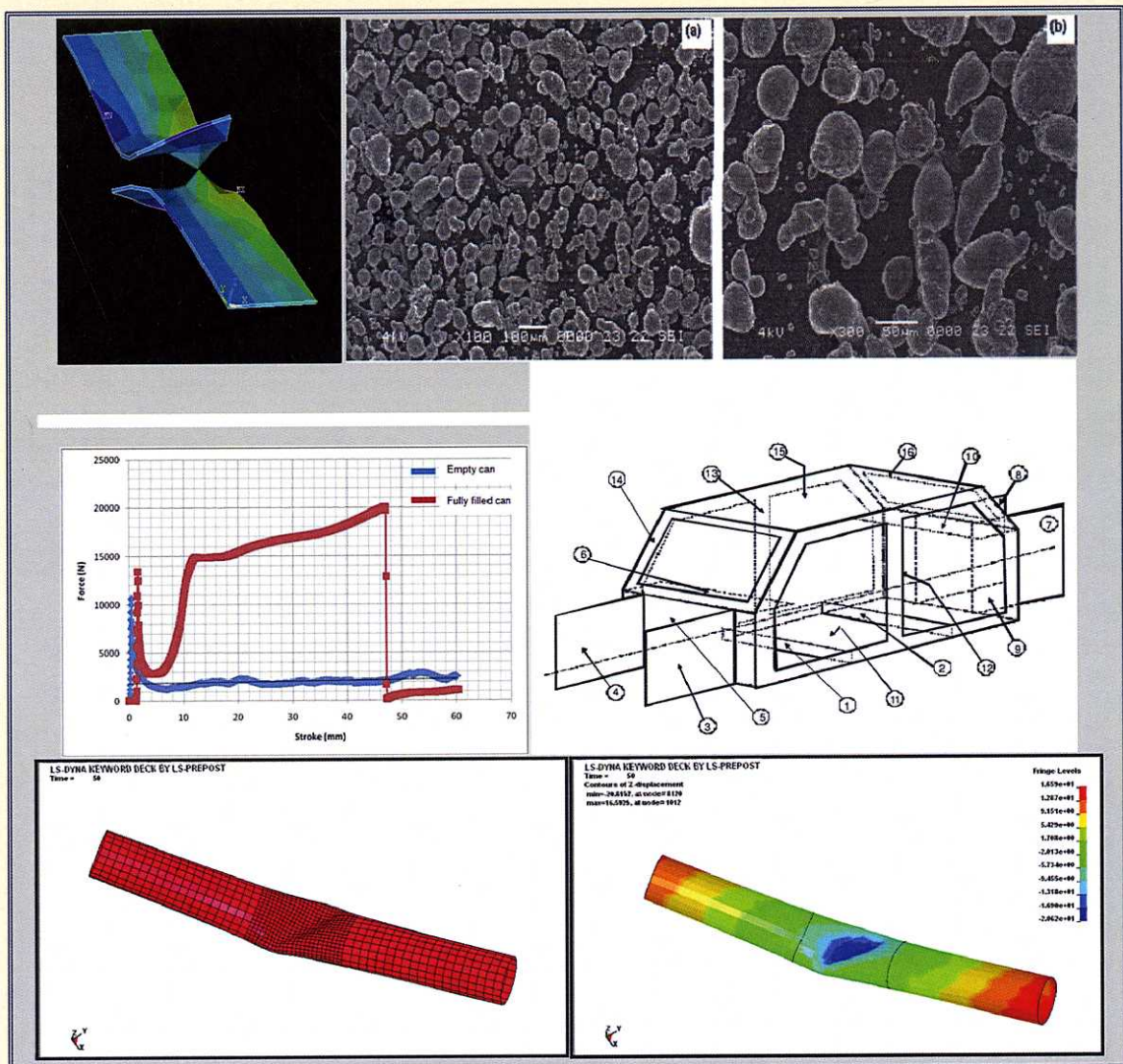


ADVANCED TOPICS IN MECHANICAL BEHAVIOR OF MATERIALS



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Meftah Hrairi



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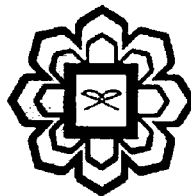
INTERNATIONAL ISLAMIC UNIVERSITY MALAYSIA

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EXPERIMENTAL STUDIES OF DIELESS FORMING

Meftah Hrairi, Saiful Mazwan Nawi

1. INTRODUCTION

Manufacturing new products brings new challenges to the product introduction and commissioning process. In traditional sheet metal forming, the tooling costs are a drawback especially for bespoke and small batch manufacturing. A sheet metal component is usually produced with dies and punches, manufactured in accordance with the shape and dimensions of the component. This conventional method is adequate for mass production because the cost of dies and punches can be shared with a large number of products. Recently, however, new production methods for a small size lot are being developed, since the customer's demand was so diversified that the lot size has become small. Among various methods, using simple tool, small hammer or laser, the incremental forming process with simple tool has gained a great attention. This type of process is called the Dieless Forming or incremental sheet forming (ISF) [1].

2. WORKING PRINCIPLE OF DIELESS FORMING

As depicted in Figure 1, the blank is firmly clamped to the fixture. The tool used to form can be programmed in the three axes of translation along with spindle rotation. The form-giving tool representing the required shape remains stationary throughout the process. Using a suitable tool path strategy, the forming tool moves around the form-giving tool, from top to bottom. It covers the component level by level, in the predefined vertical increments, in contact with the blank and incrementally deforming the blank until the desired shape has been formed. Thus, a CNC controlled movement of a universally usable forming tool produces the desired shape.