



IMPORTANT CONSIDERATIONS BEFORE SUBSTITUTING FOR STEEL

Timber supply challenges over the last two years have given many builders and fabricators cause to take another look at steel framing as a standalone solution or in tandem with timber to produce hybrid structures. Both materials can be designed to be structurally adequate and comply with the NCC, but that doesn't mean it's a straight swap.

We've recently been working with Dr Tim Law, a building surveying lecturer at Victoria University and an expert in condensation and mould in buildings, who has some great advice for fabricators considering the addition of steel framing to their offering or looking to substitute timber for steel in a specific design.

Understanding Steel

The first point to note is that there are fundamental differences in the two materials that impact how they perform in a frame. If the floor plan was developed with timber framing in mind, it may need to be modified to account for the differences in conductivity and insulation requirements.

"Steel has a much higher thermal conductivity than softwood (pine) and will result in thermal bridging if insulated using the same method as timber frames, i.e. to insert insulation batts between studs. The appropriate design and installation when constructing with steel framing is to run rigid insulation (such as EPS or rock wool) external to the structural framing, or as some would say, 'outsulation'. This would require thicker walls and thus a redesign of the floor plans." (Law, 2022)



Why is this an issue?

Failing to account for the differences in heat transfer through a steel frame can lead to homes with serious condensation and mould problems. As it stands in NCC 2019, thermal bridging is not considered when calculating the effectiveness of a building's insulation, which can lead to homes that are technically compliant but plagued with issues.



NCC 2022 is looking to remedy this with revised methods for calculating the insulation level (or 'R value') of the overall wall system, including the frame. In the meantime, if builders and fabricators aren't aware of the implications of a change to steel, they could be setting themselves up for problems in the future as condensation problems emerge.

"Unsuspecting consumers are not aware that they are being supplied a new house that can be deemed code-compliant but, due to ill-informed material substitution, will have interstitial condensation in walls resulting in mould on the paper-faced plasterboards. When direct substitution occurs, there will be a designed-in and built-in problem in new houses which will be very costly to rectify. Furthermore, it is likely that insurers will refuse compensation since the house may be deemed to be code-compliant." (Law, 2022)

Implications for builders, fabricators and surveyors

Simply complying with the NCC isn't always enough. Building surveyors want to ensure that the finished building is fit for purpose and provides the owner with years of trouble-free use. Finding out at the inspection stage that the certifier doesn't consider a steel frame fit for purpose due to inadequate insulation and/or improper detailing is an expensive lesson I'm sure we all want to avoid.

To illustrate this, Tim calls on the example of Victoria's regulations and provides some advice on how to engage with building surveyors ahead of time to ensure the risks of excessive thermal bridging and condensation have been addressed appropriately.

"The Building Regulation 2018 of Victoria requires an RBS (relevant building surveyor) to require testing of materials so as to "prohibit the use of any material that is found to be unsuitable or unfit for the purposes for which it is intended" (reg. 120). It thus falls on the RBS, for the public good, to require a method of installing steel frames appropriate to the climate that exceeds the requirements of the NCC in order to be fit for purpose.

When in doubt whether it is appropriate to do a direct substitution of timber framing with steel framing, it would be best to check with the RBS, drawing his/her attention to the risk of condensation with thermal bridging. Building surveyors/certifiers, if in doubt as to how to determine the appropriate levels of rigid external insulation, should seek advice from their respective state building regulators." (Law, 2022)

Putting my personal material preferences aside, commercial realities and ongoing supply chain uncertainty will mean the option of steel framing gets serious consideration for the foreseeable future. As an industry, it's critical that we make sure any changes are made conscientiously and without compromising on the final quality of the structure handed over to the homeowner.

References

Law, D. T. (2022). A caveat for substituting timber framing.

This edition of FTMA Tech Talk was written by Adam Dawson, Technical Manager ANZ of our Gold Sponsor, Pryda.