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Anthropometry Application for Flexible Chair College

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Abstract

Anthropometry is a part of ergonomics that specifically studies body size which includes linear dimensions, as well as content, also includes areas of size, strength, speed, other aspects of body movement. Chairs are furniture that functions as seats, with the demands of the public for the design of chairs, many innovations have sprung up for the manufacture of chairs, the comfort factor is the most served in the process of making chairs, one of which is the lecture chair. The research subjects in this study were undergraduate students at a tertiary institution in East Java with male and female sex, with an age range of 18-25 years. As a result, for Hips Width The size of the seat width used is 36 cm (95th percentile) so that large people can fit when occupying a chair, for Back Height The height of the chair is 57 cm (5th percentile) so that people with small body postures can sit comfortably without difficulty, for Knee Length The length of the knee is 61 cm (95th percentile).

Keywords*: anthropometry, lecture chairs, hips, back height, knee-length.*

1. INTRODUCTION

According to Stevenson (1989), anthropometry is a collection of numerical data related to the physical characteristics of the human body, size, shape, and strength and the application of these data to address design problems. Anthropometry can be divided into two which are Static Anthropometry and Dynamic Anthropometry. Static anthropometry is the size of the body and the characteristics of the body at rest (static) for a predetermined or standard position, for example, Height, Shoulder width.Dynamic anthropometry is body size or body characteristics in motion or paying attention to movements that may occur when the worker carries out activities., for example, The angle of the hand, the angle of the ankle. In the design used anthropometric data, three principles must be considered, namely (Wignjosoebroto, 2003): The principle of designing facilities based on extreme individuals (minimum or maximum) and Customizable facility design principle Chairs are furniture that functions as seats, with the demands of the public for the design of chairs, many innovations have sprung up for the manufacture of chairs, the comfort factor is the most served in the process of making chairs, one of which is the lecture chair. Putri (2014) suggests that from the results of anthropometric measurements that are compared with the results of measuring the dimensions of tables and chairs, as well as strengthened by the activity shooting data from research subjects, it is concluded that there is a relationship between the size of an ergonomic table and chair with the comfort of children at school.

2. METHODOLOGY

The research subjects in this study were undergraduate students at a tertiary institution in East Java with male and female sex, with an age range of 18-25 years.

Anthropometric data collection is carried out to obtain ergonomic conditions in the design of the latest lecture chair designs. The use of anthropometric data is carried out so that the designed product can be adjusted to the user's body. The following are the stages in anthropometry, Establish design requirements, Determine and describe the user population, Selection of samples to be taken data, Determination of data requirements (body dimensions to be taken), Determination of data sources (body dimensions to be taken) and selection of percentiles to beused, Preparation of measuring instruments to be

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used, Retrieval of data, Data processing, Visualize.

Some of the data processing carried out on anthropometric data are:

a. Data Adequacy Test

$$N' = \left[\frac{\frac{k}{s}\sqrt{N\sum x^2 - (\sum x)2}}{\sum x} \right]$$

Where: k = Confidence Level (If the confidence level is 99%, then k = 2.58 ≈ 3, If the confidence level is 95%, then k = 1.96 ≈ 2, If the confidence level is 68%, then k ≈ 1)

s = Degree of Accuracy

N = Total Observation Data

N '= Total Theoretical Data

x = Observation Data

If N '≤ N then the data is considered sufficient, but if N'> N data is insufficient (insufficient) and it is necessary to add data. By using the formula above, the results of the data adequacy test will be obtained from each dimension of the body.

3.RESULTS AND DISCUSSION

Table 1. Anthropometri Data

HIP WIDTH	SHOULDER HEIGHT	KNEE LENGTH
34	61	56
34	62	57
35	63	51
31	57	42
33	60	51
34	61	55
36	65	54
34	61	54
32	58	45
34	61	53
33	60	50
34	61	53
31	57	42
34	62	56
35	62	58
34	61	55
34	61	53
30	54	35
33	60	52
35	63	60
34	61	47
33	59	49
35	63	59
33	60	51
33	60	50
35	63	60
32	58	45
34	61	53
33	60	51
33	60	52
33	60	52
34	61	55
34	61	55
32	59	47

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Table 2. Determine the width of the hips

NO	NAME	HIP WIDTH	F	FX	DEVIATION EACH SCORE (X)	X^2
1	Rindra	34	1	34	0.52	0.28
2	M.Rizki	34	1	34	0.52	0.28
3	Nanda	35	1	35	1,52	2,33
4	Rida	31	1	31	-2.47	6.10
5	Alfin	33	1	33	-0.47	0.22
6	Septiyan	34	1	34	0.52	0.28
7	Karto	36	1	36	2.52	6.39
8	Fani	34	1	34	0.52	0.28
9	Opik	32	1	32	-1.47	2.16
10	Eko	34	1	34	0.52	0.28
11	Hendy	33	1	33	-0.47	0.22
12	Dennis	34	1	34	0.52	0.88
13	Titin	31	1	31	-2.47	6.10
14	Dirga	34	1	34	0.52	0.28
15	Akhmad	35	1	35	1.52	2.33
16	M. Jafar	34	1	34	0.52	0.28
17	M. Hanif	34	1	34	0.52	0.28
18	Elsa	30	1	30	-3.47	12.04
19	Febian	33	1	33	-0.47	0.22
20	M.Abid	35	1	35	1.52	2.33
21	Widodo	34	1	34	0.52	0.28
22	Rahmatulloh	33	1	33	-0.47	0.22
23	Nova	35	1	35	1.52	2.33
24	Candra	35	1	35	-0.47	0.22
25	Alex	33	1	33	-0.47	0.22
26	Prananda	33	1	33	1.52	2.33
27	Gunawan	35	1	35	-1.47	2.16
28	Prayoga	32	1	32	0.52	0.28
29	Rony	34	1	34	-0.47	0.22
30	Iwan	33	1	33	-0.47	0.22
31	Kaharudin	33	1	33	-0.47	0.22
32	M.Abdi	34	1	33	0.52	0.28
33	Dhimas	34	1	34	0.52	0.28
34	Eva	32	1	32	-1.47	2.1632
	Sum		34	1138		54.470
	Average	33.47058824				

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Table 3. Determine the height of the back

NO	NAME	BACK HEIGHT	F	FX	DEVIATION EACH SCORE (X)	X^2
1	Rindra	61	1	61	0.52	0.28
2	M.Rizki	62	1	62	1.52	2.33
3	Nanda	63	1	63	2.52	6.39
4	Rida	57	1	57	-3.47	12.04
5	Alfin	60	1	60	-0.47	0.22
6	Septiyan	61	1	61	0.52	0.28
7	Karto	65	1	65	4,52	20,51
8	Fani	61	1	61	0,52	0,28
9	Opik	58	1	58	-2.47	6.10
10	Eko	61	1	61	0.52	0.28
11	Hendy	60	1	60	-0.47	0.22
12	Dennis	61	1	61	0,52	0,28
13	Titin	57	1	57	-3.47	12.04
14	Dirga	62	1	62	1.52	2.33
15	Akhmad	62	1	62	1.52	2.33
16	M. Jafar	61	1	61	0.52	0.28
17	M. Hanif	61	1	61	0.52	0.28
18	Elsa	54	1	54	-6.47	41.86
19	Febian	60	1	60	-0.47	0.22
20	M.Abid	63	1	63	2.52	6.39
21	Widodo	61	1	61	0.52	0.28
22	Rahmatulloh	59	1	59	-1.47	2.16
23	Nova	63	1	63	2.52	6.39
24	Candra	60	1	60	-0.47	0.22
25	Alex	60	1	60	-0.47	0.22
26	Prananda	63	1	63	2.52	6.39
27	Gunawan	58	1	58	-2.47	6.10
28	Prayoga	61	1	61	0.52	0.28
29	Rony	60	1	60	-0.47	0.22
30	Iwan	60	1	60	-0.47	0.22
31	Kaharudin	60	1	60	-0.47	0.22
32	M.Abdi	61	1	61	0.52	0.28
33	Dhimas	61	1	61	0.52	0.28
34	Eva	59	1	59	-1.47	2.16
	Sum		34	2056		140.47
	Average	60.47058824				

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Table 4. Determine the length of the knee

NO	NAME	KNEE LENGTH	F	FX	DEVIATION EACH SCORE (X)	X^2
1	Rindra	56	1	56	4.29	18.43
2	M.Rizki	57	1	57	5.29	28.02
3	Nanda	51	1	51	-0.70	0.49
4	Rida	42	1	42	-9.70	94.20
5	Alfin	51	1	51	-0.70	0.49
6	Septiyan	55	1	55	3.29	10.85
7	Karto	54	1	54	2.29	5.26
8	Fani	54	1	54	2.29	5.26
9	Opik	45	1	45	-6.70	44.96
10	Eko	53	1	53	1.29	1.67
11	Hendy	50	1	50	-1.70	2.91
12	Dennis	53	1	53	1.29	1.67
13	Titin	42	1	42	-9.70	92.20
14	Dirga	56	1	56	4.29	18.43
15	Akhmad	58	1	58	6.29	39.61
16	M. Jafar	55	1	55	3.29	10.85
17	M. Hanif	53	1	53	1.29	1.67
18	Elsa	35	1	35	-16.70	279.08
19	Febian	52	1	52	0.29	0.08
20	M.Abid	60	1	60	8.29	68.79
21	Widodo	47	1	47	-4.70	22.14
22	Rahmatulloh	49	1	49	-2.70	7.32
23	Nova	59	1	59	7.29	53.20
24	Candra	51	1	51	-0.70	0.49
25	Alex	50	1	50	-1.70	2.91
26	Prananda	60	1	60	8.29	68.79
27	Gunawan	45	1	45	-6.70	44.96
28	Prayoga	53	1	53	1.29	1.67
29	Rony	51	1	51	-0.70	0.49
30	Iwan	52	1	52	0.29	0.08
31	Kaharudin	52	1	52	0.29	0.08
32	M.Abdi	55	1	55	3.29	10.85
33	Dhimas	55	1	55	3.29	10.85
34	Eva	47	1	47	-4.70	22.14
	Sum		34	1758		973.05
	Average	51.70588235				

As a result, for Hips Width The size of the seat width used is 36 cm (95th percentile) so that large people can fit when occupying a chair, for Back Height The height of the chair is 57 cm (5th percentile) so that people with small body postures can sit comfortably without difficulty, for Knee Length The length of the knee is 61 cm (95th percentile).

4. CONCLUSION

Design of Flexible Chair College Have a result Hip Width size is 36 cm, Back Height size is 57 cm, and Knee Length is 61 cm.

Measurement by anthropometry is carried out to achieve a comfortable, comfortable, safe, healthy condition for humans and of course also can create efficient working conditions with effective results or in other words, to achieve an ergonomic state.

5. REFERENCE

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