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BY

MR. INTERNATIONAL INSTITUTE

A DISSERTATION SUBMITTED IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE DEGREE OF DOCTOR OF PHILOSOPHY (ENGINEERING AND TECHNOLOGY)
SIRINDHORN INTERNATIONAL INSTITUTE OF TECHNOLOGY
THAMMASAT UNIVERSITY
ACADEMIC YEAR 2016

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SIRINDHORN INTERNATIONAL INSTITUTE OF TECHNOLOGY

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was approved as partial fulfillment of the requirements for

the degree of Doctor of Philosophy (Engineering and Technology)

on July 8, 2017

Chairman

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(Assistant Professor International Institute, Ph.D.)

Member and Advisor

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(Associate Professor International Institute, Ph.D.)

Member and Co-advisor

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(International Institute, Ph.D.)

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(Assistant Professor International Institute, Ph.D.)

Director

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(Professor International Institute, D.Eng.)

Thesis Title	DISSERTATION TITLE DISSERTATION TITLE DISSERTATION TITLE DISSERTATION TITLE
Author	Mr. International Institute
Degree	Doctor of Philosophy (Engineering and Technology)
Faculty/University	Sirindhorn International Institute of Technology/ Thammasat University
Thesis Advisor	Associate Professor International Institute, Ph.D.
Thesis Co-Advisor	Samad Rakdee, Ph.D.
Academic Years	2016

ABSTRACT

Sirindhorn International Institute of Technology (SIIT) offers three master of engineering programs, namely, Master of Engineering Program in Engineering Technology, Master of Engineering Program in Information and Communication Technology for Embedded Systems, and Master of Engineering Program in Logistics and Supply Chain Systems Engineering. It also offers a Master of Science Program in Engineering and Technology and Doctor of Philosophy Program in Engineering and Technology.

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Technology, Master of Engineering Program in Information and Communication Technology for Embedded Systems, and Master of Engineering Program in Logistics and Supply Chain Systems Engineering. It also offers a Master of Science Program in Engineering and Technology and Doctor of Philosophy Program in Engineering and Technology. Sirindhorn International Institute of Technology (SIIT) offers three master of engineering programs, namely, Master of Engineering Program in Engineering Technology, Master of Engineering Program in Information and Communication Technology for Embedded Systems, and Master of Engineering Program in Logistics and Supply Chain Systems Engineering. It also offers a Master of Science Program in Engineering and Technology and Doctor of Philosophy Program in Engineering and Technology.

Keywords: Periodic solids, Effective properties, Extreme properties, Design automation, Material design

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ACKNOWLEDGEMENTS

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Mr. International Institute

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TABLE OF CONTENTS

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LIST OF TABLES

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Tables numbering indicates the number of the tables are contained in. Thus, all the tables in this chapter begin with "3" to indicate that the section is located in Chapter 3. As the tables levels descend in order, the numbers grow by one additional digit for each level, showing the relationship between the groups of tables.

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LIST OF FIGURES

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LIST OF SYMBOLS/ABBREVIATIONS

Symbols/Abbreviations	Terms
SIIT	Sirindhorn International Institute of Technology
TU	Thammasat University

CHAPTER 1

INTRODUCTION

Sirindhorn International Institute of Technology (SIIT) offers three master of engineering programs, namely, Master of Engineering Program in Engineering Technology, Master of Engineering Program in Information and Communication Technology for Embedded Systems, and Master of Engineering Program in Logistics and Supply Chain Systems Engineering.

1.1 Main heading

Sirindhorn International Institute of Technology (SIIT) offers three master of engineering programs, namely, Master of Engineering Program in Engineering Technology, Master of Engineering Program in Information and Communication Technology for Embedded Systems, and Master of Engineering Program in Logistics and Supply Chain Systems Engineering (Chen & Winterbone, 2014).

Garlotta (2001) stated that "Sirindhorn International Institute of Technology (SIIT) offers three master of engineering programs, namely, Master of Engineering Program in Engineering Technology, Master of Engineering Program in Information and Communication Technology for Embedded Systems, and Master of Engineering Program in Logistics and Supply Chain Systems Engineering" (p.63).

1.2 Main heading

A study performed by Tokiwa and Calabia (2006) showed that Sirindhorn International Institute of Technology (SIIT) offers three master of engineering programs, namely, Master of Engineering Program in Engineering Technology, Master of Engineering Program in Information and Communication Technology for Embedded Systems, and Master of Engineering Program in Logistics and Supply Chain Systems Engineering.

1.2.1 Sub-heading 1

Sirindhorn International Institute of Technology (SIIT) offers three master of engineering programs, namely, Master of Engineering Program in Engineering Technology, Master of Engineering Program in Information and Communication Technology for Embedded Systems, and Master of Engineering Program in Logistics and Supply Chain Systems Engineering (Bocchini & Frache, 2013; Smith, 2005).

1.2.1.1 Sub-heading 2

Prokop, Helling, Hahn, Udomkaewkanjana and Rehm (2008) demonstrated Sirindhorn International Institute of Technology (SIIT) offers three master of engineering programs, namely, Master of Engineering Program in Engineering Technology, Master of Engineering Program in Information and Communication Technology for Embedded Systems, and Master of Engineering Program in Logistics and Supply Chain Systems Engineering.

1.2.1.2 Sub-heading 2

Montanari et al. (2003) found Sirindhorn International Institute of Technology (SIIT) offers three master of engineering programs, namely, Master of Engineering Program in Engineering Technology, Master of Engineering Program in Information and Communication Technology for Embedded Systems, and Master of Engineering Program in Logistics and Supply Chain Systems Engineering.

Sirindhorn International Institute of Technology (SIIT) offers three master of engineering programs, namely, Master of Engineering Program in Engineering Technology, Master of Engineering Program in Information and Communication Technology for Embedded Systems, and Master of Engineering Program in Logistics and Supply Chain Systems Engineering.

1.3 Main heading

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Citing References in Text: One Work by Multiple Authors Whereas Name of Authors Appear as Part of the Narrative
When a work has three, four, or five authors, cite all surname of authors separated by comma (,) and the year of publication be inserted in the text at the appropriate point or in the parentheses ().

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Citing References in Text: One Work has Six or More Authors
When work has Six or More authors, cite only the surname of the First author followed by et al. (with a period after al) and the year of publication in parentheses.

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Sirindhorn International Institute of Technology (SIIT) offers three master of engineering programs, namely, Master of Engineering Program in Engineering Technology, Master of Engineering Program in Information and Communication Technology for Embedded Systems, and Master of Engineering Program in Logistics and Supply Chain Systems Engineering.

CHAPTER 2
REVIEW OF LITERATURE

2.1 Main heading

Sirindhorn International Institute of Technology (SIIT) offers three master of engineering programs, namely, Master of Engineering Program in Engineering Technology. Sirindhorn International Institute of Technology (SIIT) offers three master of engineering programs.

Sirindhorn International Institute of Technology (SIIT) offers three master of engineering programs, namely, Master of Engineering Program in Engineering Technology.

2.2 Main heading

Sirindhorn International Institute of Technology (SIIT) offers three master of engineering programs, namely, Master of Engineering Program in Engineering Technology.

2.2.1 Sub-heading 1

Sirindhorn International Institute of Technology (SIIT) offers three master of engineering programs, namely, Master of Engineering Program in Engineering Technology. Sirindhorn International Institute of Technology (SIIT) offers three master of engineering programs.

Sirindhorn International Institute of Technology (SIIT) offers three master of engineering programs, namely, Master of Engineering Program in Engineering Technology. Sirindhorn International Institute of Technology (SIIT) offers three master of engineering programs.

Sirindhorn International Institute of Technology (SIIT) offers three master of engineering programs, namely, Master of Engineering Program in Engineering

Technology. Sirindhorn International Institute of Technology (SIIT) offers three master of engineering programs.

2.2.1.1 Sub-heading 2

Sirindhorn International Institute of Technology (SIIT) offers three master of engineering programs, namely, Master of Engineering Program in Engineering Technology.

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2.2.1.2 Sub-heading 2

Sirindhorn International Institute of Technology (SIIT) offers three master of engineering programs, namely, Master of Engineering Program in Engineering Technology. Sirindhorn International Institute of Technology (SIIT) offers three master of engineering programs.

Sirindhorn International Institute of Technology (SIIT) offers three master of engineering programs, namely, Master of Engineering Program in Engineering Technology. Sirindhorn International Institute of Technology (SIIT) offers three master of engineering programs.

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2.3 Main heading

Sirindhorn International Institute of Technology (SIIT) offers three master of engineering programs, namely, Master of Engineering Program in Engineering Technology.

CHAPTER 3

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3.1 Main heading

Sirindhorn International Institute of Technology (SIIT) offers three master of engineering programs, namely, Master of Engineering Program in Engineering Technology, Master of Engineering Program in Information and Communication Technology for Embedded Systems, and Master of Engineering Program in Logistics and Supply Chain Systems Engineering:

　　a. Sirindhorn International Institute of Technology (SIIT) Sirindhorn International Institute of Technology (SIIT),

　　b. Sirindhorn International Institute of Technology (SIIT),

　　c. Sirindhorn International Institute of Technology (SIIT).

Data of Sirindhorn International Institute of Technology (SIIT) are given in Table 3.1.

Table 3.1 Sirindhorn International Institute of Technology (SIIT).

Item	Sirindhorn International Institute of Technology			
	International 1		International 2	
1	15.30	11.20	25.20	11.15
2	15.40	15.20	15.10	21.15
3	15.15	13.20	16.22	18.30
4	15.24	14.20	18.45	19.47

3.1.1　Sub-heading 1

The model of Sirindhorn International Institute of Technology (SIIT) is shown in Figure 3.1.

Figure 3.1 Sirindhorn International Institute of Technology (SIIT).

Sirindhorn International Institute of Technology (SIIT) Sirindhorn International Institute of Technology (SIIT) Sirindhorn International Institute of Technology (SIIT).

Sirindhorn International Institute of Technology (SIIT) Sirindhorn International Institute of Technology (SIIT) Sirindhorn International Institute of Technology (SIIT). Sirindhorn International Institute of Technology (SIIT) Sirindhorn International Institute of Technology (SIIT) Sirindhorn International Institute of Technology (SIIT). The moving average equation for replacing the outliers is given by the following equation:

$$\Box_\Box^\Box(\Box) = \int_0^\Box \Box_{\Box\Box}^\Box(\Box)\Box_{\Box\Box}(\Box)\mathtt{a}_\Box^\Box(\Box)\Box\Box \tag{3.1}$$

where $\Box_\Box^\Box(\Box)$ is the estimated load for the outlier detected at time period t of day d, and n is set to 2.

Equation (3.1) shows Sirindhorn International Institute of Technology (SIIT) Sirindhorn International Institute of Technology (SIIT) Sirindhorn International Institute of Technology (SIIT). The parameters are given as

$$\square_\square(\square) = \square_\square(\square) - \square_\square(\square) \tag{3.2}$$
$$\square_\square^\square(\square) = \square_\square^\square(\square) - \square_\square^\square(\square). \tag{3.3}$$

Equation (3.2) and Equation (3.3) are Sirindhorn International Institute of Technology (SIIT) Sirindhorn International Institute of Technology (SIIT) Sirindhorn International Institute of Technology (SIIT).

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REFERENCES

Bocchini, S., & Frache, A. (2013). Comparative study of filler influence on polylactide photooxidation. *Express Polymer Letters, 7*(5), 431-442. doi: 10.3144/expresspolymlett.2013.40

Chen, H., & Winterbone, D. E. (2014). A one-dimensional performance model for turbocharger turbine under pulsating inlet condition A2. *Proceedings of 11th International Conference on Turbochargers and Turbocharging* (pp. 113-123). Oxford, England: Woodhead Publishing.

Garlotta, D. (2001). A literature review of poly (lactic acid). *Journal of Polymers and the Environment, 9*(2), 63-84.

Montanari, L., Cilurzo, F., Selmin, F., Conti, B., Genta, I., Poletti, G., … Valvo, L. (2003). Poly(lactide-co-glycolide) microspheres containing bupivacaine: Comparison between gamma and beta irradiation effects. *Journal of Controlled Release, 90*(3), 281-290. doi: 10.1016/S0168-3659(03)00153-6.

Prokop, A., Helling, H. J., Hahn, U., Udomkaewkanjana, C., & Rehm, K. E. (2005). Biodegradable implants for pipkin fractures. *Clinical Orthopaedics and Related Research*, *12*(32), 226-233.

Smith, R. (2005). *Biodegradable polymers for industrial applications*. Florida: CRC Press.

Tokiwa, Y., & Calabia, B. P. (2006). Biodegradability and biodegradation of poly (lactide). *Applied Microbiology and Biotechnology, 72*(2), 226-233. Retrieved from https://www.researchgate.net/publication/6960695_Biodegradability_and_biodegradation_of_polylactide

APPENDICES

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APPENDIX A

APPENDIX TITLE

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APPENDIX B

APPENDIX TITLE

BIOGRAPHY

Name	Mr. International Institute
Date of Birth	March 31, 1980
Education	2009 : Bachelor of Engineering (Chemical Engineering)
	Sirindhorn International Institute of Technology
	Thammasat University
	2010 : Master of Science (Environmental Science)
	Thammasat University

Publications

Institute, I., Foo, M. E., & Gopinath, S. C. B. (2017). Feasibility of graphene in biomedical applications. *Biomedicine & Pharmacotherapy, 94*(Supplement C), 354-361.

Institute, I., Hanot, C. C., Choi, Y. S., Anani, T. B., Soundarrajan, D., & David, A. E. (2015). Effects of iron-oxide nanoparticle surface chemistry on uptake kinetics and cytotoxicity in CHO-K1 cells. *International Journal of Molecular Sciences, 17*(1), 226-230.

Institute, I., Sinervo, A., & Arkkio, A. (2012). Modeling two-pole cage induction machine equipped with embedded force actuator. Proceedings of *10th International Conference on Vibrations in Rotating Machinery* (pp. 765-774). New York: Woodhead Publishing.