

Bed-Side Storage for Hospital

Project II

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Product Design

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special mention to “akruti furnitures” who helped me to built my final prototype.

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Contents

Abstract	5
Preamble	8
Introduction	10
Types of hospital & range	11
Hospital furniture	13
Focus	14
Data collection & analysis	15
1) Problems of hospital.	16
a) general	16
b) Furniture	17
2) User's scenario	18
a) Patient	18
b) Patient's Relative or caretaker	20
c) Doctors	22
d) Nurse	22
e) Hospital maintenance staff	24
3) Available furniture	25
4) Manufacture, material & transportation	29
5) Problems analysis	32



Storage	33
1) Requirements	34
2) Volumetric study of storage	39
3) Standards	41
Patient stay	43
Design brief	44
 Concept generation	47
 Evaluation of concept	69
 Final concept & refinement	72
Problems in final concept	75
 final concept	77
Features of final design	79
Evaluation of final design	82
Details & drawings	
Bibliography	83
Web pages	84
Final drawings	



Abstract



Abstract

Storage cabinet is the need of every hospital. From small P.H.C. to specially equipped hospitals. This is one kind of small storage which is given to a patient to keep his belongings, medicines, food etc.

The current design of storage unit doesn't allow the user to keep all the required things. There are many problems related with current design like, space, usability, accessibility, visibility, cleaning & maintenance problems. Also there are some more problems related with material, manufacturing & transportation .

From last many years there has been a typical image of this 'Bedside storage cabinet' hasn't been subjected to any change due to considering it as a secondary furniture & lack of change in design approach towards this product.

As we know the big hospitals can afford to take imported hospital furniture where as the small hospitals are using the same old design which is absurd to the user. but the study shows even the imported furniture doesnot seem to fullfill the requirements of the user.

In this project I tried to design a bedside storage unit for general hospital, with the help of different design approach by knowing the user.

The targeted user were the patient, visitors, attendant, doctor, nurse & the other hospital staff

The requirements & problems related with them were understood with the help of user survey in general hospital.

the survey included observing the user, the handling, the storage requirements, volumetric study, the duration of patient stay & the usage of the cabinet.



The requirements of patient in the hospital ward were thus listed down. From this information it was easy to do volumetric study of requirements which is most important to decide the dimension & overall size of the product. This also helped to decide the choice of materials.

The concepts are generated with various kinds of analogy like direct analogy, personal analogy and fantasy analogy etc.

I tried to reduce the problems related with space, users, Cleaning & maintenance. Finally the evaluation & finalization of concept is decided by the evaluation chart with the help of 10 people.

The final refinements have been done according to the easy manufacturing & assembly point of view to make this product for batch production.



Preamble



Preamble

25th may 2002 I could see the operation theatre light in front of my eyes before I close them for cameo act by the doctors.

Though my kidney stone operation was a success, I was to leave, not before 5 days of rest in the hospital room. Almost always my room was occupied by my family, friends & well wishers they used to bring lot many things for me like food, fruits, books & many other things. My brother bought my clothes & toiletries from home. All things were around me there were no sufficient spaces to keep all these things.

During moments of solitude, I thought to arrange these things in the storage unit but it was not possible due to insufficient space, also it was difficult to access the stored thing in lower cabinet. The purpose of this cabinet is roughly predefined. The top surface area is for the use by medical staff & doctors to keep their medical equipments whenever required. But most of the time the top surface area was not available for this purpose to the medical staff & doctors because this space was occupied by things already kept by me & my visiting relatives.

Then I started thinking about designing of new storage unit as my academic project which will fulfill patient's requirements.



Introduction





Ayurvedic treatment



surgery



Acupuncture treatment

Types of hospital & range

There are different type of hospitals according to the therapy.

1) Allopathic hospital (modern medicine & surgery) These Hospitals are government subsidized as well as private. A general hospital deals with all types of illness, while special hospital is concerned with only one disease or group of diseases. Many hospitals are maintained solely for the treatment of military personnel and veterans.

2) Ayurvedic hospital (using herbal medicines & vedic surgery) & Naturopathic hospital (natural medicine & yoga exercise):- Ayurvedic & naturopathic hospitals are not for emergency cases; mostly they are for chronic diseases treatment .Most of treatments in these hospitals are very different like “warm water treatment, warm oil treatment, body massage, vomiting, enema”, Also almost all medicines are to be prepared at the time of taking it. In these kinds of therapies patients are asked to stay in hospital, from 10 days to 6 months depending on the case.

4) Homeopathy

5) Acupuncture & Acupressure: - In these kinds of treatments patient stays only few hours they don't have to stay for long time in hospital.





Hospital range

In India we have big range of hospitals from big hospitals in metropolitan city to the small hospitals in villages.

Most of these big hospitals in metropolitan city have all special types of medical facilities, specialist doctors & very well trained nurses & sufficient medical staff.

These hospitals are well equipped with all medical equipment, surgical instruments & good medical furniture. Most of these equipments & furniture are imported.

Also this hospital provides most of the things required for patients, so there is less usage of bedside storage unit.

But on the other hand

In general hospitals in small city or rural area, there is lack of medical facilities; they work with old medical equipments, instruments & furniture. The bed side storage units in the hospitals are absurd, The patient can't store his all belongings in to that storage In such a case he keeps his required thing in big cloth, in nylon bag or in polyethylene bag around him.





1)



2)



3)

furniture use for general hospital

1) Emergency & recovery trolley: is to carry the patient in emergency & also using to carry the patient after operation in recovery condition.

2) Crash cart: is to carry the medical equipments & oxygen cylinder up to the patients in the case of emergency medical service.

3) Stretcher trolley: is to carry the patient from out side to the bed or sometime while shifting the ward.

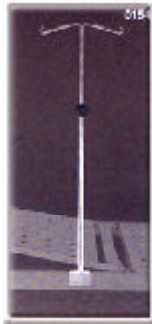
4) Bed: comes under the most important furniture in the hospital. There are different varieties of bed as per the patient's requirements.

5) IV stand: it is the accessory to the bed is used to hang where the saline bottle or blood pouched while giving it to the patient.

6) Bedside table: while taking food the patient keeps his food plate on the bedside table also he can use this table while reading book or writing.

7) Bedside locker: this is supposed to use for the storage of required thing or storage of patients belongings.

8) Stool: it is for patient's relative or care taker to seat on it.



5)



4)



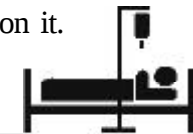
6)



7)



8)



Focus

The bedside storage unit is the mostly used furniture by the patient however it has been most ignored as far as design is concern. It has been always consider as secondary furniture.

The imported bedside storage units are also not designed well for hospital scenario.

So they are using the same old designed storage unit which is absurd to the user.

My aim is to design a bedside storage unit for general hospitals by studying the end user's requirements& related problems.



Data collection and analysis



Problems of hospital:

General problem: the basic general problem of hospital is lack of funding, in private general hospital they charge to the patient but in the case of government hospital they take nominal admission fees in some cases free of cost. These general hospitals are totally dependent on the government funding,

- 2) In rural area hospital there is a problem of lack of basic facilities like electricity & water
- 3) Lack of medical equipments & medical furniture due to this in emergency case the rural hospital doctor forwards the patient to the city general hospital.
- 4) Due to very less treatment cost all poor people prefer to go for government general hospital because of that the hospitals become too crowded & if there are less number of beds in hospital the user. Some time it is difficult to treat more patients in small ward due to unavailability of beds available the staff generally puts up a mattress in the corridor, so the patient has to suffer. In the worst case the patient would even get a bed for himself. There is no storage unit for him to keep his required things so he uses big cloth, in nylon bag or in polyethylene bag around him. For storage purpose
- 5) Less staff available for maintenance of the hospital & hospital furniture.



Furniture problem:

- 1) There is no sufficient furniture as per the requirement of hospital because of unavailability of funds,
- 2) & the same furniture they are using from last 25 to 30 yeas.
- 3) Maintenance of this furniture is very difficult
- 4) Most of the furniture is made in mild steel because of the less cost as compared to stainless steel& mild steel corrode very fast. It needs oil paint coating to prevent from corrosion but furniture painting is not possible regularly.
- 5) Even If the furniture is broken they are still using it by repairing temporarily. This may cause in to an accident.



User scenarios

The end users of the bedside storage unit are

The end users of this storage cabinet are patient, relatives, Doctors, medical staff (nurse), medical maintenance staff.

1) Patient

Observations:

- a) The patient deals partially with the storage cabinet. He can move his hands to take the things from top surface of the cabinet. But he is not able to take things from lower compartment of storage cabinet. Also it is difficult to keep things inside
- b) He uses only top surface of cabinet to keep his belongings, after some time start keeping his belongings on his bed the things like news paper, personal radio, book or magazine.
- c) In morning during sponge bath & changing the clothes the nurse or caretaker helps him.
- d) The valuables like his money, wrist watch or other things he is not really keeping it on storage top but keeping under the bed cushion. Or he keeps his valuables with his care taker.
- e) Patients start eating food by holding lunchbox in hand, by keeping it on bed. Or caretaker feeds them.
- f) The patient is not able to bend, sit on floor.
- g) But now he can pick up whatever he needs, he can get his medicines, fruits or food, water, but he has to search for the things from the storage cabinet.
- h) The cabinet has caster wheels when the patient try to access it there is chance that bottles & the liquid container may topple or fall on the floor.



Problems:

- a) The accessibility of the lower cabinet is very less he can use only top surface of the cabinet & the top surface does not provide space to keep more things.
- b) The things he deals with very frequently are medicine, water, entertainment (books, news paper) there is less space available in current design to keep it in the range of accessibility
- c) Visibility of the things is also problem in the case of patient on bed
- d) there is no locker to keep valuables & patient have fear that somebody will steal his valuable so while sleeping he keeps hid valuable under the bed to keep it safe. If somebody tries to steal he must be noticed.
- e) Using food tray attached with cabinet is problem because while arranging the food tray we have to move the cabinet within less space the patient himself can not move it or get it in use.
- f) Patient usually nether is he able to see the thing inside clearly nor able to reach the thing in lower compartment of storage cabinet.
- d) In current design there are no restrictors mounted on the cabinet to prevent bottle toppling.





2) Patient's Relative or caretaker:

Observations:

Care taker is most frequent user of storage cabinet.

- a) People from rural areas seat on the floor while accessing cabinet compartment.
- b) Urine pot, bed pan or vomiting try kept near the patient's food bag kept down on the floor though not intentionally. Many times people keep the vomiting tray keep it on the cabinet.
- c) The caretaker, who is going to live with patient, brings his own belongings in the hospital & keeps it in to the storage cabinet.
- d) The care taker is going for home for some time he tells all about medicine & belongings kept inside to the other care taker, so that other will not have problem to get the required things from the storage cabinet.
- e) He keeps the medicine in plastic bag & hangs it to the bed
- f) He keeps paper inside the cabinet box before keeping belongings.
- g) Some time he brings, god's idol, prayer card, or rosary



Problems:

- a) The visibility of the objects kept inside is poor so determining the position of required thing becomes difficult this forces the person to seat on the floor & search for the required things.
- b) There is no specified space to keep eatables away from urine pot, bed pan & vomiting tray.
- c) There is no space to keep caretakers belongings, he keeps his things in plastic bag & hang it to bed or keep it on the floor.
- d) There is no specific space to keep medicine so that there will be no need to tell about it e) the storage unit made by mild steel gets corroded & sheet metal get rusted this may spoil eatable & make user things unhygienic to handle.



Doctors:**Observation:**

Doctor uses the top surface of this cabinet when they need space to keep the medical equipment. Like portable ECG or BP apparatus etc most of the time they keep there medical equipments on bed.

Problem:

There is need that top surface of the cabinet must be cleared to keep medical equipments Due to space problem the patient keeps his things on the top surface & the doctors are not able to use it for their medical equipments.

**Nurse:****Observations:**

- a) Nurse takes care of patient & gives medicines at proper time interval, changing saline bottles, giving him a sponge bath & dressing, When she brings the sponge bath tub she keeps it on the bed.
- b) Kidney tray or any other tray to carry injections & all the other things which she brings with her, she keeps it temporarily on the bed.
- c) If it is time for the patient to take medicine & non of his relatives are around the nurse gives him medicine from his storage cabinet



Problems:

- a) she suppose to use the top surface of the storage cabinet while keeping sponge bath tub, trays, many times there is no space available on the top of the cabinet, so she keeps the tray on the bed. In such case there is a chance of liquids container may topple over on the bed, creating a mess.
- b) It is very difficult for nurse to locate the medicines inside the cabinet kept by the patient's caretaker & if he is not around.





Hospital maintenance staff: the different people come under medical maintenance staff namely ward boys, cleaners & attendants.

Observation: this staff maintains all other services like hospital cleaning, food service & laundry service etc.

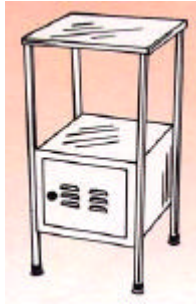
- a) the cleaner keeps cleans the hospital floor thrice times a day, while cleaning every time he has to move the cabinet to clean the floor.
- b) The ward boys are not found sincere in cleaning the cabinet from inside, because of that the spilled over medicine or eatables the mild steel sheet metal starts rusting this makes it even more unhygienic.
- c) While changing the bed sheet a he is removing the old bed sheet is that the new one is kept on the bed adjacent to it. In such case there is a chance of spreading the bacterial infection



Problems: a) while cleaning the floor the cleaner moves the cabinet, during movement the bottles kept in cabinet may topple. Very few materials other than mild steel are explored in construction of this cabinet
The top surface of cabinet is not available to keep clean bed sheet because it is already occupied by other things.

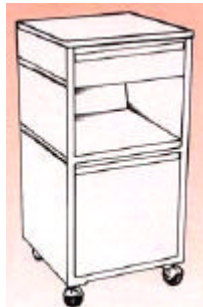


Available furniture



1) BEDSIDE LOCKER

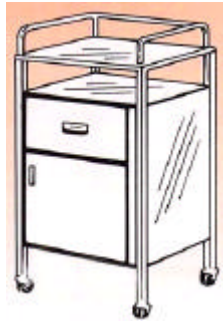
- **Size:** 40L x 40W x 82H cms.
- Complete locker box made of 20G CRCA machine pressed sheet closed from three sides and a suitable drawer for extra storage.
- Stainless steel top of 22G in mat finish.
- Complete locker mounted on four 5 cms. dia. castors with rubber buffers at the rear.
- Pre-treated and epoxy powder coated.



2)BEDSIDE LOCKER - DELUX

- **Size:** 40L x 40W x 82H cms.
- Complete locker box made of 20G CRCA machine pressed sheet closed from three sides and a suitable drawer for extra storage.
- Stainless steel top of 22G in mat finish.
- Complete locker mounted on four 5 cms. dia. castors with rubber buffers at the rear.
- Pre-treated and epoxy powder coated.





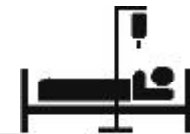
BEDSIDE LOCKER-DELUX
(All Laminated)

- **Size** : 40L x 40W x 82H cms.
- Complete locker box with drawer and top made of superior commercial board pressed with best quality laminate.
- Door fitted with a self locking catcher and a handle.
- Mounted on four castors of 5 cms. dia.



BEDSIDE LOCKER SUPER-DELUXE

- **Size** : 45L x 45W x 82 cms.
- Complete locker box with drawer made of superior commercial board pressed with best quality laminate.
- Assembled on square aluminium polished tubes.
- Mounted on four castors of 5 cms. dia.
- Top made of stainless steel fitted with three side railing.



Imported storage units



Observation:

- 1) Most of the imported brands are plastic molded or laminated because it is easy to mass produce
- 2) It can be easily assemble & dissemble for transportation.
- 3) Imported hospital storage units are more costly.
- 4) These imported storages are designed for big hospitals where patient's takes their minimum belongings & other required things are supplied by hospitals. Accordingly they give sufficient storage space as per the big hospitals requirements, but in the case of a general hospital it is difficult to store all belonging. Hence it is not that useful for general hospital.





Manufacturer, material & transportation:

- a) The bedside storage unit is secondary furniture in hospital furniture, because of that there is no any scientific data available for it & manufacturer makes it as a steel box with pedestal.
- b) This furniture is not for mass production, it is batch produce product and he makes this product as per the demand order, so not much attention is given to it.
- c) Manufacturer makes this furniture in sheet metal & he doesn't go for plastic injection molding because it is cost effective in the case of batch production
- d) In the joint detailing of this furniture the manufacturer goes directly for sheet metal welding to avoid the assembly & reduction of parts to make it more cost effective.

Materials used for this furniture are

Mild steel sheet metal, stainless steel sheet metal, wood, rubber for shoes square aluminum tubes The furniture cost mainly depends on the additional features & the material use. The storage unit cost vary from 1800 to 5000, the low-cost units are made up of mild steel & coated with paint. & other hand the high cost unit is entirely made in heavy gauge stainless steel.



Mild steel

- 1) It is the low cost material,
- 2) the main problem is it corrodes & erodes very fast due to water; moisture & biochemical substances so it needs additional surface coating of oil paint or epoxy coating
- 3) Its durability is very less as compared to mild steel.
- 4) It is difficult for mild steel sheet metal to stand against the heat generated by arc welding for that the worker must be skilled.

Stainless steel:

- 1) it is totally free from corrosion & erosion because it doesn't react with water, moisture, medicine & biochemical substances
- 2) Also it stands better against the heat of arc welding as compared to mild steel,
- 3) It has good surface finish it is easy to clean.
- 4) it is too costly (double the cost of mild steel).
- 5) It gives cold shock to the user.



Transportation:

To deliver the product safely the packaging also play important role.

There must be good packaging of product to prevent damaging.

In the case packaging of this furniture they wrap it with old news papers & then put it in the plastic bags so there are chances of product damaging during transportation.

The volume is important in transportation. Current product is not foldable, collapsible or stackable because of transporter is not able to carry more quantity at a time.



Problems analysis

User problems:

- 1) Not sufficient space to keep all his belongings.
- 2) There is no specific space to keep his medicines
- 3) There is no locker to keep his valuables.
- 4) The visibility of the things inside the storage cabinet is less.
- 5) Accessibility of the inside things is also a problem.
- 6) In current design there are no restrictors mounted on the cabinet to prevent bottle toppling.
- 7) There is no space available on the top surface of the cabinet for the use of Doctors & medical staff.
- 8) Cleaning of the storage unit is problem.
- 9) There is no more exploration of other hygienic, durable & maintenance free materials for this furniture.
- 10) In the manufacturing it is not that easy to weld sheet metal.
- 11) Current storage is not foldable, collapsible nor stackable so there is problem with transportation.
- 12) Also it is not having good aesthetic.



Storage





The things use by patient in general ward

Medicine

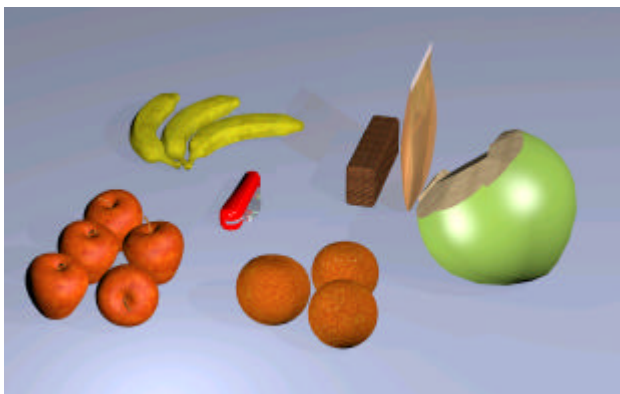
Liquid medicine bottles,
Injections,
Tablets,
saline pouches & bottles



Food & water

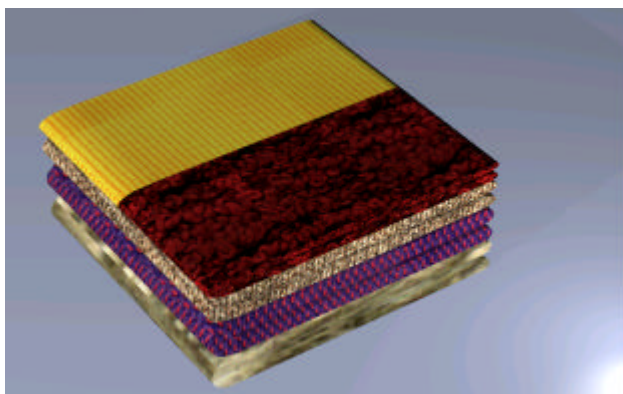
Tiffin,
water container (bottles water bags, thermo ware)
Drinking glass,
Food plate.





Fruits

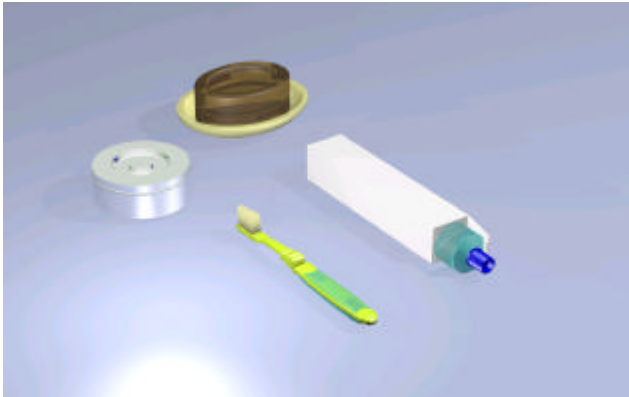
Apples,
oranges,
banana, (quantity 3 to 6 in apple & orange & banana),
Coconut water),
fruit juice pouches.



Clothes

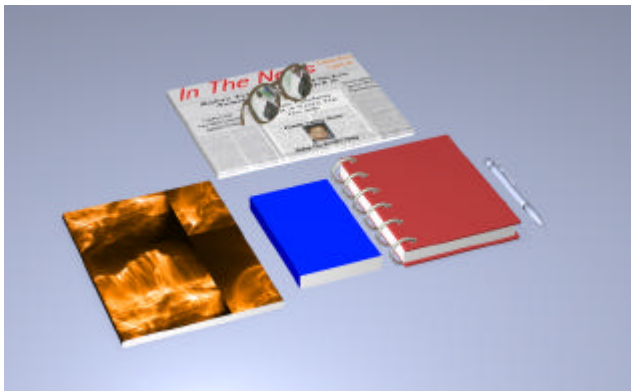
Towel, Napkins. Sweater
Undergarments
Shirt, trouser,
Cloths
& blanket





Toiletries

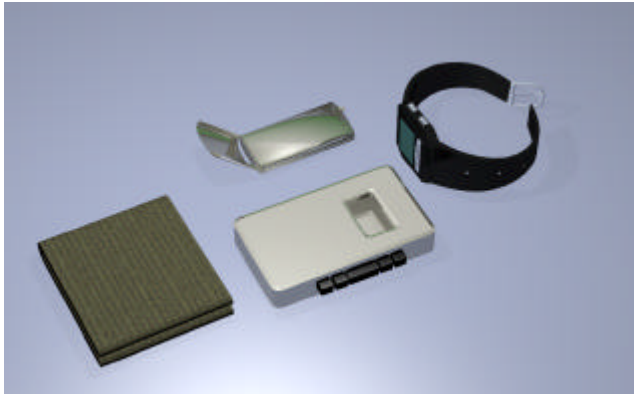
Tooth brush,
Tooth pest,
Artificial tooth case,
Soap & sop case



Entertainment

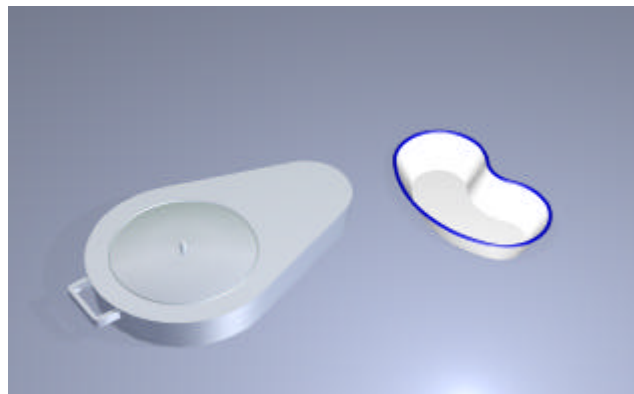
Personal radio,
Books, magazine,
Newspapers
Note book or diary
pen & pencil





Valuables

Wrist watch,
moneybag,
spectacles
& gold ornaments



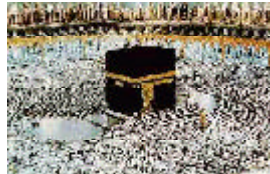
Trays

Kidney tray,
surgical instrument tray,
urine pot & bed pan

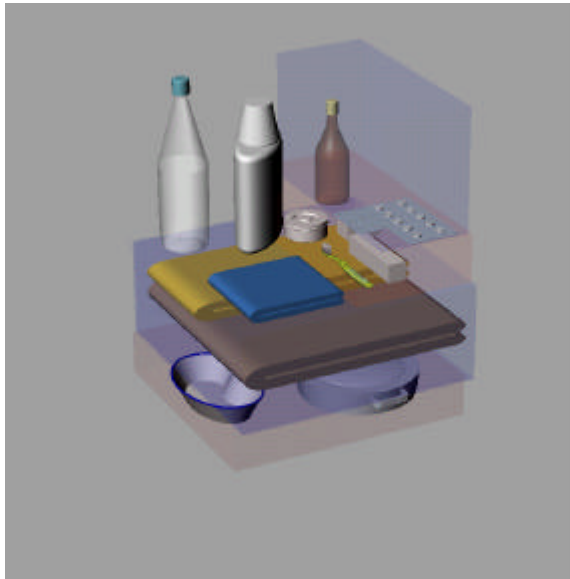




Small picture
small idol,
prayer card,
rosery,
Holy book
& rosery



Volumetric study of storage unit



Medicine

Liquid medicine bottles (dia8*20)cm

Injectables, 6height

Tablets, strips (16*10*6)cm

Saline pouches & bottles (8*22)cm

Medical equipments

Portable ECG (32*20*80), BP apparatus (35 *12*8)

Oxygen mask,

Sponge bath

Tub dia30 cm

Lotion bowls are available in diameter - 4", 5", 6", 7" and 8".

Basins are available in diameter 10", 12", 14" and 16".

Maximum top surface area require for cabinet is

40 cm *40 cm weight max 5 k.g.





Clothes

Towel, (32*30*4)

Napkins, Undergarments

Shirt, trouser,

other cloths

blanket

total =(40*40*40) weight max 7 k.g.

Toiletries:

Tooth brush, (20 *2*2) tooth pest (20*4*4), artificial tooth case, (dia8 h6)

Soap (5*9) cm total = 20*20*8 max 1/2kg

Valuables: wrist watch, moneybag, spectacles, gold ornaments

Valuate 18*8cm

Total = 20* 20* 8 max weight 1/2kg

Food &water Tiffin, (Dia20*8), or 30*10 vertical

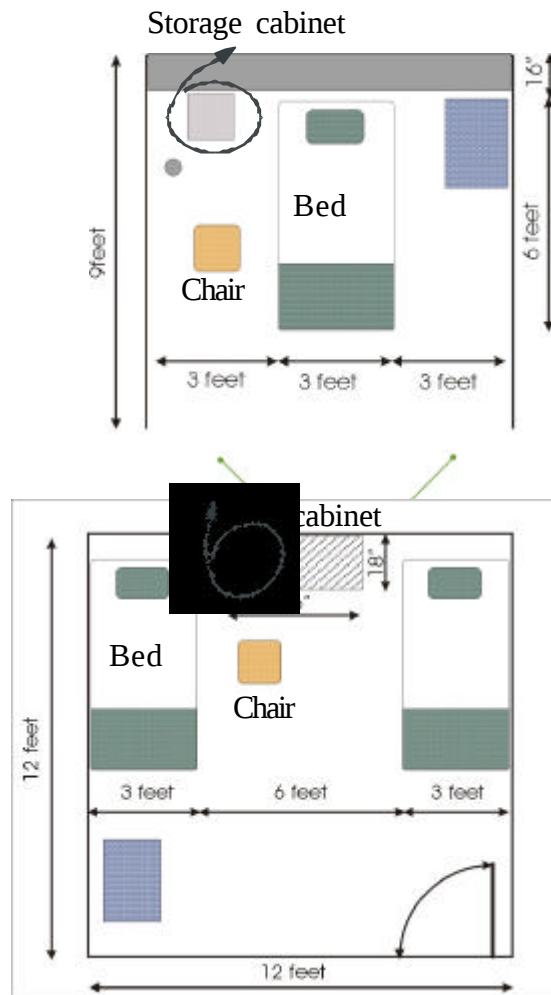
Water container (bottles (dia8*28)cm vertical I kg water bags

(18*24*8)cm vertical, thermo ware 30*18*22)cm lota (dia9*12)cms

Drinking glass, (dia7*11)cm all vertical

total vloume 40*40*28





Standards

Typical layouts of ICU, special room, special ward, general ward

Layout of ICU: This is the layout of one unit of the ICU. There are many same units in an ICU. Every unit contains special medical bed, special medical equipments, & trolleys these small units are separated with curtains or ply wood partition. The space available for a single unit In this case we have less area for bedside cabinet like we can use up to 18" * 18" ~ (45cm * 45cm) for bedside storage.

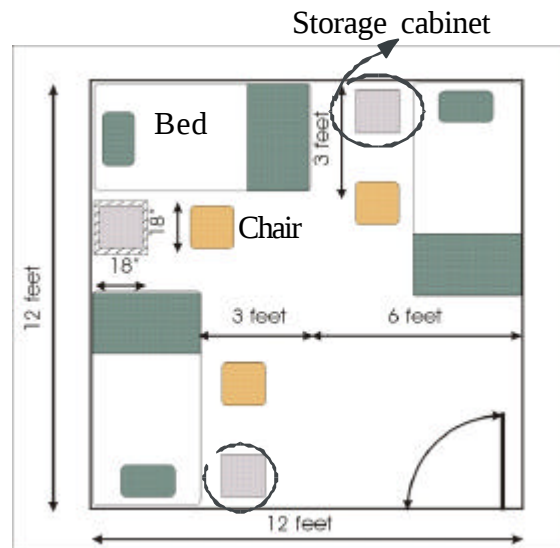
Typical Layout of Special room

There are no high end medical equipments like ICU, so there is more free space. Many of special room have cupboards to keep the things inside.

But still the room has bedside storage cabinet

In this case we have more space for bedside cabinet like we can use up to 36" * 18" ~ (90cm * 45cm) for bedside storage .

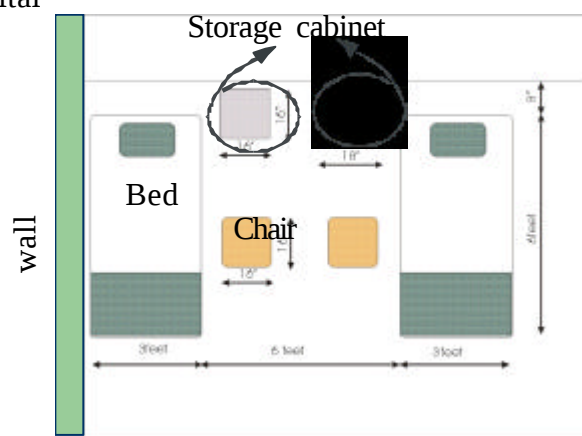
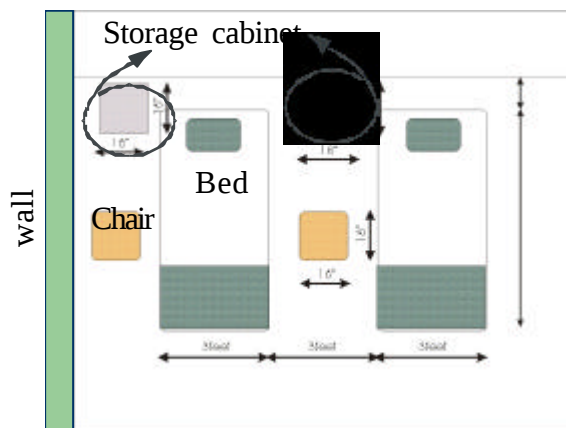


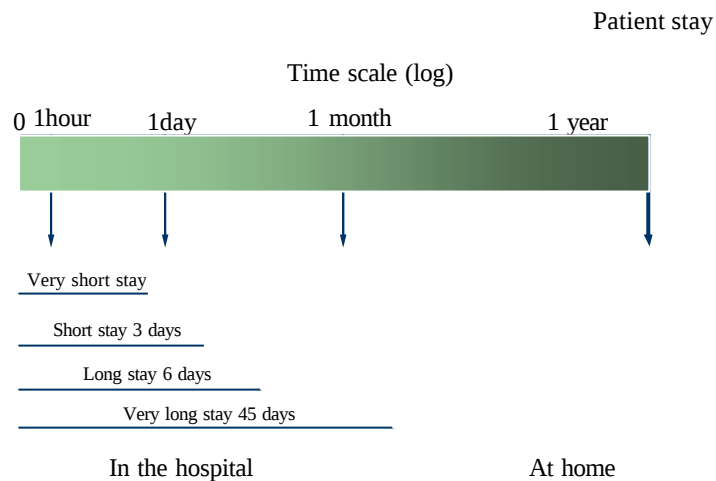


Typical Layout of special ward

The typical layouts of general ward & bed position.

This is the layout of arrangement of wall side beds & furniture in general hospital





Patient stay

Stay of patient

In hospital patient comes for quick cure treatment in emergency & serious illness.

The illness may be get cure by medicines or may be by surgery.

The stay of patient in hospital is depending upon the nature of illness & seriousness.

The stay can be from some hours to some months.

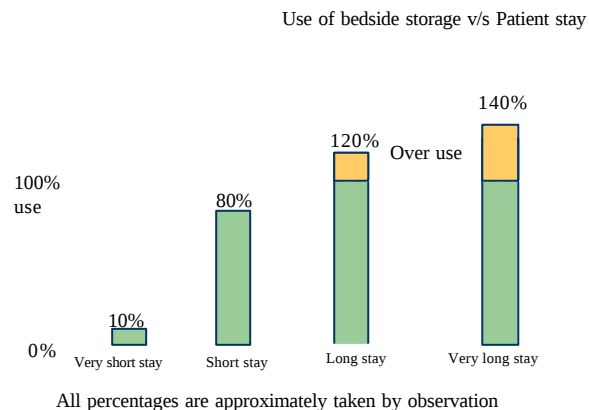
In the case of Just a checking & some of the medical tests or regular injection program the stay can be just for some hours from 1 to 2 hours

In the case of the dehydration or small surgery problem the stay can be the extend up to one night stay it call as very short stay

If the patient stays up to 3 days for his treatment it call as short stay

In the case of some treatments the stay can be extended up to 6 days or about a week it calls as a long stay.

In the case of big surgical operation the patient stay more than a month or more that 45 days it calls as very long stay.



Design brief



Product brief:

There are certain solutions I suggest after doing the survey & study of the subject .I wish to incorporate certain qualities in my product viz.

Space

1. It should fit for every ward of the hospital like ICU, special room and special ward & generalward of general hospital.
2. It should be possible to store of all required things.
3. It should provide lockable space to keep valuables.

User

4. It should provide easy accessibility for patient to access most frequently required things like water & medicine.
5. It should provide more visibility to see the things inside & it should provide visible space to keep medicine.
6. Food serving tray should be the part of the bedside storage furniture.
7. It should be possible to keep the top surface area clean for the use by doctors & medical staff to keep medical equipments .
8. The thing from lower cabinet should be easily accessible.
9. There must not be sharp corner & cuts to which may harm to user.



Maintenance

- 10. It must be made by using hygienic, durable & maintenance free material.
- 11. It must be easy to clean.

Manufacturing

- 12. It should be possible to batch produce with easy manufacturing
- 13. It should be easy to for transportation

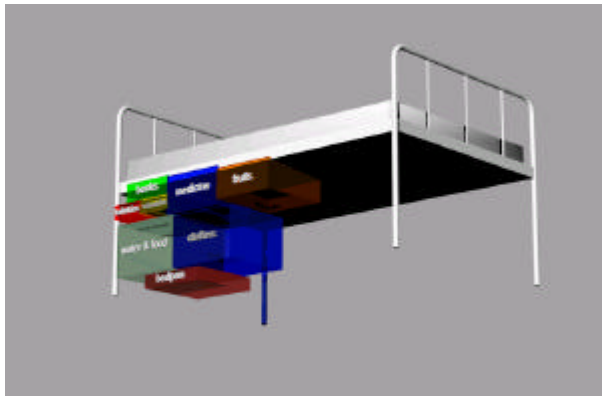
Aesthetics

- 14. It should be good looking product.



Concept generation

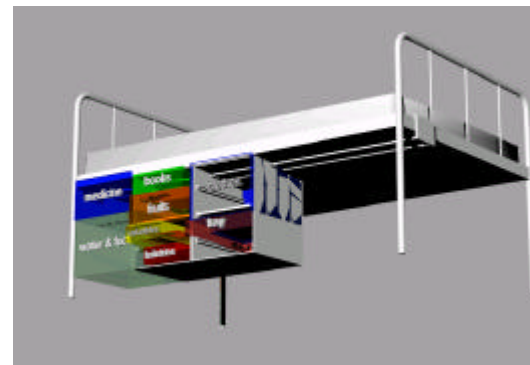


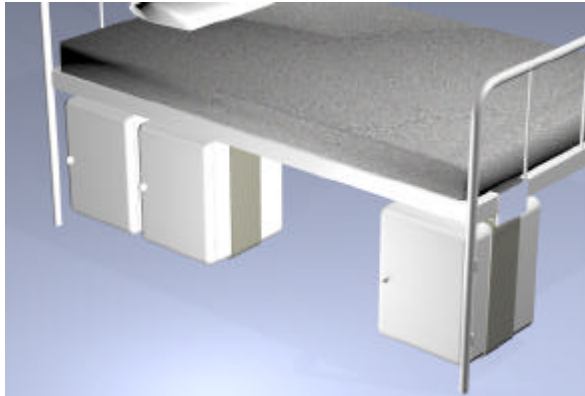


Concept1)

This concept is created to fit in the cabinet in such a place which remains unused

The concept is created with direct analogy by the hen & eggs, how the hen takes care of her eggs in the same way the furniture is playing role. The patient's bed occupies the space 3feet*6feet & the space below the bed remain unused. In this concept I try to use that unused space. This space studied with the help of volumetric study to store the thing under the bed.

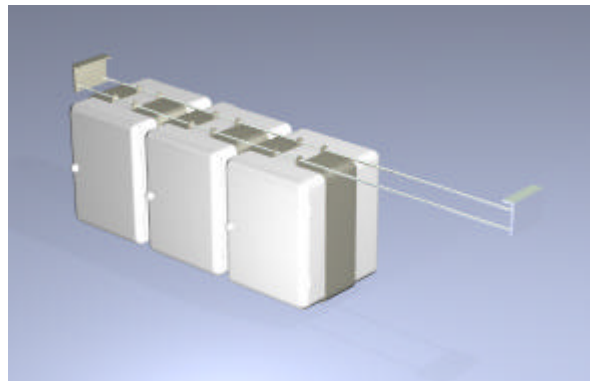
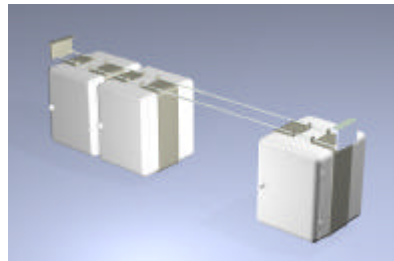


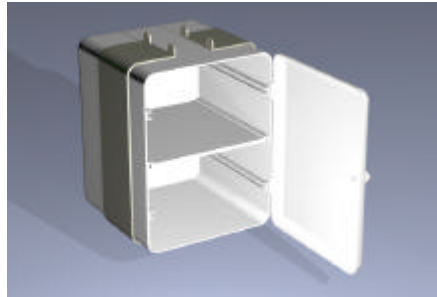


Specialties of the concept:

- 1) The concept is using unused space for storage under the bed to create more free space around the bed.
- 2) While cleaning the floor under the bed it is easy to slide over the railing & change the position of cabinet.

The material of storage unit: ABS or PVC for cabinets & caster, & acrylic, glass or polycarbonate, SS sheet & pipe for fixing details.

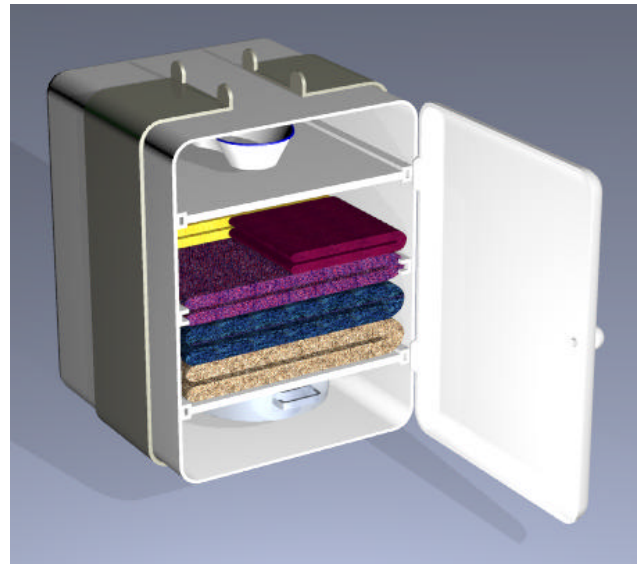
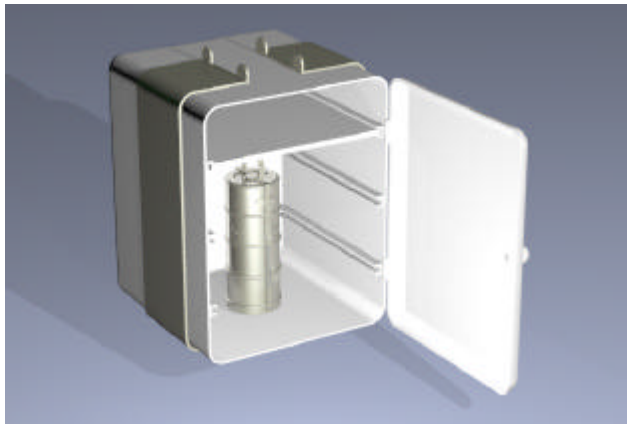




3) There are fewer components in cabinet design so it is easy to mass produce.

4) The cabinet unit is small so according to requirement we can provide more number of cabinets. Like in ICU patient has less belongings so we can provide him a single cabinet unit but in the case of general ward it goes up to 3 cabinet units.

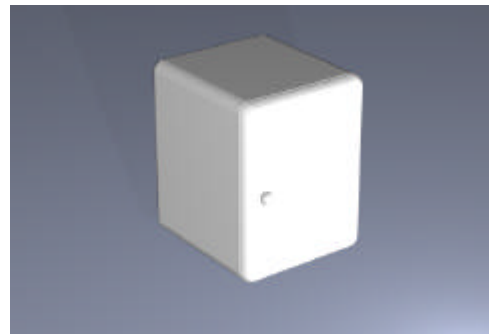
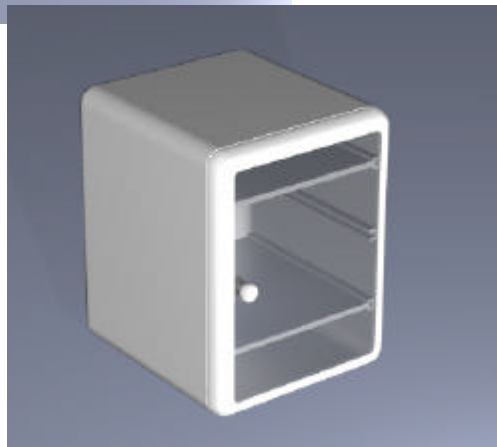
5) The space in the cabinet is adjustable according to the requirement. So that it will be easy to keep all require things with different heights in to it.

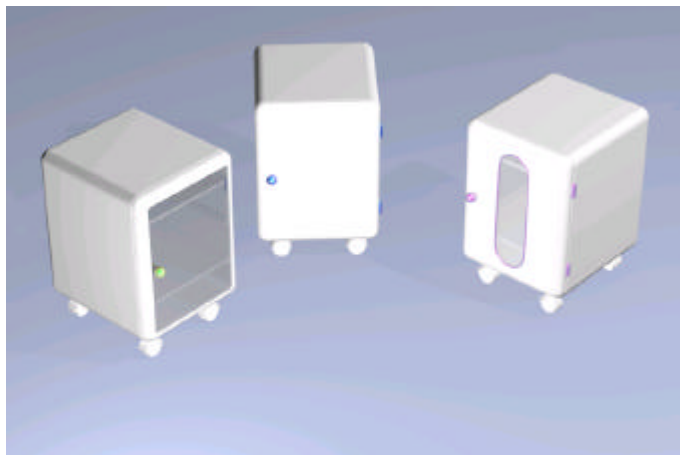
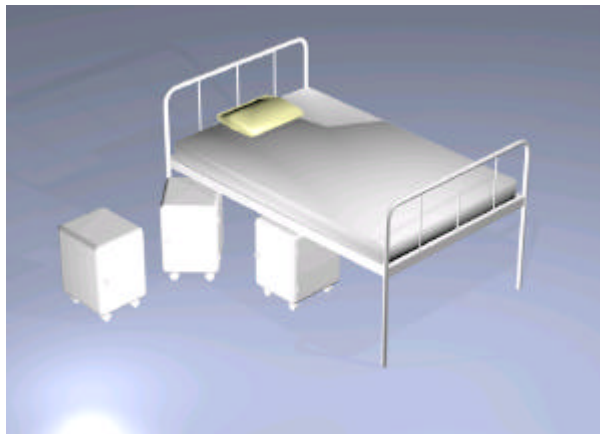




6) Here the two more design variation is given to increase the visibility of the thing kept inside

7) Also tried to improve the aesthetic.





concept 1 alternative: This concept with same analogy but further improvements it this analogy the chicken is out of eggs & but still around the hen.

Specialties of the concept

1) the alternative of earlier concept in which the visibility for the patient laying on the bed is not there, also he will not able use it he will need somebody to help him to get the required thing from cabinet

This concept is base on free movement of the cabinets so it can go under the bed or it can come out.

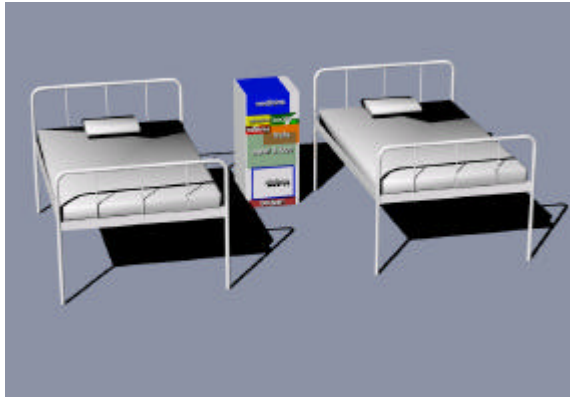
2) The top surface of these cabinets can be use for seating or keeping medical equipments.

3) Where now the visibility is more for patient and he can use. To keep books or news papers also.

The material of storage unit:

ABS or PVC for cabinets & caster, & acrylic, glass or polycarbonate.





Concept 2

This concept is based on the idea to redesign the bed side storage unit. Redesign of volume with the help of volumetric study & play with volumes it to know how much volume is require to keep all required things. Constrain was the height of storage unit must not go above the chest height level of user

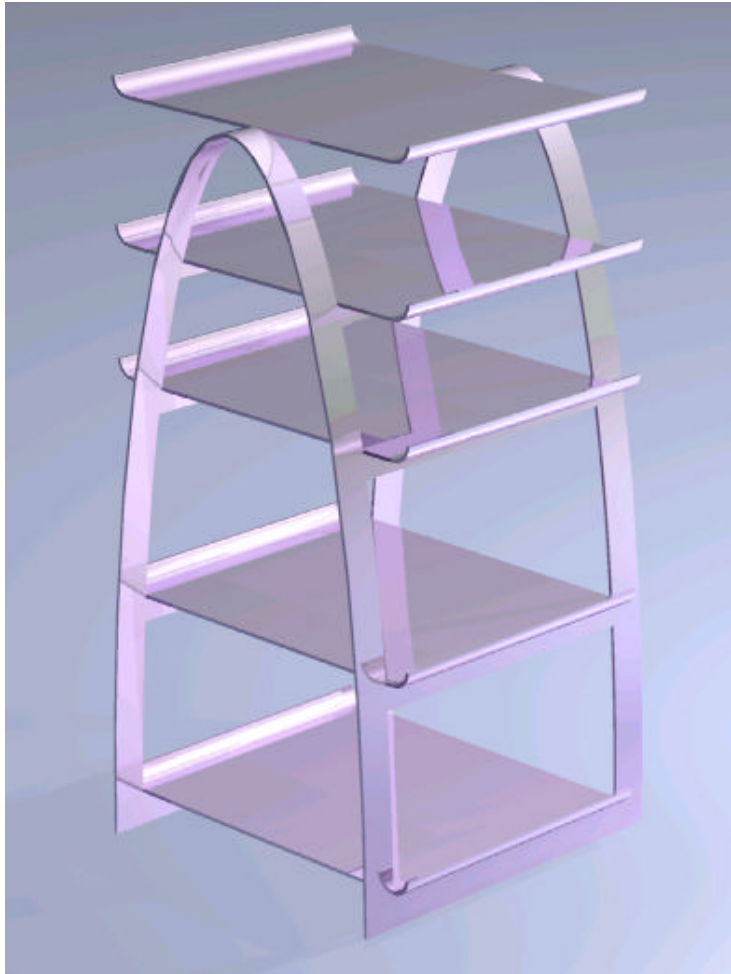
Accordingly the first attempt was to make a bedside storage with the help of sheet metal. This concept is base on open storage module.

Specialty of concept

- 1) It stores all the belongings of the patient
- 2) It designed for easy accessibility & helps to increase visibility of patient.
- 3) It is also easy to manufacture with low cost, with better aesthetic.

The material proposed is stainless steel sheet metal



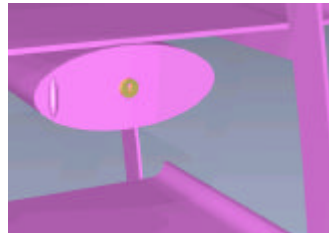


concept 1 variation:

Here is one another attempt to make variation in concept two

- 1) now it has top surface to use by doctors & medical staff.
- 2) The structure is same the only thing the trays are attached to it so It is easy to manufacture with low cost, with better aesthetic.
- 3)Locker is provided to keep patient's valuables
- 4) It designed for easy accessibility & helps to increase visibility of patient
- 3) It is easy to manufacture & assemble.
- 4) It is stackable so it is easy to transport.
- 5) It is easy to clean.

material: In this case the material is stainless steel sheet.



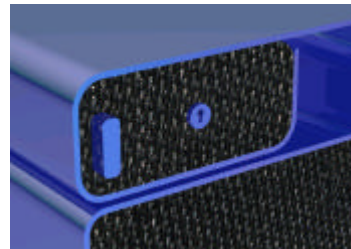
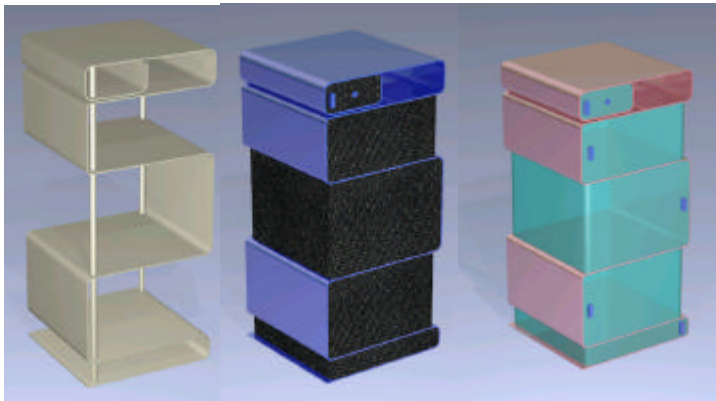
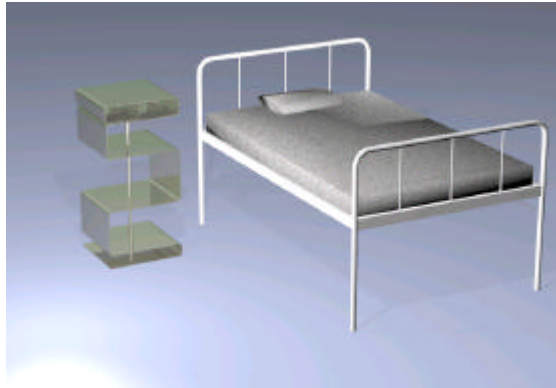
Concept 3

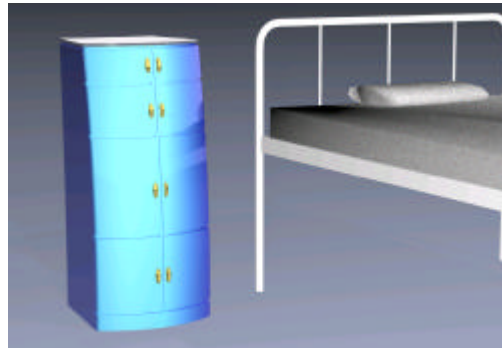
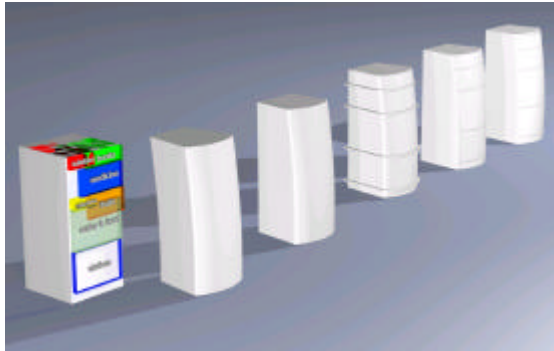
This concept is based on close space storage.

Specialty of the concept:

1) It is try to form a close space storage unit using stainless steel metal sheet. Combination with the plastics or metal net. And try to create an elegant form.

2) The treatment of sheet is in such a way that the single sheet is forming different compartments for storage. Also on the top the locker is created out of the sheet metal forming, supported with two metal pipes placed diagonally.





Concept4:

This concept is generated to solve problem about top surface must be available to use by doctors & medical staff,

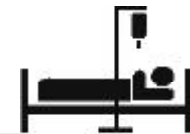
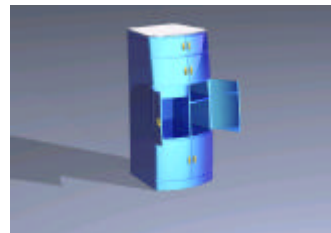
People use to keep all things on the top surface of the storage furniture, to avoid that

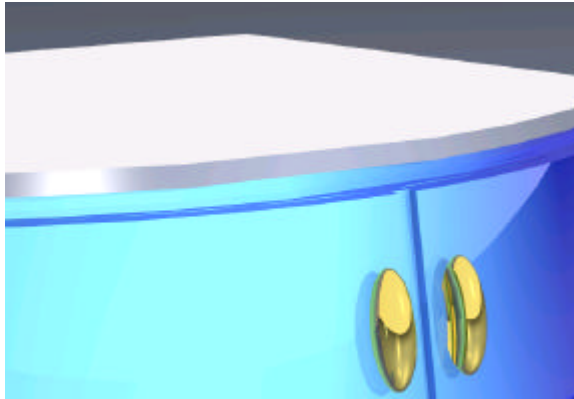
The people should get guided visually to keep the things inside this storage not on the top surface.

For that the concept is inspired by ATM machine.

The ATM machine is designed in such way that even if anybody comes closer to it but the still the monitor will be away from him to avoid strain in customers eyes. Also to avoid more pressure applied by customers on touch screen monitor by customer.

Using metaphor of ATM machine with direct analogy I developed this design to guide people to keep the things inside & not on the top surface.

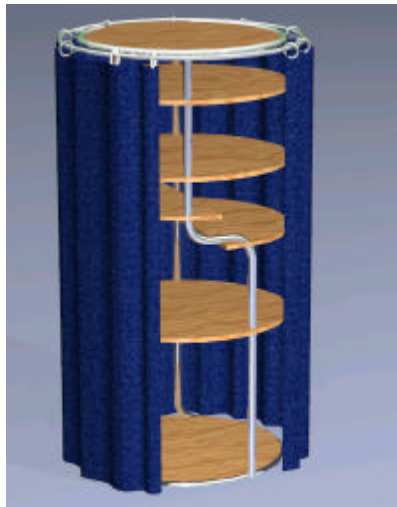




The specialty of this concept:

- 1)Visually the product shows that the sufficient space is inside & guides the use to keep thing inside by keeping him little away from top surface of storage cabinet.
- 2)In this storage the space is closed from all the sides so it is better to keep personal things inside & also provides more security to the all belongings.
- 3)Separate locker space is provided.
- 4)The material proposed is board pressed with best quality laminate.
- 5)There are less chances of contamination of eatables inside.
- 6)Height variation is given in to different compartments so we can keep any required thing of different height.





Concept 5

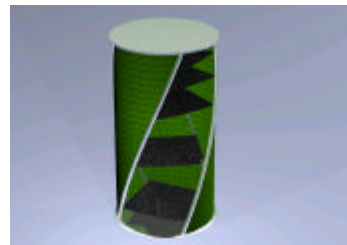
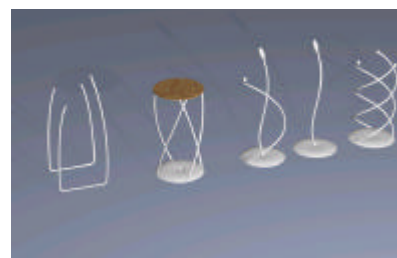
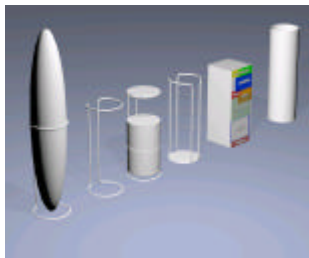
This concept generated to change the looks of the product. It should give pleasant feeling to the viewer.

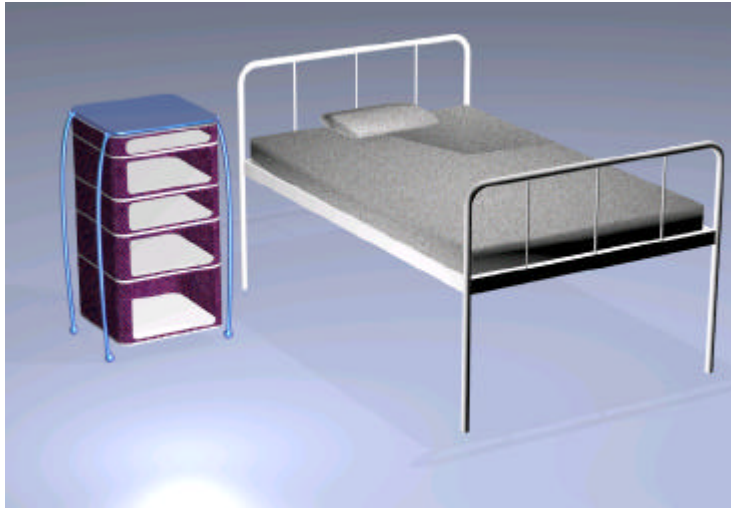
The bedside storage is not just dead storage cabinet but also can play interesting role to enhance hospital environment & create homely feeling to the patient

All hospitals products are in white color, even if the hospital furniture is in white color, & it gives the feeling hop hospital ness, which may affect the patients thinking while he is alone thinking & looking at thing in the room'. It may make patient realized that he is in hospital & he is ill that also can make him nervous

This attempt was to give different image to the medical furniture & create more visual interest & elegance in to it to enhance patient thinking hence the furniture will take his thoughts away from his illness while looking at it.

The material proposed is: board pressed with best quality laminate, stainless steel pipes for structure, cloth or polyester for curtain.



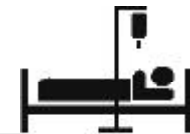
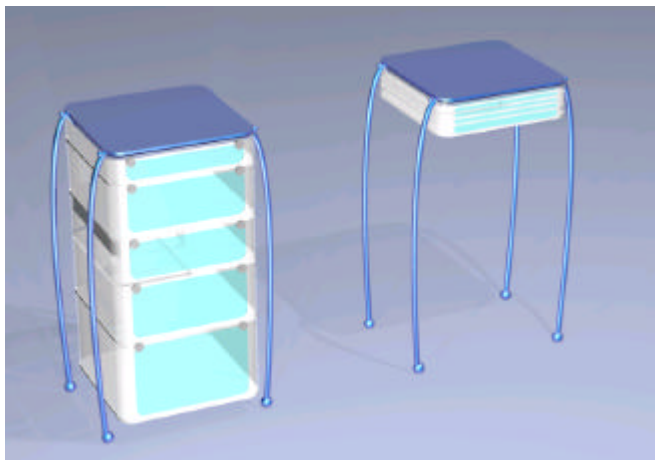


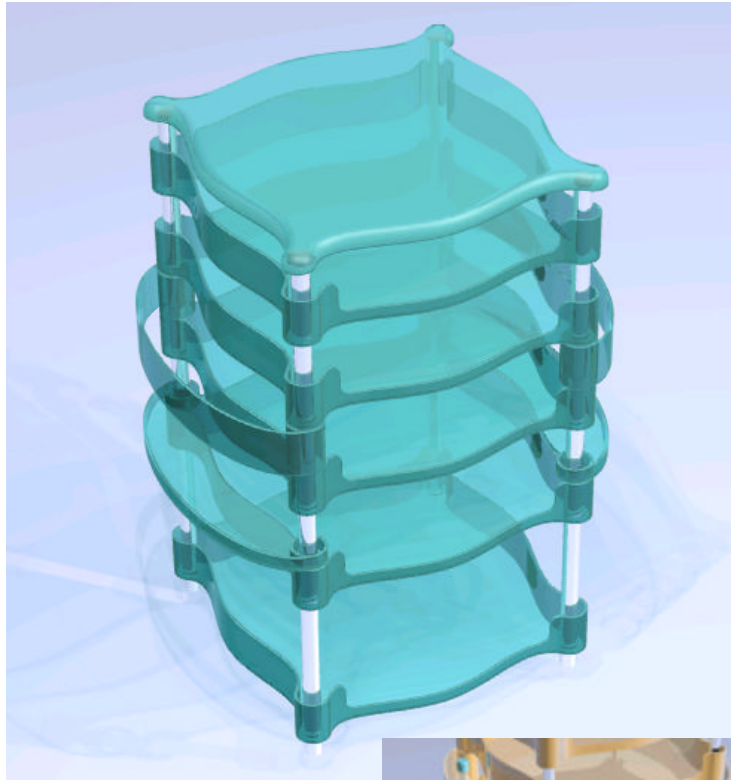
Concept 6

This concept is generated in order to make adjustable spaces. The thought behind this concept was to create a flexible storage unit in order to reduce the cost of manufacturing & material. Also reduce weight.

By using poly propylene film we can make such a storage furniture. The unit is made by poly propylene film & the base of each compartment is made by ABS boards so that the thing inside can rest on the stable surface.

But there are many problems associated with it, one is the stability, but this kind of low cost flexible storage will be very useful in outdoor medical camps.





Concept7:

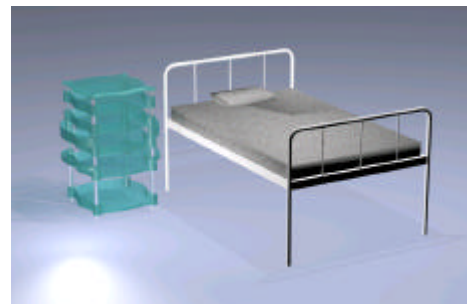
This concept is away from sheet metal

This is made in plastic the concept was to get low-cost plastic molded storage furniture which will be modular

In this concept there are molded trays in single mold & the trays are arranged one upon one on four plastic pipes & the space is created by inserting that pipes with hollow separators as shown

The specialty of this concept

- 1) The special space is created by giving special out standing trays outside to keep water bottles, Tiffin, newspaper & magazines. It is very much visible & accessible to the patient, caretaker, doctors & medical staff.s
- 2) This concept is modular concept which is easy to manufacture, assemble & transport.





Concept 8

1)Is generated by giving more importance to user related problems

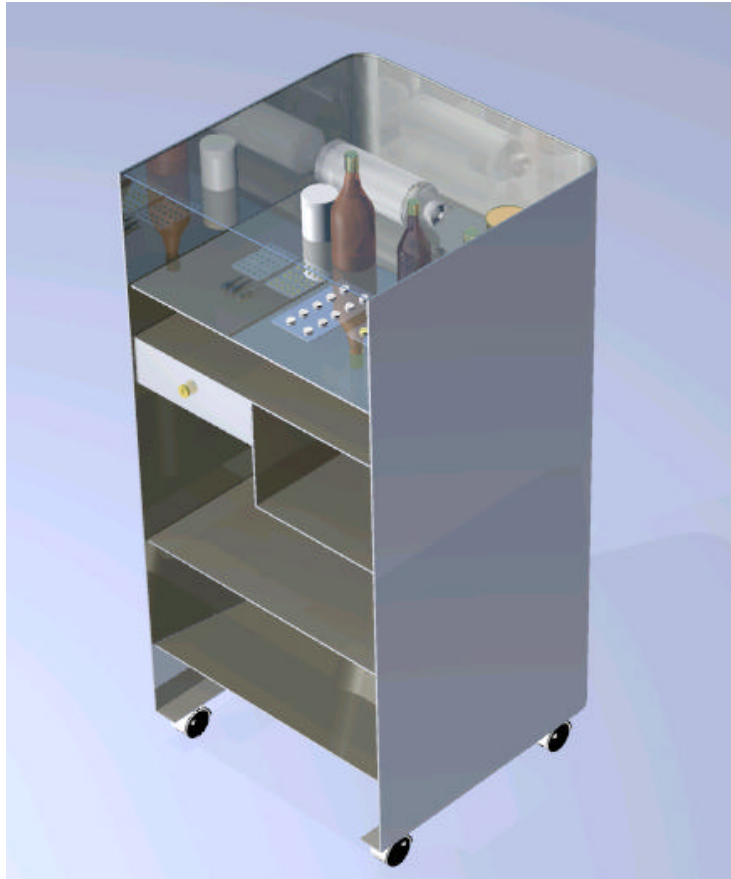
2)It is also designed with the help of volume study.

3)The material proposed

Now as per the user survey of hospital maintenance staff they don't really take care of this furniture they don't clean it frequently so that's why the things are getting rusted &

Because of this problems In this concept I used stainless steel & glass which is easy to clean & non reactive with any medical & bio chemicals Also these material don't need more maintenance.



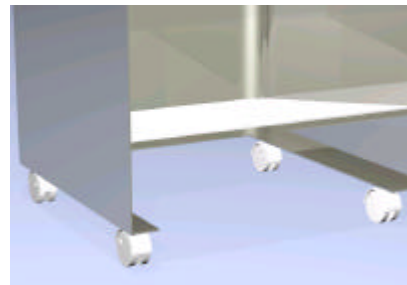


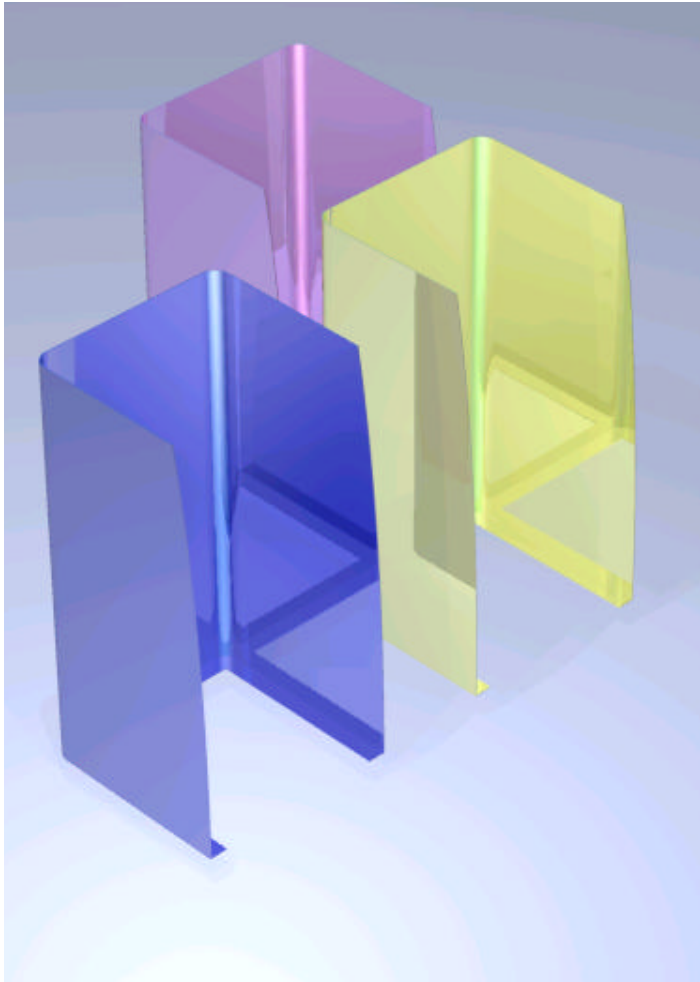
4) The top surface of the storage unit must be use by doctors & medical staff. But patient & his care taker is using it so to guide them properly to keep the things inside & not on the top surface I gave all open spaces to increase visibility so that they can see more spaces to There belongings & to avoid the use of top surface. The top surface is in clear glass so that medicine can be visible to the user & it will be easy to get desire medicine.

5)Also the transparency of glass may help to avoid use of top surface by patient because the glass give feeling of delicacy & fragileness that feel may makes them to not to keep their things on the top surface

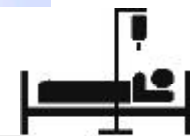
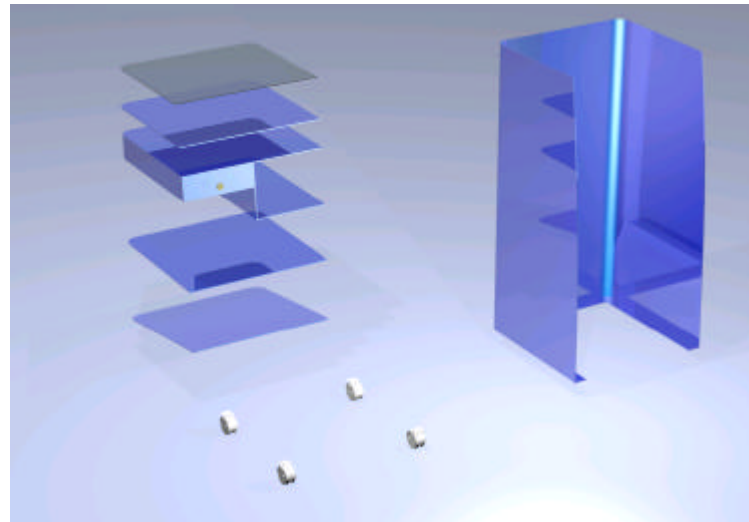
6) It is easy to manufacturing for batch production & easy assembly but still in current design there lot many problems about manufacturing. It this design we try to make components separately & that assemble together

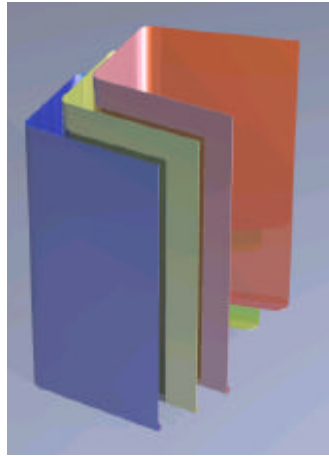
But there are still some issues about manufacturing & structure strength which will be solved during creation of final concept variations.



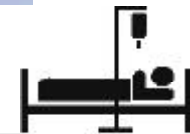
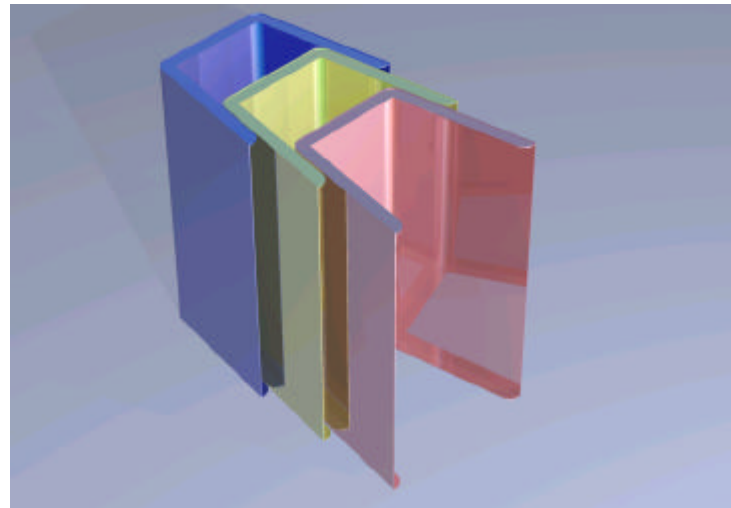
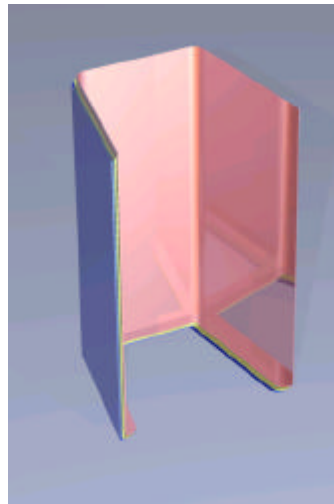


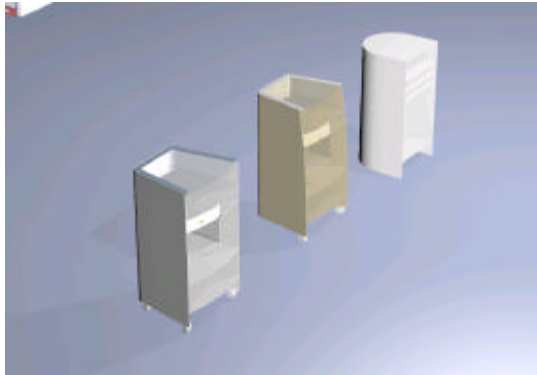
7) Knowing manufacturing problems it must fixing good detailed & it is easy to manufacturing for batch production & easy assembly
 In current design there is still lot many problems about manufacturing.
 It this design we try to make components separately & that assemble together
 But there are still some issue about manufacturing & structure strength which have to be solved



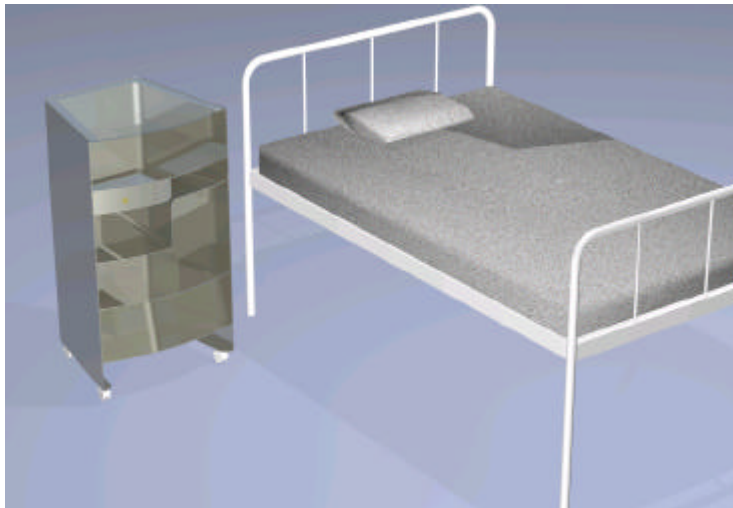
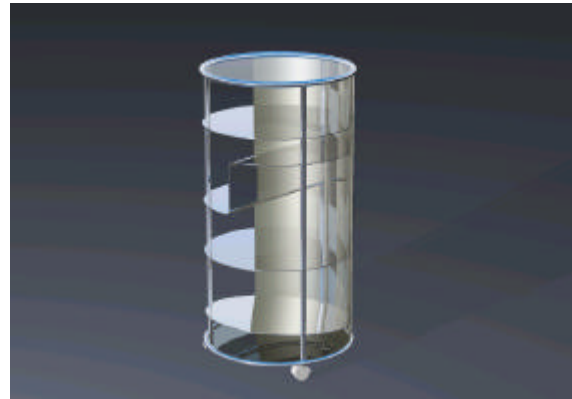


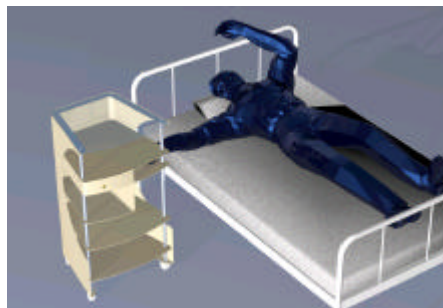
8) Considering transportation problems in that the main problem is volume & second is weight to load & unload the product if it is in part & can assembled on location it will be more easy to carry so there are two ways to make it first is to make this product easy to assemble so that we can carry it in parts & assemble on the location & the other ways to make it stackable so that less volume get use while transportation which reduce its volume hence reduction in the costs.





Some more variations of concept 8





9) In this product the first user patient laying on bed can deal with the thing kept inside the storage, mostly he deals with medicines, water & books or news paper.

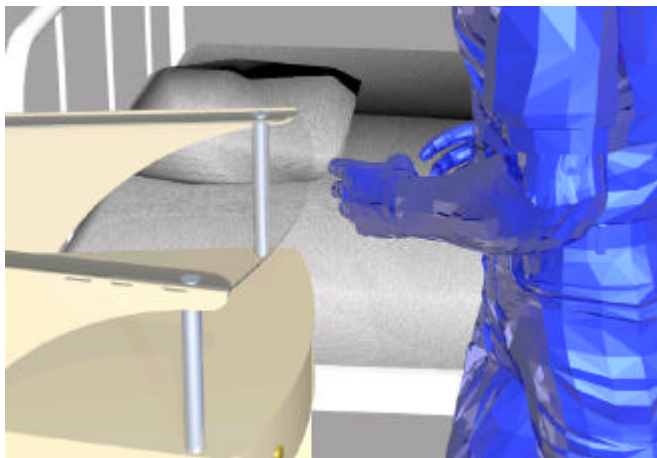
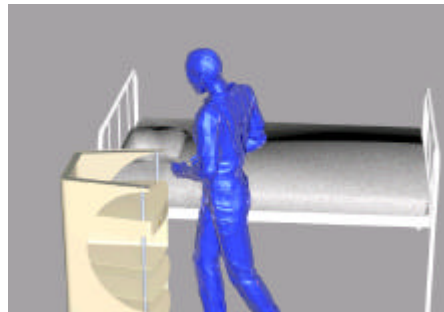
In this concept product he can easily deal with the things kept inside the storage

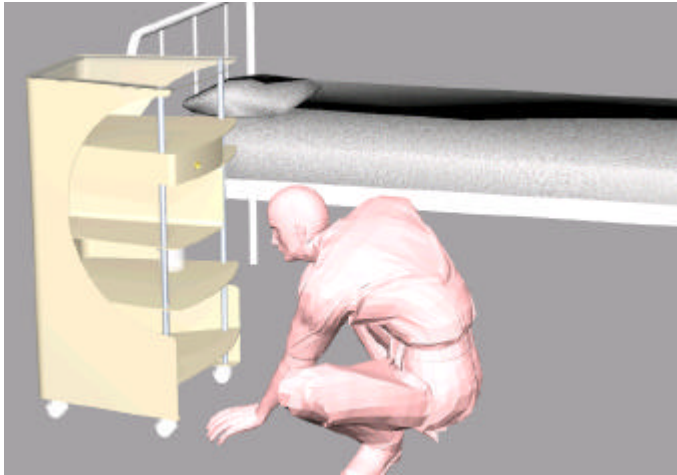


Doctors, Nurses & Medical staff can use the top surface of the product
10)it may remain clean because due to more visibility people find more spaces to keep there belongings

11)Due to transparent glass on the top surface now nurse can find the required medicine easily to give it to the patient.

12)The height of the storage is calculated & it is not above the chest height of doctors & medical staff so that person there will be no strain on his arm while putting medical equipment.

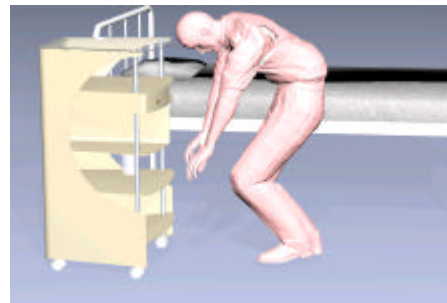




13) The other user in the patient's relative (care taker) now the visibility is more so that he can find the required things thing very easily, in earlier design there was a problem of visibility of the things kept in the lower cabinet & also while taking out the things from lower storage cabinet. In this design I tried to solve the problem by giving a little taper to the base of the lower cabinet & try to reduce the problem.

Because of the given taper one more problems get solved that is cleaning the floor below the storage now it is easy to clean floor without moving the storage.

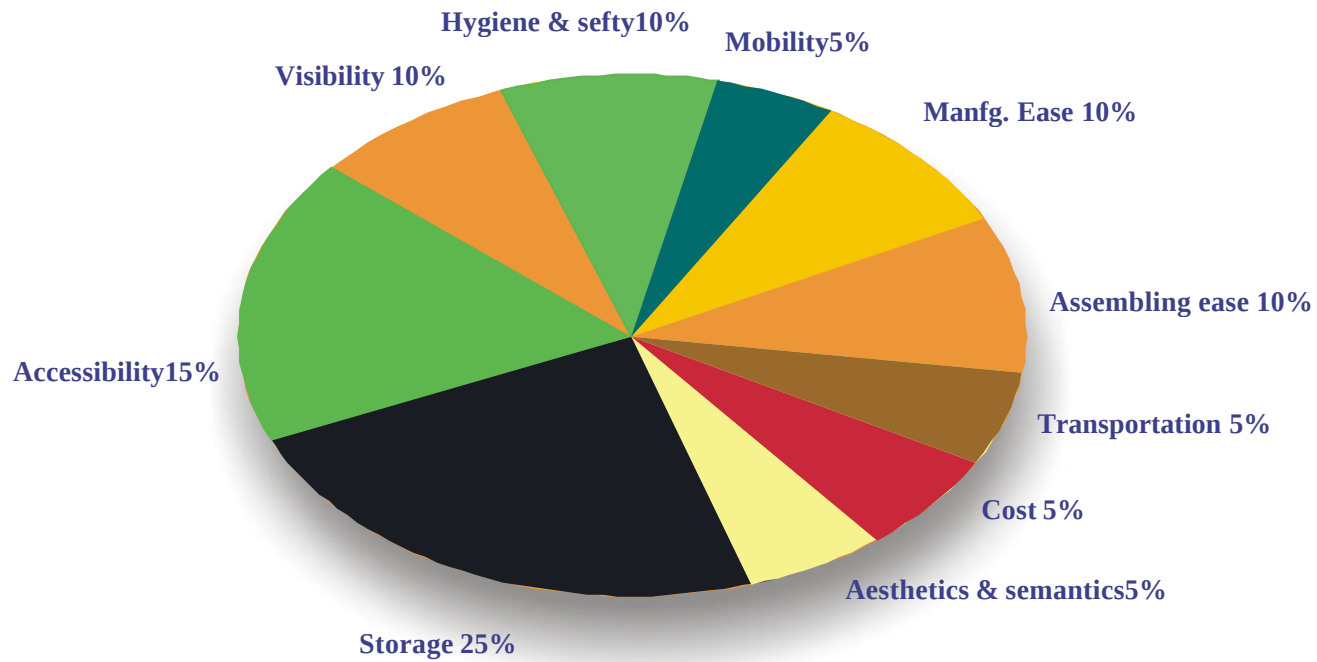
The simple design makes it easy to clean by wet cloth. There are no sharp corners for the safety of patient.



Concept evalution

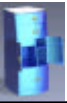


Concept evaluation



Total design 100%

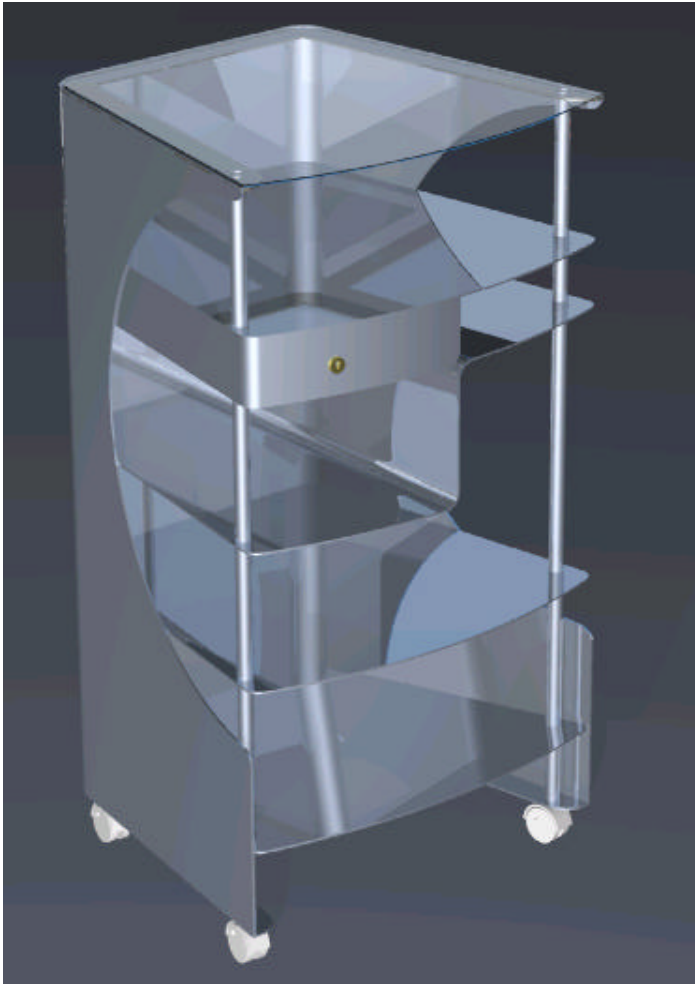


Parameters	C1 	C2' 	C3 	C4 	C5 	C6 	C7 	C8 
Storage 25%	20	15	25	25	20	15	22	25
Accessibility 15%	5	15	10	12	12	8	12	15
Visibility 10%	2	10	4	4	6	10	8	8
Hygiene & safety 10%	3	8	6	10	8	10	6	10
Mobility 5%	3	4	4	4	4	4	4	4
ManSfg. Ease 10%	6	10	6	6	6	8	7	8
Assembling ease 10%	4	10	4	4	6	8	9	5
Transportation 5%	3	1	1	1	3	4	5	3
Cost 5%	1	5	2	3	4	5	5	3
Aesthetics & semantics 5%	1	2	3	3	5	2	4	5
AVERAGE	48	80	65	72	74	74	82	86



Final design concept





according to evaluation this is the final design concept



Refinement of final concept



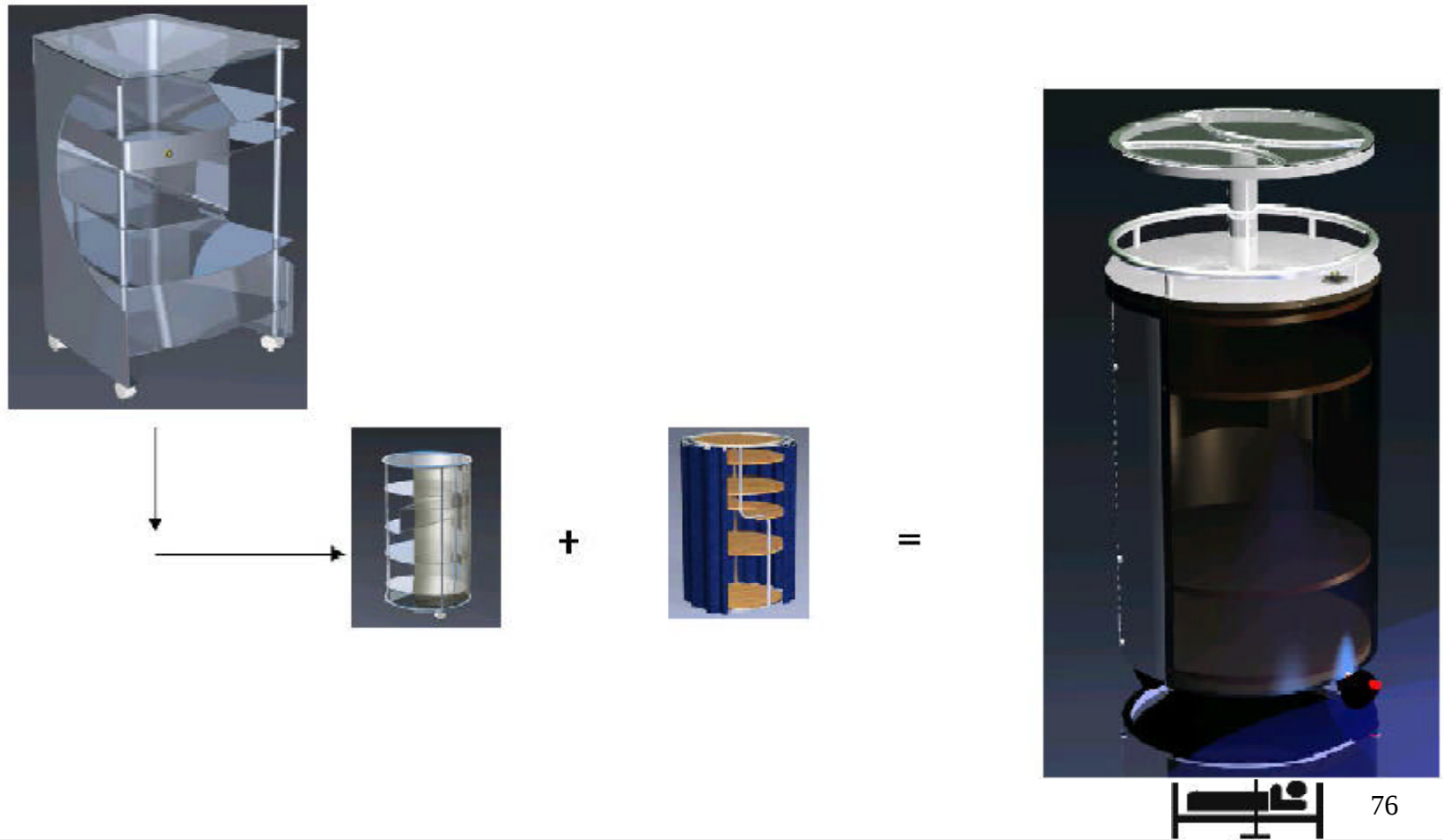
Problems in final concept:

Manufacturing

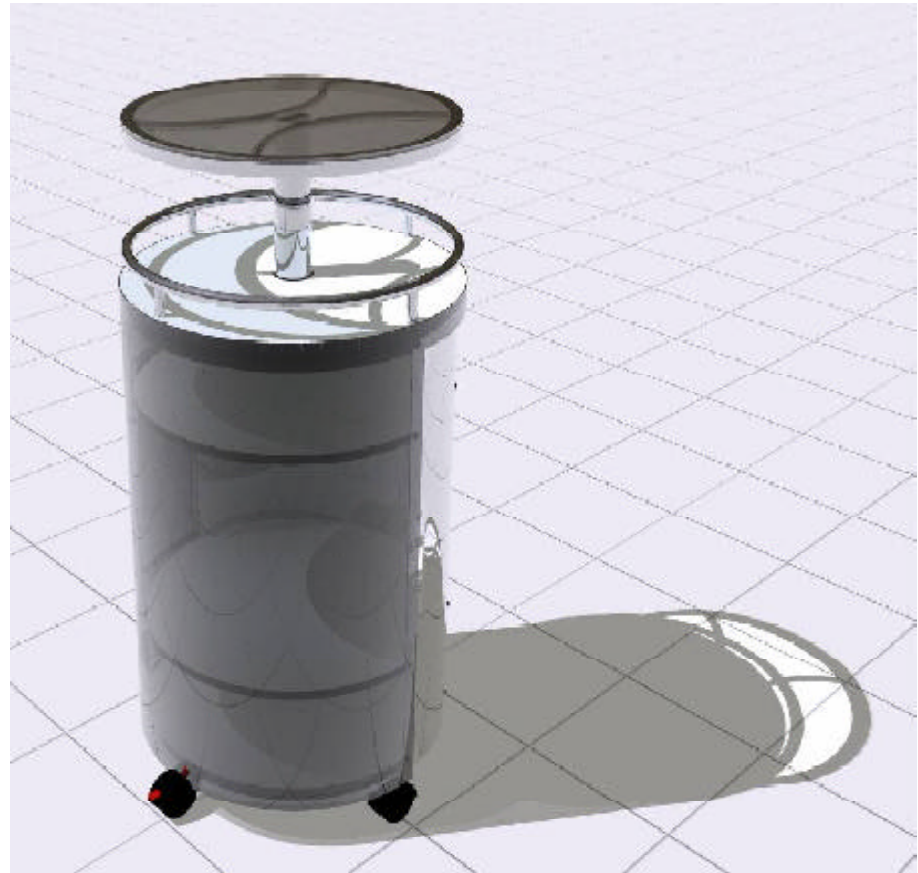
- 1) Cutting of sheet metal
- 2) Bending of sheet metal
- 3) Joinery detailing
- 4) Stability
- 5) Sharp edges treatment
- 6) Rigid looks
- 7) no closed space to keep personal belongings



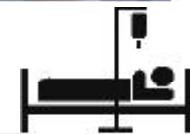
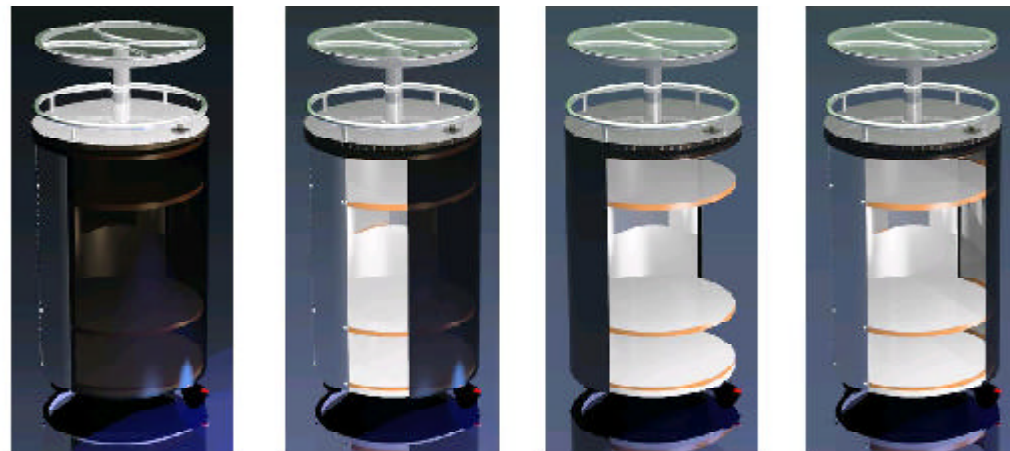
The final product further refined by taking some ideas from other concept.

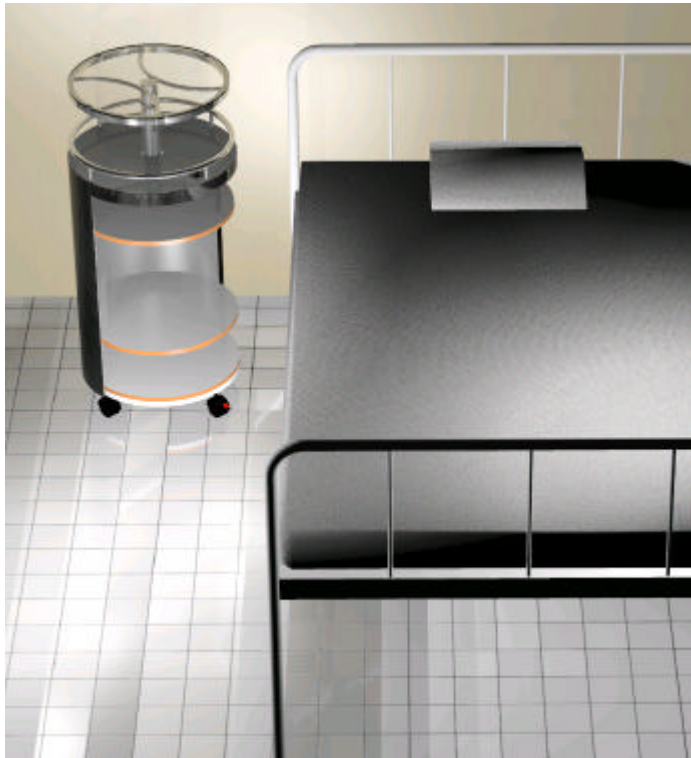


Final design:



Opening of the door is a one of the USP of this product:
Opening of the door is problem in earlier product due to limited space available around it, now in new design the opening of the door is designed in such way, it will not take space out side the product.

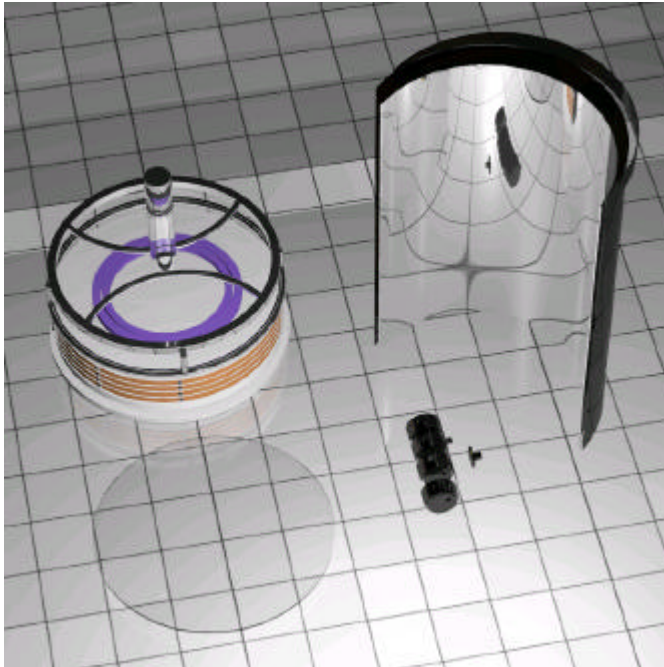




Features of final design

- Free movement & orientation
- Closed space
- Easy to open & close
- Easy accessibility
- Sufficient visibility
- Top surface
- Easy to clean & less maintenance
- Safety

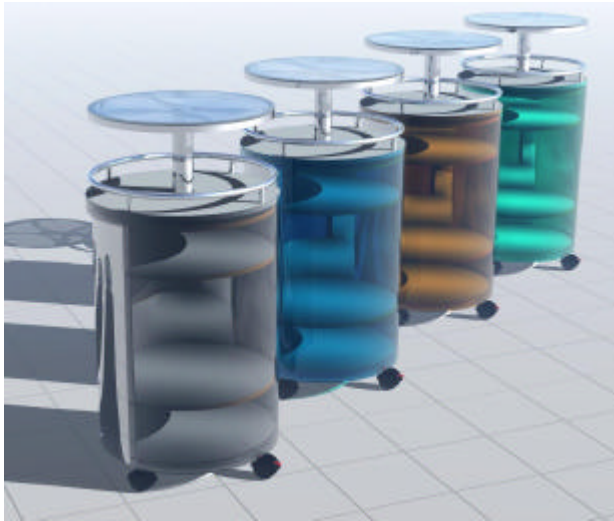




Features of final design

- Easy to manufacture
- Stackable
- Easy to assemble





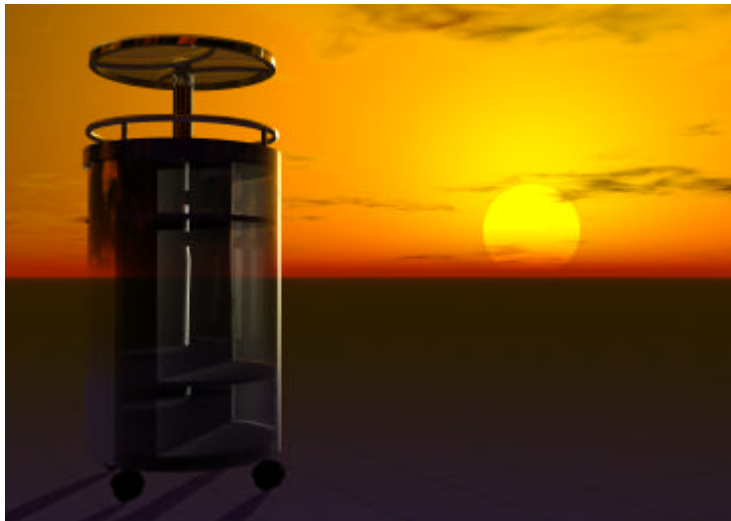
Features of final design

- Cost

Cost is Rs 5000/-
including 20 % profit margin

Mass production: Rs 3800/-





Evaluation of final design

Storage 25%	25
Accessibility 15%	14
Visibility 10%	8
Hygiene & safety 10%	10
Mobility 5%	5
Manufacturing ease 10%	9
Assembling ease 10%	8
Transportation 5%	5
Cost 5%	3
Aesthetics 5%	5
Average	92



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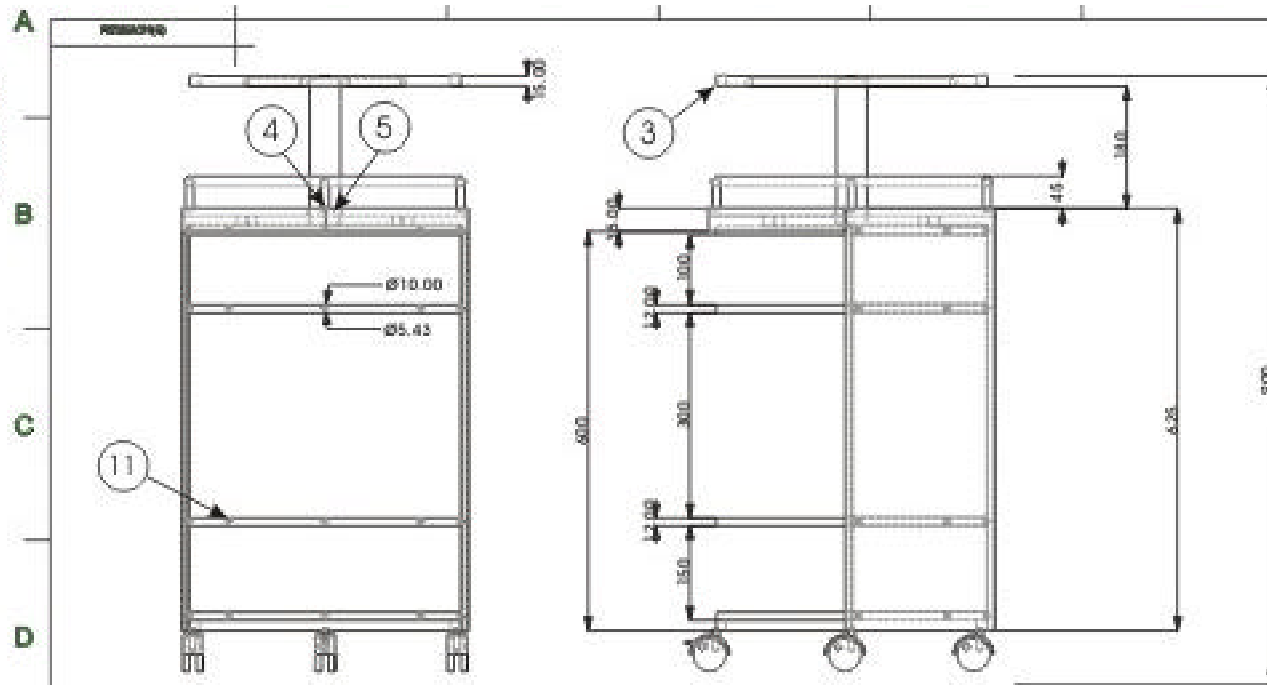
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<http://www.medisave.co.uk/>

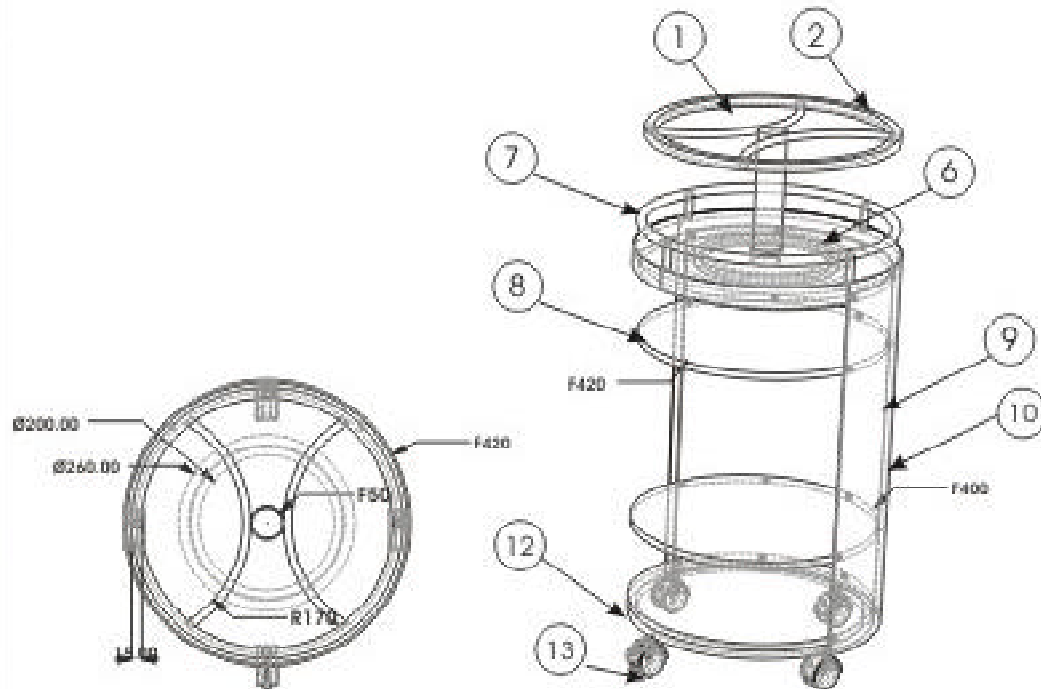
<http://www.sudamafurniture.com>

<http://www.medi-help.de/Nachtf Franz.htm>





10	CASTOR WHEELS	NYLON	4
12	BASE RING	STAINLESS STEEL	1
11	MIRROR SCREW	M.S.	20
10	ACRYLIC FRONT	TINTED ACRYLIC	1
9	BACK	STAINLESS STEEL SHEET	1
4	CIRCULAR PLATE	ECOLENE	6
7	HANDLE RING	STAINLESS STEEL	1
6	BEARING	ALUMINIUM	1
8	WASHER	M.S.	1
4	CENTER BOLT	M.S.	1
9	GLASS HOLDER	STAINLESS STEEL	1
2	GLASS ADHESIVE	ADHESIVE	4
1	TOP GLASS	GLASS	1
SR No.	PART NAME	MATERIAL	QTY.



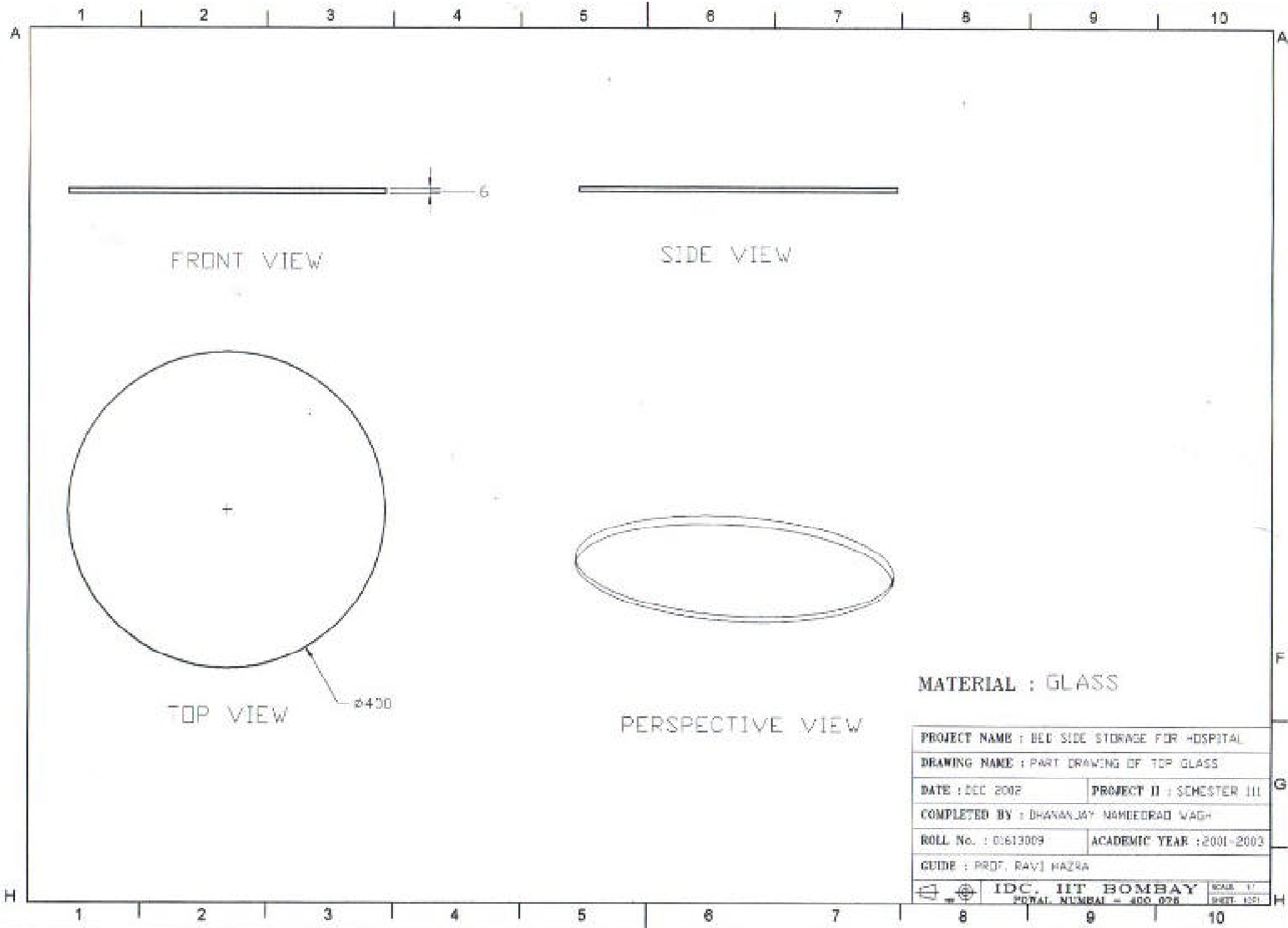
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DRAWING NAME :	ASSEMBLY OF BED SIDE STORAGE		
DATE : DEC 2002	PROJECT II : SEMESTER III		
COMPLETED BY :	DHANANJAY NAMDEORAO WAGH		
ROLL No. : 01613009	ACADEMIC YEAR : 2001-2003		
GUIDE :	PROF. RAM HAZRA		



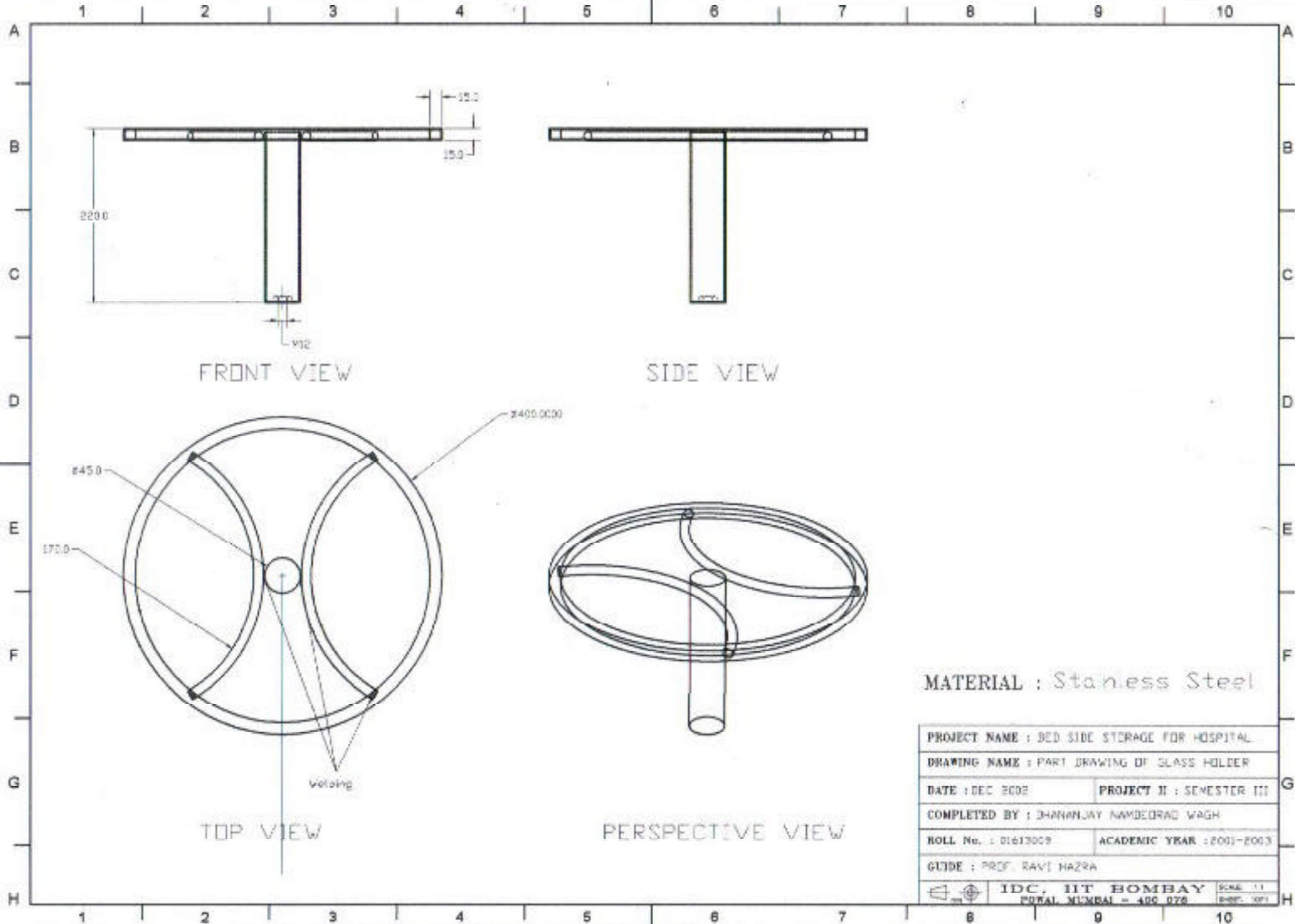
IDC, IIT BOMBAY POWAI, MUMBAI - 400 078



SCALE: 1:1



PROJECT NAME : BED SIDE STORAGE FOR HOSPITAL	
DRAWING NAME : PART DRAWING OF TOP GLASS	
DATE : DEC 2002	PROJECT II : SEMESTER III
COMPLETED BY : DHANANJAY NAMDEORAO WAGH	
ROLL No. : 01613009	ACADEMIC YEAR : 2001-2003
GUIDE : PROF. RAVI HAZRA	
IDC, IIT BOMBAY	
PROJECT NUMBER - 400 028	
SCALE : 1"	SHEET : 101

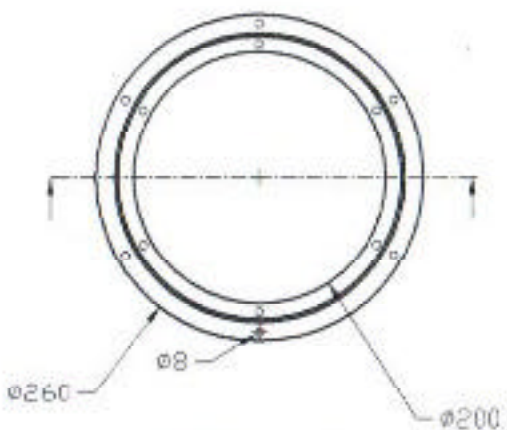




FRONT VIEW



SIDE VIEW



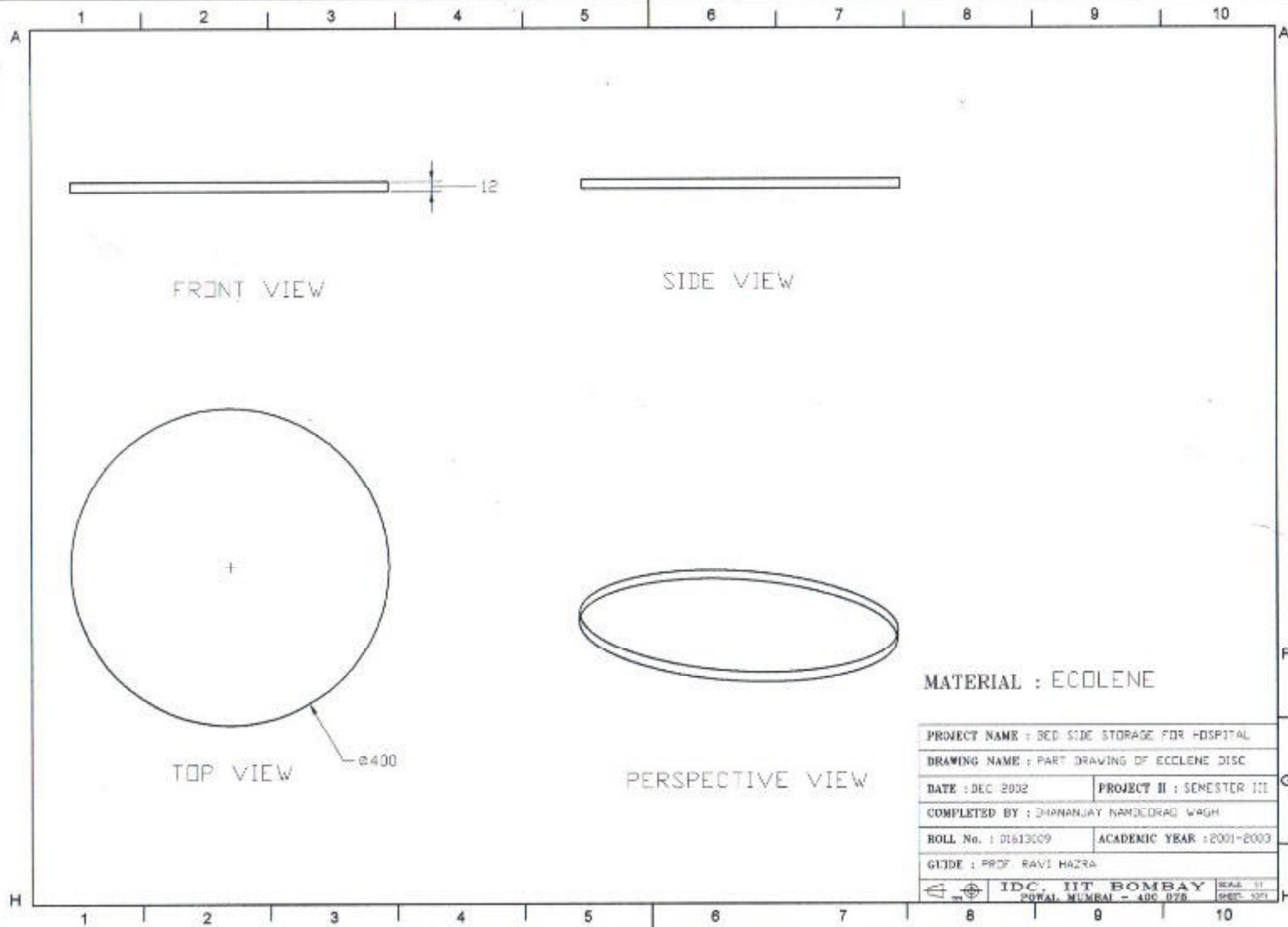
TDP VIEW

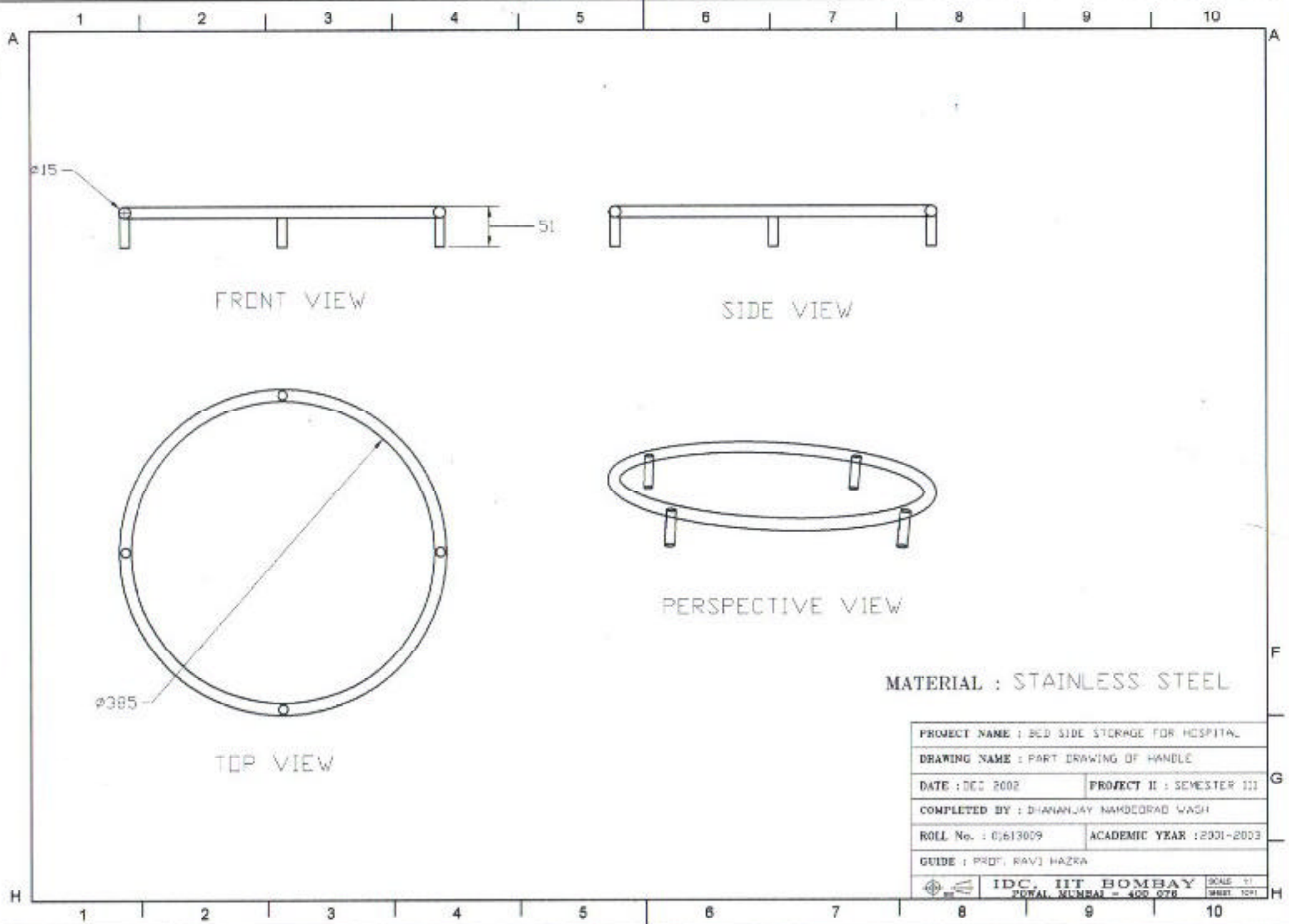


PERSPECTIVE VIEW

MATERIAL : ALUMINIUM CASTING

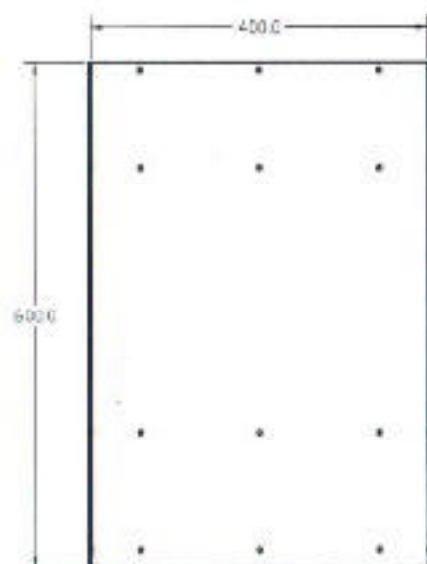
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DRAWING NAME : PART DRAWING OF BEARING	
DATE : DEC 2002	PROJECT II : SEMESTER III
COMPLETED BY : CHANANJAY NARCEDRAD WAGH	
ROLL No. : 01613009	ACADEMIC YEAR : 2001-2003
GUIDE : PROF. RAVI HAZRA	
IDC, IIT BOMBAY POWAI, MUMBAI - 400 076	
SCALE : 1:1	SHEET : 1001





MATERIAL : STAINLESS STEEL

PROJECT NAME : BED SIDE STORAGE FOR HOSPITAL	
DRAWING NAME : PART DRAWING OF HANDLE	
DATE : DEC 2002	PROJECT II : SEMESTER III
COMPLETED BY : DHANANJAY NAKDEORAB WASH	
ROLL No. : 01613009	ACADEMIC YEAR : 2001-2003
GUIDE : PROF. RAVI HAZRA	



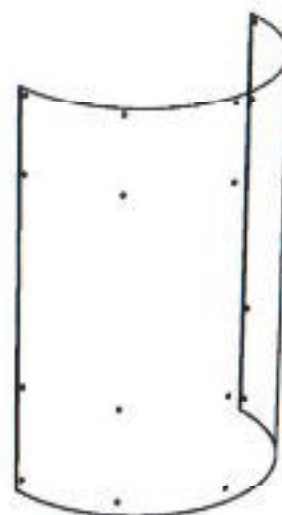
FRONT VIEW



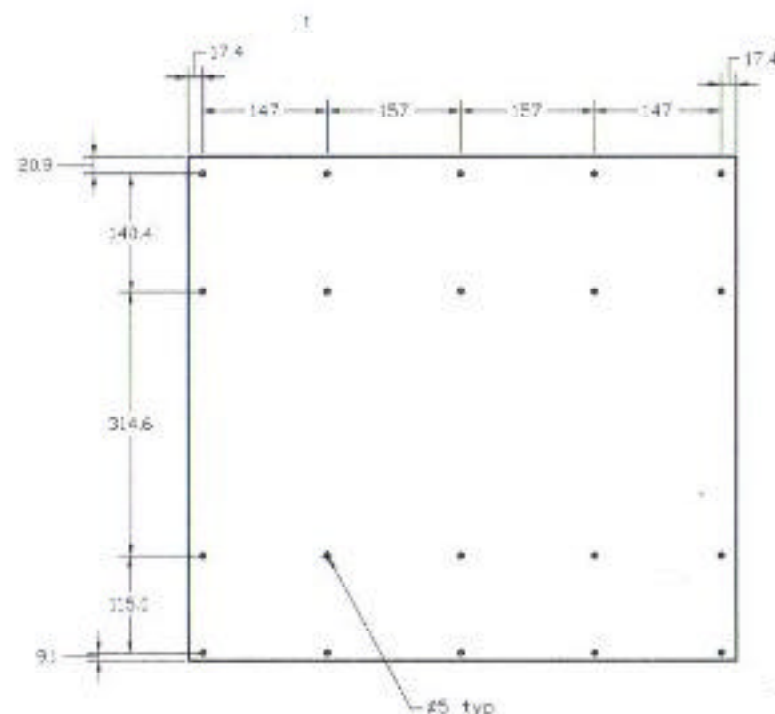
SIDE VIEW



TOP VIEW



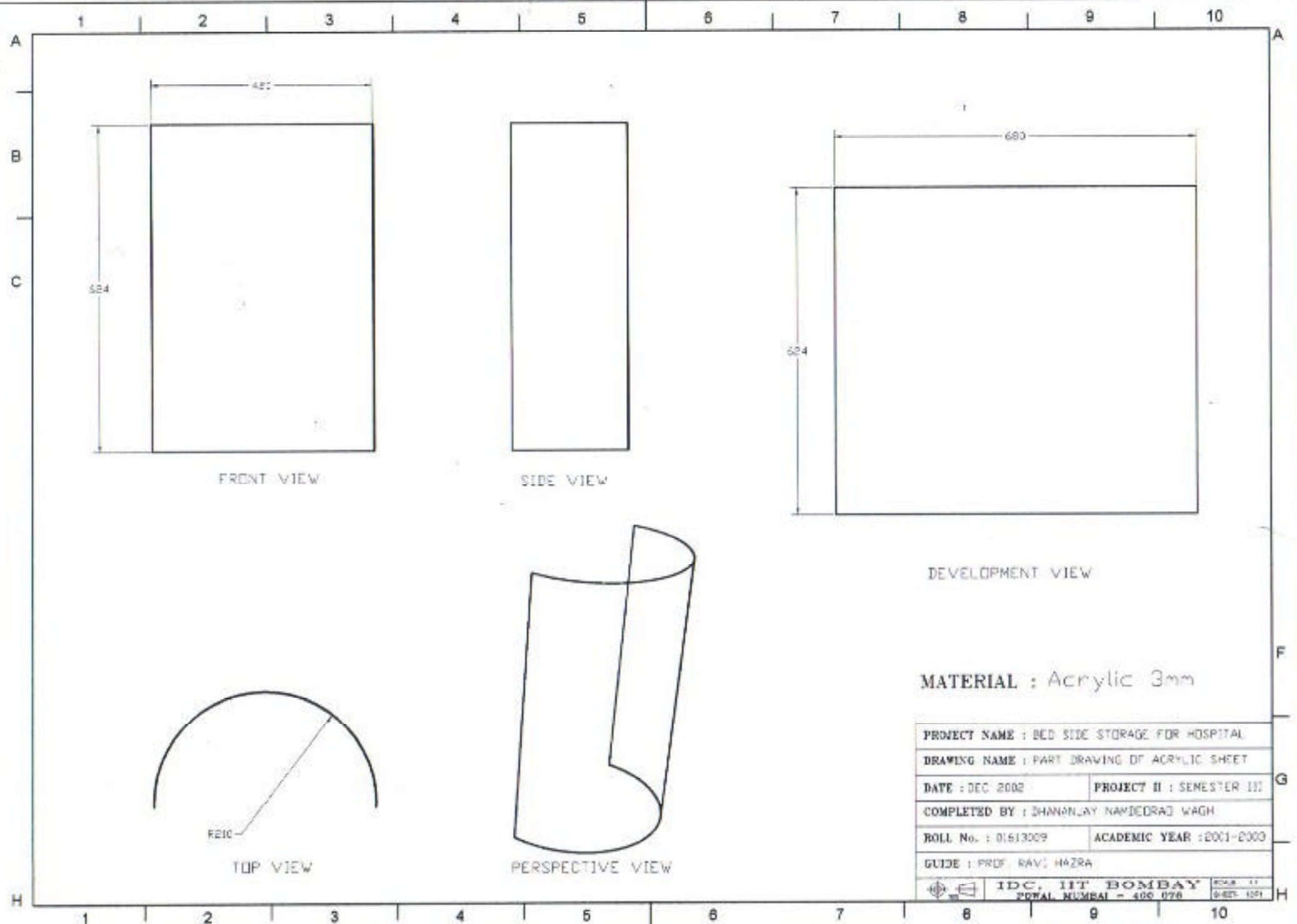
PERSPECTIVE VIEW



DEVELOPMENT VIEW

MATERIAL : Stainless Sheet
22 G

PROJECT NAME : BED SIDE STORAGE FOR HOSPITAL	
DRAWING NAME : PART DRAWING OF BACK	
DATE : DEC 2002	PROJECT II : SEMESTER III
COMPLETED BY : DHANANJAY NAMDEORAD WASH	
ROLL No. : C1613009	ACADEMIC YEAR : 2001-2003
GUIDE : PROF. RAVI HAZRA	
IDC, IIT BOMBAY	
TOTAL NUMBER = 400 078	
SCALE : 1:1	SHEET : 12/1

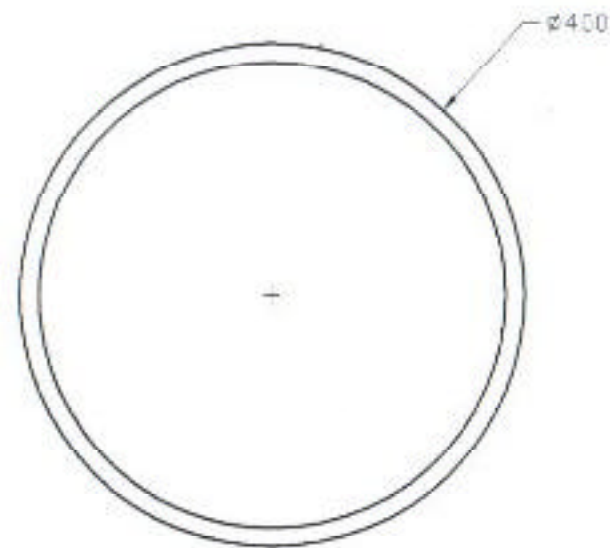




FRONT VIEW



SIDE VIEW



TOP VIEW



PERSPECTIVE VIEW

MATERIAL : Stainless Steel
Squared Pipe

PROJECT NAME : BED SIDE STORAGE FOR HOSPITAL

DRAWING NAME : PART DRAWING OF BASE RING

DATE : DEC 2003

PROJECT ID : SEMESTER III

COMPLETED BY : DHANANJAY NAMDEORAO WAGH

ROLL No. : 01613009

ACADEMIC YEAR : 2001-2003

GUIDE : PROF. RAVI PAZRA



IDC, IIT BOMBAY
POWAI, MUMBAI - 400 076

SCALE : 1"
= 400.000