

**EFFECT OF ELECTROLESS NICKEL-BORON
(EN-B) SURFACE FINISH ON SOLDERABILITY
OF SAC305 AND SOLDER JOINT STRENGTH**

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We hereby declare that we have checked this thesis and in our opinion, this thesis is adequate in terms of scope and quality for the award of the degree of Master of Engineering (Mechanical)

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I hereby declare that the work in this thesis is based on my original work except for quotations and citations which have been duly acknowledged. I also declare that it has not been previously or concurrently submitted for any other degree at Universiti Malaysia Pahang or any other institutions.

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Thesis submitted in fulfillment of the requirements
for the award of the degree of
Master of Engineering (Mechanical)

Faculty of Mechanical Engineering
UNIVERSITI MALAYSIA PAHANG

MAY 2017

ACKNOWLEDGEMENTS

First and foremost I would like to offer my unreserved gratitude and praises to Almighty Allah for His generous blessing and the undying strength bestowed upon me during the course of this research.

I would like to express my sincere gratitude to my supervisor Dr. Siti Rabiattul Aisha binti Idris for her invaluable guidance, continuous encouragement and constant support in making this research possible. The encouragement and guidance offered by Associate Prof. Dr. Mahadzir Ishak are also gratefully acknowledged.

My sincere thanks go to all my lab mates and members of the staff of the Mechanical Engineering Department, UMP, who helped me in many ways whenever needed. Thanks for always putting up the best effort in helping me learn and familiarized myself with equipments in the lab so that I can finish this research.

I also wish to thank all my friends especially Zetty Akhtar Abd Malek, for the continuous support and help especially in periods of uncertainties and difficulties.

The best thanks goes to my family especially to my parents. Thank you for constantly supporting me morally and financially which are things that I needed the most in order to complete this research. But most of all, thanks for the love and attention that they gave to me which I will cherish until the end of time. Thank you for never stop believing in me. Thank you for always pray for my success and happiness in the past, present and the future.

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LIST OF SYMBOLS

wt%	Weight percentage
$^{\circ}\text{C}$	degree celcius
MPa	Megapascal
θ	angle
\uparrow	produced as a gas
k	Growth rate constant
μm	micrometer
T_p	Peak temperature
$T_{s\ max}$	Maximum solidus temperature
$T_{s\ min}$	Minimum solidus temperature
T_c	Classification temperature
T_L	Liquidus temperature
t	time
t_L	Liquidus time
$^{\circ}\text{C}$	degree celcius
MPa	Megapascal

LIST OF ABBREVIATIONS

Ag	Silver
ASTM	American Society for Testing and Materials
Au	Gold
B	Boron
Bi	Bismuth
BGA	Ball Grid Array
Cu	Copper
Cr	Chromium
EDX	Energy Dispersive X-ray Spectroscopy
EN	Electroless Nickel
ENEP	Electroless Nickel Electroless Palladium
ENEPIG	Electroless Nickel Electroless Palladium Immersion Gold
ENIG	Electroless Nickel Immersion Gold
FESEM	Field Emission Scanning Electron Microscope (
Ge	Germanium
IMC	Intermetallic compound
ImAg	Immersion Silver
ImSn	Immersion Tin
IPC	Association Connecting Electronics Industries
JEDEC	Joint Electron Device Engineering Council
NaBH ₄	Sodium Borohydride
NaCl	Sodium Chloride

Ni	Nickel
Pb	Lead
PCB	Printed circuit board
Pd	Palladium
PDA	Personal digital assistant
SAC	Sn-Ag-Cu
SEM	Scanning Electron Microscopy
Si	Silicon
Sn	Tin
Ti	Thalium
TSM	Top surface morphology
XRD	X-ray diffraction
Zn	Zink