

NEW MEDIA IN DIGITAL DESIGN PROCESS:

Towards a standardize procedure of CAD/CAM fabrication

CHOR-KHENG LIM, CHING-SHUN TANG, WEI-YEN HSAO,
JUNE-HAO HOU, YU-TUNG LIU
Graduate Institute of Architecture, NCTU
1001, Ta Hsueh Road, 300 Hsinchu, Taiwan
kheng@arch.nctu.edu.tw

1. Introduction

In 1990, due to the traditional architecture design and construction method difficult to build the complicated and non-geometry free-form Fish Structure in Barcelona, architect Frank Gehry started learn from the field of aerospace to utilize CAD/CAM technology in design and manufacture process. He created the free-form fish model in CAD system and exported the digital CAD model data to CAM machine (RP and CNC) to fabricate the design components, and finally assembled on the site. Gehry pioneered in the new digital design process in using CAD/CAM technology or so-called digital fabrication. It becomes an important issue recently as the CAD/CAM technology progressively act as the new digital design media in architectural design and construction process (Ryder et al., 2002; Kolarevic, 2003).

Furthermore, in the field of architecture professional, some commercial computer systems had been developed on purpose of standardizes the digital design process in using CAD/CAM fabrication such as Gehry Technologies formed by Gehry Partners; SmartGeometry Group in Europe and Objectile proposed by Bernard Cache. Researchers in the research field like Mark Burry, Larry Sass, Branko Kolarevic, Schodek and others are enthusiastic about the exploration of the role of CAD/CAM fabrication as new design media in design process (Burry, 2002; Schodek et al., 2005; Lee, 2005).

2. Problem and objective

From the above statement, we can realize that CAD/CAM technology had changed the traditional design process and evolved a new design process and

construction method. Either professional or research field attempts to propose a standard process of using CAD/CAM new media. However, most of the designers still unfamiliar with CAD/CAM technology, especially they face to the complicated procedures of this new media. Therefore it's very essential to explore how to operate and apply CAD/CAM new media in design process more efficiency and accurate, in order to produce a better digital design process. This research aims to understand deeply the characteristics and function of CAD/CAM media and propose a general principle of CAD/CAM fabrication operation in design process. In the meanwhile, this research hopes to probe into the application of CAD/CAM fabrication in different stages of design process.

3. Methodology and steps

The methodology of this research includes two steps: Media experiment and Model making experiment. For the first step is testing the characteristic of CAD/CAM media, laser cutter and RP; and then find out the general manipulate principle of these new media, especially the format of the file transfer and the procedure of the process. For the second step, six architecture students are given two types of design form (geometry and free-form) to make the physical model by two different ways: 1. traditional handmade method and 2. CAD/CAM fabrication. After that, a comparison between two types of models is analyzed by these factors: time, budget, difficulty, freedom, accuracy, volume, materials, details, and structure.

4. Results

In the result of the experiments and analysis, some information of the unique features, weaknesses and strengths of each CAD/CAM media in the design process are provided during the step1 media experiments. Furthermore, a general principle in procedure of using CAD/CAM media is proposed (Figure1). During the second step, we find out the better way and appropriate time to use CAD/CAM new media in different design stages: RP model has the advantage of represent the volume and form in the early conceptual stage; while laser cutter aid the thinking of construction and method of assemble. These new media produce the free-form models more easily and accurate. Once designers grasp the unique features and the applications of the different CAD/CAM media, they will be able to use them in an integrated fashion in digital design process to aid their design thinking.



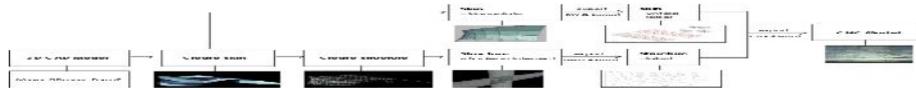


Figure 1. Procedure of using CAD/CAM media (laser cutter & RP)

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