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I am really thankful to our honorable scientific and review committee for spending much of their time in reviewing the papers for this event. I am also thankful to all the participants for being here with us to create an environment of knowledge sharing and learning. We the scholars of this world belong to the elite educated class of this society and we owe a lot to return back to this society. Let's break all the discriminating barriers and get free from all minor affiliations. Let's contribute even a little or single step for betterment of society and welfare of humanity to bring prosperity, peace and harmony in this world. Stay blessed.

Thank you.

Malika Ait Nasser
Conference Chair
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ECBA-16

Travelling Wave Rotary Ultrasonic Motor with Novel Hollow Segments Stator

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Abstract

This paper presents the method of determining and characterizing of a piezoelectric stator profile that applying in an ultrasonic motor with the consideration of heat that was generated. The ultrasonic motor is driven by the vibration of the piezoelectric element in order to ignite a motion. The harmonic and transient analysis methods are used to predict the optimized operation frequency of the ultrasonic motor travelling wave. Then, the thermal analysis was conducted in order to analyse the heat distribution on the stator. The ultrasonic motor showed a different longitudinal deflection with the increment of the temperature. Verification experiment is conducted through torque performance measurement. Travelling wave optimization was found to be strongly dependent on the heat that generated by piezoceramic material.

Peer-review under responsibility of the Scientific & Review committee of ECBA- 2016.

Keywords— Travelling Wave, Ultrasonic Motor, Stator

Introduction

Motor is a device that is driven by electromagnetic force which involves conversion of electrical energy to mechanical energy [1]. On the other hand, ultrasonic motor is a device that is driven by piezoelectric vibrations to convert electrical energy to mechanical energy [2]. Ultrasonic motor consists of piezoceramic, electrode, stator and rotor as its components. The stator surface is coupled with piezoceramic and AC voltages are supplied through electrodes. The voltages displace the stator in an elliptical trajectory. In response to the stator displacement, the rotor rotates simultaneously [3]. The travelling-wave piezoelectric ultrasonic motor (TWUSM) has recently been attracting considerable attention due to the high torque compare to the volume ratio, bigger torque at lower speed, long life span and high stability in use. Furthermore, ultrasonic motor provides free electromagnetic interference [4].

However, a lot of efforts were required to produce a robust ultrasonic motor. In the earlier development of ultrasonic motor, heat generation was not considered [5], [6], [7]. An overheating was caused depoling of the piezoceramic [8]. As a result, the motor is not suitable for continuous and long operation.

To overcome the heat problem, factors that caused heat generations were studied and reported [9]. Mathematical modelling of the temperature distribution was established using three-dimensional finite element method [10]. Devos *et al.* proved that the resonant mode working principal had reduced the heat dissipation [11]. However, a lot of heat is still generated and effective method to reduce the heat is still needed.

In order to reduce the generated heat of ultrasonic motor, heat distribution model for ultrasonic motor must be established. In this study, heat effect modelling of ultrasonic motor stator was developed. The top surface of the stator profile was modeled and analysed.

Heat Generated by Ultrasonic Motor

The heat suppression of the piezoceramics is depending on the mechanical quality factor, Q which defined as a ratio of energy stored and loss for each of an oscillation [12]. With a high mechanical quality factor, Q, less heat was generated and this parameter must be taken into consideration [8].

The generated heat during the vibrations influences dielectric loss of piezoceramic material. The relation of the piezoceramic temperature, T with the dielectric loss is shown as equation (1) [13].

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$$T = T_o + \frac{R}{U} \tag{1}$$

where T_o is the ambient temperature, R is the thermal resistance of the dielectric and U is the voltage supplied. The thermal resistant, R is numerically appropriate to the temperature increment during the conversion into thermal energy.

The increment of the piezoceramics temperature was able to influence driving frequency, ω of the stator and the relation of both factors is given as [14]:

$$\omega = \omega_o(1-1.03\times10^{-4}(T-T_o)+0.77\times10^{-7}(T-T_o)^2)^{1/2} \tag{2}$$

where ω_o is a natural frequency. The heat that affects the frequency can influence displacement of the stator, u_z in a function of radius, *r*, angle, θ and time, *t* based on equation below [15].

$$u_z(r,\theta,t) = f(q)R(r)\cos(k\theta)e^{j(wt-\phi_k)} \tag{3}$$

where

$$R(r) = \left\{ J_k\left(\alpha_k \frac{r}{a}\right) + C_k I_k\left(\alpha_k \frac{r}{a}\right)\right\}$$

$$f(q) = \frac{F_K}{\omega_k^2\sqrt{\left[1-(\omega/\omega_k)^2\right]^2 + 4\xi_k^2(\omega/\omega_k)^2}}$$

$$F_k = \frac{1}{\rho h N_k}\int_b^a\int_0^{2\pi} Q_3(r,\theta)R(r)\cos(k\theta)rdrd\theta$$

$$N_k = \int_b^a\int_0^{2\pi}[R(r)\cos(k\theta)]^2 rdrd\theta$$

$$C_k = \frac{\alpha_k^2 J_k(\alpha_k) + (1-\sigma)\left\{\alpha_k J_k(\alpha_k) - k^2 J_k(\alpha_k)\right\}}{\alpha_k^2 I_k(\alpha_k) + (1-\sigma)\left\{\alpha_k I_k(\alpha_k) - k^2 I_k(\alpha_k)\right\}}$$

The equations above integrate the properties such ξ_k denotes a modal damping coefficient, ϕ_k denotes a phase lag, α_k denotes a frequency constant and σ denotes a Poisson's ratio. On the other hand, geometry properties were represented by *b* which denotes an inner radius, *a* denotes an outer radius, *h* denotes a half-thickness of the plate, ρ denotes a mass density of the material, J_k denotes a Bessei functions and I_k denotes a modified Bessei functions.

Methodology of Ultrasonic Modelling

Two structures of USR 6060 Shensei ultrasonic motor stator was used in the experiment of heat dissipation. The stators were made by copper material that divided into 90 pieces of segment and they are supported by piezeceramic at bottom side. One of the USR 6060 Shensei stator was modified by drilling holes at side surface for each divided segments as shown in Figure 1. The holes makes the stator segments appears as hollow geometry instead of solid. The design was considered as a novelty for ultrasonic motor stator.

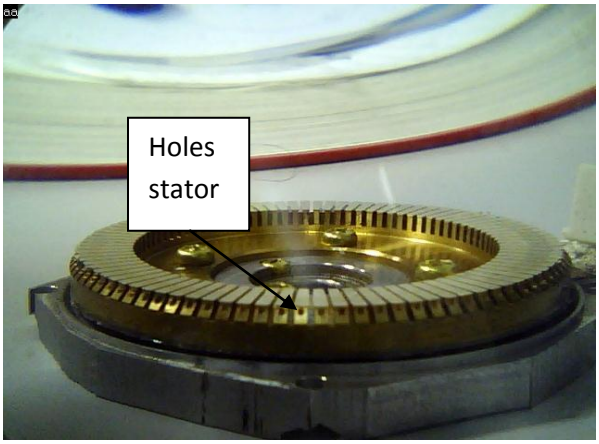

Figure 1: The structure of the stator of ultrasonic motor

Finite element analysis (FEA) was applied using MSC Marc Mentat software to simulate the vibration characteristic. Computational aided design (CAD) was developed by integrating 143 elements of piezoelectric material and 528 elements of 3-D solid. The elements were in hexagon shape.

The structure was simulated using harmonic mode analysis to identify the optimized frequency that provides the highest displacement on Z-axis. The range of the frequency is set from 1 to 50 kHz.

Then, the optimum frequency of the harmonic analysis was used as an input for transient analysis. The transient analysis was further preceded by providing two sinusoidal input functions which were shifted 90° from each other. The transient analysis was run for 3 ms to see the vibration profile of the top stator surface.

Results

Harmonic finite element analysis of USR 6060 Shensei ultrasonic motor stator was run and mode shape results were obtained. The optimized mode shape frequency was determined by analysing the highest Z-axis displacement. From this point of view, frequency 40.6 kHz was the optimized frequency that provides the highest Z-axis displacement.

Based on harmonic analysis result, transient analysis at 40.6 Hz for USR6060 Shensei stator was run. The same frequency was applied for the hollow segments stator. The reason for using the same frequency was to investigate the effect of Z-axis displacements that cause by the hollow structure and not by other factor. For this purpose, Z-axis displacements for certain of period were established. The displacement profile for standard USR6060 Shensei stator and hollow segments stator were shown in Figure 2 and 3 respectively.

Stator profile that drives the rotor is interested and a local point at the top surface is selected. Node 2909 was chosen for further analysis.

Figure 2 shows the profile of the node 2909 for the USR6060 stator at 300 K temperature. This condition, which was closed at room temperature was considered as the initial stage of the ultrasonic motor operation. The maximum displacement that performed by the node 2909 at this condition is 1.207 nm.

The same condition was applied to the hollow segments stator. For the hollow segments stator, the maximum Z-axis displacement for node 2909 is 2.258 nm as given by Figure 3.

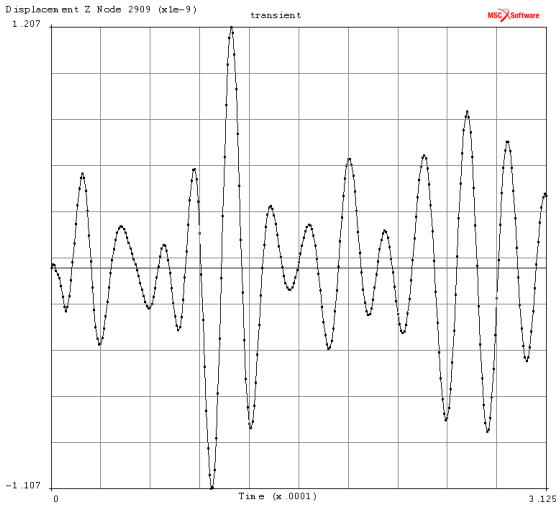

Figure 2: FEA of Z-axis displacement of node 2909 for Shensei stator

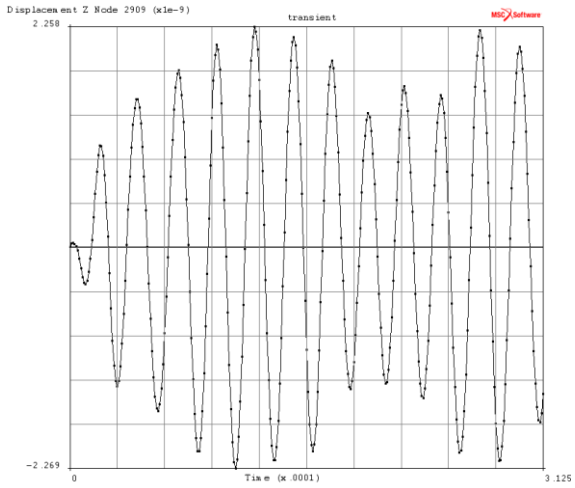

Figure 3: FEA of Z-axis displacement of node 2909 for hollow stator

It was shown that the hollow structure can influence the profile displacement of the ultrasonic motor stator. Indirectly, an addition of hollow shapes enables to improve the ultrasonic motor performance.

Since displacements have a relation with dissipated heat, heat transfer simulation and result verification were run through the temperature measurement experiment during the operation. The heat dissipation of USR 6060 Shensei and hollow segments stator were compared.

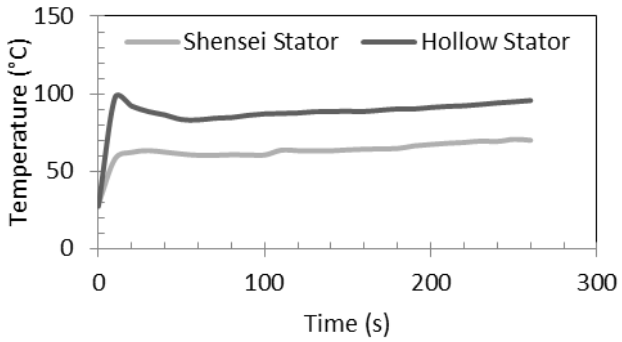

Figure 4: Stator temperature measured

Through the experiment, hollow segments stator releases more heat compare to USR 6060 Shensei stator as illustrated in Figure 4. This happened because hollow segment stators have more surface area that allows more heat to dissipate. High dissipated heat means low heat was stored. The advantage reduces dielectric loss phenomena. The effect of the low loss, the save energy contributes to displacement profile amplitude. This would allow torque of ultrasonic motor to be improved.

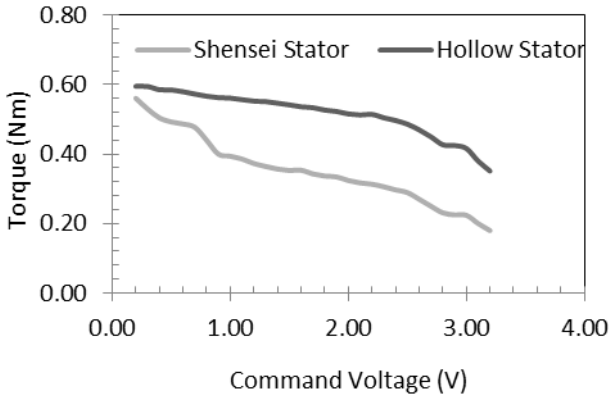

Figure 5: Torque performance of the ultrasonic motor

Figure 5 shows the hollow stator provides higher torque compare to the Shensei stator. The maximum torque of modified hollow stator was 0.60 Nm while Shensei stator was 0.58 Nm. The maximum torque was plotted at 0.20 V. The minimum torque for modified hollow stator was 0.36 Nm while Shensei stator was 0.20 Nm. The minimum torque was plotted at 3.20 V of the input signal. The torque experiment verified the finding accordingly.

Conclusion

As the conclusion, the dielectric loss that converted into heat can significantly influence the Z-axis displacement. A better way of controlling the dielectric loss will determine the stator surface deflection and directly contributed to the ultrasonic motor torque and speed improvement.

In order to gain the highest Z-axis displacement, the heat flux of the stator needs to be increased. By increasing the rate of the heat release, ultrasonic motor can provide a better performance. It is suggested that the model of ultrasonic motor stator need to be verified through speed characteristic. Therefore, the rotor performance needs to put into account. This characteristic will determine the ultrasonic motor performance in overall.

Acknowledgement

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Development of an Ontology Based Kansei Database for Evaluation and Measurement of Users\' Emotion

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Abstract

Kansei evaluation is a part of implementation in Kansei Engineering and is a crucial role in the development of users-oriented information retrieval/recommendation system. Kansei is a Japanese word that is similar to emotion, sensitivity, sensibility, and intuition in English. In this study, ontology based Kansei database that covers sets of emotion words is developed to evaluate and measure users' emotion on feedback such as reviews and survey answers. The text analytic tool SPSS and KJ method are proposed and used to categorize and to classify words based on Kansei factors. This database can use as a bridge mechanism to integrate with other systems to measure or/and to evaluate users' emotion (Kansei) for matching of specific contents and their situations. Emotion type analysis system with visual graph output by ratios of Kansei factors is developed as an experimental implementation and test to evaluate and measure emotion (Kansei) on users' feedback for specific output with ratios of emotion types. Further, the database obtained in this study is to upgrade for creating Kansei model database based on location for travel recommendation system as future enhancement and can be used to analyze users' Kansei to match up the contents of proposed research area.

Keywords— Kansei Database, Kansei Evaluation, Ontology Based Kansei Database, Emotion Evaluation and Measurement

Introduction

The amount of the information people uses on the internet are drastically increasing. The internet users are making decisions based on the available information and they more tend to find information more specific to their needs. Most users interpret their feeling with words, text and characters in the sentence that including emotion expressions when his/her has a clear intention, not during aimless net surfing. Feedback, review, and survey answers are a part of users' subjectivities in natural language text. Research activities in the area of analysis on users' opinion, feedback and review are very popular in natural language text that aims to measure and evaluate sentences or paragraphs that identify the level of users' emotion and whether those are positive or not. The users' information seeking and making response behavior is highly controlled by users' emotions in this area. Thus, Information retrieval and/or recommendation system should be adaptive to the user's emotion that expressed in text in feedback to support suitable information. Therefore, Kansei evaluation and/or detection based on natural language text is important. For evaluating or measuring users' emotions there is the necessity of having a proper mechanism so it will helpful to connect users' information seeking needs and their emotions. Thus in our study, we implement ontology based Kansei words database to measure or evaluate user's emotion so it can be reusable for many other systems. A fundamental part of this study is that to analyze the level and ratios of users' Kansei on feedbacks by with classified set of words. The result will be observed what are features of products and contents based on each user' feedback.

Kansei is a Japanese word, the subjective feelings, thoughts, opinion, and preference that meanings are closely similar to emotion in natural language text. All users' Kansei are not same, even in the same state they will decide by different views by their emotion experiences. Thus, collecting data for Kansei database for the measurement process is very challenging. Not only emotion words but words that based on features of products and contents have to be collected based on the scope considered.

The analytic tool SPSS and KJ method is employed to categorize and classify Kansei words analysis. The result of the system will show the ratio of Kansei factors based on user feedback. This part obtained in this study would be applied in the development of bridge mechanism that will integrate to existing recommender system. The paper provides general approach to evaluate users' preference in the context of feedback and to integrate as a part in travel recommender systems and it is organized as follows.: (1) design and develop for ontology based Kansei word

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database to analyze on feedback, (2) provide a tool to measure users' Kansei for different situations easily and (3) facilitating to integrate for implementing user-oriented recommender systems.

Background

All users' Kansei are not same, for instance, in the scenario of planning a party or a dinner, price, taste, location and menu would judge by different users whether the restaurant should be chosen or not. Though Kansei cannot measure by physical behavior easily and directly, it can be observed and analyzed based on requirements and preferences given by each user [8]. Analysis of emotion has many different ways as follow: subjective that is reactions about perceived emotions words or behavioral responses described by users, behavioral that is facial and postural expressions, speech paralinguistic parameters and psychophysiological answers such as heart rate, EMG, galvanic skin response [9], [14], [15]. To measure users' emotion on the website, measurements deals with psychological responses by words, text, characters in sentences of feedback and survey answers. So, the most suitable measurement and evaluation method for emotion on the web is by using words [1].

Review of Related Work

Various techniques for evaluation and measurement of Kansei/ emotion have been done in the research area of natural language text and Kansei Engineering. The following literature reviews are discussed Kansei database development and the measurement of users' emotion and users' reviews.

Lokman, Noor, and et al. [12] discussed results of emotional values in web design with Kansei Engineering Methodology. The authors constructed Kansei database for evaluation of visitor's Kansei on clothing websites. It obtained 40 Kansei Words based on emotional sensation organized in a 5-point Semantic Differential scale for pre-selected 35 clothing e-Commerce websites. Factor Analysis was uncovering Kansei factors that relate to clothing features and website design elements. The result of the study was given guidelines to develop new emotional design presented in Kansei Database System for website interface.

Saurabh Nandy and Neha Singh [16] studied the text analysis of users' reviews of the hotels in the US. Those authors aimed to analyze the type of user reviews that will help the hoteliers to identify the users' needs from a hotel. Primary data was collected from TripAdvisor's dataset of 4096 different hotel reviews with a total of 60,239 user reviews based on different locations in the United States. The result was pointed out positive or negative things about a hotel that helps to decide whether to choose or not.

Methodology

SPSS Text Analytic for Survey Analysis

It is an analytic tool used for text analysis of feedback such as survey answers, reviews and produced by IBM. It can transform unstructured sentences and texts into quantitative data and gain insight using sentiment analysis. [4]. SPSS Text Analytics for Surveys categorizes responses and integrates results with other survey data for better insight and statistical analysis.

The KJ method (affinity diagram or chart making):

"*It was developed by Kawakita Jiro and invented in 1953*" [6]. It is used to classify data into similar categories or in other words, transform data into information. In fact, the KJ method is a typical quality technique and can use as a problem-solving tool or decision-making tool for an unorganized big amount of data. It adopts the bottom-up sorting process and is very useful for classifying data. It is, however, a subjective process and may consume time when the volume of data is large. To analysis with KJ method, a group of people, index cards or sticky notes or notepads, and physical space is required. The steps in the KJ method are as follows: (1) define the scope, (2) gather primary data, (3) classify data into groups, (4) create header by specific word, and (5) chart making [18].

Framework

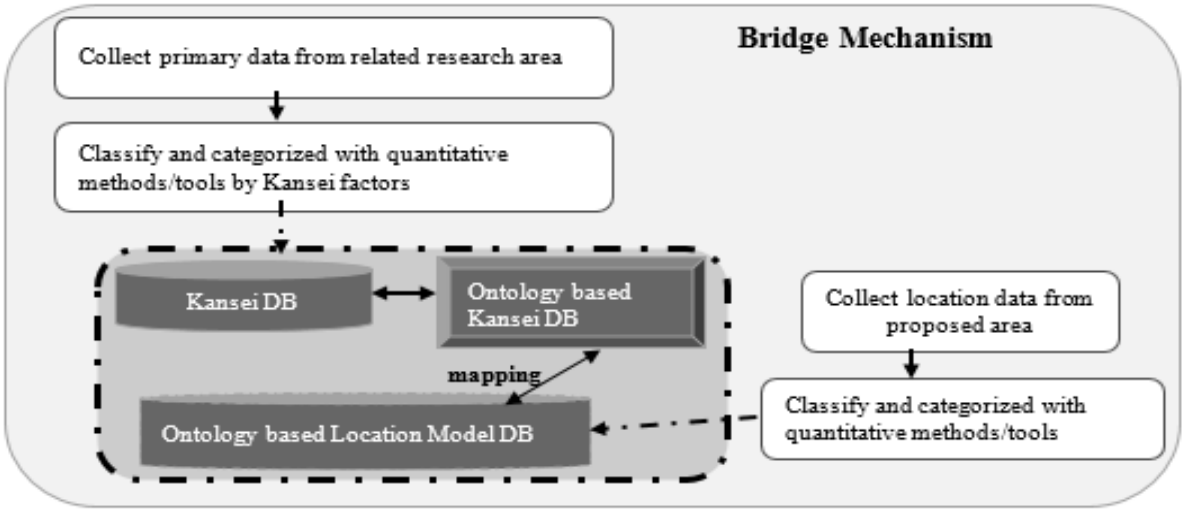

Figure 1: A Bridge Mechanism of Developing Travel Recommendation System

In order to develop a bridge mechanism for recommender system is necessary to analyze on users' emotions and to match up with contents based on their requirements. In the development of this study, two types of database are needed. Kansei words database which to measure and evaluate on users' feedback and location model database that includes ontology based specific contents of each location. In this paper, the author explains the development of an ontology based Kansei words database. The hypothesis of a bridge mechanism development is shown in the above figure.

Word Analysis

In this section, the author described the primary words collection and word categorization and classification part of developing a database. A Kansei word is a word describing the behavioral and psychological response to situations, contents, and products [2]. Most words are adjectives and nouns but other grammatical forms are possible. When e.g. describing a "good-looking", adjectives like attractive, pretty and handsome etc. but also verbs and nouns can include because sometimes users make decision shape, color and situation based on their current moods. In order to get a complete selection of words, the following sources are used, even if the words seem to be similar or the same. Suitable sources of words collecting for Kansei database are academic papers, Kansei related literature and site, e-commerce site, experienced users, and recommendation studies. In general, this paper presents four main steps in analysis process: (1) collect primary words depend on proposed area, (2) word categorization into three groups (positive, negative, neutral), (3) classify similar words by Kansei factors, and (4) define primary header on each group.

According to the scope considered, over 900 words are collected. In first step analysis, SPSS Text Analytic Tool is used to categorize and to drop the same data on the selected Kansei words. Similar words and same words are dropped in categorization step and around 600 words are collected. The ratios of words count for each category and sample words are shown in the following figure and table.

Table 1: Word Categorization with SPSS Tool

Positive - 263	Negative - 301	Neutral - 79
• Beautiful • Beloved • Kind-Hearted • Charm	• Angry • Awful • Boring • Dislike	• Natural • Formal • Non-sense

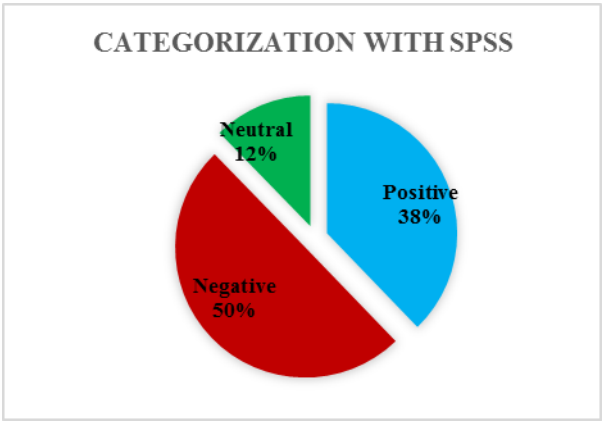

Figure 2: Word Categorization with SPSS Tool

In order to define header by Kansei factors, the author used KJ method for repeating classification on 3 categories (positive, negative and neutral) that have done by SPSS tool. KJ is a quantitative method for decision making model for big amount of data to classify similar data into small group. It has five steps such as determine the scope, gather data, group similar data, pick the specific word for headers, and chart making to develop ontology domain. The following table show Kansei factors and words count based on categories.

Table 2: word classification with KJ method

Positive	Word	Negative	Word	Neutral	Word
Aesthetics	52	Anger	85	Usability	79
Satisfy	78	Dissatisfy	76	Color	
Love	32	Confusing	49	Comparison	
Surprise	49			Size	
Happiness	52	Sadness	91		

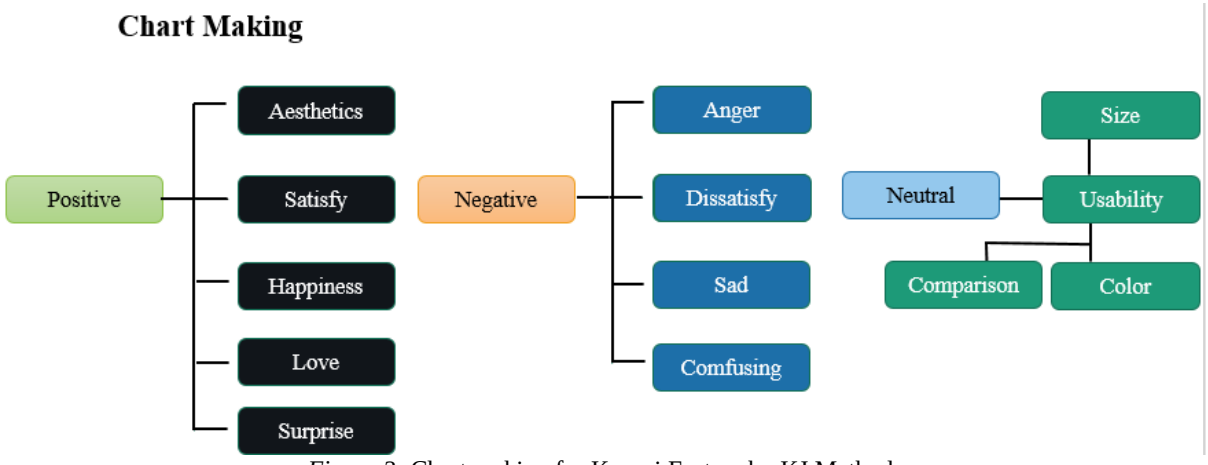

Figure 3: Chart making for Kansei Factors by KJ Method

To develop a semantic web application in further study, ontologies specifications of concepts and relations are needed to develop. For this study, a word domain ontology is developed which is utilized by every aspect of the system, especially in used to extract and match contents with location models that will be obtained in further development. The following ontology model is developed for Kansei database for feedback analysis. The ontology model structure of words factors and collected data will have changes in analysis on other research areas such as education, music, and industrial developments.

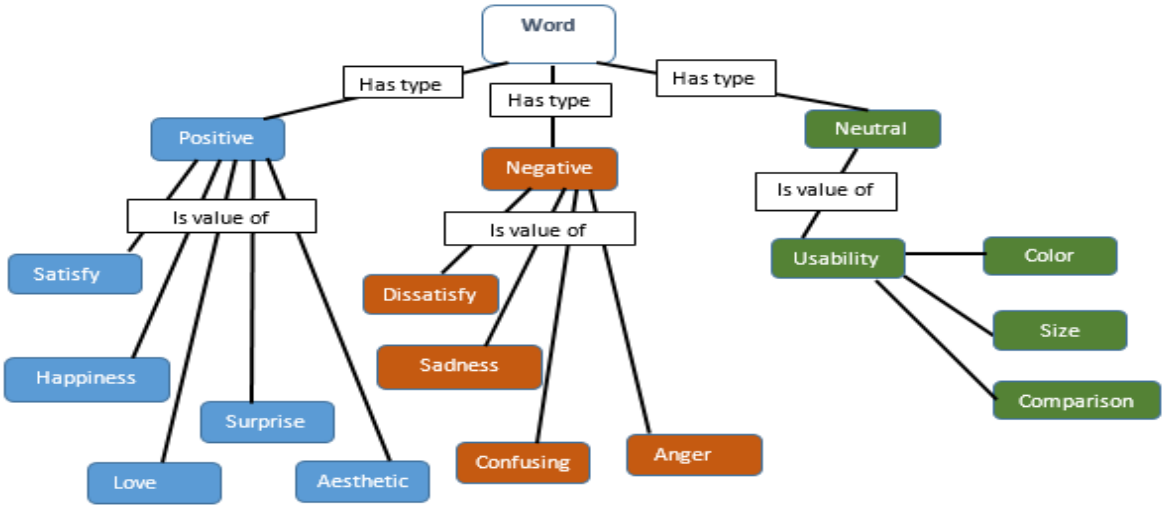

Figure 4: Ontology model for Kansei Database on Feedback Analysis

Evaluation and Result

In this section, the author described the evaluation part of the preliminary analysis. A test system is developed to measure and to evaluate users' Kansei on feedback and survey analysis. In order to evaluate that can use as a bridge mechanism and can integrate with other systems, collect some feedback data from e-commence site input into system. This system segments on each word and drops unrequired words and measure emotions using the database. Then the system analyzes on each group and defines a ratio by Kansei factors. As a specific output, it gives a feedback (positive or negative) and a visual graph output with a ratio of Kansei factors unlike other systems. The following figure describes the system evaluation. Even the system design is very simple, visual graph output can be observed simply and very easy to understand by the ratio of emotion level. The following figure shows the way of simple and easy result of this system.

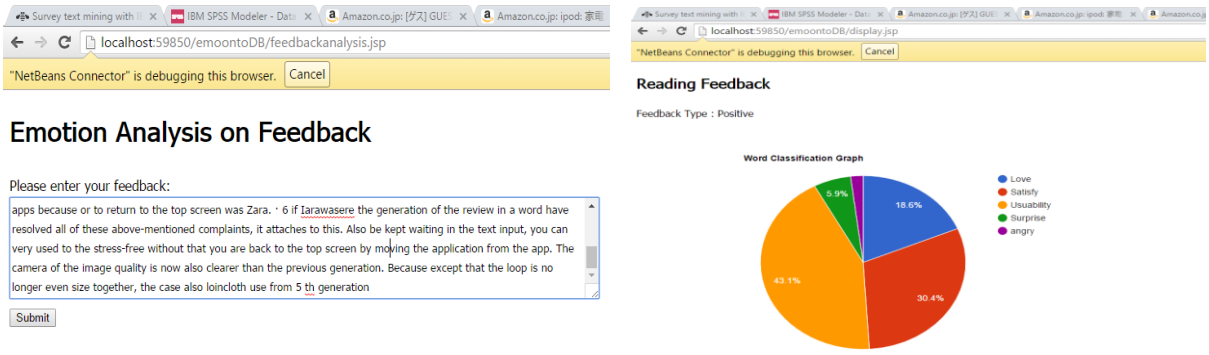

Figure *6, 7:* Input And Output Interface of The System for Measuring Kansei on Feedback Analysis

Conclusion

This paper analyzed the measurement and evaluation of users' Kansei expression. Developed an ontology based Kansei database with different kinds of features and different kinds of view that can use as a preliminary step of bridge mechanism development and easily to integrate with other systems which includes all the aspects of domain and ontology development, word extraction, Kansei, Kansei engineering and Kansei evaluation. When these technologies and features are combined with the comfort of a keyword-based database, it obtained one of the most

user-friendly, high performance and easily to define the specific value for evaluation and measurement for each kind of Kansei behaviors. Therefore, the performance and user friendly result is a better way and make advantage to other systems. However, the evaluation result for the specific situation with diffident feature presented significant evaluation result. Finally, Kansei database proved that can be measured and evaluated easily as a first step of developing bridge mechanism. The current implementation can be extended and improved in many ways. First of all, it has the plan to upgrade as a user model database and establish the location-based model database to support travel recommender system with Kansei features. The performance will be further improved by implementing a model matching system. Finally, implementing travel recommendation system with a bridge mechanism that expands the index automatically according to the users' Kansei is a goal of future development.

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ECBA-16

Performance Evaluation of PCI Express Non-Transparent Bridge based Interconnection Network

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Abstract

PCI Express is a widely used system bus technology that connects the processor and the peripheral I/O devices. The PCI Express is nowadays regarded as a de-facto standard in system area interconnection network. It has good characteristics in terms of high-speed, low power. In addition, PCI Express is becoming popular interconnection network technology as like Giga-bit Ethernet, Infiniband, and Myrinet which are extensively used in high-performance computing. In this paper, we designed and implemented interconnect system using PCI Express x8 between two computing nodes. For this purpose, PCI Express supports a novel technique, known as non-transparent bridge(NTB), in order to isolate between two subsystems.

Keywords— PCI Express, Giga-bit Ethernet, Non-Transparent Bridge

Introduction

PCI Express is a further improved version than PCI bus technology developed by INTEL. PCI Ex-press is a technology by which can be connected with various peripherals or host, support high I/O scalability and high-performance, high-speed communication. PCI express non-transparent bridge is widely used in the multi-host and host-failover. Figure 1 shows the system architecture in which two hosts are connected through PCI Express non-transparent bridge.

PCI Express is transmitting and receiving data (full-duplex) through an independent link tied to an integrated line in one lanes of transmit and receive. PCI Express may be used by a plurality of lanes (x2, x4, x8, x16) to control the links from a single lane width (X1). PCI Express has the 8Gbps per-formance of a single-lane Gen3 data rate. Table 1 represents the data transfer rates depending on the generation and link width.

In Figure 1, Host A and B can communicate via logical endpoint interface of virtual side and link side through address translation. It is necessary to know the address of the external memory when the host address translation. There are some scratchpad registers that can be accessed from each of the interface. Two hosts may share data with each other via the scratchpad register.

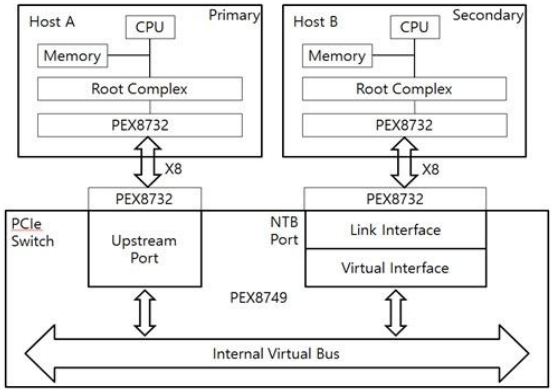

Figure 1: Execution Results for

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It can also cause an interrupt to the other party through the Doorbell register. The interconnection network determines where the packet is directed through the bus and device information field in the packet header. The bus number and device number are different, so the interconnection network returns a proper ID depending on the bus number and device number during address translation. In order to do this, there is a address-translation lookup table (LUT) to which we can register an ID, lookup the ID by the index. Figure 3 shows the address translation process of a PCI Express packet.

Our approach and Experimental Results

We constructed a testbed system with these technologies and evaluated the performance on the testbed. Figure 1 represents the system architecture of our evaluation testbed.

Table 1

Experimental Environment

Host PC Hardware Environment	
M/B	GIGABYTE GA-H61M-DS2V
Processor	Intel® CoreTM i5-3470 CPU @ 3.20GHz X 4
Memory	Samsung DDR3 1333MHz 2GB
O/S	Centos Linux 7 64bit Kernel : 3.10.0-327.el7
Interconnect Hardware Environment	
PCI Express Switch	PLX PEX8749 RDK 48 Lane, 18 Port, PCI Express Gen 3 Switch
NIC	PLX PEX8732 Cable Adapter X 4
Driver	PLX SDK Device Driver

First, we show the performance difference between non-DMA transfer using ordinary memcpy and PCI Express RDMA transfer and we also evaluate the performance improvement between Block RDMA transfer and scatter-gather RDMA.

Figure 2

Performance Evaluation Results 1

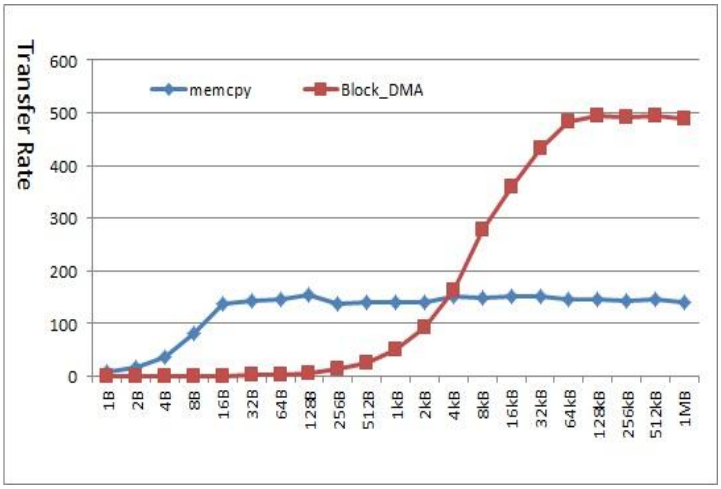

Figure 2 depicts the evaluation between non-DMA transfer and block RDMA transfer. The x axis shows the size of transfer data and the y axis represents the transfer rate as MB/s, commonly in both graphs. When the size of the buffer is small, memcpy and DMA transfer shows low performance at the same time. The larger the size of the buffer gets better performance in DMA transfer. This is because the data transfer at a time to increase. When the data size is below 2kB, memcpy showed higher transmission rate than DMA transfer. Even if we increase the buffer size in memcpy, it tends to be satisfied at the transfer rate of up to 150MB/s. In more than 4kB buffer size, we got a relatively high performance of up to about 500MB/s in DMA transfer.

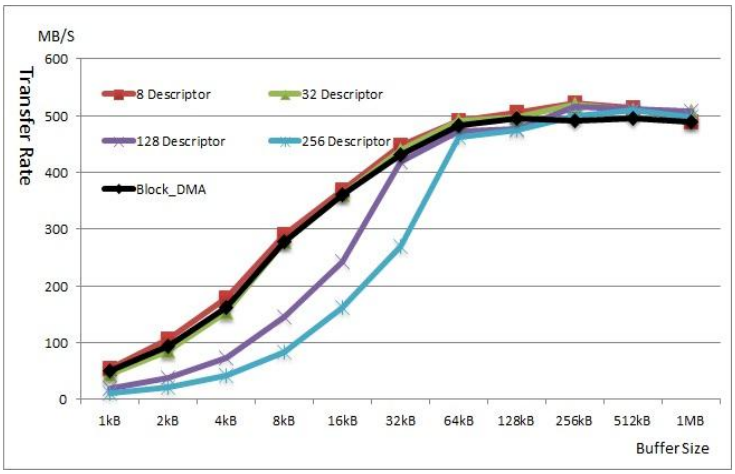

Figure 3: Performance Evaluation Results 2

Fig. 3 shows the evaluation between block RDMA transfer and scatter-gather RDMA transfer. The x axis shows the size of transfer data and the y axis represents the transfer rate as MB/s, commonly in both graphs. Evaluation result shows that the non-DMA transfer performance is 150MB/s and the Block RDMA transfer is improved to 500MB/s. Finally, scatter-gather DMA performance is shown up to 520MB/s.

Acknowledgement

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ECBA-16

Research on Asymmetric Embossing Process Technology of Dynamic Bag-type Assistant Magnetic Variation Plate

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Abstract

This study focused on the development on asymmetric embossing process technology of dynamic bag-type assistant magnetic variation plate. Firstly, after discussing related technologies adopted for manufacturing microstructure molds through non-traditional process technology, laser beam machining technology is adopted to create the microvoid structure mold, which is taken as the original mold, and then upgraded with silica gel to form the required microstructure mold, which is regarded as the embossing mold used herein. In addition, asymmetric embossing system equipment of a dynamic bag-type assistant magnetic variation plate is developed, and linear incline microstructure duplication embossing testing of the magnetic variation plate arrangement is conducted. The results show that, under the conditions of different permanent magnet arrangements, through polar repulsions, the upper pressing plate (mold structure surface) will have an inclined angle. Through a series of studies and discussions, a successful copy of a good linear inclined microstructure is guaranteed, which proves that the new asymmetric microstructure process developed herein is sufficient to be selected for the microsystem industry in manufacturing applications.

Keywords— Magnetic Variation Plate, Asymmetric, Dynamic, Microstructure

Introduction

Technology industries often require rapid, high-value industry models in order to provide the opportunity to continuously maintain industrial competitiveness, as such continuous process technology may promote the stable growth of the manufacturing industry. Nowadays, with rapid scientific and technological developments, communications, computers, and consumer electronics, 3C industries are the emerging industries of the 21st century, and there is continuous demand for lightweight and tiny systems to facilitate convenience demands of consumers. Before manufacturing microsystems, manufacturers must work out the parent mold (original mold) in order to facilitate the manufacturing of microcomponents; however, due to very tiny structure size, microcomponents cannot be manufactured through general traditional machining, thus, most are manufactured by non-traditional machining methods. The non-traditional machining and manufacturing technologies roughly include: mechanical energy, heat energy, chemical energy, electric energy, and other types of energy supply. Generally, non-traditional machining often has higher machining capacity and less machining removal, meaning better surface roughness and fewer defects, such as residual stress, can be obtained; moreover, due to the requirements of tiny machining and high dimensional precision, non-traditional machining is applicable to the original mold machining and the creation of microsystem and microstructure components. A very common microstructure manufacturing technology is to use heat energy machining for the removal of workpiece material parts, for example, Micro-electrical discharge machining (Micro-EDM) [1-2] is an insulating liquid method in which ionization insulated liquid is generated under high voltage, and the electrical discharge between electrodes causes electric sparks to force the heat energy rise in order to remove the workpiece material. It conducts continuous feed machining according to the fixed spacing until the set machining position is reached. In such technology, as the removed material has a fine work rate and stable surface, this technology can be applied to the machining of high aspect ratio, such as microhole drilling [3-4], and is an important machining method for microsystem components. In addition, according to electrical discharge wire cutting

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[5], also known as electrical discharge machining, the microwire diameter in deionized water is taken as a tool to conduct continuous electric spark discharge, which cuts and removes the workpiece material. Moreover, according to electrical discharge grinding (EDG) [6-7], as the electric spark is between the grinding wheel and workpeice, the material is removed through high heat for cutting. Electron beam machining (EBM) [8-9] is frequently applied in the machining of microstructure components with hole diameters below 20μm; electrons are generated through the electronic tree generator in the vacuum, and the material is removed and machined by the accelerated electron principle; as this method has a very high aspect ratio and quick machining speed, the machined material will not have thermal deformation or thermal stress; therefore, it is considerably advantageous in thin microstructure mold machining.

The demands for microsystem manufacturing by technological industries, i.e. the display panel, have gradually changed from hard-boards to micro soft-board displays [10-13], which indicates changing user demands for lightweight and flexible microcomponents with other aspects. Regarding the optical display system, in order to develop small and flexible microcomponents to meet changing user demands requires microsystem process technology, thus, technology industries and research units shall continuously conduct diversified development aimed at flexible materials based on microsystems and macromolecule base materials, and take continuous process as the most important direction. In this study, the asymmetric embossing process technology of a dynamic bag-type assistant magnetic variation plate is developed, in order to obtain the asymmetric microstructure molding method by using the phenomenon of polar repulsions. Moreover, through the establishment of no-damage mold drawing technology, the microstructure components will become more stable in the process of molding, and the microsystem technology industry will have one more choice in asymmetric manufacturing.

Experimental

Microstructure Mold Manufacturing and Design Selection

This study adopts laser beam machining (LBM) [14-18] technology to create the microstructure parent mold. LBM generally uses a laser beam resonator to stimulate the laser material to generate highly parallel beams, and then, through the lens inside the instrument, such laser beams are highly focused and irradiated to the workpiece surface in order to realize machining through high energy and heat energy in the method of melting or evaporation; with such technology, 10μm-level size pieces can be machined, and is often applied in the machining and manufacturing of original parent molds of microstructure components of plastics, metal, glass, and ceramic materials. Laser materials have three states, gas, liquid, and solid; gas and solid laser materials are commonly used in forming, while the laser material in the gas state is novel and more common: the first type is laser materials based on Kr_2, Xe_2, Ar_2, and other inert gases; while the second type is the gaseous laser materials of ArF, KrCl, and KrF formed through mixing inert gas atoms and halogen elements, which can generate laser beams through motivation, and both belong to the excimer laser range. The second kind of excimer laser is widely applied in manufacturing industries, as the beam it generates is of short wavelength, and because the light source wavelength is in the UV-light waveband range, it is very applicable to metal materials and is frequently applied in semiconductor manufacturing processes as an exposure light source. In addition, regarding the removal of workpiece material machining parts, gaseous carbon dioxide laser and solid Q-switched ruby laser materials are adopted, as their light source wavelengths are in the infrared waveband range, thus, they are frequently used in tiny workpiece removal and very thin plate cutting in surgical operations or industries.

In this study, the microstructure hole (diameter 150μm) obtained through laser beam machining is as shown in Figure 1. Afterwards, a complementary (convex) structure is obtained through hot-embossing technology(Figure 2), and through adjustment of Hot-embossing parameters in the process, convex microstructures with different heights and curvature radiuses can be obtained. In addition, through the rollover process, the obtained PC structure is improved to a PDMS soft mold to serve as the microstructure soft mold adopted herein.

Dynamic Bag-Type Assistant Magnetic Variation Plate Embossing System and Inhibitor Selection

This study first develops a dynamic bag-type assistant magnetic variation plate embossing system, which includes six main sub-systems: a gas-driven slide part, magnetofluid bladder, magnet arrangement zone, magnetic control embossing platform, exposure system, and multiaxial dynamic tension no-damage mold drawing system, as shown in Figure 1. In the embossing force part, the final asymmetric embossing force is provided by the integration of three main aspects: (a) gas-driven slide part, which uses gas to promote the magnetofluid bladder, with a slide as the drive; (b) magnetofluid bladder, which cooperates with the magnetic control pressure to provide magnetic pressure; and (c) magnet arrangement, which provides the interaction repulsive based on the property of polar repulsions. The UV curing photoresist of epoxy resin structure is adopted as the inhibitor.

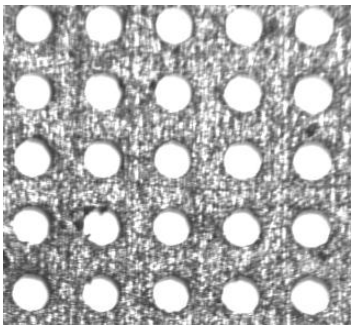


Figure 1: Microstructure Hole Obtained through LBM

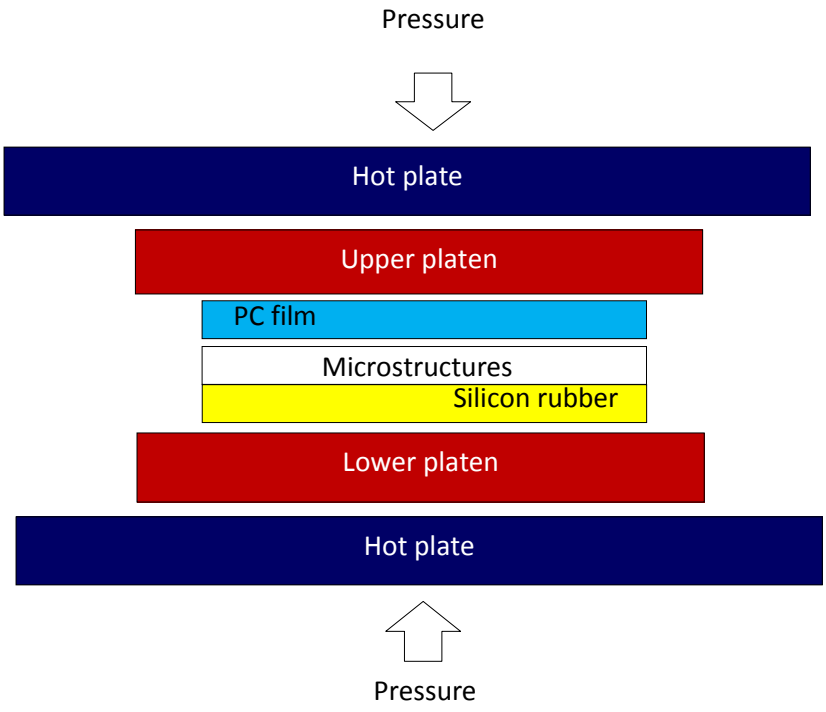


Figure 2: Hot-Embossing Set Up

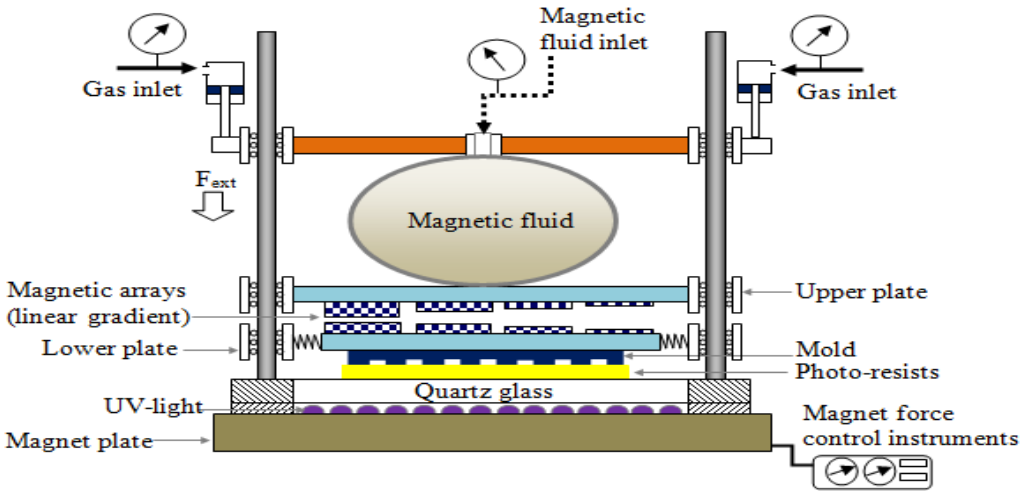


Figure 3: Dynamic Bag-Type Magnetic Variation Plate Embossing System

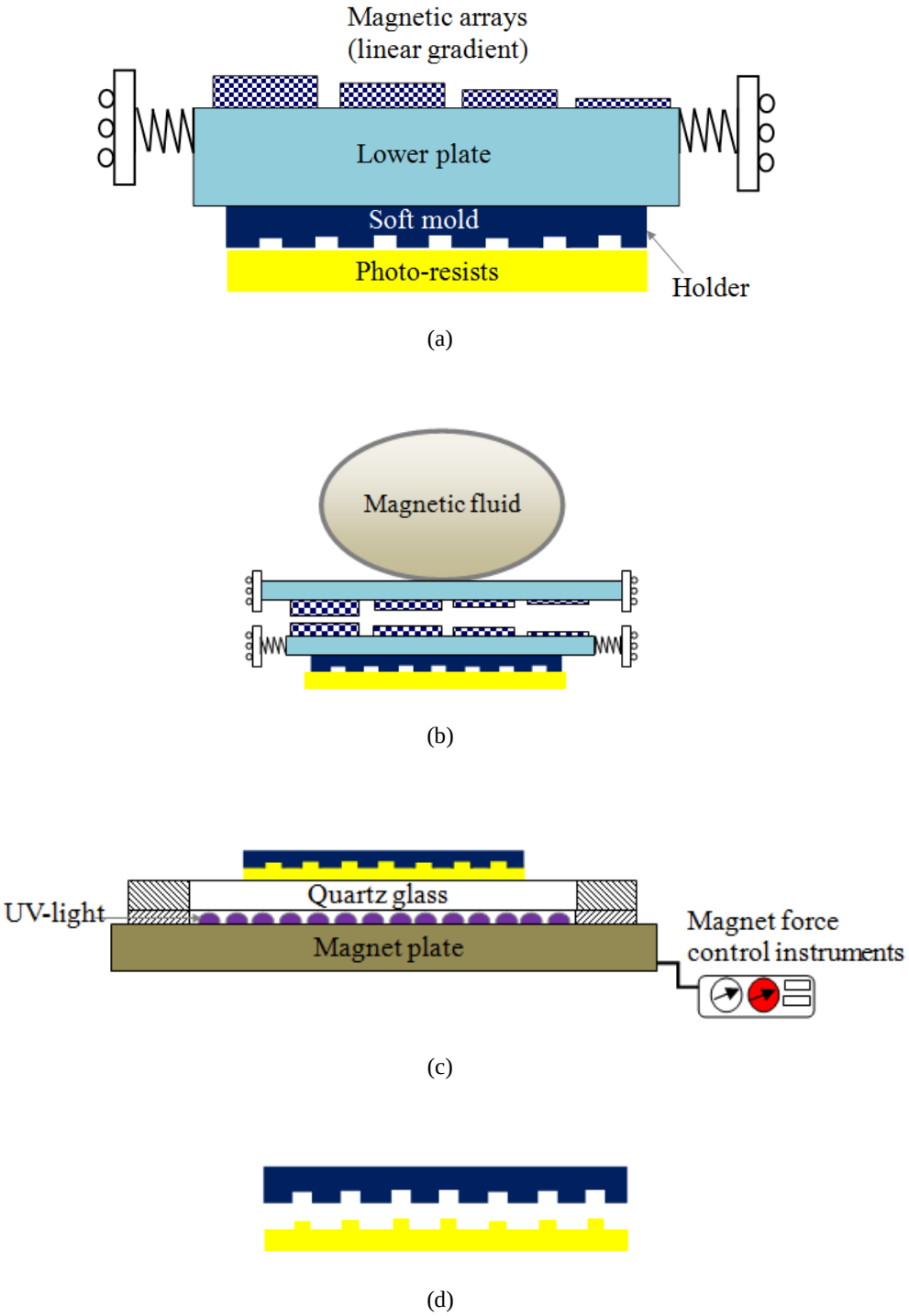


Figure 4: Dynamic Bag-Type Assistant Magnetic Variation Plate Molding Steps

Dynamic Bag-Type Assistant Magnetic Variation Plate Molding Steps

The actual embossing and molding steps of the dynamic bag-type magnetic variation plate embossing system, as designed and developed herein, include: (a) clamp the microstructure mold; (b) place photoresist on the transparent plate of the embossing exposure system and fill with magnetic fluid; (c) turn on the magnetic plate switch and apply pressure to the magnetofluid bladder through the gas-assisted control pneumatic cylinder, and act above the upper

plate; (d) after the proper molding force is achieved, conduct embossing exposure, curing, and molding then obtain the finished product, as shown in Figure 4.

Results and Discussion

Microvoid Hot-Embossing PC Microstructure Parent Mold Array Module and PDMS Rollover

In this section, through many groups of experimental parameters (Table 1), as based on the microvoid Hot-embossing PC microstructure parent mold, a microstructure with many feature sizes can be obtained, as shown in Figure 5 and Table 2. The obtained microstructure will be changed to a microstructure soft mold through PDMS rollover, as based on the host agent: curing agent 1:10 standard.

Table 1:
Hot-Embossing Experiment Parameters

No.	Pressure (Psi)	Embossing time (seconds)
1	2000	30
2	1000	30
3	1000	50

Table 2:
Hot-Embossing of PC Microstructures

Pressure (Psi)	Embossing time (seconds)	Height (μm)
1000	30	26.850
1000	50	4.512
Embossing time (seconds)	Pressure (Psi)	Height (μm)
30	2000	56.253
30	1000	26.850

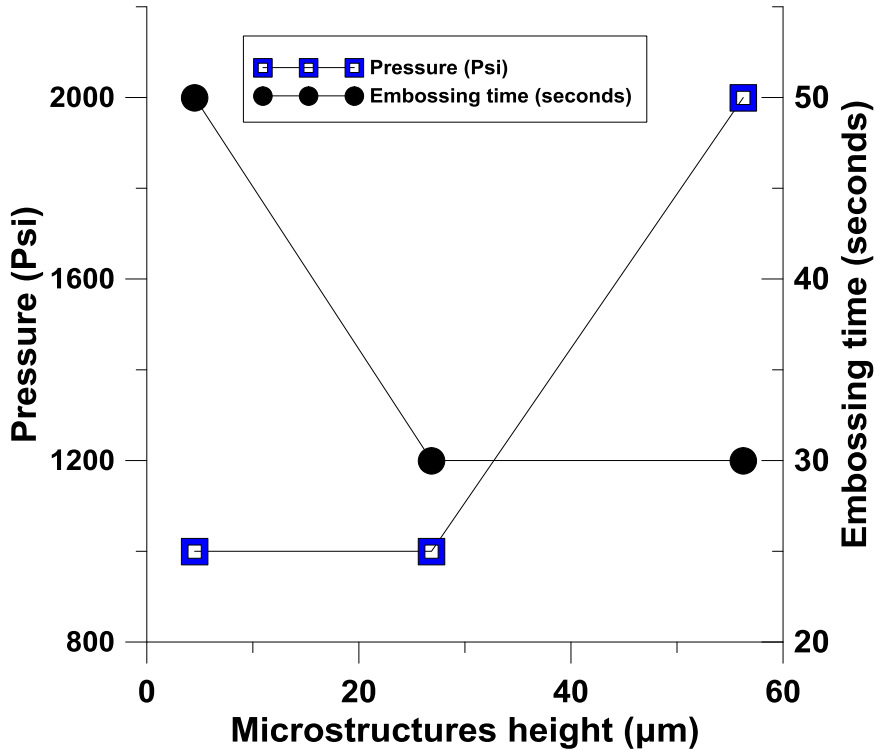


Figure 5: Influence on Forming Height and Curvature Radius under Different Hot-Embossing Conditions

Dynamic Bag-Type Assistant Magnetic Variation Plate Embossing Molding Research

By use of the independently designed and developed dynamic bag-type assistant magnetic variation plate embossing, this section conducts research on duplication molding, discusses the stability and symmetric and asymmetric molding features of such system, and verifies the surface conditions after the imprint process. The experimental results show that, after the symmetric embossing process, this system has a good embossing duplication, as shown in Figure 6; in the asymmetric molding feature, through asymmetric magnet arrangement, an angle embossing mechanism can be provided; and in this study, different angles of inclination are taken as embossing angles applied at the beginning, and through the judgment of microstructure component angle part after embossing, an accurate angle transfer printing mechanism can be achieved, as shown in Figure 7. In addition, this section discusses the conditions of feature size before and after imprint is obtained for the original microstructure, which is subject to symmetric imprint deformation and the imprint process given by imprinting system, and subject to the action of the imprinting mechanism, as well as the conditions of the feature size (diameter variation) of finished products after imprinting. There is good transfer print effect, as shown in Figure 8. Through the measurement of the side surface roughness influence of original and finished microstructures with a atomic force microscope, the finished product has better surface roughness, as shown in Figure 9.

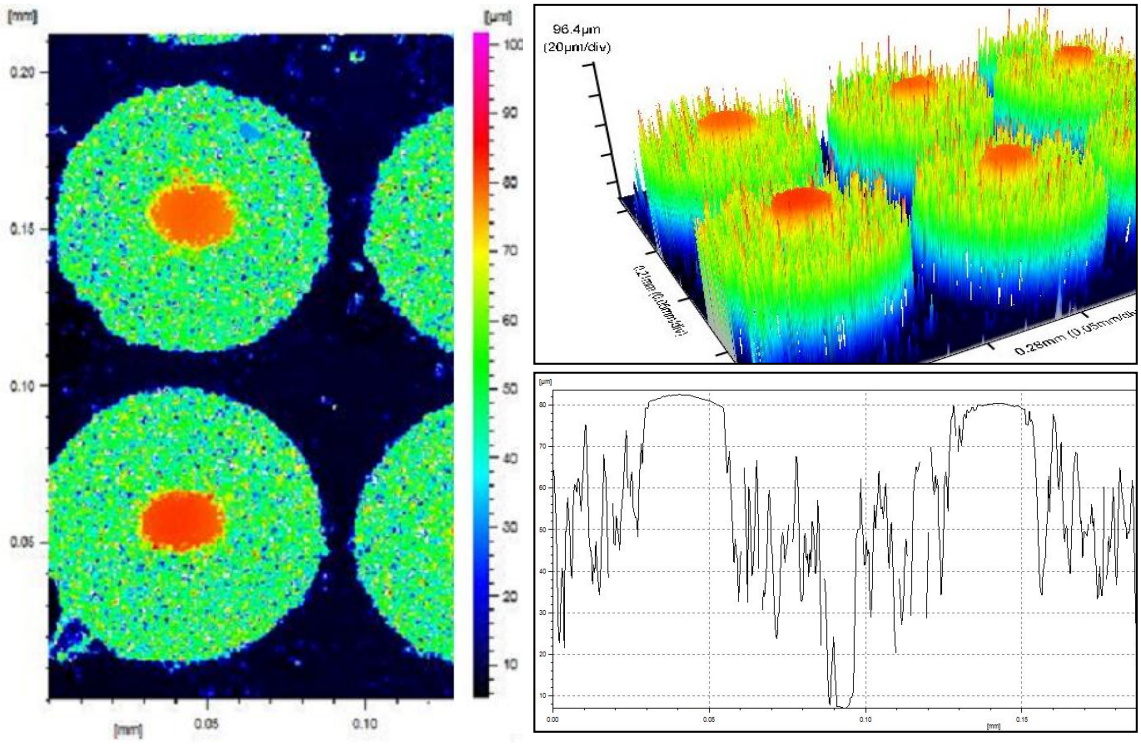


Figure 6: Embossing Replicate after Symmetric Embossing Process

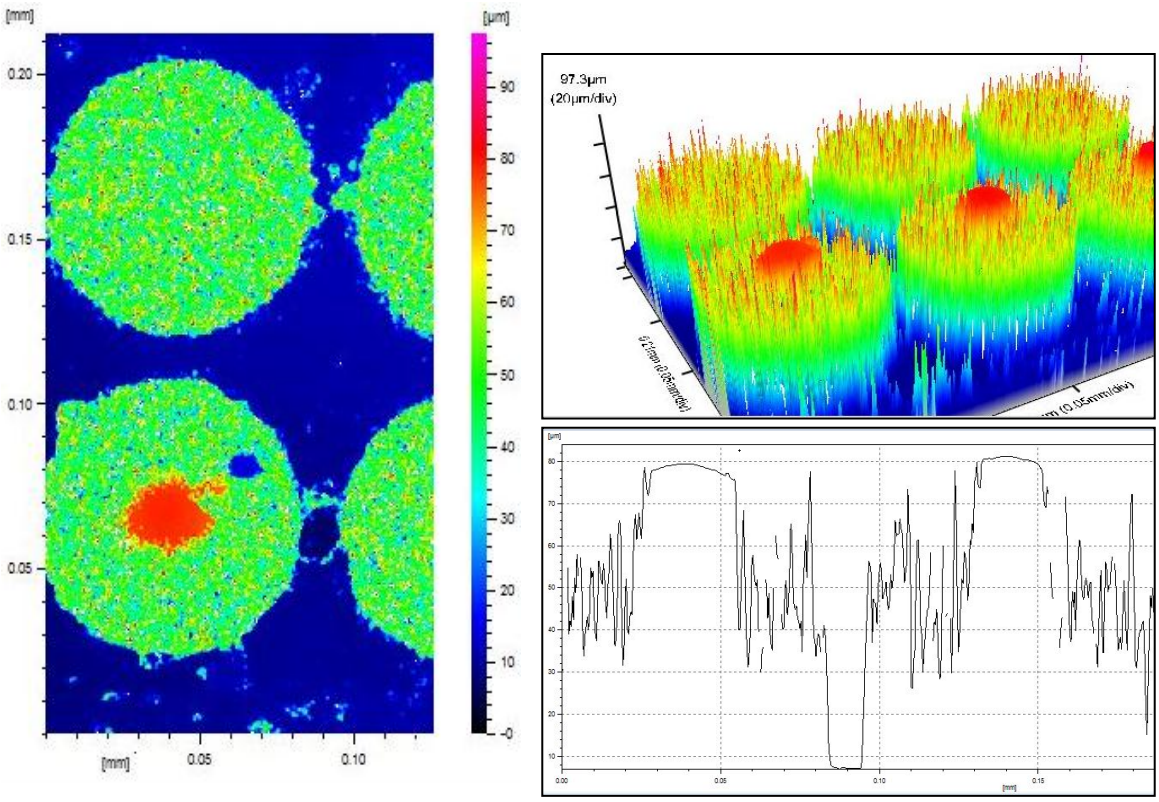


Figure 7: Embossing Replicate of Microstructure Component Angle after Embossing Process under Different Angles of Inclination

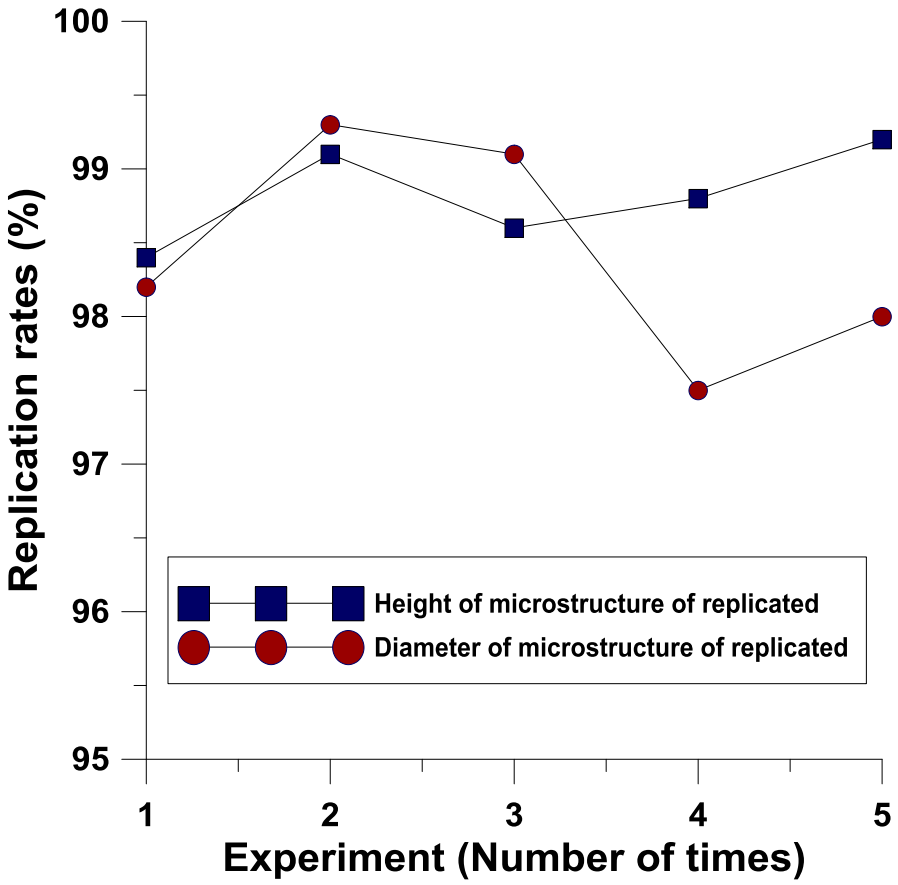
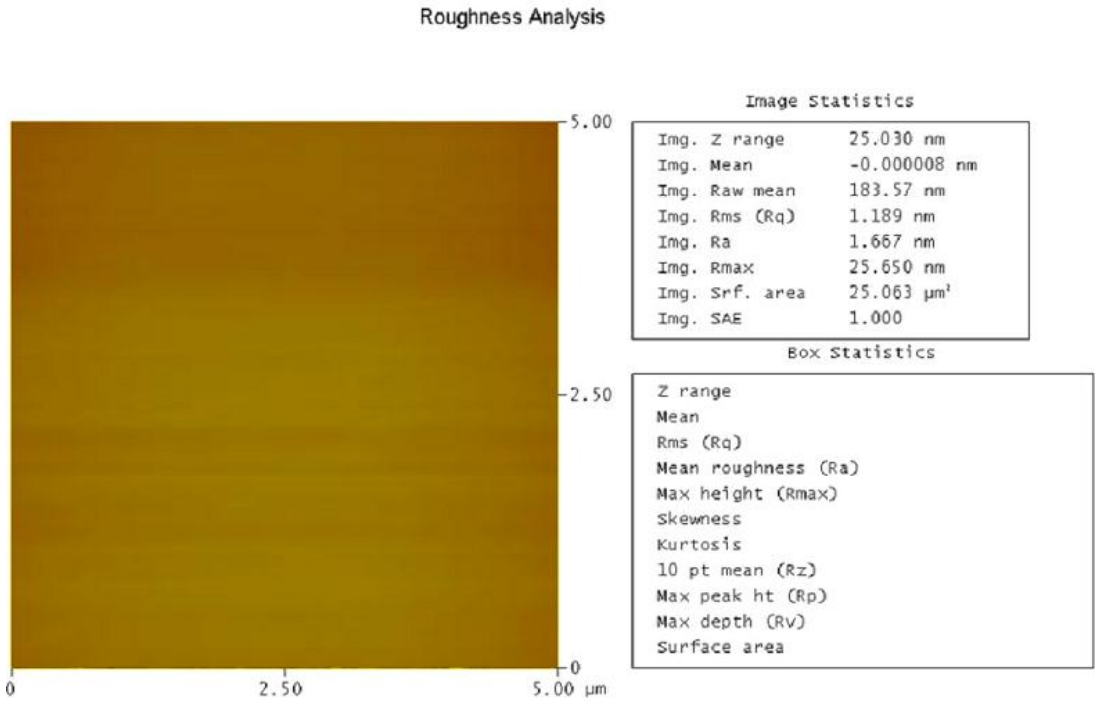
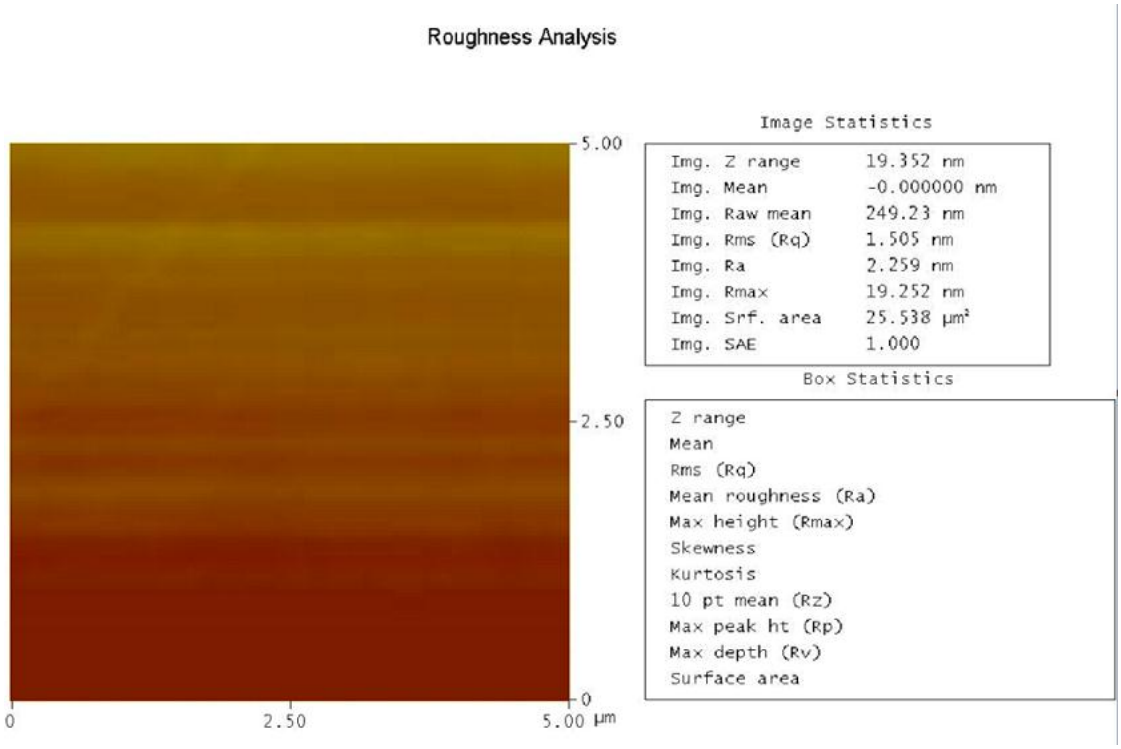


Figure 8: Feature Size Variation of Before and after Embossing



(a) Upper of the microstructure



(b) Side of the microstructure

Figure 9: Upper and Side Microstructure Component Surface Roughness Conditions of The Original and Finished Product Under Atomic Force Microscope

Conclusions

This study discussed the asymmetric embossing process technology of a dynamic bag-type assistant magnetic variation plate. In the process, a dynamic bag-type magnetic variation plate embossing system is designed and developed, , Moreover, through the application of uniform pressure to the dynamic bag-type system, and in combination with the unequal magnetic property arrangement of the magnetic variation plate. In addition, the asymmetric embossing process of the dynamic bag-type assistant magnetic variation plate developed herein can provide uniform pressure, and a valid inclined forming mechanism with a tiny angle can be provided on the asymmetric magnet arrangement, thus, through the final forming re-testing, it is proved that this method has a good duplication rate. According to the development result hereof, a stable forming mechanism is provided, where edge damage and destruction can be effectively inhibited, and it is expected that a valid process selection will be provided for the microsystem structure components in molding.

Acknowledgement

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Factors affecting Information Technology Self-learning with Smart Phone in Generation

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Abstract

Factors affecting information technology self-learning with smart phone in generation had objectives to study about factors that affected to information technology self-learning with smart phone in each generation and compared factors which affected to information technology self-learning with smart phone in each generation. This research studied information technology self-learning with smart phone in each generation for 5 factors which were self-acceptance factor, influence factor, learning plan factor, readiness factor and environment factor. The research sample was population in each region in Thailand. This research sample was multistage sample for 840 questionnaires, analyzed data to calculated reliability value with Cronbach's alpha coefficient method (α =0.82). The statistics used for data analysis was descriptive statistics to explain sample feature so these statistics were frequency, percentage, mean and standard deviation. Another statistics was inferential statistics to use for research hypothesis testing for comparing so these statistics were t-test to compared 2 variable group and F-test in case of more than 2 variable group with 0.05 significant. This research result found that respondents had good opinions about factors affecting information technology self-learning with smart phone in each generation which were self-acceptance factor, influence factor, learning plan factor, readiness factor and environment factor(Average were 4.19, 4.25, 3.98, 4.16 and 4.22 in order). Sex (male and female) had difference result of information technology self-learning with smart phone in case of influence factor and leaning plan factor for 0.05 significant but had no difference in case of self-acceptance, readiness and environment factors for 0.05 significant.

Keywords— Factors Affecting Information Technology Self-Learning, Smart phone, Generation, Self-Learning

Introduction

The information technology generation in Thailand was increased rapidly and continuously. Information technology and communication let people to had equipment to access data, complete communication, convenient, fast and had multi-channel to communicated. Thailand must developed structure base of technology and supported people to get technology knowledge and skill to enhance as another developed country. This was the benefits to developed economics and social for country in social globalization (Economic and Social Statistics Bureau, 2015). Globalization and world culture trend came to Thailand and affected Thai life style in family, community and social level. While "Online media" of information technology progression made a gap between each generation (Office of the National Economic and Social Development Board, 2010). Generations were related with age and social revolution in order of time (Mannheim, 1952, pp. 286-287). The difference social in each generation affected people's life style to be difference life style. Some person growth under one environment that had their own thinking, their own belief and their own social value to reflect in their behavior so this affected to quite difference in each generation (Billingham, 2007). New generation people started to perform to replace old generation people which quietly disappeared from social that it was inherit from their ancestor (Takatoshi, 2004, p. 85). The difference generation made creative thinking to social (Humphrey & Stokes, 2000, p. 4) that they separated generation or class of people from same birth date or same month or same year to be same life style. (Glass, 2007). There were 4Generation which were Baby Boomer Generation (After 2nd world war-1964), X Generation (1965- 1979), Y Generation (1980 – 1992) and Z Generation Z (1993 – current) (Howe, N., & Strauss, W, 2003)

Information technology and communication's survey in population on 2010-2014 of people of minimum 6 years old found for number computer users were increased from 30.6 percent(19.1 million persons) to 38.2 percent(23.8 million persons), internet users were increased from 22.4 percent(13.8 million persons) to 34.9 percent (21.7 million persons) and smart phone users were increased from 61.8 percent(38.2 million persons) to 77.2 percent (48.1 million persons) in 5 years (As figure1) (Economic and Social Statistics Bureau, 2015).When the researcher separated to

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country region and found that Bangkok has most number of smart phone users as 89.2 percent, inferior percent was center region as 81.7 percent, north region was 74.4 percent, south was 73.2 percent and least percent was north east region as 70.7 percent (As figure 2) (Economic and Social Statistics Bureau, 2015).

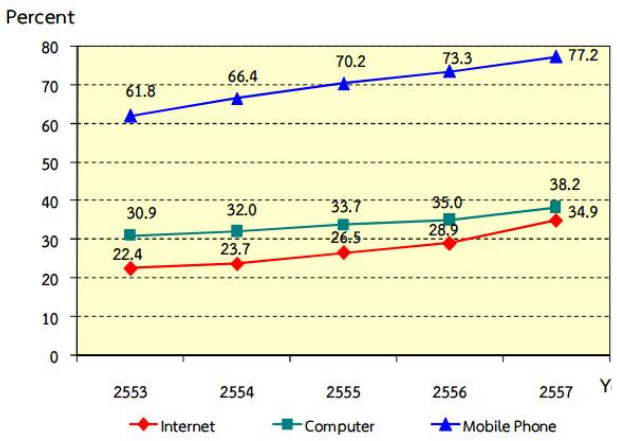

Figure 1: Percentage of population aged 6 years and over used computer Internet and mobile phone 2010-2014

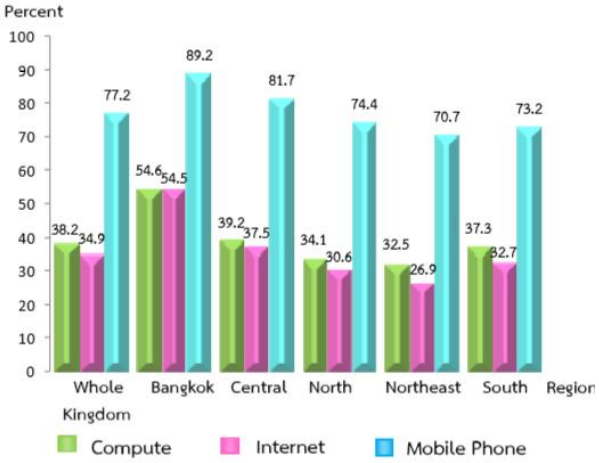

Figure 2: Percentage of population aged 6 years and over used computer, Internet and mobile phone by region

Figure 1 and 2 showed that number of people using smart phone were increased by measuring from increasing mobile phone number registration. Thailand had increasing trend from 2014(97.7 million telephone number registration) which were post-paid for 84.4 million number and pre-paid for 12.9 million number. This expand was affected from lower mobile equipment price and lower service price. Mobile signal and service center point were easy that home telephone service so it continuously increased registration telephone number and number of telephone user. Finally telephone number registration was more than population which has ration for 100 persons use phone for 145.8 persons. (Figure 3 and 4) (National Science and Technology Development Agency, 2558)

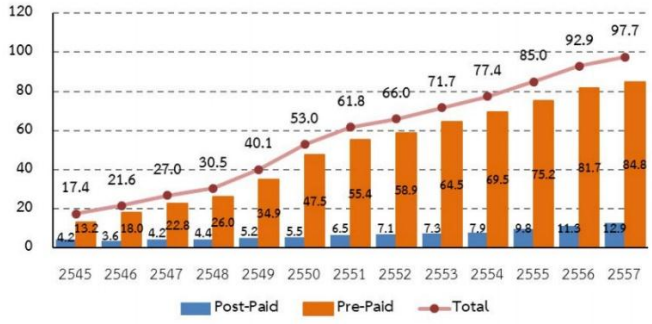

Figure 3: Display number of increasing mobile phone number registration year 2002 – 2014

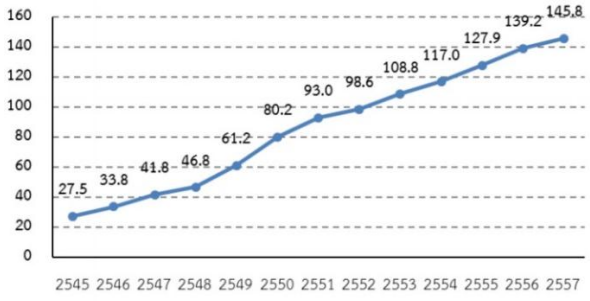

Figure 4: display percentage of population to access mobile phone year 2002-2014

As mentioned above smart phone were used for all gender, all age and were increased. People had to learn about how to use smart phone because of new version of smart phone launched rapidly and continuously. This research studied in information technology self-learning with smart phone in generation for 5 factors which were self-acceptance factor, influence factor, learning plan factor, readiness factor and environment factor because of each generation has their own learning style. This research would find about factors affecting information technology self-learning with smart phone in generation and self-learning development way with smart phone in generation.

Research Objective

1. To studied about factors affecting information technology self-learning with smart phone in generation.
2. To compared about factors affecting information technology self-learning with smart phone in generation.

Research Scope

This research studied information technology self-learning with smart phone in generation for 5 factors which were self-acceptance factor, influence factor, learning plan factor, readiness factor and environment factor.

Research Methodology

Population and Sample Group

1. Population size

This research population were Thai people in each region which were Bangkok metropolitan region (6 provinces), central region (6 provinces), east region (8 provinces), west region (6 provinces), north region (17 provinces), north east region (20 provinces) and south region (14 provinces).

2. Sample group

This research sample groups were Thai people of each region by multistage sample method and had step below.

1.Cluster sample was did random by brought province name in Thailand to group by geographic region. These regions were 6 regions and chose random to be 1 province of each region which were Chaingmai province for north region, Pranakornsri Ayuttaya province for central region, Chonburee province or east region, Supanburee province for west region, Khonkan province for north east region and Songkla province for south.

2. Because most people live in Bangkok metropolitan (Bangkok, Nontaburee and Patumtanee) so researcher chose sample by purposive sample method.

3.Sample data collection used accidental sample method to gather data until completed.

3. Data collection tools

Researcher defined research methodology which used quantitative research methodology. This quantitative research methodology was survey research by collected 840 questionnaires (120 questionnaires per region)

4. Analysis and analysis statistics

Researcher used Cronbach's Alpha Coefficient method to find reliability value of data analysis (α =0.82) which were descriptive statistics to explain general data of sample group. These statistics were frequency, percentage, mean, standard deviation and inferential statistics to tested hypothesis to compare. The statistics used t-Test for 2 group of independent variable and F-test for more 2 groups of independent variable with 0.005 statistics significant.

Research Result

There were 3 parts of this research presentation below.
Part number 1 Data of feather of sample group.
Part number 2 Data about factors affecting information technology self-learning.
Part number 3 Data comparing of Factors affecting information technology self-learning with smart phone in generation

Part 1 Feather of sample group

Feather of sample group were gender, generation group and hometown. These data were percentage of each sample group which show table 1-3 below.

Table 1
Display quantity and percentage by gender

Gender	Quantity (Persons)	Percentage
Male	400	47.62
Female	440	52.38
Total	840	100.00

Table 1 described that most sample group was female which more than male. The female percentage was 52.38 and male percentage was 47.62.

Table 2:
Display quantity and percentage by generation group

Generation	Quantity (persons)	Percentage
Generation X	273	32.50
Generation Y	285	33.93
Generation Z	282	33.57
Total	840	100

Table 2 described that most sample group was Y generation (33.93 percent), inferior was Z generation (33.57 percent) and X generation (32.50 percent).

Part 2 Data about factors affecting information technology self-learning

Data about factors affecting information technology self-learning was separated to be 5 sides which were self-acceptance factor, influence factor, learning plan factor, readiness factor and environment factor side and the details were in table 3-7 below.

Table 3
Displayed average value and standard deviation value for self-acceptance factor affecting information technology self-learning. (N = 840)

Self-acceptance factor affecting information technology self-learning	Mean	SD.	Description
1. You thought that information technology learning was importance and infinity.	4.57	0.63	Most
2. You agreed about "No one too old to learn especially learning about information technology learning in smart phone"	4.47	0.68	High
3. You believed that you could learn information technology learning in smart phone by yourself.	4.18	0.80	High
4. You were one person who firmly learned information technology learning in smart phone although it was new technology or did not familiar.	4.02	0.93	High
5. You were one person who liked trial and error with using information technology in smart phone.	4.07	0.92	High
6. You liked to solve problem about information technology self-learning with smart phone more than consulted with another person.	3.96	1.01	High
7. You had expertly skill to search new data of information technology from smart phone.	4.04	0.93	High
Total	4.19	0.64	High

Table 3 found that most in sample group had opinion about self-acceptance factor affecting information technology self-learning to be high value of attitude (average 4.19). When we considered in each topics, we found that the most value (average 4.57) was "Information technology learning was importance and infinity". The inferior three were "No one too old to learn especially learning about information technology learning in smart phone" sentence, "You could learn information technology learning in smart phone by yourself" sentence and "You were one person who liked to always trial and error with using information technology in smart phone" sentence(The inferior averages were 4.47, 4.18 and 4.07)

Table 4
Display average standard deviation value of influence factor affecting information technology self-learning (N = 840)

Influence factor affecting information technology self-learning	Mean	SD.	Description

1. You were one person who wanted to learned information technology from smart phone	4.24	0.85	High
2. You used your self-ability to learned information technology from smart phone.	4.19	1.66	High
3. You thought that information technology from smart phone was whole life learning and infinity learning.	4.31	0.84	High
Total	4.25	0.86	High

Table 4 described that mast in sample group had opinion about influence factor affecting information technology self-learning to be high value of attitude (average 4.25). When we considered in each topics, we found that the most value was "information technology from smart phone was whole life learning and infinity learning" (The average value was 4.31). The inferiors were "You were one person who wanted to learned information technology from smart phone" and "You used your self-ability to learned information technology from smart phone" (The inferior average values were 4.24 and 4.19).

Table 5
Displayed average value and standard deviation value of learning plan factor affecting information technology self-learning (N = 840)

Learning plan factor affecting information technology self-learning	Mean	SD.	Description
1. You were person who like to learn information technology from smart phone of each time.	3.92	0.73	High
2. You intended to develop your ability about information technology self-learning in first step.	4.10	0.88	High
3. Every time when you used information technology from smart phone, you properly managed your time to learn of each time.	3.93	0.94	High
4. Sometime you wanted help from other people to tough information technology using from smart phone until success in learning.	4.02	0.66	High
5. Sometime you wanted help from other people to tough information technology using from smart phone until success in learning.	4.02	0.66	High
6. You usually estimated your ability after learned information technology using from smart phone of each time to develop to expand your learning in next time.	3.88	0.98	High
7. If other people estimated your ability of information technology using from smart hone, you felt that you achieve about this learning development.	4.05	0.91	High
Total	3.98	0.79	High

Table 5 described that most in sample group had opinion about learning plan factor affecting information technology self-learning to be high value of attitude (average 3.98). When we considered in each topics, we found that the most value was "You always intended to develop your ability about information technology self-learning in first step" (average value 4.10). The inferiors were "If other people estimated your ability of information technology using from smart hone, you felt that you achieved about this learning development" and "Sometime you wanted help from other people to tough information technology using from smart phone until success in learning" (The inferior average values were 4.10 and 4.02).

Table 6
Display average value and standard deviation value about readiness factor affecting information technology self-learning (N = 840)

Readiness factor affecting information technology self-learning	Mean	SD.	Description
1. You were person who had readiness in body and eye to use information technology from smart phone.	4.15	0.90	High
2. You felt fun and happy to use information technology from smart phone.	4.29	0.85	High

3. You thought that you had creative idea for information technology using from smart phone in each time.	4.02	0.92	High
4. You principally used information technology from smart phone which not repetitiously used or not uselessly used.	4.16	0.88	High
Total	4.16	0.72	High

Table 6 described that most in sample groups had readiness factor affecting information technology self-learning to be high attitude value (average 4.16). When we considered in each topics, we found that the most value was "You felt fun and happy to use information technology from smart phone" (average value 4.29). The inferiors were "You principally used information technology from smart phone which not repetitiously used or not uselessly used" and "You were person who had readiness in body and eye to use information technology from smart phone" (The inferior average values were 4.16 and 4.15).

Table 7
Described average value and standard deviation value for environment factor affecting information technology self-learning (N = 840)

Environment factor affecting information technology self-learning	Mean	SD.	Description
1. You had a free to used information technology from smart phone by without any permission from another person.	4.48	0.76	High
2. Information technology using from smart phone in private area was more reinforce than public area.	4.20	0.89	High
3. Moral support from people around was a part to push you to learn more information technology from smart phone.	3.96	1.04	High
4. Time period for information technology self-learning was time staying alone.	4.30	0.85	High
5. Friend or around social was part to activated you to must learned information technology self-learning.	4.16	0.91	High
Total	4.22	0.67	High

Table 7 described that most in sample groups had readiness factor affecting information technology self-learning to be high attitude value (average 4.22). When we considered in each topics, we found that the most value was "You had a free to used information technology from smart phone by without any permission from another person" (average value 4.48). The inferiors were "Time period for information technology self-learning was time staying alone" and "Information technology using from smart phone in private area was more reinforce than public area" (The inferior average values were 4.30 and 4.20)

Part 3 Comparison data about Factors affecting information technology self-learning with smart phone in generation

Comparison about Factors affecting information technology self-learning with smart phone in generation would compared 2 topics which were gender and generation. Table 8-9 were the details

Table 8
Compared factors affecting information technology self-learning with smart phone by gender (N = 840)

Factors affecting information technology	Gender	Mean	SD.	t-Test
Self-acceptance	Male	4.20	0.67	0.79
	Female	4.18	0.62	
Influence	Male	4.26	0.61	0.43*
	Female	4.23	0.84	
Learning plan	Male	4.03	0.67	0.54*
	Female	3.95	0.80	
Readiness	Male	4.23	0.70	0.55
	Female	4.11	0.73	
Environment	Male	4.22	0.70	0.67
	Female	4.22	0.65	
Total	Male	4.19	0.65	0.77

	Female	4.14	0.60	

* p <0.05

Table 8 described that factors affecting information technology self-learning with smart phone in sample group of male gender and female gender found that there was difference between gender with value of 0.05 statistics significant for influence and learning plan factors but there was no difference between gender with value of 0.05 statistics significant for self-acceptance, readiness and environment factors.

Table 9:
Compared Factors affecting Information Technology Self-Learning with Smart Phone in Generation (N = 840)

Generation	Mean	SD.	F-Test
1. Self-acceptance factor affecting information technology self-learning			
Generation X	4.20	0.68	0.51*
Generation Y	4.24	0.61	
Generation Z	4.12	0.62	
2. Influence factor affecting information technology self-learning			
Generation X	4.25	0.81	0.32*
Generation Y	4.32	1.04	
Generation Z	4.16	0.69	
3. Learning plan factor affecting information technology self-learning			
Generation X	4.01	0.78	0.16*
Generation Y	3.97	0.71	
Generation Z	3.98	0.88	
4. Readiness factor affecting information technology self-learning			
Generation X	4.19	0.73	0.60
Generation Y	4.15	0.73	
Generation Z	4.12	0.70	
5. Environment factor affecting information technology self-learning			
Generation X	4.25	0.69	0.40
Generation Y	4.20	0.66	
Generation Z	4.21	0.66	

*p< 0.05

Table 9 described that self-acceptance, influence and learning plan Factors affecting information technology self-learning with smart phone in generation were difference with 0.05 statistics significant value but readiness and environment factors were not difference with 0.05 statistics significant value.

Conclusion

Self-acceptance, influence and learning plan factors affecting information technology self-learning with smart phone in generation were difference because X generation had their own thinking and own working style as standalone working style without consult with another person (O'Bannon, 2001). X generation had open mind thinking, accepted all comments to improved and developed them self but did not ready to accepted new technology. If they believed, it must come from their proof (Steve, 1995). Y generation growth with computer and technology. This generation just started working. They liked to showed off and high self-confident (Stock, 2008). They did not confine and did not like any conditions. They wanted clear working to affect themselves and their working sector. Moreover they could work about communication and multi-working in same time (Solomon, 2009). They did not like to be control by any one and had their self-confident. Z generation involved more new technology (YagbalaKapil, Anuja Roy, 2014). If there was class room with technology activity and had competition award, this Z generation people would motivated to more learn. This Z generation people did not like to study in explanation style but they liked chart data, picture and clear statistics with short sentence, easy to understanding because they could remember data as well of short data with streaming online data (Geck, C., 2006). Especaily Z generation had ability to use more technology and high self-freedom. They had their own way, difference from another person and did not want to be same of another person (Jeremy Finch, 2015)

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