

Human Factors Brief Report

Next Generation Pool Lounger Project

The HCT human factors staff is presenting this brief report to the client as a mechanism for providing user data for the next-generation lounger project. Included here are user “requirements” from an ergonomic / anthropometric standpoint. Also included are user scenarios and considerations that should be taken into account as the client devises their next product line.

Ergonomic Data

The primary purchaser of a pool lounger is an adult female. The client has taken steps to understand and classify their primary consumer into a consumer profile(s) that encapsulate the main targets. Also of interest is to capture some of the male consumer interest, which could become potential purchasers in the future.

Because the primary purchaser and user is an adult female, HCT collected anthropometric data about the adult female body. These data represent average body measurements taken from large samples of females living in the US. These data are classically found in the ergonomic literature, which provides guidelines for best practices in product design. The purpose of consulting anthropometric data is to ensure that when the product design is decided and refined, the dimensions of the product comfortably accommodate the majority of your users. When prototypes are created, users of each size should sit in the lounger and assess its comfort, size, and ease of lifting, handling, etc. Knowing ahead of time the sizes of an adult female and how much weight she can comfortably lift will minimize the need to re-work the product dimensions at the last moment. Here, the primary user is the adult female, thus her data are presented below.

Table 1. Anthropometric data for an Adult Female

Dimensions of Adult Females (US population)¹	1st percentile female	50th percentile females	99th percentile females
Standing height	58'1"	64"	70"
Weight (whole body, nude)	93 lbs	139 lbs	218 lbs
Neck measurements	TBD	TBD	TBD
Leg length, hip to heel	36.6"	33.4"	29.6"
Shoulder width, side to side	18"	16.1"	13.5"
Dimensions of Adult Females (US population)²	5th percentile females	50th percentile females	95th percentile females
Elbow room (side to side while sitting, with arms bent at side)	12.3"	15.1"	19.3"
Elbow to fingertip length	16"	17.4"	19"
Seat width at hips	12.3"	14.3"	17.1"

Standing lift strength from floor level

Considering the weight and bulk of the current products, it is desirable to consider the user requirements for lifting heavy and bulky objects.

Adult females and males: maximum weight for lifting objects from the floor up to 36" at the waist level is 44 lbs for male and female adults. This is a maximum and an average for men and women.

Heavy objects are those that are 35% of one's body weight.

Large bulky objects should be 50% lighter than the maximum (which is 44 lbs)

Use Case Considerations

User: Vanessa

Vanessa is a 35-year-old mother of 3 children, each under the age of ten. She is married and does not work in order to take care of her children fulltime. Vanessa enjoys spending downtime at her pool with friends and their children.

Vanessa's pool is a typical in-ground pool with a liner and a concrete patio surrounding the pool on all sides. Vanessa's use of the concrete areas is also typical. She uses the areas around the outer edges of the decking for tables, chairs, recliners, and other decorative items.

Vanessa enjoys hosting her friends – both mothers and non-mothers- during summer afternoons and evenings. It is important to Vanessa that her pool furniture and other products are sturdy and durable, comfortable and attractive and easily adaptable to the décor of the pool area, adding positively to the pool experience for herself and her guests. Most importantly, since children are often present, pool products must be safe. Since Vanessa is a busy mom and host, assembly, maintenance and cleaning of peripheral items such as her pool lounges and pool furniture are low priority. She requires a lounge product that is easy to assemble, move in and out of the pool, clean, and store.

Vanessa and friends enjoy sitting by the pool but also spending a great deal of time being in and on the pool water, especially relaxing on the floating lounges. They enjoy sunbathing, talking, reading, listening to portable music players, and sometimes chatting on mobile phones. The group often enjoys beverages while relaxing in the pool.

User Scenario 1: Purchasing a New Lounge for the Pool

Vanessa is fashionable and prefers mid- and high-tier stores for purchase of most products including pool supplies. It is late spring and Vanessa has made a special trip to the pool store to buy a new pool lounge to replace her existing lounge which is aging and out-of-date. Vanessa is of normal stature and can handle larger and bulkier items but not with great ease. She drives a station wagon.

While shopping, Vanessa notices the client's Lounge. The product draws her because the packaging shows that the lounge is attractive, stable while on the water, and with compartments and accessories that enhance the experience while lounging in the pool. Most of all, it looks comfortable.

After considering the lounge's usage and price points, Vanessa decides the lounge is a good value and that it meets her needs and wants. She finds that the package is rather bulky and heavy but is able to carry the product to the counter. She remarks to the register attendant about the weight and awkward size of the box and after the transaction is complete, the attendant carries the package to the car for Vanessa while she prepares her children for the ride home.

The attendant rearranges some items in the cargo area that were purchased earlier in the day by Vanessa and slides in the lounge; with some maneuvering, the lounge fits. The attendant closes the hatch and Vanessa drives home. Once home, Vanessa eventually removes the lounge from the cargo area and carries it to the pool area.

Summary:

- Good product packaging lends itself to the positive perception by the end use of a product
- For consumers who are smaller in stature, larger and bulkier packaging may be too difficult to maneuver
- Vanessa's station wagon was able to accommodate the larger packaging but another vehicle such as a sedan may have been too small

Consideration: Smaller attractive packaging with handles or other mechanisms designed to assist in the moving of the product. The product should be small enough to be moved in typical family cars since use of a truck or SUV may not be practical to all purchasers.

User Scenario 2: Assembly

The next day, with the kids in school, Vanessa decides to remove the lounge from the packaging and assemble it by the pool area. Her husband works long hours and is not able to assemble the lounge until the weekend. She finds the lounge's out-of-box experience appealing because the product is easy to remove from the packaging and the assembly and safety instructions are readily evident and immediately available.

Once the packaging is opened, Vanessa distributes the parts around her work area and begins assembly. The assembly takes longer than she anticipates due to the number of parts and attachment pieces. However, the instructions are clear and she completes assembly. Vanessa intends to keep the lounge outdoors, either floating on the pool, or sitting on the concrete area around the pool throughout the summer season. She considers storage and thinks in passing about where she will place the lounge during the winter and if she will need to disassemble it then. Vanessa looks at the assembled lounge, admiring her handiwork.

Summary:

- Out-of-box experience is key to the positive perception of the product
- The number of parts and assembly time should be kept to a minimum to avoid frustration and negative consumer experience
- The assembly should be simple and easy for anyone to perform

Considerations: There should be little or no assembly of the lounge, i.e. a lounge with a folding mechanism that removes the need for assembled framing. A lounge that folds will also reduce the amount of storage necessary. Additional parts (e.g. accessory table) not assembled at the factory may be clipped or snapped into place. While out of the pool, the lounge should be fully functional as a patio lounge.

User Scenario 3: Preparing for Use

After Vanessa finishes the assembly of her new The client lounge, she pulls the lounge using the handle on the back of the backrest to the edge of the pool. She then returns to the house to retrieve her pool bag containing the items she typically needs while relaxing. She also retrieves ice, beverages, and cups from the kitchen anticipating the arrival of her friends Carol and Diane after lunch.

Once back at the pool with all the necessary items, Vanessa first opens the lid on the lounge cooler, pours in ice, and slides in 4 full beverage cans. She then closes the lid and flips the latch to keep the ice from melting and to make the compartment water tight. Next, she places her cell phone and iPod into one water-tight compartment and her cup, suntan lotion, a small towel, and her book into the other water-tight compartment and then closes and latches both compartments. Vanessa then slips the lounge into the pool and enters the water. Once in the water, Vanessa climbs onto the lounge and arranges all of her items so that she is comfortable and ready for relaxation.

Summary:

- The lounge should be easy to maneuver while out of the water considering that by nature the product may be bulky once assembled
- Lounge should be easy to mount while in the pool
- Wet/Dry compartments for Coolers and other storage are necessary.

Considerations:

Built-in wheels may assist in moving the lounge while it is out of the water. Coolers should be water tight to prevent water from seeping into the cooler when placing the lounge in and out of the water and during use. Other compartments should also be water-tight but headset wires should be accommodated by providing headset jacks or pass-through for headset wires. Compartments should be large enough, for example, to hold a larger portable landline phone.

User Scenario 4: Using the Lounge

Once on the lounge, Vanessa first extends the footrest. Next, she prepares her beverage; she is left-handed so she slips the full cup into the cup holder on the left side. She then adjusts the headrest. She retrieves her book from the wet-dry compartment and draws the retractable table from the side, extending it to the fully-open state. She then places the book on the table. Since she will be in the sun all afternoon, she applies suntan lotion and opens the retractable canopy so she is partially covered for now from the morning sun. After reading for a while, Vanessa reclines the backrest and takes a nap.

When her friends arrive, Vanessa awakens from her nap. She places her book back in the wet/dry compartment and returns the table to its folded state. She paddles the lounge to the shallow end of the pool and slides off the lounge.

Summary:

- Lounge material should be comfortable to the user.
- Lounge design should be comfortable to the user.
- The Lounge should be easy to propel and maneuver while in the pool

Considerations:

Lounge material should be smooth and not leave marks or lines in the skin of the user. Built-in propulsion (motor) or snap-on propulsion (paddle) should be considered. Lounge accessories such as footrest and backrest should be simple to move while the lounge is in use in the pool. Location of the armrests and cupholders should be ergonomically suitable for all user types from Vanessa to her husband to her small children.

User Scenario 6: Storage and Maintenance

After enjoying the new lounge throughout the summer season, Vanessa prepares it for storage. During the non-pool seasons, she must store the lounge and other pool products in the pool storage building located near the pool, in her garage or basement, or other storage area.

She decides to store the lounge in basement. There she finds a clear area with exposed rafters and hooks from which she can hang the lounge. Before moving the lounge, she folds the lounge into a manageable bundle according to the instructions she originally received in the package. She then carries the bundled lounge to the basement and hangs it from a hook

Summary:

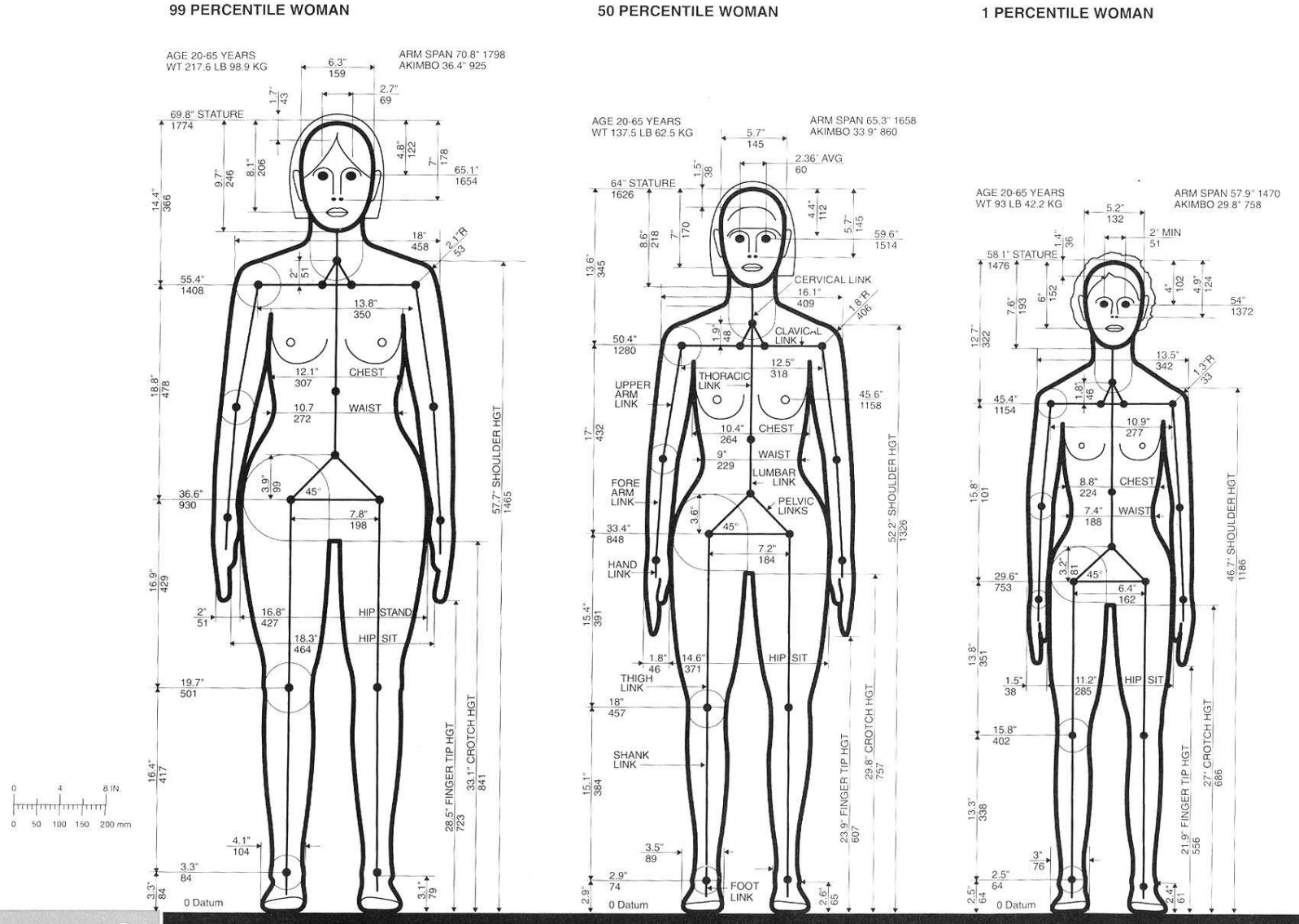
- The lounge should be easy to disassemble or fold
- The lounge should be rust and mold deterrent and easy to clean (if minimal cleaning is necessary)

Considerations:

Once folded, the lounge should have a handle the user can use to carry the bundle. The handle could be on the bundle itself on a "bag" in which the lounge is contained after folding. The user should be able to hang the bundled lounge from the handle.

If the user must disassemble part or all of the lounge for storage, the owner must keep track of parts such as screws, fasteners, etc while the lounge is disassembled. If the lounge must be disassembled, a bag for the parts, etc should be provided to the user.

Figure 1. First Percentile, 50th percentile, and 99th percentile adult female



¹ The Measure of Man & Woman Human Factors in Design (revised edition), 2002. Henry Dreyfuss Associates (Eds.)

² Human Factors Design Handbook (1992) Woodson, Tilman & Tilman. McGraw-Hill Publishing.