

RESEARCH ON APPLICATION OF STRUCTURE ENGINEERING SOFTWARE

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Abstract : Nowadays, the usage of the software engineering especially in structure engineering are getting more and more popular among the construction companies either for contractor, consultant or local authority (Jabatan Kerja Raya). Structure engineering software program has substitutes the manual method in design structure in construction industry. Design and analysis structure can be quickly and easily input and viewed on the screen in a various format. The most popular structure engineering software in construction industry is STAAD Pro, ESTEEM, PROKON, ORION and SAP 2000. Other computer software that widely used in design structure even though it is not one of the structure engineering software is Microsoft Excel. Microsoft Excel is one of the easiest software that can be used and operated. All of this software engineering helps a lot in the development of the project and save the time in the design structure. This study is focusing on the level of using structure engineering, type of software structure and a frequency of software applications despite the advantages for each software that usually used in structure design. Data was collected from books, journals, magazines, internet and others. A part from that, questionnaire survey was also conducted to obtain information of the practical software engineering's type and a level of understanding the application software from the selected respondents within the Ipoh area. The results from the study revealed that the software application in structure engineering is widely used, helps a lot and make it easy for design especially structure engineering in construction industry in Malaysia.

1. INTRODUCTION

Software application in construction and engineering field very important to achieve better result and decision in the project implemented. This is because larger scale changes in the construction area and traditional method is no longer suitable to be used. There were many software in engineering field was introduced presently. One of engineering field is structure engineering software. There were many field in structure engineering such as steel structure, wood, concrete, aluminium and others. Difficult structures need longer time to be designed, with indirectly enhance project cost. Therefore with this structure engineering software, design structure are easier to do. System engineering software produce more accurate result and fast in the design. Hereby can reduce cost and save time needed compared with traditional method apply before this. On the other word, it can produce fast, economy and good quality in construction.

1.1 Problem Statement

How much is structure engineering software been applied and what type of software design usually used in application to produce analysis and design structure. With this study, we can identify which software engineering can give good impact in the field of structure engineering.

1.2 Project Objective

These studies have been done to achieve the objectives as follows:

- i. To know how many company using structure engineering software.
- ii. To study the most popular software in structure engineering.
- iii. To know and identify whether syllabus educated in computer engineering software being practiced in construction field especially structure engineering and meet market demands.

1.3 Scope of Study

This scope of study concentrate to:

- i. Emphasis to structure engineering software only.
- ii. Focus are given to contractor, consultant construction and local authority in the area Bandaraya Ipoh.

2. METHODOLOGY AND STUDY AREA

Information acquire in two ways through the study literature and case-study. Ordinarily, in case-study, method most suitable to be used to obtain information is through questionnaires and interview. This research work divided to two kinds case-study for structure engineering software in Bandaraya Ipoh which is type of structure engineering software and level on application of structure engineering software.

3. RESULTS AND DISCUSSIONS

Analysis of data made based on form of questionnaires and discussion acquired from the party respondent. Main Objective is to view how far application of structure engineering software in construction's company nowadays & to knowing type of software usually used by local organization in the structure engineering, especially in study area, Ipoh. As many as 30 set questionnaires form was sent to 30 contractor company, construction consultant and local authority whose selected. Only 26 set questionnaires form return through retransmission by post and form that taken back from the company. Analysis division made based on the parts are contained within set questionnaire form. First analysis referring to the outlook for software application in structure engineering. Further, analysis made based on the types of software which are used, frequency of application software and the reason of each software that have been used in construction industry in Malaysia.

3.1 Respondent Profile

From 26 company construction become respondent, Contractor Company is the total highest respondent as many as 13 company, followed also with 12 companies from consultant construction. While only 1 respondent from the local authority (Jabatan Kerja Raya). According to Jabatan Kerja Raya Ipoh, design works and structure development in Ipoh for local authority made only by Public Work Department alone without involving other local authority.

3.2 Company That Used Structure Engineering Software

Majority or 100% from respondent companies said that they have use the software for each structure engineering design in their construction's work. This indicates that undeniably the use of software in structure engineering already much applied in facilitate and launch the project progress in respondent companies. This proved that these companies realize on the importance and facility provided in software use in improving company productivity.

3.3 Software Types And Frequency of It Application

From data analysis, there were six popular types of software and frequently used in structure engineering such as STAAD Pro, ESTEEM, PROKON, ORION, EXCEL and SAP 2000. Staad-Pro occupies uppermost place in this frequency of use. This show most of respondent companies more fond on Staad-Pro's software compared with another software. This is because according to them Staad-Pro is the best method for the construction steel structure, it is very user friendly and no detail rebar needed, that mean this software only produce the result that are required only. Second-highest place it is Esteem's software that give faster and accurate result in the production structure design. Followed also by Prokon's software at the third place frequency of using. Prokon's software also provided accurate result and faster in the design structure engineering. Orion's software in the forth place in the frequency of use. According to questionnaires from the respondent, they say that Orion's software can produce better and faster 3D. Excel occupies in fifth position frequency of percentage of using software although it only normal computer software not structure engineering software but a lot of company likes to use it in design structure. This is because Excel's software is easily practised and anyone are capable to control it because it is easy to be applied during production in the calculation data with the simple calculation. SAP's software 2000 took the last place in frequency of use structure engineering software. Although it is sit under and lowest place popularity over other software but it still also popular used in structure design because it can help in generating fast data in the structure design.

3.4 Frequency or Level of Using Software

Most construction of structure design in Consultant Company is using the software 2 or 3 times within a week to accelerate design process and to follow the schedule in accordance with customer needs. While software frequency of use from Contractor Company is once a week or 2, 3 times within a month. This followed with the local authority only use the software 1 or 2 times a month compared with Consultant Company and contractor. Although local authority have it own design department, but there were many projects which involves contractor and consultant in design structure for each construction project and responsibility in constructing the design mostly submit to the consultant accredited have been appointed in the construction project which will be conducted. This indicates that this software engineering become more important frequently used and always practiced in structure engineering project implementation to facilitate and accelerate construction works and increase productivity and save time as well.

3.5 Reason of using structure engineering software

3.5.1 STAAD Pro

- i. Easy to understand, control in the short time and user friendly.
- ii. No rebar detail needed, only produce result & facilitate work in structure design.
- iii. Complete with analysis, design & drawing.
- iv. Facilities from model, analysis, design, structure checking, make a report & others according to user.

3.5.2 ESTEEM

- i. Produce detailing drawing for building structure analysis.
- ii. Show tension & compression reinforcement arrangement that been produce, it is important for design building engineer.
- iii. Related between other level for building structure so it easy to calculate.
- iv. Using easy grid system and can easily understand.
- v. Using plan layout plan as design & analysis reference.
- vi. Esteem analysis can convert to 'Auto Cad' software to produce a detailing drawing.
- vii. Simple and easy, it can get analysis information, detailing and cost quantity at the same time.

3.5.3 PROKON

- i. Produce maximum values and minimum for design moment, rilih force, tension reinforcement area and compression reinforcement area.
- ii. Produce reinforcement area required to design any building structure.

3.5.4 ORION

- i. ORION is very useful software in design shaped square building. This software is immensely helpful because it will conduct analysis work, design and stated reinforcement that are required and show detail together with only implement information that is required.
- ii. Detail drawing by this software can be renovated with transfer it to Auto Cad.
- iii. Produce better 3D using the software.

3.5.5 Microsoft EXCEL

- i. Microsoft Excel not only facilitates most operation which involves storage record and information, in fact it can make calculation operation able to be carried out with faster and effective than traditional method. Formula- formula arithmetic and logic, and function referring data also may be included into it to enable feasible calculation operation automatically.
- ii. Each changes data those implemented in electronic spreadsheet will automatically cause change to display result in calculation. Somebody doesn't need to redo calculation operation every time changing data happened.
- iii. Electronic spreadsheet software also enables to producing the chart or various forms graph easily.

3.5.6 SAP 2000

- i. SAP software 2000 available to determine impact & advantages every design structure condition in handling internal and surface load for each design structure produce.
- ii. Faster and accurate enough in production of information and data for required design structure.

4. CONCLUSIONS AND RECOMMENDATIONS

The conclusions that can be drawn are as follows:-

- i. From the study, show that all the 26 respondent companies using software in structure design. This is prove that structure engineering software have been applied a lot nowadays.
- ii. The most popular software structure is STAAD Pro & Esteem.

From the study those carried out, there are several proposals which can be considered that become guide to reader, lecturers and undergraduate UTM especially:

- i. Future Scope of research on structure engineering software need to do detail in Malaysia to get more accurate data.
- ii. Reshuffle and draft new syllabus for future curriculum in education especially in structure engineering with add Esteem software in syllabus, previously only taught introduction of STAAD Pro.

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