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Traverse Application F2F for DCC20063 Engineering Survey

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Abstract

In the current practice of surveying, Field to Finish (F2F) are a work process that automated integrated manner until the end result without repetitive processes. Field to Finish (F2F) method also use as a fully automated process used in practice using several components of Total Station Survey System, District Survey Office Automation System (SAPD) and Handshake with Cadastral Data Management System (SPDK). The use of Field to Finish (F2F) method has been widely applied in surveying work because it uses more data generation and uses short time. In this paper, Traverse Application F2F will be develop as a Field to Finish (F2F) component for practical DCC20063 Engineering Survey course. Microsoft Excel 365 will be use to develop Traverse Application F2F which uses the several formula and this application will connect to several screens. The Traverse Application F2F a develop to provide exposure for DCC20063 Engineering Survey student to use Field to Finish (F2F) component and to collect more data in the real time.

Key-word: - Field to finish

1. Introduction

The Department of Survey and Mapping Malaysia (JUPEM) is the main driver of the Field to Finish (F2F) method. Starting in1995, the Department of Survey and Mapping Malaysia has implemented the concept of Field to Finish work in stages with the acquisition of Total Station System (STS). This was followed in 1999 with the development of two new system namely the Cadastral Data Management System (SPDK) and the District Office Automation System (SAPD). These systems were crested to provide, store and process data digitally for work in each State JUPEM unit. As a result, in 2002 these three systems were enhanced with the acquisition of measuring equipment as well the latest hardware and software capable of connecting the three systems to each other. Thus begins a revolution in the world of measurement. Where conventional measurement work change toward "Fully Automated". Field to Finish is a work process that is automated in an integrated manner until the end result without involving mwny repetitive processes at work in other word is a fully automated process. (Mustafa Md Kasim.2008). As a result of this success and starting from more practitioners in the world are producing Filed to Finish components that have different functions but still have the same purpose which is fully automated process.

2. Objective

i. To produce Traverse application using Microsoft Excel 365.
ii. Evaluate the effectiveness of Traverse application produced in the DCC20063 Engineering Survey course.

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3. Problem Statement

In the Filed to Finish system (F2F) the component used is a total station. Due to this, student take more time to calculate the Data because student no experience to use the total station. Due to the lack of exposure to the Field to Finish method, students always take a long time to finished the practical work in DCC20063 Engineering Survey while the scope that study a should focus to data collection, adjustment and plotting.

4. Literature Review

In the field of surveying, traverse surveying is an important branch of engineering survey to obtain and record clear information in the field for the planning and construction of engineering project. The purpose a to provide things such as making a plan or map as a sign to mark on a construction site for work in irrigation plans, drainage and roads as well as calculate the area and volume of earthworks (Bannister & Raymond.1983).

Traverse measurement are mean of providing a horizontal control network in which position ais determined through a combination of angle and distance measurement between the sequence of lines connecting the control stations. Slides are use for two main proposes namely (Bannister & Raymond.1998).

i. For the measurement of detail, a network of traverse line and land marks provides a system of control point that can be plotted precisely on a map or plan. The position of original and manmade details is determined on the ground compared to this network and details can be plotted in their correct position with reference to the plotted line and traverse.
ii. For making the position of road, building and other new construction may be established by the surveyor as opposed to the control points slipped from the information supplied by the designer, architect or engineer. Then the spikes can be marked on the ground from the cut to determine the position of the new work.

5. Field to Finish (F2F)

From the 1920s to the 70s, many measurements were made using conventional equipment that required complete human handling. Currently bearing measurements of vertical and vertical angles are performed using vernier theodolite and optical theodolite. While standard chains and stinging chains are used to obtain distance. All measurement information obtained will be recorded manually into an external workbook. The data obtained are processed using the calculator "Bruns" & "Curta" as well as short ridge trigonometry cipher books, Bruns & chambers. In the late 70s, Arithmetic calculators were used to replace mechanical calculators for calculation work.

In the 80s, EDM was introduced to standardize chains and stinging chains for distance. Digital theodolite replaces vernier theodolite and optical theod0lite. At this point all calculations are done using electronic machines program TI 59, Casio 602P, 603P, 702P and 802p. In the late 80s, the use of computers was introduced to speed up the process of calculating measurement data. The 90s era introduced the use of computers complete with certain software and modern measuring equipment which has had a huge impact on the measurement system. This era saw the use of total station as a replacement for theodolite. Where it is able to measure angle and distance. The measurement observation data carried out in the field is recorded with a data storage memory card with the help of computer software "All in one".

The rapid development of the computer world has also affected the world of measurement. In 1995, JUPEM pioneered the Field to Finish concept. The Field to Finish system is a system created to provide, store and process data digitally. Among the advantages of Field to Finish Are Fully Automated and Real Time Computing. Any errors can be identified directly while working in the field. Has high security features to store observation data to reduce the possibility of data loss.

6. Methodology

Methodology a one of the important part to develop Travers Application F2F. That include methods and approaches to achieve the objective of the study. Bellow a explain the research methodology used and strategies are formulated to obtain information and data to achieve the objective.

6.1 Develop The Traverse Application F2F with Microsoft Excel 365

As the number of learning and teaching continuing professional development (CPD) courses increases in Higher Education Institutions (HEIs), so too does the accompanying number of learning innovations being implemented and evaluated. (Ronan T. Bree,2016). Excel function can be used in place of long and complicated formula simply your worksheet. Before use function, Recall that the syntax of and Excel function to follow the general pattern. (June Jam rich Ojai and Patrick Carey,2016).

The use of computing systems in various fields continues to grow day by day. The selection of Microsoft Excel 365 has been applied to produce an interface to facilitate the calculation of cross-sectional data with more accurate, neat and orderly results. It is one of the software components that is integrated into Microsoft Office 365 software. It is a very popular software for analyzing data and information, making calculations on information and in turn can produce high-capacity graphs or charts in a short time. In the development of Traverse Application F2F, the worksheet interface is used to develop the slashed form according to the slashed station and each display is connected using a hyperlink formula.

Figure 1 Worksheet interface used.

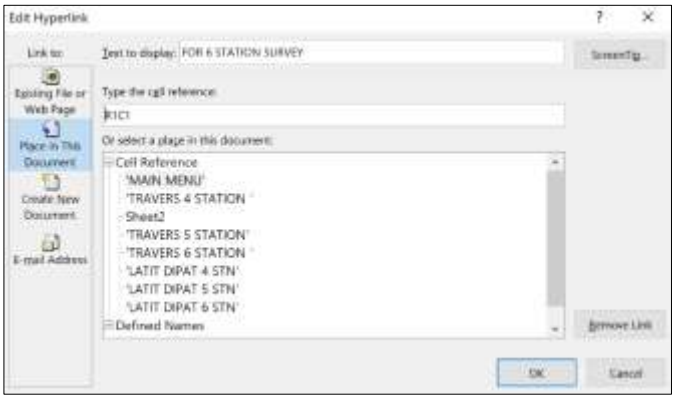

Figure 2 Use of hyperlinks to link between displays

In this Microsoft Excel 365 software, Traverse Application F2F uses the formula "if" in the recording to give space to the system to calculate the data results obtained in the field.

Figure 3 Formula" if "use as a cording in Traverse Application F2F

Among the cording used by the Traverse Application F2F component in Microsoft Excel 365 software are as follows;

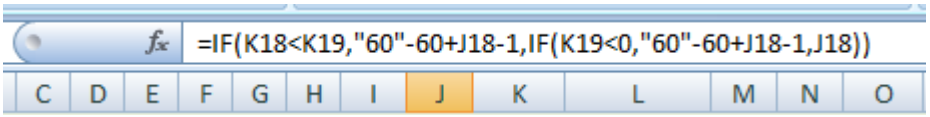

Figure 4 Use of "if" cording to calculate the minutes on the bearing mean

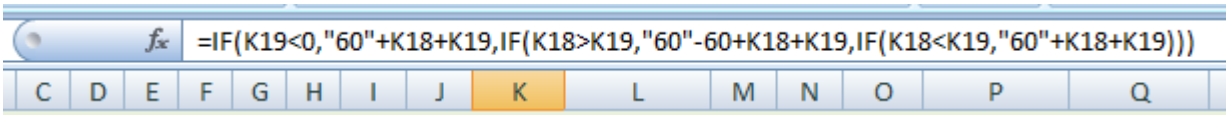

Figure 5 Use of "if" cording to calculate the seconds on the bearing

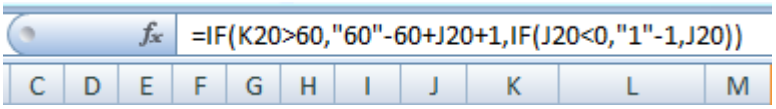

Figure 6 Use of "if" cording to calculate the minutes on the final bearing

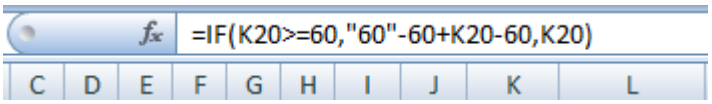

Figure 7 Use of "if" cording to calculate the moment on the final bearing

6.2 Traverse Application F2F and Procedure to Use

The F2F Traverse Application developed is a Field to Finish component developed for use by DCC 20063 Engineering Survey students in field practice. Where it will reveal to students about the real concept of Field to Finish work. In this Traverse Application F2F, students can choose to display the slashed form according to the number of slashed stations performed. Given the habit of students making measurements using 4,5 and 6 stations. Therefore, the Traverse Application F2F component is developed according to the needs of students, namely by containing a boring display for cross-functional practical work involving four stations, five stations and six stations.

Figure 8 Students can choose the slashed form according to the suitability of the practical work done

Students only need to take the data on the green screen only. In addition, the data will be calculated using the Traverse Application F2F component. This is called Fully Automated where the system will calculate all the data. If there is a mistake, students can find out while on the field. Next students will use the final bearing data obtained from the Traverse Application F2F component to take the details. This method can save time and avoid mistakes when measuring on the field.

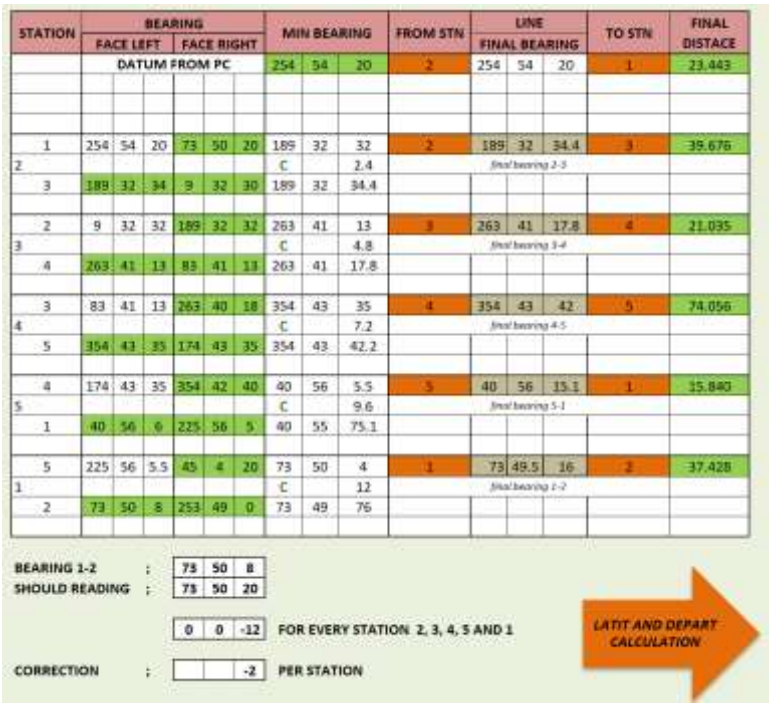

Figure 9 Traverse Application F2F display that students need to complete while on the field

Figure 10 Final Bearing is obtained directly while on the field

6.3 Traverse Application F2F Analysis

The analysis was done through a questionnaire that was distributed to the second semester students for section DKA2S1 only. Questionnaire forms are given to students after students have completed field practice using Traverse Application F2F in the DCC20063 Engineering Survey course. The objective of the questionnaire is to find out the extent to which the effectiveness of this Traverse Application F2F operates. In addition to seeing the extent of students' understanding of the concept of Field to Finish.

In general, this form questionnaire contains four section;

i. Section A: Student Background
This section aims to find out the group of students who use this Traverse Application F2F component.

ii. Section B: Student background in Field to Finish knowledge and user opinion on Traverse Application F2F
This section aims to determine the extent to which students' knowledge of the experience of the Field to Finish component and students' opinions on the Traverse Application F2F component used during field practice.

The results of the study analysis are according to the sections as found in the questionnaire. Where the results of the study are divided into part A analysis, part B analysis. The results of part A analysis are related to gender, race and student status in the course registration DCC20063 Engineering Survey.

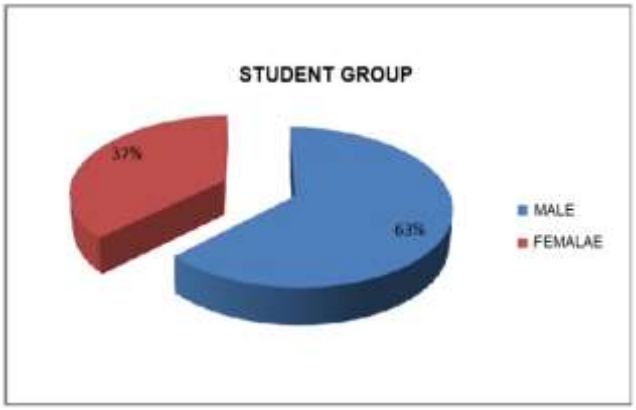

Figure 11 Student group

Referring to Figure 11, 63% of the students are male students and 37% are female students.

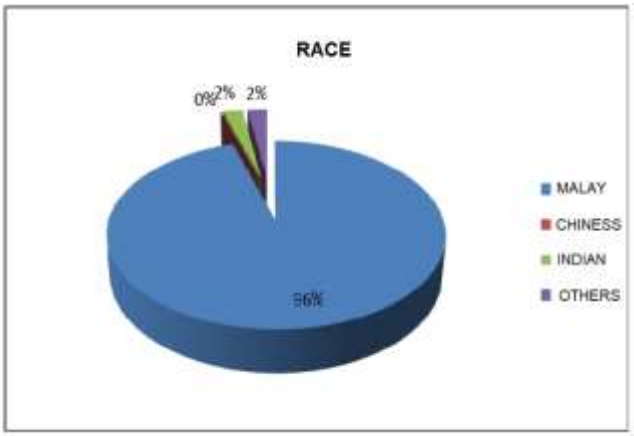

Figure 12 Student race

Referring to Figure 12, as many as 96% of students consists of Malay students, 2% are Chinese and Indian students is 2%.

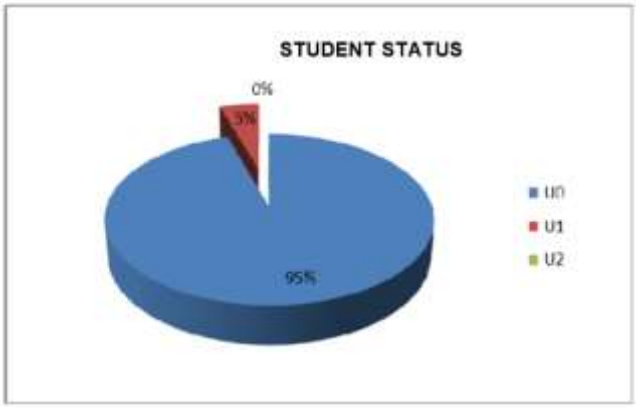

Figure 13 Status of students taking the DCC20063 Engineering Survey

Referring to Figure 13, 95% of the students are U0 students, 5% are U1 students and 0% are U2 students.

The results of Section B analysis are relevant to the extent to which students' knowledge of Field To Finish and user opinion on Traverse Application F2F and component used during field practice.

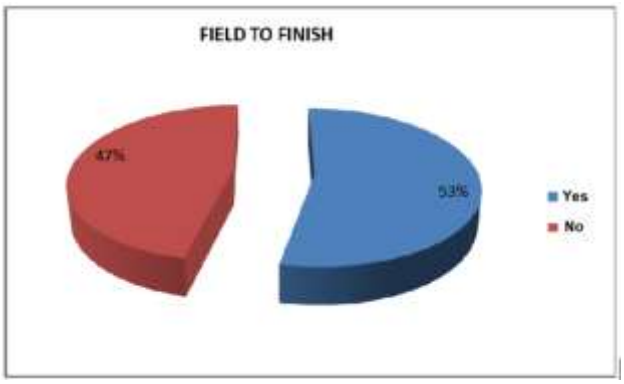

Figure 14 Student knowledge about Field to Finish component

Referring to Figure 14, 53% of students know about the Field to Finish component, 47% of students do not know about the Field to Finish component.

Figure 15 Traverse Application F2F is easy to use

Referring to Figure 15, as many as 98% of students agree that this Traverse Application F2F is easy to use, 2% of students do not agree that this Traverse Application F2F is easy to use.

Figure 17 Data collection time can be shortened by using Traverse Application F2F.

Referring to Figure 17, as many as 93% of students agreed that the time of measurement could be shortened by using Traverse Application F2F, 0% of students disagreed that the time of measurement could be shortened by using Traverse Application F2F.

7. Suggestion and Conclusion

Based on the results of the questionnaire that has been conducted shows that the component of Traverse Application F2F has achieved its objectives. However, in the future from the point of view of visual display or design can still be improved as appropriate. From the point of view of increasing the number of sliding stations can also be improved according to the change of syllabus. In this component of Traverse Application F2F, it is developed specifically for semester 2 students. Where it is for practical use of geometry that requires students to make cross-sectional measurements. However, the Traverse Application F2F component can still be developed by adding other measurement applications as appropriate.

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