KINEMATIC MODELING OF A MOTORCYCLE RIDER FOR DESIGN OF FUNCTIONAL CLOTHING

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ABSTRACT

Background-

Motorcycles have become a style statement for the majority of youth in India, besides serving as a convenient and affordable means of commute in the rural as well as urban areas. The number of registered motorized two wheelers in India increased at the rate of 14.7% during 2016-2017 to reach a figure of 20.19 million in March 2018. This increase in the number of riders has been accompanied, unfortunately, by an equally alarming increase in the number of accidents. Nearly 0.2 million motorcycle accidents were reported in 2018 in the country. Significant evidence is available in literature to indicate that protective clothing can protect a motorcycle rider from severe injuries in case of an accident. While active research is going on in developed countries, hardly any work has been done towards development of protective clothing for Indian riders. Indian weather and use conditions in any case pose a unique challenge for clothing designers. Very little data is available on the ergonomic, physiological and social needs of Indian motorbikers.

Conventional pattern making methods are based on a static human form. A motorcycle rider however spends long periods of time in specific postures. The conventional patterns hence yield garments that do not fit well and are not comfortable while riding the motorcycle.

Method-

In the reported study, kinematic analysis was employed to identify the typical body postures of a motorcycle rider. A subject was then scanned in the identified typical poses using a 3D body scanner. Garment patterns for top and bottom garment were developed on the 3D scanned form in typical poses. The protective zones specified by standard EN 13595 were mapped on the form. Patterns were flattened, the best-fit pattern shapes were selected across the typical poses and draped on the digital avatar and virtually tested for fit.

Results-

Results show that the patterns developed on the 3D model are dynamic in nature since they have the body movement inbuilt in them. These patterns accommodate the stretches and the strains of the typical body poses hence will not restrict the riders' movements during riding.

Conclusion-

Identification of typical postures of motorcyclists has not been done before. The CAD models developed through kinematic motion analysis can be used for generation of ergonomic clothing for the motorcycle riders, which will reduce the stresses and strains experienced by them leading to improved comfort and garment fit.