

## Study Report

# The Process of Ceramic Design to Apply CNS System with Drawing Objects

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### Abstract

Now in many industrial parts, we depend on the computer systems. This thesis is not focused on 3D programming. It rather talks about computer designing process called Bitmap method, which you can design the pattern, and cut the ceramic using CNC machine. When creating pottery, the computer system is being used in order to make the process faster, save some time, and be creative. This system has lots of good side but you cannot engrave the natural expressions that can be done only by humans. The artificial looking refers to the mechanisms, which calculate, and cut same size repeatedly using mathematical formula.

## 1. Introduction

Now in many industrial parts, we depend on the computer systems. This thesis is not focused on 3D programming. It rather talks about computer designing process called Bitmap method, which you can design the pattern, and cut the ceramic using CNC machine. When creating pottery, the computer system is being used in order to make the process faster, save some time, and be creative. This system has lots of good side but you cannot engrave the natural expressions that can be done only by humans. The artificial looking refers to the

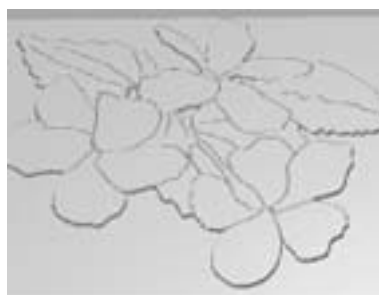
mechanisms, which calculate, and cut same size repeatedly using mathematical formula.

## 2. CAM experiment using pencil drawing

I create 3D using 2D data, which is done by pencil drawing. In this process, I want to find the method to distinguish the different height simply by light and darkness. I also want to combine different images (picture, geometrical image) with pencil drawing to generate natural look of design. **(Fig.1)**

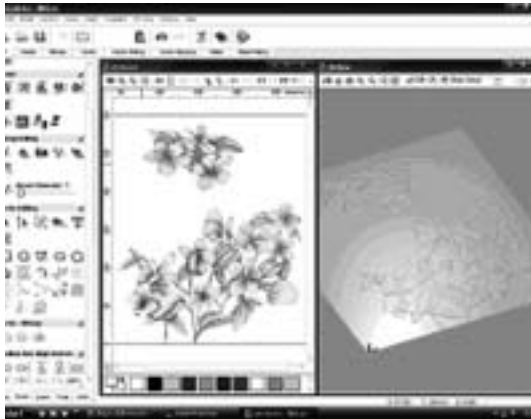


=> bitmap of pencil drawing  
changes to relief

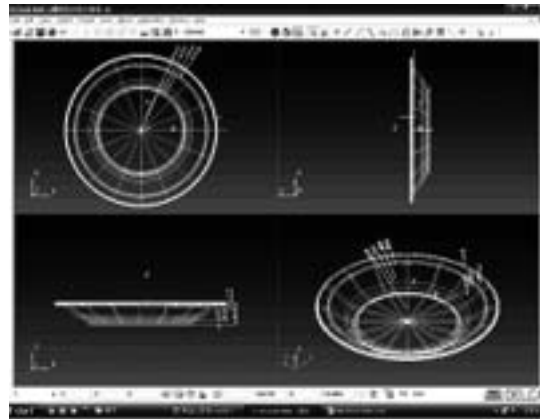


=> vector line changes to relief

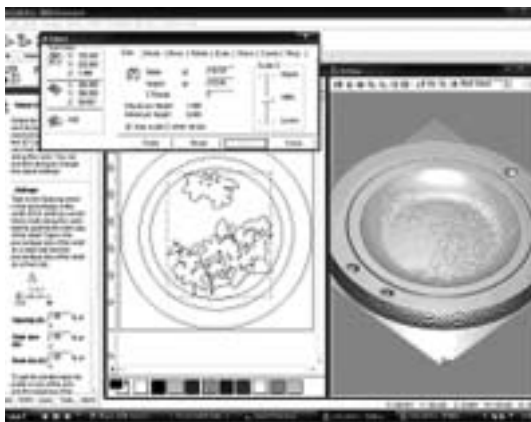
**Fig. 1** The Process of artwork before manufacturing CNC



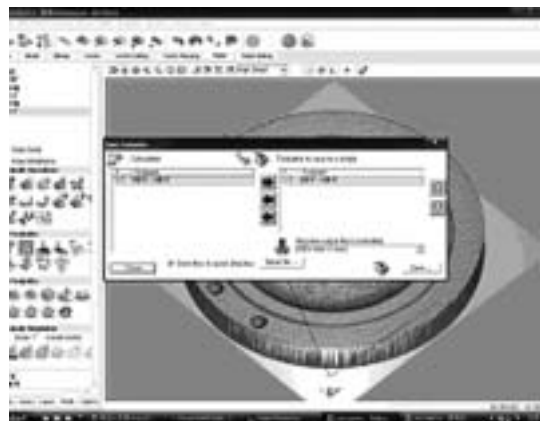
① scanning drawings changes to relief



② a plate shape produce use 3D program



③ the plate shape with mold add pattern



④ Toolpath produce to NC processing

Fig. 2

<Experiment 1> Experiment of line drawing using 4B pencil

<Experiment 2> Experiment of relief, depressed engraving, and geometrical pattern

<Experiment 3> Experiment of pencil line

<Experiment 4> Experiment of effectiveness, application of brush pen

From these experiments, I am assured that pencil drawing can develop designing process. First of all, time can be saved due to the simple process. The natural expression can be found in this designing process, too. Next is the process for developing design process using pencil drawing.

### 3. Process of developing CAD/CAM

Using Bitmap, which recognizes height differences, jpg file makes pencil drawing into 3D from ArtCAM. This rather recognize as pixel not vector. Therefore, it is easy to represent height differences from drawing. When using vector, it takes time to make one side of flower because the vector fills the line

inside of the vector. Also natural expression is hard to create using vector(Fig.2).

### 4. Forming process from manufactured CNC

When creating cast, using milling machine, there are three processes- Rough cutting, Semi-finishing, Finishing. Rough



Fig. 3

cutting is initiation. The rough outline on the cast is being cut. This coarse edge is being cut again from the Semi-finishing. In the Finishing, the cast becomes much more delicate. The thickness of cutting tools becomes thinner, and its moving length (step over) gets shorter in the Finishing(**Fig. 3**).

## 5. Conclusion

The results of using CAD/CAM and CNC machine are followed.

First, according to personal choice, different height of cast can be made, due to the effectiveness of shade by drawing.

Second, producing time gets shorter.

Third, there is no need for experts since programmed CNC machine can create the products.

Fourth, there will be no mistake on thickness, pattern's thickness, and size.

When you apply these results to industry, you can get many advantages.

First, you can save unit cost- since designer can do engineering work, you can save some cost on labor. Also the increased production would decrease the unit cost.

Second, you can increase productions- the programmed machine can work during night time, and in early morning.

Third, you can increase the quality of design- you can create certain pattern of design over and over again.

Fourth, even though you produce in a large scale, you can still make the most of feeling of handicraft.