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Title :
Information Architecture & Mathematical Modelling to Optimally 'Fit' Human Operator on Motorcycle

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Code (2010) noted that motorcycles road accidents are always due to human error. Based on Stedmon (2010), it is strongly suggested that when the human operator's working posture does not 'fit' the motorcycle, the human operator is prone to human error and possibly accident. Therefore, there is an existing link between motorcycle road accidents and motorcycle ergonomics. This study aimed to establish new motorcycle ergonomics information architecture from existing ergonomics knowledge for the establishment of new mathematical model to optimally 'fit' human operator on motorcycle. The motorcycle information architectures established were the Motorcycle Risk Information Architecture (MORIA) and Riding Posture Analysis Components (RIPAC) (consisting of RIPEC, HUMIS and RIPOC). Based on the MORIA, RIPAC, biomechanical analysis, and in referring to the guidelines provided by literature on physical loading and physiological stress, new mathematical model that proposed an optimally 'fit' riding posture for a human operator on motorcycle were established. The mathematical model is named the Bologna Triangle. In validating that the optimal 'fit' riding posture proposed by the Bologna Triangle is more advantageous; comparison were performed between the proposed riding posture, RIPOC riding postures and neutral sitting. The methods used in validating the Bologna Triangle were working posture ergonomics assessment, biomechanical analysis and experimental research design. The experimental research design was a surface electromyography (sEMG) bilateral measurement of 4 muscle groups (extensor carpi radialis longus (forearm muscle), upper trapezius (shoulder/ neck), triceps (upper arms), and deltoid (shoulder)). 8 subjects participated voluntary for the experiment. The triangulation between the three validation methods showed that the proposed optimal 'fit' riding posture (specific for a particular subject) showed the lowest physical static loading distribution, working posture hazard score and total body muscular activation. Hence, this validates that the riding posture proposed by the mathematical model is a more advantageous riding posture in comparison to the currently available riding posture. Both motorcycle manufacturers and consumers could benefit from the Bologna Triangle. Conclusively, this study closes the research gap by introducing the MORIA and the RIPAC and the Bologna Triangle. From the Bologna Triangle, motorcycle could be specifically designed, built and even modified to optimally 'fit' the human operator. By having an optimal 'fit' on the motorcycle, human operator could perform their motorcycling duties more effectively, efficiently and safely; thus, minimizing the occurrence possibility of human error. Ultimately, this would reduce motorcycles road accidents.

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