Innovation by Design
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Module - 07
Start of section 3
Lecture – 45
The manufacturing challenge
From 20 to 200 numbers

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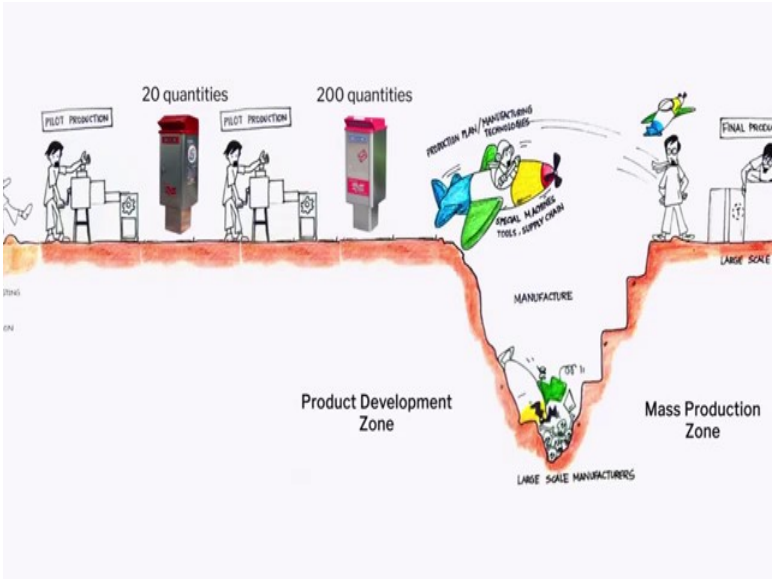

Then to a surprise, you know, as soon as we produce 20, we got an order for 200. So, tell me now, once we have an order for 200, will my old top which is made out of hand made process work for me? It will not.

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So, I like to think of innovative ways of manufacturing the top again.

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Luckily the stainless steel fabrication was anyway high quality CNC production. So, it had all the components which you could produce through CNC manufacturing. So, that was, you know, still there. So, we went ahead back in our journey, went back to concept again and then we tried number of options. Remember, I was always telling you we need to have at least three options before you decide what type of process to use.

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Can you see that white top? What you think the material? Is there in that box which you see on the slide? The bottom is steel on the top. It was supposed to be plastic, but then I had to produce 200 numbers. So, I said can I try aluminum casting. So, this is the aluminum casting top. We tried an aluminum casting too, because now I had to produce, you know, like 200 numbers, sand casting is a very good process to produce 200 numbers. It is again batch production, very convenient. We tried this one, we found it very expensive; we also found it very heavy.

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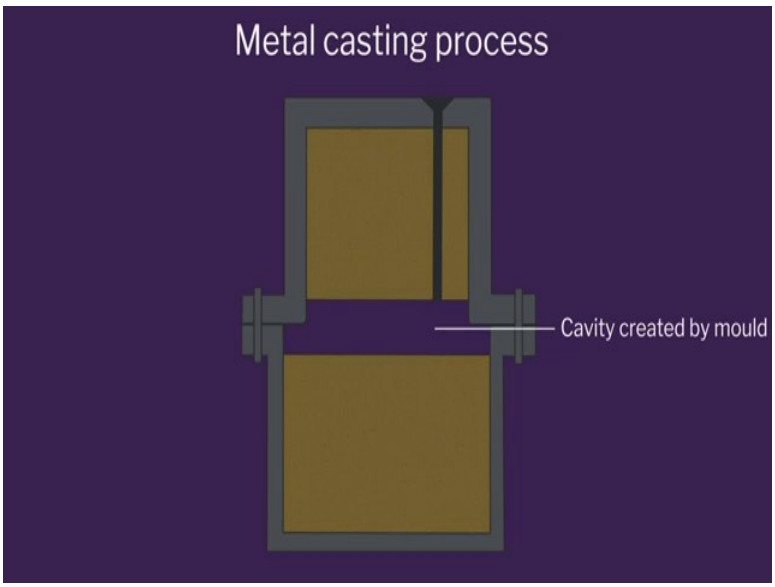

So, we didn't go ahead with this idea. Then we said, this is a sand casting process.

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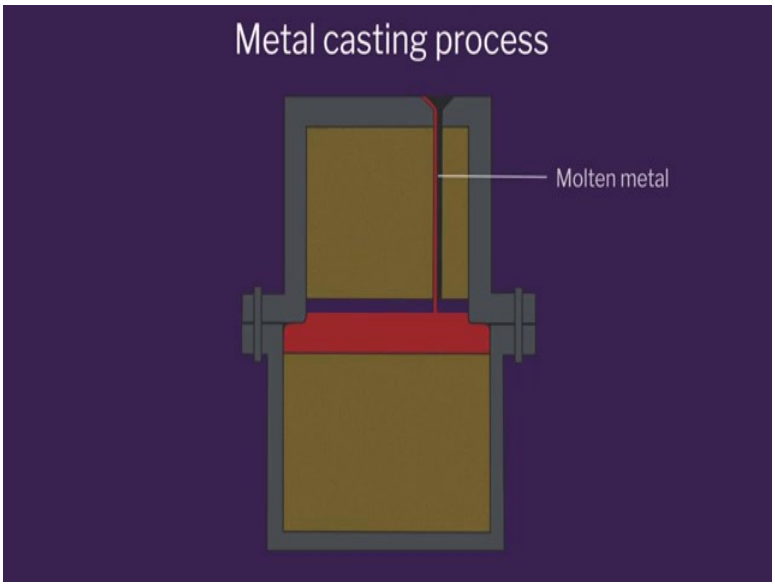

Where you make a mould and then you pour molten aluminum,

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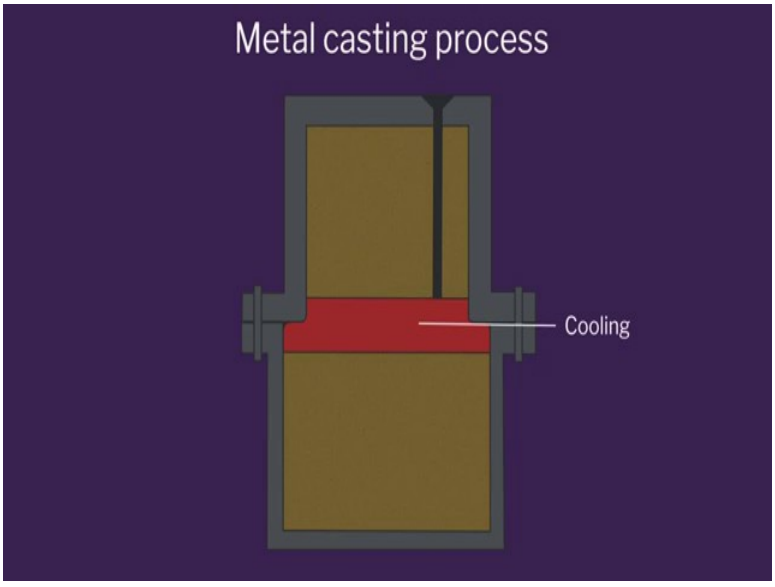

and then you get your, you know, one piece top.

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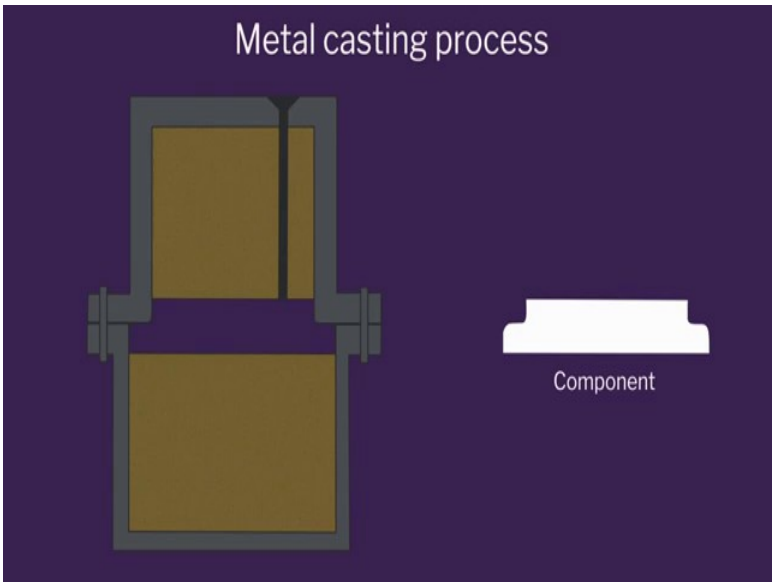

And, then we said, let me try a next technique of low cost tooling called vacuum thermo forming.

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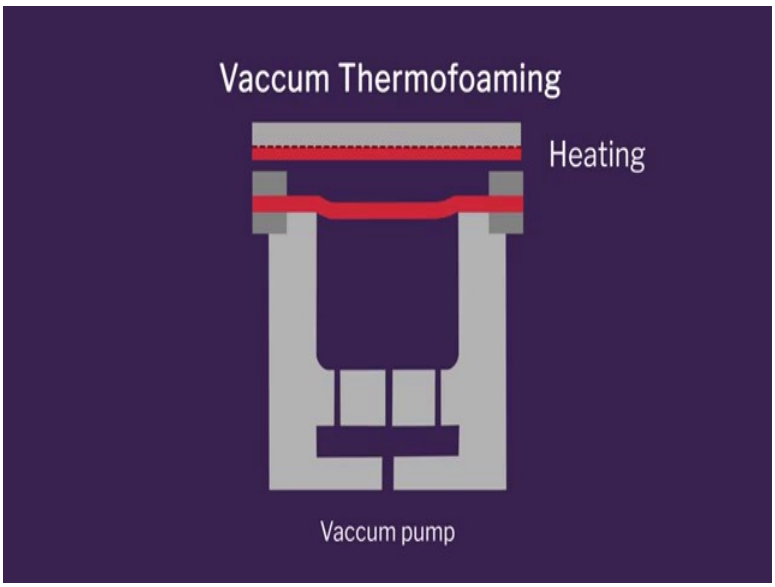

So, what is this process? You have a sheet of plastic, you heat it to the, you know, temperatures where it becomes like a cloth,

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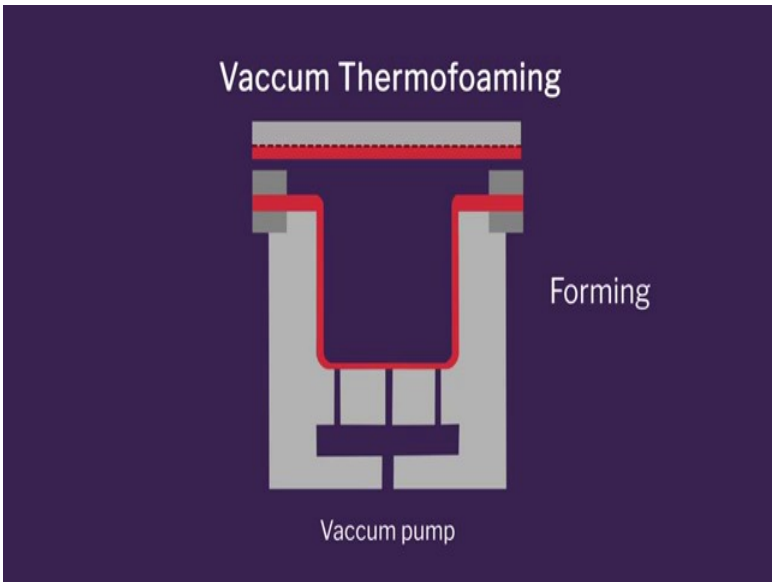

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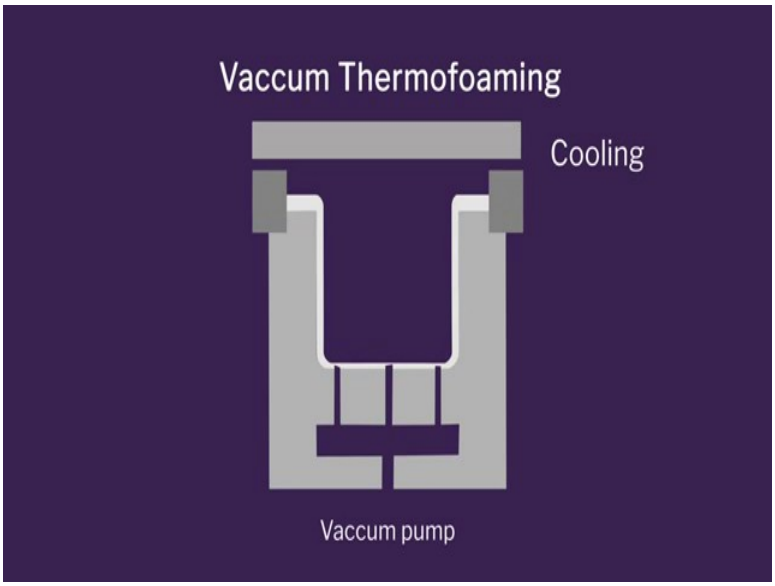

and you wrap it around the mould by vacuum. So, you have the surface and you suck the air out of the surface it sticks to the surface of the dye and that is how the forming is done.

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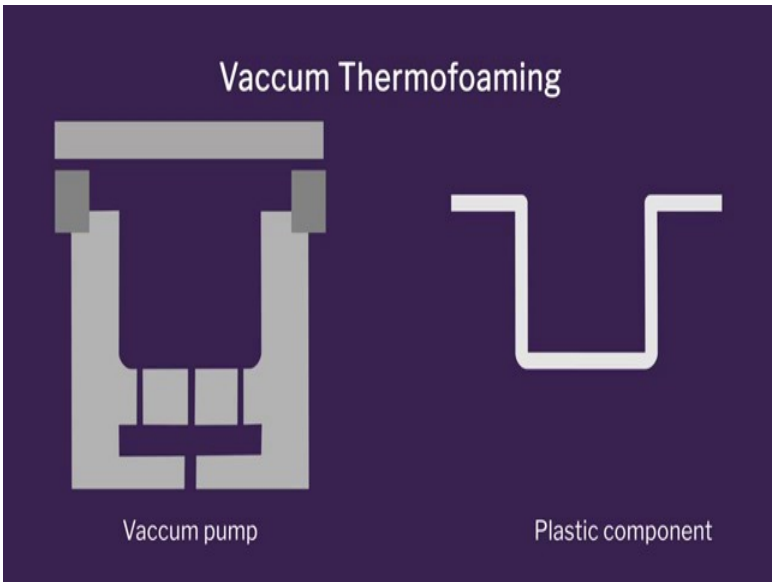

In the cavity also you suck it adheres to the cavity and you get this tray which is available. So, we use the same technique to make the next level. So, in this process we had to go and get the raw material also.

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Luckily we were, you know, happy that GE Plastics collaborated, so we got this, you know, granules, the plastic is made out in the form of granules,

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and we made sheet out of those granules by extrusion.

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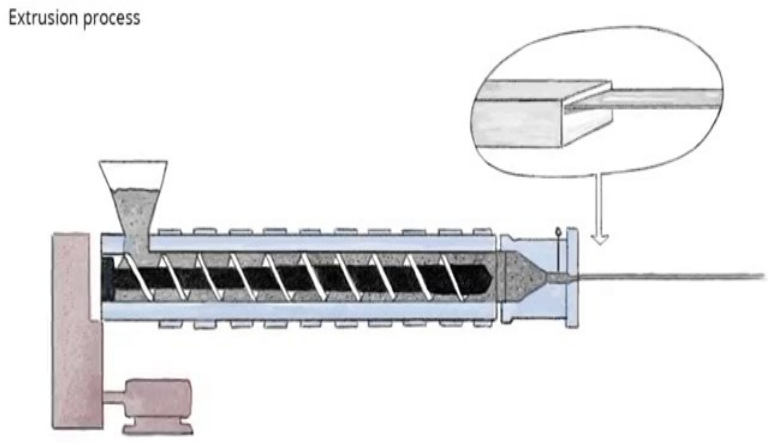

What is the extrusion process? You heat the granules and you extrude out of a thin slit and you get these slabs of plastic. So, we extrude into the sheet. Why do you need to extrude the sheet? Because, nobody has this red color.

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We have to get the granules, we have to extrude the sheet on our own and then we made these dyes.

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The three part dye and finally, you cut all the parts together

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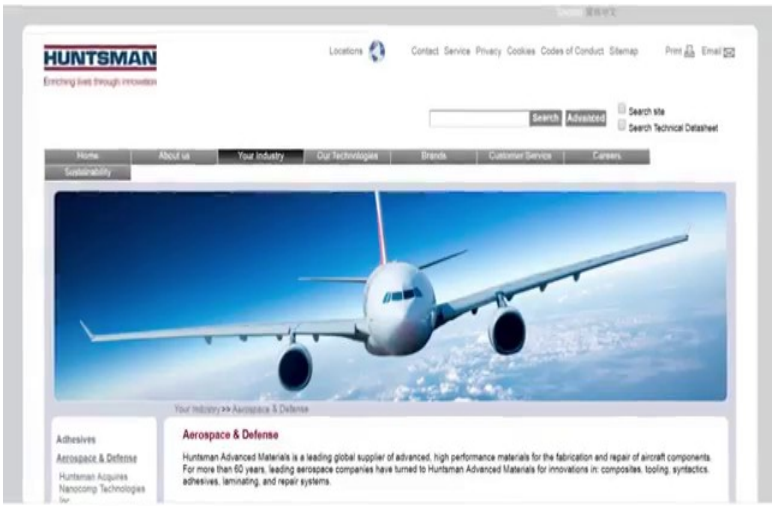

and we joined it using the best adhesives from Huntsman manufacture of adhesives, who makes it really, you know, stronger than a virgin material. Today, adhesives are very very high-tech, you have very very good adhesives in the market, which are as good as the original materials and then we have now the composite to thermoforming top lightweight, you know,

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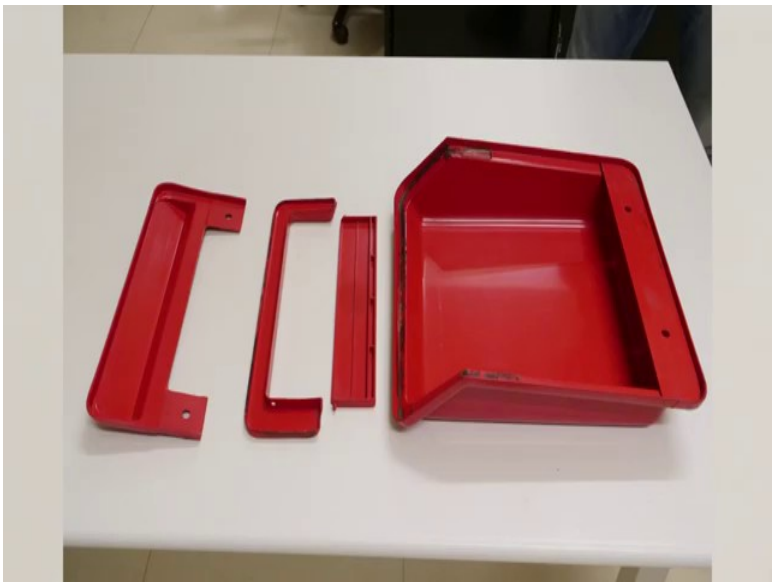

formed out of three parts.

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This is one part.

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This is the front part,

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and this is the flap which goes in and this again was a very very mass manufacturable to a level of 200 numbers. So, we, you know, using the cost again. See the whole business when you come to large volumes like 200 numbers is cost. What type of tooling cost and what type of production cost? And because we are working with the government, it was very difficult for us to convince that please give me an upfront tooling cost and then give me the production cost.

They can't do that; so they said, no no, you said that the post box is going to cost 8000 rupees, we can't give you more than that. So, we have to work out innovative ways of pilot production of how we went ahead with making the top, you can see one of the boxes put in the top.

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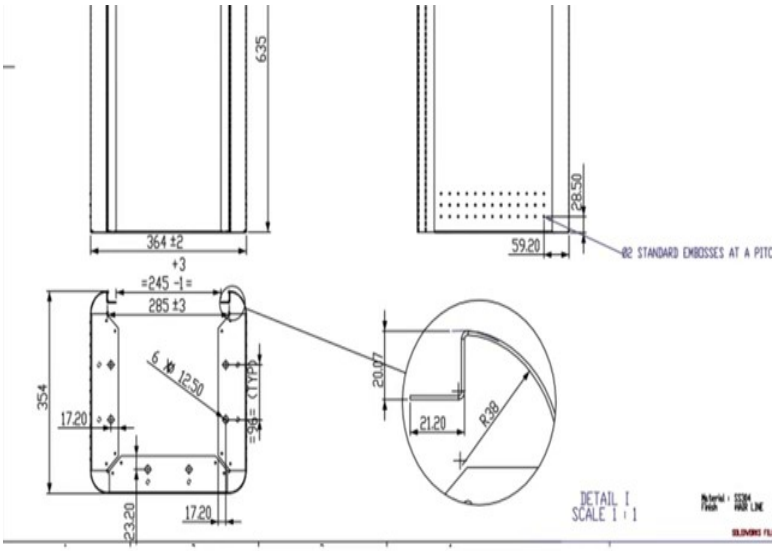

So, here we have the tops ready, then we made all the drawings ready. You can see how engineering drawings are made with all the details

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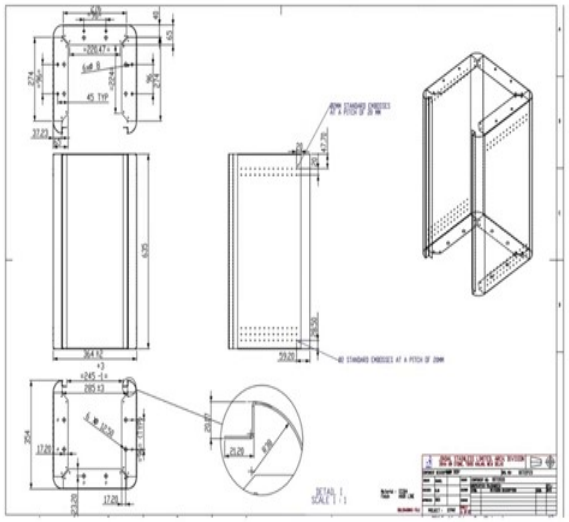

and, you know, this is the assembly drawing; this is the drawing of the base; you see the small indentations to make the stainless steel very strong and, you know, how the whole situation was taken forward and then how the fabrication was drawing was, you know, made. And, remember I was talking about embossing on the post box to make it very

strong. So, we reduce the cost by 3000 rupees by reducing the thickness of the stainless steel.

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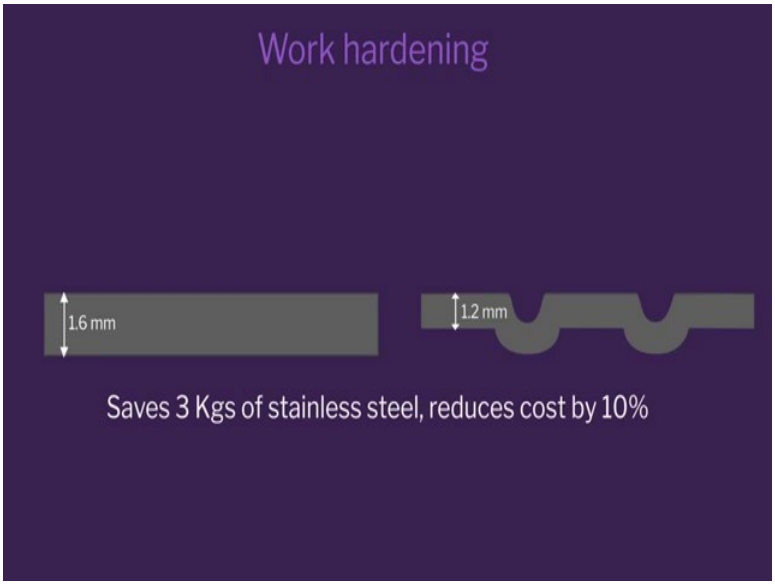

So, what we did was, we used, you know, this work hardening property by doing constant bending, the stainless steel edge the corner which was the most important became very strong and we reduced the thickness of the stainless steel sheet from 1.6 millimeters to 1.2 millimeters and saved around 3 kilos of stainless steel.

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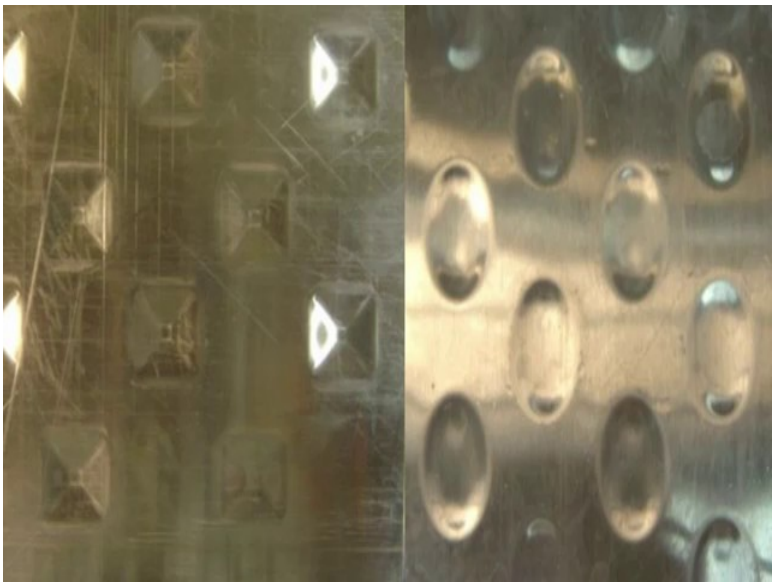

We have these embossings, which makes the surface very strong. So, we use the embossing, we use the bending and made the product, you know, very very strong. So, from these then, you know, we went ahead and we, you know, went for pilot production.