

Project Case: Malling School

# At Malling School they are keeping their heads cool

Hot class rooms and pupils who are unable to focus during class is a well-known phenomenon. However at Malling School they have reduced the temperature by 4-5°C with solar shading which is integrated in the glazing units.



## Problems with indoor climate

Malling School, just south of Aarhus, Denmark, had persistent problems with its indoor climate for some time, particularly in the south facing classrooms, where the strong sun radiation coming through the windows sharply raised classroom temperatures and provided poor lighting. This was even though solar control glass had already been installed. The problem had to be fixed and it had to be done in the most cost-effective way, in terms of maintenance and investment.

Gorm Albertsen, construction advisor for the schools south of Aarhus County: "Too high temperatures in south facing class rooms are a continual problem – especially

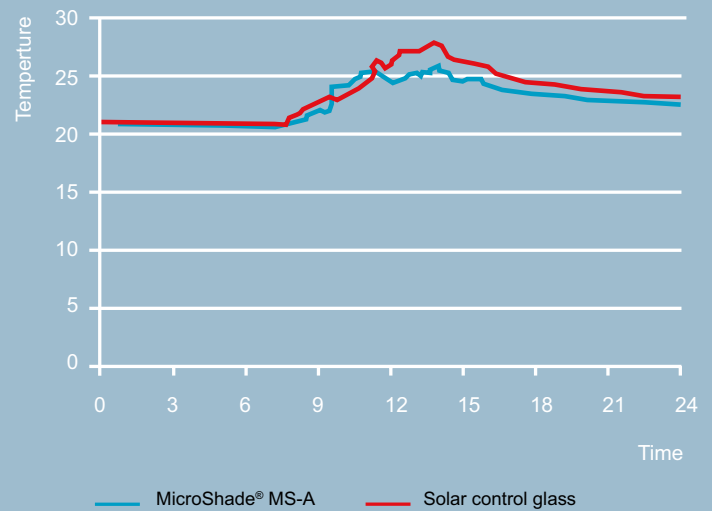
at high sun angles. The Danish Working Environment Authority ordered us to find a solution to the problem with the indoor climate in certain areas of Malling School. We dismissed traditional solutions with exterior solar screening, because they were considered unsuitable in terms of maintenance, also with regards to the activities in the school yards.

As a result, Aarhus County had to look around for a less conventional solution, so that pupils and teachers could keep their heads cool.

*"Our own tests confirm that the temperature has been significantly reduced using MicroShade®, in some cases from 30°C to 25.5°C."*

*Gorm Albertsen of Aarhus County*





## Example of temperatures at Malling School

Measurement data from Malling School, thermometry performed with shaded temperature sensors.

Measurement data includes two series which have been measured at the same time in adjoining and identical class rooms. Room 1 was equipped with solar control glass and room 2 with MicroShade® MS-A glazing panes.

The displayed measurement data has been registered on Tuesday, September 1st 2009, on a partly cloudy day.

## The market for solar shading

The solution was found in cooperation with Bascon A/S, consulting engineer for Aarhus County in this project. Mark Lund Andersen, Bascon A/S: MicroShade A/S and their solar shading with micro-lamellas, MicroShade® were mentioned in a technical magazine. We visited MicroShade A/S with one of our experts on indoor climate and the client and found this new solution very exciting, because the solar shading is integrated in the glazing pane and doesn't need any physical operation. Thus the disadvantages of exterior solar shading are eliminated."

A series of comprehensive studies were made directly at the school and MicroShade® was chosen because MicroShade A/S presented effective solar shading with a good overall economy. Mark Lund Andersen elaborates: "MicroShade® is operationally and with regards to maintenance costs an intelligent product with a really good overall economy over time."

## No maintenance and no vandalism

An important parameter for the choice of MicroShade® was the fact that this solar shading doesn't need any maintenance at all – as opposed to exterior solar shading. An exterior solution would have been exposed in terms of weather conditions and potential vandalism.

## Significant reduction of temperature from day one

Both pupils and teachers are delighted with MicroShade®. The indoor environment is now much improved, helping to improve levels of concentration. Gorm Albertsen of Aarhus County says: "Our own tests confirm that the temperature has been significantly reduced using MicroShade®, in some cases from 30°C to 25.5°C. It used to be boiling hot in the sun and it could be difficult to read the writing on the board. However, the problem has been solved and teachers and pupils now feel much more comfortable."

It had to be acknowledged that the existing panes with traditional sun control glass only had a limited effect. The uncomfortable direct heating of the pupils and furniture is now an element of the past and on top of that the pupils are now able to see the writing on the board. Combined with balanced ventilation the solution with MicroShade® has significantly improved the indoor climate – to the complete satisfaction of the Danish Working Environment Authority.



With MicroShade® the uncomfortable direct heating of the pupils and furniture is now an element of the past.

## Micro-lamellas block the sun – not the view

The solution consists of 50 m<sup>2</sup> double layered glazing panes with integrated MicroShade® solar shading, argon filling and an U-value of 1.1. The glazing panes have a g-value as low as 0.10 – i.e. maximum shading. The glazing panes have been installed as any other type of glazing pane.

MicroShade® solar shading contains patented and transparent micro-lamella foil which is placed as an internal layer in the glazing pane. The shading principle in MicroShade® has been designed according to the sun's pattern of movement during the day and year: The higher the sun, the better the shading effect. The transmitted light is a good, natural daylight.

## New project already on its way

Aarhus County is very satisfied with the progress of this project and with the fact that the problems with poor indoor climate at Malling School are now solved. Consequently it has been decided to use MicroShade® on a big renovation project on one of the other schools in the county, Solbjerg Skole. 400 m<sup>2</sup> of MicroShade® 3-layer glazing panes in energy class 1 and with an U-value of 0.76 are going to be installed.

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