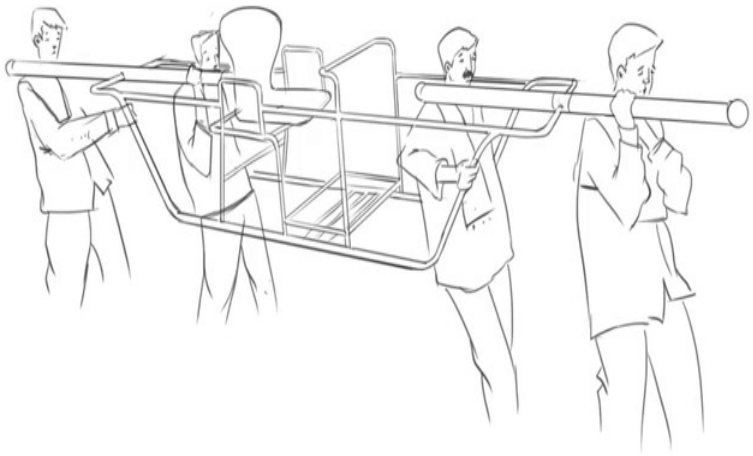
Innovation by Design
Dr. B. K. Chakravarthy
Department of Engineering Design
Indian Institute of Technology, Bombay

Module - 05
Start of section 4
Lecture - 32
Prototyping: Alternatives in structure and materials

So, we work together very closely and we came up with our first prototype.

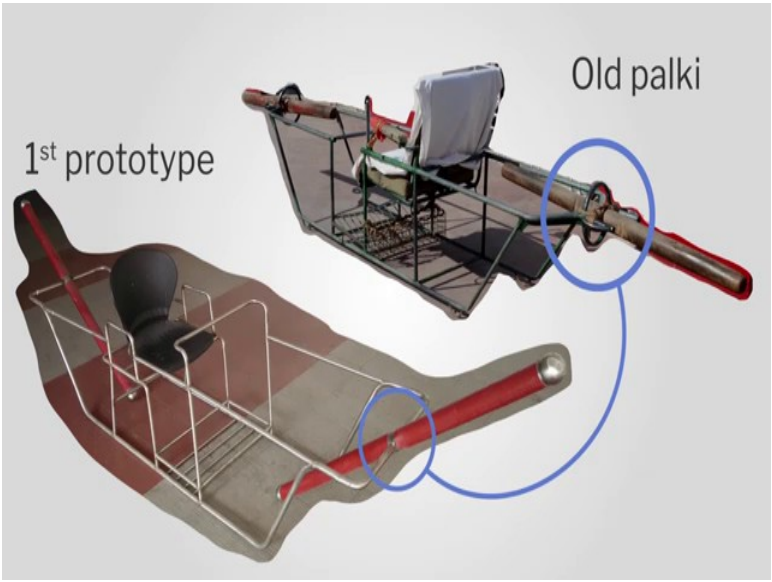
(Refer Slide Time: 00:08)

(Refer Slide Time: 00:10)



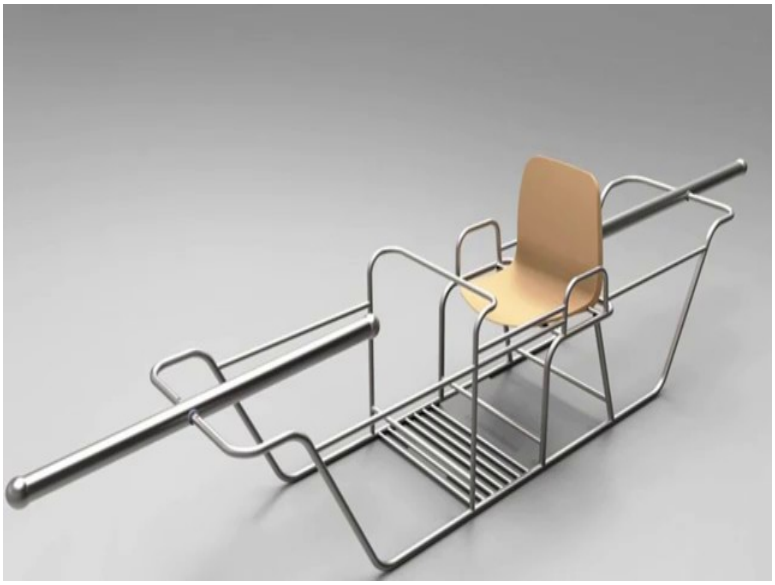
Look at the first prototype design the dimensions are pretty same. We did some amount of innovation where we reduce some of the pipes, we failed miserably when we did the user testing.

(Refer Slide Time: 00:19)



We removed the pipes it is used for gripping in accidents. For example, you slip you want to grip something we removed those pipes.

(Refer Slide Time: 00:38)



You can look at the cad model and we said you know we are all use to this plastic moulded chairs are very comfortable right the lumbar support is very good.

(Refer Slide Time: 00:37)

I said why do not we use these plastic moulded seatbacks? So, we went to the seat manufacturer we bought a plastic moulded seatback and bolted into the to the palki.

(Refer Slide Time: 00:45)

And we quickly prototyped this we make made the whole prototype in stainless steel pipe because now we are experienced from Ajanta palki and lot of people said why do not you use composites? Composites are lighter than stainless steel. But I knew from my experience that composites are very expensive and they have larger lead time for moulding and processing and you know implementation and then you know longevity also is an issue.

(Refer Slide Time: 01:11)

We had more strength in stainless steel welding and local fabrication. So, we also look at that as our option.

(Refer Slide Time: 01:18)

And we went to Katra again and we did the tests and the porters were very unhappy, they said oh where are all my pipes? Because you saw there is so many reasons for which the pipes are there just you know integrated everything we put one pipe structure around it we give a nice look at this how we give the handle, we brought the handle forward and we looked at the comfort of the person who is sitting.

What happens with all of us is you always bothered about the patron or the pilgrim who is sitting. Here the focus has to be the porters not the pilgrim as I told you the porters were pretty unhappy because there was some you know serious issues of gripping holding and it was not sitting in the pattern of their traditional palki and that change was very difficult for them.

(Refer Slide Time: 02:06)

So, we went back quickly and we made one more prototype. So, here what we did? We copied their organization we call it organization.

(Refer Slide Time: 02:16)

(Refer Slide Time: 02:19)

The slopes, the grips.

(Refer Slide Time: 02:21)

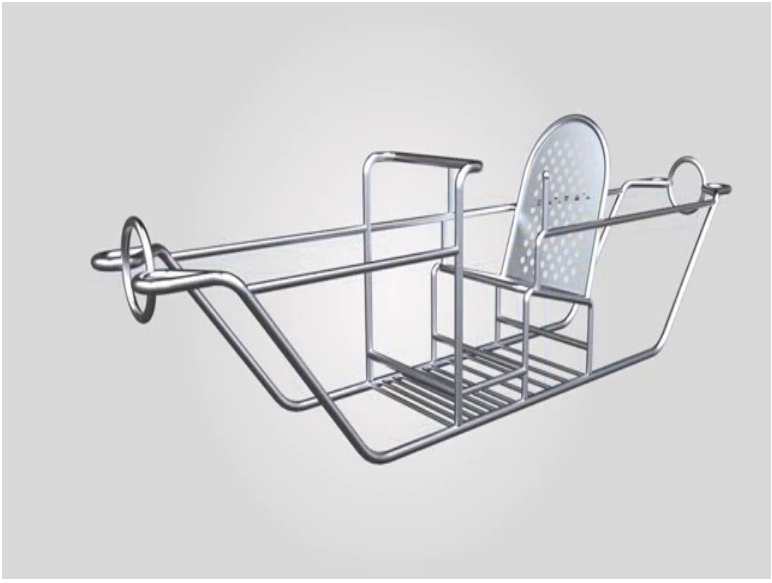
The angles are you seeing now?

(Refer Slide Time: 02:25)

Very very close to the original palki.

(Refer Slide Time: 02:30)

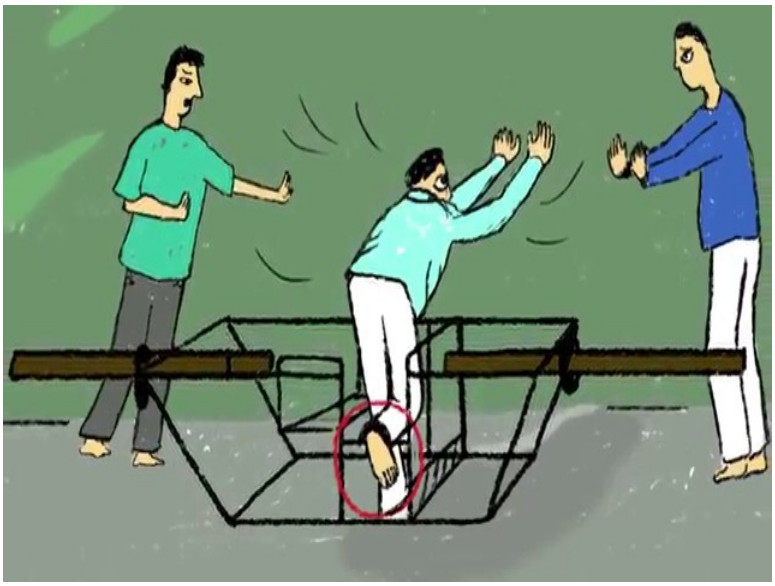
(Refer Slide Time: 02:34)



We just replaced the plastic with stainless steel we added innovative manufacturing details. So that the weldings will not break, we added an integral seat and we perforated that seat so that the weight is not big. So the seat does not need any maintenance. You know what happened with the molded seat you know? It was very comfortable to sit, but on long run the schools were coming off, the seat was getting weak and it need to be replaced within 6 months.

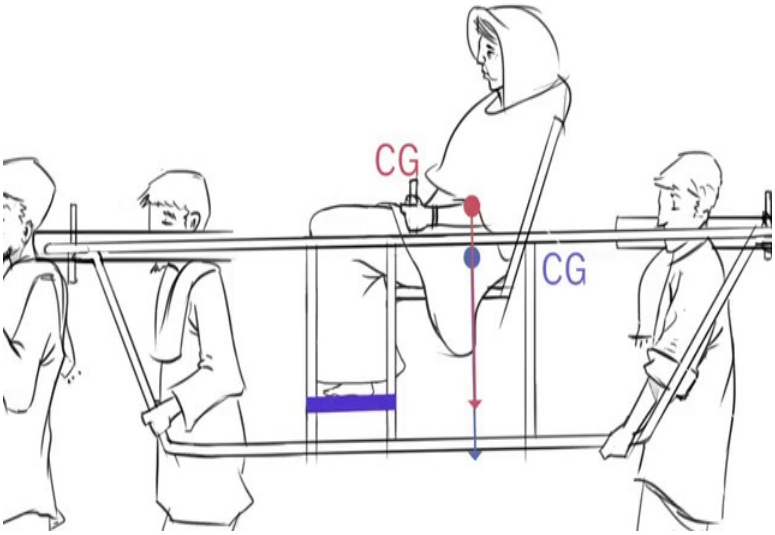
So, the plastic moulded seat was completely unacceptable. So, we went ahead with the stainless steel integrated seat. And then again we went for the you know trials we found out you know what the issues are.

(Refer Slide Time: 03:07)



See there was this very interesting detail where this footrest was in the bottom and there was a pipe to support. When you are coming in and out you could trip on the pipe.

(Refer Slide Time: 03:20)



So what we did was we raised the footrest up. So when we raised the footrest up the whole center of gravity went up and that is very detrimental for the porters the center of gravity line is very critical for them that is a very important lesson we learned from this prototype that we cannot mess around with the center of gravity loads.

So they also make the pilgrim sit at an angle. So there is so much development of participatory design in this that the porters added a lot because of their experience they are running this over the years. So with that experience you know we need to you know we need to learn very humbly sometimes we fail miserably, but we learned from them what are the critical factors and came up with all the details.