Group Classes and Measurements: Towards Made to Measure

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Abstract

A group of 1700 men was studied for clothing purposes. Classification based on the HOAXY was applied to this population and only the HXY silhouettes were considered for the study. The H silhouette was the most representative with 1184 individuals belonging to this group. Using depth measurements based on the bust and waist, we proposed 3 side view groups "I" ," P" and " D": "I" is equal for both bust and waist depths, P is bust prominent compared to the waist, and D is belly prominent. This classification will be linked to garment construction. The principle is to obtain a size chart based on classical bust distribution. All the measurements involved in the construction and alteration of the garment are taken into account and a regression calculation is carried out for each measurement.

Measurement "5030" is the length from the neck to across back for the detection of stooping. Regression gives the intervals to be used for standard grading. The points in away from the cloud give the proportion of individuals for whom alterations would be necessary (here stoop posture).The process was enhanced to calculate the distance of individuals for any measurement compared to the regression, in order to calculate the value of the alterations to be applied to the garment geometry. In conclusion, we demonstrate that any classification may be key in an industrial process. In addition, the population clustering is more industry dependant than any anthropological purpose.

Keywords: Anthropometry, Scanner, Body shape, HOAX statistics, postures

1. Introduction

The purpose of this study is to evaluate a grading system based on direct anthropometric data issued from a body scanner. Our previous studies show silhouette distribution as HXY shapes for men. Analysis of a group of 1700 men makes it possible to elaborate another way of sizing.

2. Method

We based our study on simple Cartesian coordinates to represent the link between 2 measurements. The classical statistics referring to Principle component analysis have already been carried out on this population (27).
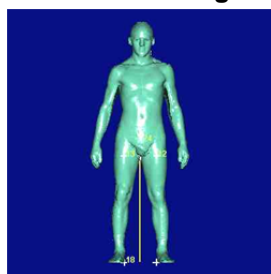
Instead of classification calculated via histogram groups, we considered the total population to use an analysis of linear regression.

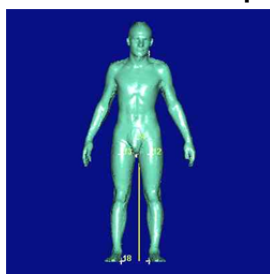### 2.1. Technology (see ref 20)

3D volumes were scanned. A total of 180 measurements per scan were organized in an Oracle database.

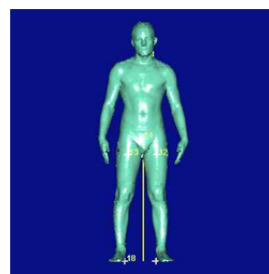We used the SPAD software as the data mining tool (22).

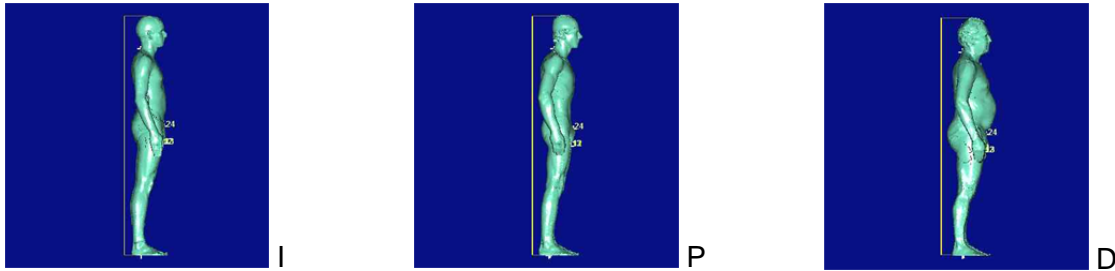### 2.2. Results using width ratios for bust waist and hip

 H 1184   X 46   Y 482

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Using depth measurements based on the bust and waist, we proposed 3 side view groups "I" ," P" and " D": "I" is equal for both bust and waist depths. P is bust prominent compared to the waist, and D is belly prominent.

I

P

D

We obtained HI, HP, HD, XI, XP, YI, YP classes.
Such classification gives too many classes to be managed for garment grading.

3. Linear regression on total population

We first compared bust and waist used in classical classification for sizing (drop as a signed difference between bust and waist).
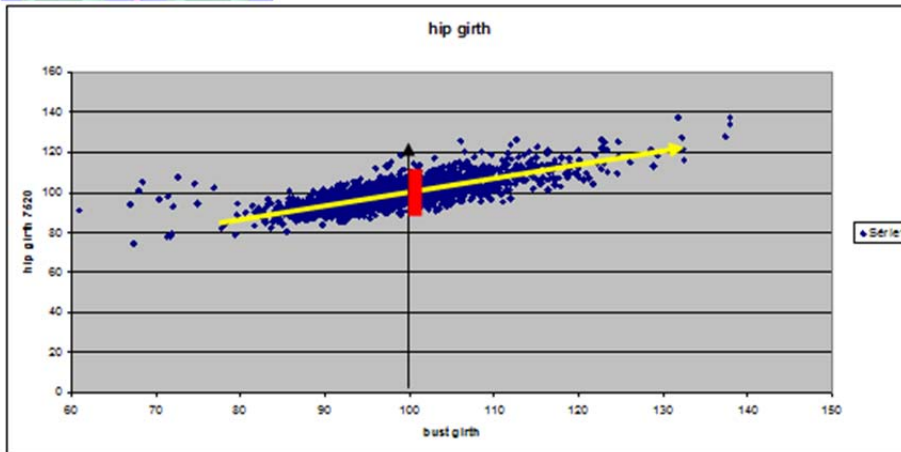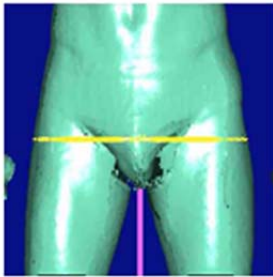

Waist girth vs size
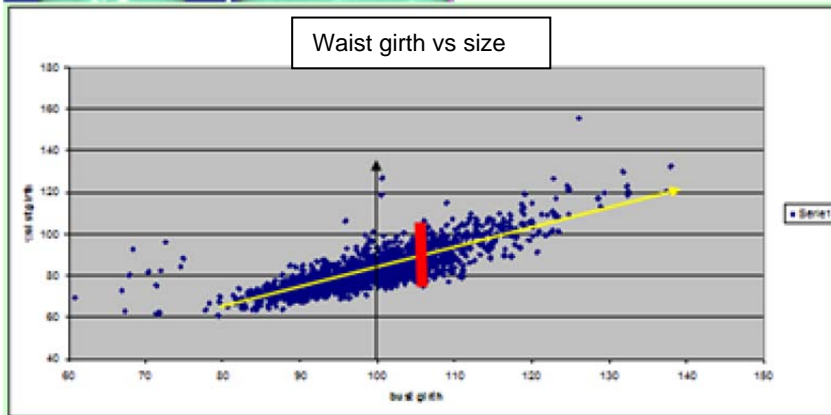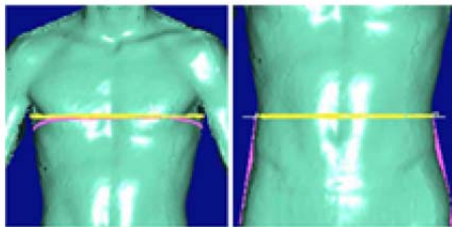
B 76 = 60 cm   B 120 = 106 cm   interval = 4 cm
For size 50 (bust 100 cm) average is 84 (drop 8)
Min = 72 cm max = 92 cm
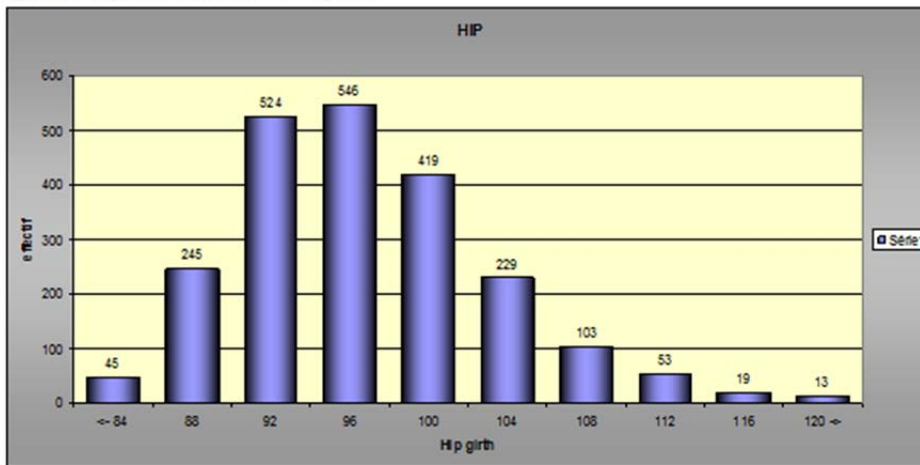The regular measurements are given using the yellow arrow.

The total depth of the cloud gives an idea of the alteration for example +/- 10cm for size 50 (red line)
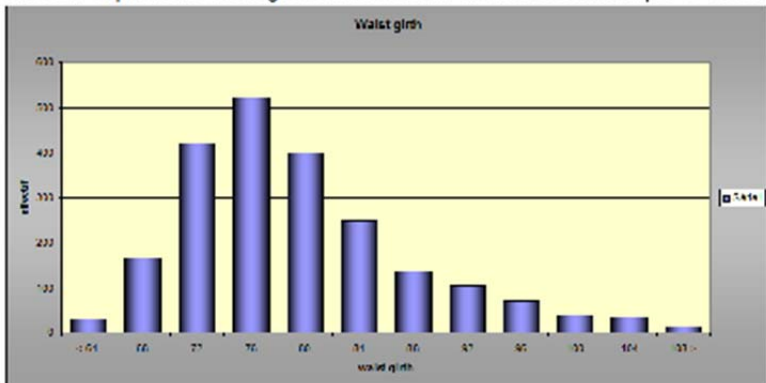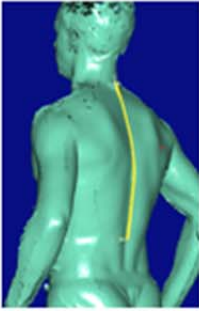
Relation for the hip

$80 : 85$ cm $120 : 115$ cm   Interval $= 3$ cm
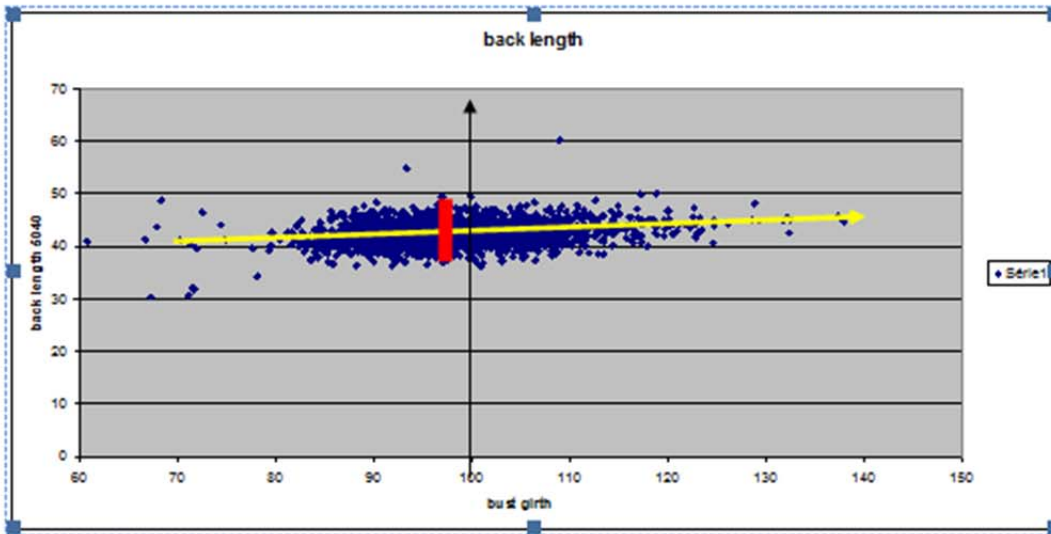For size 50, alteration is $+/- 10$ cm

These charts show some points that do not correspond to the rest of the population. They are generally eliminated from statistics except when real people are to be dressed.
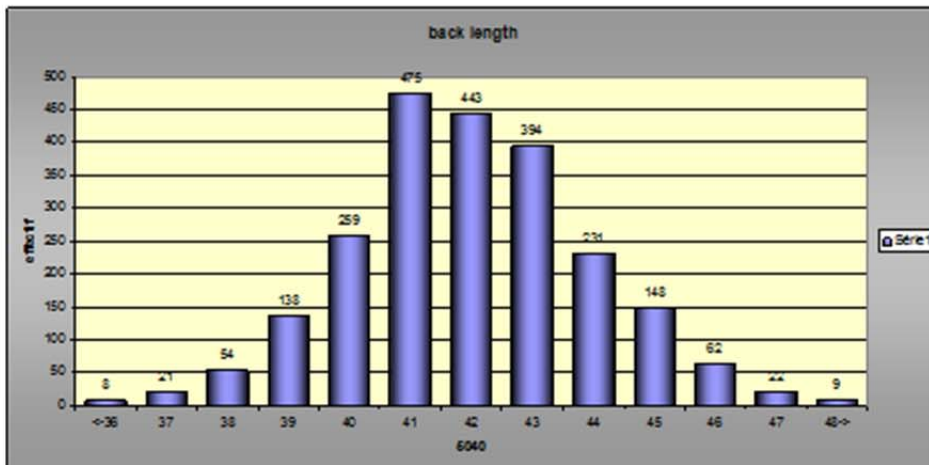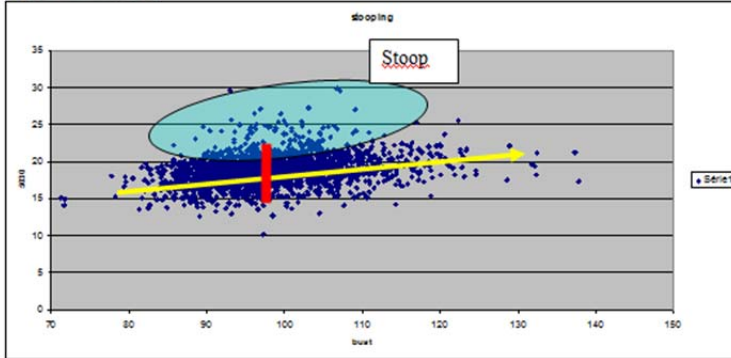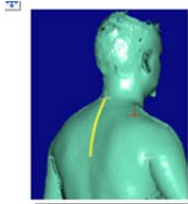
Back length

Values are given by the body chart.

B 80 : 41 cm   B 120 : 45 cm   Interval = 0.4 cm amplitude is +/- 5 cm

The back length is little dependent on bust girth. This is an obvious observation that is useful to justify the grading for jacket length.

Stooping detection
We use Human solution 5030 (see picture). Every point is the couple for a soldier, "5030", Bust
Bust 80 cm : back 16 cm   bust 120 cm : back 20 cm   interval = 0.4 cm
Amplitude is +/- 4 cm
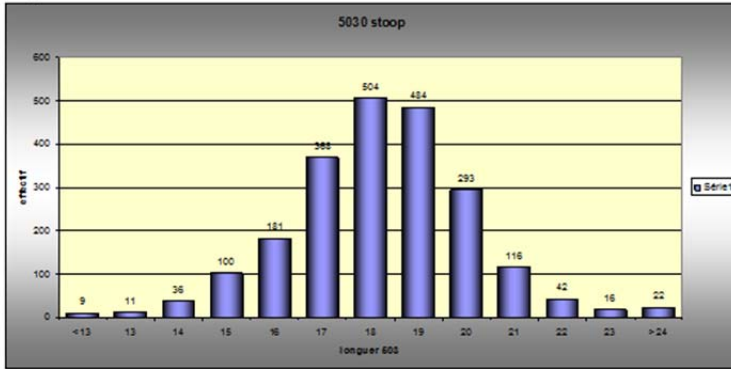
The top back length is generally considered as stoop measurement in menswear.

Here we have the graphic representation of the stoop population.
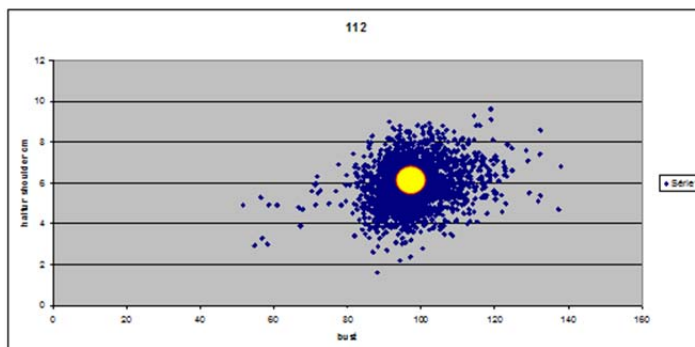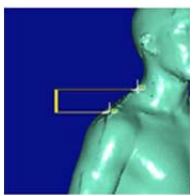
Central value = 6cm is independent from bust girth. (see garment value = 6cm)
Any value may be considered to the 6 cm reference.

The shoulder height is independent of bust girth.

4. Pant evaluation

The reference measurement is the waistband.
Here we consider only 2 characteristic measurements.

The tight girth

W 70 : 46 cm W 100 : 64 cm interval = 2.4 cm
Amplitude is +/- 7 cm

The waist to hip length

The side wait to hip
Average value 21.3 cm for all sizes with an amplitude of +/- 3 cm
This information is useful to justify a regular standard height of the pant rise.
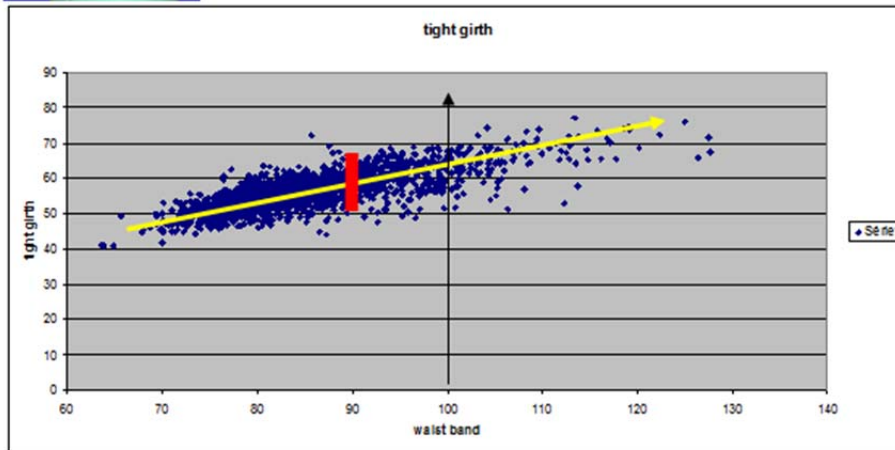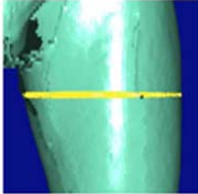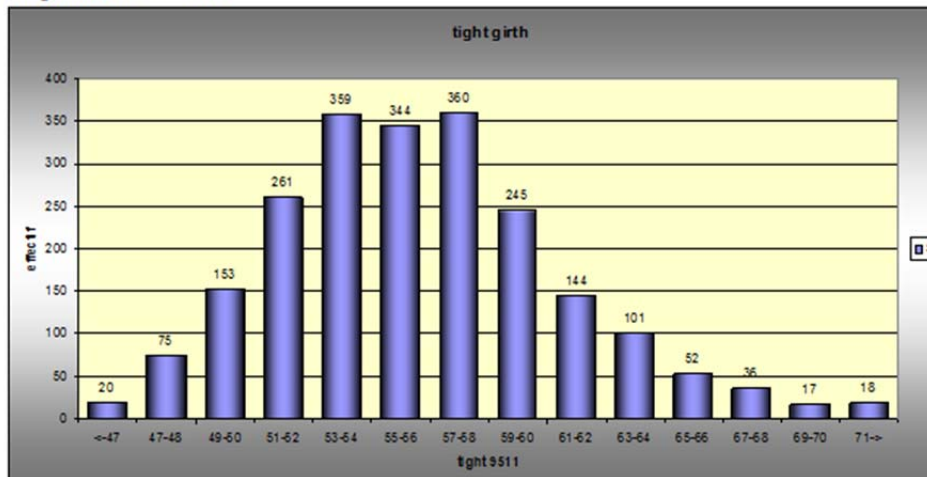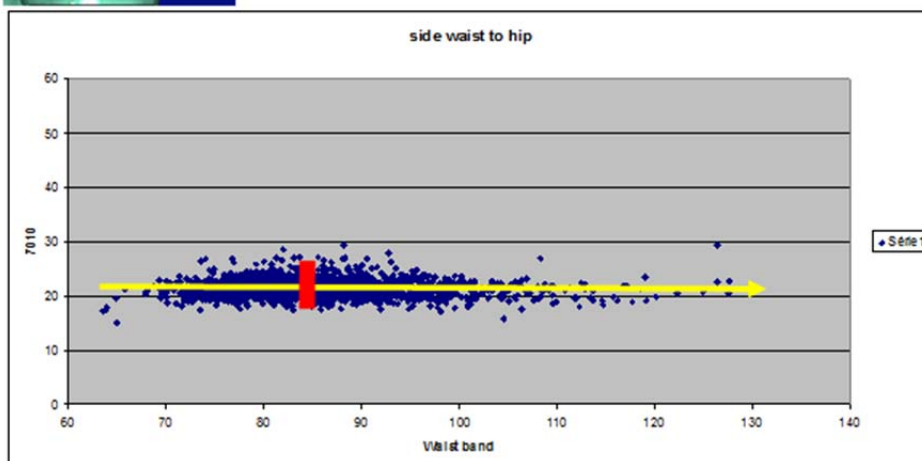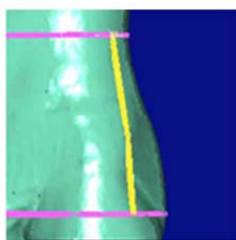
The waist to hip measurement is totally independent and may be considered as constant for garment construction.

6. Discussion

This graphic approach using linear regression is a practical tool for grading evaluation based on the analysis of a real population and non-related to common garment values.

The process has been tested to level out grading intervals (24) and is of great interest for subjects whose measurements are not situated within the regular cloud as shown in the graphs. Most of the time the extra value for a measurement may be applied as a made to measure alteration in garment production.

7. Conclusions

This method is another way to elaborate grading rules . The central values for the basic and intervals calculated on the linear regression is a concrete process to establish a size chart.

Those people whose measurements are not situated within the regular cloud as shown in the graphs may be identified and as a percentage provide useful information for the decision of made to measure treatment as a matter of industrial process.

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