CRITICAL EVALUATION OF CONTAINER TRAILER FAILURES AND IMPROVEMENTS IN THEIR MANUFACTURE

A dissertation submitted to the
Department of Mechanical Engineering, University of Moratuwa
in partial fulfillment of the requirements for the
Degree of Master of Engineering

by
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DECLARATION

The work submitted in this dissertation is the result of my own investigation, except where otherwise stated.

It has not already been accepted for any degree, and is also not being concurrently submitted for any other degree.

UOM Verified Signature

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Date 01/10/2007

I endorse the declaration by the candidate.

UOM Verified Signature

Dr. M. A\ R. ∀. Fernando

Abstract

Container trailer manufacturing is a growing industry in Sri Lanka. Only two organizations are involved in this business and the monthly production was recorded as 100 to 125 trailers. Like other manufacturing industries, trailer industry also faces problems due to trailer failures and difficulties to improve the trade. Failures are mainly due to lack of design stage analysis of the product. The primary objective of my research project is to analyze trailer failure problems and suggest solutions to improve the trailer industry in Sri Lanka.

The methodology of this research is a combination of research training programme, questionnaire based study and a finite element analysis of the trailer solid model. Research training programme was arranged in a leading manufacturing and servicing organization in Sri Lanka by the Department of Mechanical Engineering, University of Moratuwa. It was very useful to understand the trailer manufacturing concepts, designs, trailer failures and the general problems faced by the trailer industry.

Questionnaires are produced to two different categories of industries such as Trailer manufacturers and Trailer users. Questionnaires for trailer manufacturers are oriented towards identifying the techniques used by manufacturers to control the failures especially in design stage and identifying their problems and limitations in manufacturing trailers. Questionnaires for trailer users are oriented towards identifying trailer failures.

A finite element analysis was carried out to study the present design of a particular type of trailer to identify the efficiency in design and to present any solutions if needed. Further, there were several rounds of semi-structured interviews with technical specialists, designers, supervisors and welders who were involved in trailer manufacturing. By the combination of all the efforts, it is found that trailer failures are mainly due to the problems due to design, fabrication, materials and parts selection, human resource and trailer misuse. Suggestions to present trailer problems and future improvements in trailer manufacture are produced.

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Abbreviations

CAD	Computer Aided Design
FCAW	Flux Cored Arc Welding
FEA	Finite Element Analysis
HAZ	Heat Affected Zone
MAG	Metal Active Gas welding
MMAW	Manual Metal Arc Welding