# DEVELOPMENT OF A FRAMEWORK TO ENCOURAGE INJECTION MOULD REMANUFACTURING IN SRI LANKA

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Thesis/Dissertation submitted in partial fulfilment of the requirements for the degree

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# DECLARATION

I declare that this is my own work and this thesis/dissertation does not incorporate without acknowledgement any material previously submitted for a Degree or Diploma in any other University or Institute of higher learning and to the best of my knowledge and belief, it does not contain any material previously published or written by another person except where the acknowledgement is made in the text. I retain the right to use this content in whole or part in future works (such as articles or books).

Signature: Date: 2023-03-13

The above candidate has carried out research for the Master's thesis/dissertation under my supervision. I confirm that the declaration made above by the student is true and correct.

Name of the supervisor: Dr. J.R.Gamage

Signature of the supervisor:

Date:

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# ABSTRACT

The global mould manufacturing market amounts to USD 26.21 billion in 2020 and is expected to increase to USD 38.62 billion in 2025 at a Compound Annual Growth Rate (CAGR) of 8%[1]. This growing demand for moulds urges to develop sustainable methods to recover used moulds. Remanufacturing of moulds offers a promising solution in the industry which extends the useful life of end-of-use moulds. However, there is a lack of evidence that mould remanufacturing is used to reap its potential benefits in the Sri Lankan 'Small and Medium-sized Enterprises (SME)'.

The purpose of this research is to develop a framework to promote mould remanufacturing in Sri Lanka. This research was conducted within organizations that are already remanufacturing moulds, manufacturing moulds and which have the potential to remanufacture moulds. Semi-structured interviews of 09 organizations were conducted to ascertain relevant data to develop the framework to promote mould remanufacturing. Literature review and semi-structured interviews were used to establish the current knowledge, to identify barriers, and to identify key elements in developing the framework.

The presented framework is in the format of a three-by-three matrix that is developed to help promote mould remanufacturing. The three columns address, 1) barriers and challenges, 2) technologies or methods, and 3) process steps and essential factors. These three factors are fused with three phases as shown in the rows of the framework namely, the initial stage, process stage, and market stage. This framework would be beneficial for the stakeholders of mould remanufacturing. Future research can be directed to further fine-tune the framework and make it available in a more accessible form such as a web or a mobile application. Additionally, the research can be extended to include other types of moulds such as blow moulds, and compression moulds as the data were mostly sourced from plastic injection mould (re)manufacturing.

*Keywords— Mould Remanufacturing, Mould remanufacturing in Sri Lanka, Remanufacturing Framework*

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# LIST OF ABBREVIATIONS

OEM – Original Equipment Manufacturer

CMM – Coordinated Measuring Machine

SME – Small to Medium Scale Enterprises

LSR – Liquid Silicone Rubber

CNC – Computer Numerical Control

EDM – Electrical Discharge Machining

WEDM – Wire Electrical Discharge Machining

TIG – Tungsten Inert Gas