Experiment #6
Anthropometry and Workspace design

Objective:

1. To learn how to use the measuring instruments.
2. To learn how to locate and describe reference points for taking anthropometric measurements.
3. To determine an appropriate set of anthropometric measurements which would be necessary to design a workplace, a product or a tool.
4. To express anthropometric measures in percentiles of any similar population for which data are available.

Background:

Anthropometry deals with the measurements of the dimensions and certain physical characteristics of the body. There are two primary types of dimensions:

1. Static dimension: taken when the body is in a fixed (static) positions (Shoulder height).
2. Dynamic dimensions: taken under conditions in which the body is engaged in some physical activity, such as practical limit of arm reach.

Principles in the application of anthropometric data:

1. Design for extreme individual.
2. Designing for adjustable range.
3. Designing for the average.

Confidence interval and percentile:
Since it is not usually possible to design workplace to suit the very biggest or the very smallest workers, we must be content with meeting the requirements of the majority.

Practical guidelines for work layout:

1. Avoid any kind for bent or unnatural posture.
2. Avoid keeping an arm outstretched either forwards or sideways.
3. Work sitting down as much as possible.
4. Arm movements should be either in opposition each other or otherwise symmetrical.
5. The working field should be at such a height that it is the best distance from the eyes of the operator.
6. hand grips, tools and materials should be arranged around the work place in such a way that the most frequent movements are carried out with elbow bent and near to the body.
7. Hand-work can be raised up by using supports under the elbows, forearms or hands.

Equipments

Anthropometer

figure

Spreading caliper

figure

The Large Anthropometer has a range of 0 to 60 cm in 0.1 cm increments. Popular uses include measuring shoulder width, long bone length and chest depth for tracking growth and development of children or for use in motion analysis studies. Aluminum in construction, it uses a spring-loaded ball bearing in a sliding C-shaped arm to provide accurate and precise measurement.

The Small Anthropometer has a range of 0 to 30 cm in 0.1 cm increments. Popular uses include measuring wrist, elbow, knee and ankle widths, as well as measuring smaller muscle masses like the bicep and calf. Aluminum in construction, it uses a spring-loaded ball bearing in a sliding C-shaped arm to provide accurate and precise measurement

	1	Stature
	2	Eye height
	3	Shoulder height
	4	Elbow height
	5	Hip height
	6	Knuckle height
	7	Fingertip height

	8	Sitting height
	9	Sitting eye height
	10	Sitting shoulder height
	11	Sitting elbow height
	12	Thigh thickness
	15	Knee height
	16	Popliteal height
	20	Chest (bust) depth

	13	Buttock-knee height
	14	Buttock-popliteal length
	20	Chest (bust) depth
	21	Abdominal depth
	26	Head length

	22	Shoulder-elbow length
	23	Elbow-fingertip length
	35	Vertical grip reach (sitting)
	22	Shoulder-elbow length
	23	Elbow-fingertip length

	24	Upper limb length
	25	Shoulder-grip length
	34	Vertical grip reach (standing)
	36	Forward grip reach.

	17	Shoulder breadth (bideltoid)
	18	Shoulder breadth (bicromial)
	19	Hip breadth
	27	Head breadth

Dimension		Computer work station	Disk
1	Stature		
2	Eye height		
3	Shoulder height		
4	Elbow height		
5	Hip height		
6	Knuckle height		
7	Fingertip height		
8	Sitting height		
9	Sitting eye height		
10	Sitting shoulder height		
11	Sitting elbow height		
12	Thigh thickness		
13	Buttock-knee height		
14	Buttock-popliteal length		
15	Knee height		
16	Popliteal height		
17	Shoulder breadth (bideltoid)		
18	Shoulder breadth (bicromial)		
19	Hip breadth		
20	Chest (bust) depth		
21	Abdominal depth		
22	Shoulder-elbow length		
23	Elbow-fingertip length		
24	Upper limb length		
25	Shoulder-grip length		
26	Head length		
27	Head breadth		
28	Hand length		
29	Hand breadth		
30	Foot length		
31	Foot breadth		
32	Span		
33	Elbow span		
34	Vertical grip reach (standing)		
35	Vertical grip reach (sitting)		
36	Forward grip reach.		

Procedures:

1. Determine the necessary anthropometric dimensions to design:
   A computer station
   A student disk in a class room
2. For each dimension in (1) carefully describe the point to be used in making the measurements (use a sketch)
4. Measure the dimension in (1) and (2).

Analysis:

1. Determine the percentile of the population represented by the group members.
2. Report your findings for the design of the item in (1) showing the range of the anthropometric dimensions you would use for the design stating your reasons and present your design using sketches, figures and drawing.