

## *Design Narrative 7*

*a g rao*

### Street lamp for Crompton Greaves

“Everybody said it is a Ferrari, professor!”

I thought that the marketing manager was exaggerating a little bit. But I felt happy! This was with reference to the street lamp which I had designed for Crompton Greaves in 1993-94. The pictures of the new design were exhibited in Korea and that was the feedback. Crompton (India) got into a technical collaboration with a Korean Company to produce lamps with an integral coating which acts as a reflector. The new lamps eliminated the need for ‘separate reflectors’ inside the housing of the lamp. So the need for new lamp design arose. The project came through a development engineer who was a friend of prof.Seshu in the department of Mechanical Engineering, who in turn had put them in touch with me!

Designing a street lamp was an interesting experience. It had content of a typical product with many complexities at a detail level. The product when used widely, would influence the “city landscape”. I looked at the designs of other companies. There were not many. Philips dominated the scene!

I started collecting data from all available sources. Surprisingly the engineers in the company had no knowledge of competitors’ models! I started assessing the need for the angle of the lamps! Street lamps are used for roads with different widths!

The data at the company level was fuzzy! Series of discussions finally culminated into following points:

- The street lamps could be used for roads of ‘3 widths: small, large and very large. Large width will be general demand.
- The height of the lamp pole will vary accordingly.
- The angle of the lamp has to be adjustable accordingly.

The major competitor was ‘Philips’. They had introduced an expensive lamp which had a swivel system and could be adjusted to any angle.

Crompton Greaves could not afford to adopt this strategy!

Their strategy would be to offer street lamps at lower cost!

Here I came out with an **innovation!** I worked out the slopes required for the ‘3’ widths of roads! I introduced a small stepped cast base inside the lamp. The lamp fitting was mounted on this base which had three steps. Mounting on each of these steps lead

to different angle of the lamp. The three required slopes of the lamp were easily achieved by changing the mounting.

*This completely eliminated the need for expensive 'swivel', which involved rotating and tightening for each position!*

This innovation made the new lamp cost effective with the same functional features of the competitor's lamp!

The second feature in the lamp was its slope with the vertical. Two standard slopes were used in street lamps. One which goes along with the bent pole and the other at 90° to the vertical. The lamp had a base pipe which slid over the cylindrical lamp post. The two slopes demanded two types of bases.

*In those days we used to work on the drawing board. A full scale cross section was made on the drafting table and one could see the lamp in front and feel the presence of the product. I see now no body works on drafting boards anymore! It is all on a small computer screen.*

*The advantage of seeing a product on a board that too in full scale is that it has a presence. It starts acquiring a life of its own, separate from you. It is no more your product. As it used to happen, colleagues in the design office, used to peep in ! We start a conversation, I keep explaining the problems,  
and*

***Design became a social act.***

*I still remember how some ideas were suggested by others. It was like a mini brain-storming session! Prof. Bapat said, 'turn around and fit!', when he saw two castings of the bottom of the lamp! It was a good idea! I incorporated it.*

We could get 45° and 90°, by making a separate base plate on which lamp casting is fixed. The base plate has 45° to the pipe on which it is mounted. when we turn the base plate we can get 90° for vertical mounting. It did put some restrictions on the flow of 'Form', but it gave a definite advantage in the 'cost' as it reduced an extra casting!

I made several field trips to see how the street lamps were maintained. A person has to climb up with a separate ladder. The transformer inside the lamp was heavy! It weighed around 2 kgs and was difficult to lift or

remove for replacement as it was usually fixed with 4 bolts. It was even more difficult to bring it down as it had no grip to fold.

*I provided a handle to carry the transformer.*

*(I have never forgotten the weight of trunk I had to carry with a small rod handle- see My Memory lane1)*

So making all these into a compact arrangement went on the drawing board, full scale, where one can feel !

Computer screen gives no such luxury!

But it gives you 3D simulations.

With Computer you need to develop different skills for conceptualization! I come from the old school! I still don't use 3D modeling on computer for concept development! But this could be the future, I suspect! we have not developed enough methodology to bring the 'feel' of physical representation in to the digital screen! With the power of computer it should be possible to develop new ways of visualization!

*Whole new world of design in the digital world awaits us! But often we see even in 'star wars' people fighting with same swords only they glitter more!*

When it came to materials to be used for the new street lamp, there were several options. Sheet metal pressed into shape had been used for top cover in some designs. The bottom shell was generally of steel constructed by welding or cast in aluminum. Parts placed in the bottom like transformer were heavy. So one option turned out to be aluminum casting. There were 3 modes of manufacture possible, sand casting gravity die casting and pressure die-casting. Pressure die castings required high investment in moulds, as it was a large part. So it was ruled out. Gravity die casting remained a good option. Sand casting demanded machining for accuracy and finish, making it more expensive. Gravity die casting in aluminum got finalized as the lamp also generated heat.

For the top cover, the company came up with a new suggestion. They brought a moulded piece from abroad to show! It looked like a injection moulded part. It had many inserts. But it was made by R.T.M. (Resin Transfer Moulding).

*R.T.M is done by using polyester with glass reinforcement. It is essentially F.R.P (Fibre glass Reinforced Polyester). Match dies are used to get smooth moulded finish inside and outside. Gravity pressure is used like in gravity die casting!*

The piece was very impressive. It could withstand heat and resist ultra violet radiation from Sun. RTM was new at that time in India. Few manufactures claimed the ability. They were secretive and not ready to show the process. Myself and MSG Rajan visited a manufacturer along with Crompton engineers. We could not see any product in manufacture. We assumed RTM offered better detailing for the lamp top cover!

I started working on different concepts and 'form'. I made some thermocol models to get a rough perception in full scale. The company wanted to see the preliminary ideas. Normally I avoid early presentation but involve the company in possible ideas! The CEO of the division was an imaginative person. He continuously kept coming with new ideas! But not ready to think about the problems each new idea generates or already has. His subordinates had a problem to discourage the 'Boss'.

*If the ideas are agreed upon, it will become their responsibility to execute.*

As I started meeting the CEO started gaining his confidence, I had to take the role of dissuading new ideas which kept coming from him without looking at constraints or consequences. No doubt he has been naturally creative in other contexts which has taken him to the top of the division!

*This is where the professionalism comes in to picture!  
You have to get new ideas but they also have to take into account the constraints! As an experienced professional when the new ideas keep coming, you develop filters to eliminate those which would lead to more problems! Being creative and taking the responsibility for the new ideas is not an easy job!*

One problem we observed in all lamps was some how insects entered through the joints and accumulated in the bottom of the transparent cover reducing the light! Generally the transparent covers were latched to give access to the bulb to replace when it got fused.

I thought over the problem and came with a solution. I sealed the bottom transparent cover with silicon rubber gasket. There was no chance of insects getting inside with this fixed closure! The top cover gave access to bulb as well as the transformer for maintenance! Silicon rubber gasket could withstand the heat. The transparent part would be in Polycarbonate. This arrangement completely eliminated the insect accumulation problem! it was also completely vandal proof! No amount of pelting stones can damage polycarbonate! I worked lot on the hinge of the top cover.

A lip which was possible to mould easily in RTM ensured leak proof closing. But the hinge had to allow vertical lifting initially. This I achieved with a double hinge detailing! The top part covered the bottom casting all along with an overlap of 10 millimeters. This overlap fixing ensured no entry for insects from the top.

The top of the lamp had a nice flow of form. Even before finalizing the final form, there was continuous pressure from the company to show the concepts. They actually wanted to see concepts on the computer!

A computer presentation meant the latest, advanced design method to the company engineers. I involved some students to make preliminary concepts on the computer. The concepts did not show the details nor the new form. This was way back in 1994 and 3D modeling software had not reached any level to compete with mock up 3D models. We also had most powerful work force in IDC studios. On demand we could do miracles!

But the presentation with computer models became a 'ritual' to be followed and the company was satisfied. This gave us time for the final presentation. Once certain detailing and physical parameters were fixed, I started working on the product form. It had a flare of car styling and that is the compliment I got, 'a Ferrari'!

A slide presentation with full scale mock up model was made to the company at IDC, in (previous) conference room! This conference room had a flare with an unusual false ceiling designed by Prof. Nadkarni. With his natural flare of exhibition design, he used colourful textile pieces going over horizontal Aluminum pipes, up and down. A mock up model of ceiling fan done in colourful turned wood, designed by J P Mehta was hanging on one side. He had used the famous sankheda wood turning Technique coloured with lac in a unique style! Next to it was a fan in metal work from Rajasthan designed by Prashant Ahir. These were our attempts to bring in Indianness into Industrially made products!

The CEO and President of the division were present. the presentation went very well! The whole team clapped after the presentation! What else a designer wants! Of course, my whole team of workshop lead by MSG Rajan was there! They felt proud too! The meeting ended. The design was accepted! The mock up model was given to the Company!.

Soon we heard from the Company. They wanted us to make the prototype. We had given an option to the company to make the prototype with free technical advice from us or we would make the prototype of the design. Since we had no idea of cost, I had mentioned 'It may cost Rs. 1 lakh'. I actually had forgotten that we had even given an amount. We got a letter from the company saying that they have

approved the proposal for the prototype and we should go ahead!  
Then only I realized that I had mentioned an approximate cost!  
We immediately called the company and said it was an estimate before designing. It would be preferable if the company takes up the prototype making. But the company insisted that IDC should take up the prototype making! We quoted double the figure. The company agreed and paid up the money in advance!

Thus my adventure started!

This was an unknown territory for us! We had a good team headed by Mr. Rajan. But we had never built models of that size in 'casting', RTM prototype was new to us! Prototype making of this kind was a tedious task! I also realised that IDC studios had lost that edge we had earlier! We did not have required contacts! I called up some of my past students who were active in Mumbai. The 'Design Touch' group of 4 were very resourceful. They used to take my advice when they started. Now it was my turn to learn from them! With their help I located a very good person who took the contract to make the huge aluminum casting. The casting was 60 cm long with an opening at the top and at one side of the bottom for the transparent cover. The person made the pattern in plywood and formica to my surprise. It was simple and cost effective. Then he got the casting done. I visited the sand casting unit. I congratulated them! They were fine bunch of men working in hot surroundings. I experienced an unknown bond with them! It was as if I was working with them all along, shoulder to shoulder. MSG Rajan was with me. he also appreciated their work! I took some pictures and they were so happy!

*This is the benefit of being a designer and working in India! Suddenly you find a bunch of people as seriously working on your product as you!  
Of course we had to wait 20 years to hear a slogan 'Make in India'*

we had casted 2 pieces for the prototype to be on the safer side. Machining of such a large sand casting was not an easy job! The piece had to be handled like a baby! The holding pressure on the milling machine has to be optimised by feel, to take the load of milling! Any undue haste to finish quickly could break the piece! The person who took the contract was very skilled. He hired the milling machine of others on a hourly basis and worked on it. In spite of all the care he took, the first piece cracked. He came to me crest fallen, 'sir, problem aa gaya ! piece tut raha hai! kya karenge?' (sir, a problem has arisen.the piece is braking. What shall we do?) I said,' don't worry! Use the second piece! use IDC facility and make in our workshop'! He agreed. He finished the second piece on our milling machine!

*India still has these unusual talents offered at very low costs! My suspicion is that these self nurtured talents are vanishing in the country!*

The top part of the lamp was to simulate the part to be produced in R.T.M. We could easily get one side finish with negative a mould in F.R.P. once a good positive was made. The vacuum formed piece we had made with a wooden mould could itself become the pattern for the negative mould. Only problem was the edge lip. This needed another mould just for that portion and some skills in making. I was keen to get it done outside IDC, as people familiar with F.R.P like Mr.Panciker had already retired and left IDC!

We searched and searched still we could not locate anybody!. After a long search we located an engineer who moulded F.R.P furniture. He came, saw our drawings and had a long discussion. He said he can do it. But he wanted Rs. 1.2 lakhs for the mould. This would take off all our budget. and the person had no experience to claim in this type of work!

We went back to search mode! Fortunately we located another person. His surname was 'Khanna'. He came to IDC. His face looked familiar. But I was sure I had not met him before. Neither he had any recall . He was enthusiastic. He said he can make one piece or ten pieces as we wanted. His cost including the mould for the first piece was just Rs. 1,500/- This was a blessing! I was relieved. We had a further chat with him on many things. Then he revealed that he is closely related to well known film actor Vinod Khanna! Wow! No wonder his face looked familiar! He had good resemblance to Vinod Khanna!

*Bombay's small scale industry has full of surprises and unusual talents!  
But it takes time to find them!*

So we overcame the major hurdle in the prototype

A large aluminum part and a cover in FRP with special requirements. got into process of making! The hinge attachment and fittings were handled by our workshop staff under the command of Mr.Rajan.

Bottom transparent cover and fixing it with a silicon gaskets still remained. We got transparent part vacuum formed outside by giving our mould. The gasket could be made with silicon rubber solutions by moulding at room temperature. Only we needed a precise mould. The thickness was 2 to 3 mm. To cover a rectangle of 50 x 20 cm with this thickness was a difficult task. We had to cast an aluminum piece or cut it from a thick plate. Holding and Machining the piece, both seemed a complex process.

Then came the use of our first computer aided machine.i had located the Roland machine during my trip to France in 1992! We had just procured the Computer Aided Model making (CAMM) machine to make small models, that too in soft materials. But we

could get the accuracy without problem so we broke down our mould into several parts and machined it in PVC using the CAMM machine. We assembled our mould with the machined parts and were able to make the silicon gasket. This withstood the heat of the lamp on trials!

The company executed the design. I still have not seen the produced piece in spite of a clause in our agreement to give a manufactured piece as a sample to us! Indian companies still have not developed a culture of developing a new design! Still it is seen as contracts and fragmented roles for specialists. Top level management need an exposure to understand the holistic nature of design and development!

*Designers need nurturing of their 'design-souls' not just the pay pockets!*

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