

MEASUREMENT OF DIELECTRIC CONSTANT OF PAINT COATED
ALUMINIUM PANEL THROUGH MICROWAVE NON DESTRUCTIVE TESTING
AT FREQUENCY 18 TO 26GHZ (K BAND)

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ABSTRACT

Microwave non destructive testing of paint and primer in components used in moist environment are crucial in the investigation of corrosion. This thesis presents a method for measuring the dielectric properties of corrode and non-corrode paint coated aluminium panels using metal-back method. The complex reflection coefficient S_{11} (real and imaginary) is measured using the Vector Network Analyzer (VNA). The dielectric constant and loss factor were measured for both corrode and non-corrode paint coated aluminium panels in the range of frequency from 18 to 26 GHz (K-Band) and the loss tangent was calculated. The thru, reflect and line (TRL) calibration technique were used to eliminate the effect of undesirable multiple reflection. The measurement system consists of Vector Network Analyzer (VNA), a pair of spot focusing horn lens antenna, mode transitions, coaxial cable and computer. A computer program was developed for calculating the complex reflection coefficient. The data obtained from the VNA measurement is sent to the program, which calculates the dielectric constant and loss tangent. The results show a significant difference in the dielectric properties of corrode and non-corrode paint coated aluminium panels.

TABLE OF CONTENTS

DECLARATION	i
ACKNOWLEDGEMENT	ii
ABSTRACT	iii
LIST OF FIGURES	vi
LIST OF TABLES	vii
LIST OF ABBREVIATIONS	viii
1.0 INTRODUCTION	1
1.1 OBJECTIVE OF PROJECT	4
1.2 SIGNIFICANCE OF PROJECT	4
1.3 SCOPE OF PROJECT	5
2.0 LITERATURE REVIEW	7
2.1 MICROWAVE TECHNOLOGY	7
2.1.1 DEFINITION OF MICROWAVE	7
2.2 INTRODUCTION OF MICROWAVE	7
2.3 MICROWAVE FREQUENCY	8
2.4 MICROWAVE GENERATION	10
2.5 ADVANTAGES OF MICROWAVES	11
2.6 APPLICATION OF MICROWAVES	11
2.7 CHARACTERIZATION OF MICROWAVE MATERIALS	13
3.0 MICROWAVE NON-DESTRUCTIVE TESTING	15
3.1 INTRODUCTION	15
3.2 DEFINITION OF MICROWAVE NON DESTRUCTIVE TESTING	16
3.3 ADVANTAGES AND DISADVANTAGES OF MNDT	17
3.4 APPLICATION OF MICROWAVE NON-DESTRUCTIVE TESTING	18
3.5 COMPLEX PERMITTIVITY	19
3.5.1 DIELECTRIC CONSTANT	20
3.5.2 LOSS FACTOR	21
3.5.3 LOSS TANGENT	21
3.6 SCATTERING PARAMETERS	21
3.6.1 INTRODUCTION TO SCATTERING PARAMETERS	21
4.0 METHODOLOGY	24

4.1 THEORY	24
4.1.1 METAL BACK METHOD	24
4.2 FREE SPACE TECHNIQUE	26
4.3 FREE SPACE MEASUREMENT SET UP	27
4.3.1 VECTOR NETWORK ANALYZER (VNA)	29
4.3.2 VECTOR NETWORK ANALYZER (VNA) MEASUREMENT	31
4.3.3 GAUSSIAN OPTIC LENS ANTENNA	31
4.3.4 CALIBRATION	32
4.3.5 MEASUREMENT OF THE REFLECTION COEFFICIENT	33
4.3.6 ERROR OF MEASUREMENT USING FREE SPACE	33
4.4 EXPERIMENTAL WORK	33
4.4.1 CALIBRATION USING TRL (THRU, REFLECT, LINE)	34
4.4.2 GATING	37
4.5 FLOWCHART	38
5.0 RESULT AND DISCUSSION	39
6.0 CONCLUSION AND FUTURE DEVELOPMENT	50
REFERENCES	52
APPENDIX	54
APPENDIX A CALIBRATION RESULTS	54
APPENDIX B FORTRAN PROGRAMMING FOR METAL BACK METHOD	56
APPENDIX C RESULTS FOR CORRODE PAINT COATED ALUMINIUM PANEL	63
APPENDIX D RESULTS FOR NON-CORRODE PAINT COATED ALUMINIUM PANEL	68
APPENDIX E AVERAGE RESULTS FOR CORRODE AND NON-CORRODE SAMPLES	73