Innovative Design and Development of Chinese Sanitary Ceramics from the Perspective of Humanistic Care

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Abstract. Sanitary ceramics is one of the symbols of the development of social civilization and an important part of people's living space. Its design concept is "People-Oriented". Especially under the impact of the sudden "epidemic", the sanitary safety, practicality and convenience of sanitary ceramics have formed the innovative design direction of sanitary ceramics from the perspective of humanistic care, and put forward new design and research topics to the society. Taking the design of public space, security and intelligent sanitary products as the starting point, this paper makes an in-depth study on the innovative design of sanitary ceramics. It is based on the natural ecological consciousness and the survival and development environment of human society as the research scene, takes the issue of the community of human destiny as the guiding goal, and provides for the future safety and health of mankind through three parts: health, social service and ecological design, these ideas put forward opinions on the era of healthy development.

Keywords: From the perspective of humanistic care; Innovative design of sanitary ceramics; Health design; Social service design; Ecological design

1 Introduction

The historical process of human development shows that the development of social civilization promotes the continuous change of people's way of life. It is the "toilet civilization" closely related to the progress of people's life style that can highlight the development progress of civilization. "Toilet civilization" the purpose of continuous evolution is based on the solution of privacy, so that the reasonable layout of sanitary space, sanitary products and practical integration of people, make the sanitary products health and safe, intelligent and convenient, more conducive to the development of human beings.

Chinese sanitary ceramics started relatively late. Before the founding of new China, China's toilet is basically to squat pit, public toilet space is open rectangular squat pit, with partition divided into independent squat, using the way of regular centralized washing. The open squat pit causes the excrement to be exposed to the air for a long time, causing serious pollution to the environment. As the saying goes: " looking for the toilet do not ask, smell the smell to find." It can be seen that the influence of
excrement on the environmental taste at that time. After the founding of new China, the social life gradually stabilized, the lifestyle gradually improved, and the design and development of sanitary ceramics was widely valued. In the early 1960s, the sanitary ware [1] designed by Teacher Li Shude from Beijing Institute of Construction Engineering opened a new chapter of the Chinese design and development of sanitary ceramics, which is a product of special significance in the history of the product structure of sanitary ceramics in China. The squat toilet designed and developed in this period has become a common sanitary ware in people's living space. The design improvement of the squat toilet has reduced the pollution of excrement to the living environment and greatly improved the quality of people's life. In 1973, the national building sanitary ceramics "Tangshan Conference" was held, formulated the development plan of the industry, [2] put forward specific development measures, to promote the development of Chinese sanitary ceramics in the future. In 1982, domestic whirlpool integrated toilet research and development success, from "squat" to "sit" toilet design improvement, not only reduce the inconvenience to the body, and greatly reduce the waste pollution to the environment, improve people's quality of life, change the social way of life, health ceramic products get benign development. In 1986, sanitary ceramic products in the toilet in addition to the original flush type, siphon type, flush siphon type, but also added jet siphon type, whirlpool siphon type, water-saving sanitary ware and accessories and other new products. By the end of the 20th century, China's sanitary ceramics enterprise design and production of sanitary ware has been very common, the progress of sanitary ceramics production technology, further optimization of industrial structure, the formulation of industrial standardization system, the design and development of sanitary ceramics, improve the development of sanitary products and space, improve the quality of people's life, changed the social way of life.

With the development of human, sanitary ceramic products and space design become an important part of social public health and health, it from simple and practical and pay attention to privacy, gradually to the social development of humanistic care, through advanced technology design more suitable for public health safety products, human, human-computer interaction relationship more and more profound, for the safe and healthy development provides a powerful guarantee.

2 Purpose and significance of the study

It is an important social value to solve human physiological needs and improve the quality of human life from the perspective of human development. Different periods will produce different human needs. Maslow's theory divides human needs into five categories: physiology, safety, social interaction, respect, and self-realization, which are arranged from lower to higher levels. The basic meaning of different levels, such as physiological needs is the most basic requirement of human survival, it includes breathing, water, food, sleep, physiological balance, secretion, sex, clean, etc., if these needs are not meet, individual life characteristics cannot normal circulation, threat to the person's life safety [3]. From this point of view, physiological needs are the driving force of human life characteristics and an effective means of improving social lifestyle. With
the continuous change of social life style, health, safety and cleanliness have become an important aspect of the development of human life. Human toilet civilization from the natural floor and row, water and bath, gradually to pay attention to the privacy of the ground health bathroom space construction development. And bathroom products and space not only solve the privacy, maintain the physiological balance of human body, excretion secretions, cleaning and other functions, but also become truly into people's life, protect human own health safety, one of the important means to maintain the benign development of society.

Contemporary, in the context of the "epidemic" outbreak, the aging problem deepening, the development of energy conservation and environmental protection concept, the health and safety of the public bathroom space, the humanized design of the bathroom, the technological application of intelligent bathroom, have put forward a new design direction for the design and development of sanitary ceramic products and space. Health, social services, ecological ceramic bathroom products design and research and development, from the perspective of the benign development of human society and natural environment, put forward to solve the human health and safety problems, improve the healthy development of human lifestyle of effective methods.

3 Connotation and value of sanitary ceramics design innovation direction

With the improvement of social living standards, people gradually change the concept of health and safety. People's requirements for bathroom products and space applications are becoming higher and higher, and sanitary ceramics have become a very important part of people's life. The quality of sanitary products directly affects the safety and health of People's Daily life, comfort and convenience, and people's physical and mental health. Health ceramics in meet human physiological needs and psychological feelings at the same time, also should pay attention to the principle of practical, artistic, it not only meet people physiological needs, and become people's pursuit of safety and health, aesthetic expression appeal object, it from two aspects of function and emotional bring people more enjoyment.

From the perspective of functional characteristics, sanitary ceramics use many advanced technologies in product design, such as induction device, automatic heating, sterilization, height adjustment, automatic cleaning, etc., so that science and technology to serve human, play a comfortable and safe role; the concept of energy saving and environmental protection into the functional design of sanitary products, such as water-saving toilet, waterless toilet, folding toilet, atomization faucet, etc., using the principle of science and technology to change the function of sanitary ceramics, to achieve the development concept of energy conservation and environmental protection, make environmental friendly sanitary products more and more attention. The design and development of functional features not only improves the practicability of health and safety, energy saving and environmental protection of products, but also provides technical support for the direction of health and ecological design. Emotional bathroom products are added on the basis of the function of the rich aesthetic humanized design, more
suitable for the requirements of human health development, it is divided into two forms of visual, experience. Visual is the first element for people to perceive the aesthetic appreciation of sanitary products is modeling and decoration, such as the beautiful appearance and decoration effect of products, decorative beautification of lighting; experience is the resonance of man-machine dialogue in the process of using sanitary ceramic products, and is also the basis of sanitary ceramic design under the humanistic perspective. Sanitary products use scenarios and the use of different groups, the use of needs and aesthetic trends are not the same. Public space, kindergarten, nursing home, home and other use space is different, different age levels of the actual demand for bathroom products are different, sanitary ceramic design to solve the key problems are also different, so the designers should carefully observe the use of each product user. For example, in the future, there will be 1/3 of the total population of the elderly need to care for [4], and sanitary ceramic products are people must use every day, to meet the elderly group safe, convenient use of bathroom products design and development of aging development of society to ensure bathroom products to put forward a new design direction. Such as children from the family to help excretion to complete the excretion, develop a good lifestyle and habits, bathroom products play a great role, and children's bathroom products have completely different needs and demands from adults. In the use of safety, design the size and height of the product according to the needs of children, and try to avoid the existence of unsafe factors. In experience, by adding lovely color, popular modeling elements and decoration, to meet the emotional demands of children, attract children to develop independent living habits; for example, people use the public space sanitary products always produce unhygienic feeling, this experience psychology often cause more unreasonable use, more health problems.

From this point of view, health, ecological and social service design is to meet people's growing health aesthetic needs based on product function design and development, through product function, visual elements and emotional expression.

4 Research method

There are many specific research methods and means used in this paper, such as historical literature research method, anthropological field investigation method, and quantitative and qualitative research methods and means commonly used in social science research.

4.1 Historical literature research method:

Search, collect, sort out, analyze and study the relevant literature of this paper through libraries, archives and other institutions. On the one hand, it is to comprehensively understand the history and current situation of the development of sanitary ceramic art design, the centennial history of Chinese ceramics edited by Chen fan, the history of Chinese architectural sanitary ceramics edited by Ding Weidong China Building sanitary ceramics Yearbook 2008-2019 compiled by China Building Sanitary Ceramics Association and bathroom product model design and production compiled by Liu lejun
provide a large number of literature research data for this paper. It is analyzed that the development process of sanitary ceramics is the process of human survival and civilization evolution. On the other hand, it is to grasp the domestic and foreign researchers' research on the role of sanitary ceramics in human living space from the perspective of humanistic care, as well as the development status and research views of sanitary ceramics art design based on human healthy development, so as to fully absorb the previous research results. Donald Norman, Fu Qiufang, et al. Translated emotional design, Abraham Maslow's human motivation theory and other literature works point out the importance of sanitary ceramic health, ecology and social service design from the perspective of human survival and development (As shown in Figure 1, the bibliography of the research on the development of Chinese ceramic art from 1949 to 2019).

Fig. 1. The bibliography of the research on the development of Chinese ceramic art from 1949 to 2019

4.2 Anthropological fieldwork method:

Although the sanitary ceramics art has left a wealth of literature in the development process, the research on this paper is far from enough. Therefore, it is necessary to interview the parties or indirect acquaintances in the historical stage, observe and record on the spot, and obtain first-hand relevant data to improve the design and development of sanitary ceramics and production technology. From the perspective of the benign development of human society and natural environment, it is analyzed that sanitary ceramics health, social service and ecological design are effective methods to solve human health and safety problems and improve human healthy development lifestyle. The research group was divided into three investigation groups to conduct in-depth research on ceramic production areas such as Zibo, Shandong, Tangshan, Hebei, Foshan, Guangdong and Nan'an, Fujian. It successively inspected sanitary ware companies such as Tangshan Huida, Foshan Wrigley, Hengjie, farnsa and Fujian Jiumu, and conducted key interviews with enterprise experts to fully understand the development process of sanitary ceramics and the development direction of design innovation. At the same time, it also conducted in-depth investigation on the health and safety of toilets in public and household spaces in first tier cities such as Shanghai and Guangzhou, rural areas such as Jiangxi and Shandong, and formed a complete and detailed investigation and Research Report, so as to obtain detailed first-hand data for the research of the subject. Therefore, fieldwork is an indispensable research method in this subject.
4.3 Methods of quantitative research and qualitative research:

Quantitative research and qualitative research are two important research methods in the field of social science. Based on the conclusion of qualitative research, quantitative research collects the relevant data and industry data of Chinese sanitary ceramics from 1949 to 2019 for quantitative analysis. Quantitative analysis and qualitative analysis complement each other. While providing objective basis for qualitative analysis, quantitative analysis takes the qualitative research conclusion as the basic premise, constructs a theoretical mathematical model by processing statistical data, and uses the mathematical model to calculate various indexes and meanings of the analysis object, so as to explore the impact on Chinese ceramic art. In particular, it is the core factor for the development of art design in daily-use ceramics and building and sanitary ceramics industry. The latter is a method to study things according to the attributes and internal regulations of social phenomena or things. Quantitative research is mainly expressed by data, patterns and graphics, and qualitative research conclusions are mainly described in words. The research of ceramic art should also use the methods of quantitative research and qualitative research in order to make the research views and conclusions more objective and persuasive.

5 Existing problems in bathroom products and space

With the change of social lifestyle, bathroom space has become an important part of people's living environment. It is divided into public space and home space, which serve people's working and family living environment respectively. In the process of use, they all have their own characteristics, and different problems will appear, pointing out the direction for healthy and ecological humanized design.

5.1 Rationality, hygiene and safety of public sanitary ceramic products

"Toilet revolution" is a part of the development of human civilization. It is closely related to people's life and is the life of civilization. Public health space mainly refers to medical treatment, education, convalescence, commerce, office, high-speed service area and toilet of tourist attractions. It was originally an interval squatting position of cement pit. Excreta was exposed to the space for a long time, resulting in strong peculiar smell. It has become an effective way for bacterial reproduction and transmission. After improvement, an independent closed squatting toilet has emerged, the excrement is washed in time, which effectively solves the problems of odor and the transmission of bacteria, but the squatting toilet will produce leg numbness after a long time of use. In order to solve these problems, the toilet was born, which makes people go to the toilet in a sitting position, and the comfort is improved a lot. However, the people who use the toilet in public space are more complex, and the seat ring has more contact with people's skin. In the process of use, the excrement is often not washed in time, resulting in the dirty and disorderly sanitation of the toilet, and the toilet in public space becomes a "riding toilet". In order to solve this problem, seat cushion paper came into being, and various forms of cushion paper still do not seem to reasonably solve the health and
safety problems of public space toilet. The rationality of the use of toilet promotes the
design innovation and research and development, such as squatting and sitting toilet.
People can choose the way to enter the toilet according to their own habits. According
to the data, The squatting and sitting toilet developed by Tsinghua Academy of fine arts
and the toilet without flushing developed abroad point out the research direction for the
innovative design of public sanitary products[5]. Faucet and washbasin are sanitary
products with high utilization rate of public sanitary space. In the process of using the
products, contact cross use causes a large number of opportunities for bacterial trans-
mission and cross infection. In order to solve the problem of bacterial cross infection
Due to the problem of fork infection, the inductive faucet came into being. Due to the
humanized design of the sensor location, distance and sensing effect, the use of the
product is more convenient, hygienic and safe. The public space washtand is generally
established according to the adult standard, which has a lot of impact on the use of
teenagers, the elderly and the disabled; the safety and hygiene of the washrin and the
safety and health of the washstand The problem of accumulated water mainly depends
on manual cleaning in time; the utilization rate of public space is high and humid, and
the ventilation problem is the key to the design; the design of public sanitary space for
ensuring sanitary products needs to be improved, such as the safety guarantee of incon-
venient movement, and a series of problems caused by children's use of sanitary prod-
ucts, which need to be designed from the perspective of humanization More intimate
bathroom products.

5.2 Problems of ensuring the development of sanitary products under
the environment of aging society

The trend of population aging is an important issue in social development. As shown
in Figures 2 Statistical table of population proportion of all age groups and Figures3.
Population statistics, the relevant data of the seventh national census show that the pop-
ulation aged 60 and over is about 260 million, of which the population aged 65 and
over is about 190 million, accounting for 13.5% of China's total population. Compared
with 2010, the proportion of the population aged 60 and over has increased by nearly
six percentage points, and the degree of population aging in China is gradually deepen-
ing [6]. The increase of age leads to the gradual decline of physiological indexes of the
elderly.

![Fig. 2. Statistical table of population proportion of all age groups](image)
Health, various problems such as health and self-care ability have become increasingly prominent, which has brought unprecedented pressure to social security services. Therefore, vigorously developing security industry is an important aspect of social service design. Aging industry includes structural products and auxiliary products. A key link in auxiliary products is to ensure the design and R & D of sanitary products. In daily life, there are few sanitary ceramic products designed for the elderly, which brings great inconvenience to the elderly to solve the problems of physiology and washing and cleaning. There are not many enterprises engaged in the design and production of sanitary ceramic products related to aging, and the depth of design and R & D is not enough. At present, the bathroom space is basically equipped with various handrails to give the elderly a certain support point in going to the toilet and washing; There are also movable walking carts to help the elderly with mobility difficulties enter the toilet for cleaning; The toilet with automatic flushing function solves the physiological and health problems of the elderly by alleviating constipation of the elderly, and the needs of the elderly for comfortable and convenient use of sanitary products have not been fully considered. Therefore, the design of guaranteed sanitary ware products should start from the perspective of humanistic care, carefully study the psychological and behavioral characteristics of users, and the research and development of guaranteed sanitary ware products is the internal inevitable requirement of building a well-off society in an all-round way. It is of great significance to promote economic and social development and maintain social harmony and stability. It is also an important symbol to measure a society's progress and civilization.

5.3 Development of intelligent sanitary products

From the perspective of humanistic care, intelligent bathroom products have become a part of living space. On May 20, 2019, the toilet revolution with the theme of "design for love" and the white paper release ceremony of China's intelligent public toilet hosted by farnsha bathroom were held in Beijing [7]. This press conference mainly focused on the current situation research and preliminary solutions of intelligent public toilet. At present, the state attaches great importance to the "toilet revolution", and the "toilet revolution" launched by local governments at all levels is a good thing for the benefit of the people. Objectively speaking, there is still much room for us to improve our understanding of the role of sanitary products. Sanitary space is one of the places where bacteria spread and breed. Sanitary products should not only solve the problems of
physiology and sanitation, but also relate to the public's health and safety. It should be one of the important links to solve the health and safety problems at the social level. Therefore, it is not enough to focus on increasing the comfort of bathroom products and space. We should also devote ourselves to promoting the R & D of bathroom products with science and technology, and integrate science and technology with ergonomics and modern aesthetics into product design. Therefore, both the design and production of sanitary products and the rational use of new technology need to be more in-depth thought. For example, advanced disinfection and sterilization technology, safeguard means, beautification and other scientific and technological means should be applied to sanitary products and space design, so as to make the real intelligence become the trend of product design and development, and create a more healthy, environmental protection and Smart and beautiful life provides better solutions for the rational use of bathroom products and space, and conforms to the trend of social development.

6 Innovative design of sanitary ceramic products in the context of humanistic care

"Humanism", also known as attaching importance to human culture, is the core and advanced part of human culture. It includes human value, human personality, human dignity and human life[9]. The so-called humanistic care is a kind of care for people's living conditions. It advocates restoring people's natural nature and advocating respect and care for people. It is one of the important factors for the healthy development of human beings. It is the product of the development of social spiritual civilization to a certain level and is involved in all fields of life. Sanitary products are one of the symbols of the development of human civilization and are closely related to people's life. It not only includes the real feeling of the quality, price and other attributes of sanitary products, the public's appreciation, recognition and resonance of products, but also involves the social aspects of health, safety and sustainable development brought by products to the public. In particular, the shape, function, structure and material design of sanitary products in the context of humanistic care are becoming more and more humanized, which not only cares about people's life from subtle points, but also reflects the practicability of safe, hygienic, convenient and humanized products and the connotation of humanistic care. It is based on the natural ecological consciousness, takes human society and natural environment as the research and practice scene, and takes the problem of the community of human destiny as the guiding goal. It puts forward solutions to the era problems of safety, health and healthy development in the future through three parts: health design, social service design and ecological design.

6.1 Health design -- Safety and health care

Human life needs a healthy living environment, and the premise of health is safety and health. In particular, today, under the "epidemic" attack, a healthy living environment reflects people's attitude towards getting along with nature, and tests people's response ability to the complex natural environment. Healthy design starts from the vision of the
community of human destiny, repositions their respective missions with scientific and humanized design innovation, and puts forward various solutions to problems for people's healthy development. The living habits of people in economically backward areas, such as going to the toilet on the spot and bathing in water, have brought a lot of health and safety problems to the living environment. The feces everywhere produce a large number of bacteria, nourish a large number of mosquitoes, and cause the disorderly spread of infectious diseases. The evolution process from toilet on the ground to squatting pit, squatting pan and toilet; From bathing with water, the water quality and water temperature in the bathing process will lead many uncertain factors affecting health, to the research and development of faucets and showers. While controlling the water quality, the appropriate water temperature regulation is more suitable for people's use, which fully reflects the change of life style with the healthy development of human beings as the main line. The health design of sanitary ceramics mainly starts with the research of materials, functions and ergonomic data.

**Research and development of materials to promote healthy design.**

In the design of sanitary products, the research and development of materials can effectively improve the innovative perspective of humanistic care in product design. From the perspective of epidemic protection requirements, frequent hand washing is one of the necessary conditions. Sanitary ceramics are the daily necessities most used by people when washing, and the humid environment of sanitary space is the place where bacteria breed and reproduce. Most of the modern sanitary space is dominated by stool, and the seat ring is a product that directly contacts people's skin. Experts from the school of public health of Fudan University have pointed out that 32% of the toilet may be attached with dysentery bacteria, some of which can survive on the seat ring for 17 days! Another research report pointed out that when 100 million poliovirus were put into the toilet, 3000 viruses were detected on the seat! These shocking figures make people realize how important it is to have a toilet with bacteriostasis, sterilization and antifouling ability [9]. In particular, the public space toilet, due to health problems, there are many abnormal phenomena in the use of the toilet, and the toilet appears more dirty and messy, which makes people unwilling to use the toilet seat ring and use the toilet as a squatting toilet. The main reason is the health and safety problem of the seat ring. Some enterprises have developed and designed a variety of cushion paper to improve the use of the seat ring. The cushion paper has the property of water melting. It can be directly washed away after being put into the toilet without causing blockage. To some extent, it reflects the humanized design of humanistic care, but it does not play the role of antibacterial and sterilization fundamentally. In the bathroom space, there are many health and safety problems similar to sitting circle. How to eliminate the breeding of bacteria from the source is the key to health design. As shown in Figure 4 Automatic telescopic design, the expansion principle of the scheme shrinks the seat ring and cover into the closed tank, and uses ultraviolet light for sterilization, disinfection and heating, so as to ensure the hygiene and safety of the toilet. As shown in Figure 5. Design dimension drawing of automatic expansion, the telescopic structure data in the scheme conforms to the use data of man-machine process, which greatly reduces the contact route of bacterial transmission and ensures people's use safety. From this point
of view, the design and R & D of antibacterial and bactericidal materials for bathroom products can achieve the role of antibacterial and sterilization at the source, which can effectively improve the hygiene and safety of products and the expression of health design concept, and greatly improve the humanized design concept of products.

![Fig. 4. Automatic telescopic design](image)

![Fig. 5. Design dimension drawing of automatic expansion](image)

**Research and development of functions to promote health design.**

Sanitary products are mainly responsible for the transportation and cleaning of a large number of excreta produced in the process of human excretion and washing. Human excreta contains more than 140 kinds of bacteria, viruses and parasites[10]. If not handled properly, the bacteria, toxins and parasites in excreta will breed mosquitoes, pollute food, water, float or float in the aerosol attached to the air, enter the human body with the respiratory tract, and endanger human health. At present, the improved functional structure of sanitary products from exposed to closed prevents the spread of most bacteria and toxins, but the humid environment of sanitary space gives the soil for bacteria breeding. In addition to meeting people's most basic physiological needs, what kind of sanitary products can make sanitary life more secure and comfortable? In the process of using sanitary products, hygiene and safety is the most basic humanized design concept, and contact use often causes cross infection of bacteria. Therefore, various forms of "inductive non-contact" functions are widely used in product design. At
present, the opening and closing of faucet and toilet cover on the market adopts various "inductive no touch" functions, without manual flap and button, so as to effectively reduce the transmission route of bacteria. As shown in figures 6 Auto sensing legend and Figures 7 Hand drawn drawing of telescopic structure, the toilet uses the principle of constant temperature induction. At the corresponding position between the human body and the seat body, the cover automatically shrinks into the closed space, and the sterilized seat ring extends out for use; After the human body leaves, the cover extends, the seat ring shrinks, and the flushing method and flushing amount are selected according to the excreta, which can be easily used without manual contact. The "inductive" shower and faucet can set the water temperature in advance. When the human body enters the sensing range set by the product, the water with comfortable temperature will gush out. When it leaves the sensing range, the water flow will be automatically closed. Even the elderly, children and the disabled can learn and use it immediately to obtain a convenient, comfortable and reassuring product use experience. The research and development of "inductive" product function minimizes the opportunity of manual contact, solves the problem of bacterial cross infection in the use of sanitary products, and ensures the health and safety. As shown in the figure, from this point of view, the functional design and R & D of various products conducive to human health and safety point out new innovations for the design of health bathroom.

 Intelligent technology improves health design index. Intelligent sanitary products originated in Europe and America and developed in Korea and Japan[11]. The original design concept is mainly used for medical treatment and elderly health care. Through continuous design innovation, they have added sexual design concepts such as sterilization and antibacterial, paperless, automatic flushing, deodorization and cleaning, warm air drying, etc. It provides people with safety and health protection and changes people's lifestyle from the perspective of scientific and technological intelligence. The complete solution of sanitary products is only the functional appeal of human beings to solve physiological needs, which has triggered the innovation of sanitary product design and formed the trend of sanitary development in the future. Intelligent sanitary products are sought after by people for their powerful environmental protection and health functions, and will become a must for people's life: For the health needs of living space, excreta and cleaning supplies in public space are stacked naked after use, becoming a place for bacteria breeding and breeding, polluting
the living environment and a source of virus infection; Contact sanitary products cause health and safety hazards such as bacterial transmission and cross infection in the process of use, which are always critical to human life and health. Using scientific and technological means and scientific intelligent sanitary product design can not only reduce the existence of pollution sources, but also completely eliminate the source of bacterial and virus transmission and protect people's health. Health needs of sanitary cleaning: according to relevant data, 60% of gynecological diseases are caused by bacterial infection [12], and sanitary cleaning is the first line of defense against diseases; Fluorescent whitening agent or talc powder on toilet paper is easy to cause various diseases in long-term contact with skin; Removal of peculiar smell in sanitary space; The cleaning degree of excreta and other factors bring hidden dangers to the health and safety of sanitary space. Therefore, the positive design and development of scientific and technological intelligent technologies such as paperless, automatic cleaning and automatic sterilization devices in sanitary products will greatly improve the safety and health guarantee; The need to protect health: the development trend of social aging promotes the development of security design. With the growth of age, the elderly are inconvenient to move, it is not very convenient to wash in the toilet normally, and the decline of physiological indicators leads to constipation, difficulty in entering the toilet and so on; It is very inconvenient for people with disabilities such as the disabled, the blind and deaf to enter the toilet and clean the toilet, and the sexual design functions such as various intelligent handrails, power tools, lighting and sound effects, automatic induction and flushing can effectively help them solve the problem of cleaning the toilet and ensure health and safety. From this point of view, the bathroom product design concept of intelligent technology is to take practicality as the core, safe, convenient, people-oriented, and effectively improve the health index of health design. The health design of sanitary products is one of the important means to change people's lifestyle. Its design and R & D is based on "people-oriented". It protects human health from the perspective of comfort, safety and hygiene, promotes the continuous evolution of human civilized lifestyle, and is conducive to the healthy development of human beings.

6.2 Social service design - indemnificatory care

With the improvement of social living standards and the progress of civilization, the direction of social service design is more detailed. While meeting the needs of people's daily life, sanitary products, on the basis of beauty and practicality, from the perspective of humanistic care, fully consider the needs of all kinds of people for the use of sanitary products, and design disability service-oriented products more suitable for aging, all kinds of disabled people and children, which meet the needs of different people and make the design of sanitary products more reflective Social service concept from the perspective of "humanistic care".

help product design.

According to relevant studies, with the increase of age, the probability of falls in the elderly is 13.7%, of which 51.5% occur in the bathroom and bedroom [13]. As the
The saying goes, "people grow old before they grow old". The physiological skills of the elderly are declining year by year. When entering the toilet and bathing, they are most afraid of actions such as rising, sitting and bending down. They need to help the product support to prevent falling (as shown in Table 1); Disabled people

<table>
<thead>
<tr>
<th>Fall probability factor place</th>
<th>Adverse consequences of falls</th>
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<tbody>
<tr>
<td>Old age</td>
<td>The complications caused by falls are the main cause of death in the elderly over 65 years old; Cause fracture, soft tissue injury, bleeding, etc., reduce the quality of life, fear of falling here, and cause the psychological burden of action</td>
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<tr>
<td>60-69 years old</td>
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<td>70-79 years old</td>
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<td>Over 80 years old</td>
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<td>inherent external</td>
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<td>of one's own unit</td>
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<td>indoor</td>
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<td>toilet, bedroom</td>
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<td>Various diseases</td>
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<td>9.8%</td>
<td>15.7%</td>
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<td>22.7%</td>
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</table>

Table 1. Cognition of fall factors in the elderly

When hands and feet are inconvenient, it is difficult to complete toilet and cleaning; When children use adult bathroom products, the height and size of the products will cause all kinds of inconvenience. Reasonably designed booster products can effectively achieve "power assistance" and solve the safety problems of people going to the toilet and bathing. There are many design directions of power assisted products. Its main functions are: toilet power assisted. Various intelligent handrails of the toilet are designed to support and facilitate people in need of various toilet actions such as sitting up and bending down, so as to effectively help ensure safety. The height of various intelligent handrails from the ground is generally about 65 ~ 70cm[14], and the size of the horizontal movable table is generally 45-60cm, as shown in Fig. 11. The intelligent handrail is designed based on the pull rod principle, which can adjust the height according to the needs of users (as shown in Fig. 8-10 Schematic diagram 1.2.3 of hidden handrail) and play a real role in helping. The ergonomic data of the product is very key, so it must be practical and scientifically hidden. The folding power armrest design can effectively ensure safety. There are also many design directions for bath assistance. For example, installing assistance handrails at the corresponding positions of wash basins and shower devices can help to ensure standing balance. As shown in Figure 11 Hand drawn drawing of telescopic handrail design of washbasin, retractable handrails can effectively meet the assistance needs of different people; The height setting of the bathing device is suitable for use and balance, and anti-skid function is added. The booster design of the product functional structure, such as the washbasin with adjustable height and direction, can be used reasonably by adults and children; The height adjustment of the toilet can facilitate the needs of people of different heights (as shown in Figure 12...
Schematic diagram of handrail height adjustment. As shown in Figures 13 and Figures 14, the assisted bathroom product design truly reflects the guarantee care of social service design from the perspective of humanistic care.

**Fig. 8.** Hide railing design  
**Fig. 9.** Hidden handrail design freehand drawing  
**Fig. 10.** Schematic diagram 1 of hidden handrail  
**Fig. 11.** Schematic diagram 2 of hidden handrail  
**Fig. 12.** Schematic diagram 13 of hidden handrail  
**Fig. 13.** Hand drawn drawing of telescopic handrail design of washbasin  
**Fig. 14.** Schematic diagram of handrail height adjustment

**Prompt and guarantee product design.**

With the improvement of social life quality, the use of bathroom products has become an important part of improving the happy life index. In particular, the application of intelligent technology in products makes more and more human-computer interaction methods and more suitable for use. Bathroom products with lamp effect and voice as the core have become a new direction to ensure the exploration of product design. It senses people's voice, gesture, expression, etc. It realizes the possibility of human-computer natural interaction, and makes the product shape, structure and function more suitable for human needs from the perspective of humanistic care. Tips to ensure
product design mainly has three functions: reminder and guidance function: the biggest problem of the elderly, blind and deaf people entering the toilet and bathing is the location of bathroom products. The use of light and voice tips can effectively guide them to use bathroom products safely. Service function: when people use the bathroom at night, they often encounter dazzling lights, which makes people sleepless. An inductive lighting system is designed in the bathroom products, and the lights gradually light up when opening the door, so that people can adapt to the lights in the dark night, which can effectively avoid "dazzling lights" and contribute to the quality of sleep. The intelligent lighting creates the light and shadow effect and voice of the natural environment, so that the words and sentences are clear and legible, natural and smooth, so as to achieve the feeling of "nature", and truly realize the design concept of reminder guarantee under humanistic care.

6.3 Ecological design -- humanistic care for sustainable development

Respecting nature and coordinating the relationship between good people and nature are the key to human sustainable development. The design of ecological sanitary products is mainly reflected in the sustainable development concept of energy conservation and environmental protection. It carries out innovative design from materials, functions and structures: Environmental protection materials. Sanitary products are the necessities of people's life. The use of materials must be safe and environmentally friendly. Ceramic materials are safe and reliable after firing at high temperature. The antibacterial and bactericidal glaze developed by many enterprises increases the safety of sanitary products, and the easy cleaning characteristics of ceramics also bring more safety guarantee to the use of products. The research and development of environmental protection and safety ceramic materials is the basis of ecological sanitary ware design and research and development. Functional R & D promotes energy conservation and environmental protection. Saving energy and space is an important aspect of the ecological design of sanitary products[15]. The design of energy conservation and environmental protection mainly depends on the functional structure of products. Sanitary enterprises have been committed to the research and development of water-saving functions. Anhydrous clean toilet is a good example. It changes the traditional water scouring function and uses the principle of biodegradation on the basis of changing the product structure, Water free scouring is realized, and human excreta is biodegradable into plant fertilizer - health, safety and environmental protection. As shown in Figure 15 Two in one toilet, "two in one" toilet combines the male urinal with the toilet, turns the seat up into a urinal (as shown in Figure 16 Urination use scenario), and puts the seat down to form a toilet (as shown in Figure 17 Stool usage scenario). The male toilet in public space is usually separated from the toilet. The urinal is basically open without a sense of privacy, and the open urinal produces a great peculiar smell. The "two in one" toilet is installed in a private space. It is a toilet when not in use. A cover can prevent the emission of peculiar smell. It structurally changes the function of the toilet and effectively strengthens the health and safety of the public bathroom space. The design of sanitary products should be suitable for the use habits of the public. Ergonomic data show that different heights, widths and positions of products are suitable for different
users, and the rational use of these data is the key to function research and development. For example, the telescopic and mobile functions can adjust the up and down positions of sanitary products, and provide the strength support for the elderly and the disabled to bend over, sit down and get up, so that they can complete the toilet cleaning behavior; The adjustment of upper and lower height is convenient for everyone to use comfortably. From this point of view, using ergonomic data and through the design and R & D of materials and functions is the future development direction of ecological design of sanitary products, and truly achieve the design concept of energy conservation and environmental protection under humanistic care.

7 Conclusions

To sum up, as American psychologist Donald Norman said: "... Because products are designed for human use" [16], sanitary ceramics, as a necessity of people's life, should be based on "healthy and sustainable" human development needs, and turn it from a single practical function to an innovative design direction with human healthy development as the main line through design means. With the unique design concepts of health, social service and ecology, it creates a natural, pleasant and positive healthy life experience for mankind and improves the quality of human life.

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