

**THE DEVELOPMENT OF A CONFORMAL LASER
TOOLING FOR USE IN FLEXIBLE MANUFACTURING
ENVIRONMENTS**

By

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An Abstract of a Thesis Submitted to the Graduate
Faculty of Rensselaer Polytechnic Institute
in Partial Fulfillment of the
Requirements for the Degree of
MASTER OF SCIENCE

Major Subject: MECHANICAL ENGINEERING

The original of the complete thesis is on file
in the Rensselaer Polytechnic Institute Library

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April 2009
(For Graduation May 2009)

ABSTRACT

Cutting of thin, flexible materials has most commonly been performed using precision cutting dies, with the most precision achieved through the use of hard tooling requiring weeks of lead time to produce. However, emerging markets are showing an increased demand for manufacturing flexibility not possible with hard tooling. Laser cutting may offer a capable alternative in these cases, but workpiece fixturing methods must be developed to maintain accuracy and quality comparable to mechanical cutting.

In this paper, a type of conformal laser tooling is developed that attempts to provide maximum material support and restraint with minimal laser interaction. Three methods of manufacturing this conformal tooling are examined for performance and ease of integration with an existing manufacturing system. Typical defects encountered when laser processing thin materials are also explored, with particular focus on beam reflection and the use of metal honeycomb tooling. Finally, conformal tooling is compared to honeycomb tooling, and found to have several key advantages, though these may not be necessary in all laser cutting applications.