

# Steel: one size doesn't fit all

Choosing the right roof sheeting profile for the right location and performance is more than choosing a colour, material or copying and pasting from a previous specification.

By Richard Polling, group director, MRC Group | Photos by Richard Polling

One of the major aspects that often is overlooked is wind loadings and how this affects the roof design. There are many different roof profiles available in the market place from many manufacturers, all promoting the strengths of their individual profiles and yet one profile cannot be 'one size fits all'.

In terms of what to ask about wind loadings and how this affects the design? 'Acts of God' are very often the point of reference when a roof system detaches itself from a structure and yet how often is this really the case? Could it be that the roof system was not correctly specified, installed or maintained resulting in detachment from the structure?

On most projects the design is done by the engineer on the structural steel and the roofing specification is left to the architect to decide. In essence the engineer should select the roofing profile as he is the professional who calculates the terrain category and the wind pressures on the structure.

## Choosing material

So, what should designers look at when designing the building to ensure the roof will stay on the building?

1. The high-pressure zones on buildings in the built environment are generally the eaves, gables and ridge of the building as a rule of thumb. A designer will close up the purlin spacings in these areas to ensure the roof sheets can withstand the wind pressures. In the mid span areas, the pressures could only be one third as opposed to the ridge and eaves all depending on the shape of the roof.
2. Careful consideration should be taken on selecting roof sheeting, such as total coated thickness, hot dipped coatings, base metal thickness, mechanical properties and overall performance of



There is a process to selecting a roof sheet profile.

- the system in terms of ultimate and serviceability limits of the profile.
3. It is because of this information that a roof sheet should be selected on the performance criteria and not because of a brand name. The engineer will take the serviceability and ultimate loads of the roof sheet into consideration to select the profile to be used.
4. In retail design as a rule of thumb the point loading on the roofing profile becomes more critical as the roof sheeting is usually protected by parapet walls and it is expected that following trades use the roof platform as a trafficable area when, actually, most of these structures are designed as non-trafficable areas. Again, the engineer is key for deciding if the areas require walkways for maintenance teams to access areas. Point loading limits are tested and published by the roofing manufacturer for the engineer to decide on the serviceability.
5. If a building has exposed eaves overhangs again the engineer should determine the superimposed wind loads that the eave is exposed to and select the correct roofing profile.
6. An important point for the professional team to consider is the suppliers willingness to issue performance guarantees on the roofing system. In requesting this information, the designers can be sure that the roofing profile that is selected is the correct profile for the project.
7. Last but not least the applications of the solar installations on buildings play a major role on wind effects on the structure as well as point loading. The whole building design will change in terms of loadings and must be considered at the design stage even though this application may be done at a later stage.

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### Other considerations

Protection of the perimeters of the building is essential due to the increased wind pressure in these zones. This can be accommodated in many ways including:

1. Closing the purlins distances around the perimeter, as highlighted above, increases the amount of fixation and therefore the ability of the roof sheet to remain attached to the main structure.
2. The detail of the eaves / ridge flashing can have a major bearing on how the wind is diverted from impacting on the roof system.
3. Soffit protection such as metal soffit sheeting can deflect the wind from forcing the roof sheet off its clips. If soffits are left exposed the wind, the pressure from the compressed insulation and thermal movement can lead to detachment.

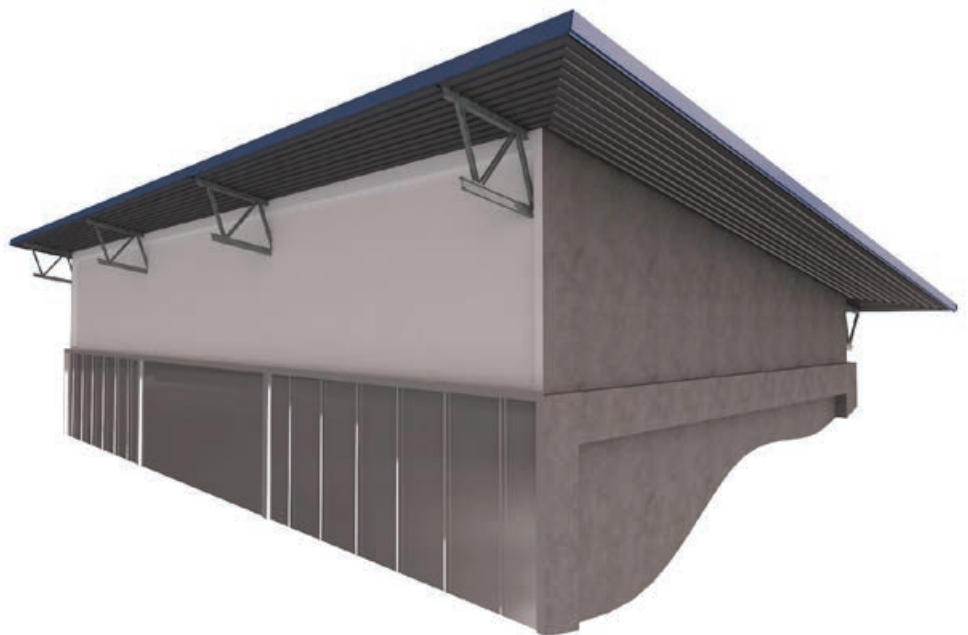
### Summary

Careful specification of the roof sheet profile, material and gauge for every project individually is essential to ensure long term roof system performance.

MRC Group has undertaken a review of all the roof sheet profiles and the ability for each profile to withstand both a downward imposed load and the upward wind loading, and the results show a massive difference in each of the profiles and materials to withstand the various project loads. The trend of 'copy and paste' specifications could leave the long-term performance of the roof system defective. 🌀



■ Considerations on how the steel will perform are important when selecting steel for a project.



■ One profile doesn't fit all.



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