The Impact of Anthropometrics on the Functional Design of Office Furniture

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Abstract:

The science of anthropology is concerned with the biological, cultural, and social diversity of people. Man is viewed as a biological and social being with the unique power to create and build culture. Human biology and culture make up the first two axes of anthropology, time makes up the third. It is necessary to define anthropology as a separate field. It is the field of science that investigates how human beings produce things. Anthropology seeks to comprehend man by investigating a wide range of scientific issues that are related to one another and linked by a common science. Anthropometrics is the study of body proportions and other physical attributes. It is concerned with information concerning the size and shape of the human body and is used in industrial design, garment design, ergonomics, and architecture. Anthropometric data is displayed inside a design table demonstrating the average measures of the human figure, affected by ergonomic tools for the human shape, and used to explain the user or target scope of the design. The research aims to assess the office furniture using anthropometric factors of the sitting posture. And the use of data collection and anthropometric measurements of the sitting position, the study of areas of discomfort, and the study of postural deficiencies, particularly in office furniture, make it essential for the furniture to have an ergonomic design and ergonomic compatibility in size. Body discomfort was assessed using anthropometric factors. Little attention has been paid to ergonomic concerns in their contact with users, particularly about office furniture, making it critical that the furniture has an ergonomic design and an appropriate size.

Keywords:

Ergonomics
Anthropometric
Anthropologist
Functional Anthropometry

Paper received 29th July 2021, Accepted 20th August 2022, Published 1st of September 2022

Introduction

Ergonomics is a field that studies and analyses the interactions between humans and other system elements, as well as a profession that uses theory, concepts, data, and methodologies to enhance human well-being and overall system performance.

The term ergonomics is derived from the Greek words "ergon" (labor) and "nomos" (rules). It is essentially the "design guidelines." The ergonomic design eliminates job-to-worker mismatches, resulting in the best possible working environment.

Ergonomics The science of building job spaces and furnishings to fulfill the job goal is essential to prevent repeated work pressures from growing over time and resulting in long-term damage.

Functional Anthropometrics: Functional anthropometrics is the measuring of capacities connected to job completion, such as reaching, maneuvering, moving, and other characteristics of space and furniture.

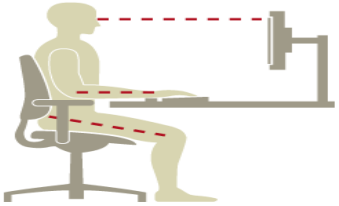


Fig (2) you should consider the function being done, the furniture used (size, shape and how it fits the space function)

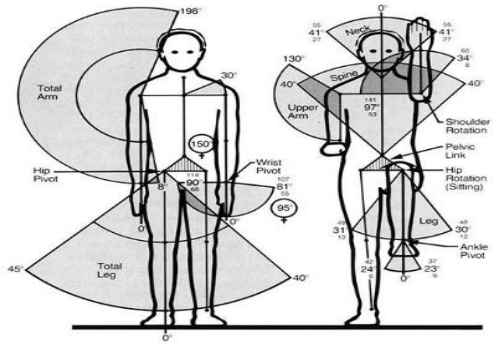


Fig (1): Functional anthropometric measurement is the measurement of task-related capabilities

To assess the compatibility between the person and the various workspaces and indoor furniture units, consideration must be given to the job being performed, the worker's requirements, the furniture used (its size, shape, and how it fits into the function of the space), analysis and the information available to the user of the space and its environment, to reach the ideal design for indoor furniture units and constitutes an anthropometric measurement. (Landry, 2013)

Ergonomics's main philosophy is "How can we construct or change the ergonomics to suit human design?" Because we are all different in shape and size, there is no one-size-fits-all solution in workplace applications, and this concept is true when evaluating workplaces. While there are several guidelines in various technical materials,

there are some basic concepts that must be understood and applied in workplace control.

Human engineering is a system-oriented strategy that applies to all elements of human activity, and the term "system" refers to both the physical or technological system with which people interact and the social and regulatory system. Human engineering has three key areas of specialization: deeper abilities in certain human features or qualities in human interaction.

Table (1) the workplace environment is dependent on a range of disciplines to maximize the interaction between the work environment and the worker. (Brinkerhoff, 2009)

Physical human engineering	Cognitive human engineering	Organizational human engineering
The study of anatomical, anthropological, psychological, biological, and mechanical human traits as they relate to human activity is known as physical human engineering. (Includes employees with work-related musculoskeletal problems, workplace design, safety, and health issues.)	Designers are fascinated with mental functions including cognition, memory, logical reasoning, and physical response because they affect how a person interacts with other system components (including users related to mental work, decision-making, skilled performance, human-computer interaction, human accuracy, work pressure, and training, where they can be associated with human-system design).	It is concerned with optimizing social-technical systems, including organizational structures, policies, and processes.

Ergonomics is a function-appropriate science for the worker, and the product for the user to meet specific criteria

- Functional efficiency
- Ease of use.
- Comfort.
- Health and safety.
- Quality of working life

Using interactive or pre-emptive methods when applying the work of the Science of Ergonomics, interactive ergonomics is found when you need to fix something and take corrective action, while ergonomics is used in the process of improving areas and repairing issues before they become a big problem, problems can be solved by designing devices or environmental design, where the design of furniture units changes the actual and physical devices while changing the design of furniture units from actual and physical devices used by man, as well as what people do with furniture units, while changing the design of furniture units from actual and physical devices used by man, as well as changing the preparatory work of the task and what people do with furniture units, The environment in which they function remains unchanged due to the utilization of furniture units.

The concept of "form follows function" underpins functional design. It is meant that the shape of the product is chosen only by functional considerations, making adornment superfluous. As a result, professional objectives the dominant philosophy that defined the so-called "modern movement" was functionalism, which had to be aesthetically beautiful.

Fig (3) Wassily Chair by Marcel Breuer (1925)

Fig (4) or "Barcelona" chair by Mays van der Roh (1929)

Fig (5) William Marie furniture units

Fig (6) Queen Anne furniture units

We consider modern classics such as Wasseli's chair. We see a basic link between the design of these chairs and the shape of the human body, whose role (supposedly) is to support it. Wassily Marcel Brewer Marcel Breuer (1925) or Miss van der Rohe's "Barcelona" chair (1929). And the fact that such items have been returned is referred to as

"occasional chairs." They don't have a definite function, although they are employed "sometimes." Occasionally.

When we look at furniture design from earlier times, such as the early 18th century in Britain, we see a completely different state of design. Georgian era the reigns of Queen Anne, William, and Mary created furniture in general, and chairs in particular, that underlined the practical relationship between the human body and the surroundings. The back seems moderately bent and is formed like the human spine. We should also not forget the various types of furniture produced during the Georgian period for a variety of purposes, some of which were rather specific. There are library seats, reading tables, and even a night table. All of this demonstrated a high level of interest in user requirements and the link between manufacturer or designer and user, which is also reflected in the most popular designs.

There are five main misconceptions to avoid while educating interior design students, as shown in **Table 2**. The first is the contradiction between experimental science's investigative procedures and the designer's creative problem-solving skills, which we may term intuitiveness.

Table (2) five common mistakes encountered while educating interior design students

No, 1	Because this design appeals to me, it will appeal to everyone.
No, 2	This design is acceptable to the average person and will consequently be acceptable to everyone.
No, 3	The disparity among humans is so great that it is practically impossible to provide them with any design, yet because people are so flexible, it doesn't matter.
No, 4	Ergonomics items are costly, and because things are chosen for their beauty and style, human engineering features are frequently disregarded.
No, 5	Ergonomics is a beautiful concept; I always construct things with human engineering in mind, but I do so intuitively and rely on my intuition, so tables aren't necessary.

The first error, while not usually voiced in words, is pervasive. During the design process, how many items are tried on a random sample of people during the design phase? In most circumstances, the evaluation of the design idea is relatively objective. The designer considers the design, tests the prototype, and determines that it "looks good for a designer," which suggests that if it's excellent "for a designer," it will be beneficial to others as well. In general, things generated by stronger or more capable members of the population can pose devastating issues for the weak or less talented.

The first fallacy is linked to the latter through the idea of empathy, which is closer. It is also more directly related to the second since most people regard themselves as higher or lower than average. We will only satisfy or please around half of our users. The second misconception is typically seen in the work of design and human engineering students who have only learned the basics of human anthropometric measurements. We must strive to accommodate as many users as feasible. The decision to disregard human engineering for economic reasons is just unethical. (John A Roebuck, 1995)

Assume we were given the task of determining the proportions of an escape door from a small workspace. The figure based on the physical dimensions of 99 percent of users will result in the suspension of one in every 100 persons. This is unquestionably appropriate. In mission-critical applications such as handicapped Individual cases of this type must be decided on their own merits. For example, we may assume that less than one user in 10,000 should be mismatched, and we put our design boundaries at four standard deviations from the average. Generally, we can only establish the percentage of each if we first define the user audience. Should we consider adults, the elderly, the infirm, pregnant women, and wheelchair users in addition to children? Perhaps these folks struggle to agree on timetables. Can they be lawfully barred from participating in the organization or environment in question? we must address the issue of barrier-free design in due course, but first, we must address the majority's narrower design challenge. (Islam Rafaat Mohamed, 2021)

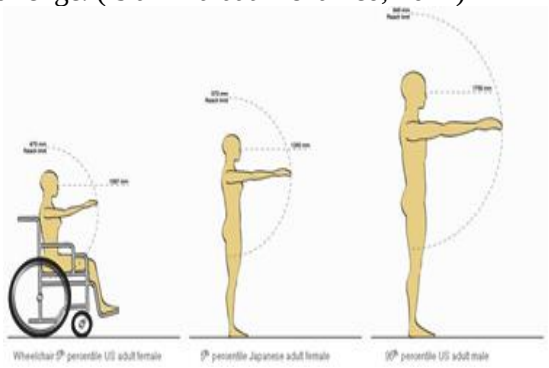


Fig (7) uses and functions of anthropometry

The diversity in body form and its influence on seat design:

Human measurement data (anthropometric data) were commonly employed in the design of chairs, seats, and other seating equipment. These measurements are useful for defining the overall height, breadth, and depth of the chair, but they provide little information on a body shape that can be used to pick materials ideal for backrests. A new

approach for developing statistical models of the 3D trunk form for use in the chair and seat design has been developed. Laser survey data were obtained from a large-scale anthropometric survey and analyzed using the main component analysis, the decline of numerous factors was used to forecast the form of the average body as a function of total anthropometric variables, and to improve applications, The statistical model might be used to generate a random sample of the area of trunk forms for automated virtual suitable trials. This technique has also permitted exchange analyses and other uses of other design decision-making methodologies. Although this is a specific example, the concept may be used in different designs of human variation scenarios where relevant body perimeter data are available. (Committee., 2004)

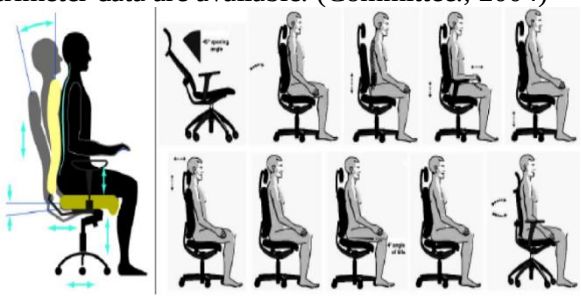


Fig (8) Random sample of trunk shape area for automated virtual fit experiments

Create products that "suit" their users, taking into account their size and form. The design is based on human measuring data that describes the dispersion of the human body's size and form. In general, particular situations are defined as the association of certain body dimensions with design factors. For example, the breadth of arms on an office chair must be more than the thigh width of most seated users. However, human measurement data are virtually always connected to design variables of interest, and human measurement data are often obtained using measuring tapes and other basic equipment for oceanic and repeatable point-point measurements. These measurements are often gathered in one or two conventional modes; therefore, they do not reflect acceptable body dimensions that are relevant in many applications. In recent years, 3D scanning technology has made a rapid recording of the entire body shape, providing a systematic method of analyzing and modeling the body shape for design purposes, focusing on the representation of the shape of the trunk, which is not well described by traditional anthropomorphic measurements. (Matthew B. Parkinson, 2006)

1-1 Constraints and criteria:

In the workplace, anthropology has constraints that may be observed or seen with all of the usual qualities assigned to humans, which have implications for the design of a specific vacuum. If user-tool compatibility can be measured, the standard is a judgment test. We may distinguish between several serial levels of standards such as comfort, safety, efficacy, aesthetics, and so on, which we term the high-level standard, general or fundamental. To fulfill these objectives, a vast number of low, private, or secondary criteria must be met. Examples can help to clarify the link between concepts. Comfort will be a clear fundamental criterion in seat design since the length of the user's lower leg will be a constraint if the design of the seat is too high, and pressure on the bottom side of the thigh would create pain. This leads us to propose a second criterion: the chair's height should not be larger than the vertical distance from the soles of the toes to the curvature of the knee (this dimension is called knee height). (O G Akanbi, 2018)

As a result, the spreadsheet defines how this dimension is distributed. It seems appropriate to select the value of the 5% percentage segment because if it adapts to a person whose leg is in this palace, 95 percent of the people with the tallest leg will adapt.

Some suitable concessions can be established while providing as much comfort to as many individuals as feasible. Similarly, there may be times when it is important to trade comfort for efficacy or safety. to make an intriguing point about what super standard will be utilized to assess them. Mid-sequence is generally the greatest spot to begin practical things: (this is known as the "middle-out average"). As a result, we must consider four sets of restrictions that explain the vast majority of daily difficulties in anthropometry in general, and hence a big portion of human engineering (working environment).

1- Clearance
2- The principle of the limiting user
3- Posture
4- Strength

1-1-1 Clearance

It is vital to give adequate head space, arm space, and leg room while creating the office furniture unit. Etc. Environments must give an access point and deployable space. Handles must have appropriate holes for fingers or palms. All of these are constraints on empty They are one-way limitations that define the goal's minimum allowable dimension. If such a dimension is set to accommodate a major portion of the user audience, the remainder of the audience will inevitably fit in.

1-1-2 The principle of the limiting user

A limited user is the default member of the user audience who, based on the reality of their physical or mental qualities, puts the most severe limits on the product's design. Even if the older person was

the restricted user or the young person is the restricted user.

1-1-3 Posture

The relationship between a person's body measurements and the dimensions of his or her furniture unit will depend, at least in part, on the person's work mode. Since we could have limited users in both districts, posture problems are typically more complicated than emptiness and access problems. For instance, a work table that is too low for a long person yet too high for a short person is undesirable. To put it another way, there is a two-way limitation.

1-1-4 Strength

The use of force in the operation of controllers and other physical duties is the fourth restriction. The one-way limitation that force limits often impose is adequate to ascertain the allowable degree of force for the weak limited user. However, there are instances where a clever, fast-moving user or the inadvertent usage of control might suffer unfavorable outcomes. Etc., in such situations, a two-way limitation can be enforced.

1-2 Fitting trials and the method of limits

The suitable experiment is pilot research in which a sample of users utilizes the standard size of a flexible furniture item to determine if a given dimension is "too large," "too tiny," or "exactly appropriate."

Fig (10) the outcomes of a simple, acceptable experiment designed to identify the ideal height of a reading table in a lecture hall. Sample ten pupils (5 males and 5 females). A musical platform was utilized. Unit of furniture to the standard adjustable size. And he has completed all users Set up the musical platform to the highest or lowest permissible heights for them, and then adjust it to the best-chosen length for them. For All ten users, the average and standard deviation of the top and lower limits have been computed. These have been used to create consistent curves for "extremely low" and "very high" (using values z and p as shown).

The regular curve of "satisfaction" was created by estimating the percentage of persons whose satisfaction was neither "too high" nor "too low." So, for every given length, the ("Low Very" + "very high" + "satisfaction" = 100 percent). Bringing each subject's answer closer to 50 mm and sketching this immediately resulted in the exactly suited distribution. (Grandjean, 1997)

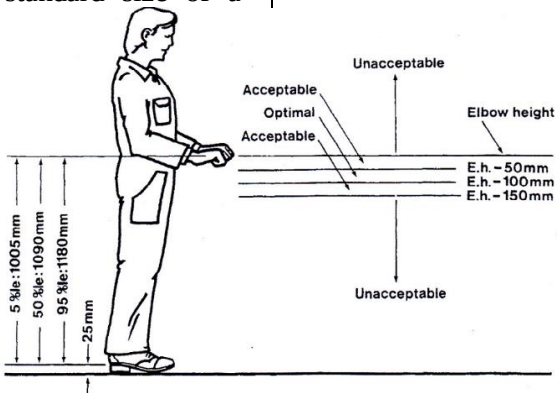


Fig (9) Determine the percentage of users who have adapted to a 1000 mm work table.

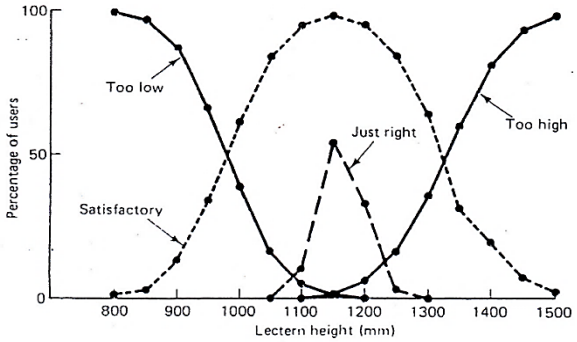


Fig (10) a pilot study in which a sample of users determines the appropriate height using the standard size of a changeable furniture item.

1-2-1 Result:

This experiment revealed a definite optimal limit of 1150 mm (for this group of users at least). At the time, more than half of customers thought the writing table was "just the proper height" (52mm), and more than 95 percent thought it was "satisfactory." This is a psychophysical-experiment physical experience in which the user makes objective (i.e., psychological) judgments on the objective properties of physical occurrences or users.

Human suitability measures vary: Most standard anthropometric posture standards and positions have been made on one of the two standard stand-up positions, a man stands firm, pulls himself up until he stands at full length, looks straight ahead, his shoulders relax, and his arms are stuck next to him. He sits firmly on a smooth horizontal platform, tightens himself up to his full length, and stares straight ahead, his shoulders are relaxed, his upper arm swings freely on either side, and his arms are horizontal. (The attachment, in other words, bends at a right angle.) (Bridger, 2017)

Seat height is increased (or footrests are placed under the feet) until the knees are horizontal and the legs are vertical (i.e. the knees are bent at a right angle). On two reference surfaces, vertical scales were created. The seat surface has a horizontal reference surface and the vertical reference surface is a real or fictitious surface that contacts the back of the uncompressed buttocks and the human shoulder bones. The seat reference point (SRP) lies at the junction of these two surfaces as well as the body's medium surface. (That is, the surface that splits it in half, right and left.) In real life, people rarely employ a straight stance. (G up; 2020)

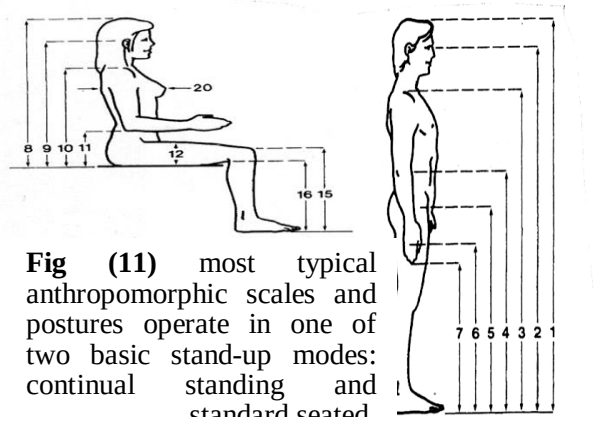


Fig (11) most typical anthropomorphic scales and postures operate in one of two basic stand-up modes: continual standing and standard seated

Fig (12) Seat height should be adjusted (or footrest should be placed under the feet) until the knees are horizontal and the legs are vertical (the knees are bent at a right angle).

How to design a seat for office work through anthropometric data:

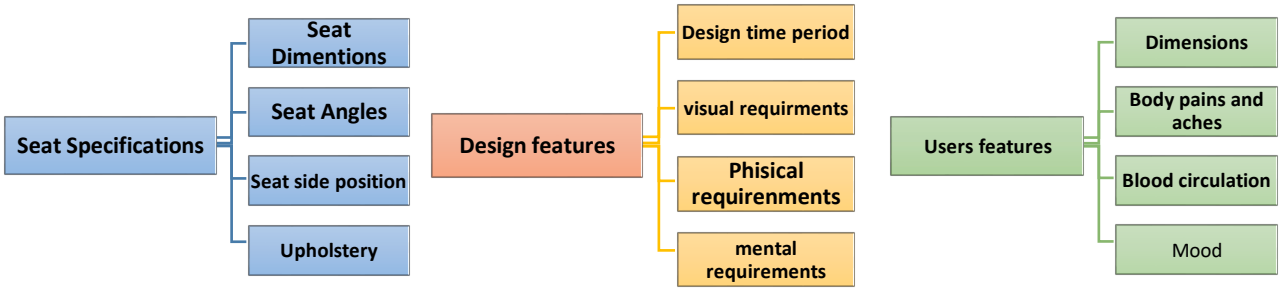
2.1 Seat foundations:

The design of a desk seat is based on providing consistent physical support in a comfortable position over time. In the long run, all chairs are unpleasant, but certain seats become uncomfortable faster than others, and some people will feel more uncomfortable than others in a particulaseatsat.

Anthropometric considerations are critical to a seat's fitness for the user, yet they are not unique in any manner. Appropriate compatibility between seat dimensions and user dimensions is necessary for satisfaction, but it is not sufficient. We'll come back to the anthropoid characteristics of the sitting arrangement later.

The ideal work chair should replicate the body's natural focal points and allow the chair to move properly around the chair's center points. The work chair requires a synchronous tilforor for the chair's body to expand up while tilting.

Because the total trunk positions change approximately 53 times an hour, or almost once every minute, the ideal work chair for the user's body should allow you to stay relaxed as the conditions are changed and maintained. (Dowell William, 2001)



2.2 Design problem

A work chair with a superb seat and backrest design will not support the sitter's motions and postures if it lacks mobility. When people are sitting, they may be supported at the beginning and end of a conventional work chair tilt range, but not equally across the chair. To provide balance and support as you move across the reclining range. Tilt motions are based on kinetic research that was created to mirror or reflect the natural pivot points of the human body, and the designers were able to improve the movement of these tilts by positioning the pivot points near the natural pivot sites of the human body. (Dowell William, 2001)

Fig (13) the physical approximation of the human body's natural focus points in the placement of focal points

In general, a long-term (somewhat) comfy seat will be psychologically satisfying. our Sensory inform us that we are "uncomfortable," which might be interpreted as a psychological warning sign of impending tissue damage. As a result, we may infer that, in the absence of such warnings, there is no impending danger.

However, it may be as easy as that. Some argue that the whole concealed harm caused by "poor sitting" can occur in the absence of objective uneasiness. This is a challenging case to make in any direction.

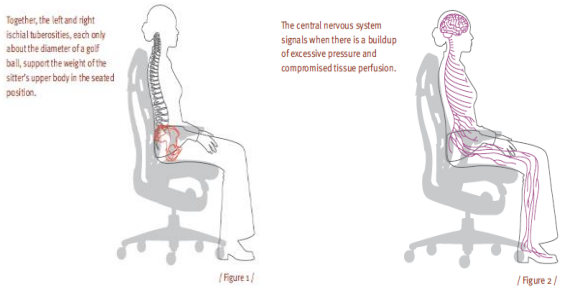


Fig (14) Thinking about psychology and biological mechanics to put sitting, with a focus on the anatomy and function of the lumbar spine

To acquire a better understanding of these issues, we will now consider psychology and biological mechanics when it comes to sitting placement, with a focus on the anatomy and function of the lumbar spine.

Anderson's compression measurements and Grandgen's matching experiments confirmed that a seat that allows the user to take a semi-reclining position (rest), with a backrest surrounding the lumbar spine, will minimize mechanical load on the lumbar spine and maximize the overall levels of rest mentioned. (Clements-Croome, 2018)

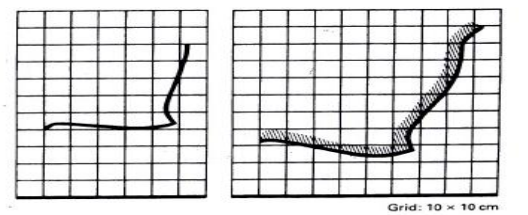


Fig (15) side images of sitting on a multi-purpose chair (left image), and a comfortable chair (right image), both of which cause minimal substantive complaints

However, difficulty emerges in occupations like writing, which need continual bending, and the backrest support is lost. The backrest is still necessary for these activities, but just during pauses. Grandjean presented a study of office employees utilizing slow microscopy, which revealed that they were linked to the backrest 42 % of the time.

When the angle of the seat and the angle of the knee change separately, the locations of the forward slanted seat do not result in a significantly different lower back position than the horizontal seat and the knee at right angles. (Janari, 2015)

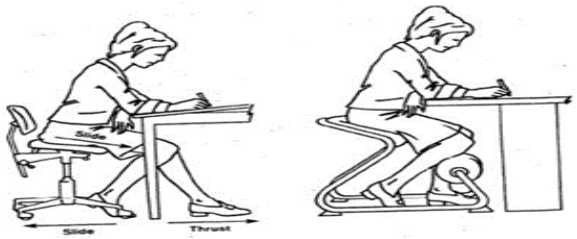


Fig (16) the forward slanted seat positions do not result in a considerably different lower back position than the horizontal seat, and the knee is at the appropriate angles.

Francher and Drury evaluated furniture For designers who exclusively deal with computers Through user experience for a wide range of problems. It was also the sample. The bulk of commonly used devices is on your computer or at a computer station. They discovered that it gave no more satisfaction than traditional seats and may even be worse than well-designed office chairs. The most common complaints were difficulty getting in and out, pressure on the tibia, and knee discomfort. There was little or no reduction in back discomfort, and despite training, the sample leaned forward and had a convex spine. They may have alleviated their back muscle by connecting the ligaments. (Nag, 2019)

Fig (17) a chair designated for the permanent use of computer users

3- The role of human engineering in alleviating back discomfort caused by longer working hours:

To investigate the appropriateness of the office furniture unit specific for the user and the task planned for it, several questions should be asked,

such as how comfortable the office chair is. Is it common for the user to require additional cushions for the seat while working long hours? The ability to support, comfort, and attractiveness must be balanced in the design of the office sitting unit.

Workstations that are free of boredom, environmentally proportional, and humanely enriched are progressively being designed for designers."

In recent years, it has become a basic requirement rather than a luxury to expect the existence of ergonomic standards when purchasing good office furniture, and this common human engineering system, and design standard has led to a significant increase in the number of products designed "consistent with human engineering, and as a result, many of the basic benefits have arisen for office designers as well as implements who want to create an effective working environment.

3-1 Anthropometric aspect of seat design:

Pressure is felt on the bottom side of the thighs as the seat height exceeds the height of the knee being utilized. Numbness, foot swelling, and extreme pain result from a reduction in circulation to the lower limbs. For a tall individual, a low seat is preferable. To reduce sub-thigh pressure, shorten the seat and rotate its front edge. ((Haslegrave, 2006.)

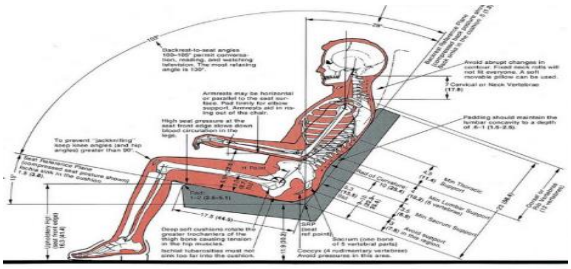


Fig (18) the relationship between chair height and back inclination to minimize sub-thigh pressure.

3.1.1 Seat depth:

If the depth is more than the length of the buttocks to the knee (5 percent of women = 435 mm), the user will be unable to utilize the backrest efficiently without intolerable pressure on the back of the knee. Furthermore, the deeper the seat, the more difficult standing, and sitting would be. Tall individuals may complain that the comfy chair seats are too short, which might be attributed to an insufficient backrest.

3.1.2 Seat width:

The space between the armbands should be enough for the largest user. The width of the thigh of 95% of women is 435 mm. And a slice of 95% of men = 550 mm). A minimum of 500 mm will be required.

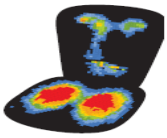
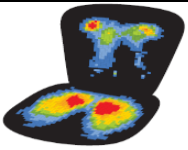
3-1-3 backrest Dimensions:

The higher the backrest, the more effective it is to support the weight of the trunk, and the more successful the design, but in some circumstances, there may be some other requirements, such as the ability of the shoulders to move, more important. (Associates., 1993) Table (3) Backrest chairs.

The pressure arrangement depicts how pressure is distributed while sitting: red represents the top of the pressure zones, while orange, yellow, green, blue, and purple represent low-pressure locations.

Table (4) the relationship between seat tendencies and the physical comfort of the user

Low-level backrest	Mid-level backrest	High-level backrest
Supports just the lower back (cotton) and lower chest area, and stops below the shoulder board level, enabling unrestricted mobility of the shoulders and arms. A total backrest height (C) of around 400 mm is required to support the lower back while leaving the shoulder regions open.	Supports the upper back and shoulder region. Most modern office chairs fall in this category, as do many "suitable" chairs and stadium seats. Etc. To support the mid-chest level, a total backrest height of roughly 500 mm and full shoulder support of 650 mm are required. Office chairs are typically 500 mm wide.	It provides full support to the head and neck, requiring a total backrest height of about 900 mm for the 95% segment of men.

 Sitting tensely, tight, on a cotton-supported chair shows pressure restrictions as the lower back connects with cotton support.	 Sit tight on a chair that supports a vertical position and distributes pressure on the sedation basin, cotton area, and thoracic areas.	 Sit in a curved position on a neutral topographical support chair that distributes pressure across the chest area and away from the spine.

Whatever its length, it is occasionally advantageous and sometimes necessary for the backrest to be spine-shaped and to offer positive support, especially to the cotton region in the form of a lining (filler). To fully use support, vacant buttock space is required, hence some chairs (particularly work chairs) should have room between the seat deck and the bottom border of the backrest. Adjustable backrests are desirable, though not required, for work chairs.

4. Backrest angle or rake angle

The pressure between the trunk and the pelvis reduces as the angle of the back armrest increases (and with it the pressure between the discs). Increase the angle between the trunk and thighs as well. This tends to force the buttocks out of the seat, reducing user comfort, as the higher drop also makes standing and sitting more difficult.

To reduce this by:

- A suitable mile for the seat is usually 100 and 110 degrees.
- High friction upholstery.
- Muscle effort from the user.

5. Seat angle or tilt angle

The positive seat angle helps the user maintain good communication with the backrest and helps neutralize any tendency to slide from the seat. And the exaggerated tendency reduces the angle of the trunk, and the ease of standing and sitting.

6. Seat Surface:

The aim of forming or lining the seat surface is to produce a suitable distribution of pressure under the buttocks. Using the ergonomics rules, we discover:

- The seat surface should be more or less flat and unshaped, while a round front edge is generally desired.
- Upholstery should be "chunky" rather than "soft" (its shape by more than 25 mm).
- The covering materials must be permeable for ventilation and rough to aid in stability.

Fig (19): The covering materials must be permeable to allow for air and rough to aid in stability.

Results:

- Anthropometric measures have a considerable influence on interior design and furniture design, influencing proportions and the overall design of the building.
- The basic hypothesis of human measurements is that design must adapt to the human body, not the other way around.
- As a static anthropometric assessment, body measurements should be examined when resting and when utilizing furniture units, mobility aids, and so on.
- The proportions of the human body and the movement of the human being must be correctly matched to fulfill human requirements to pleasant notions that can be used in daily activities.
- Human measurement in design should not be static, but dynamic and variable, therefore interior architects must collect body dimension data as people move, undertake activities, or participate in work.

Acknowledgment:

This work is dedicated to the soul of our beloved professor Dr: Akram El Away, the president and godfather of Horus University-Egypt, who passed away on February 3rd, 2021. We will miss you and love you always. Your love will light our way and your memory will be forever in our hearts. We will grasp you in our hearts till we can cuddle you again in heaven.

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