UNIVERSITI TEKNOLOGI MARA

EFFECT OF PROCES PARAMETERS ON THE PROPERTIES OF INCO 718 THERMAL SPRAYED COATING

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of the requirements for the degree of
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AUTHOR'S DECLARATION

I declare that the work in this thesis was carried out in accordance with the regulations of Universiti Teknologi MARA. It is original and is the results of my own work, unless otherwise indicated or acknowledged as referenced work. This topic has not been submitted to any other academic institution or non- academic institution for any degree or qualification.

I, hereby, acknowledge that I have been supplied with the Academic Rules and Regulations for Post Graduate, Universiti Teknologi MARA, regulating the conduct of my study and research.

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ABSTRACT

Inconel 718 materials have been used widely as a source for coating materials produced by thermal spray techniques. The materials can be applied by using the plasma spray, High Velocity Oxy Fuel (HVOF) , Wire arc and normal combustion technique. In this study, the coating on test samples have been produced by plasma spray technique and HVOF, spray distance 2, 4, 6 and 8 inch with 20,40 and 60 gram/minute were studied for the coating produced by Plasma Technique. On the other hand, spray distance 6,10,14 and 16 inch with 20,40 and 60 gram/minute powder feed rate were the selected value of the studied parameter for coating produced by HVOF technique. The influence of spray distance and powder feed rate on the coating microstructure, hardness and residual stress of the coating were studied in this thesis. Additionally, the influence of the coating microstructure against the hardness and residual stress were also been discussed.Results showed that the increased in both spray distance and powder feed rate had significantly influenced the amount of porosities and oxides in the coating structure produced thermal spray process. The formation of oxides in the HVOF coating were mostly due to the coating heating of the substrate or previously deposited material and the dwell time of the metal particles during the spraying process. The data also confirmed that coatings produced by HVOF exhibited denser coating structure relative to plasma coating. It has been observed in this study that microhardness has been effected with powder feed rate for coatings produced by HVOF and Plasma. A strong correlation between spray distances against microhardness of the coating was seen for coatings produced by Plasma technique. The further analysis reveals that oxides in the coating influence the value of the microhardness in the plasma sprayed coating.

The effect of spray distance and feed rate were studied and it has been observed that the data for the coating produced by plasma has shown an increase of compression stress with powder feed rate for short stand of distance .The data for plasma coating indicates that as the spray distance increases, the residual stress also change from compression to tension. The same effect of spray distance with residual stress has been reported in this study for HVOF coating test data.

TABLE OF CONTENTS