

**INVESTIGATION OF BURR  
PREDICTION IN DRILLING USING  
ACOUSTIC EMISSION**



# **INVESTIGATION OF BURR PREDICTION IN DRILLING USING ACOUSTIC EMISSION**

By

**NTENDELENI ARNOLD LUKOTO**

**THESIS**

Submitted in partial fulfilment of the requirements for the degree

**MASTERS IN ENGINEERING**

**MECHANICAL AND MANUFACTURING ENGINEERING**

UNIVERSITY  
At the  
JOHANNESBURG

**UNIVERSITY OF JOHANNESBURG**

**Supervisor: Prof. Z. KATZ**

**February 2005**

## DECLARATION

I hereby declare that the thesis submitted for the masters of engineering degree to University of Johannesburg, apart from the help recognized, is my own work and has not been formerly submitted to another university for a degree.

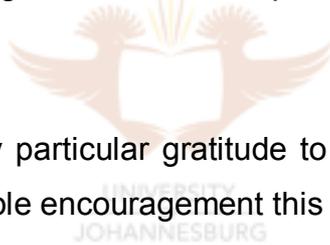
UNIVERSITY  
OF  
JOHANNESBURG

## ACKNOWLEDGEMENT

Firstly I would like to thank God for everything. This report has drawn on the talent, advice and encouragement of more people that I can possibly acknowledge. I would however like to recognise the contribution of many who have helped. I want to thank my family and friends for their support and encouragement. I am particularly grateful for the large amount of help from fellow research students in Manufacturing Engineering and all Mechanical Engineering staff who were equally valuable to me.

I regret that space doesn't allow me to acknowledge each individual personally and express my appreciation to many others who were equally valuable to me. It must be carefully noted that neither these experts, nor the University of Johannesburg can be held responsible for any statements or conclusions presented.

I would like to express my particular gratitude to Prof. Z. Katz under whose supervision and considerable encouragement this study was made.



## SYNOPSIS

A method for predicting drilling burr formation using an Acoustic Emission (AE) based technique is proposed and tested.

The model development is based on drilling with and without burrs using a standard twist drill. Tests were performed on aluminium and steel. Data obtained was analysed and compared. The objective of the work is to enable on-line prediction of burr formation and appearance. The experimental set-up is described and the analysis of AE signals is explained, formulated and applied. From the analytical model, the effects of drilling conditions, feed, and speed and drill diameter have been studied. This resulted in establishing empirical type AE equations which incorporate drilling conditions. The aim of prediction can be used to change the parameters on-line.