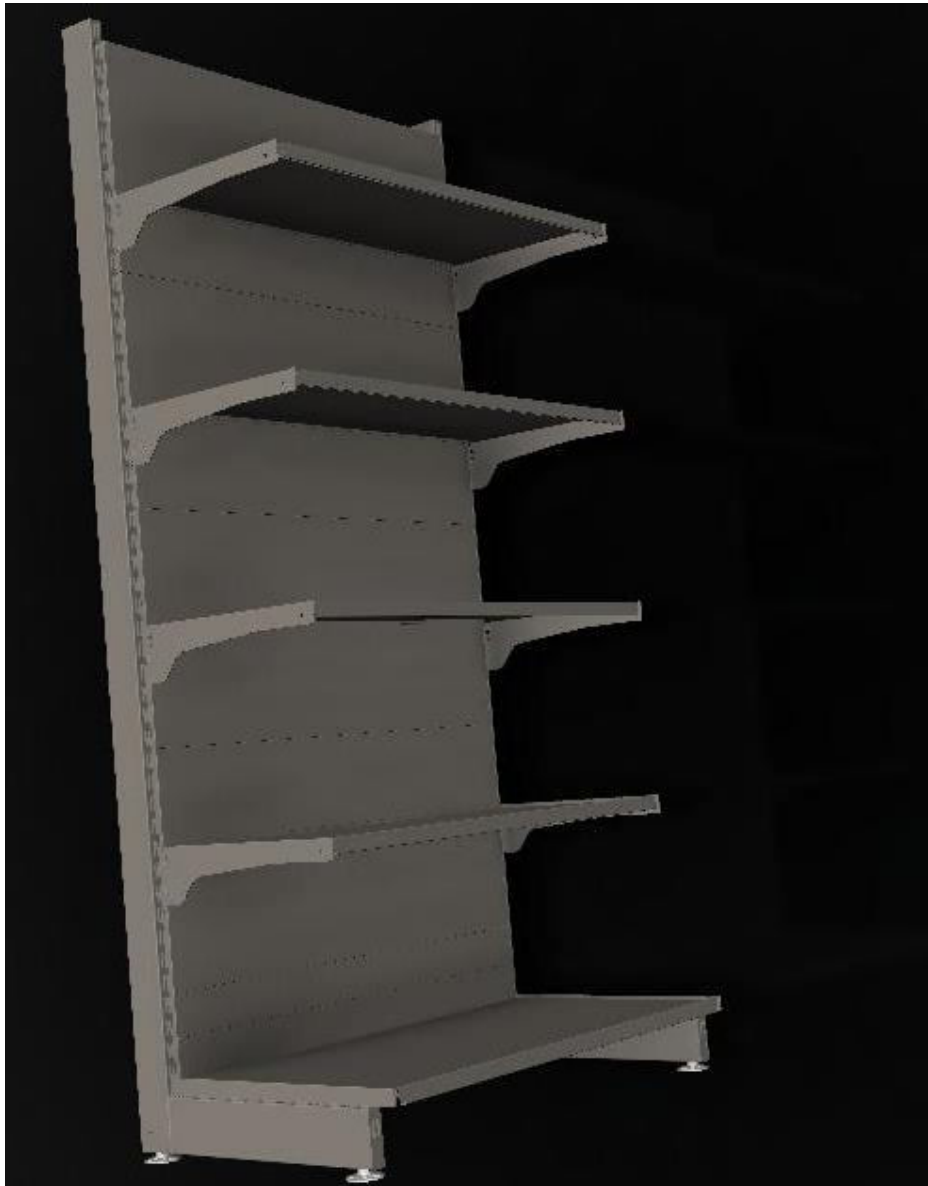

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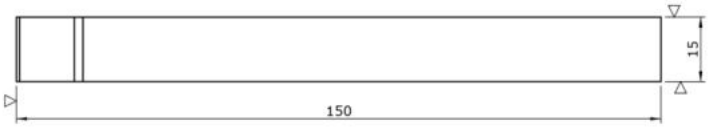
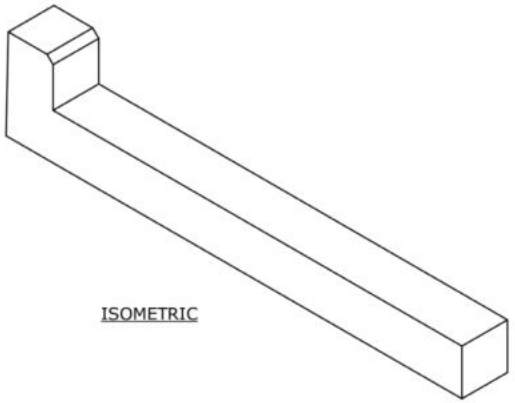


TOP VIEW



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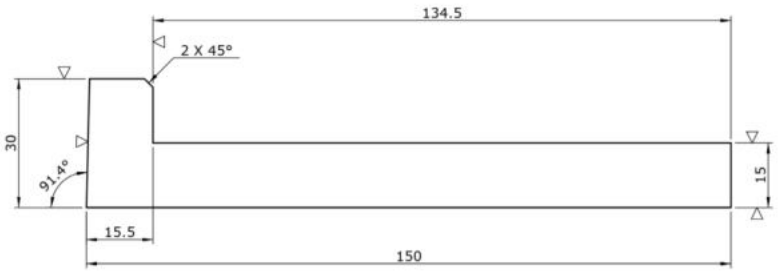
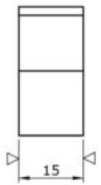


FRONT VIEW



SIDE VIEW

GENERAL NOTES :-

1. REMOVE ALL SHARP EDGES AND BURRS.
2. MATERIAL : MILD STEEL FLAT / PLATE.
3. WEIGHT : 0.29 Kg. APPROX.

Scale 1:1	Material:- REFER NOTE Finish:- REFER NOTE						
	Name	Date					
Drawn	RDS	06.06.13					
Chkd	RDS	06.06.13					
Appvd	PGV	06.06.13	Alteration	Reason	Approved	Date	Rev

All dimensions are in mm unless otherwise stated. General tolerance to be refer as per ISO 2768-1 (medium class)

Title:- BASE LEG KEY

Dwg No. CI-PRT-00007

Rev 0

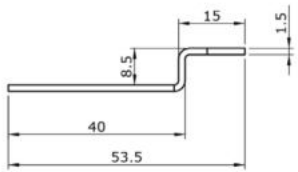
CAEM INDIA SHELVING PVT. LTD.
Plot No. C-16/17, M.I.D.C. Hingna Road, Nagpur- 440028

Sheet 1 OFF 1

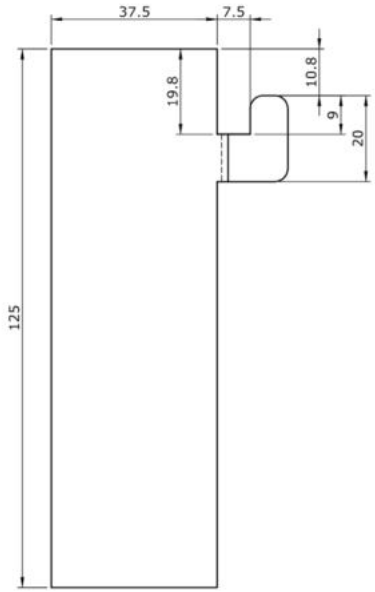
Replaced by NIL

A3

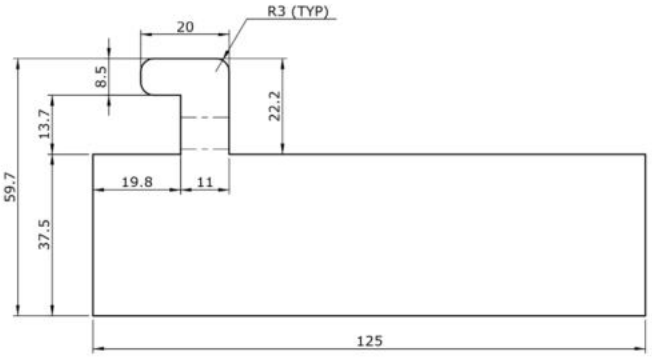
Design Brief and Work done



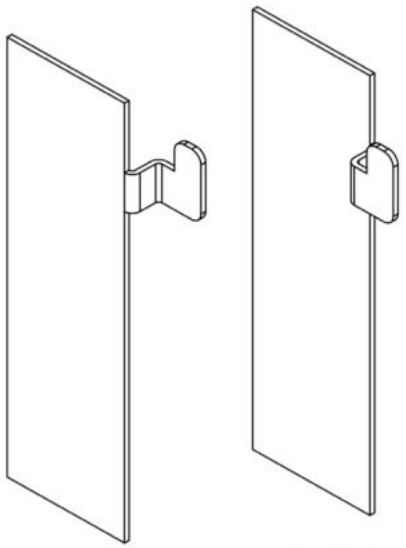
TOP VIEW



FRONT VIEW



DEVELOPED SHAPE
(FOR REFERENCE ONLY)



LHS BEND

RHS BEND

GENERAL NOTES :-

1. MATERIAL : 1.5mm CRCA SHEET METAL.
2. FINISH : POWDER COATED AS PER REQUIRED COLOUR.
3. WEIGHT : 0.06 Kg. APPROX.

Scale 1:1	Material:- REFER NOTE Finish:- REFER NOTE						
	Name	Date					
Drawn	RDS	07.06.13					
Chkd	RDS	07.06.13					
Appvd	PGV	07.06.13	Alteration	Reason	Approved	Date	Rev
All dimensions are in mm unless otherwise stated. General tolerance to be refer as per ISO 2768-1 (medium class)	Title:- BASE LEG ADD HOOK				Dwg No. CI-PRT-00015		0
CAEM Shelving Engineering	CAEM INDIA SHELVING PVT. LTD. Plot No. C-16/17, M.I.D.C. Hingna Road, Nagpur- 440028				Sheet 1 OFF 1 Replaced by NIL		A3

Result and Conclusion

Two concepts were developed up to CAD model and Drawing stage. Drafting of the models were completed for manufacturing prototype .

The two system developed have a common upright. Rest of the entities of the system i.e. back panels, kicker plate, brackets and shelves are the same.

The system was designed according to manufacturing constraints of the local manufacturing vendors.

Efforts were made to minimize the components and hence to reduce the cost per unit, keeping in mind the cost constraints of Indian retail industry and competition from Chinese supplier.

Result and Conclusion

The build of Quantity was generated for cost estimation from local manufacturing vendor.

Sr no	Items/Particulars	Unit/Quantity	Drawing No.	Rate	Total
1	UPRIGHT GA	2	CI-PRT-00001	945	1890
2	BASE LEG WELD ASSEMBLY	2	CI-PRT-00005	555	1110
3	TUBELER BASE LEG WELD ASSEMBLY	2	CI-PRT-00008	496	992

After the calculation of cost of existing system i.e. TN 9 and S50 it was found that the cost of I40 was on a higher side.

The cost per unit of TN9 and S50 were almost two times cheaper than Chinese quoted rate.

Result and Conclusion

The reasons were –

As the units to be manufactured were less the cost of I40 was more. This can be lowered in production run and negotiating with vendor.

Chinese supplier get sufficient subsidy from their government for exports. This lower down the unit cost sufficiently as compared to other international supplier of shelving system.

Total cost to make a prototype for the two system was calculated to be 3992 Rs.

It was finally decided to do a virtual simulation of load bearing capacity of the system on Mechanical simulation software.
Prototype will be manufactured and physically tested once virtual simulation results are positive.

Result and Conclusion

Future Scope

Two system will be virtually tested on simulation software for loading bearing capacities.

If system can withstand a load of 120Kg per shelf then prototype will be manufactured.

The prototype will be physically tested in laboratory under expert supervision to measure bending and deflection.

System will then be certified and patented if required.

With the onset of FDI in retail further efforts will be made to minimize the cost and mass produce the system. Retailer in India would prefer locally made shelving system rather than exported from china considering extra cost on imports ,logistics and service.

Result and Conclusion

References

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https://www.facebook.com/CAEM.net/info
http://fr.slideshare.net/procaem
Caemalogy Design Document for TN9 system
Caemalogy Design Document for S50 system
http://www.ijsejournal.com/
Failure analysis of Upright & Base for Shelving Rack - International Journal of Science and Engineering Application Volume 2 Issue 5, 2013, ISSN-2319-7560 by Pratik Vitonde and G.H. Waghmare

Thank you!