



**Temporary Works
forum**

Promoting best practice in
the construction industry.

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TWf Research Briefing Note No. 2

Improving the methodology of temporary works design using bespoke software

Title:

Improving the methodology of temporary works design using bespoke software

Researcher:

James Lawson

Email: jlawson@tcd.ie

Supervisor:

Dr. Breiffni Fitzgerald

Email: Breiffni.Fitzgerald@tcd.ie

Research Institution:

Trinity College Dublin

Date:

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Abstract:

The objective of this research project was to improve the quality/output frequency and reduce the cost of bespoke structural designs for engineers in a design office. The project takes a specific look into the field of temporary works design, an engineering discipline that is still in its relative infancy in comparison to RC and Steel Design as it was traditionally the responsibility of the contractor.

It was found, through a questionnaire study of groups of engineers from three different organisations (university students, consulting design office engineers, temporary works specialists), that alterations of practice in the field of temporary works were needed. The changes have been described in the form of high level recommendations.

The research led to the creation of engineering software and a model that provides engineers with a framework on the creation of bespoke temporary works software for the design of repetitive temporary works items. From the author's conjecture, based on a review of literature as well as being reinforced by qualitative data from the surveys conducted, several high-level recommendations have been made for universities, consulting offices and the temporary works industry as a whole.



Research aim:

The research looked to prove that there is a need for new engineering methodologies in the formation of temporary works designs, develop examples of software to solve this problem and finally develop a standardised model for the production of design software. This was done to create in-house software for normally bespoke structural elements that are not currently available and develop design guides for engineers. Several questionnaire studies were conducted to gauge the need for software and design guides in the industry.

Research objectives:

To achieve its aim, the following objectives were set:

- review literature related to the management, design and future prospects of temporary works and look for areas in which improvements are to be made;
- determine key parameters that impact performance;
- devise a method to improve the quality and speed at which temporary works reports can be outputted:
 - develop in-house software to automate calculations;
 - create algorithmic guides based on published literature to train engineers in design processes.
- determine the need for the products of the previous objective through survey questionnaires;
- make high-level recommendations as to what should be regarded as 'good practice' in the industry, predominantly in relation to the construction design phase:
 - propose hypotheses to be rejected or accepted by the analysis of the questionnaires;
 - develop a cost-benefit analysis for the design methods produced.

Research strategy:

The project was organised into the following Chapters:

Chapter 2 (Background)

- Description of the research project and a literature review. The literature covers an extensive range of topics related to temporary works such as concurrent engineering, management practices and the types of engineering design items that would be considered as temporary works.

Chapter 3 (Methods and Experiment Design)

- Formation of survey questionnaire related to temporary works (TW) and development of in-house software. This chapter contains an overview of the research methods adopted, the process followed to obtain the required data and the design of the software.



Chapter 4 (Analysis)

- A qualitative analysis of data from questionnaires taken by members of three distinct groups of engineers and a cost-benefit analysis of the proposed solution.

Chapter 5 (Discussion)

- The results presented in Chapter 4 are reviewed and inferences were made to be summarised in Chapter 7.

Chapter 6 (Model)

- A visual diagram to provide a comprehensive review of the project. This details the process by which engineers should develop software to automate calculations. It is the author's intent that this model is adopted by engineers creating temporary works design.

Chapter 7 (Conclusions)

- Proposed changes and guidance with regards to the creation of temporary works designs. Recommendations were made regarding developments in the industry based on verified conjecture from the qualitative analysis.

Conclusions and Recommendations:

The study showed that there was a need for improvement in the area of education for junior engineers and students. It was also demonstrated that the main problems in the field derive more from communication between the temporary works designer (TWD), the permanent works designer (PWD) and the contractor rather than in the design phase.

The research also presented a clear demand for temporary works software for repeatable items. Many engineers believe that software will become more predominant in the design phase whether this is desired or not. Therefore, it is important for engineers to be adequately educated on the use of new software to prevent complacency.

Recommendations for future research focused on the benefits of remote working for engineers and a means by which more comprehensive design briefs can be delivered to the engineer by the contractor. It was noted that many of these recommendations consume cost, resources, manpower and - not least of all - they require commitment and skill to achieve them. Achieving some of the proposed recommendations would take years and dramatic changes in industry culture.

The model (**Figure 1**) was developed by the author to be used by any TWD. It contains an overview guide as to the production of bespoke custom temporary works software.

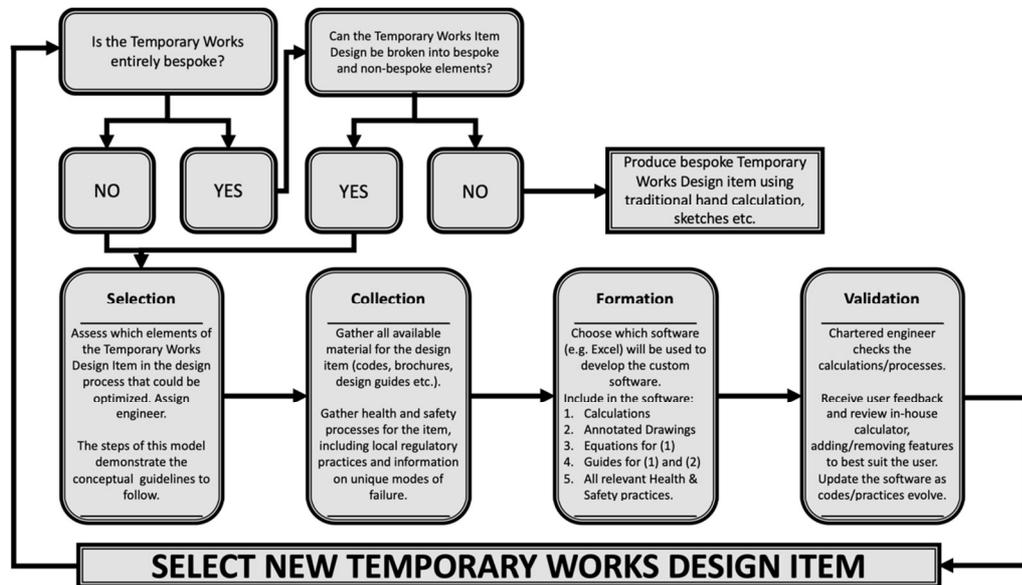


Figure 1

Model developed for the production of temporary works design bespoke software

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Background

The purpose of this **TWf Research Briefing Note** is to disseminate the main findings of academic research. The findings – and any opinion expressed – are those of the researcher(s) and do not necessarily reflect views of the Temporary Works Forum (TWf).

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