

HOSPITALS is a European demonstration project with five exemplar energy conscious hospitals and health care buildings being designed and constructed throughout Europe.

The hospitals incorporate innovative energy-efficient techniques in the building designs to achieve substantial reductions in operational energy consumption.

This brochure focuses on the benefits and other aspects of double skin facade design in health care buildings.

## DOUBLE SKIN FACADE DESIGN

***A double skin facade is an additional external skin for a building that can optimize the indoor climate and reduce the energy demand of the building.***

The use of double skin facades in the health care sector is almost unknown at the moment. The quality requirements for the indoor climate and the stability of temperatures in health care buildings are very high. The patients can often not be moved and therefore an optimized indoor climate is of high importance. Double skin facades are planned in Bredstedt, Germany and Aabenraa Sygehus in Denmark.

Outside the EU-project, double skin facades have been used in health care buildings in Torshavn, the Faroe Islands and Philadelphia, USA.

The following issues influence the applicability and planning of double skin facades in hospital buildings:

- Location - in the city or in the countryside
- Renovation or new build
- Energy saving ambitions
- Fire regulations
- Indoor climate and thermal comfort
- Visual comfort



HOSPITALS





Interior Bredstedt

## Principle Function



Winter

Summer I

Summer II

Computer modelling must always be carried out when using double skin facades

## Advantages and Recommendations

### Advantages

**Protection** of the inner facade against weather conditions saves costs in the operating phase by reducing maintenance costs.

**Preheating** of incoming fresh air in the winter period saves energy.

**Natural ventilation** may be combined with a double skin facade to save energy and to enable inexpensive ventilation methods.

**Lower energy losses** with the reduction of wind cooling of the facade.

**Acoustic protection**, this is of particular importance in health care buildings close to traffic or other sources of noise.

**Wind protection** and the possibility of opening windows in high-rise buildings - the double skin facade works as acoustic curtains.

**Double skin facades offer** the possibility of increasing the daylight level inside the building.

**High degree** of openability towards an attractive outdoor environment.

**Enables** less expensive external shading devices due to the effective wind protection.

**Reduction** of thermal bridges via improved building envelope.

**Architectural possibilities.**

### Disadvantages

**Extra costs** in the construction phase. The double skin facade costs extra because of the extra material required and the extra space used ( $m^2$  and  $m^3$ ). The designers have to make detailed dynamic computer simulations to document the energy savings in the future as well as the architectural and indoor climate benefits.

**Cleaning** might cause extra work and thereby extra costs which have to be made clear to the client during the planning phase.

**Fire regulations** might cause difficulties. The fire escape routes have to be given extra attention.

**Condensation** might be a problem using a 1 layer glazing outside + a 2 layer thermo solution inside. By opening the inner (double skin) facade, the inside of the outer facade might suffer condensation in winter.

## Examples of double skin facade designs:

### Fachkrankenhaus Nordfriesland, Germany

Architect S&I arkitekter A/S

At the Fachkrankenhaus Nordfriesland in Bredstedt, double skin facades will be implemented in the first building phase (Wohnheim). The double skin facade is meant to:

- Reduce the use of energy
- Preheat ventilation air
- Improve comfort and indoor climate by stabilizing the temperature and reducing the feeling of cold drafts
- Give an extra architectural dimension to the building

At the same time there is a risk of creating negative issues such as:

- Higher building cost for the client
- Solar gain control is necessary due to the large glazing area, but inexpensive solar shading may easily be integrated inside the double skin facade
- Using too much space (too many square meters)

## Haderslev Hospital, Danmark

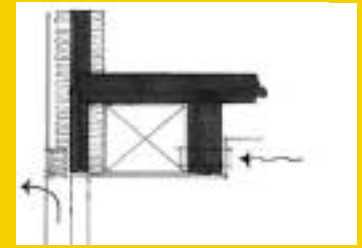
Architect S&I arkitekter A/S

During the design of the renovation of Haderslev Hospital, valuable experience was gained on double skin facades. The project included the renovation of the façade of a high-rise building. The chimney effect in the double skin facade was used for natural ventilation.

Opposite to the Fachkrankenhaus Nordfriesland, the outer skin was planned as a double layer energy glazing with a single layer glazing inside.

In Haderslev Hospital the double skin facade was also planned to be used for preheating ventilation air.

The double skin facade includes an effective, inexpensive, wind protected, solar shading system integrated in the structure of the glazing.



1+2 Window  
Outside 1-layer glazing  
Void with integrated sunscreen  
Inside 2-layer energy glazing



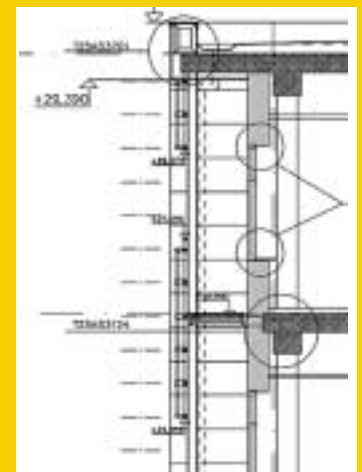
## Torshavn Hospital, Faroe Islands

Architect Arni Winther

In Torshavn, Faroe Islands, the first European hospital using double skin facades has been built. The hospital is situated in an extremely windy location. The use of the double skin facade means lower heat losses through the facades and offers the possibility of opening the windows even on very windy days. It was however not possible to implement double skin facades where the fire escape routes were fitted.



Thorshavn Hospital



Section at the Faroe Islands Hospital.



The Children's Hospital of Philadelphia  
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Information about The Fifth Framework Programme is available at the following website:

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Further information on DG for Energy and Transport activities is available at the internet  
website address: [http://europa.eu.int/comm/energy/res/index\\_en.htm](http://europa.eu.int/comm/energy/res/index_en.htm)

The HOSPITALS internet website address is <http://www.eu-hospitals.net>