

DESIGN OF BALLISTIC PROTECTION EQUIPMENT FOR MILITARY FEMININE STAFF

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***Abstract:** The comfort of ballistic protection vests resides on weight and ergonomics, light products easy to wear during longer periods of time, discrete and morphologically adapted to the personnel. Thus, the present study focused on the utility and comfort of the individual protection equipment for military feminine staff. The feminine anthropomorphology data basis has been achieved and the constitutive materials have been assessed.*

***Keywords:** ergonomics, anthropomorphology data basis, Dyneema.*

1. Introduction

The military protection clothing industry has developed tremendously in the past years, using the benefits brought by nanotechnologies and other new advanced technologies, in order to improve key performances: ballistic protection, lower weight, optimization of the concealing capacity, enhanced protection during chemical, biological, radiological and nuclear incidents.

The modern protection clothing must achieve a wide variety of multifunctional requirements and a high protection level, together with a high

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comfort degree and wearability, with a high influence on the individual military staff performances.

In case of the ballistic protection equipment, besides the main purpose, projectile-proof capacity, the target is on the wearing comfort, discretion and trauma reduction through an increased energy absorption capacity. In this regard, it has been proved that the state-of-the-art vests, if worn by females, leave a free space between the chest and the protection plate, a space large enough for a grenade. More, the pressure of the front ballistic plate creates a great discomfort for the females respiratory system.

Even though the Romanian military feminine staff ratio is ascending, the individual protection equipment has not been adapted to their needs, conducting to a high level of unsecurity and discomfort.

2. Materials and anthropometric data basis

The comfort of ballistic protection vests resides on weight and ergonomics, light products that could be permanently worn, are discrete and morphologically adapted to the personnel. In this regard, the present study focused on the design of individual protection vests for feminine staff.

One key parameter in conceiving such an equipment is to create an operational anthropometric data basis. The obtainment of the data basis necessary for the ballistic protection equipment design was performed in order to morphologically characterize the feminine target group from the national defense system. Therefore, a 3D scanning technology has been employed using a 3D Body Scanner VITUS XXL Anthroscan Professional mobile system (Figure 1).



Figure 1. 3D measurement system

Another key parameter considered in this study was the material to be used. Due to its absorption and toughness, Dyneema SB21 has been identified as the most suitable for this application.

The data obtained are submitted to the unidimensional statistic processing, and the parameters calculated will allow the feminine anthropomorphic assessment in order to design accurate individual ballistic protection equipment for military feminine staff.

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References

- [1] C. NICULESCU, E. FILIPESCU, M. AVĂDANEI – *Aspecte generale privind elaborarea tipologiei dimensionale pentru femei, pe baza măsurătorilor 3D*, Industria Textilă no. 6, Vol. 61, pp. 271-275, 2010
- [2] Human Solutions – Manual de utilizare XFIT Army ScanDB