Review on Anthropometric Test Dummy and Computational Modelling

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Abstract. This paper presents the differences of anthropometric data between Malaysian, Chinese, Korean, Japanese, Taiwanese, North American, North African, South Indian, Portuguese and Australian, which can be use in anthropometric test dummy (ATD) and the computational modelling of ATD. The available anthropometric data of stature, sitting height and sitting knee height for male and female are analyzed by weighting them according to their ranking in the corresponding parameters and presented in bar chart. It is found that Australian male and female have the biggest body posture compared with others. The results also indicate that females in Australia, North Africa and South India, when the three parameters are considered, they have bigger posture than male. For the computational model, hybrid modelling combine finite elements and rigid bodies can be an alternative approach.

Introduction

Anthropometric is well known as an important of ergonomics term, which not only just for medication purpose but also for design in order to fit human with the developing of machinery, workstation, objects and equipment for more comfortable and safer environment for user. However, the anthropometric data was influences by ethnic diversity, population of regions, gander, standard deviation and the mean of anthropometric dimension. Thus, these differences are highly take count in development of new products in order to suit the people in their representing country.

Dummy is one of the devices developed based on the anthropometric database in various percentiles. It is used to specify the physical dimensions for product design and dynamic behaviour analysis for safety factors [1]. This ATD have been a main device used to carry out the crash test. Development of dummy starts from the rigid body models to deformable models and then adopted into finite element models for more accurate and detailed result in doing analysis [2]. By using numerical method to evaluate crash test has increase the cost saving and accuracy in crash analysis [3].

In developed countries such as United States, Canada, Germany, Japan and Korea has their own standard anthropometry family test dummy for further crash test in order to increase the safety requirement especially for passenger vehicles production [4]. Use of the dummy in crash test is to represent human as using the human subject for the real crash test is not a good approach because it may cause killed or injured of human.

Anthropometric Database

Study on anthropometric has been done in many countries for ergonomics purpose, safety and health. Anthropometric data is important for two primary uses: for understanding the representative of the dummy and for developing computational model. Anthropometry data are usually grouped by age range, gender, ethnicity and region [5]. Most of the developments of new products are use the existing anthropometry database to suit the people in their representing countries [1]. Through the past studies on anthropometry has shown that different region of population had different size of body posture. Table 1 shows the differences of anthropometry data among several regions for male and female conducted by Mohammad et al [6], Lin et al [7], Barroso et al [8], and Juergens et al [9].