



INDIAN INSTITUTE OF TECHNOLOGY GUWAHATI
SHORT ABSTRACT OF THESIS

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SHORT ABSTRACT

With the exponential growth of the population, the number of motorcycle users in India is increasing rapidly. The number was reported as 40 million by 2016. Injures and accidental death due to motorcycle mishaps are in an upward trend in recent years in comparison to other modes of transportation. One major aspect associated with these accidents is the ignorance of proper consideration of human factor issues in motorcycle design. Out of various human factor issues, prevalent postural distress among the Indian riders might be an important root cause of these road accidents. Thus, it is essential for designers/ engineers to find the comfortable riding posture (CRP - which was perceived to be comfortable or no discomfort by the rider) and optimum riding position during the conceptual phase of motorcycle design. Moreover, it is worthy to note that there are various databases on the CRP (based on comfort joint angles), anthropometry and range of motion (ROM) for four-wheeler drivers, but there is no reported similar database for motorcyclist in Indian context. Thus, it is very important for automobile industries to develop the databases on standard motorcycle rider's anthropometry and ROM, since standard motorcycles are widely used as a mode of commute by Indian riders.

The problem was addressed with the systematic approaches:

- (a) Development of an instrument for measuring key dimensions of standard motorcycles.

- (b) Considering the dimensional variations of standard motorcycles, the adjustable motorcycle test-rig and experimental set-up were constructed.
- (c) With the help of an adjustable test-rig; CRP and optimum riding position were estimated from the representative sample of the Indian motorcycle riders. Perceived comfort/discomfort ratings, image process techniques, and Taguchi optimization techniques were adopted for this purpose. The measurements were also tested for trustworthiness using alternate-form and intra-/inter observer reliability technique.
- (d) Statistical analyses were used to establish the association of the rider's physical attributes (anthropometric, and ROM) with the CRP, as well as with comfortable riding position (RP - position which was perceived to be comfortable or no discomfort by the rider).

It is expected that the findings on rider's anthropometry, ROM, CRP and optimum RP will be immensely useful for automobile industries to design a new or redesigning of existing motorcycle to ensuring better comfort. Design of motorcycle based on the anthropometric and ROM data for defining optimal riding position and thereby comfortable riding posture would certainly reduce muscular discomfort/ pain of the motorcyclists.