

EFFICIENT AND ACCURATE UNDERCUT DETECTION SYSTEM

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ABSTRACT

Molding and casting of parts can be done more simply and economically for parts that are free from undercut features, primarily because a more expensive multi-piece mold must be used for parts with such undercut features. Therefore immediate feedback to the designer about the presence of costly undercuts allows for their early removal in the design process. Without immediate and accurate feedback designers can wind up with high part costs, waste, and a complicated manufacturing process.

UC Berkeley researchers have developed a design system, based on a sophisticated new algorithm that allows for very efficient and rapid identification of undercuts in 3D geometric models. The Berkeley system uses graphics acceleration to allow a user to rotate an object, examine the undercuts in real time and accurately identify undercuts on a pixel by pixel basis. The system also highlights the portions of faces, including curved faces, which have undercuts. Early detection and removal of undercuts ensures rapid development of the lowest cost design.

The system can also be used as a subroutine in finding whether any under-cut free parting directions exist and for evaluating which is optimal if there are multiple choices. The ability to find the optimal direction along with pixel level accuracy makes the system highly desirable for designers.

APPLICATIONS

Casting design for metal and plastic parts

Low cost part design

CAD and graphics software

ADVANTAGES

Pixel by pixel analysis

Accuracy and high speed even on curved surfaces

Real time analysis for efficient and optimized mold design

Real time cost estimation

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OTHER INFORMATION

KEYWORDS

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graphics, software: CAD

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