Hand Anthropometry of Czech Population

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Introduction:

Proposed paper is focused on hand anthropometry. A huge study was performed in order to map actual hand dimensions of Czech population. The motivation behind this study was to obtain relevant data for designing gripping properties for whatever devices that human uses, beginning with electronics, kitchen appliances, hand tools and many more. Last but not least obtained hand dimensions will be used in software for virtual ergonomics (eg. Tecnomatix Jack) which is using sophisticated digital human models. With those digital human models further analyses of gripping conditions of current products as well as proposals for design of new products can be performed.

Method:

There is a problem with the lack of necessary data. Last measurements of the Czech population were performed in 1985 so the actual body dimensions are missing. Also regarding the hand anthropometry only hand length and hand breadth were taken. At the University of West Bohemia on the Department of Industrial Engineering and Management we therefore decided to carry out new anthropometric measurement of the population.

Measurements are currently in the progress. The measurements are performed according to the international standards, such as EN ISO 15535:2006 General requirements for establishing anthropometric databases and EN ISO 7250:1997 Basic human body measurements for technological design. Created database will contain the following items:

- Subject number
- Sex
- Exam location
- Exam date
- Birth date
- Decimal age
- Age
- Birth place
- Education
- Occupation
- Population group
- Dominated hand
- Stature
- Body mass

In addition 7 hand parameters are measured and 1 will be calculated. On every person a measurement of both left and right hand is being performed. The hand parameters are as follows:

- Hand length
- Palm length
- Hand breadth
- Palm circumference
- Index finger length
- Middle finger length – calculated
- Thumb length
- Distance from metacarpophalang to proximal interphalangeal of index finger

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<thead>
<tr>
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Results:

Measurements are primarily performed on population aged 20 to 70 years. Population groups will be divided by 10 years, resulting in a total of 5 population groups. In each group a minimum of 300 measurements will be performed (150 man and 150 woman), or a relevant number of measurements so that sufficient accuracy and validity of the measured dimensions will be ensured. So the stated goal is 1500 measured people. 950 people were already measured. After measurement completion the statistical evaluation will take a turn. Many interesting outputs are expected. As we are measuring also the people's height and weight we will evaluate if those parameters has risen from the last measurement and in which amount exactly. We are monitoring the share between right hand and left hand users. Also classical statistical evaluation of 5th, 50th and 95th dimensions percentile will be evaluated throughout all population groups as well as in individual population groups. It is well known that human body is not symmetrical. We will search for dependences between hand dimensions and dominated hand. From the first results a hypothesis was stated that domination hand is usually smaller at length dimensions but bigger in breath or circumferences dimensions. Also many other evaluations can be performed. The measurements will be finished till the end of January 2015 following up with the statistical evaluation in February 2015.