Research report – Abridgement

Study on options to improve usage of DIN V 18599 software in practice

Editing

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1   Aim of Research

The subject of research is laying the foundation for an improved use of the DIN V 18599 Software. The Study was divided into two parts: the analysis of typical application problems during the calculation, which are likely to arise in practice; and the development of test cases to further study the calculation accuracy.

In the preceding research project "TITLE USED FOR THIS" was the user as potential main error cause not considered and to greatest extent excluded by the test methods applied. Therefore the focus should be broadened, to study reasons for application errors.

It is to assume, that application errors have an immense impact on calculation accuracy. To find possible reasons, some fundamental information should be researched, such as:

- establishment of user groups of software users
- information about the qualification of users
- typical use cases for each user group
- problems in the user group.

Beside the user survey, in the context of a sustainable quality assurance of the software it was aimed to improve the quality of 18599-calculation by developing and applying different test cases with defined calculation schemes and boundary conditions. For this multiple variations of a building model were developed, between which the building zones vary in the kind of conditioning and the technical building equipment. The occurring rooms for interpretation or errors in the guidelines should be discussed with the standardization committees and the EnEV-regulatory   authority.

2 Implementation of the research

2.1 Area of user study

For the study of the user side an empirical approach was followed, which was based on a survey of sufficient dimensions?? to gain reliable statements. The application errors occur presumably not just in the use of the guidelines, but also during the use of software for the verification. This research project aims to identify reasons that cause errors in using the application, a complete software test was out of scope. Furthermore it was paid attention to that the results of the survey can't be used in marketing material by any singular company.

The study to analyse problems in the field of the DIN V 18599 was conducted as an online survey. It incorporated open and closed questions. To improve evaluatability approximately 50% of the questions were posed as multiple choice. The number of participants was chosen to gain statistical reliable results. Based on the types of questions posed, the evaluation took place with statistical methods (multiple choice and closed questions) and as a basic empirical collection and unification of repeating answers (open questions).

2.2 Area of development of test cases

For the development of test cases an integrated approach was chosen, including the manufacturers of the software. In a first step a unification of calculation using the guidelines EnEV 2009 and DIN V 18599 took place, generating?? test cases with defined calculation schemes and boundary restrictions. For this a building model of multiple variations with corresponding input and calculations schemes was developed. The input of data in the available 18599-software products was performed by the producers of the software themselves. The calculation results were afterwards validated and potentially occurring differences analysed. Possible inaccuracies in the calculation have been discussed and if necessary revised by the manufacturers, to repeat the calculation process of the test cases. By those means a continuous improvement process could be started already during the project duration. Using the development of set of test cases further quality criteria for DIN V 18599 software products should be derived and described, which later could be used in a quality seal.

During processing of the test cases it could be ascertained that a need for clarification arises due to multiple ways of interpreting the standard which could result in a number of different, but still valid outcomes. In consequence thereof it was aimed to discuss with standardization committees and EnEV-regulatory authorities to minimize the interpretation problems of software products.

2.3

3   Summary of the results

3.1   Conclusion user survey

The EnEV and the DIN V 18599 lay the foundation of the energy performance certification, however the majority of user relies almost completely on information from third parties. Only few use the guidelines as primary source of information, as it is intended.

On of the reasons could be identified by analysis of the free text fields in the questionnaire: it seems, that user are often overwhelmed by the handling of the standard. This might explain the frequent enquiries about technichal issues submitted to third parties, and also the repeated wish for simplification of the standard. Furthermore many supposedly software related questions happen to betechnichal questions relating to the standard. The expectation of many user, motivated also by the price of the software products, is that the software application should take over the guidance over the EnEV calculation process. This however can't by accomplished by any software product.

Since many users don't have access to standard for different reasons, the issue of energy performance certification sometimes resembles a "blind flight". A simple look up in the standard usually doesn't suffice, because in many situations multiple parts of the standard have to be consulted – and found. Therefore it is necessary to lower the entry barrier to the EnEV and the DIN V 18599.

Both software training and training concerning the guidelines are essential basics for the at most error less issue of energy performance certification. The interest of questioned users is low.

The use of out of date software should not be part of the working basis. User might not have access to important program changes (e.g. bug fixes, features or input based on work of the 18599 quality association) because they work with outdated software.

As a recommendation based on the research training of user is an important tool in raising calculation quality significantly.

Especially in revising the free text input it became apparent, that many users have great difficulties in issuing energy performance certifications respectively calculations compliant with the DIN V 18599. According to the user statements this is mainly due to extensive and confusing guidelines, and to opaque software products. However it also became clear in the evaluation that the mentioned problems often stem from not the deficiency of guidelines and software, but the absence of necessary skills in using it.

For example many user report, that the input request for the issuing of an energy performance certification requires extensive knowledge in the fields of civil and mechanical engineering but both areas could only rarely be covered with the needed skill level. This results in a number of partly unjust points of criticism in dealing with the software, especially during the input of the technical building equipment.

3.2   Conclusion of test cases

At the beginning of the project a set of test cases was developed in agreement with the involved software manufacturers, which were used in comparative analysis between the products. The input of data was performed by the manufacturers themselves. The calculation results were subsequently verified and noticed differences analysed. The communication between participants took place on a specifically established internet forum. Additionally meetings to discuss and adjust the course of action to take occurred during the research project.

In general it was the aim of the comparative analysis to identify potential software errors an correct them, and to discuss the various calculation and interpretation possibilities in the guidelines, and consequently coordinate a common implementation of the standard. During the process some enquiries concerning interpretation were send to the Normenausschuss Bauwesen (NABau), the DIBt (Deutsches Institut für Bautechnik) and the Bundesinstitut für Bau-, Stadt- und Raumforschung (BBSR). The responses were incorporated into the further course of actions.

The approach employing comparative analysis resulted in a continuous levelling of singular calculation values. Thus, a number of problems could be identified and resolved.

It became clear that this approach was very time consuming. Calculating the test cases with all technical variants was not feasible during the research project. Despite the great engagement of the participating software manufacturers extending the upon agreed service provision (each eight person days) just parts of the first variant could be processed. All in this relation corrected errors, but principally the purposefully coordination of a consistent implementation of the guidelines resulted in an improved quality of the calculation compliant with DIN V 18599. Provided the user utilized the regular software updates, they benefited from the improvements.

All in this final report resented calculation results and diagrams are according to the state until November 2010.

3.3 Proposition for the implementation of a seal of quality

With the introduction of a seal of quality for software products the user's trust in the dealings with 18599 calculation might be strengthened. For products carrying the seal perhaps the following assertions could be made:

- The software is a reliable tool.

- The calculation results are credible.

- The product was audited before release.

- The software reaches a well defined quality standard.