

## NEW PARADIGM OF PROCESSES AND MARKET SERVICES OF GARMENTS FOR OBESE AND ELDERLY PEOPLE – GarmNet

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**Abstract:** *This paper presents the GarmNet project research in EUREKA program in collaboration with the following partners: INCDTP, DATSA TEXTIL SRL, MAGNUM SX SRL –Romania and Textile Research Institute Lodz - Poland.*

*The aim of the research is to develop a new garment manufacturing process, based on anthropometric specific data of obese and elderly people.*

*The results of the project: 3D anthropometric databases for Romanian obese and elderly people; the sizes tables with the anthropometric data necessary to design patterns for target people; an interactive set of instruments for direct body measurement aimed at people who have no access to the 3D scanner; software modules (classification of body and shape types; clothing models/design correlated with body types; basic patterns in conformity with size tables; online guide for the web portal; clothing prototypes for the target group, made using the data from the web portal by SMEs involved in the project.*

**Key words:** *anthropometric database; body type; customized clothing.*

### 1. INTRODUCTION

The goal of the project is to develop a new, innovative and interactive clothing production system and business model able to respond at several aspects of personalized products for obese and elderly people.

Retail stores and fitting rooms are designed for people who are walking without restrictions, and clothing is constructed for people with standard body dimensions and posture. The network role is to represent the joint of SMEs garments producers in order to empower the competitiveness. Eurostat New release 172/2011 mentions that among the 19 Member States for which data are available, the proportion of overweight and obese people in the adult population varied between 8.0% and 23.9% for women and between 7.6% and 24.7% for men. In all European countries, the population most affected by obesity is older than 65 years.

Also, to Eurostat, older persons (65 or more years old) had a 17.4 % share of the EU-27's population in 2010. The EU promotes the active inclusion and full participation of obese and elderly people in society, in line with the EU human rights. Clothing products for this target people is governed by a number of different needs and restrictions [1].

The problems of obese and elderly people and their needs will be identified in the project in order to design the most appropriate and comfortable clothes, that allow them to do daily activities. The project will address two design directions for clothing of target people: personalized clothes for people that can be measured by scanning or manually and standard clothing for people in wheelchairs or assets that cannot move easily.

The project will consider the aiding devices used e.g. to facilitate dressing and undressing for persons with restricted mobility and dexterity. The specific anthropometric reference data of this target population is necessary and essential.

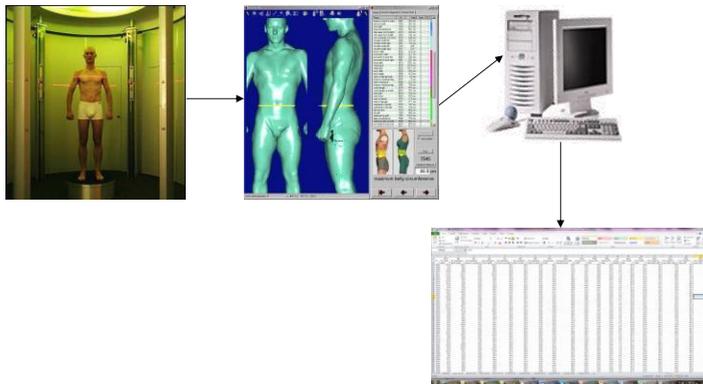
Nowadays, laser scanning technology has revolutionized the traditional collection and application of anthropometric data.

The new innovative manufacturing and service system will ensure the production of comfortable clothing, without neglecting aesthetics function and the price will be compatible to the standard price of clothing.

## 2. EXPERIMENTAL

### 2.1. 3D Body Scanner Technology

The acquisition of anthropometric data of the target group was made by using 3D scanning body technology with Vitus XXL scanner equipped with ScanWorth and Anthroscan Professional software (Figure 1).



**Figure 1:** Anthropometric data collecting system

This technology has pushed anthropometric research towards a digitalized environment, which allows researchers to conveniently access and study the anthropometric data and can bridge many professional disciplines such as medicine, CAD/CAM, engineering and e-commerce applications.

By this technology, 3D digitized anthropometric data can easily be collected in a few seconds and accessed immediately from anywhere in the world through the internet [2].

CAD systems on the market at this moment are built based on classic algorithms that allow geometric constructions in the series system or individualized series. The numbers of anthropometric parameters involved in the patterns designs are insufficient for completely describe the geometry of the obese and elderly body.

The multitude of anthropometric data allows the optimization of algorithm used in the design of patterns.

## 2.2. Statistical analysis

The methodology consist in 3D anthropometric data collection, statistical analysis, design and development of anthropometric databases of target people, characterization of body types, types of obesity, sizes and proportion [3].

Primary anthropometric data were filtered by gender (women and men). By scanning the body with 3D Body scanner we automatically obtained 150 primary anthropometric dimensions.

For statistical analysis we selected the anthropometric data necessary for clothing designers and patterns manufacturers.

The selected anthropometric data was statistically processed according to the formulas described in the speciality literature, allowing these determinations:

- Arithmetic-media selection, trend parameter Mean ( $\bar{x}$ ), to the dimensions of each gender group;
- Limits number of variations ( $x_{min}$  și  $x_{max}$ ), Standard deviation ( $S_x$ ), Dispersion (*Variance*,  $S^2_x$ ) and coefficient of variation ( $C_v$ );
- The error limit of the mean sample ( $\Delta \bar{x}$ ) and average test selection ( $t_{xm}$ ).

The anthropometric data were analyzed for the identification of the different body type from the target group (Figure 2) and also from the various postures (Figure 3).

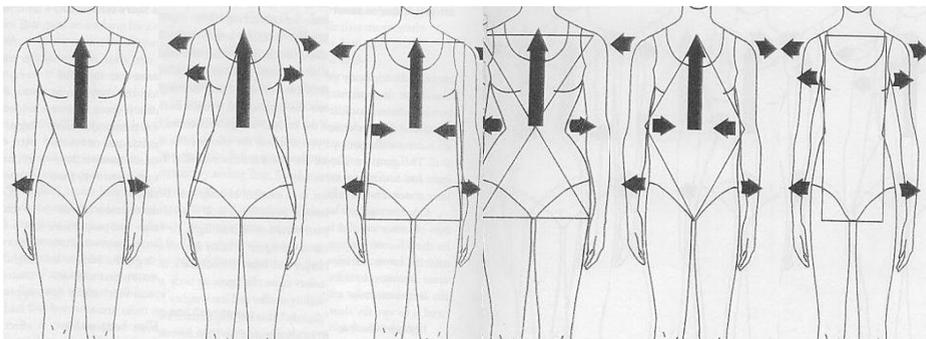


Figure 2: Different body types

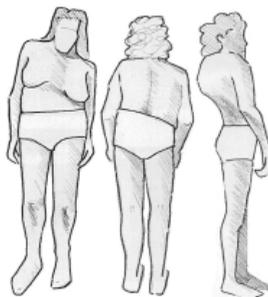


Figure 3: Different body posture

In the CAD system, the pattern design begins with the selection of the pattern closest to the individual's size. Alterations subsequently made to this pattern are driven by the individual's measurements. In this regard we will design and develop some software modules which will be posted on the GarmNet web portal.

These modules will provide all the information for the manufacturing the garments of target group. A network will be developed in order to make the joint between producers, customers and market.

### 3. RESULTS AND DISCUSSION

The technical application in the project consists in:

- development of a 3D anthropometric data base for target people, investigation of the anthropometric data and characterization of bodies type, in order to enhance style and all design aspects including patterns design using special algorithms;
- development of a network portal that will enable a new, innovative and interactive way of design, production and marketing of garments that will engage the customers, stylists, designers and producers based on the need of target customer.

Web portal should be designed to integrate the following modules: 3D anthropometric data obtained by body scanning; A set of anthropometric measurement tools, easily and inexpensively, delivered via Web platform to people that have not access to the 3D scanner (alternative to scan measuring); Sizing tables for this specific market; A CAD system; A library with specific body type of this target people; A special library of basic models correlated with the body type; A library with standard patterns; A database of fabrics with characteristics suitable for target people. The network has a producer and customer interface.

This model system will be developed, implemented and tested in real industrial environments. The joint producer-customer-services will become an important part of the new type of business model. The project will provide tools to help garment companies maintain their global competitiveness. Using the information of network portal, the garments companies can obtain the fitted or individual patterns and optimize the existing sizing system for this market niche.

In order to achieve objectives and getting results, the partners of consortium possess the complementary key qualifications: SMEs have expertise in design and production of women's and men's clothing (classic and casual); manufacturer of knitted underwear, day and sleep suits, leisure wear and knitted jackets. The research institutes are equipped with modern research equipment (3D body scanners, CAD-CAM and modeling systems) and have the expertise in the design and maintenance of

the Network Portal. So, the project involves an interdisciplinary team that creates a synergy and adds considerably qualifications of each partner. All partners have interests in achieving the results and expand the new paradigm in design and production of clothing with added value, for obese and elderly people and winning these market niches. The innovative technology is based on the latest IT solutions; represents major leaps in manufacturing clothing for this target group and the partners will improve their technology and market impact.

#### 4. CONCLUSIONS

The new methods of 3D measurements and imaging of the human body in combination with other developments in IT technology enables new manufacturing and business paradigms where the manufacturers and retailers of clothing can cooperate in order to give service to target population consisting in obese and elderly users.

The interactions between body shapes, pattern shapes and fabric properties can create an exponential number of possible fitting issues to be resolved.

The results of the project will contribute and will increase quality of life for target population with disproportionate body, various degrees of obesity, asymmetric posture, deficient spinal, deficient joints, by developing daily clothing with a better fitting and functionality.

#### 5. REFERENCES

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