
Adding solar shading outside

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Windows

What is the solution?

Traditional options for improving windows thermally are the insertion of external solar shadings like shutters, blinds and curtains. Shutters and curtains are very common technical element in the original configuration of historic buildings, while blinds are recent elements and, in some cases, considered incongruous in historic buildings field from a typological, constructive and energetic point of view. As a matter of fact, they can compromise the characteristics of the façade. The insertion of blinds therefore requires careful design. All these systems can result in significant reductions in thermal gains from solar radiation during the summer and in heat loss in winter, with no impact on existing window fabric. Well-fitted external wooden shutters can decrease heat loss from both draughts and conduction through the window by up to 51%. Curtains, on the other hand, can control draughts and reduce heat loss by 14%. It is evaluated that the combination of these systems can reduce heat loss by as much as 62%. Various range of solar shading with a variety of insulating and reflective layers are also available to further improve the energy efficiency of the opening system. In general, this intervention requires a careful evaluation of the compatibility with the building envelope, the local climatic variables, the building exposure, the orientation of the glass surfaces and the intended use of the building.

Why does the solution work?

The performance characteristics of solar shading depends on the type: shutters, blinds or curtains. External shutters, in the cold season, slightly reduce the night-time heat losses preventing leak of the accumulated heat during the day. These devices help to increase the thermal resistance of the window creating an additional ventilated air gap between the window and the solar shading. In the warm season they help to mitigate summer overheating:

during the day they are closed when there is a greatest sun exposure, and then they are reopened in the evening to favor the leak of accumulated heat. They are very effective in reducing summer heat gain because they intercept direct sunlight before passing through the glass pane and therefore have a high solar control efficiency. External shutters, once closed, improve users' safety and privacy, but they block the incoming natural daylight. In addition, they can also help to reduce external noise levels. External curtains and blinds, like the external shutters, prevent sunlight from reaching the glass, making them more efficient than the internal ones in terms of sun protection. However, their contribution to thermal insulation can be considered null. From the point of view of conservation, the addition of solar shading does not affect the historical material consistency and does not distort building characteristics so, if well designed, it is respectful of heritage even if the external visual impact is not negligible.

Pros and cons of the solution:

Pros: external shutters protect against both solar gain and heat loss and provide weather protection; external shutters improve thermal comfort in hot climates and summer seasons; external shutters improve solar control of the façade; external shutters increase the thermal resistance of the window; external shutters improve users' safety and privacy; external shutters offer reasonable noise protection; external curtains and blinds avoid glare; external curtains and blinds distribute light in the indoor environment; external curtains and blinds improve the conditions of visual comfort in indoor environments; on large areas of glass external curtains and blinds can reduce both heating loads in winter and cooling loads in summer; external curtains and blinds would usually be used anyway; external curtains and blinds are cheap options to upgrade; low impact on heritage. Cons: closed shutters preclude the entrance of natural light; lack of privacy when shutters, curtains and blinds are open; external curtains and blinds contribution to thermal insulation can be considered null; affects external appearance of the window.