

Research on Application of Man-Machine Engineering to Design of Ceramic Wash Basin

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Abstract

An analysis on design of ceramic wash basin is presented to highlight application of design philosophy of "human-orientation" to design and expand on function of man-machine engineering in design of ceramic wash basin, and point out future product design in China must be tied to creation and innovation, and should conform to man-machine engineering, i.e. conforming to the core of "human-orientation". It is conducted to establish design fully adapting to and meeting hope of "human", make humanistic design lead the front-edge fashion, and achieve harmonious unity between human and products.

Keywords

Ceramic wash basin Design Man-machine engineering Application.

1. Introduction

Currently, "human-orientation" has become a mainstream design thinking. In design, some believe that "human-orientation" just means considering accordance between man-machine engineering and designed size of product, or designing appropriate products for disadvantaged groups, which, however, is just a unilateral understanding. The design thinking of "human-orientation" means the product design must consider human related factors from the perspective of design, including use habit, cognition mentality, social, physical, cultural level, etc., which directly or indirectly influence the interaction between people and the outer world and reveal people's demands and desires. While these demands and desires are actualized by designers who research designed products, market, information, social cognition, and production system. The research on man-machine engineering in design of ceramic wash basin mainly aims to explore and research bathroom products and potential consumption habits, usage mode, layout habit of bathroom space and the level and trend of demands for bathroom products, thereby raising new thinking of design and development of bathroom products and new concept of future design.

2. Principle of design of wash basin model

Design of ceramic wash basin is mainly divided into modeling, decoration and function. Here we are mainly discussing design principle of man-machine engineering in modeling design. In modeling aspect, the designers analyze investigation data of ceramic wash basin product market, consider positioning of model of wash basin, select effective design element for evolution and deformation, make artistic processing and produce new expression, to enable mass production of the product model and satisfy consumers' aesthetic appreciation, use habit and life style. While in model design, reasonableness in four aspects of structure, material, function and operation is speculated over emphatically: Reasonable structure serves as the basis for model design. In real production, model should be combined with reasonable product internal structure, while product model tends to be limited by internal structure of bathroom products, so reasonable structure usually should be considered in design and modeling; ② selection of reasonable material has a direct influence on production cost and modeling. Reasonable modeling material is the key to design, and reasonable material selection will add gloss to model of designed product; ③ functional reasonableness is

pivotal to design of model of wash basin. So-called functionality of wash basin model refers to accepting and rejecting of corresponding functions and position, etc; Reasonableness of operation is embodied in model reasonableness of ceramic wash basin in visual, touch perception and use course in the course of man machine interaction. Reasonable and comfortable operation mode should be designed and comfortability in real operation should be controlled to eliminate discomfort or use difficulty of users in using, which conforms to principle of man-machine engineering.

3. Man-machine engineering of space where wash basin is located

Research on man-machine engineering of space where wash basin is located is an important tool to effectively explore various characteristics reflected by consumers in using ceramic wash basin products, thereby making characteristics conforming to man-machine engineering fully considered in design of wash basin, so as to realize safer and more efficient interaction between human and object. Furthermore, the designers can make pertinent survey of consumers population to go deep into spiritual aspects, cultural level and mental demands of consumers population in using ceramic wash basin, to inject real design idea of "human-orientation" into designed ceramic wash basin.

In design and use of ceramic wash basin, research on man-machine engineering is not limited to categories of man-machine engineering such as body size and spatial scale, etc., but also include deep-seated research on operating ambients, people's mental and cognitive research, and research on wider social cultural background. The wash space in modern houses has transcended original wash function, and changes to wash dresser with bedplate, hence its height should also consider dressing up and washing hair. Top edge of general washing platform is about 720 - 780mm high, and up to over 800mm in northern area in China where average height of body is high. As the movement of stooping is large when one washes face, so adequate space should be left in front, and the distance from cabinet behind mirror should be at least more than 450mm. When left and right distance from wall is too narrow, arms will feel constrained. The center of washing platform should be more than 375mm apart from the wall. Following is focused on numerical value of man-machine engineering and is a discussion about requirements on numerical value conforming to man-machine engineering of ceramic wash basin, for reference in design (as shown in figure 1).

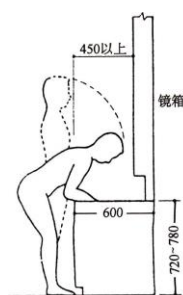


Figure 1

4. Application of man-machine engineering to design of ceramic wash basin

4.1 Man-machine engineering in terms of wash basin size.

The materials of wash basin are highly diversified: ceramic, glass, woody, etc. The paper is mainly about type and size of ceramic wash basin. There are a wide variety of models for ceramic wash basin, here we mainly research man-machine engineering of counter basin and vertical basin: ① the counter basins are divided into embedded basin and countertop, which two show no significant transformation in model and size. For the convenience of research, the paper takes countertop for example to state its numerical value. Most of models of countertops are round and square, also include semicircular, diamond, and irregular, etc. Functionally, its basic numeric values are: 490-590*420-480*150-195mm for square basin. 420---510*420---510*150-250mm for round basin; 500---570*360---460*120-210mm for semicircular basin; no exactly accurate numerical value for

irregular basin for reference, yet its design should follow basic numeric value of man-machine engineering. There are a great many types of wash basin, which are not enumerated one by one here. In designing size of physical images, the key is to notice to apply principle of man-machine engineering, i.e. the usability of designed physical image should be strong. Vertical basins are mostly ceramic, also include glasswork and woodwork, etc. Vertical wash basins are approximately divided into lift type and floor-type: basic numerical value of lift-type vertical basin is 630--- 660*490 ---520*580-600mm; the basic numerical value of floor-type vertical wash basin is 490-650*420---510*750---860mm. The above size is summarized after combination of model esthetic appearance, functional science, and human machine interaction utility, etc.

4.2 Man-machine engineering in terms of wash basin use.

The proportion and size of ceramic wash basin must conform to man-machine engineering. Meanwhile, the man-machine engineering of space where wash basin is located is also an important aspect showing superiority or inferiority of designed products, including wash basin's height in space, relation with area in space, relation with other matched products, consumers' use habit, etc. In principle, ceramic wash basin's height is determined by the height of people who stand, bend two arms, and bend and stretch out elbow. The heights for males and females are different, generally subject to female one. The too high wash basin will make the water glide off along arm when one washes face, thereby moistening gusset; Too low height will make waist bend excessively (as shown in figure 2 and 3). For the height of wash basin, there are also a plurality of behavior applicability problems, such as washing face, washing hands, brushing teeth, washing small clothes, convenience in taking and placing back makeup and shaver, etc. Effective height can enable comfortable use without fatigue or discomfort in waist and knee; height and position of towel rail, storage position of soap and tooth set, etc. will have an effect on reasonable use of wash basin. The wash appliances must be convenient for taking, inadvisable to be too high or too low. Too high will cause water to run down along arm, while too low entails stooping and crouching, thereby inconveniencing the user. The proper height is about 1.0m.

For mirror height, there are problem of selecting the optimum field of vision, and applicability of adults and children of different heights. For example shaving, trimming, dressing up, looking into the mirror, and other washing behaviors require proper position of mirror. Too low mirror entails stooping or crouching, while too high makes the short user have to tiptoe. Investigation and research show that advisable height of washing mirror is 1.0-2.0m; for illumination of washing space, illuminants of different positions lead to differing feelings. The position and angle of mirror lamp must conform to man-machine engineering. The improper position of lamp installed will cause glare which lowers comfort of washing;

The socket position must be reasonable to be waterproof and usable, including embodiment of position and functions of electric socket, such as facilitating using AC shaver, electric wind and other electrical equipment; position relation of tap, switch and wash basin should be reasonable. Effective distance of use and spatial utilization are the principle of man-machine engineering generated by tap and wash basin. Plastic box and cask are often placed in the wash basin to collect water, then the relation between tap and wash basin is particularly important. When position is improper, water collection is constrained. The installation site of tap switch will influence usability of tap. The switching mode and shape of switch will influence the mode of applying force and regulating sensitiveness.

Give a simple example, for washing hair, collision of tap and head should be avoided and turning on and off the tap should be convenient, which highlights the importance of the man-machine engineering of position and height of tap. Then height of wash basin and surrounding space should facilitate stooping and bowing, etc. (as shown in figure 4)

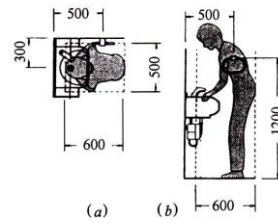


Figure 2

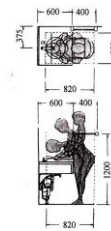


Figure 3

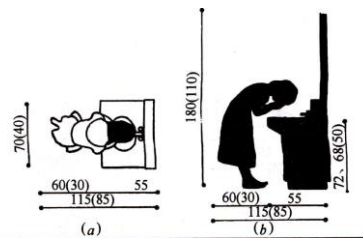


Figure 4

5. Conclusion

To sum up, research on man-machine engineering can be found in size and spatial application of ceramic wash basin. Profound research on it conduces to reasonableness of design and usability of product's space utilization. We should enhance effective research on man-machine engineering from different perspectives and different levels to give full play to its promotion function to design..

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