

# Computer Aided Ergonomy Analises in Function of Spatial 3D Modeling Expert System for Car Forensic Analysis

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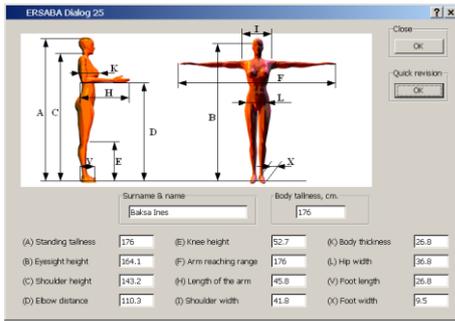
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The research of the analyses of traffic accidents in the available literature has shown that the calculations of the dynamic moments of vehicle inertia are estimated rather approximately without the anthropo-dynamical values of the passengers and other cargo, which may significantly change the results for calculating the kinetic energy of the vehicle rotation. The paper analyses the dynamic models of the drivers in the seated posture on the basis of which the dynamic moments of inertia for male and female persons of our population have been calculated, using the method of virtual space visualisation.

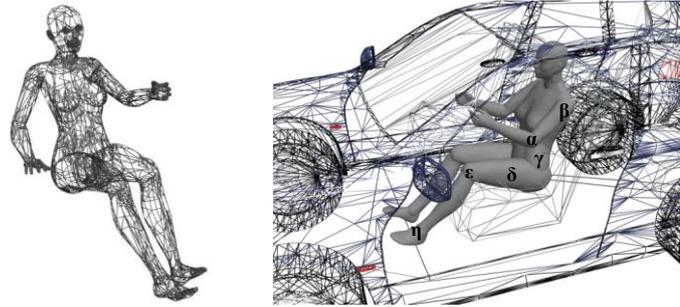
The research of the analyses of traffic accidents in the available literature, has shown that the calculations of the dynamic moments of vehicle inertia are estimated rather approximately, which may significantly change the results for calculating the kinetic energy of the vehicle rotation [1]. On the other hand, however, the numerous data presented by the vehicle manufacturers provide the possibility of determining the dimensions, and the weight of the vehicle either empty or occupied by the driver and the passengers. The data on the centre of gravity of the masses and the data on the dynamic moments of inertia for all three axes are simply missing.

A virtual model of a real body can be developed employing hand modelling methods, using conventional anthropometric measuring procedures, or by import of contemporary 3D digitally scanned real models, as "*ErSABA*", and "*BodySABA*", Fig. 1., and Fig. 2. [2,3]. The characteristic posture of a person driving a car is presented in Fig. 2.

The model of a person, made of the bodies of regular geometrical forms whose position is given by relative angles between the axes of the geometric solids is set in the position for which the axial dynamic moments of inertia will be calculated according to the coordinate system (x, y, z) set in the human body centre of gravity [3].

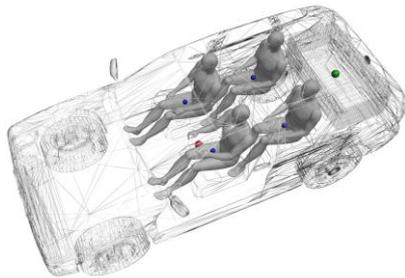


**Fig. 1.** On-screen presentation of computer program "ErSaba"

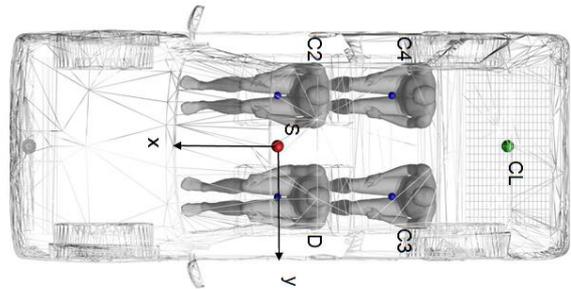


**Fig. 2.** Digitized physically scanning system "BodySaba"

When the position of the centre of mass for a certain posture and the central moments of inertia are known, the reduction of moments of inertia to the central axes of the vehicle with passengers can be carried out easily. For an average vehicle, the data have been taken regarding the position of the centre of mass of the car and the dimensions of the cabin, as it is shown in Fig. 3. And Fig. 4.



**Fig. 3.** Trimetric virtual view of a car and virtual models of supposed passengers



**Fig. 4.** Layout of the virtual model – car and passengers distribution

The analysis of external dynamic moments of human body inertia for a general posture is a complex problem [4,5]. Computer Aided Ergonomy Analyses in the Function of Spatial 3D Modeling Expert System for Car Forensic Analysis greatly contributes to improving the impact on traffic safety environment.

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