

Chapter 9

CONTOUR CRAFTING

A Mega Scale Fabrication Technology

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Abstract:

Contour Crafting is a mega scale fabrication technology based on Layered Manufacturing process (LM). This fabrication technique is capable of utilizing various types of materials to produce parts with high surface quality at high fabrication speed. The process extends its fabrication capabilities to construction of houses and civil structures.

Key words:

Contour Crafting; Layered Manufacturing; large scale fabrication, mega scale fabrication, extrusion, troweling, formative process, thick layer fabrication, thermoplastics extrusion, ceramics extrusion, concrete extrusion, construction automation; house construction; Lunar construction, extraterrestrial construction,

9.1 INTRODUCTION

An innovative rapid prototyping process, called Contour Crafting (CC), has been developed at the University of Southern California (USC). Because of its unique capability in using thick layers with smooth surface quality, the CC process is suitable for rapid fabrication of large-scale complex shaped objects with smooth surface finish¹. The CC process is based on an extrusion and filling process shown in Figure 9-1.

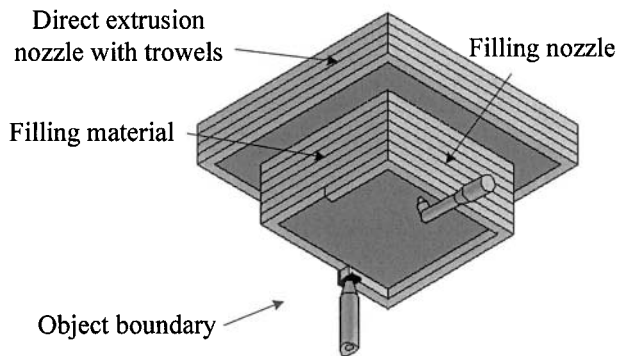


Figure 9-1. Schematic of CC extrusion and filling process

The extrusion process forms the smooth object surface by constraining the extruded flow in the vertical and horizontal directions by the use of trowels. A schematic view of extrusion using two trowels is shown in Figure 9-2.

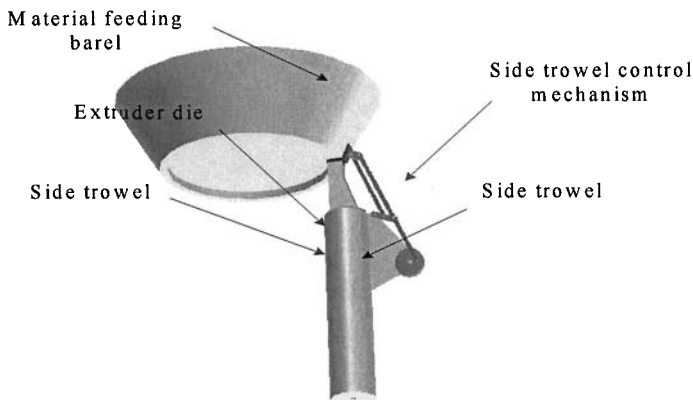


Figure 9-2. Schematic of trowels and extrusion assembly