

Harshwardhan Gupta's Design Tips-15

Ergonomics

Simply put, ergonomics is the science and art of designing things to suit human users.

We Indians live in an ocean of bad ergonomic design. Sadly, almost all good ergonomic design seen in our country is of foreign origin. Better than nothing, but much is not suited to us. There is an amazing lack of awareness and knowledge about this field even today. Easier said than done! Much of ergonomics is commonsense... which is not common, and all that...

It is the professional and ethical duty of all designers to keep ergonomics above all other considerations, and ensure that the interaction between their design and its final user does not become unpleasant, difficult to use (difficult to reach and clean too), confusing, tiring, illegible, unintelligible, mistake-prone, harmful or dangerous even in the smallest possible way.

This too is easier said than done. In developed countries, much of ergonomics is well-codified in laws, standards, guidelines and publicly available research data. We have virtually nothing of the sort! This puts a damper on all genuine efforts to make an ergonomically better design. Many engineering colleges are now teaching Ergonomics, but in a very superficial sense, and as a part of the industrial engineering course, not the machine design course! "Why you need ergonomics in machine design course, tell me?"

Many of you have visited Europe, America, Singapore, Japan... the developed world! The rest of you have heard glowing accounts of "everything is sooo nice there!" Do take a moment to realize that what you are appreciating is not just public cleanliness, aesthetically pleasing surroundings, and trains running on time, but are also subconsciously appreciating the good ergonomic designs all around – even though they are done for

the locals who are marginally different from you physically.

There are two approaches to make an ergonomically sound design. First approach is that you go by the book and design everything by available standards! But virtually no good books exist even today on how to do good ergonomic design! Much of the available human body measurement data (anthropometrics) is predominantly derived from tall, strapping American army recruits by American industrial engineers for American designers! The other standards are from the great Henry Dreyfus (for the average American), or there are Japanese standards – more suitable to us, but sorry not available in English, Designer San, Gozaimaste!

The other approach is that, in the absence of anthropometric data, you should try and do good ergonomic design through a practical, eyes-wide-open commonsense approach. You have to evaluate your work objectively, starting with defining the faceless user. Too many real people are too often too obese, too short, too inexperienced, too old, too stiff, not intelligent enough, not educated enough, are just infants, or very curious children... and too often they are people with imperfect eyesight, arthritis, back-aches, knee-problems, orthopedic collars, allergies, pregnancies, liver problems, diabetes...

The Japanese and Koreans use their own ergonomic standards to design (say) a car, which explains why their seats are more comfortable to us than the ones designed in Europe and America. Also explains why cell-phone buttons are too small for us (East Asians do have smaller hands than us.) Lesson? Everybody designs things for themselves! And since we do not care about ourselves (as collectively, we are not perceptive and demanding consumers), absolutely nobody cares about ergonomically developing things specifically for us Indians, whatever their (and our) advertisers may say.

This 'American GI-Joe' centered anthropometry also explains why most dining tables (copied from the West) are too high, corporate-executive chairs slowly give you spondylitis, 'imported' sofas are too deep, sports shoes are too narrow, car steering-wheels are too high (especially for Indian women),

Kitchen platforms are too high “You are not tall enough, Mrs. Joshi!”, shirts of correct collar/shoulder size are too narrow on the chest, International 5-Star hotel spoons are too big, electric switches are too awkward, branded nappies are too wide at the base, most lathes and milling machines need a high platform in the front for the operator to stand, most power-tools cannot be operated by Indian women, first-class aircraft seats are horribly deep and economy-class one’s are designed for aliens from Mars...

The bad ergonomic designing is not entirely confined to wrong dimensions. Severe engine-vibrations can slowly ruin a rickshaw / taxi / truck driver’s kidneys. Daily 8+ hours of work on a keyboard is already producing orthopedic syndromes, as the standard QWERTY keyboard is the World’s worst ergonomic design! There are no national standards for road-signs in India. Most wall clocks cannot be read from 15 feet away. Text on most medicine packs cannot be read without a magnifier by anyone beyond 35. Diabetics cannot get calorie information on food packs (1 in every 12 Indians is a diabetic now). User instructions in Hindi or regional languages – first written in English and then translated – are undecipherable even to a linguist...

A handful of organizations like the Indian Railways, Godrej, Tata Motors, Mumbai’s BEST (buses), do make their seats /chairs quite Indian-user-friendly. Yet Indian Railways still fly in the face of all safety research, and believe that more uncomfortable the train driver’s seat, more alert he would remain. Recent design changes in locomotive seats only upgrade them from sadistic to pathetic!

I am not playing impossible-to-please here. I am trying to point out glaring instances of bad design to you, so you as a designer don’t contribute further to people’s miseries. Some tips for you:

First, define your users, and see to it that your design is suitable for 95th percentile (95 out of 100 users), meaning you need not design for 3 feet tall dwarfs, 6½ feet tall *lamboos*, 32 Kg anorexics and 200+ Kg fatties, yet you have to take the middle 95% seriously. And your assembly / servicing / repair guys MUST to be included as a special category of users too! “See again this fellow is going full tangent!” Also remember that the buyer /

consumer may or may not be the ultimate user – your wife buys a mop and your housemaid uses it.

Inadvertently, do not end up discriminating against large groups of the population – such as women, children and old people – by designing something only *jawaan* males can handle. Like our ¼-turn twist-lock lids for jams, honey and coffee jars! Once my-daddy-stronngest closes them with his routine strength, no one else in the whole household can open them till daddy comes home again.

Do not go against prevalent conventions – like making MCCBs operate the other way – up for on and down for off. (Yes sir, I know the technical reason for this, but it can be gotten around by redesigning.)

A ‘nice-looking’ design is by no means a good ergonomic design, and vice versa. Unfortunately, many industrial designers – more conversant in ergonomics than machine designers –are often more preoccupied with aesthetics than with ergonomics.

A good ergonomic design is a safe design too, by definition; but vice-versa is not always true. Fool-proofing is just a small ingredient of ergonomics. Beyond jig & fixture design, not much of it is practiced in India! Child-safe packages for medicine / household cleaners / pesticides, and child-safe electrical hardware do not exist in India. “Keep out of reach of children” in fine print is sufficient to keep the manufacturer out of reach of the law.

If children are going to come in contact with your design – say of a kitchen cabinet system – then you have to play the role of the child BEFORE you play the housewife. Go down to their exact eye level and you will see a different world. And think like a child – they will scramble onto a trolley with castors and bring it down upon their heads, crawl into narrow spaces and get stuck, or pinch their tiny fingers, or lock themselves in, in ways you can’t normally imagine. So, design against all such possibilities instead of blaming the poor mother.

If you are evaluating your design by putting yourself in the shoes of the user (a desirable method), you must always bear in mind how far away you are from the average. To wit, if you are

6' tall, then while designing / evaluating you must bear in mind you are 7" above the average Indian male and 10" above the average female, and therefore have longer arms, legs and bigger hands too. It's an extremely common mistake to unwittingly believe that you yourself can stand for the Average User!

You should never ever let machine-design conventions, styling, aesthetics, graphics, decoration, 'outlook-improvement', etc., take precedence over sound ergonomics.

If your marketing guys are the ones who are getting design feedback from the user, 9 times out of 10 they will simply pat their back, or yours if you are the boss. Indian marketers are talkers, not listeners; and the Indian user will rather suffer in silence than plainly tell a big company's representative that their product needs to be designed better, as that person will invariably argue back and put you down. Even if he does listen, that feedback will almost never translate into design changes. So, get a qualified team to conduct scientifically designed consumer research to reveal design flaws. Gathering of ergonomic feedback cannot be given on contract to call centers or to door-to-door teams – or worse – to camera-teams. "Hii I'm Shrutii and we are in Mumbaai with our cameraman Guddu and we are going to ask all these wonderful people here about how they like Futura's brand new Turbomate vacuum cleaner excuse me ma'am please tell us ya please take the mike and now tell us your name and please tell our viewers *aapko yeh Futura kaa naya Turbomate vacuum cleaner kaisa laga?*" will only get you what you'd love to hear. But detailed, patient, probing questions like "Is this specific vacuuming accessory easy to mount? Is it too tight to remove easily after use? Does it come off during use? Can your maidservant break it by 'normal' careless use? Does it reach everywhere you want

it to reach? Are any protruding metal parts too sharp? Can it fit the wrong way? Is your healthily-curious 6-month old toddler safe around the running machine..." will bring in loads of nasty surprises! The wise king's tale comes to mind, who used to go anonymously in the evenings among ordinary citizens, disguised as an ordinary man, and chat with them to find out their opinions, problems and their king's shortcomings. Nowadays we are just given to posturing in this age of acceptable lies, brassy publicity and political correctness. "But now it is too late no?" Obviously, get ergonomic feedback **before** launching the product into the hyperbolic orbit of advertising. In Western Europe, a new model of practically every product is a definite ergonomic improvement over the last one. In India, usually only the advertising claims become taller!

And lastly, if you have made even a few users unhappy, don't try to shift the blame on them for their ignorance, lack of physical perfection, clumsiness, lack of education, etc... That's the refuge of the self-centered, self-righteous, self-justifying, self-opinionated, arrogant designer.

Plain and simple – if your have distressed the user, you have failed! Period!

"Kya boss, have you (hic), have you noticed that all liquor bottles, all Indian, foreign, (hic) all so easy for opening and holding when you pour no? I noticed today only, man! *Ek dum* Besht design! I am *toh* (hiiic) phully satisphied! Hey, common (come on) *yaar*, common common, bottoms up!"

Next Month: Machine Safety-1

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