

## The effect of using computer numerical control on ceramic art

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### **Abstract:**

CNC technology and CAD design have an important role in the development of many fields, including ceramic industry as a tool for the production of models and molds used in the production of ceramics, taking advantage of the accuracy and speed provided by such technology, as well as taking advantage of the advantages of CAD design systems. Is it possible to benefit from this technology as a tool that can have a role in enriching the art of ceramics? This question expresses the real problem of the research, and to answer it we must understand the nature of this technique, which can perform deletions through drilling to form the surface, and then through the artist's thought it can be used as a tool to express his idea separately, or to combine it with shaping techniques of ceramic, and various ceramic surface treatment technologies. Then the research deals with the possibility of using CNC digital control technology, and the use of CAD design systems as tools to enrich the art of ceramics, with a brief presentation of CNC digital control technology, and traditional methods of forming and treating ceramic surfaces, where the research aims to use a digital control machine with three axes to obtain artistic ceramic pieces bearing an aesthetic value, the researcher has reached through his own artistic experience of obtaining ceramic pieces bearing a distinctive aesthetic value, and the practical application of the research included a presentation of some ceramic pieces with aesthetic value in which traditional methods of forming ceramics were used with the use of machine for drilling with numerical control by computer, in one of the stages of obtaining these ceramic pieces.

### **Key Words:**

Ceramic Art

Computer Numerical Control(CNC)

Computer-Aided Design (CAD)

### **Introduction:**

The development of many technologies based on scientific progress in all scientific fields has pushed many fields to move at an accelerated pace towards development, and therefore researchers in various fields must try to achieve the maximum benefit from these technologies to keep pace with these developments, as in the forties of the last century that were the beginnings of the emergence of computer supported by electronic keys that enable data to be entered in the form of binary variables, and since this period until now it has been accompanied by the emergence of many computer programs that are developing tremendously and continuously to serve all areas of life, while saving a lot of effort and time and enriching human life with much luxury, and nowadays, computers and software have developed to lead

machines and equipment, in addition to the emergence of new tools such as robots ... etc., as well as providing many systems that support art and design processes.

During the nineteenth century, there were primitive attempts to control weaving machines through a perforated tape that could be replaced as a data holder, and then attempts to control some musical instruments such as the piano through a plate with prominent points, while at the fifties of the last century was the emergence of the first machine that works with numerical control, and its control was through an emission valve that provides synchronous movement on three axes, it had been operated via a bilaterally coded perforated tape, and 1975 a quantum leap through the transition from numerical control designed with physical components to numerical control of the computer through the software CNC (Computer Numerical Control), and in the eighties appeared many integration of systems such as CNC, CAM, and CAD systems jointly to serve the design and production processes in all fields, which serve the desires of people and support their lives with more luxury, and now the various types of computer numerical control machines occupy most of fields to carry out many tasks with accuracy and speed that is not comparable to manual or traditional techniques. (5 - p. 2)

Due to the multiplicity of methods of forming ceramics due to the flexibility of ceramic raw materials in shaping, because the ceramic material can take different forms (clay slips, semi-dry clays, plastic clays), which leads to a variety of forming methods from molding clay suspensions into molds, or compression of semi-dry clays, or machine-forming, such as extrusion through extrusion machines, or the use of cuffs to form products such as open pots, such as plates and cups, or manual forming by formation techniques of plastic clays, as it is often the case when producing artistic ceramic pieces through ceramic forming techniques such as using strips or ropes, etc., in addition to surface treatment techniques to express the art of ceramics, the potter artist does not adhere to a specific technique but tries to use these techniques, or merge them together to express his idea, and CNC technology and CAD design have such an important role in the development of many fields, including the ceramic industry as a tool for the production of models and molds used in the production of ceramics, taking advantage of the accuracy and speed provided by this technology, as well as taking advantage of the advantages of design systems by CAD. Here, we must ask: Can this technology be used as a tool that can have a role in enriching the art of ceramics? This question expresses the real problem of the research, and to answer it, the nature of this technique must be understood, which can perform deletions by drilling to form the surface. Then, through the artist's thought, the potter can be used as a tool to express his idea separately, or to combine it with the techniques of forming ceramics, and the various techniques for treating ceramic surfaces.

### **Research problem:**

The research tries to answer these questions:

- 1- Can CNC technology contribute to enriching ceramic art?
- 2- Is it possible to obtain ceramic pieces that have aesthetic value by making use of CNC technology?
- 3- What is the appropriate way to take advantage of CNC technology to obtain ceramic pieces that have aesthetic value?
- 4- How can computers and CNC technology contribute to enriching the art of ceramics?

### **Research importance:**

- 1- Developing new tools to enrich the art of ceramics by making use of CNC digital control techniques.
- 2- Shedding light on the effect of using computer numerical control techniques and computer programs to enrich the art of ceramics.

### **Research limits:**

- The use of a three-axis CNC machine to obtain artistic ceramic pieces with aesthetic value.

### **Research goal:**

- Obtaining aesthetic value ceramic pieces through the combination of computer programs and computer numerical control techniques as a tool to obtain these ceramic art pieces.

### **Research Methodology:**

Experimental method.

### **Research content:**

**First:** the art of ceramics.

**Second:** the traditional methods of forming artistic ceramics.

**Third:** practical application

### **Research results:**

1. Ceramic pieces that have a distinctive and innovative aesthetic value can be obtained through the combination of traditional methods of forming ceramics and CNC machines and using computer programs as complementary tools to the creative process.
2. Fine details can be obtained, which enrich the art of ceramics, which are difficult to obtain by traditional methods.
3. Diversity of designs through flexibility in modifying the design and making use of computer design features.
4. Saving time and effort and shortening many stages of design and implementation.
5. The ceramic material resulting from the forming process can be recycled in this way, which contributes to saving resources.
6. This technology may open the way for new trends in the field of ceramic art.
7. This technology plays a distinct role in enriching the art of ceramics.

### **Research recommendations:**

1. Holding seminars and workshops for the introduction and training on the use of CNC technology, and computer-based design to serve the field of ceramics in general, and technical ceramics in particular, as well as all other different disciplines.
2. The necessity to use computer programs and technologies in design processes as an artistic tool to enrich artistic ceramics in particular, and all other arts in general, and to benefit from its many advantages.
3. Supporting scientific research interested in developing and producing computer programs to benefit from them as a new tool for enriching the arts in general, and in the field of ceramics in particular.

4. Conducting research to keep pace with this technological development in the field of digital control techniques, because of its great impact to open new horizons for the development of the field of ceramics in general.

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