

FLAW INSPECTION OF ULTRASONIC TESTING BY ANGLE PROBES

HALIMATUN FAZAIANA BT ABDULLAH

Final Year Project Report Submitted in
Partial Fulfilment of the Requirement for the
Degree of Bachelor of Sciences (Hons.) Industrial Physics
in the Faculty of Applied Sciences
Universiti Teknologi MARA

MEI 2010

ACKNOWLEDGEMENT

Thanks and grateful to the mighty Allah S.W.T for giving me the strength, courage and time for me in completing my final project within the given time. I would like to express my deepest gratitude to my supervisor Madam Zakiah bt Mohamed for his outstanding support and excellent supervision. This research would not have been successful without his valuable guidance, enthusiastic help as well as constructive criticisms throughout the research.

I would like to express my sincere thanks to Abdul Rahman bin Md Nor who provided guidance and help during the research. Also to my colleagues Nuramyzura bt Abdul Kadir and Abdul Rahman, thank you for your helpful discussions and suggestions. On the other hand, also to the lab assistance, En. Khalid bin Abdul Rahman and Khairuniza bt. Kamalludin thanks you for your helps and supports during my research. Special thanks to my parents for their assistance and continued guidance during my thesis writing. Also, thanks to my friends and all those whom had helped me in one-way or other during my research.

Last but not least, to the Faculty of Applied Science Universiti Teknologi Mara for allowing me to use the facilities during my research is greatly appreciated and without it, this research could not have been carried out.

Halimatun Fazaiana Abdullah

TABLE OF CONTENTS

	PAGE
ACKNOWLEDGEMENT	iii
TABLE OF CONTENTS	iv
LIST OF TABLES	vi
LIST OF FIGURES	viii
ABSTRACT	xi
ABSTRAK	xii
CHAPTER 1 INTRODUCTION	
1.1 Background	1
1.1.1 Ultrasonic testing	1
1.1.2 Strengths of adhesion of the couplant and the test material	4
1.1.3 Calibration method	5
1.2 Problem of statement	5
1.3 Significant of study	6
1.4 Objective of study	7
CHAPTER 2 LITERATURE REVIEW	
2.1 Strength adhesion	8
2.2 Crack position versus angle of probe	9
2.2.1 Constant crack towards variation of angle	9
2.2.2 Many types of crack towards variation of angle	11
2.3 Types of flaw detected	12
2.4 Different angle used to detect flaw	12
2.5 Each probe have own probe index by comparison between index point measurement from 25 and 50 mm arcs	13

ABSTRACT

FLAW INSPECTION BY ULTRASONIC TESTING ANGLE PROBES

Non-destructive testing is useful to detect internal failure of any material without damaged the material. Nowadays many types of non destructive testing are applied such as radiography, magnetic particle inspection and ultrasonic testing. Ultrasonic testing is one of the best methods of non-destructive testing, where use the frequency above 20 kHz .This method are very effectively and excellent to detect crack or flaw in the material by using the small sensor or probe ad detect on the material. In this paper I would use stainless steel as my sample or material. Since there are also many types of flaw may occur like sub surface flaw, root crack, center line crack and lack of root fusion. All that crack can be detected by use all the types of angle probe such at angle 45° , 60° and 70° .that would be use in this paper. Pulse echo technique is the one of technique to detect the flaw where the probe would be link to OSK (oscilloscope).Its the technique using the echo appear on the OSK's screen and simultaneously know the length and the width of the flaw. Its amazing technique can be use engineers and inspector and actually already by them. What this focus is what angle of certain flaw are effectively can be detected. From the result got, the high of the amplitude and the lowest of decibel be use for echo be appear are the best angle for that flaw. It can been seen in chapter 4 for any crack, at 45 degree, have the highest amplitude compare to 60 degree and 70 degree. The most important is since the crack in the internal of the stainless stain is not change and permanently inside the sample, so whether it use the different angle at one sample. The length and width would unchange. It can also can be seen in chapter 4, for example centre line crack at different angle approximately same. Where at 40° , 60° , and 70° , the length are 8.0mm, 8.9mm, and 8.0mm respectively and the width are 6.0mm, 6.0mm and 6.9mm respectively. The main objective this be written are to determine and investigate the best angle could be use to each sample to make sure engineer and research are more easier to done other testing for future.

CHAPTER 1

INTRODUCTION

1.1 BACKGROUND

1.1.1 Ultrasonic testing

Ultrasonic Testing is the one of the non-destructive method by using the high frequency sound wave would be penetrate into the material to be check or inspected like metal or weld. It expedient to check the internal of the material that did not be look over on the material surface. In addition, ultrasonic testing used between 0.5 to 30MHz. Former researches pointed out optimal results around 100kHz. (Hillger, W, 1994) by used a short electrical pulse to excite the transducer which vibrate and generate sound beam, then travel through the thin layer of liquid couplant and transmitted into the test material.

Recently, there are many techniques such as Delta technique or Scattering Technique for Ultrasonic Testing of Helicopter Electron Beam Welded Joints (Roberto pezzoni, Luigin. Merletti, Augusta, Barker code pulse compression technique(W.H.Chen and J.L.Deng,2002),TIFD (Technique for Identification of Flaw signal using Deconvolution)(Young H.Kim,Sung-Jin Song,Jun Young Kim),Radiography testing has been widely used for the inspection of thinner welded joints, and ultrasonic testing has been used for the thicker ones (R.J. Bitchburn, S.K. Burke,1996). Another method also been extensively used to accurately detect and size cracks in critical engineering