Review of Doctoral Thesis

Author: Ing. Robert Wawerka
Title: Nearly Zero-Energy Building Retrofitting: Case Study of a Conventional Single Family House in Denmark

Study programme: Civil Engineering
Field of study: 3608V001 Building Structures

The dean of Faculty of Civil Engineering, Brno University of Technology Prof. Ing. Rostislav Drochytka, CSc., has appointed me, by the letter dated 22th January 2016, as an opponent for the doctoral thesis “Nearly Zero-Energy Building Retrofitting: Case Study of a Conventional Single Family House in Denmark” of student Ing. Robert Wawerka. The opponent review of doctoral work is prepared according to Article 45 of the Degree Regulations of the Brno University of Technology.

The doctoral work is written on 112 pages at all and consists of six main chapters. The all chapters have clear and logical structure and include following parts: 1 Introduction, 2 Literature review, 3 Objectives, 4 Methodology, 5 Analysis and results, 6 Conclusions and recommendations. The work includes the abstract in the Czech language, the list of figures, tables and list of used literature.

The doctor student has used suitable literature and references for better orientation in this issue. The structure of thesis conforms to principles and requests for scientific work.
A. State of the Art

The work consist very actual questions and answers about nearly zero-energy houses in Europe (especially in Denmark) and can brings new points of view.

The pilot energy retrofitted residential building towards nearly zero-energy with using progressive design technologies is very attractive, mainly with using and research by progressive ways of modelling, monitoring data, optimisation consumption and verification procedures. Pilot project can show new trends how to make buildings more sustainable and independent on external sources of energy by building envelope and mainly by HVAC.

B. Aims and methods

The aim and method is clearly described and author solve problems by sufficient knowledge and theoretical background.

All objectives were fulfilled and detailed in this thesis The pilot energy retrofitted residential building towards nearly zero-energy with using progressive design technologies is very attractive. Also with progressive ways modelling and measurement.

C. Results

The author presented new results of theoretical and experimental research. Theoretical part consist results of simulation software Design Builder / Energy Plus with energy calculations of many variants of building envelope, air change, solar and other internal gains etc.

In the part experimental shows performance of energy in the building. Measurement and balancing of renewable and classic energy sources and fuels.

Questions:

i. Is there possibilities to make repeatable design of HVAC system and other parts or structures of family houses more effectively?

ii. How big effect has serial production of this houses and give some economic aspects?

iii. Explain “European” Near zero and Zero house and differences between “old” Passive house (prof. Feist, Germany)?
D. Conclusion

The PhD thesis *Nearly Zero-Energy Building Retrofitting: Case Study of a Conventional Single Family House in Denmark* of Ing. Robert Wawerka is on the high theoretical and application level and includes significant original approaches. I recommend the dissertation for defence. And after successfully answering comments and questions,

I recommend
to award Ph.D. degree

Brno 18th April 2016

doc. Ing. Miloš Kalousek, Ph.D.