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Science and Technology and China Ancient Art Design

—The Qin and Han Dynasty and beforehand time

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Abstract—Since the ancient times, art design and the science always hand in hand advance together, science breeding art, art grows in the science. The Qin and Han Dynasty and the beforehand time's art design in the ancient art design history has the important status, it was to a great extent the establishment at that time above the foundation which the science and technology developed unceasingly. This paper tries to based on science and technology development and the China ancient art design make analysis .

Keywords- science and technology; art design; bronzeware

China is a country with a long history, rich and outstanding cultural heritage, have created a splendid material and spiritual civilization. The Qin and Han Dynasty and the beforehand time's art design is this kind of great civilization important component, and has close contacting with the scientific technological advance then, is product which at that time the physical production, art and the science and technology unified.

“The painted pottery is the agriculture civilization and the humanity settles down the later product, is not only brimming with primitive man's romantic mood, reflects the technology advancement and accumulates esthetically; Bronze brightness, does not have bronze smelting technology better and better, possibly presents that plain and the classically elegant beautiful gloss over in no way.”

^[1] It can be said that the Qin and Han Dynasty and the beforehand time's art design was to a great extent the establishment in the science and technology foundation then. Each time new scientific, the new material, the new technology, the new craft could give the art layout then to bring the new function, the new category, the new modelling, the new decoration, and had the new artistic style, sometimes even caused one time design the utensil, became at that time the time symbol, for example: Bronze Age.

One time's art design must be able to satisfy at that time the people to the life new demand, must use at that time the newest science and technology achievement, used the newest tool, the newest material, the newest technology , the newest theory could transform as the new physical product, adapted with at that time people's material life level.

I. NEW TOOL AND DESIGN

Benjamin Franklin once said: “Man is a tool-making animal.” Hits the system stone implement from the manufacture first tool to start, the humanity on is creating unceasingly and is innovating own production tool, starts this process is even long very. And in dyeing and weaving

industry development, tool's innovation and application to profession progress important promotion effect.

The human initial period also is only sews the animal skin through the bone needle to take clothes, To Neolithic Age Yangshao culture time, has spun the wheel to obtain the application, thus causes the textile fiber to use spins a round rotation to be possible to twist the spun yarn. The Mt. Longshan time has invented the weaving bone shuttle, thus changed the past “the hand after refers to hangs” the operating procedure, raised the textile efficiency greatly, this time unearthed linen, each square inch may achieve warp 78, the latitude parallel 50 fine degrees. The Spring and Autumn Period Warring States time, plants the mulberry hemp, reeled thread to weave was very already common, the craft also rapidly expand, might infer according to the unearthed cross grain jacquard fabric at that time had used rack's-like loom. When Han Dynasty widely used the foot pedal to propose the synthesis the slanting loom, also created the multi-synthesis soft jacquard loom. Mawangdui first grave unearthed plain gauze imperial sacrifices clothes length 128 centimeters, pass the sleeve length 190 centimeters, only the weight 49 grams, just so-called “frivolous like spatial”, “lift like do not have”, the advanced production tool has not been is unable to achieve the so high craft effect.

The earthenware obtains the artistic achievement also cannot leave the new tool's application. The early earthenware's design language, is “writes” depending on person's both hands comes out, the formation divides into molds clay figurines the law, the putty piece pastes builds the law and the putty strip plate builds the law. Hand's operation played the decisive role in the formation process, its design language primitive pure, the work structure was simple, the physique monotonous was not standard, the surface had the concave-convex rough feeling. The Longshan culture time's black pottery, its manufacture had already used the quick wheel. The so-called quick wheel, is one kind lithical or the ceramic makes using the lignin may the free rotation disc, lays aside in buries makes the inertia on the underground wooden axis rotation. ^[2] In system ceramic process, along with disc's revolving, both hands disc central putty material upward on rollers, this must compared to by model many which portably completely the formation the design language needs to enrich. The black pottery is called “the egg shell ceramic”, wall uniform thin, does not have the quick wheel craft and the technical utilization is the impossible achievement like this craft effect conceivably.

II. NEW MATERIAL AND DESIGN

The design and the material are complement one another, in the Chinese ancient times's design history, our ancestors to the new material's discovery, the

transformation and the use has been in the developing process which one kind grows continually, one new material was published often gives design then to have the significant influence.

The most direct invention pottery is primitive life need, but also experienced a long search and the process of practice. In <Origin of Art>, standard Ernst Grosse thought: "basket, no matter when always earth pot's trail blazer." May say before the earthenware has not invented, the wooden household utensils and the bamboo basket once were made by the primitive man save water and the grain use. Engels in a book wrote in <Family Private ownership and National Origin>: "earthenware's manufacture is because spreads the clay in establishment or in the wooden vessel to enable it fireproof to produce. At first is fires with the mud sheath on the cloth, afterward directly has burnt with the putty system semfinished product."^[3]

The earthenware is the richest resources—soil takes the new material by the nature. The water and the soil phase fuse into the putty material, passes incineration which goes too far, causes the adobe to have the chemical change into earthenware, in fact is transforms into other one material from one material. "The invention of pottery completed the first chemical changes, its importance is matched by the nineteenth century radium."^[4] Earthenware putty material's itself in unceasingly is also discovered and the transformation, the Neolithic Age, the intermediate stage argillaceous ceramic, clamps early the sand ceramic, its work is rough, is plain; Later period black pottery, argillaceous luminous exquisite; Shang Dynasty's white pottery, take the porcelain clay or the kleit as raw material, the quality of material pure pure white exquisite. Along with time development, when has developed for several thousand years take the pottery clay as raw material earthenware, the function has satisfied the people with difficulty to when lives the new demand, one new utensil - - bronzeware produces. The bronze is in manufactures the stone implement, in earthenware's foundation produces and develops. The people in seek with in the processing stone material process, has distinguished the native copper and the copper ore gradually, but earthenware burn technology development, also has provided the essential condition for bronze smelting. The bronzeware appearance, enriched and has enriched the Era of slavery people's material and the spiritual life greatly, moreover in long-term bronze smelting practice, the people gradually realized to copper, tin, the lead reasonable allocated proportion, thus obtained the performance to vary, suited in the different use alloy.

III. NEW TECHNOLOGY AND DESIGN

The ceramics have the shoptalk named "fire two earth three fine workmanships", "the fire" are the burn craft. Earthenware's burn had the open-air flat land to pile the fever the stage, the Neolithic Age mid and late stage presented the ceramic kiln burn. Technically looked that this is a huge science and technology leap, first may enhance the firing temperature to 1000 degrees above, thus enables the earthenware to have the firm shape and a stronger quality of material, next may adjust the different burn atmosphere in the burn process (for example reducing

atmosphere or oxidizing atmosphere), thus obtains the rich artistic effects.

The bronzeware was our country Era of slavery art with at that time the science and technology perfect union the product, was also the Era of slavery science and the artistic development outstanding feature, usually the Era of slavery is called the Bronze Age. The manufacture bronzeware, must pass through the ore separation, system Fan, casting and so on several processes.

Before Western Zhou Dynasty early time, the bronzeware formation craft uses a mold Fan law much, therefore the modelling is dissimilar in shape and form, even if the similar function, the identical variety's bronzeware, the modelling is also an infinite variety. After Western Zhou Dynasty intermediate stage, the formation craft has carried out a modulus Fan law gradually, this has provided the processing technology condition for the bronzeware modelling's seriation. The Western Zhou Dynasty and the Spring and Autumn Period Warring States time massive row tripod with two handles, the chime modelling, used this processing technology method to manufacture. The Spring and Autumn Period time starts, to manufacture from has cast muddily develops the minute to cast, also has used the welding, loses the wax law and so on new technology, the new method, causes the bronzeware the model to be more richly colorful. Lost the wax law already to be possible to use for the casting precise slight art treasure. The Warring States early time's Hubei Sui County Zeng Houyi grave unearthed copper revered bronzeware syntheses and so on plate to utilize has cast muddily, divides casts, the muddy minute to cast, welds, the riveting and loses the wax law and so on to make copperware's method, caused the bronzeware the modelling becomes the arc tune is lively, is exquisitely carved.^[5] In the superficial decoration craft, the Warring States time also used the line to engrave, the crustification, the gold and silver cuo, techniques and so on fine gold gold, these new technologies changed the former bronzeware surface sole color, increased the color level and the luster change, enriched the bronzeware art to appreciate the effect.

IV. NEW THEORY AND DESIGN

<Kao Gong Ji> is China present sees the age earliest handicraft industry technical paper, historian Guo Mo-ruo advocated strongly that <Kao Gong Ji> does for Spring and Autumn Period last stage Qi Ren. Nowadays sees is takes <Zhou Li>a part, also said that <Zhou Li Kao Gong Ji>. Passes the view "To test Labor To record" the full text, the content mainly involves: Unified product part name terminology; establishment needed materials standard and selection method; making product design standard, determination technique of production standard and so on. This obviously its already non-general production technical data assembly, but should be to the product manufacturing working instruction and the technology standard instruction standard.

<Kao Gong Ji> records already to be very thin, the altogether six big technical class 30 kinds of work in a factory, summarized each craft manufacture science experience. What is commendable is <Kao Gong Ji> proposed: "the day sometimes, is angry, the material has

beautiful, the labor has skillful, gathers this four then may for good.”This section of writing may say that was China ancient times in the technical theory a profound divine creative force principle. “the weather”, “the rusticity” is refers to from the nature objective factor, “material beautiful”, “exquisite” is the main body subjective factor function, two aspect factor's union is restricting the complete process which directly the utensil manufactures.

<Kao Gong Ji> has also stipulated the product examination system and the inspection standards, As China ancient times a very influential craft work, "Tested Labor To record" has the important historical culture value to the Chinese ancient times's utensil design.

In summary, the art design and the science and technology are the relations which depends on each other mutually. The design has been separated from the technology, will be separated from practical, will be separated from the life; But the science and technology has not designed the participation also not to be able to find the

same social life the combining site, cannot transform as the social material and the spiritual wealth. The Qin and Han Dynasty beforehand art layout, has used at that time the newest material fully, the advanced craft and the technology, transform the product which each article can see, to serve a need, not only enriched and has enriched people's life, simultaneously also promoted the human culture advancement.

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