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A Comparison Study of Inspector's Performance between Regular and Complex Tasks

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***Abstract*—**This research was to study a comparison of inspector's performance between regular and complex visual inspection task. Visual task was simulated on DVD read control circuit. Inspection task was performed by using computer. Subjects were 10 undergraduate randomly selected and test for 20/20. Then, subjects were divided into two groups, five for regular inspection (control group) and five for complex inspection (treatment group) tasks. Result was showed that performance on regular and complex inspectors was significantly difference at the level of 0.05. Inspector performance on regular inspection was showed high percentage on defects detected by using equal time to complex inspection. This would be indicated that inspector performance was affected by visual inspection task.

***Keywords*—**Visual inspection task, Regular and complex task.

I. Introduction

AT the present, there are many competitive to the market to keep customer's satisfaction [1]. This would enforce company to have successful inspection on products. The best way to do this is 100 percent inspection to detect defects on product before reaching to customer. In this situation, visual inspection has become play significant role on inspected product. Visual inspection has composed of two significant categories, which are visual search for defect and decision making. Visual search is inspector looked for defect and compared to standard while decision making is that inspector has to make judgment to reject or not reject the product [1]. Therefore, this would be indicated that if inspector does not have the experience, the bad product could be passed to external customers. Even though the 100 percent on inspection, it could not be guarantee that bad product would be detected. In order to improve inspector performance, training is one of the best ways to be used [2, 3]. Training strategy would enhance the inspector on skill in speed and accuracy in a short time [4]. As it known that visual search have two major categories on search and decision making. However, the performance of inspector have involved in other factors such as task and search strategies. Types of task affected inspector performance due to physical or mental workloads. To study on this effect, this research was set the situation on visual inspection for regular and complex visual inspection tasks. In this research, the computer based training (CBT) has become factor that use for inspection. The advantages of CBT are high performance of technology and inexpensive devices [4]. Moreover, CBT could be used for training any place and any time on unlimited number of inspectors as long as they have enough devices [5]. The inspection task on this research was set on regular and complex tasks. Complex task is inspection several task under the same time provided on regular task. This situation was to study the mental workload affected inspector performance. Therefore, the purposes of this research were to study (1) inspector performance on complex task, and (2) comparison inspector performance between regular and complex task. The hypothesis was that task complexity has affected on inspector performance.

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II. Research Methodology

A. Subject

Ten undergraduate subjects were randomly selected and tested for 20/20. They were equally divided on performance into two groups (control and treatment groups) and were provided information before running the experiment. Control group was inspected regular task which is inspecting one product while treatment group was asked to inspect three products but equal number of tasks and time.

B. Stimulus Material

The experiment was run by using computer Pentium IV, 1.5 GHz ram 512 MB with 17 inch monitor. The example of screen capture was showed in Fig. 1

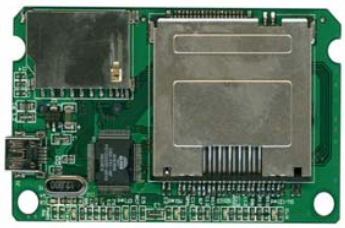
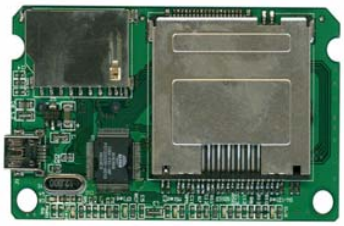
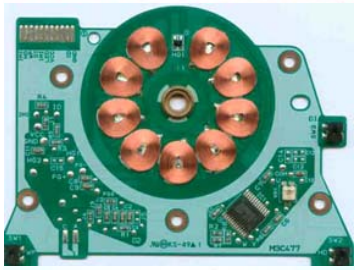
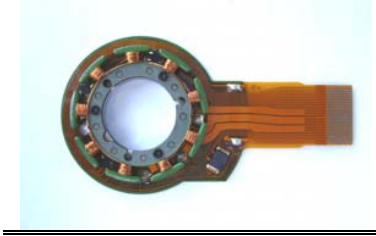
C. Visual Task

Visual inspection task was simulated on electronic devices of DVD read control circuit. Both regular and complex simulated tasks were showed in Table I. Defects of regular and complex tasks were developed on IC contract, IC loss, circuit line loss, chip leg loss, brazing defect I, brazing defect II, brazing loss, IC misaligned component, chip misaligned component, and over component as shown in Table II.

D. Experiment Design

The experiment was run on two groups between regular and treatment (complex) groups. There were sixty DVD read control circuit on each experiment, which were 15 tasks of each of the following: perfect task, single defect, two defects and several defects. Subject was asked to perform inspection task and DVD read control circuit were randomly showed to inspectors.

TABLE I
EXAMPLES OF REGULAR AND COMPLEX STIMULUS TASKS

Figures	Defect types
	Regular task
	Complex task I
	Complex task II
	Complex task III

E. Procedure

The steps on running experiment were as following:

1. Day 1 subjects were provided preliminary information,
2. Day 2 subjects asked to perform test. Subjects who passed the test at least 60 percent of defects detected were randomly divided into two groups,
3. Day 3 both groups were asked to perform the inspection test on DVD read control circuit. Treatment group was performed on three different tasks, but control group was performed only one task. Both groups were performed same number of task and time.

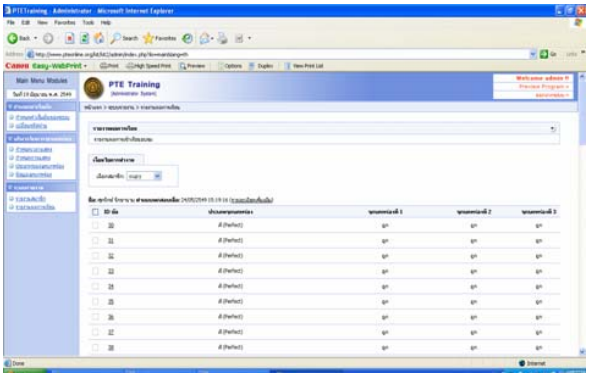
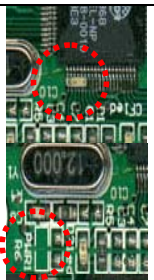
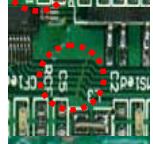
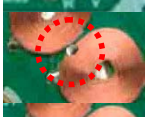
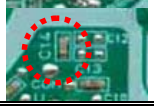


Fig. 1 Sample of defect display for computer programming

TABLE II
DEFECT EXAMPLE OF REGULAR AND COMPLEX STIMULUS TASKS

Defects	Defect types
	IC contract
	IC loss
	Circuit Line loss
	Chip leg loss
	Brazing defect I
	Brazing defect II
	Brazing loss
	IC Misaligned component
	Chip Misaligned component
	Over component

F. Data Correction

Data was collected on performance measure, which is percent defects detected.

III. Results

A. Performance Measures

The result on pilot study used to divide subjects into two groups was showed in Fig. 2. It was seen that before running experiment subjects were having the same performance.

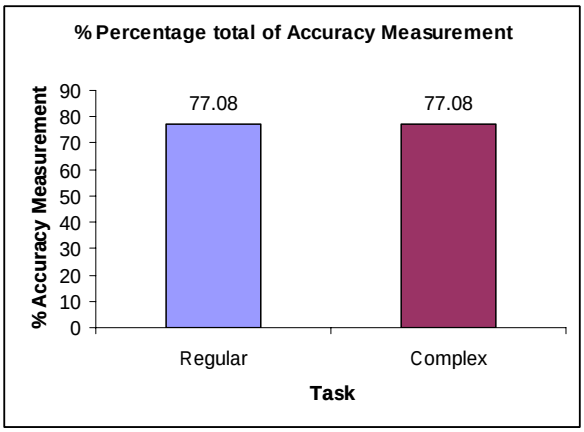


Fig. 2 Subject performance on two groups before running experiment

The result of difference between regular and complex tasks on percent defect detected as shown in Table III. It was showed significantly different between regular and complex tasks at the level of 0.05. This indicated that tasks were affected on inspector performance.

TABLE III
Analysis of Inspector Performance

Paired Samples Test				
	Paired Differences		t	P-value
	Mean	SD.		
Regular-complex	11.2	8.526	2.93	0.043

P < .05

Fig. 3 showed the comparison of inspector performance on percent defect detected. From the graph, it was cleared that inspectors inspected only one task has higher performance that inspector inspected several tasks even though they was spent the same time and inspected same number of tasks.

Table IV shows the effect of tasks on inspector performance. From the table, the results have indicated that there was not different on task affected to inspector performance. This means that all three different products din not affect on inspector performance.

Fig. 4 showed the comparison of inspector performance on percent defect detected of complex task. From the results, it was cleared that task types were not affect on inspector performance.

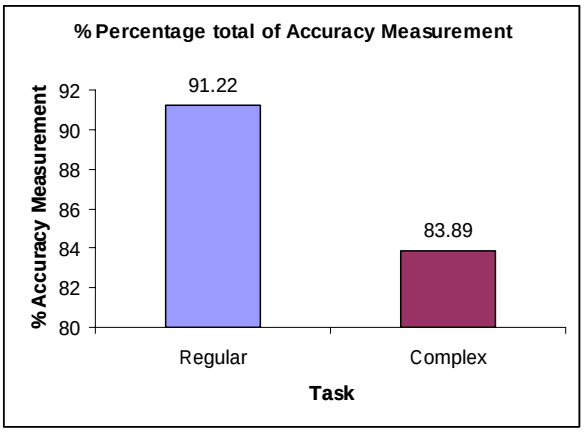


Fig. 3 Comparison of inspector performance on tasks

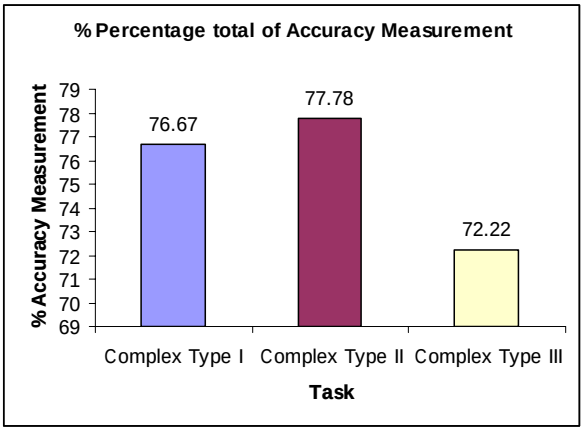


Fig. 4 Inspector performance on complex tasks

TABLE IV
Analysis of Inspector Performance on Complex Task

ANOVA					
Sources	Sum of Squares	d.f.	Mean Square	F	P -value
Complex Task	12.4	2	6.2	0.497	0.620
Errors	149.6	12	12.4		
Total	162	14			

P > .05

IV. Discussion and Conclusion

As the results, it was indicated that inspector performance on the regular task was performed significantly different better than the complex task at the level of 0.05. This indicated that if companies want to have better inspector, they should give inspector to inspect on regular task. As seen in Fig. 3, percent defect detected on regular task was higher than complex task. This indicated that complex task has an effect on inspector performance. The results on complex task when it was compared on performance. This founded that inspector performance in inspecting different tasks was not significantly different at the level of 0.05. This indicated that task complexity has no effect on inspector as seen in Fig. 4.

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