Summer Internship Project

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

By
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Mobility and Vehicle Design
Batch 2012-2014
IDC-IIT Bombay
For CAEM Shelving India Pvt. Ltd

Acknowledgement

I would like to thank my Guides Abid Vakil,Pratik Vaitonde, Radheshyam Shahare and Rakesh Nandanwar for their continued guidance and support throughout the project and helping me learn the different aspects of Product Development. The project helped me understand the real-life design solu-tions, approaches and methodologies.
I would also like to express my gratitude to my Institute and Design center for helping me with the environment to learn. I also would like to thank all my fellow classmates for their tre-mendous support throughout the project.

Certification

This dissertation entitled 'To design and manufacture a system competitive to TN9 shelving system which will be manufactured locally befitting Indian scenario' by Mr. Saurabh S. Nimsarkar is approved as Summer Internship Training (Project 1) for the degree M.Des (Mobility & Vehicle Design).

Examiners:

Supervisor (Guide):

Chairman:

Date: 8th July, 2013
Place: IDC, IIT Bombay

CAEM ShelvingEngineering

CAEM INDIA SHELVING PRIVATE LIMITED
Plot No. C-16/17, M I D C Industrial Area,
Hingna Road Nagpur, India - 440028.
Tel. :- +91 07104 232565
www.caem.net
Email : info@caemindia.com

TO WHOM SO EVER IT MAY CONCERN

This is to certify that Mr.Saurabh Nimsarkar, pursuing M.Des from Indian Institute of Technology, Bombay has successfully completed his thirty days internship project from 20th May to 20th June 2013 with us.

He has worked on the project "To design and manufacture a system competitive to TN9 shelving system which will be manufactured locally befitting Indian scenario"

He was found sincere & hard working during his tenure.

We wish him all the best for his future endeavors.

For, Caem India Shelving Pvt. Ltd.,

CAEM INDIA SHELVING PRIVATE LIMITED * NAGPUR *

Abid Vakil
Alternate Director
Place: Nagpur
Date: 20th June, 2013

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 in-tegrity 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.

Saurabh S. Nimsarkar
126390010
Mobility & Vehicle Design

Date: 8th July, 2013
Place: IDC, IIT Bombay

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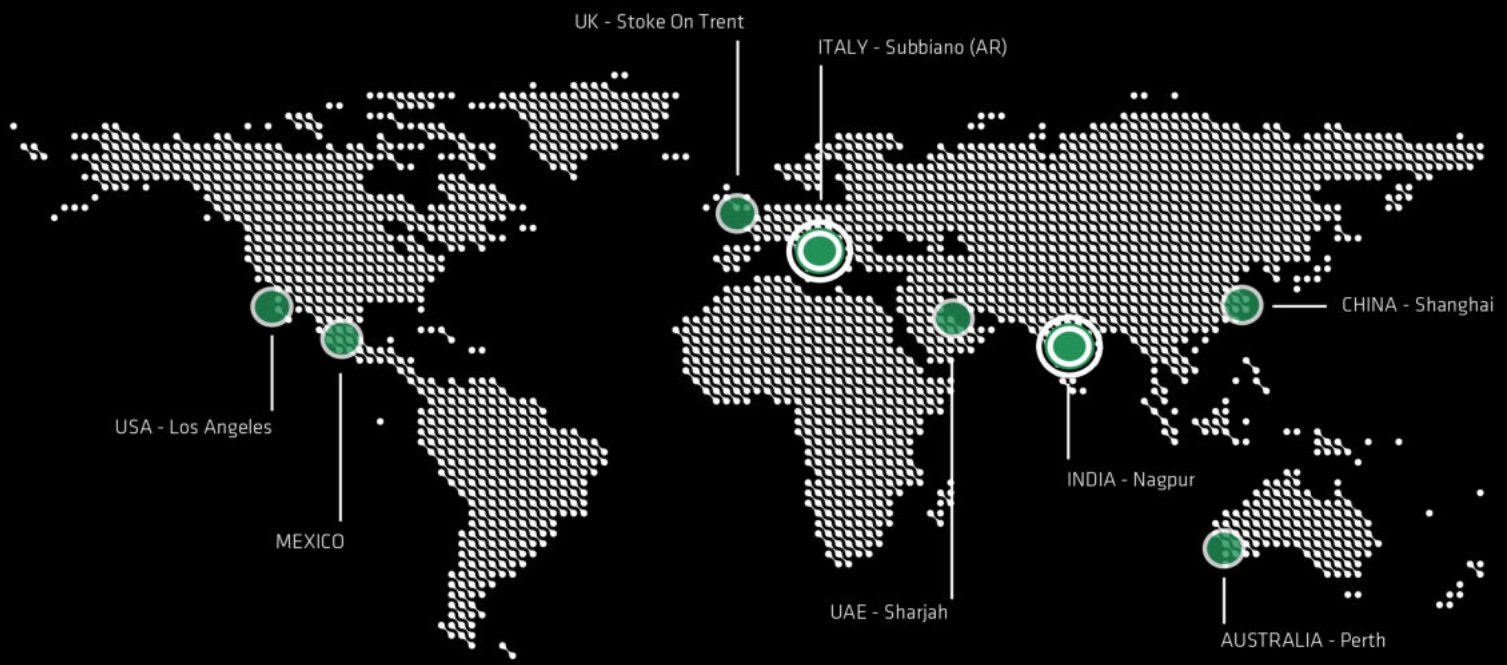
1. About CAEM

CAEM is a Glocal company for manufacturing and services related to the Shopfitting and retail industry. From its historical Headquarters in Subbiano Italy, the Group is constantly evolving and includes several strong companies around the World making Caem not only Global but also Local.



www.caem.net

ITALY

United Kingdom

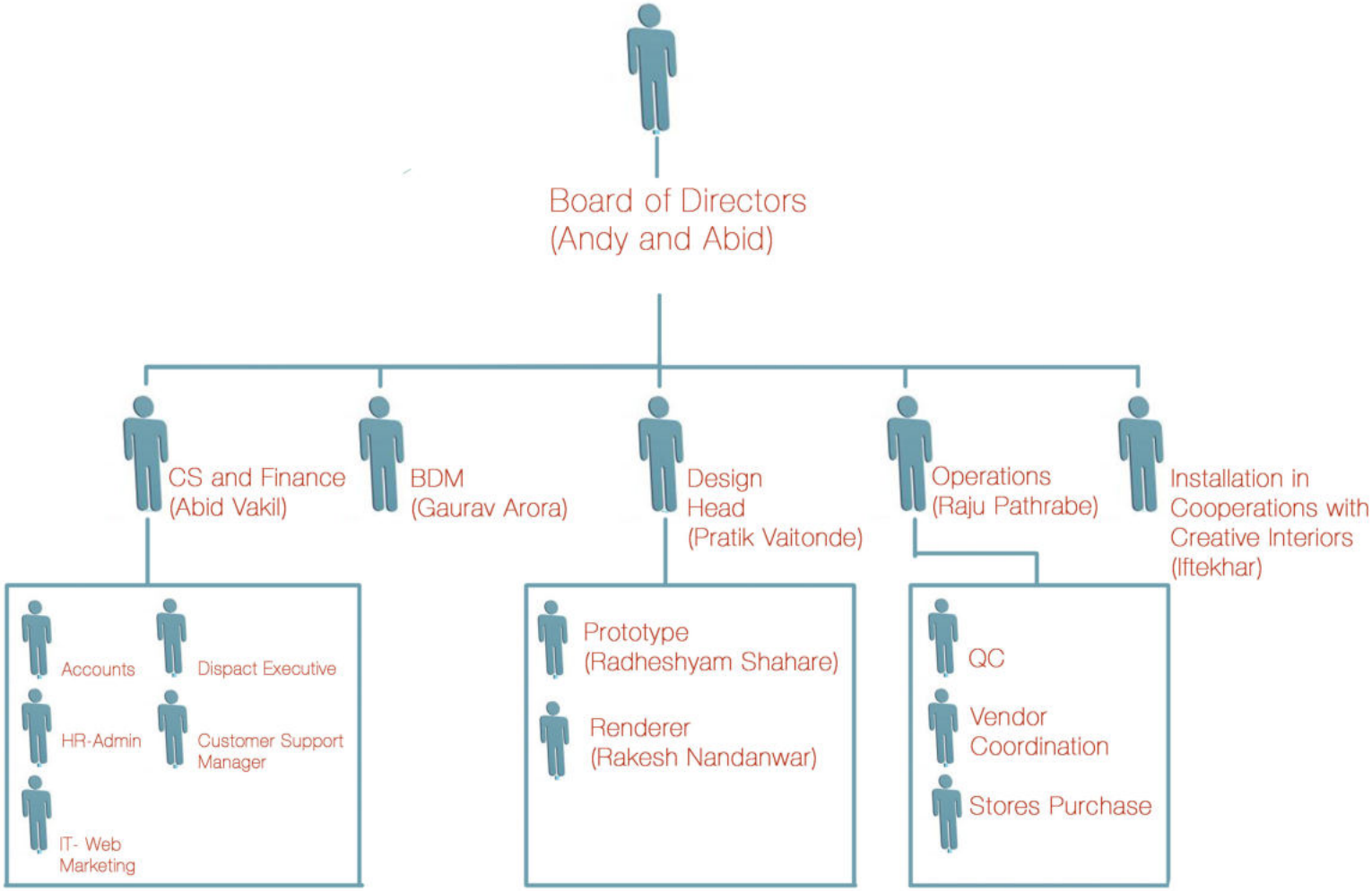
AUSTRALIA

CAEM India Shelving Private Limited was established in India in 2005 and has around 30-35 employees. CAEM has office in heart of India - Nagpur.

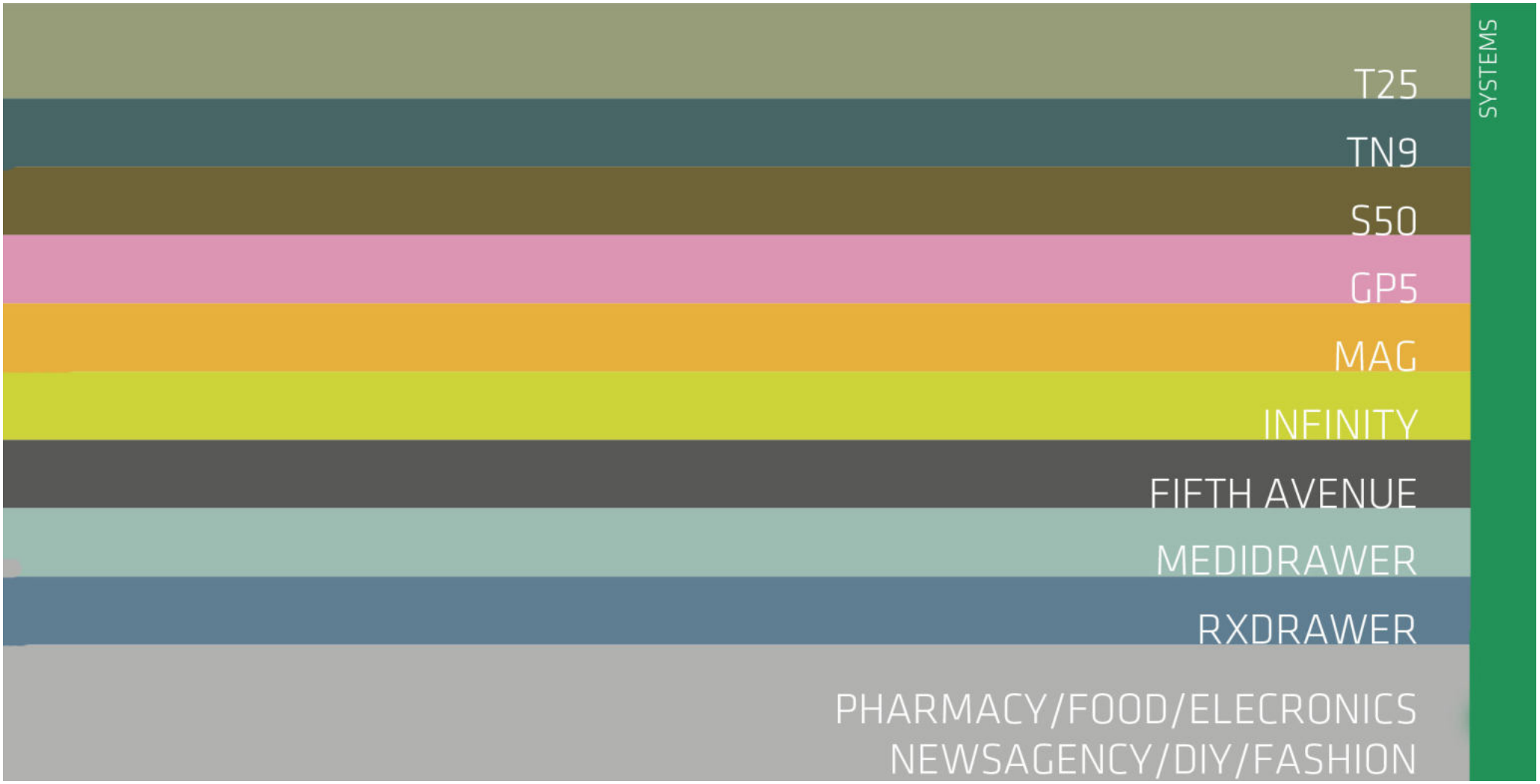
CAEM India Shelving Private Limited,
Plot No. C -16/17, MIDC Industrial Area,
Hingna Road, Nagpur - 440028
www.caem.net
info@caemindia.com

CAEM ShelvingEngineering

2. Organization Structure



3. CAEM Products



CAEM
ShelvingEngineering

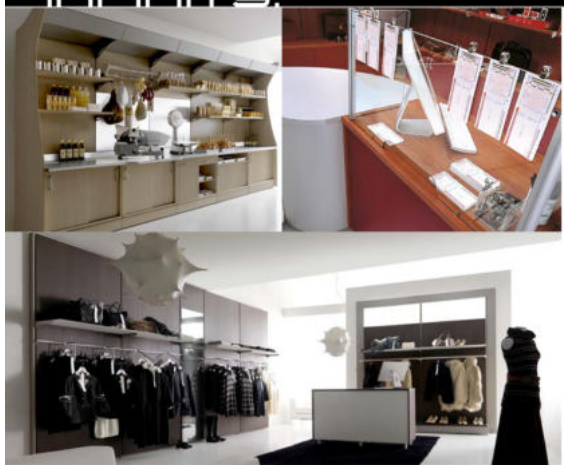
T25. T09. S50.

CAEM
ShelvingEngineering

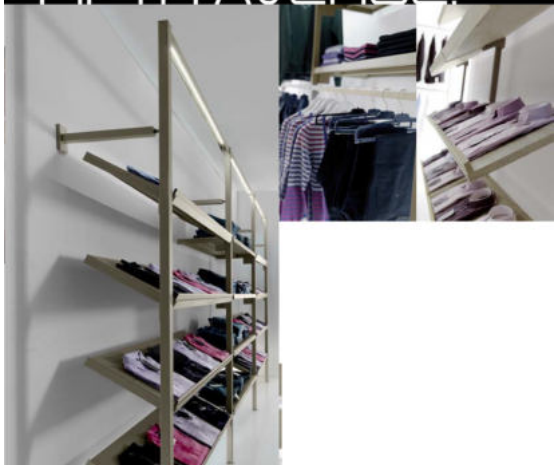
GP5.

MAG.

INFINITY.



FIFTH AVENUE.

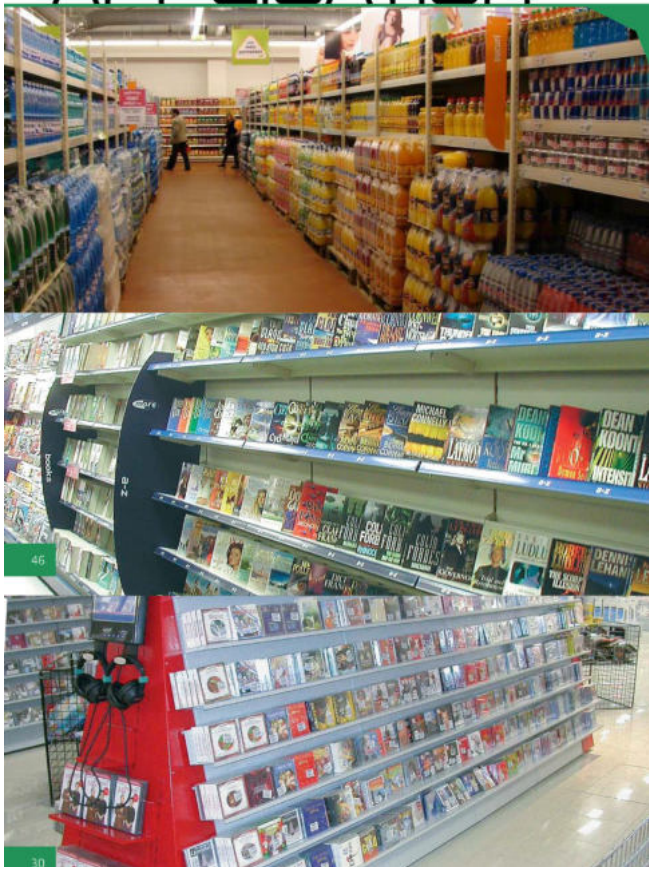


CAEM
ShelvingEngineering

MEDIDRAWER.

RXDRAWER.

APPLICATION



4. CAEM India installations and Clients

KIMS Wellness Center, Kerala

CAEM
ShelvingEngineering

5. Design Brief

5.1 Title of the Project :

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

5.2 About the Company :

The CAEM Group has more than 50 years experience in the manufacturing of shopfitting.

CAEM is a Global company for manufacturing and services related to the 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'.

5.3 Process

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 -

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

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.

5.4 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 the purchaser. Secondary user is CAEM shelving.

5.5 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.

5.6 Competitors

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

5.7 Product overview

CAEM products include -

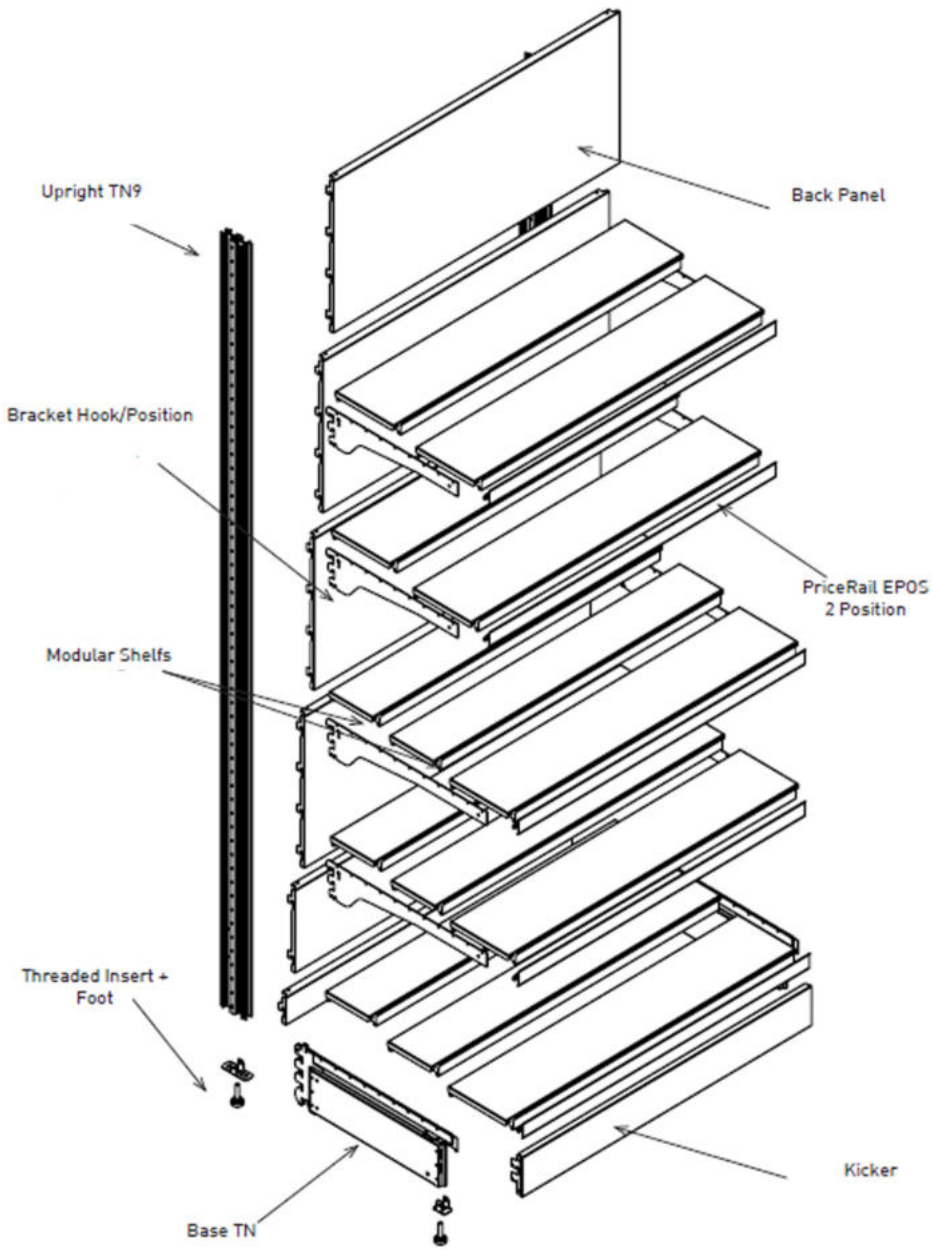
1. TN9
2. T25
3. S50
4. GP5
5. MAG
6. INFINITY,
7. FIFTH AVENUE
8. MEDIDRAWER
9. RXDRAWER and
10. Other Application.

Refer Section 3

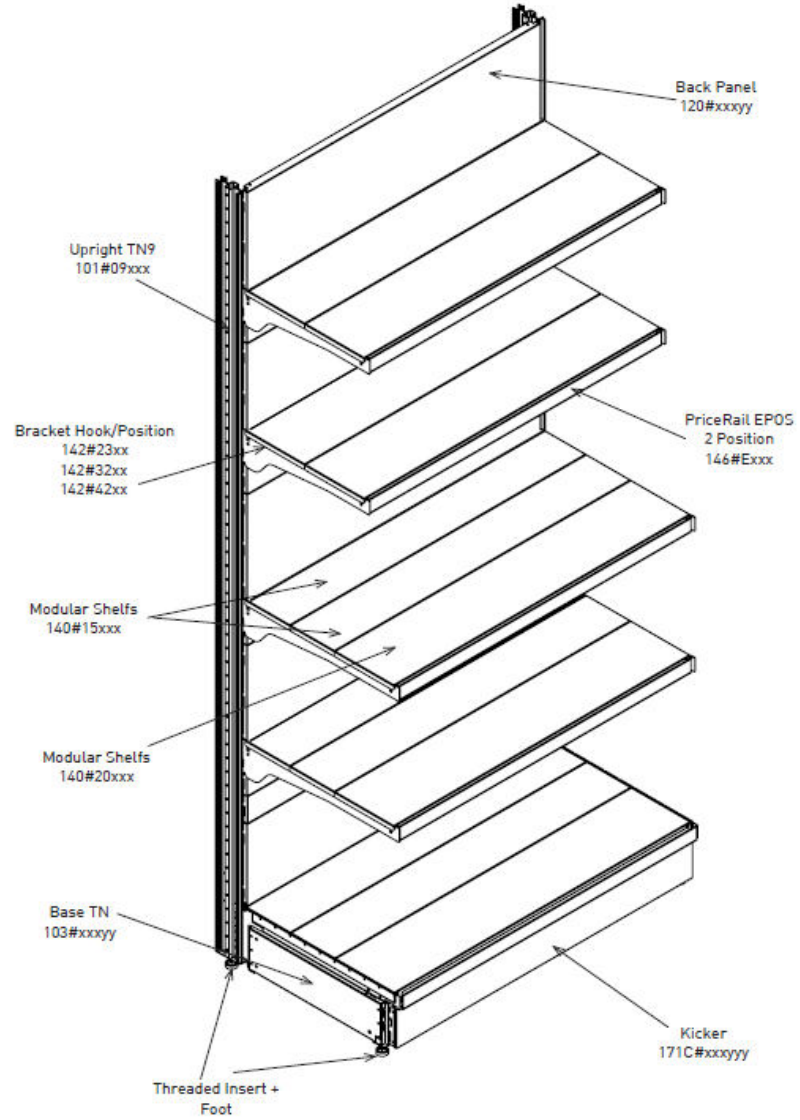
Shelving system comprises of following basic units -

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

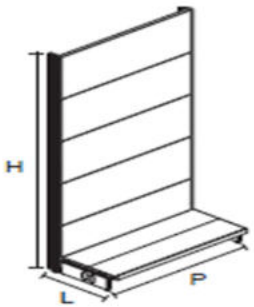
TN9 SYSTEM - Exploded Wall Unit



TN9 SYSTEM - Wall Unit TN



Different Configurations

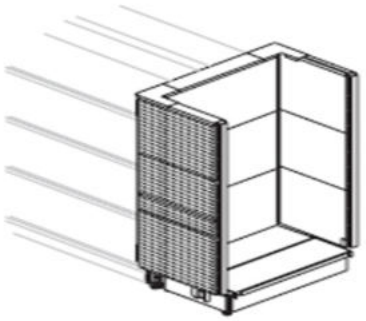


Wall Unit

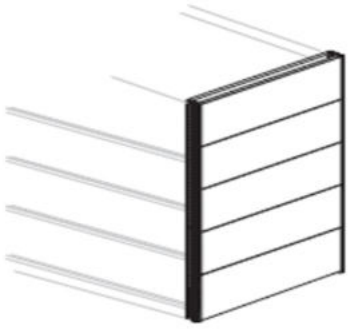
Gondola Unit

Gondola Units

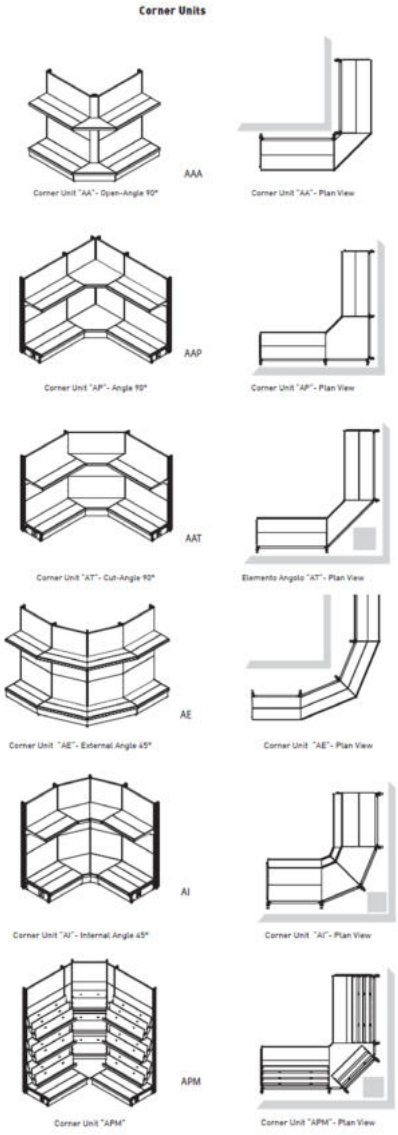
Gondola End "TG"



Gondola End "SIDEY"



Gondola End "TN" (with or without base)



5.8 Challenges in Indian scenario for CAEM

CAEM India imports TN9 upright from Italy. The upright used in TN9 is patented and has proprietary manufacturing process. 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.

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

5.9 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"

5.10 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

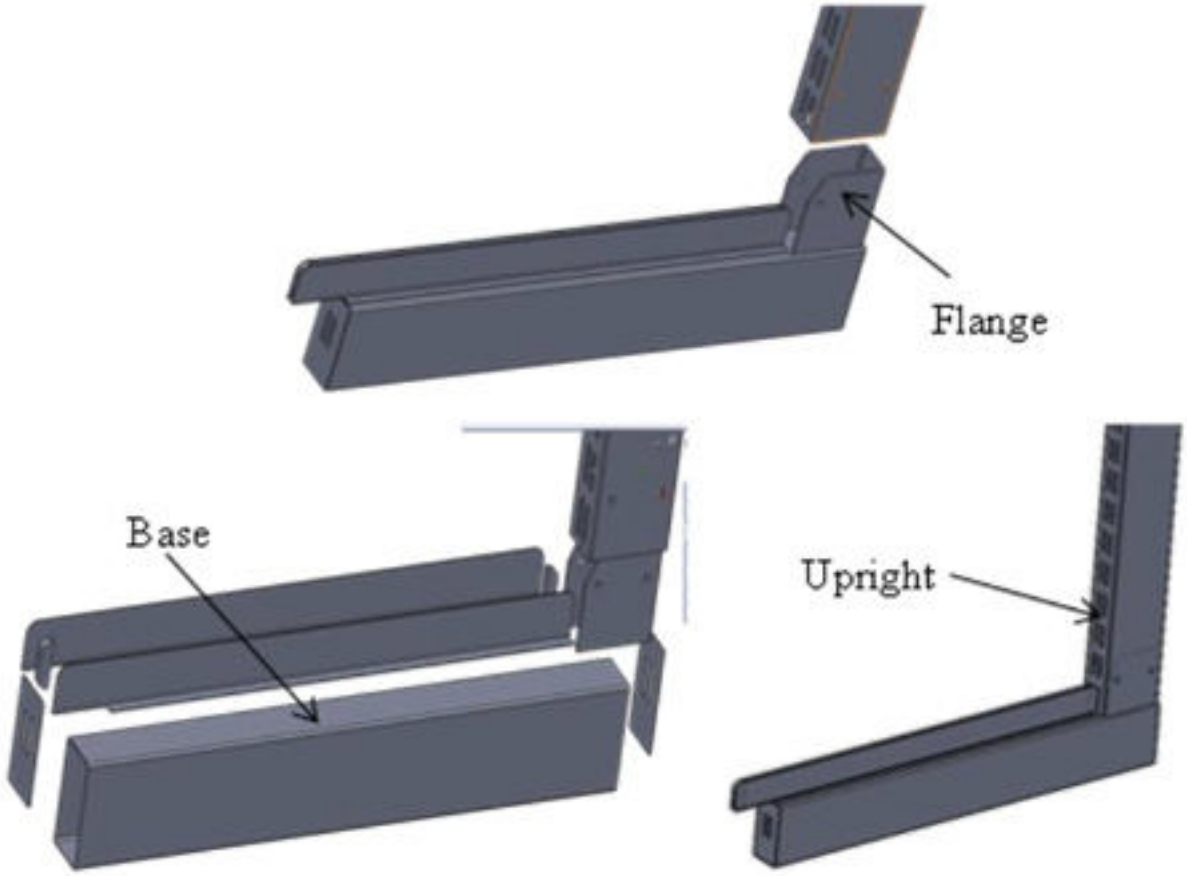
An attempt was made to develop a system known as l40 considering Indian scenario. However the system could not sustain the desired load and was discarded.
Previous history of the project can be studied to get cues on do's and don'ts to develop a foolproof system.

80x40x2mm thick rectangular pipe section is used for both upright & base as shown. The slotting is done on the upright pipe in such a way that, the pitch of the slots are compatible with the other assembly items such as back-planes, brackets, and loading bar etc.

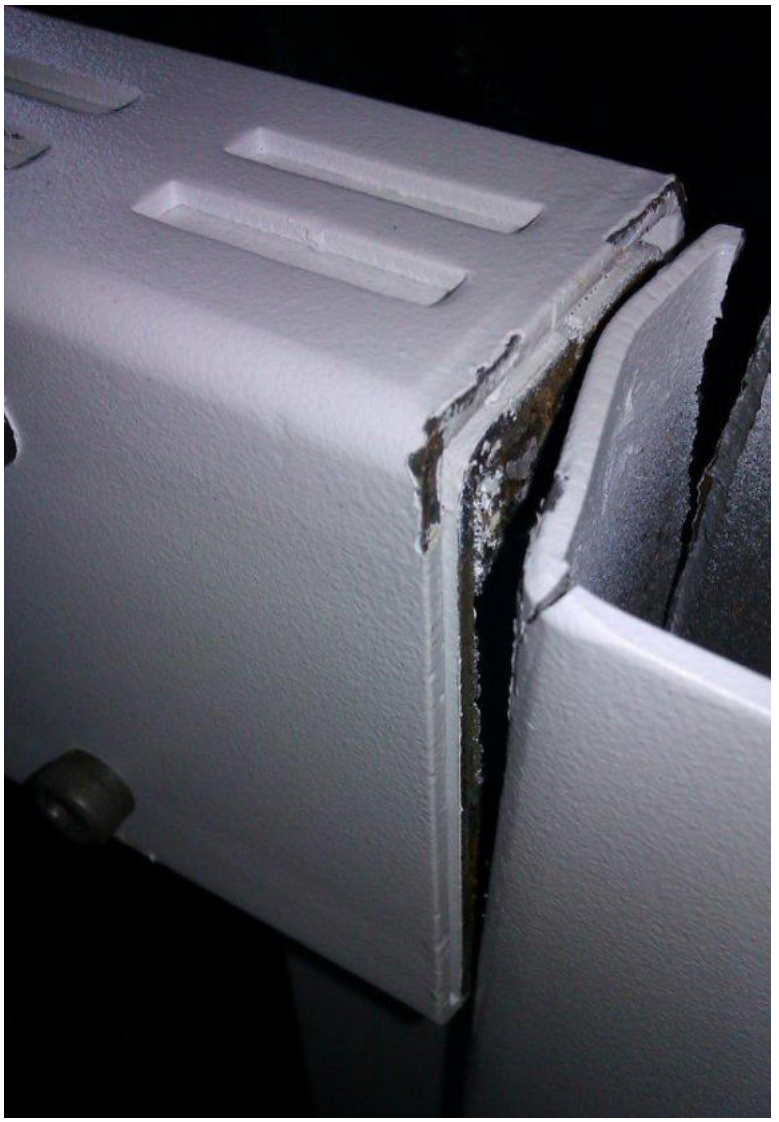
A flange of size 75x75x3mm thick is welded on the top of the base as shown. The upright is inserted vertically into the flange. The outer dimensions of the flange are smaller than that of the inner dimension of the upright. Once the upright is inserted into the flange the assembly is tight-ened by the use of fasteners.

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

Initial reasons of failures for the suggested design is ob-served are as follows:




WOODEN SHELF 400MM
02 NOS



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

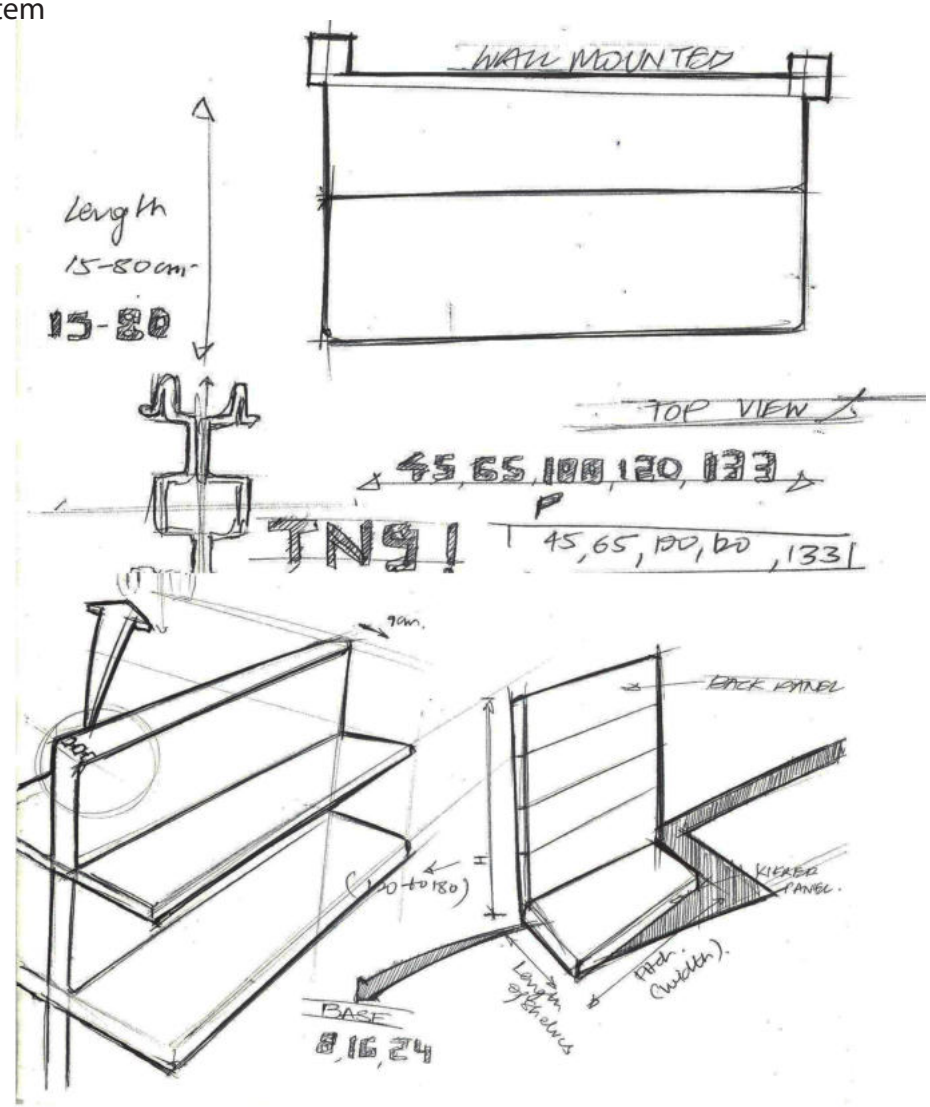
- The load acting on the upright has a reaction force on the base
- The load acting on the upright is carried by the base
- The height of base is used as 8cm instead of 16cm for more than 200cm ht. of upright
- Horizontal deflection support is inadequate
- The thickness of pipe section for base & upright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

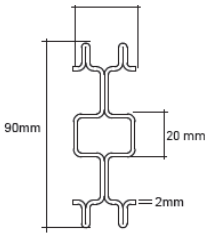
5.11 Design Direction

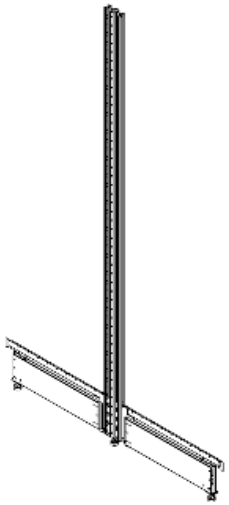
- New design should be modular i.e. existing parts of the shelving should be compatible with new.
- Care should be taken regarding easy storage and transportation of the new system.
- System should be minimilistic and easy to manufacture.
- Design should suffice wall and gondola system.
- Cost of the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

6. Ideation

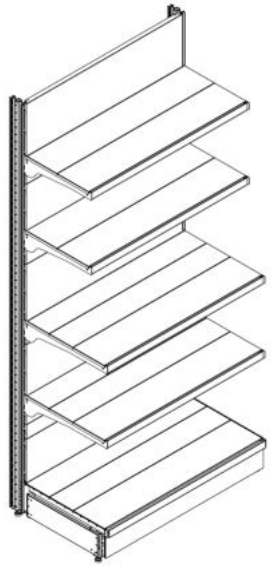
Study of TN 9 System



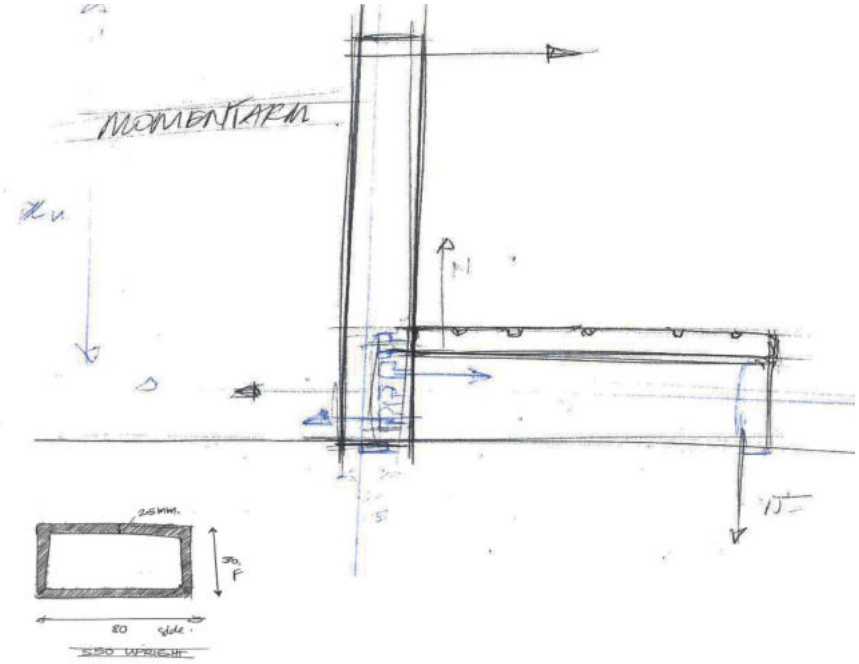




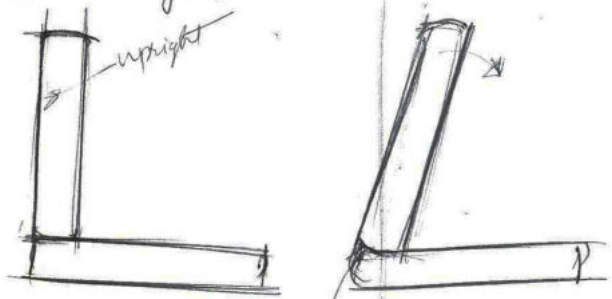
(Modular Shelfs, Epos, Kicker)

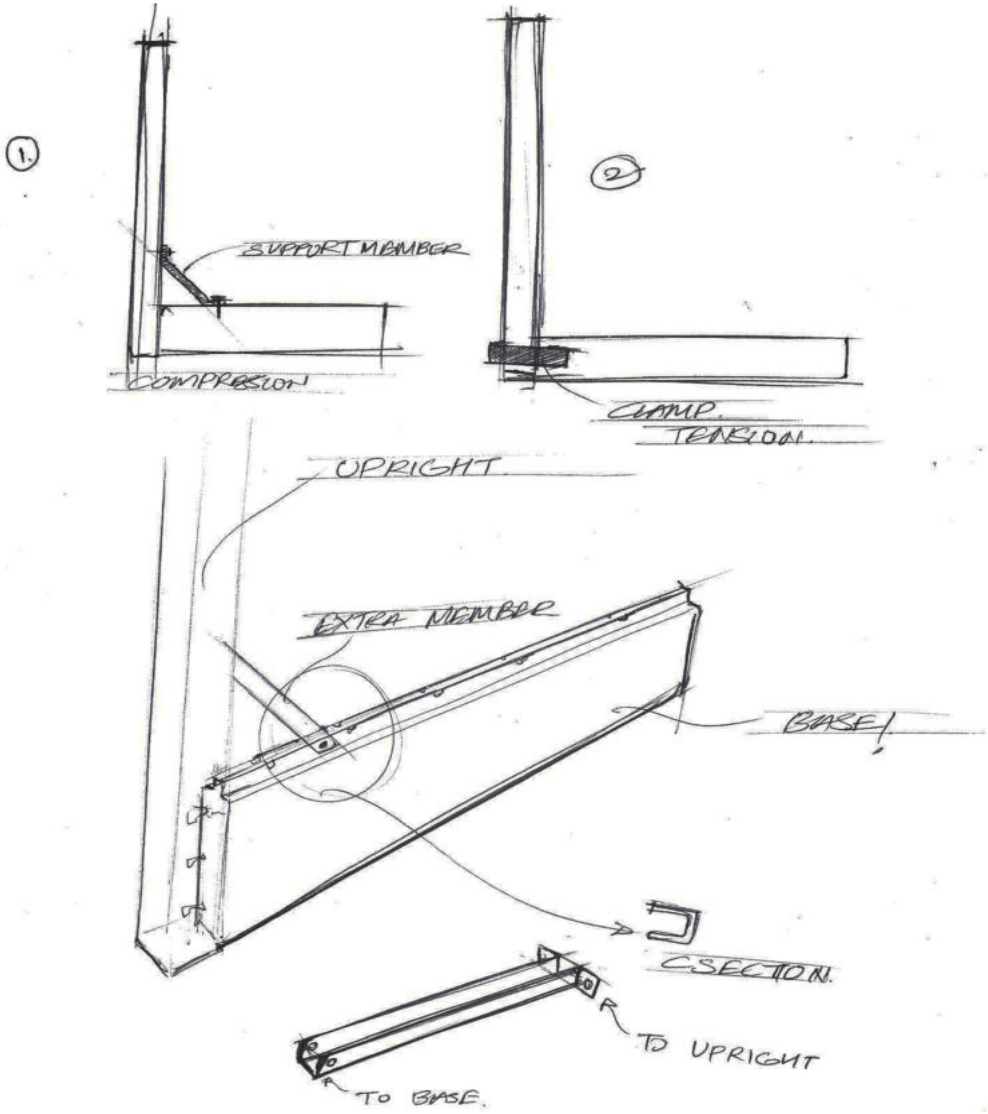


KIT	Kit#[EM][ZZ][NP][BBB][HHH][LL][PPP]
it: [BBB]	016 - 024 - 008
ght: [HHH]	148 - 172 - 192 - 216 - 236 - 260 - 280
nght: [LL]	40 - 50 - 60 - 70 - 80
ch: [PPP]	045 - 065 - 100 - 120 - 133
fs: [NP]	1 - 2 - 3 - 4 - 5 - 6 - 7 - 8
EM]	Y - N
[ZZ]	Y - N

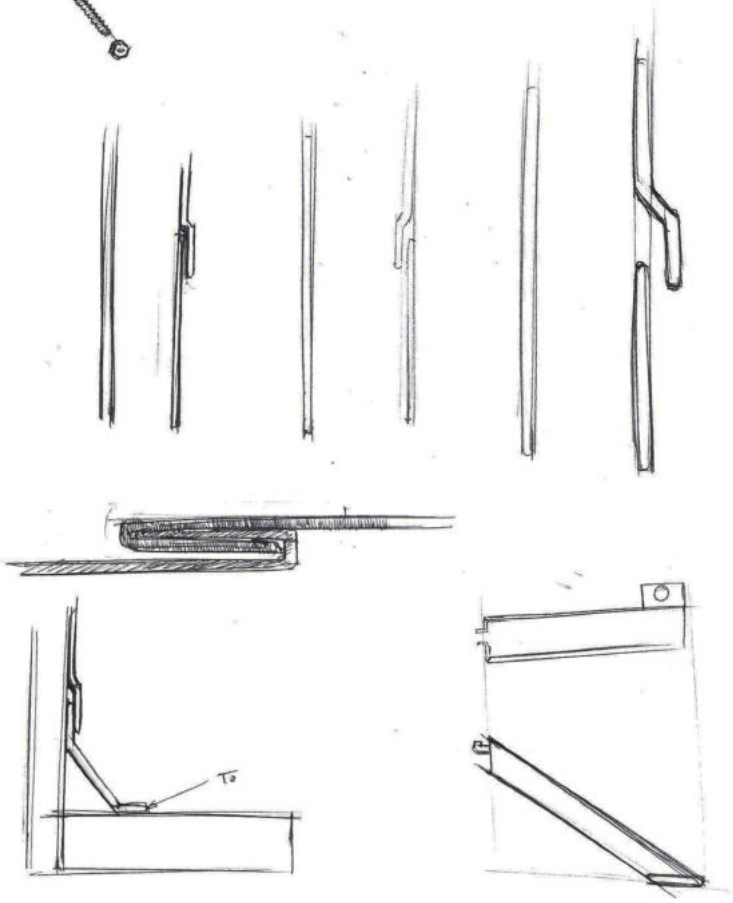


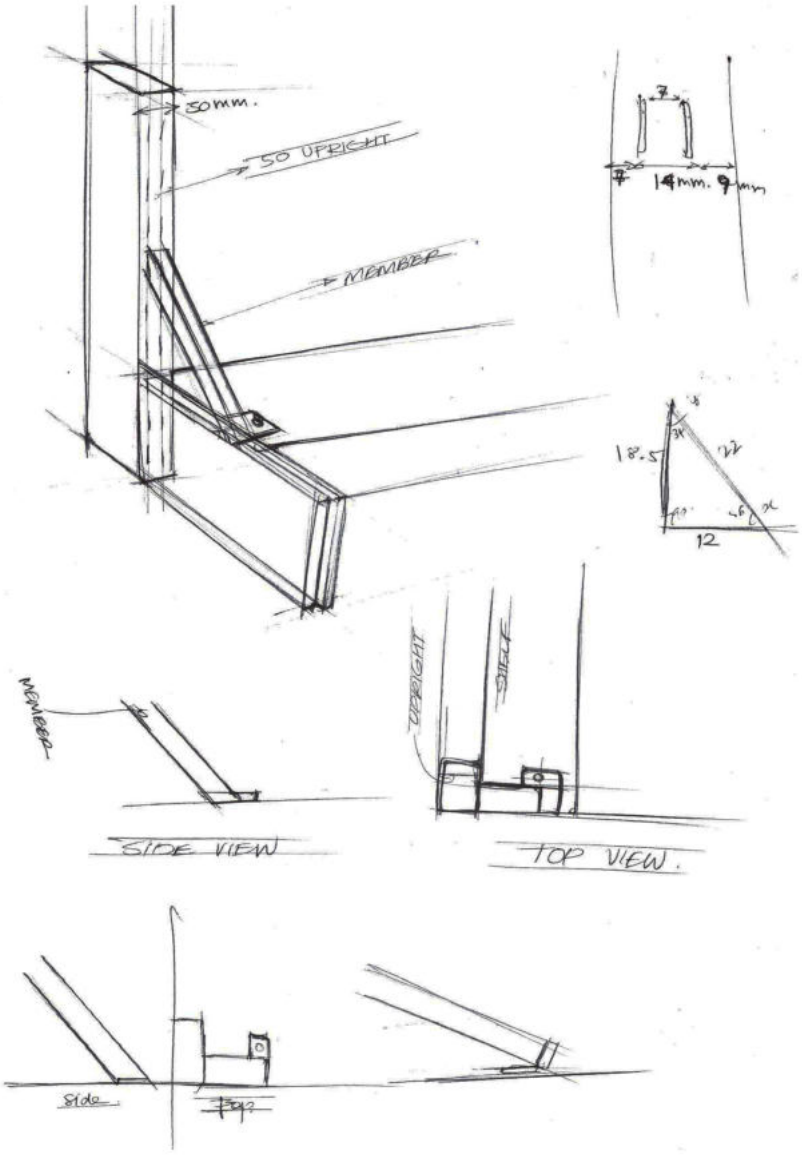
→ Earlier design.

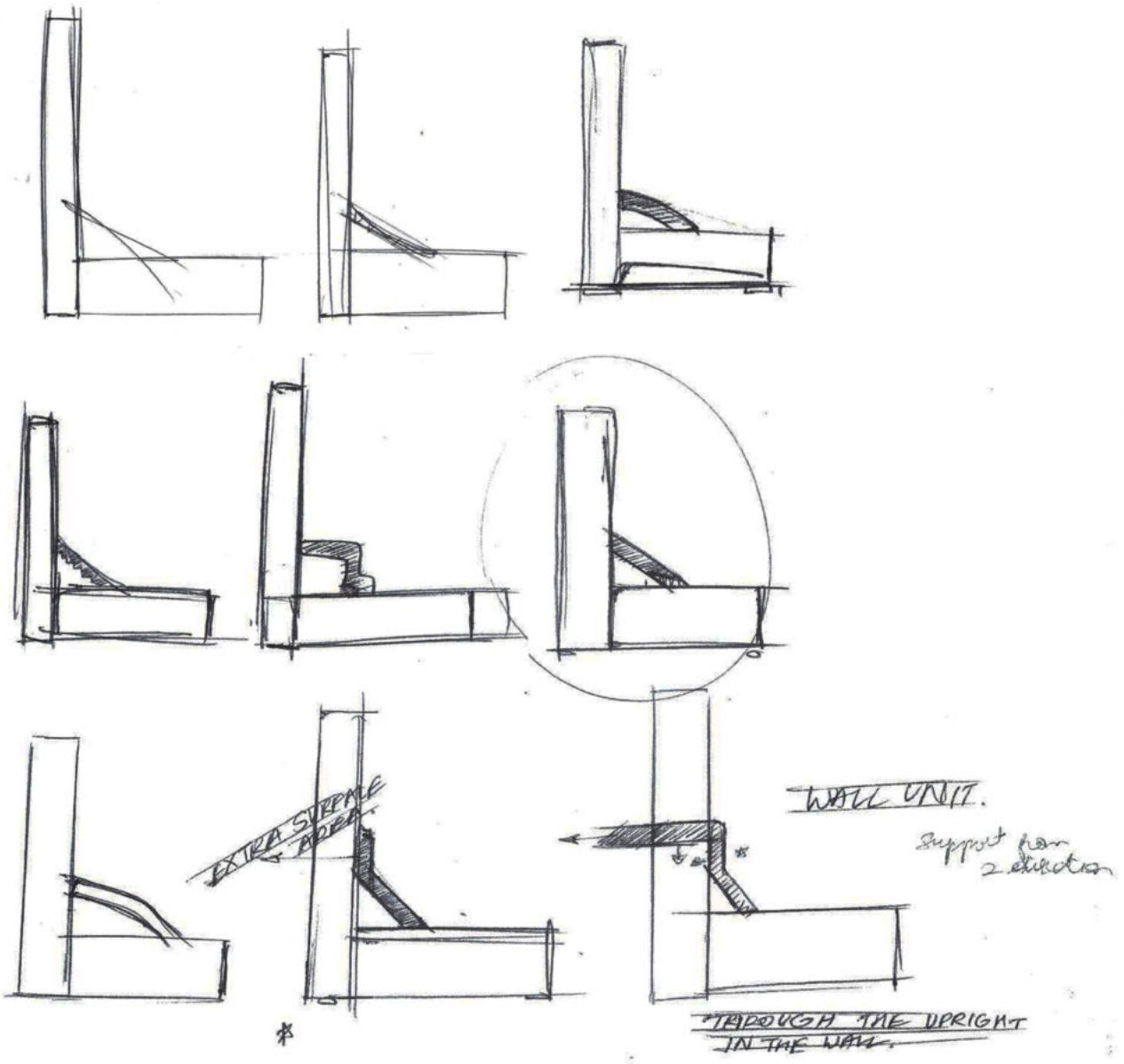


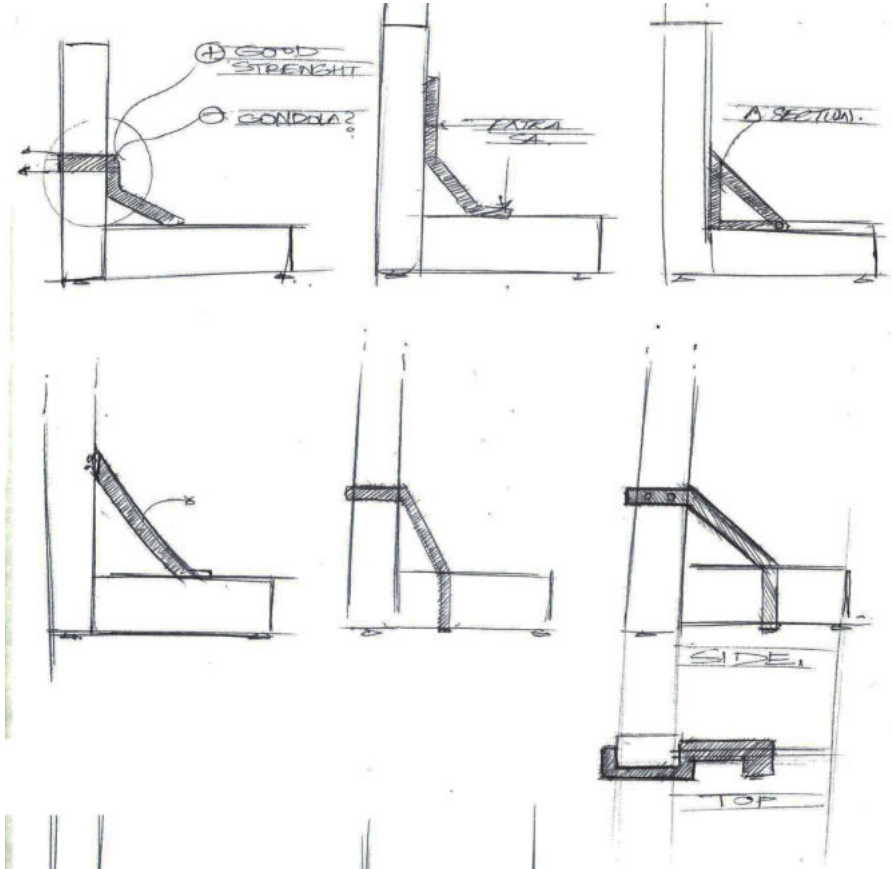


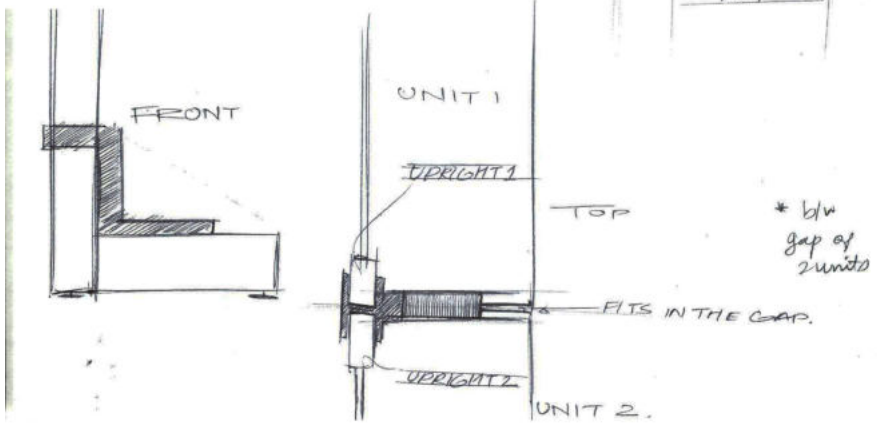

SUPPORT MEMBER
B

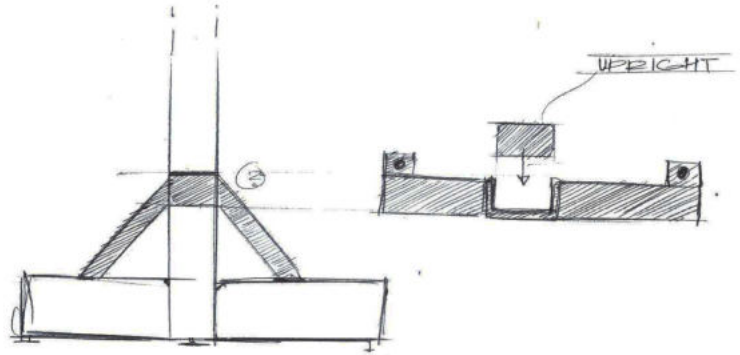

To

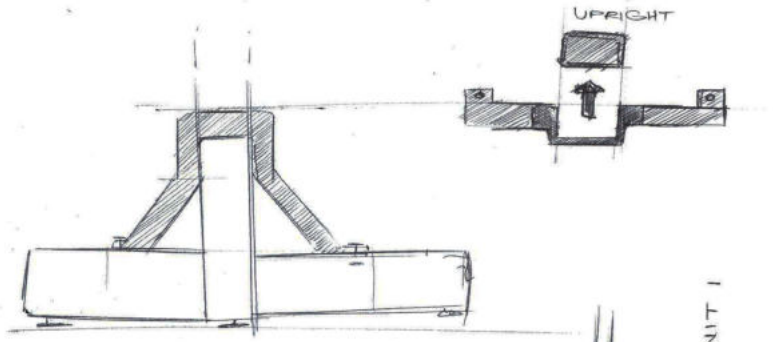

50mm.
50 UPRIGHT
MEMBER
14mm.
9mm
18.5
12
MEMBER
SIDE VIEW
UPRIGHT
SHELF
TOP VIEW.
Side
Top

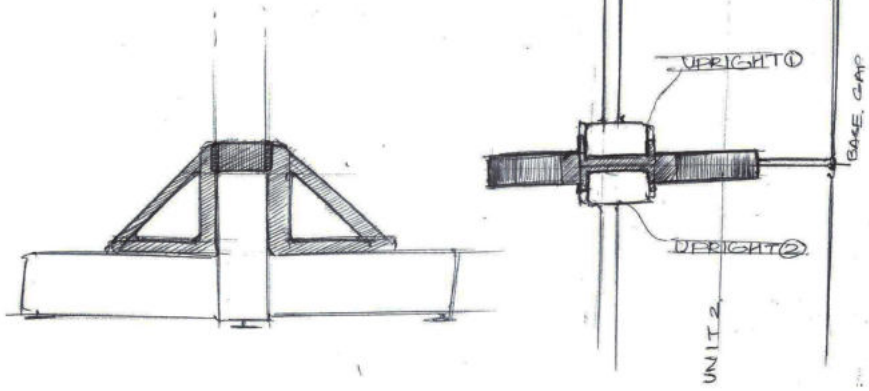

EXTRA SURFACE AREA
WALL UNIT.
Support from structure
*THROUGH THE UPRIGHT IN THE WALL.


GOOD STRENGHT
CONDOLA?
EXTRA SA.
SECTION.
SIDE.
TOP


FRONT
UNIT 1
UPRIGHT 1
TOP
* b/w gap of 2 units
FITS IN THE GAP.
UPRIGHT 2
UNIT 2.


UPRIGHT


UPRIGHT


UNIT 1
SHELVES
UPRIGHT ①
BASE. CAP
UPRIGHT ②
UNIT 2.

CAEM
ShelvingEngineering

L40

CAEM
ShelvingEngineering

L40

CAEM
ShelvingEngineering

140

6.1 Discussion and Feedback

Pro's

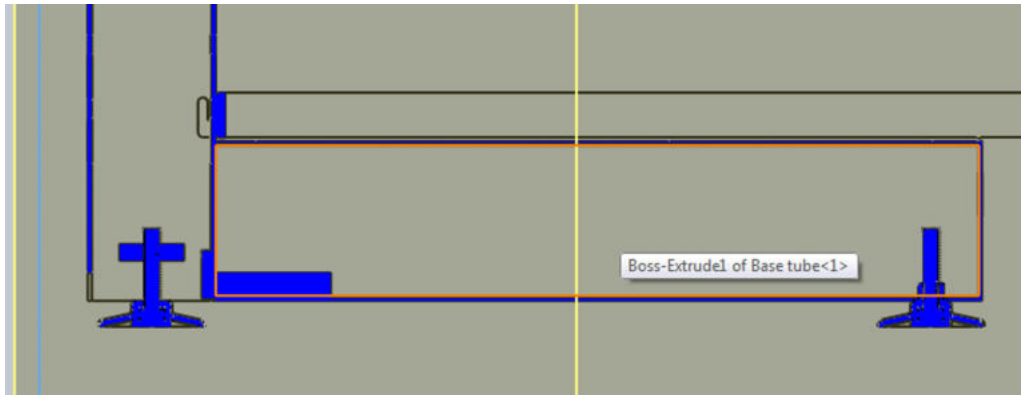
- The support member will be cheaper to manufacture
- The system with support member idea is new and is not used in any systems worldwide
- Support member can be customized for various shelving system
- Support member will cater the additional load and horizontal deflection

Cons

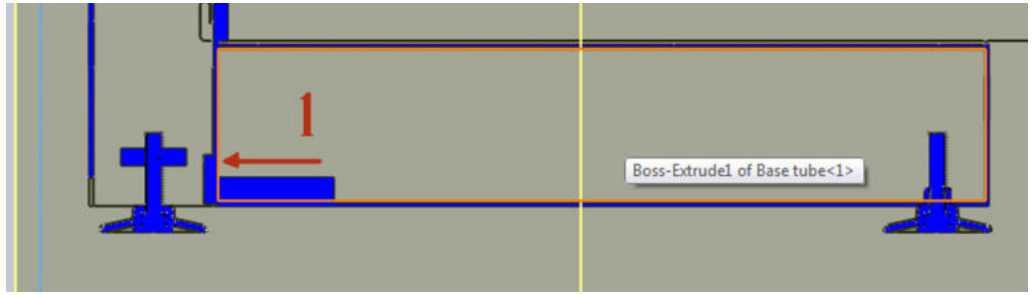
- Extra member will add transportation cost
- Support member will add storage and cost
- LH and RH member will add manufacturing and tool cost
- Support member will add restriction on the height of first shelf
- Aesthetic will be a concern

Conclusion

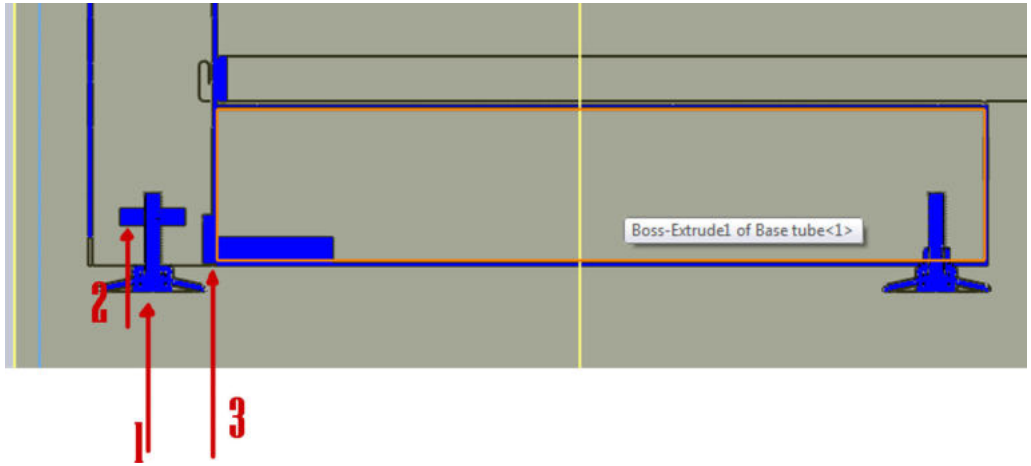
Instead of external component or entity which is visible an alternative concept has to be developed which will support the required load,preferably without changing the exterior of system.



It was decided the existing I40 system can be used to further improve design which would sustain required weight of 120 kgs

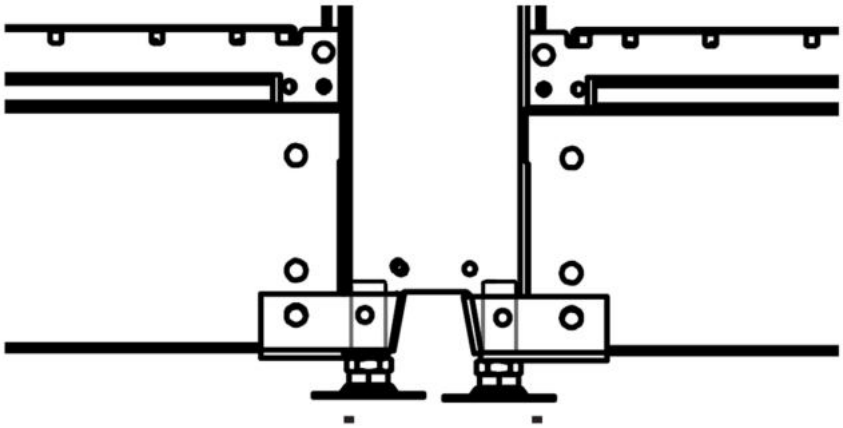


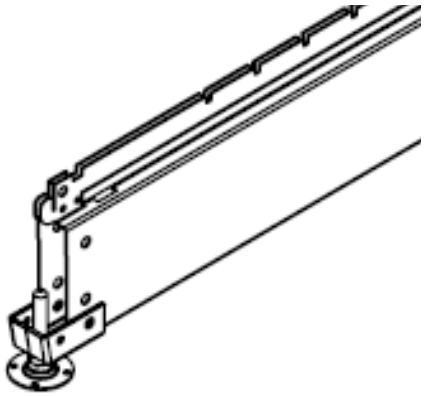
Horizontal component of forces working on the support member



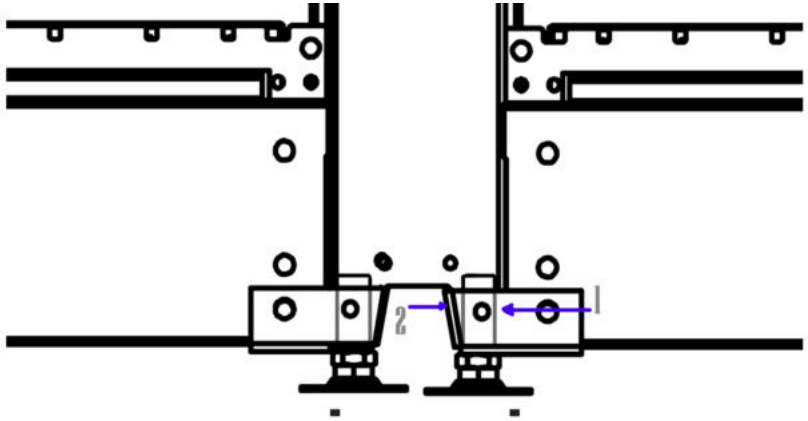
Vertical component of forces working on the system

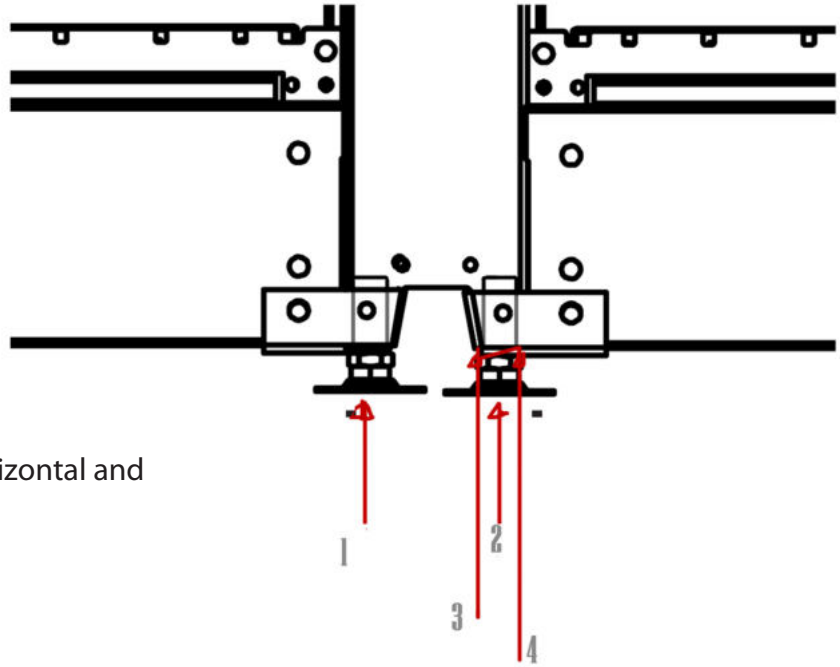
7. Ideation Concept B



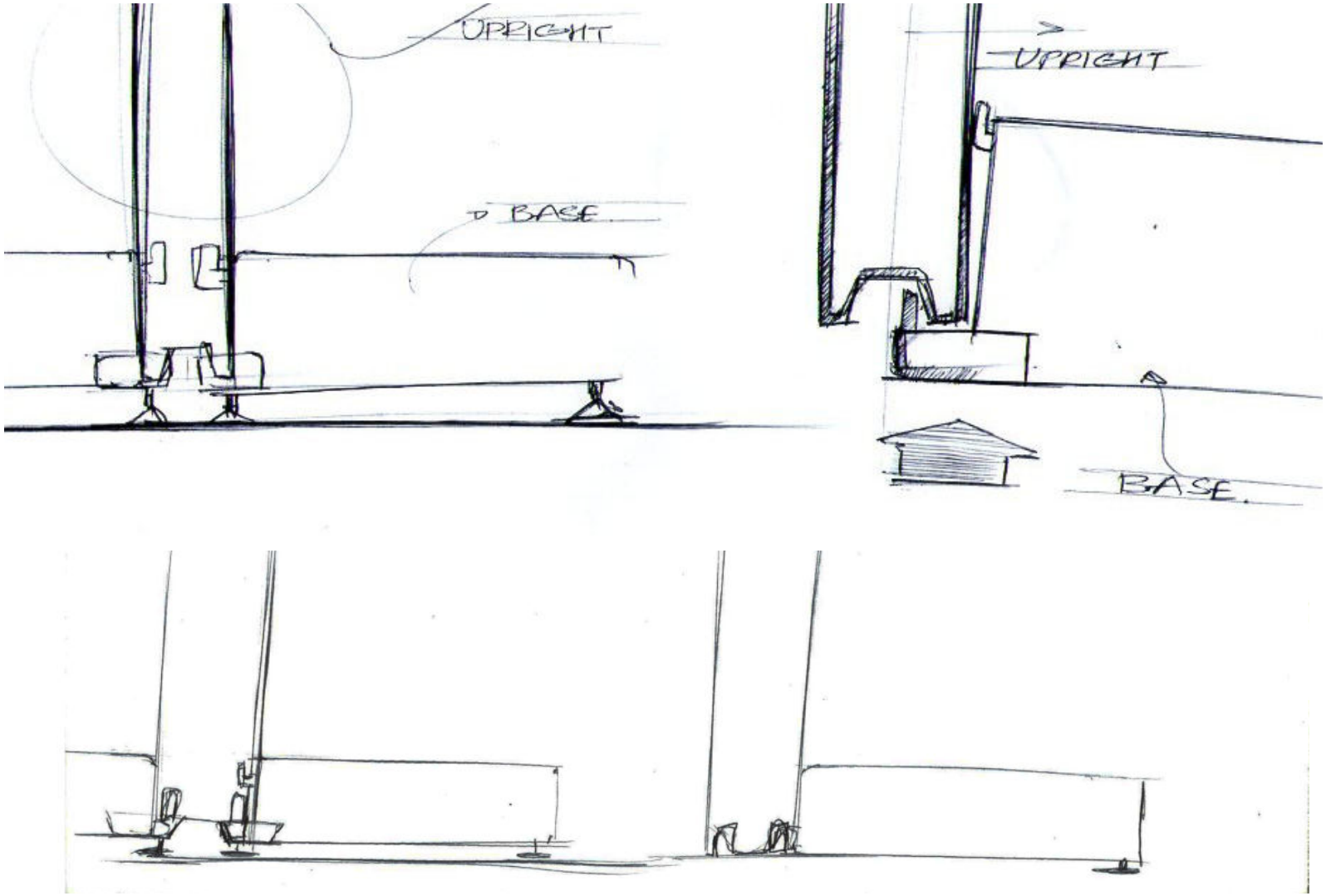


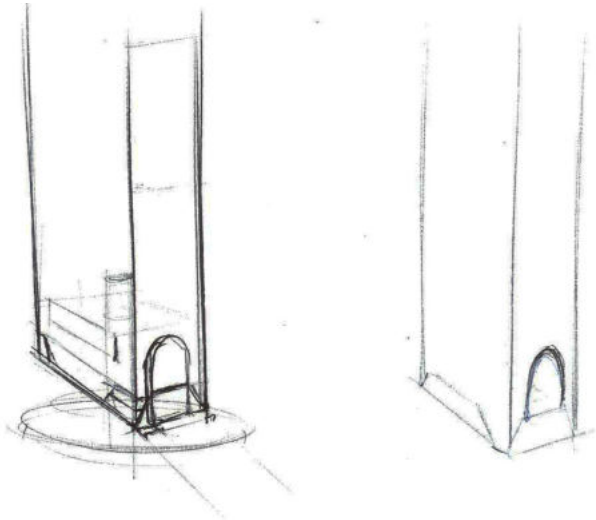
Study of S50 base system

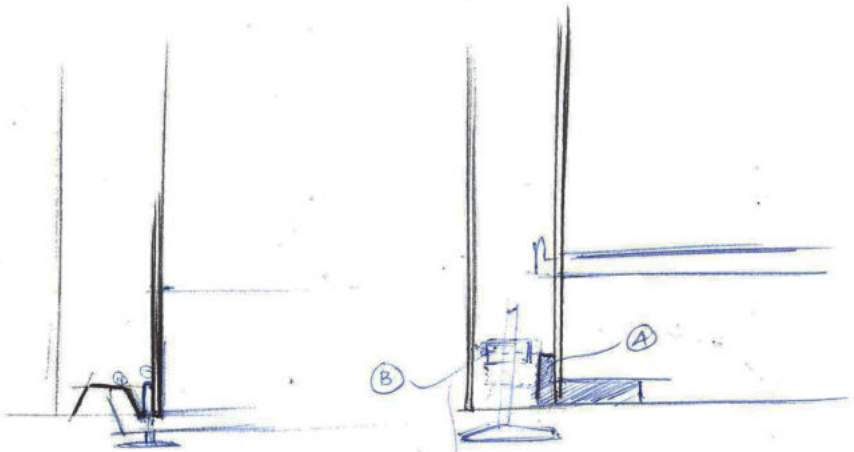




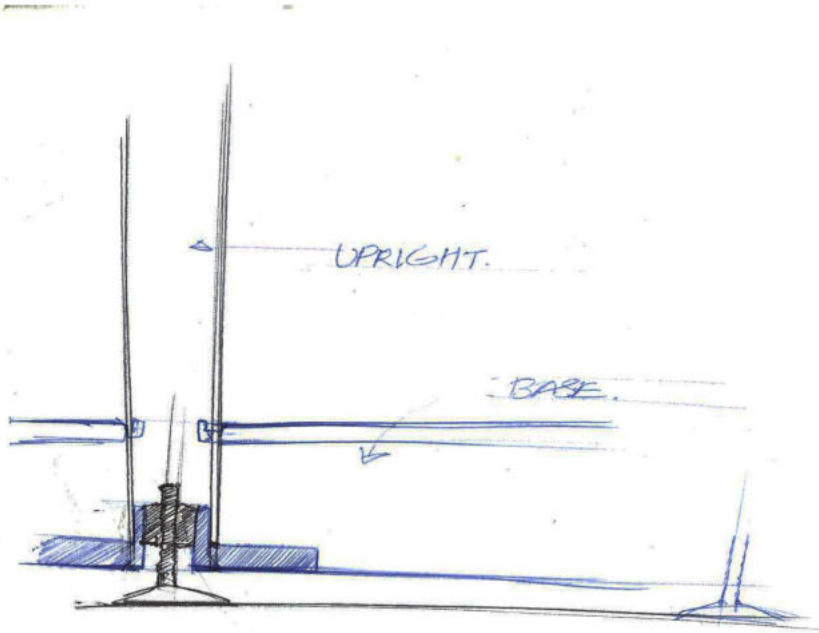
Study of S50 base system - Horizontal and vertical forces on the system


UPRIGHT
BASE
UPRIGHT
BASE

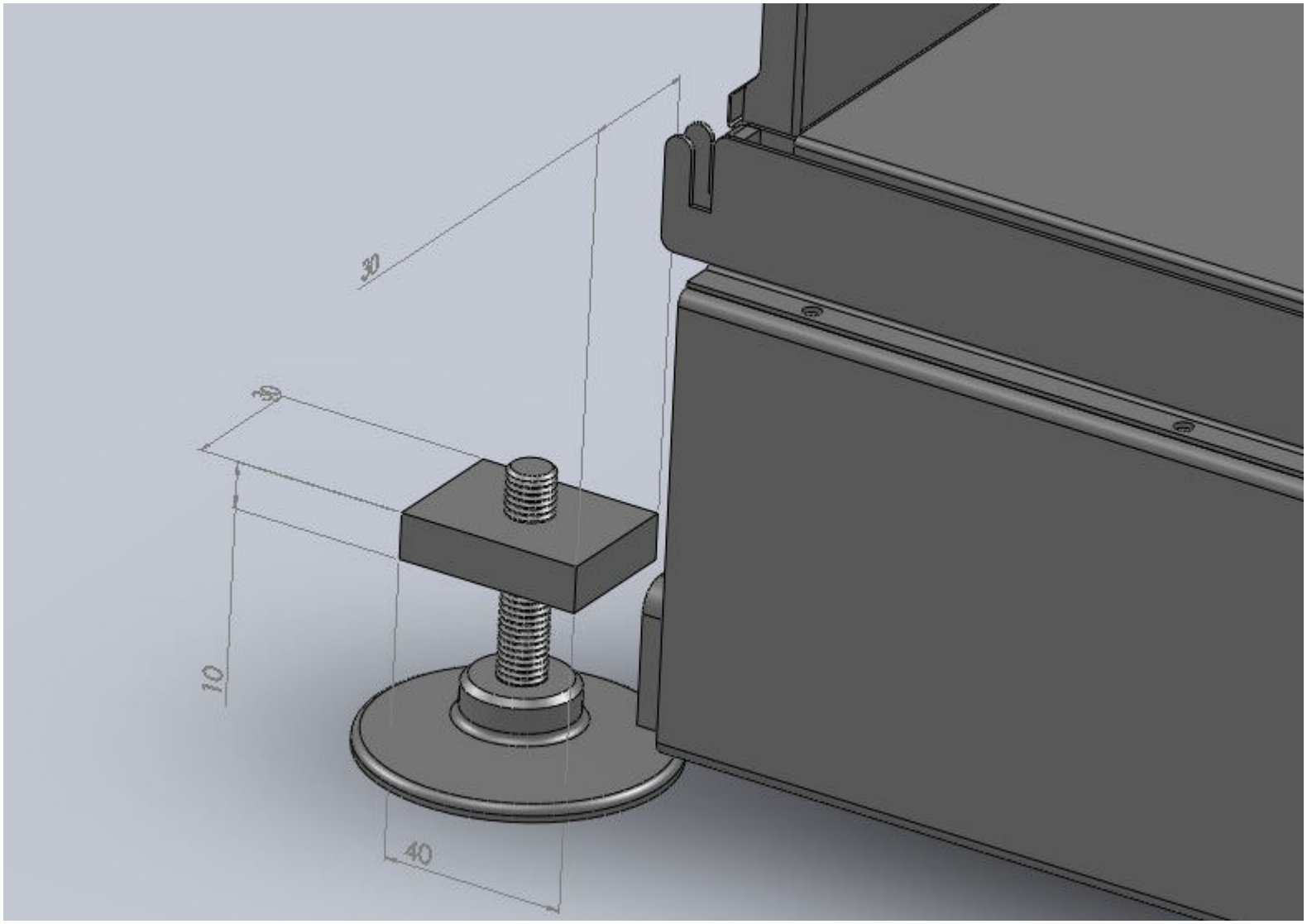




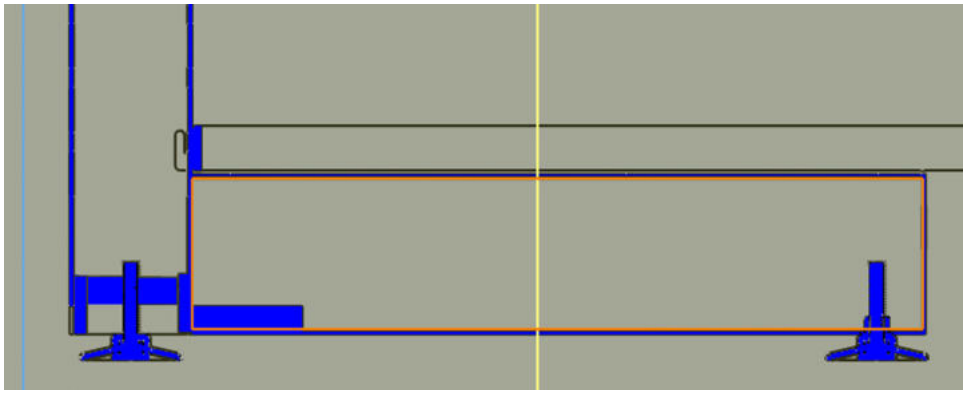
INCREASE THE DIMENSION OF LEVELER SUPPORT MEMBER (B) TO TOUCH THE (A) FOR EXTRA SUPPORT AND LOAD DISTRIBUTION.



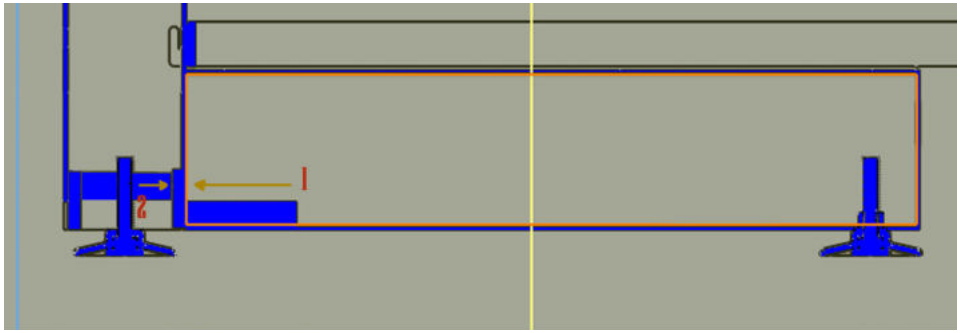
→ WELDED MEMBER. IN UPRIGHT FOR LEVELER!



Leveller plate dimension in former case.Here there is gap between leveller plate and support



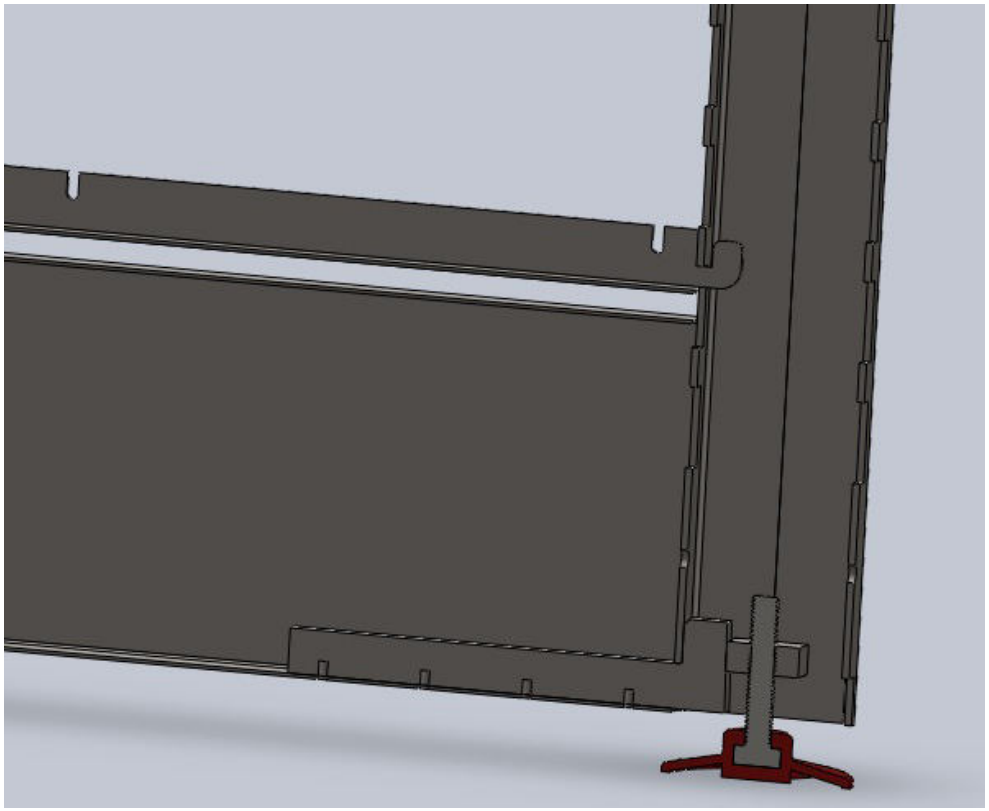
It was proposed to increase the dimension of the leveller plate so the it mate with the support member.This will restrict the bending and provide extra support and distribute horizontal forces.

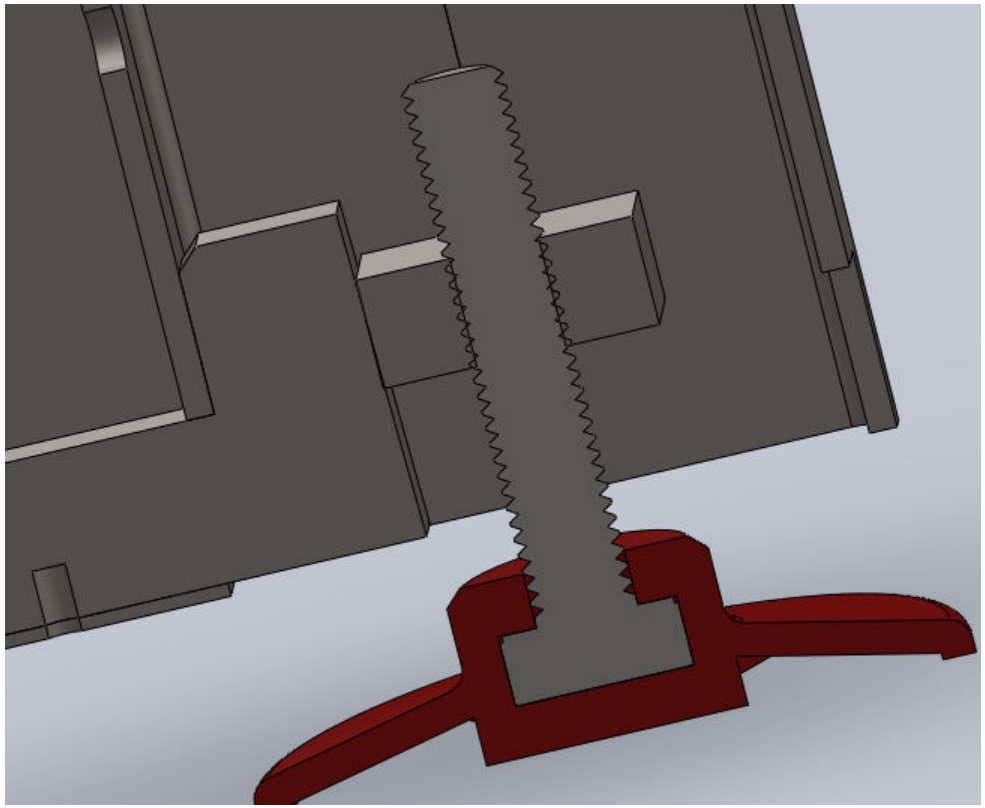


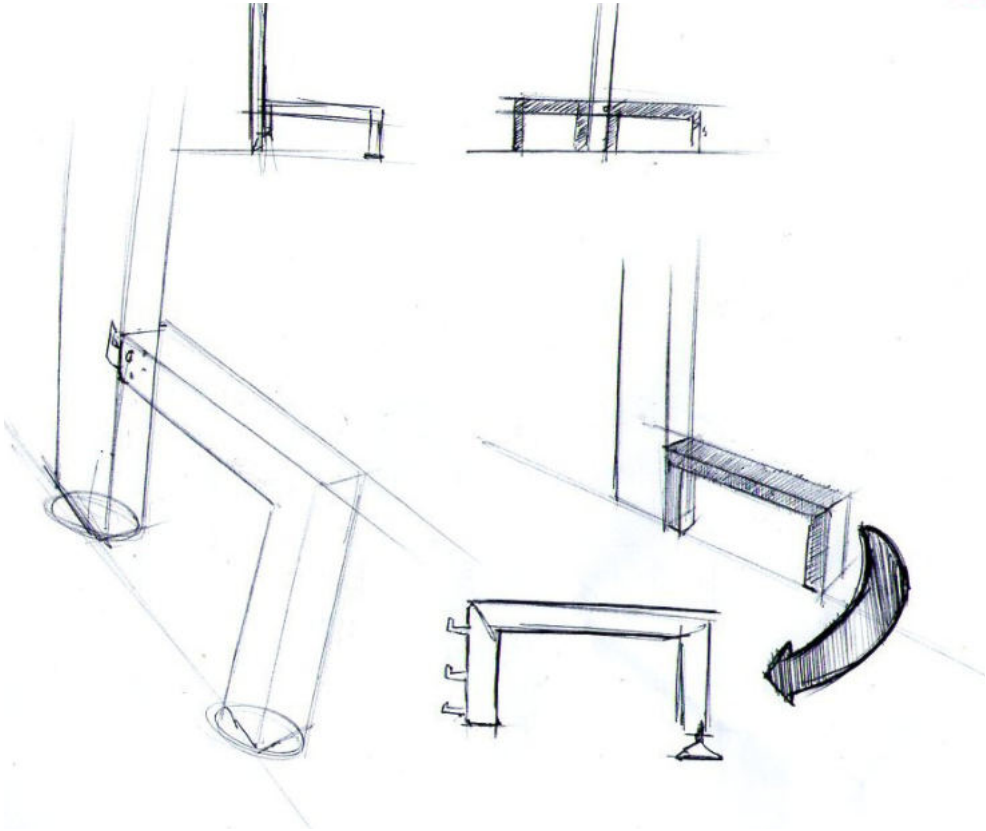
Horizontal force resolution when leveller plate dimensions are increased.

Vertical force resolution when leveller plate dimensions are increased.

Changes were made in CAD model





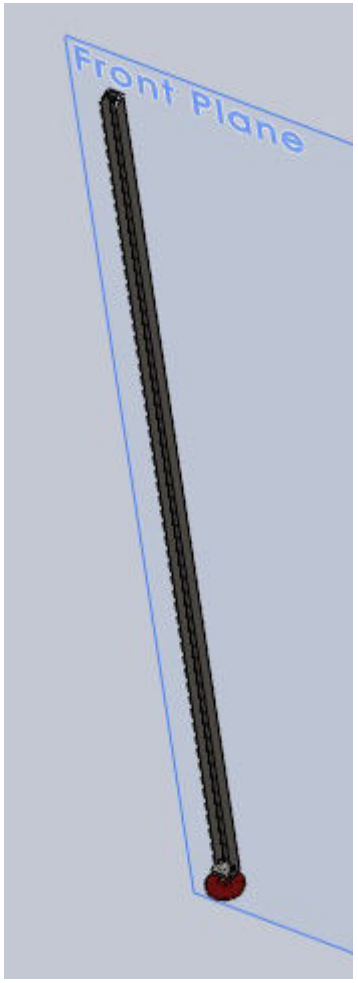


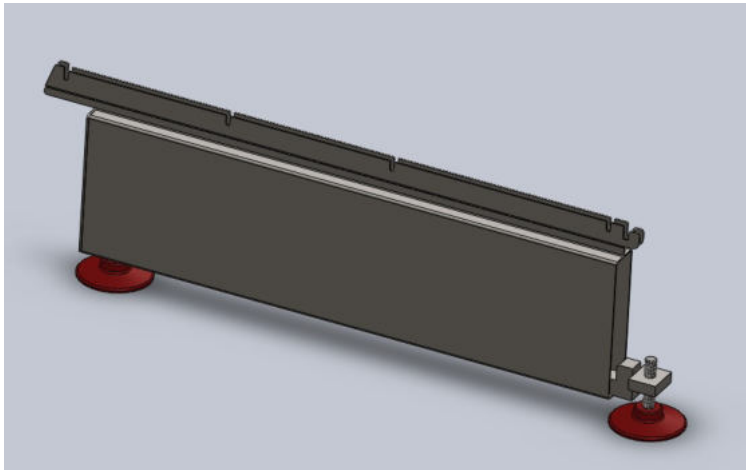
Conclusion and Inferences

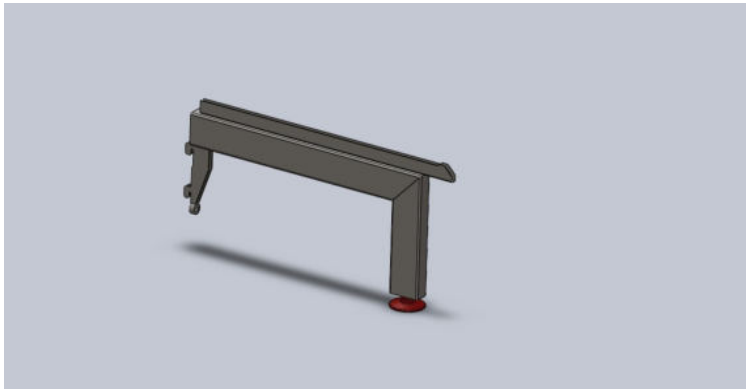
Ideation concept B proposal after discussion with the team was considered as feasible.Concept of increasing dimension of leveller plate was logical and was viable in terms of cost of manufacturing and time.
The above concept was considered as practicle.It had simple configuration,easy to manufacture and cost effective.
Therefore Concept B given a go to develop CAD model and Drawing for manufacturing.

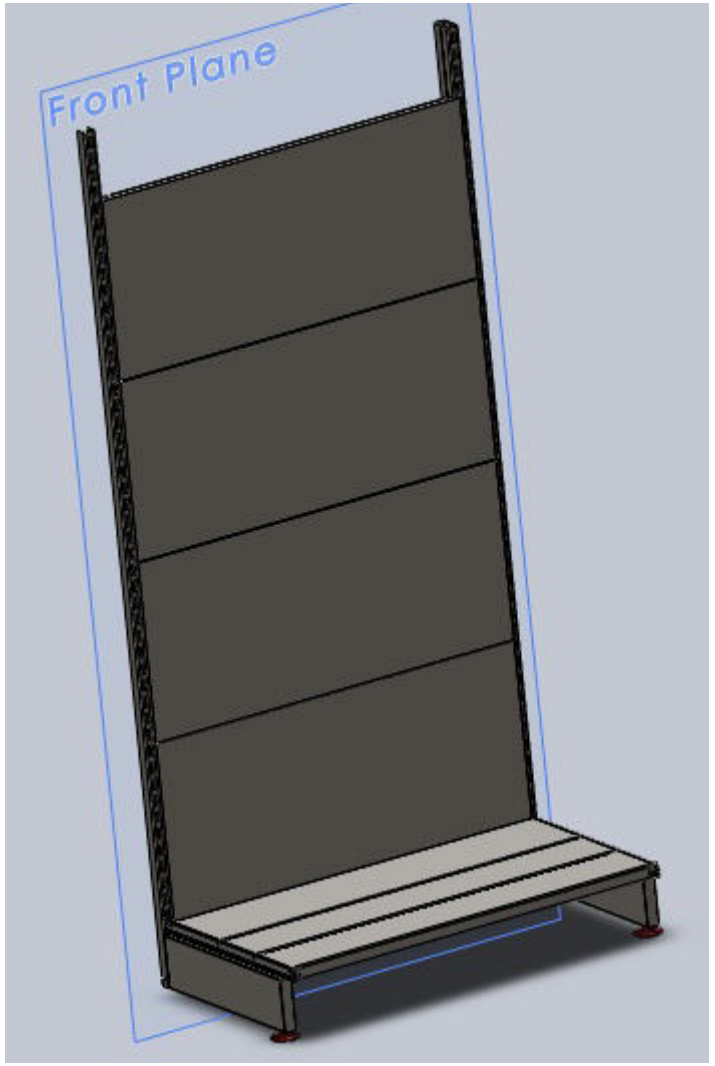
8. CAD Model

Solidworks Modelling

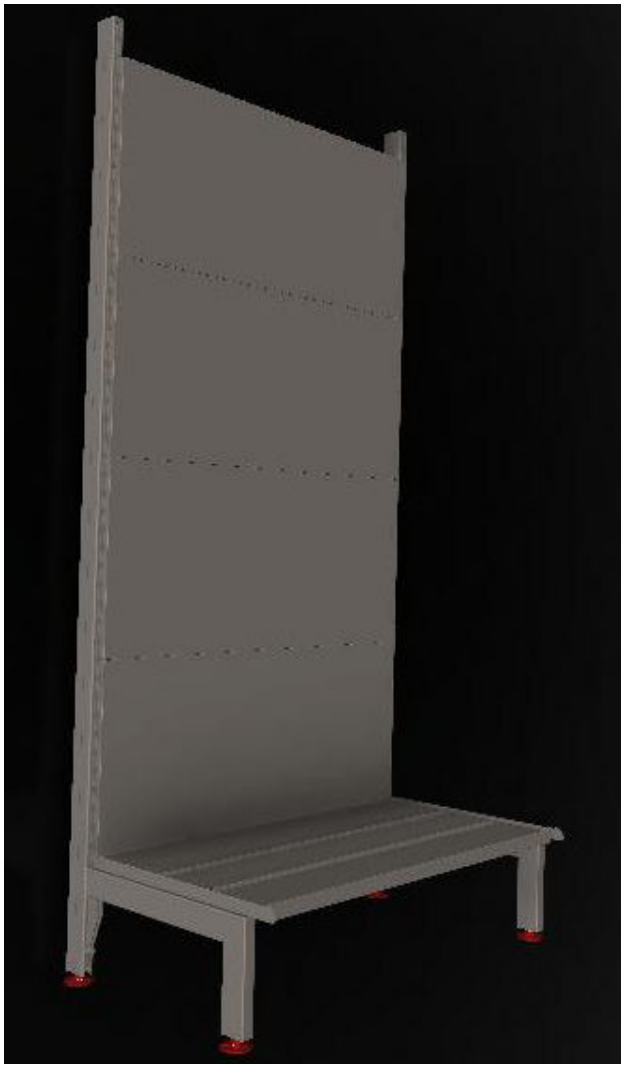


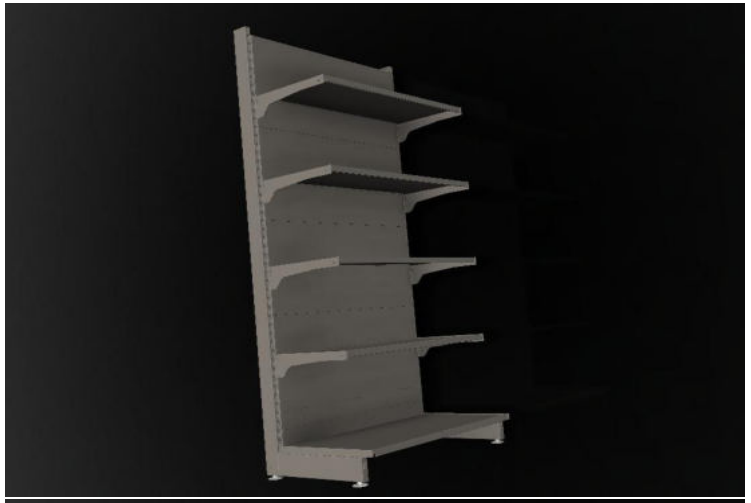


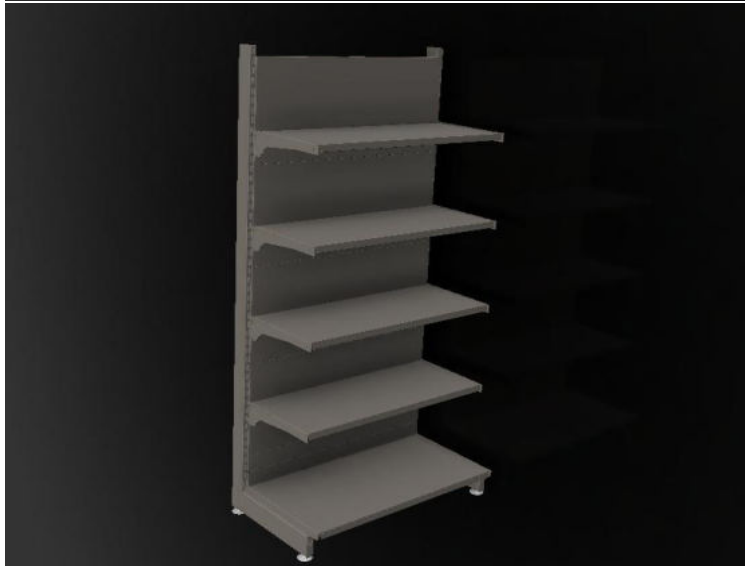




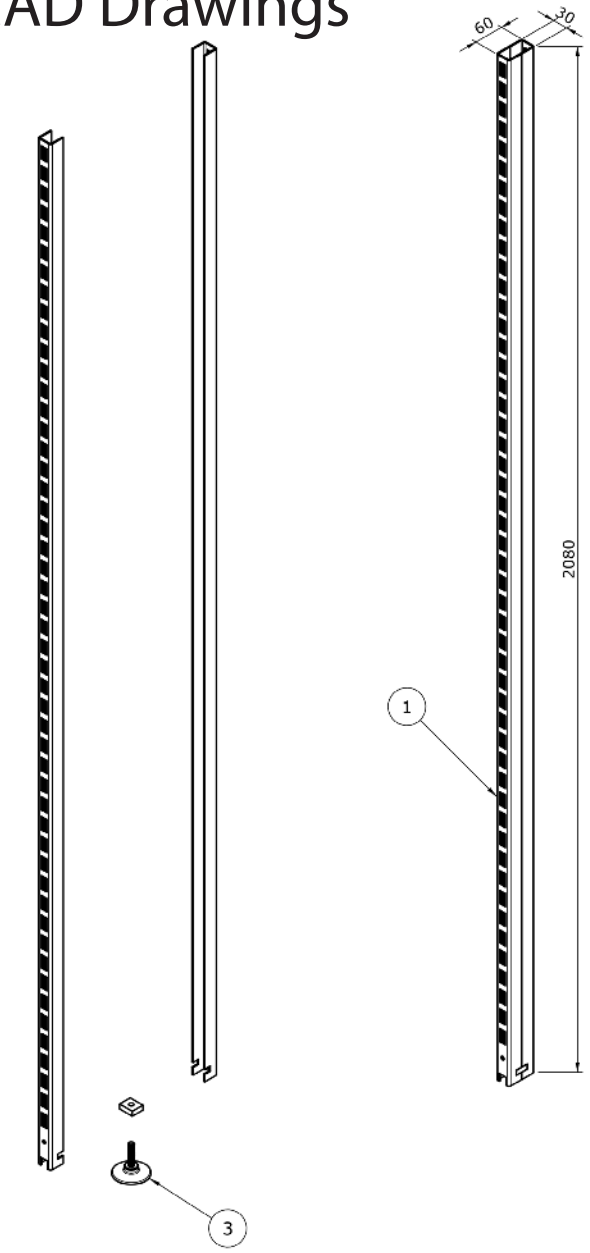
Autodesk Fusion Rendering







9. CAD Drawings



GENERAL NOTES :-

1. UPRIGHT CHANNEL TO BE MADE FROM 2.5mm CRCA SHEET METAL.
2. FOOT HOLDER PLATE TO BE MADE FROM 10mm THK MS PLATE/BAR.
3. FINISH : POWDER COATED AS PER REQUIRED COLOR.

ITEM No	DESCRIPTION	DRAWING No	QUANTITY	REMARKS
2	FOOT M10 (EXISTING FROM TN9)	STD	1 No	
1	UPRIGHT WELDING ASSLY	CI-PRT-00002	1 No	

Scale 1:8	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:- UPRIGHT GA

Dwg No. CI-PRT-00001

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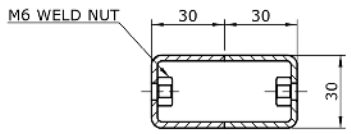
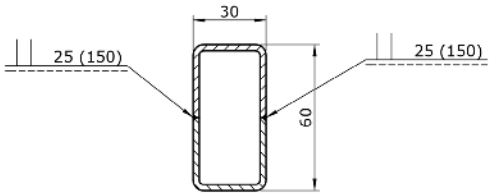
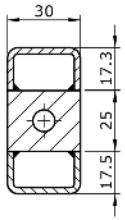


SECTION Z-Z
SCALE 1 : 2



SECTION Y-Y
SCALE 1 : 2



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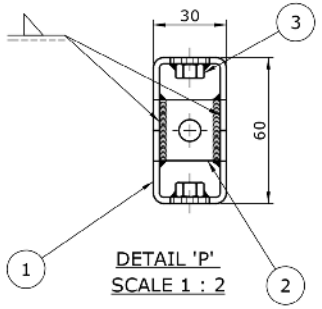
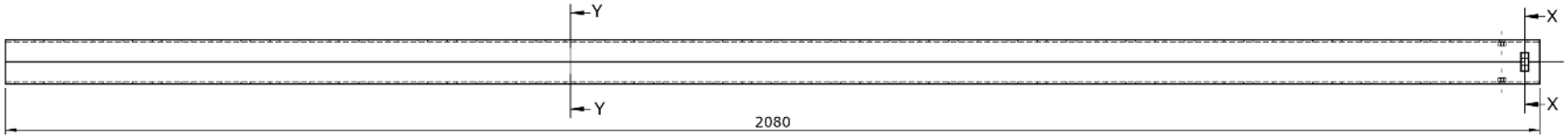
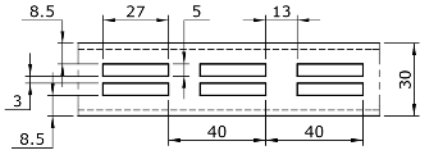
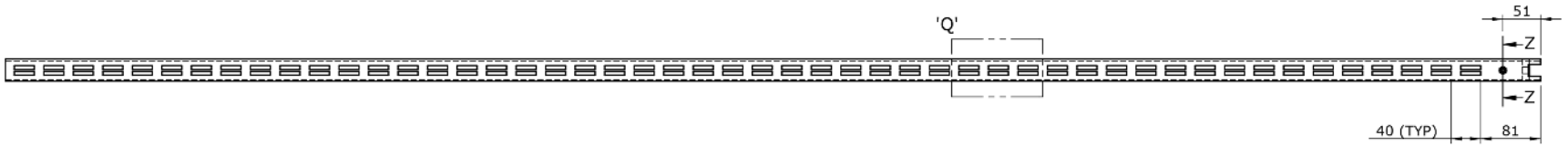


DETAIL 'P'
SCALE 1 : 2





DETAIL 'Q'
SCALE 1 : 2



ITEM No	DESCRIPTION	DRAWING No	QUANTITY	REMARKS
3	M6 HEXAGONAL NUT	STD	2 Nos	
2	FOOT HOLDER PLATE	CI-PRT-00004	1 No	
1	UPRIGHT CHANNEL BENDING	CI-PRT-00003	2 Nos	

GENERAL NOTES :-

1. UPRIGHT CHANNEL TO BE MADE FROM 2.5mm CRCA SHEET METAL.
2. FOOT HOLDER PLATE TO BE MADE FROM 10mm THK MS PLATE/BAR.
3. FINISH : POWDER COATED AS PER REQUIRED COLOUR.
4. ALL EXTERNAL /VISIBLE WELDS TO BE DRESSED OFF SMOOTHLY.

Scale 1:6	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:- UPRIGHT WELDING ASSLY

Dwg No. CI-PRT-00002

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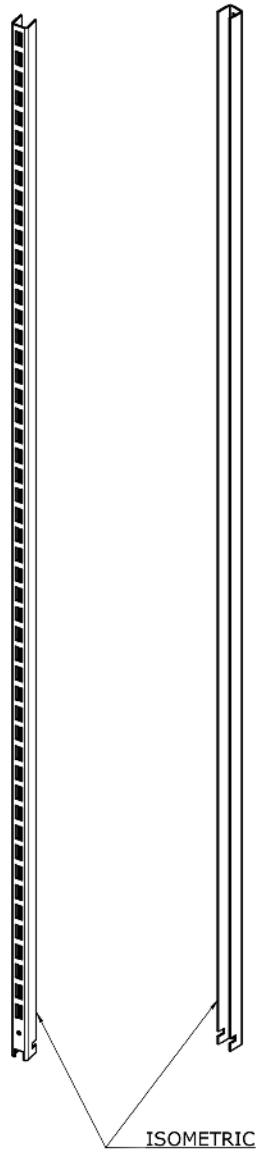

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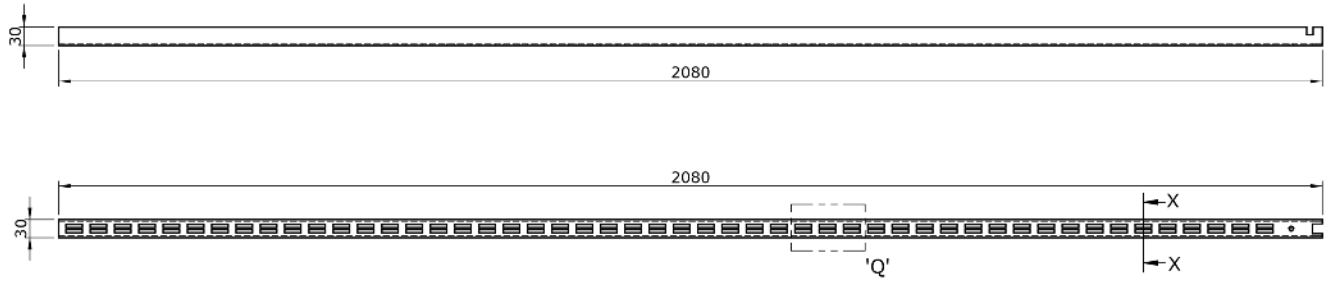
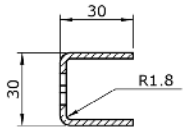
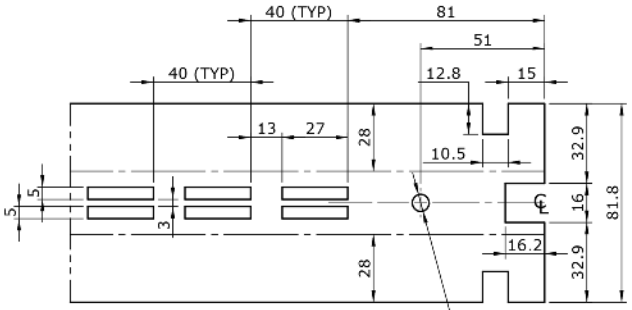
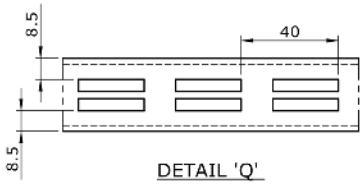




SECTION X-X
SCALE 1 : 2

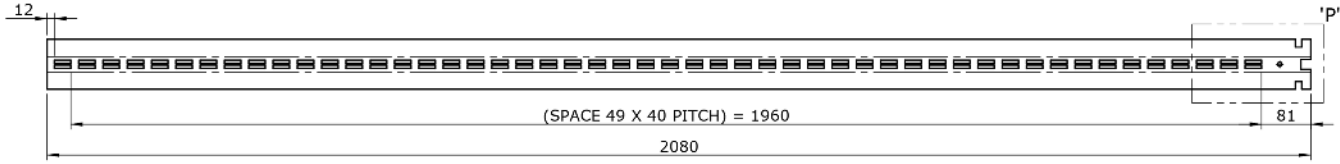


DETAIL 'P'
SCALE 1 : 2



DETAIL 'Q'
SCALE 1 : 2

Ø7
FOR M6 HEX NUT
WELDING LOCATION



DEVELOPED SHAPE
(FOR REFERENCE ONLY)

GENERAL NOTES :-

1. MATERIAL : 2.5mm CRCA SHEET METAL.
2. FINISH : POWDER COATED AS PER REQUIRED COLOUR.
3. WEIGHT : 3.00 Kg. APPROX.

Scale 1:8	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:- UPRIGHT CHANNEL BENDING

Dwg No. CI-PRT-00003

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Plot No. C-16/17, M.I.D.C. Hingna Road, Nagpur- 440028

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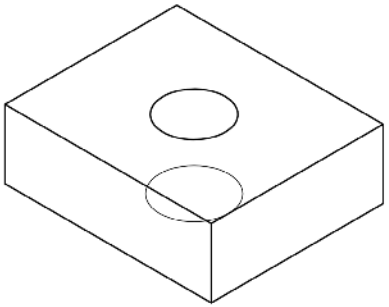

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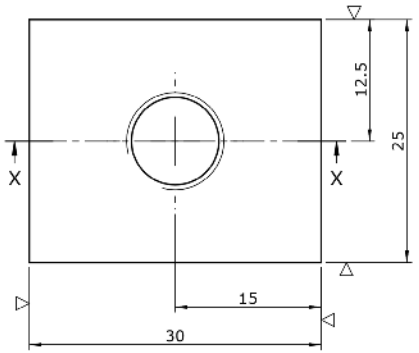

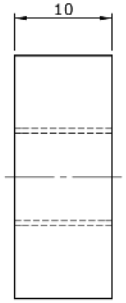

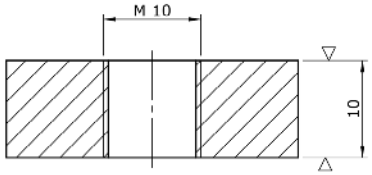

SECTION X-X
SCALE 2 : 1

GENERAL NOTES :-

1. MATERIAL : 10mm MILD STEEL PLATE / BAR.
2. FINISH : REFER ASSEMBLY DRAWING No. CI-PRT-00002.
3. WEIGHT : 0.053 Kg. APPROX.

Scale 2:1	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:- FOOT HOLDER PLATE

Dwg No. CI-PRT-00004

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Plot No. C-16/17, M.I.D.C. Hingna Road, Nagpur- 440028

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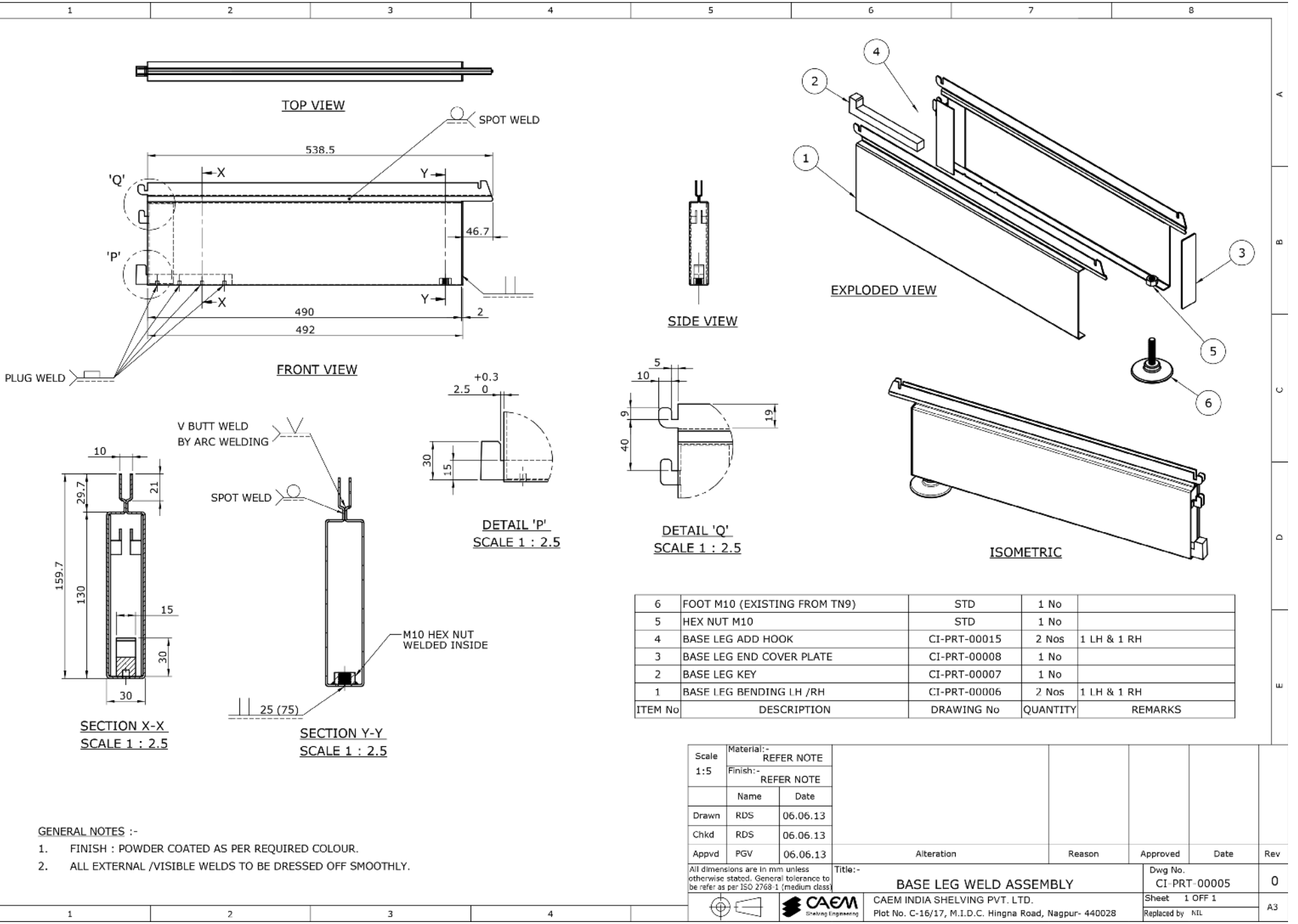

ITEM No	DESCRIPTION	DRAWING No	QUANTITY	REMARKS
6	FOOT M10 (EXISTING FROM TN9)	STD	1 No	
5	HEX NUT M10	STD	1 No	
4	BASE LEG ADD HOOK	CI-PRT-00015	2 Nos	1 LH & 1 RH
3	BASE LEG END COVER PLATE	CI-PRT-00008	1 No	
2	BASE LEG KEY	CI-PRT-00007	1 No	
1	BASE LEG BENDING LH /RH	CI-PRT-00006	2 Nos	1 LH & 1 RH

GENERAL NOTES :-

1. FINISH : POWDER COATED AS PER REQUIRED COLOUR.
2. ALL EXTERNAL /VISIBLE WELDS TO BE DRESSED OFF SMOOTHLY.

Scale 1:5	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 WELD ASSEMBLY

Dwg No. CI-PRT-00005 | Rev 0

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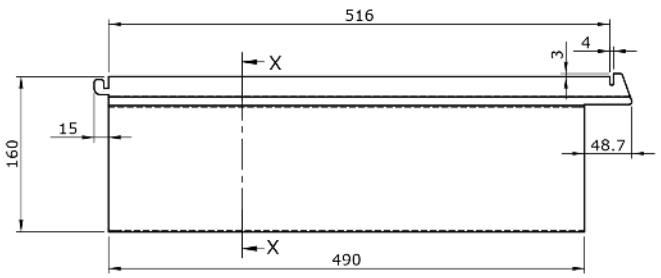
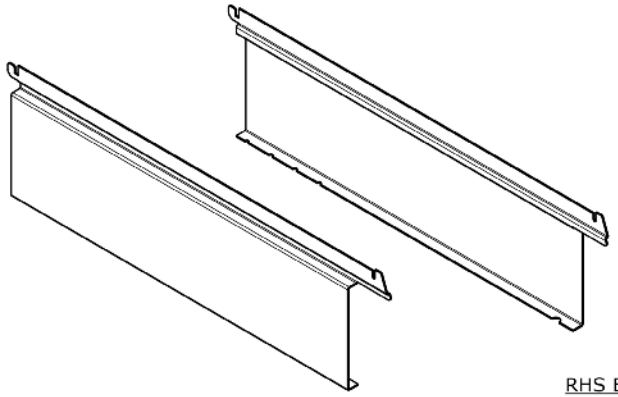


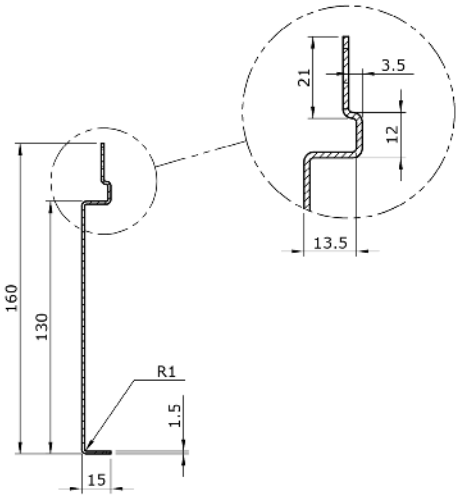
FRONT VIEW

SIDE VIEW

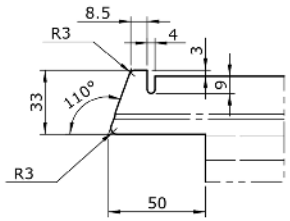


LHS BEND

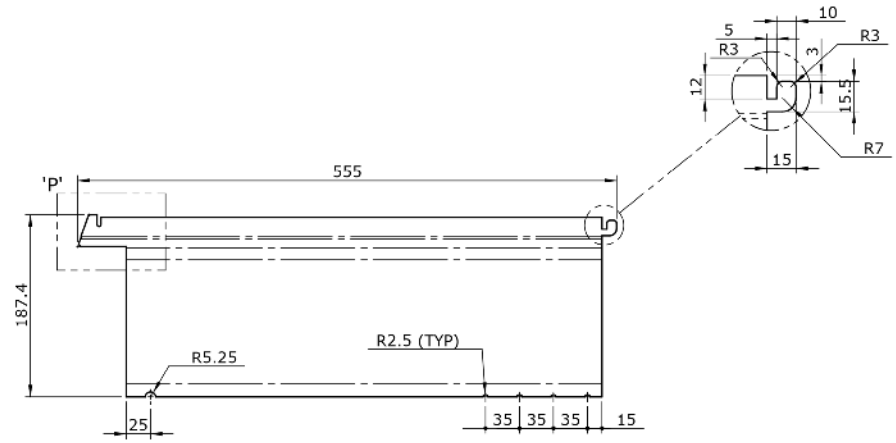
RHS BEND



SECTION X-X
SCALE 1 : 2.5



DETAIL 'P'
SCALE 1 : 2.5



DEVELOPED SHAPE
(FOR REFERENCE ONLY)

GENERAL NOTES :-

1. MATERIAL : 1.5mm CRCA SHEET METAL.
2. FINISH : REFER ASSEMBLY DRAWING No. CI-PRT-00005.
3. WEIGHT : 1.100 Kg. APPROX.
4. MAKE LH / RH PAIR.

Scale 1:5	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 BENDING LH/RH

Dwg No. CI-PRT-00006

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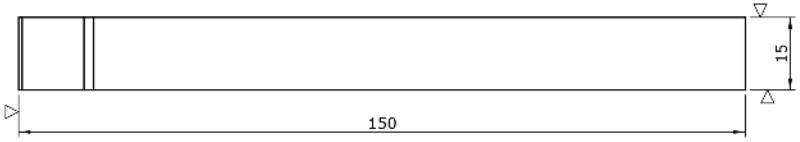
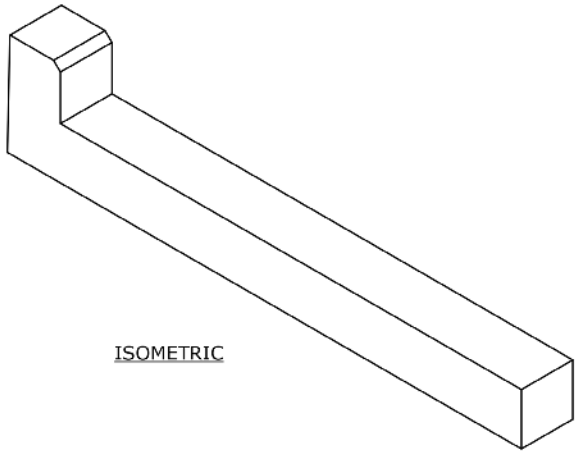


TOP VIEW



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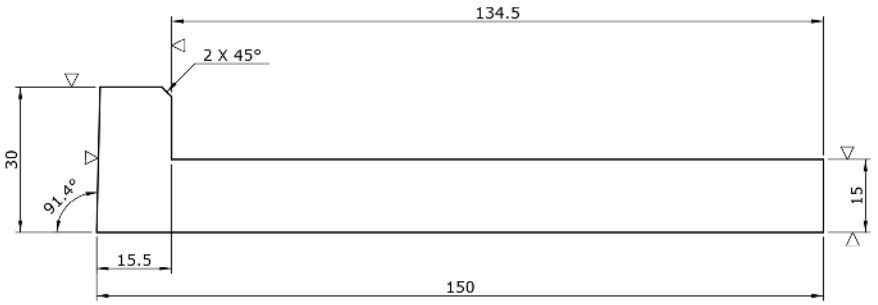
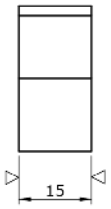


FRONT VIEW



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

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CAEM Shelving Engineering

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

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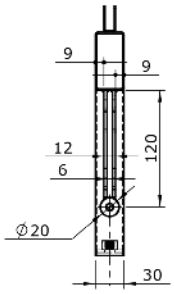

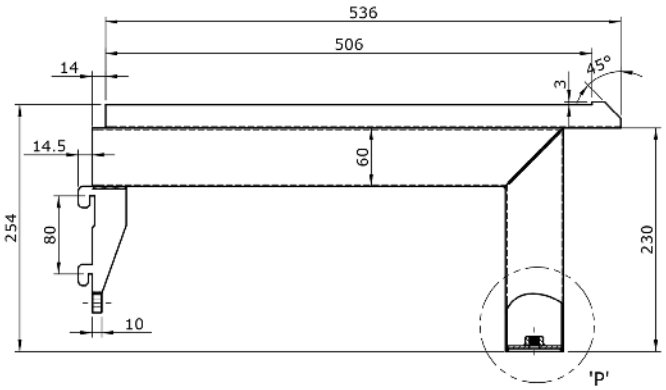

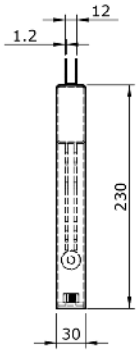

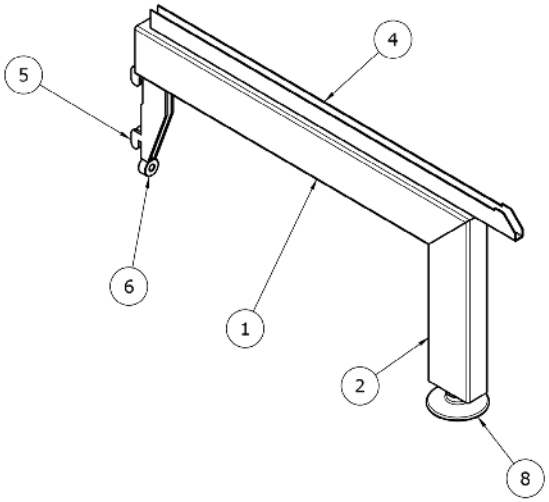

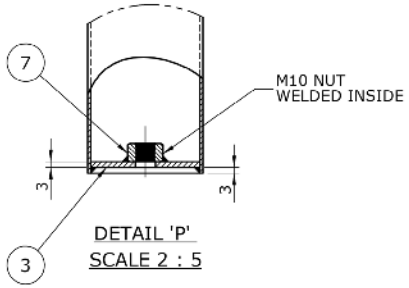

DETAIL 'P'
SCALE 2 : 5

ITEM No	DESCRIPTION	DRAWING No	QUANTITY	REMARKS
8	FOOT M10 (EXISTING FROM TN9)	STD	1 No	
7	HEX NUT M10	STD	1 No	
6	TUBELER BASE LEG HOOK PLATE BOSS	CI-PRT-00014	1 No	
5	TUBELER BASE LEG HOOK PLATE	CI-PRT-00013	2 Nos	
4	TUBELER BASE CHANNEL	CI-PRT-00012	1 No	
3	FOOT HOLDER PLATE	CI-PRT-00011	1 No	
2	TUBELER BASE VERTICAL TUBE	CI-PRT-00010	1 No	
1	TUBELER BASE HORIZONTAL TUBE	CI-PRT-00009	1 No	

GENERAL NOTES :-

1. FINISH : POWDER COATED AS PER REQUIRED COLOUR.
2. ALL EXTERNAL /VISIBLE WELDS TO BE DRESSED OFF SMOOTHLY.

Scale 1:5	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:- TUBELER BASE LEG WELD ASSLY

Dwg No. CI-PRT-00008 | 0

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

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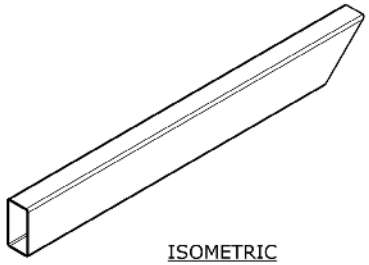
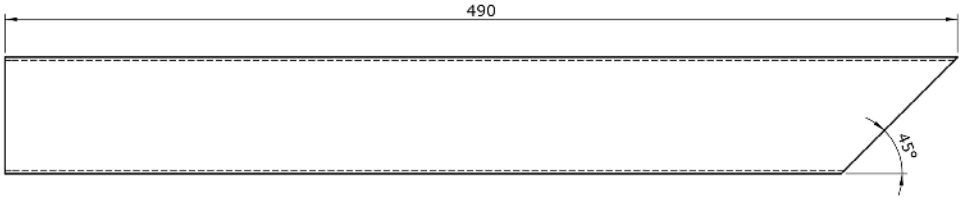
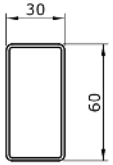
TOP VIEW



ISOMETRIC



FRONT VIEW



SIDE VIEW

GENERAL NOTES :-

1. MATERIAL : 30 x 60 x 1.6mm THK CRCA METAL PIPE.
2. FINISH : REFER ASSEMBLY DRAWING No. CI-PRT-00008.
3. WEIGHT : 1.00 Kg. APPROX.

Scale 1:2.5	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:- TUBELER BASE HORIZONTAL TUBE

Dwg No. CI-PRT-00009

Rev 0

CAEM Shelving Engineering

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Plot No. C-16/17, M.I.D.C. Hingna Road, Nagpur- 440028

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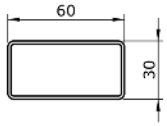
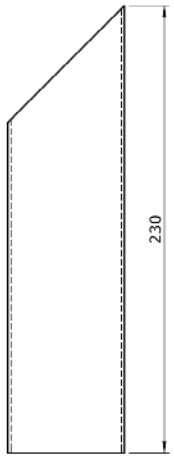
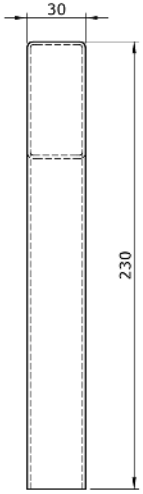


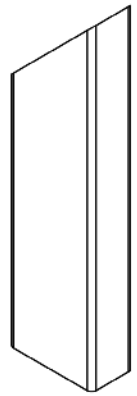
TOP VIEW



FRONT VIEW



SIDE VIEW



ISOMETRIC

GENERAL NOTES :-

1. MATERIAL : 30 x 60 x 1.6mm THK CRCA METAL PIPE.
2. FINISH : REFER ASSEMBLY DRAWING No. CI-PRT-00008.
3. WEIGHT : 0.43 Kg. APPROX.

Scale 1:2.5	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:- TUBELER BASE VERTICAL TUBE					Dwg No. CI-PRT-00010		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		A3
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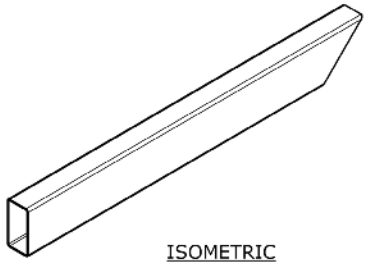
TOP VIEW



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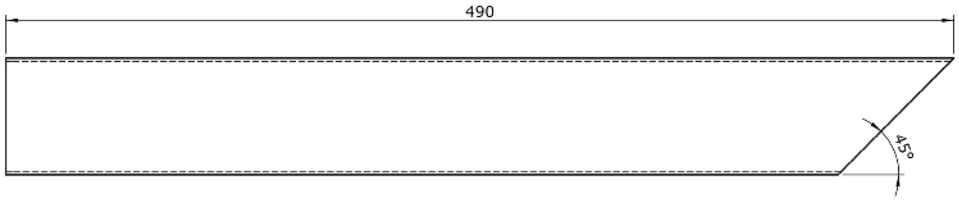

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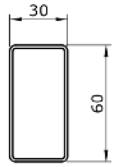

SIDE VIEW

GENERAL NOTES :-

1. MATERIAL : 30 x 60 x 1.6mm THK CRCA METAL PIPE.
2. FINISH : REFER ASSEMBLY DRAWING No. CI-PRT-00008.
3. WEIGHT : 1.00 Kg. APPROX.

Scale	Material:- REFER NOTE						
1:2.5	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:- TUBELER BASE HORIZONTAL TUBE

Dwg No. CI-PRT-00009

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CAEM Shelving Engineering

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

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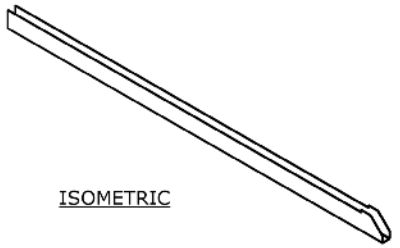
TOP VIEW



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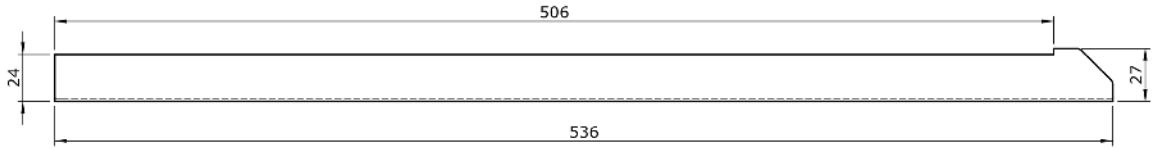

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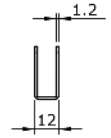
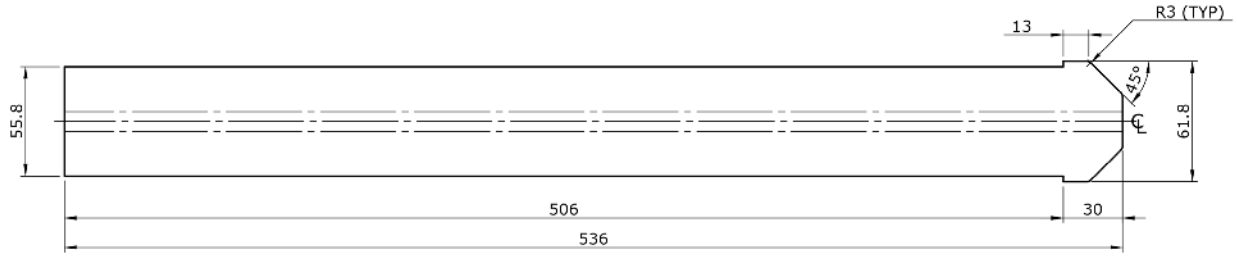


SIDE VIEW



DEVELOPED SHAPE
(FOR REFERENCE ONLY)

GENERAL NOTES :-

1. MATERIAL : 1.2mm CRCA SHEET METAL.
2. FINISH : REFER ASSEMBLY DRAWING No. CI-PRT-00008.
3. WEIGHT : 0.290 Kg. APPROX.

Scale 1:2.5	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:- TUBELER BASE CHANNEL

Dwg No. CI-PRT-00012 | 0

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Plot No. C-16/17, M.I.D.C. Hingna Road, Nagpur- 440028

Sheet 1 OFF 1 | A3

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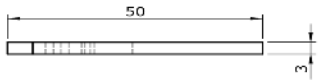
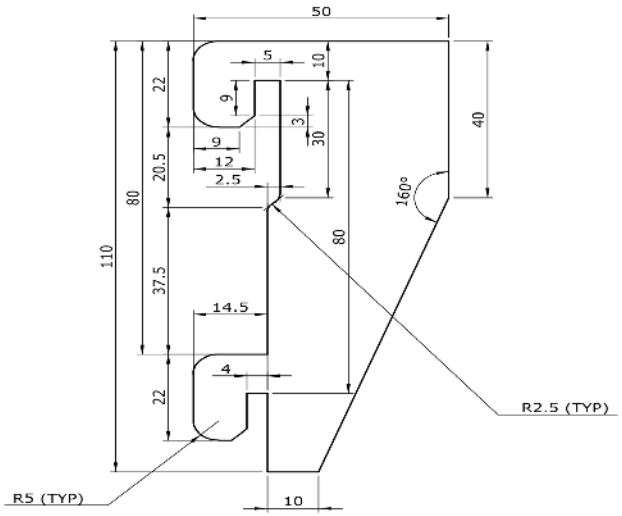
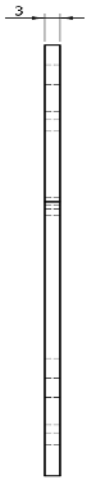


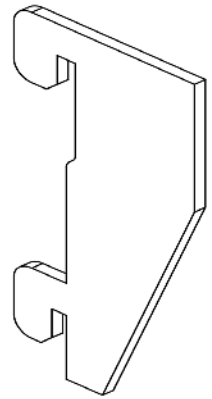
TOP VIEW



FRONT VIEW



SIDE VIEW



ISOMETRIC

MATERIAL : 3mm THK MILD STEEL SHEET.

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:- TUBELER BASE LEG HOOK PLATE

Dwg No. CI-PRT-00013

Rev 0

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

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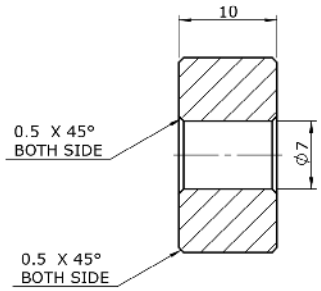
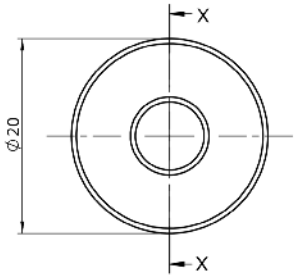
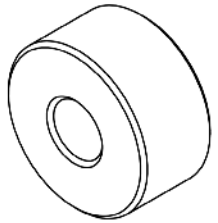
A3



SECTION X-X
SCALE 2 : 1



FRONT VIEW



ISOMETRIC

MATERIAL : ϕ20 MILD STEEL BAR

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:- TUBELER BASE LEG HOOK PLATE BOSS

Dwg No. CI-PRT-00014

Rev 0

CAEM Shelving Engineering

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

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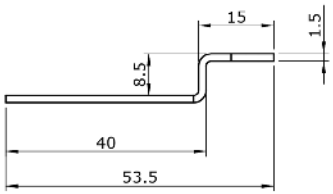
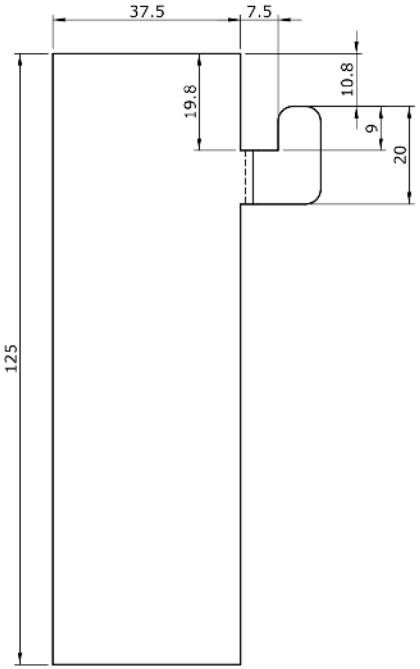
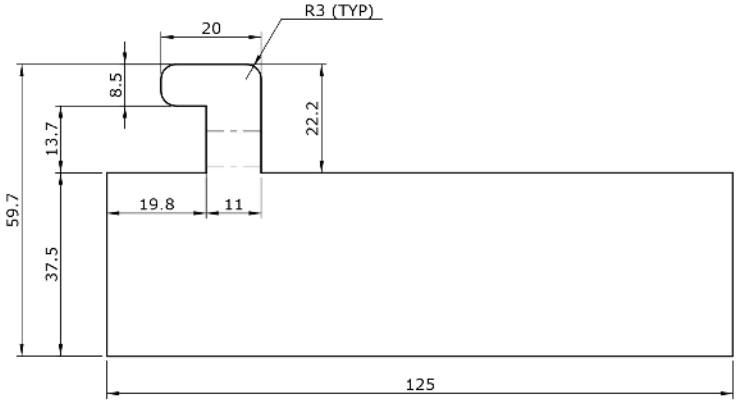


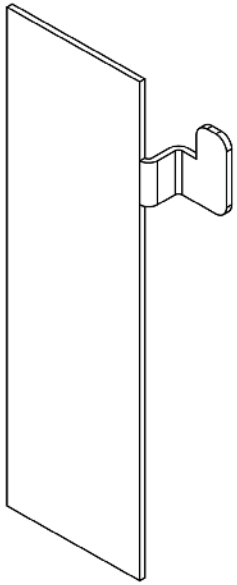
TOP VIEW



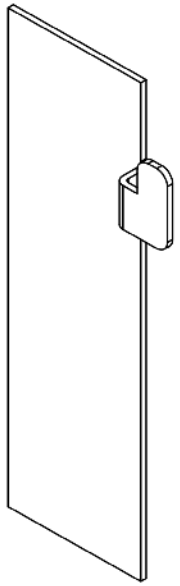
FRONT VIEW



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 — Rev 0

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

Sheet 1 OFF 1 — A3

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10. 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.

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 was almost two times cheaper than Chinese quoted rate.

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.

11. 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.

12. References

- http://www.caem.net
- http://youcaem.blogspot.in
- http://www.webdesignerdepot.com
- http://www.caemindia.com
- http://www.alibaba.com
- http://www.indiamart.com
- 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