DESIGN OF TROLLEY SUITCASE FOR ELDERLY

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Problem statement

• To design a trolley suitcase for the elderly considering the problems of lugging about, maneuvering and handling.
Purpose of the project

- To study the existing luggage options available for the elderly
- To understand how the elderly are interacting with the available luggage
- Propose a new design that’s solving most problems the existing luggage pose to the elderly
Introduction

- Traveling and handling of luggage by themselves can be difficult for the elderly, who may be battling with limited strength, eyesight, stamina or dexterity.
- Elderly need special type of luggage that can make them self dependent in travel.
Methods used in study

• The main study was at the railway stations and the airports. The elderly were observed in how they managed their luggage.
• The elderly were observed in crowds, ascending and descending the stairs, managing luggage on carousel, boarding and de-boarding for higher surfaces, walking around with luggage on even and uneven surfaces.
• A mock up model was made in wood in the same dimensions as proposed for the design. The mock up was tested with elderly in the equivalent places where the study was carried out.
Introduction to 2 wheeled Trolley suitcase

- Trolley cases typically have two fixed wheels on one end with the handle located on the opposite side.
- One needs to drag the trolley with this handle and lug the trolley around.
Positives and negatives of the existing trolley suitcases
Findings at the railway stations and roads

- Indian railway stations and roads are very uneven and rough.
- *Vertically shaped suitcases* are good on rough surfaces, since the centre of gravity is low and thus doesn’t tend to fall sideward. The *horizontally shaped suitcases* are very bad on rough surfaces, since the spacing between wheels is very small and the centre of gravity is high.
- They are difficult to *control on slopes*. The suitcases wobble and fall sideways. The user has to continually check the orientation of the suitcase.
• Effort is required to pull the 2 wheeled luggage. The *weight* doesn’t get *transferred* to the wheels in the conventional suitcases, but comes on to the arms, shoulders and back.

• Such *straining* of the *back and wrist* of the user, lead to the design of the spinner wheeler suitcases (to be discussed further)

*Pain in the knee joints gives into a hunchback stature when lifting weights*
• The *Twisting motion* involved in pulling a wheeled suitcase, when it wobbles or goes out of control, can be very bad for the back.

• When *encountering a staircase*, the telescopic handle needs to be pushed down to close and the handle on the suitcase be taken and carried.

• The suitcase keeps *bumping into the user’s legs* and the height of the suitcase makes the *user lift it*, to avoid hitting the stairs, with either a bent posture or a bent elbow.

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*Use the swing of the leg to lift the baggage up*

*Tilt at an angle to sustain weight of the bag*

*Figures showing bent postures and way the legs are used to support the baggage*
Problems seen at the airports

• Since we cannot predict how the baggage would be *facing us* when it arrives on the carousel, *non-provision of requisite handles* created problems and people had to grope for the edges of the zip or the wheels to drag the luggage out.

• *Recognition* of their baggage was a problem. The elderly get embarrassed when they pick wrong luggage or *get anxious* when unable to recognize their luggage in the pile.
**4 Wheeled upright spinner wheel suitcases**

- Very convenient, as moves in any direction and thus can be *maneuvered easily*.
- Handling on surfaces, turning, easy, since it *requires a pushing* motion, not pulling.
- To get one up or down an escalator it is easy, particularly if your other arm is occupied with something else.
- Harder to balance - if one of the wheels is out of balance, it can throw off the luggage.
- Negotiating slopes, carpeted areas and rough surfaces is a problem-can *hurt the wrist badly* when countering the fall.
Design of the suitcase

- The present design shifts the boundary of the suitcase.

* Duffle bag

* Trolley suitcase
Positives and negatives of a wheeled duffle bag

- A duffle bag can fit in a lot of items and is very *easy to carry around*
- The wheeled duffle bags have a disadvantage that they *can’t be put upright.*
- When encountering crowds or staircases, *switching* from the telescopic handle to flexible handles is not easy.
- Duffle bag is lighter than a suitcase, is easy to maneuver around and has the maximum dimension of itself, in the direction parallel to the ground when held up in the hand, thus *doesn’t* become an *impediment* to walking.
- The clothes can get *crumpled* up in a journey
- Are *inefficient* at being handled on an *uneven* road by dragging
Thus this design concept aims at taking the best of the two...the duffle bag and the trolley suitcase to make a new product, that is

- Light in weight
- Easily maneuverable
- Has well placed and special handles
- Keeps clothes clean and well packaged
- Has easily accessible pockets
- Is colour contrasted
- Is of appropriate size for a week’s travel for the elderly
- Easy to operate zippers
- Has Spinner wheels
Design of the Suitcase:
The design
Design of the Suitcase:

Flexible, soft handles

Hard plastic handles
Design of the Suitcase:

- Handle shaped like that of a walking stick
- Turns and can get locked at every 90 degree rotation
- Smaller dimension comes in contact with user
- Longer dimension in the direction of motion
Design of the Suitcase:

- When the need to switch from the telescopic handle to the body handles arises, the switch is instantaneous and there is no need to draw the telescopic handle down.
- The arm of the user is straight when holding it with body handles.
- The suitcase can still keep rolling on the wheels, so the user doesn’t lift it off ground, but has increased freedom in handling and control on it. The suitcase can be dragged thus on any kind of surface.
Design of the Suitcase:

• **Design of the telescopic boom handle:** The handle is made in the shape of a simple projecting *walking stick handle*. When pushing the suitcase and walking by the side of it, the *wrist* need *not* be strained and the handle can be held very freely and naturally.

• The dimensions are as follows:
  • *Maximum height at curvature*: 22 inches
  • *Height at shorter curvature*: 17 inches
  • *Width of the case*: 15 inches
  • *Depth of the case*: 8 inches
  • The volume of the case is 28 litres.
Photos of the mock up
Photos of the mock up
Conclusions

• The suitcase was tested amongst the elderly groups and they found it working very well.
• The shape of the handle was especially appreciated considering a natural holding posture than holding a horizontal bar seen in the existing trolley suitcases.
• The shape and the way the suitcase moved surprised the group. They found it a relief to use the backache removing design, where we push rather than pulling the suitcase.
• Since the suitcase doesn’t bump into the user when lifted, the elderly could happily hold a walking stick in one hand and the suitcase in another.
• The suitcase moved satisfactorily on almost all types of surfaces.
Conclusions

• But, considering the inputs given on the testing of this mock up, it was understood that the shape and the handle were working well, but there was more work to be done with the wheels.

• A proposal for further research is a design with 3 wheel, one roller ball in the front and 2 spinner wheels (large dia) at the rear end. The bag can be tipped by pressing down on the tip of the handle (ref illus) and the obstacles and other uneven surfaces can be encountered easily.

Press further on the handle and the suitcase tips over the rear wheels. The front roller wheel lifts up and obstacles are passed over.
Thank you