

Review of Diploma Thesis

Student: Nina Feber

Thesis title: Possibilities of using HSS in truss beams – a parametric study

The topic for the diploma thesis arose from Ruukki Construction's need to investigate the feasibility of using high strength steel (HSS) in the Czech market, where currently mainly mild steels (S355 or lower) are used within the construction business. SSAB and Ruukki Construction are especially on the Nordic market heavily pushing the use of HSS (up to S700), as it has been proven to be cost efficient in especially roof trusses. Furthermore Ruukki's workshops and welders have been certified to weld HSS-structures.

The building used in this case study and parametric analysis has been studied and analysed quite thoroughly and carefully by the student. The thesis is also generally well written and the completed analyses are explained in a quite detailed manner.

Questions and detailed comments:

1. An overview on Czech regulations and Eurocode national annexes with regards to HSS, and any possible restrictions, would have been interesting.
2. Generally the usage of HSS leads to smaller and thinner profiles compared to design with milder steels, which one could also imagine would lead to less welding. However, the minimum fillet weld sizes according to current Eurocodes are bigger for HSS than for mild steels, and it seems as this has not been considered in the analyses.
3. More direct references to Eurocode for each formula would have made it easier for the reader to follow the calculations. Also a bit more figures, explaining the details, could have been used in places to clarify the calculations.
4. Why were only N-trusses considered? For example in the Nordics K- or KT-trusses are very common and considered to be efficient. However, it is understandable that N-trusses were used as the original design of the case building was made with N-trusses, but some comparison to other truss models would have been interesting.
5. The serviceability limit state (SLS), or the deflections in more detail, are at least on the Nordic market often handled or reduced with precamber, simply in order for SLS not to become governing in design, and furthermore to be able to optimize the structure and profiles according to ultimate limit state. I'm however not sure are there any regulations restricting the usage of precamber in the Czech market.
6. Omitting the fire resistance check seems justified, as it would have made the analyses and parametric study a bit too complex. However, taking fire resistance into account can lead to a different solution when searching for the most cost-effective design, and hence this could perhaps have been considered in at least some specific case to study how much the fire resistance check influences the optimal solution and material configuration.
7. More focus could have been put on the parametric study in part D, chapter 16, and considering the quite comprehensive scope, left some parts of the case study out, e.g. the design of the administrative part of the building.
8. The results from the parametric analyses is quite well in line with previous corresponding studies made on HSS and hybrid roof trusses for the Nordic market. Taking the fabrication

costs, especially the welding costs, into account would have given the results an even bigger value. However, in total the outcome from this thesis is a good indication that the usage of HSS on the Czech- and CEE-market should be further investigated and to be considered in the design of upcoming projects.

Suggested grade: C (good)

Reviewed by:



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