**ORIGINAL ARTICLE**

# ACTIVE VOICE VS. PASSIVE VOICE: EFFECTS OF INSTRUCTION COMMAND OF MACHINE'S VIDEO TUTORIAL ON LEARNING PERFORMANCE

*Ahmad Ridzuan MOHD ZUBER[1], Ammar ADNAN[1], Radin Zaid RADIN UMAR[2], Siby SAMUEL[3], Norhashimah MOHD SHAFFIAR[1], Mohd Hanafi ANI[1], Malek HAMID[1,*]*

*[1]Department of Manufacturing and Materials Engineering, Faculty of Engineering, International Islamic University Malaysia, Kuala Lumpur, Malaysia*
*[2]Faculty of Manufacturing Engineering, Universiti Teknikal Malaysia Melaka, Melaka, Malaysia*
*[3]Department of System Design Engineering, University of Waterloo, Ontario, N2L 3G1, Canada*
*[*] Corresponding Author: abdmalek@iium.edu.my*

## ABSTRACT

*Video tutorial is one of the best media for teaching and learning. It can be applied in numerous fields of studies such as medical, computer sciences, as well as an engineering field as to give an instruction on how to use appliances, devices, or systems. The use of video tutorial captions, the voice of command of instruction, the quality of the video and the system used are among the contributing factors for the success or failure of a video tutorial. However, it is unknown if the type of voice of command may aid in improving the learning performance of video tutorial of engineering machinery. The objectives of the study are: (i) to evaluate the effect of active and passive voice as the command of instruction on the machine's video tutorial on learning performance of the video tutorial; and (ii) to evaluate the effect of active and passive voice as the command of instruction on the safety, equipment, and procedure part of machine's video tutorial on learning performance of the video tutorial. Sixteen participants were recruited and randomly assigned into two different groups, namely Active and Passive. The Active group and Passive group were stimulated with four video tutorials that used an active voice and passive voice respectively. After the video tutorial, a participant was assessed with a quiz that covered the content of the tutorials. The finding shows that there is a significant difference in the learning performance for Active group (M=33.687, SD=3.891) and Passive group (M=24.625, SD=6.507) conditions; t (8) = 3.381, p = 0.004. In the safety and procedure part of the video tutorial, the findings also show a significant difference. In safety criteria; Active group (M=2.156, SD=0.376) and Passive group (M=1.234, SD=0.618) conditions; t (8) = 3.605, p = 0.003. In procedure criteria, Active group (M=4.234, SD=0.528) and Passive group (M=3.016, SD=1.095) conditions; t (8) = 2.836, p = 0.018. While for the equipment criteria, there is no significant different in the scores for Active group (M=2.031, SD=0.485) and Passive group (M=1.906, SD=0.400) conditions; t (8) = 0.562, p = 0.583. The results from this study provide additional information regarding the use of active voice in command of instruction for video tutorial is better in improving learning performance in general, particularly for engineering machinery.*

***Keywords**: Active Voice, Passive Voice, Video Tutorial, Learning Performance*

## INTRODUCTION

Video tutorial is a visual recording of step-by-step instructions that can be referred to by people to complete a certain designated task. It is a visual translation of well-prepared written instructions into choreographed actions that produce the desired results. The use of video tutorials commonly helped in facilitating the teaching and learning processes of a subject in class. Majority of students and facilitators considered that video triggers could help the students to develop their clinical reasoning and observational power (Chan et al., 2010). Besides that, it also helps in learning to operate new technology. According to Ellington and Hardin (2008), video tutorials were developed to cover the technical skills of students who need to successfully run the software system.

Nowadays, there are many sources of video tutorials available online. This kind of online tutoring was introduced as a need for a regular classroom and laboratory instructions. The method focused on instructor demonstrations and skill in overcoming critical thinking (Yi, Swenson, & Lents, 2012). One of the most popular video sharing platforms was YouTube, which provides different genres for the user and it also contains tutorial videos and lectures in many fields (Kawano et al., 2011). Moreover, there are few specialized websites with thousands of user-made 'How to' videos (van der Meij, 2014).

Based on He, Swenson, and Lents (2012), video tutorial is an effective way to help students in controlling their learning independently. It provides the user with an easy to follow model because the user can imitate the action performed (van der Meij, 2014). Moreover, the video is designed to force students to analyze the problem qualitatively and spend time deciding why certain principles of physics are appropriate (Singh, 2004). Video triggers seem to possess many features that are lacking in paper cases and may make them superior to paper cases as triggers (Chan et al., 2010). Showing

instructions through video presentations can strengthen the auditory and visual information as well as overcoming the processing demand with a single modality ((Clark & Pavio, 1991); (Paivio, 1990))Furthermore, it is helpful in studying, as it can be a supplement in learning a difficult concept and skills (He, Swenson, & Lents, 2012).

Using a video tutorial to give instruction can be difficult if the command of instruction is hardly understood by the user. Therefore, the type of voice command used is important to ensure the information can be understood clearly. In the English language, there are two forms of verbs, the active and passive voice ((Huddleston, 2005);(Harmer, 1983)). The active voice is defined as the normal voice. It is used when giving commands or instructions. A command is a kind of active sentence in which a person is being ordered to perform the action in the active voice ((Huddleston, 2005);(Harmer, 1983)). Usually, active voice is used for most of the non-scientific writing. It makes the meaning clearer for readers, which also prevents complicated sentences. Even in scientific procedures, too much use of passive voice can blur the meaning of the sentences (Toadvine, Brizee, & Angeli, 2012). While for passive voice, it requires more words and structurally more complex compared to active voice (Turner, 1967). For this kind of voice, the subject receives the action of the verb and the object of the active verb becomes the subject of the passive verb. Because passive voice sentences necessarily add words and change the normal doer-action-receiver of action direction, they may make the reader work harder to understand the intended meaning ((Huddleston, 2005);(Harmer, 1983)).

However, in an engineering field, there are no specific information about the type of voice – active or passive – that is preferred to be used as the command of instructions on machine operation via video as the medium of learning. In addition, in the field of engineering, there is no prevalence study on video tutorials that conclude the most preferable type of voice – active or passive on the user's learning performance while operating the machine.

The aim of the project is to evaluate the effect of voice command instruction of the machine's video tutorial on learning performance. In order to achieve the aim, the following objectives were identified: (i) to evaluate the effect of active and passive voice as the command of instruction on the machine's video tutorial on learning performance of the video tutorial; (ii) to evaluate the effect of active and passive voice as the command of instruction on the safety, equipment and procedure part of machine's video tutorial on learning performance of the video tutorial.

## METHODS

*Participants*

Sixteen participants between 19-20 years of age completed the study. They are undergraduate students from the Faculty of Engineering at the International Islamic University Malaysia (IIUM). Only engineering students were considered in this study. This was to ensure that they have similar basic knowledge on machining operations. Besides that, the chosen participants also have never taken the Workshop Technology courses offered by the faculty - to control the level of familiarity of the machinery operation among participants. Ethnic background, first language, and minority status were not considered in the study.

*Apparatus and Stimuli*

Machines: Only machines that were included in Workshop Technology courses were used. The machines were categorized into four categories and one machine was selected for each category for the study: (i) material removal machinery (Lathe machine – Figure 1); joining material machinery (Arc Welding – Figure 2); programming or software based machinery (CNC Milling machine – Figure 3); and hand tool process (Benchwork workspace – Figure 4).

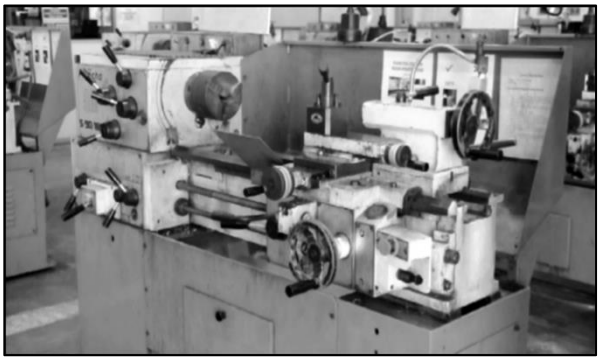

**Fig. 1 Lathe machine**

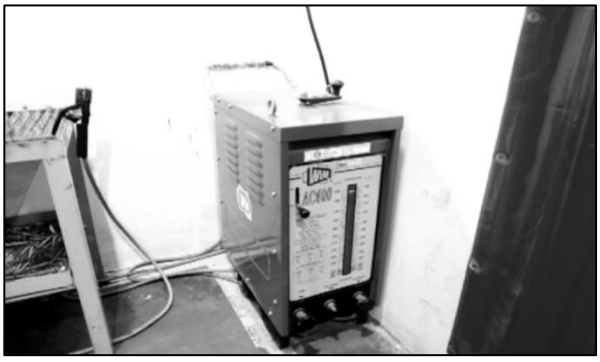

**Fig. 2 Arc welding machine**

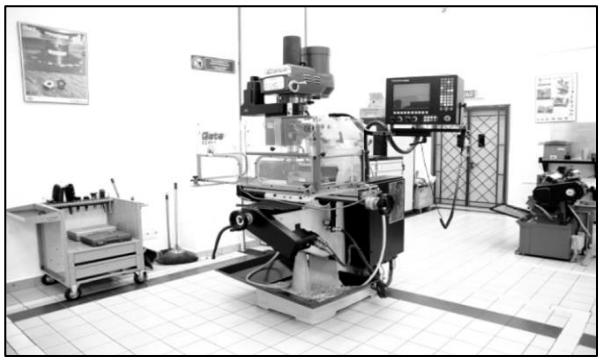

**Fig. 3 CNC milling machine**

**Fig. 4 Bench Work Workspace**

Video Tutorials: Four video tutorials were developed – one for each machinery category mentioned above. The development process included was the preparation of the initial video, verification of the initial video, and preparation of the final version of the video.

Preparation of the initial video: Three criteria – safety precautions of the experiment, equipment used in the experiment, and the procedure of the experiment – were considered in the preparation of the video tutorials. In the safety precaution of the experiment, all safety precautions to be practiced in the experiment were addressed. For example, in the Lathe machine, switch for spindle rotation need to be activated correctly for user safety (Figure 5 below). In the equipment used in the experiment, the tools used in the experiment were familiarized. For instance, in bench work experiment, Vernier calliper, threading tools, and L-block were introduced (Figure 6 below). Lastly, in the procedure of the experiment, step-by-step procedures of the experiment were explained.

**Fig. 5 Switch for spindle rotation of Lathe**

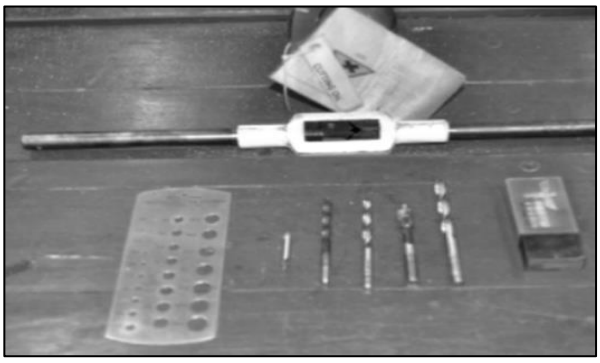

**Fig. 6 Tools in bench work machining operation**

Verification of the initial video: The initial videos prepared were verified so that its content is parallel with the manual handbook of the experiments. This was done by getting verifications from several experts who included the workshop coordinator, workshop engineer, workshop technicians, and workshop demonstrators. In addition, the script for the videos was also proof-read for language verification. In the language verification, the aspects included were the tense used, grammar, and the sentences of the caption.

Preparation of the final version of the video: The final version of the video tutorials was made based on the comments and recommendations during the verification process.

Laptop: Acer Aspire laptop was used to play all the videos. The same laptop was used throughout the experiment to maintain the quality of the video tutorials.

Headphone: Beats by Dr Dre – was used. The headphone was used to minimize the environment noise. Additionally, the sound quality of the video tutorials was also maintained throughout the experiment.

Quizzes: Four sets of quizzes (pen and pencil) – each for Lathe machine, Arc welding, CNC milling, and Bench Work – was designed and administrated immediately after the video tutoring session. Each set of quizzes consist of three focused criteria – safety, equipment, and experimental procedures. Three students from the Ergonomics Laboratory were served as the

pilot to test the designed quizzes. This was done so that the format of the instructions and what participants needed to do was clearly understood.

Administrative forms: Participant details form and payment voucher were used in the experiment. Participant details forms were used to record details of the participant, e.g. demographics grouping, and experimental details. Other than that, a payment voucher was used to record the compensation made to the participants.

*Design of the Study*

The experiment was conducted on Monday, Tuesday, Wednesday, Thursday, and Friday. Weekends were excluded to avoid any potential factoring effect on the participant performance (i.e. the lifestyle of the participants would be different. Thus, a different performance may be shown). The time the experiment conducted was between 2:00 p.m. to 5:00 p.m. This is to ensure that the level of comprehension was similar.

Video Tutorial Counterbalancing: The video tutorials were arranged such that sequencing of the videos stimulated was counterbalanced. In this experiment, there were four video tutorials used – Lathe Machine, Arc Welding, CNC Milling, and Bench Work. Therefore, in order to minimize the effect that the ordering of video tutorials might have in the experiment, a Latin Square was used to counterbalance the four videos. The videos were labelled as A, B, C, and D for Lathe Machine, Arc Welding, CNC Milling, and Bench Work respectively. The arrangement of the videos tested is shown in Table 1 below. In explanation, as can be seen in Table 1, for each group – Active and Passive, the first video tested on the participants were different – i.e. two participants received Lathe machine (labelled as A) as the first video, and then was followed by other three videos. The same explanation applied to the second, third, and forth videos tested.

**Table 1 Latin Square for counterbalancing of the videos used in the experiment**

| Group | Participant | Video Arrangement | | | |
|---|---|---|---|---|---|
| | | 1st Video | 2nd Video | 3rd Video | 4th Video |
| Active | 1 | A | B | D | C |
| | 2 | B | C | A | D |
| | 3 | C | D | B | A |
| | 4 | D | A | C | B |
| | 5 | A | B | D | C |
| | 6 | B | C | A | D |
| | 7 | C | D | B | A |
| | 8 | D | A | C | B |
| Passive | 1 | A | B | D | C |
| | 2 | B | C | A | D |
| | 3 | C | D | B | A |
| | 4 | D | A | C | B |
| | 5 | A | B | D | C |
| | 6 | B | C | A | D |
| | 7 | C | D | B | A |
| | 8 | D | A | C | B |

*Procedure*

At the beginning of the experiment, a participant was asked to fill up the demographic part of the participant form. Then, the participants were randomly assigned into either the Active group or Passive group. In addition, the experimental procedure was also briefed to the participants. Then, a participant completed the video tutorial session that followed by the quiz session.

Video Tutoring Session: Participant was equipped with a headphone, and then, they were monitored to watch the videos with the arrangement that followed the experimental design. This completed the first phase of the experiment.

*Quiz Session*

Immediately after the first phase was completed (video tutoring session), a participant was given a set of quizzes. They were given 20 minutes to answer the quizzes. After completing the quiz session, participant filled out a payment voucher and was compensated MYR 15 for completing the experiment session.

*Variables and Hypotheses*

Dependent Variable 1: Percentage of the score on the quizzes (overall). The quizzes consist of four sections – one section for each machine. In each section, there were three parts of criteria – safety, equipment, and experiment procedures – were evaluated. The maximum score for each part was 10 points. Thus, the total mark for the quizzes was 40 points.

Hypothesis 1: Passive group will score less (a smaller percentage of the total score) on the quizzes rather than the Active group because the instruction of the machining operation will be better with the active voice. This is due to the active voice is better in explaining details and proving facts or information (Yannuar et al., 2014).

Dependent Variable 2: Percentage of the score on the quizzes (by criteria; safety, equipment and procedure). The maximum score for each part was 10 points.

Hypothesis 1: Passive group will score less (a smaller percentage of the score) on the safety's questions rather than the Active group because, in the safety part of the video tutorials, only short sentences were used. Passive voice can lead to a poor method because it does not stress action and hides the agent doing an action (Beason and Lester, 2003).

Hypothesis 2: Passive and Active group will score similar (a similar percentage of the score) on the equipment's questions because in the equipment part of the video tutorials, only the name of the

equipment was introduced – i.e. there are no sentences for comprehension purpose.

Hypothesis 3: Passive group will score less (a smaller percentage of the score) on the machining operation procedure's questions rather than the Active group because, in the machining operation procedures part of the video tutorials, only simple instruction sentences were used. Passive voice can lead to a poor method because it does not stress action and hides the agent doing an action (Beason and Lester, 2003).

## RESULTS

*The effect of active and passive voice of video tutorial on learning performance (overall)*
Figure 7 (on the next page) shows the comparison of the effectiveness of active and passive voice of machine's video tutorials on learning performance. Overall, by comparing the total score of the quizzes, the percentage score of learning performance by Passive group (61.56%) is lower than the Active group (84.22%). The data was further analyzed by using SPSS software (version 23). Independent Sample T-Test model was utilized because there are only two variables being compared, and the participants of the Active and Passive group were independent to each other – i.e. different participant (Barret et al., 2013). The output of the model given that there was a significant difference in the scores for Active group (M=33.687, SD=3.891) and Passive group (M=24.625, SD=6.507) conditions; t (8) = 3.381, p = 0.004. These results suggest that different type of voice in video tutoring does have an effect on learning performance of the machine's video tutoring. Specifically, when an active voice was used as the command for instruction, the learning performance of the machine's video tutoring increases.

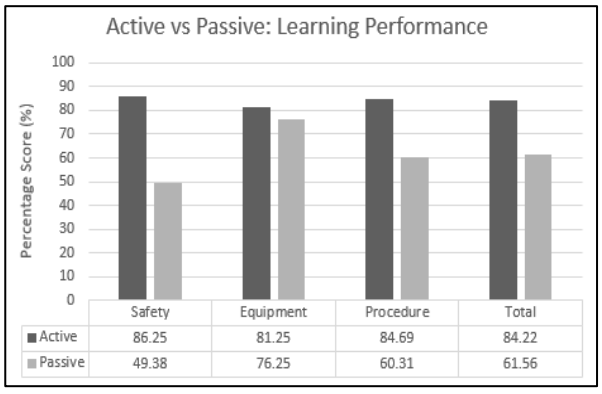


**Fig. 7 Comparison of percentage score of active and passive voice of video tutorial on learning performance**

*The effect of active and passive voice of the video tutorial on learning performance based on the criteria – safety, equipment, and procedure.*

In general, comparing the scores of the quizzes by the criteria – safety, equipment, and procedure, learning performances of the Passive group is less than the leaning performance of the Active group in all criteria. On average, the Passive group; scored less (49.38%, lower percentage of score) than the Active group (86.25%) in safety criteria; in equipment criteria, Passive group scored less (76.25%) than the Active group (81.25%); lastly, passive group score is also less (60.31%) than the Active group (84.69%) in procedure criteria. Figure 8 below depicts the mean score of the Active and Passive group based on safety, equipment and procedure criteria.

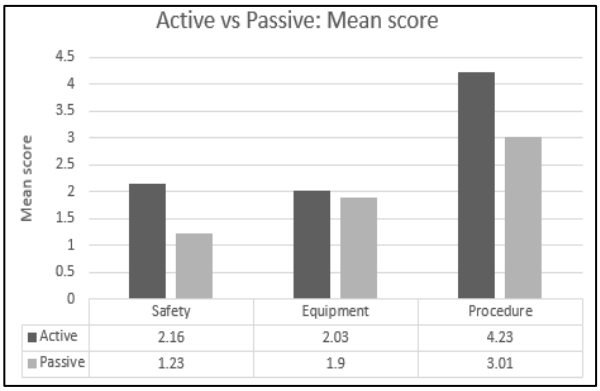


**Fig. 8 Comparison of the mean score between active and passive voice**

In safety criteria, the Independent T-test model reveals that the was significant different in the score for Active group (M=2.156, SD=0.376) and Passive group (M=1.234, SD=0.618), conditions; t (8) = 3.605, p = 0.003. Similarly, in the procedure criteria, the statistical analysis reveals that there was a significant different in the score for Active group (M=4.234, SD=0.528) and Passive group (M=3.016, SD=1.095) conditions; t (8) = 2.836, p = 0.018. These results suggest that for the safety and procedure part of the video tutorial, a different type of voice in the video tutoring does have an effect on learning performance of the machine's video tutoring. Specifically, the result suggests that when an active voice was used as the command for instruction for safety and procedure part of the video, the learning performance of the machine's video tutoring increases.

On the other hand, for the equipment part of the video tutorial, there is no significant difference in the scores for Active group (M=2.031, SD=0.485) and Passive group (M=1.906, SD=0.400) conditions; t (8) = 0.562, p = 0.583. These results suggest that different type of voice in the equipment part of the machine's video tutoring does not have an effect on learning performance of the machine's video tutoring. Specifically, the result suggests that whether an active or passive voice was used as the command for instruction,

the learning performance of the machine's video tutoring would be similar.

## DISCUSSION

*The effect of active and passive voice of video tutorial on learning performance*

The overall percentage of learning performance for Passive group is worst (61.56%) than the Active group (84.22%). This finding gives insight on the use of different types of voice command instruction via video tutorial on the learning performance. Through this finding, it shows that active voice provides a clear and better understanding as it does not involve complex sentences, on the other hand, passive voice is considered more complex as it involves more sentences. Thus, making the meaning takes a longer time to be interpreted or to understand fully. A study by Hinkel (2004) and Espinoza (1997) indicate that, the used of passive voice, especially to the non-native speaker of English is quite difficult to fully grasp. Besides that, using passive voice can lead to a terrible approach, as it does not emphasize the action and hides the agent doing the action (Beason and Lester, 2003). This finding is in parallel with Yannuar et al., (2014) who stated that active voice is more convenient in delivering information, thus, improving the learning performance.

The better performance of the Active group compared to Passive group shows that the use of active voice is more familiar. In addition, it proves that to convey information in which the focus is not only on the process, active voice is commonly used (Ahmad, 2012). It enables for the clarification of meaning, emotional association and more ways to engage with the readers, which in this case the participants (( (Ahmad, 2012); (Hyland, 2005)).

*The effect of active and passive voice of the video tutorial on learning performance based on the criteria – safety, equipment, and procedure.*

Table 2 below summarizes the findings of the effect of active and passive voice of the video tutorial on learning performance based on the criteria – safety, equipment, and procedure.

**Table 2 Finding by criteria**

| Criteria | Mean Score (Which one is better?) | Significant Different |
|---|---|---|
| Safety | Active group | Yes |
| Equipment | Active group | No |
| Procedure | Active group | Yes |

In terms of the criteria, the Active group performed better than the Passive group based on the safety and procedure criteria. There were significantly different. Through the video tutorial, both criteria stress more on the action need to be taken. For instance, in the safety part, on and off switch for the machine need to be activated correctly for user safety. Also, a user must wear a goggle before conducting the experiment. In addition, for the procedure part, the step by step use of the machines was explained. As stated by Yannuar et al., (2014), active voice is better to help deliver information when the emphasized is more on the action. However, for equipment criteria, Active group performed just slightly better (almost similar) than the Passive group. As expected, there is no significant difference in this criteria because only the names of the equipment were introduced – i.e. there are no sentences for comprehension purpose. In other words, in this part of the video, the voice used cannot be classified as an active or passive voice.

## CONCLUSION

As a conclusion, the current study found that the use of active voice for command instructions in video tutorial (for engineering machinery) increase learning performance when compared to passive voice. For learning performance, in overall, there was a significant difference in the learning performance between the Active group ($M=33.687$, $SD=3.891$) and Passive group ($M=24.625$, $SD=6.507$) conditions; $t(8) = 3.381$, $p = 0.004$. For the criteria, safety and procedure shows a significant different. Safety; Active group ($M=2.156$, $SD=0.376$) and Passive group ($M=1.234$, $SD=0.618$) conditions; $t(8) = 3.605$, $p = 0.003$. In procedure criteria, for Active group ($M=4.234$, $SD=0.528$) and Passive group ($M=3.016$, $SD=1.095$) conditions; $t(8) = 2.836$, $p = 0.018$. For the equipment criteria, there is no significant different in the scores for Active group ($M=2.031$, $SD=0.485$) and Passive group ($M=1.906$, $SD=0.400$) conditions; $t(8) = 0.562$, $p = 0.583$.

The results from this study provide additional information regarding the machine's video tutorial in general and, more particularly, the use of the suitable type of voice for the command of instruction of the machine's video tutorial. The finding of this study shows that the use of active voice for instruction increase the learning performance. In addition, the finding from this study also could lead the other similar research studies in deeper approaches.

## ACKNOWLEDGEMENTS

The research was supported by the Malaysian Ministry of Higher Education through the RAGS15-066-0129 grant to International Islamic University Malaysia (Malek Hamid, PI) and the FRGS17-035-0601 grant to International Islamic University (Mohd Hanafi Ani, PI). This study was also supported by the Department of Manufacturing and Materials Engineering, International Islamic University Malaysia, Malaysia.

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