

Sandwich Panel for the Building Industry

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Faipur 2012 Sao Paulo

FASCINATION
FASCINATION PUR
>> PUR

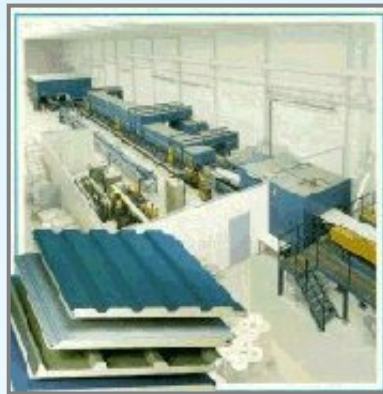
Topics

- Motivation for Sandwich Panels
- Sandwich Panel types and corresponding plant technology
- Hennecke's Solutions for the Production of Panels
- Other PU - Applications for the Building Industry
- Who is Hennecke GmbH

Motivation for better Insolation

- Worldwide Growing Demand for more Energy
- Demand for higher Comfort
- Growing Demand for a bigger Variation in Food
- Growing Demand to Use Energy more Effective

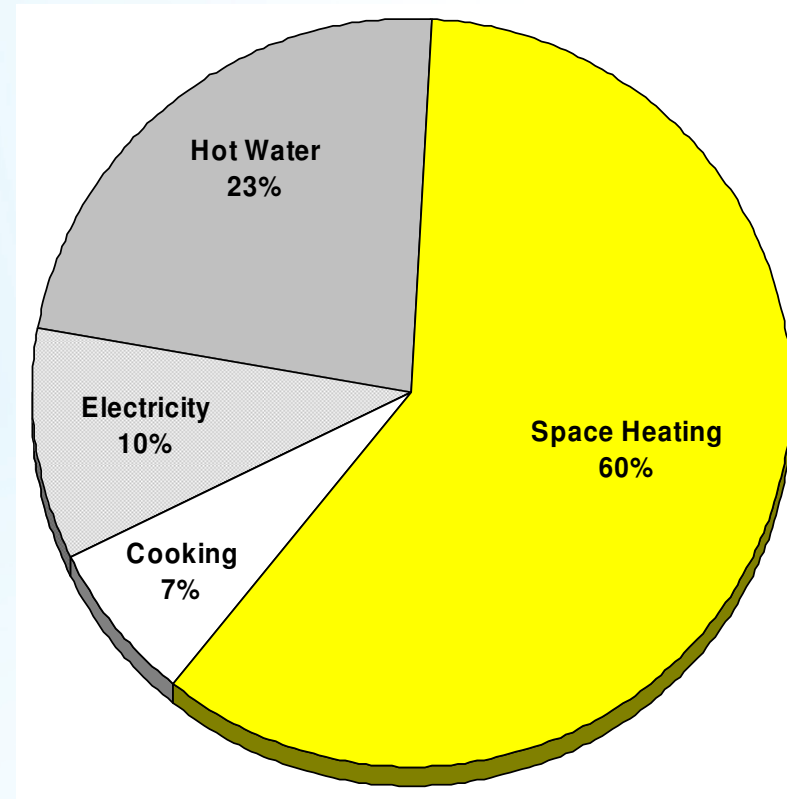
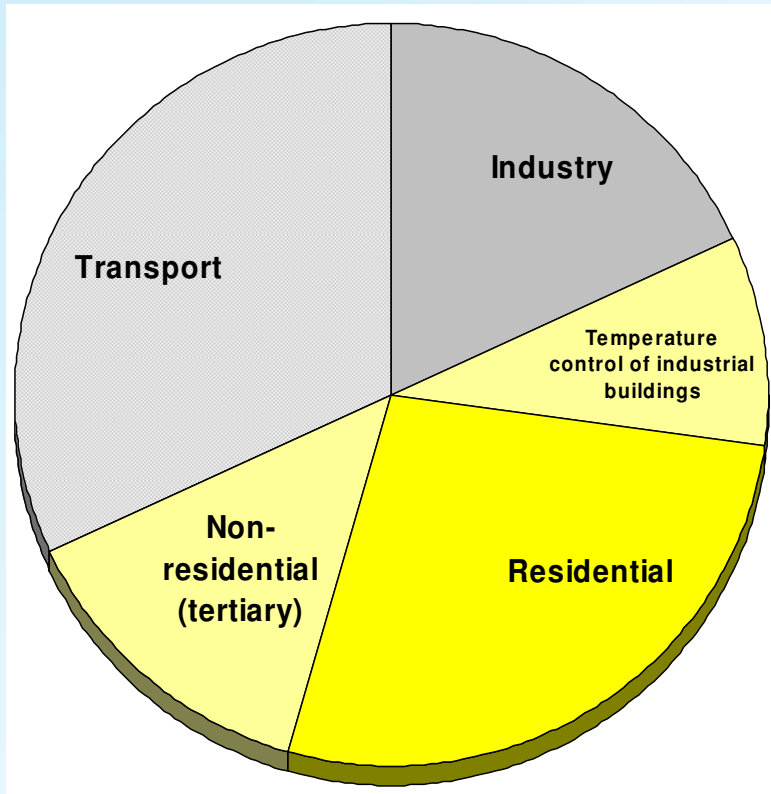
This all calls for an Effective Thermal Insulation



Sandwich Panel – Motivation

- Increasing energy costs
→ higher demand more effective insulation
- Reduced CO2 emission
→ Is leading to a higher demand in insulation
- Increasing labor costs in building industry
→ higher demand for Sandwich Panels (easy installation)
- Increasing costs for transportation
→ increasing number of Sandwich Panel production in place
- Increasing demand in Africa / Asia for cold / frozen food
→ higher demand for Sandwich Panels (Cold store chain)
- Use of new Foam Systems (PIR) offering better product properties
→ need of new/better metering and production equipment

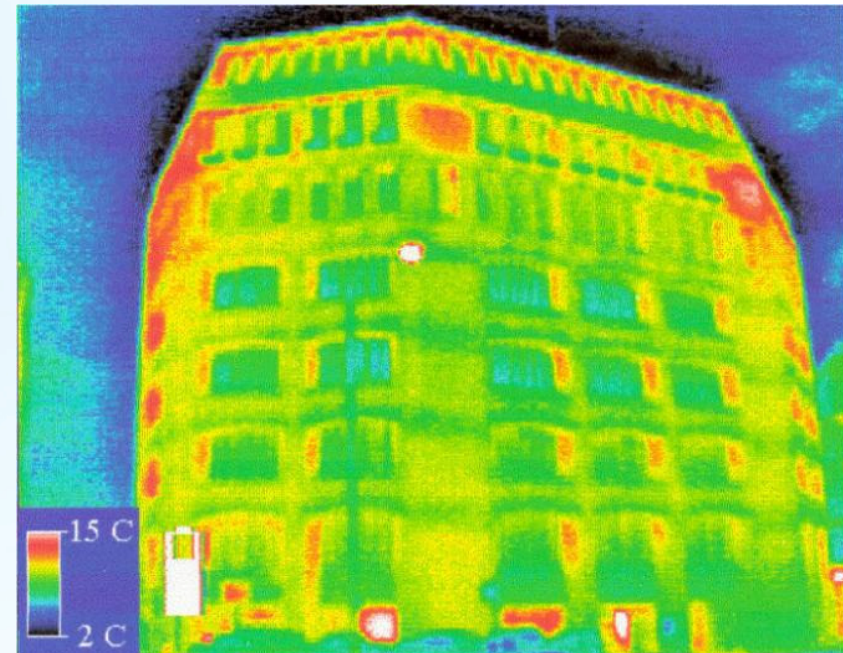
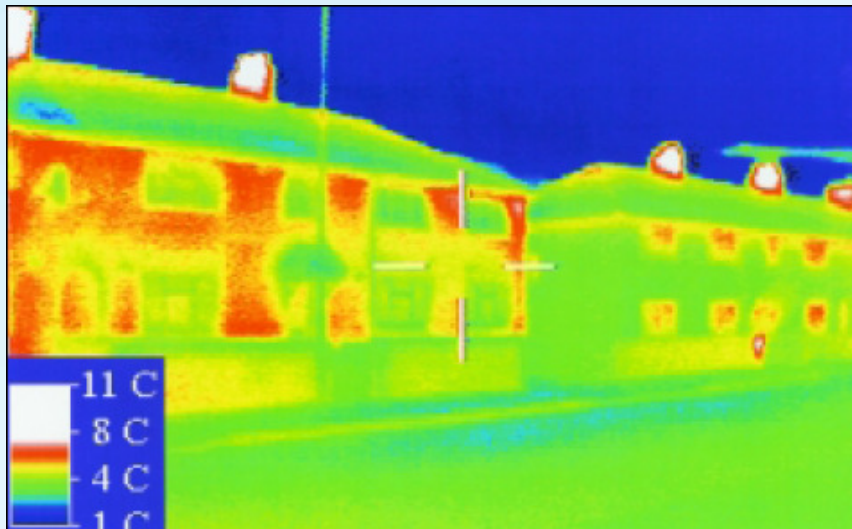
Sandwich Panel Motivation



50 % of energy use in the EU is in buildings

Sandwich Panel Motivation

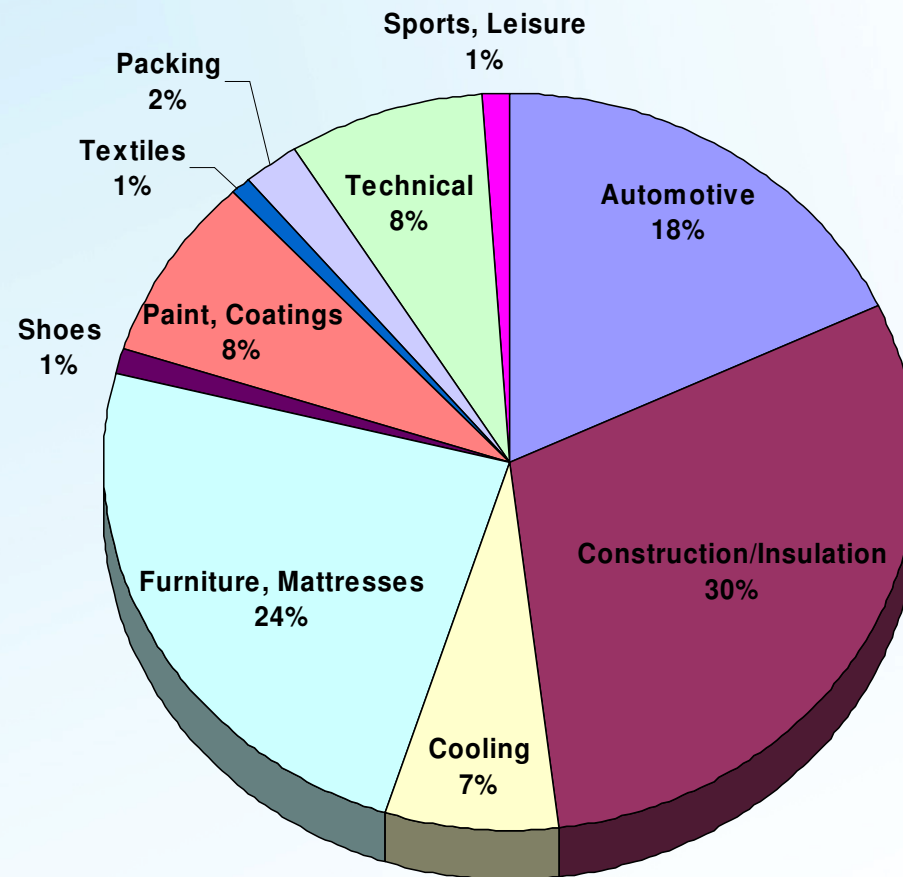
Purpose: Insulation



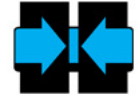
Thermal losses of a building

Market share Insulation

2011: 3,8 Mio. tons of PU in the EU divided into the following sectors



Sandwich elements basic insulation



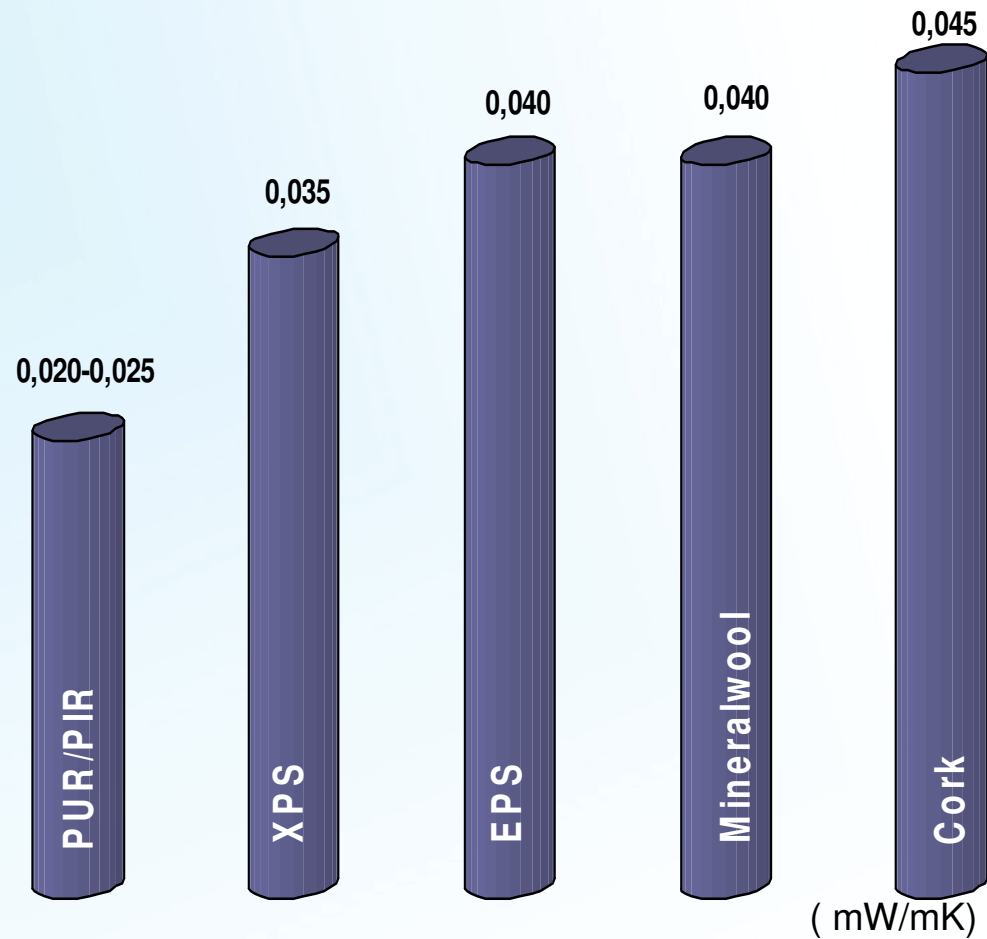
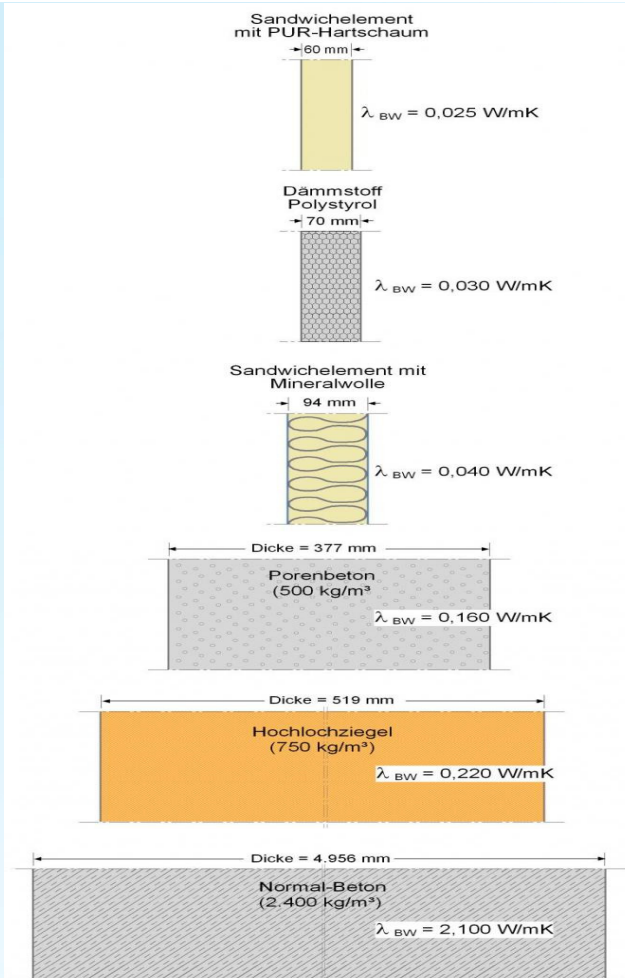
Insulation and how it works



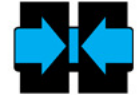
Only a minor part of the Polyurethane rigid foam volume consists of solid material.

Based on a density of abt. 30 kg/m^3 as usual in building and construction, the content of solid plastics only amounts to roughly 3 % of the volume. It forms a grid structure made of cell numbers and sizes serving to withstand mechanical stress. The blowing agent remains in the cell and contributes to the insulation.

Comparison thermal conductivity

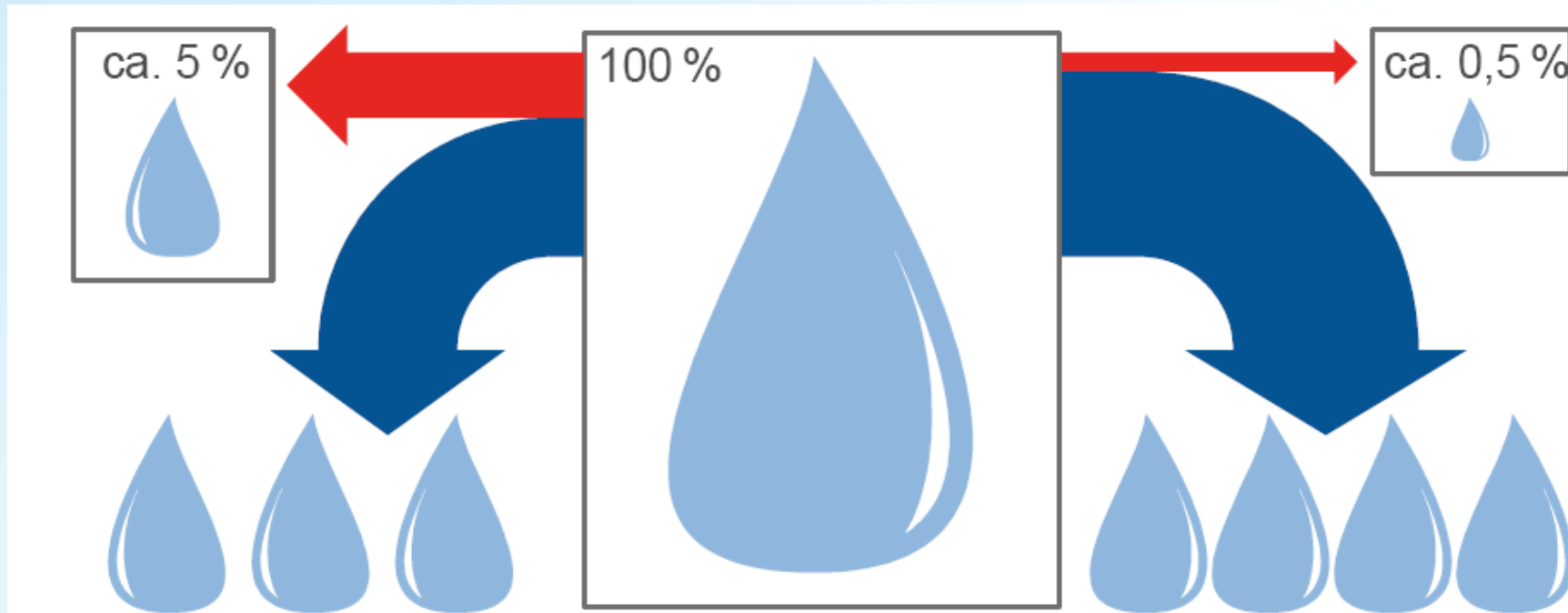


Sandwich elements

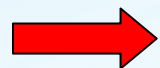


Diffusible / open facing

Sealed facing

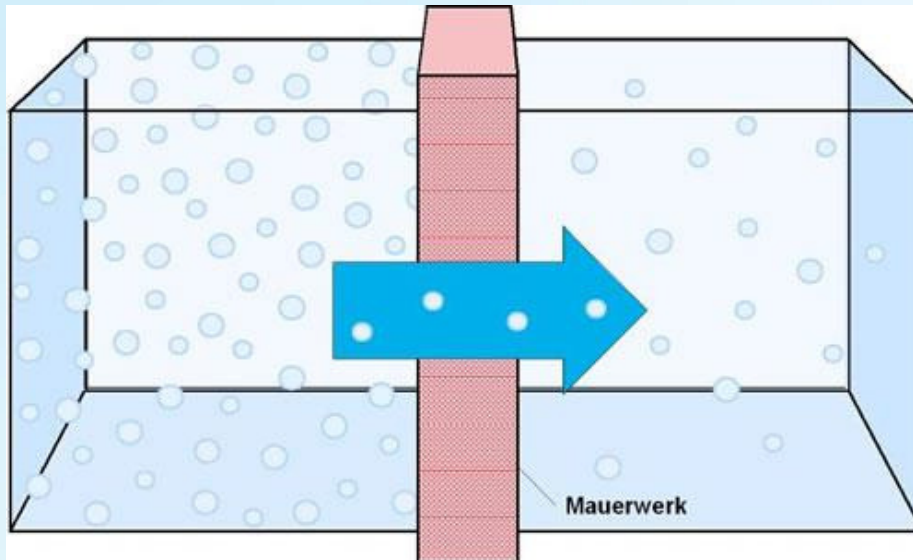
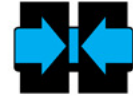


Water adsorption of PU sandwich elements



Higher water content leads to a tremendous increase of thermal conductivity!

Vapour conductivity



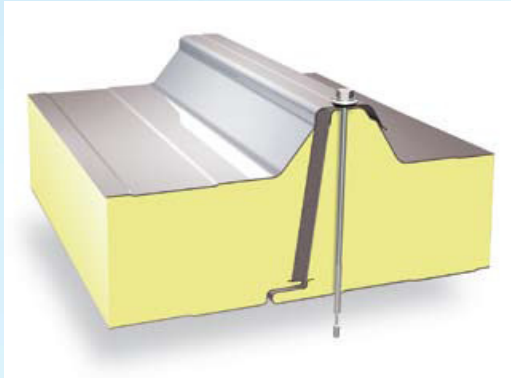
Material	Resistance of vapour conductivity μ
Air	1
Mineral wool	1
Polyurethane	30 – 100
Polystyrene	80 - 250
Cork	5 - 10
Concrete	80 – 130

Sandwich elements basic insulating material

- Polyurethane PUR
 PIR
- Mineral Wool
- Polystyrene EPS
 XPS



Basic difference cellular plastic/mineral fibre



😊 Vapour permeability
very low except at butt joints if poorly assembled

😊 Moisture/condensation
possible on surface, only slight effect on thermal performance. Wetness may cause degradation of materials

😊 Physical degradation
only likely in cases of catastrophic degradation

😊 Air movement
low permeability especially if joints are taped or interlocked



😐 Vapour permeability
permeable

😞 Moisture/condensation
possible in material; water causes large deterioration to thermal performance

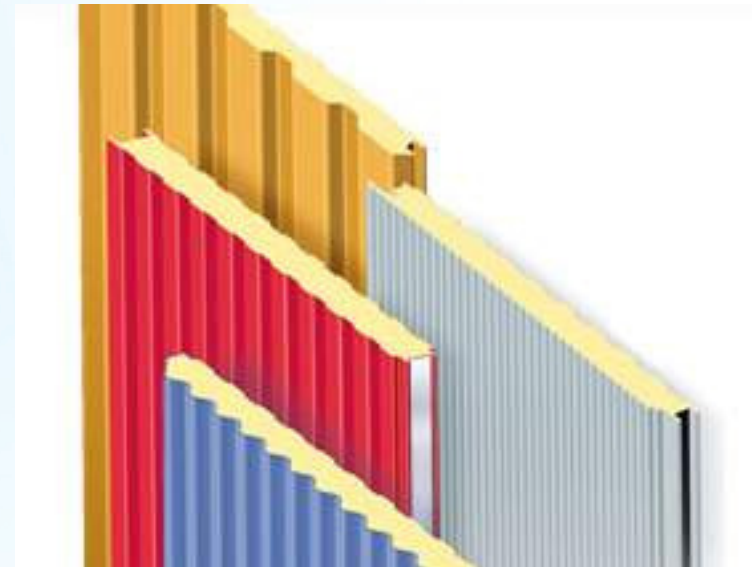
😐 Physical degradation
possible if insufficiently protected; greater strength boards have higher binder %

😞 Air movement
possible reduction to thermal performance

Sandwich Panels

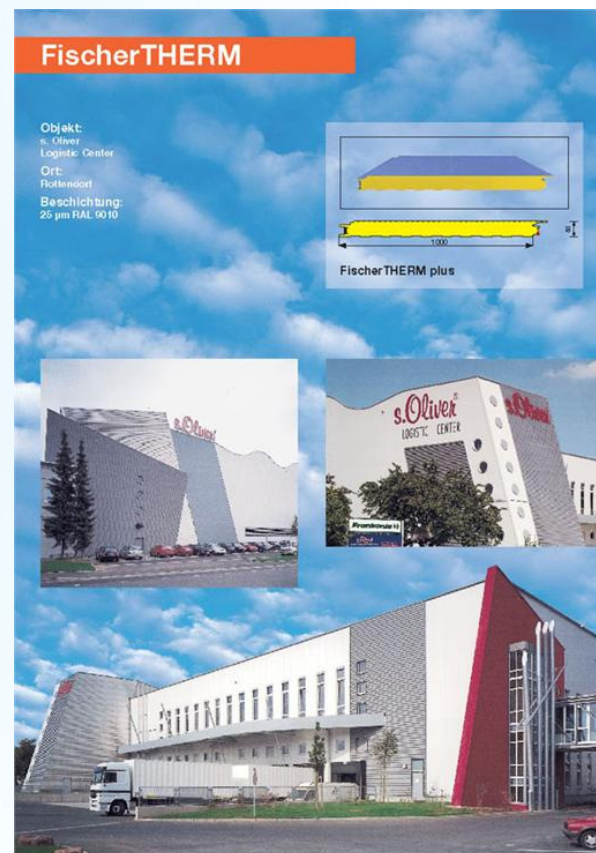
Properties of Sandwich Panels

- excellent insulation properties
- temperature range from
- 50 °C to + 110 °C
- high dimensional accuracy and stability
- extraordinary weather resistance
- fire resistance according to International Standards (B-Class, SBI, PLC)



Sandwich elements

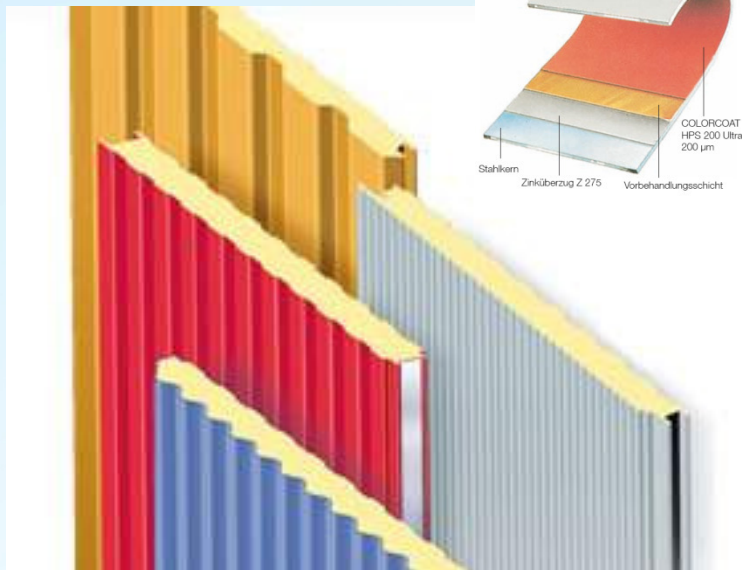
Purpose: design



Sandwich elements

Main purpose: Insulation

metal facings



flexible facings

Properties of Sandwich elements

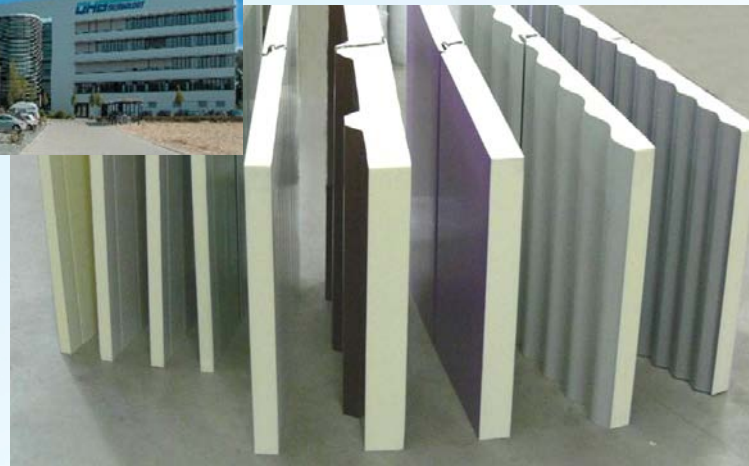
- Stiff and stable
- Best insulation properties
- Modern
- Creative
- Flexible
- Easy and safe
- Fully developed
- Easy to assemble



Metal Panel Sandwich Elements



- Sandwich elements, wall type
- Sandwich elements, cold storage type
- Sandwich elements, roof type



Sandwich elements

Purpose: easy and quick installation



Sandwich elements

- Easy to adapt on site



Flexible Facing Sandwich Elements

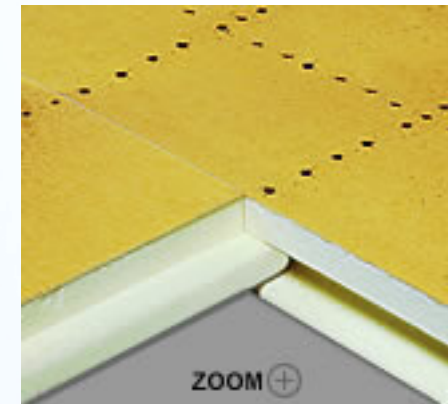
Wall insulation



Roof insulation



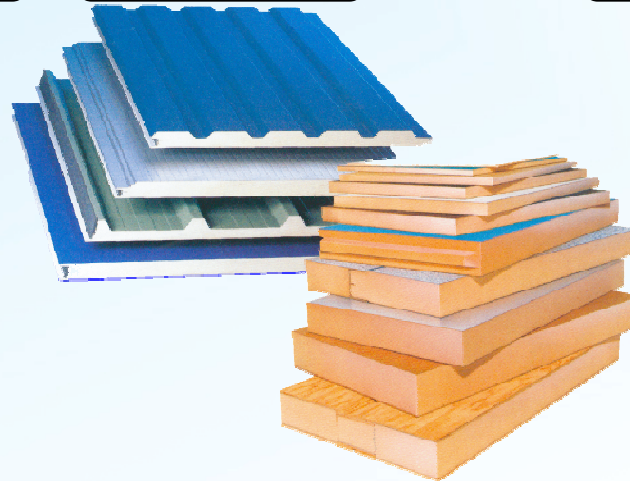
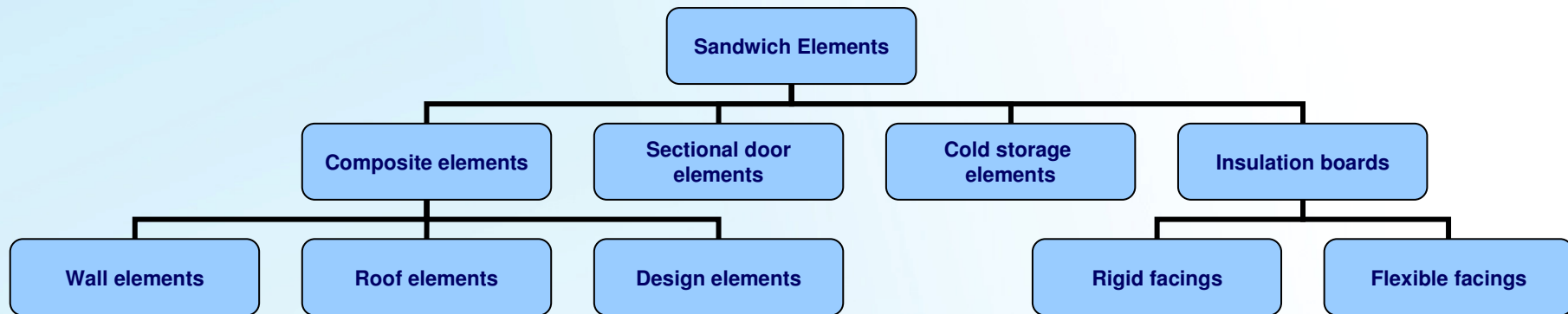
Floor insulation



Agricultural application



Sandwich elements basic types



Sandwich Panels

- Standard wall element



Sandwich Panels

- Wall element with hidden fixing



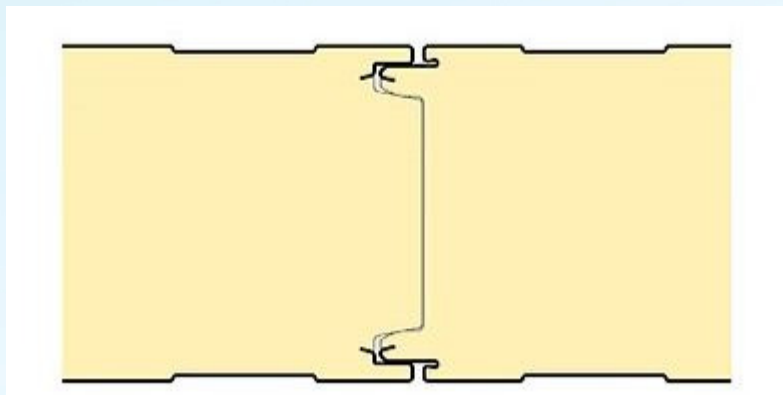
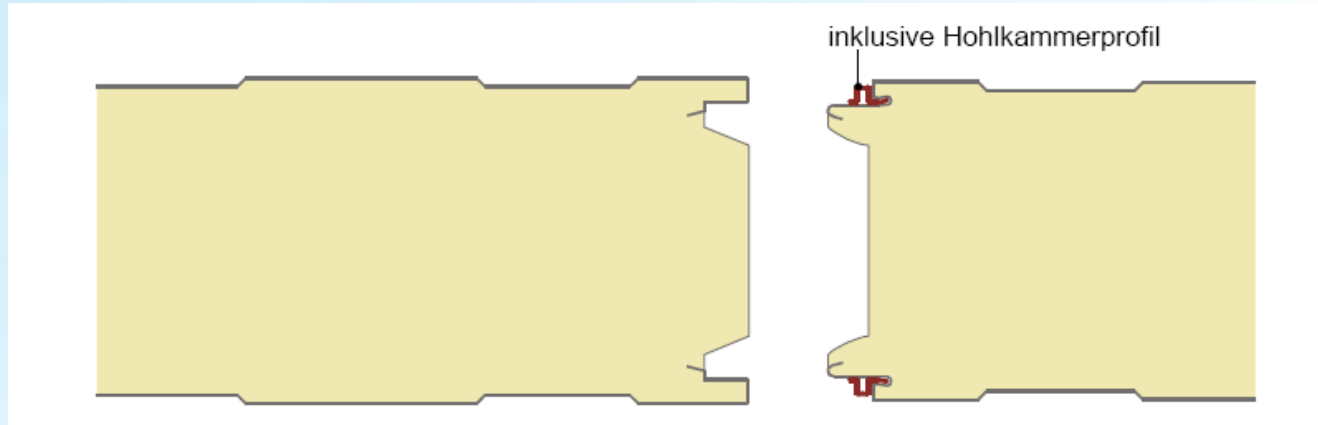
Sandwich Panels

- Standard roof element

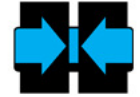


Sandwich Panels

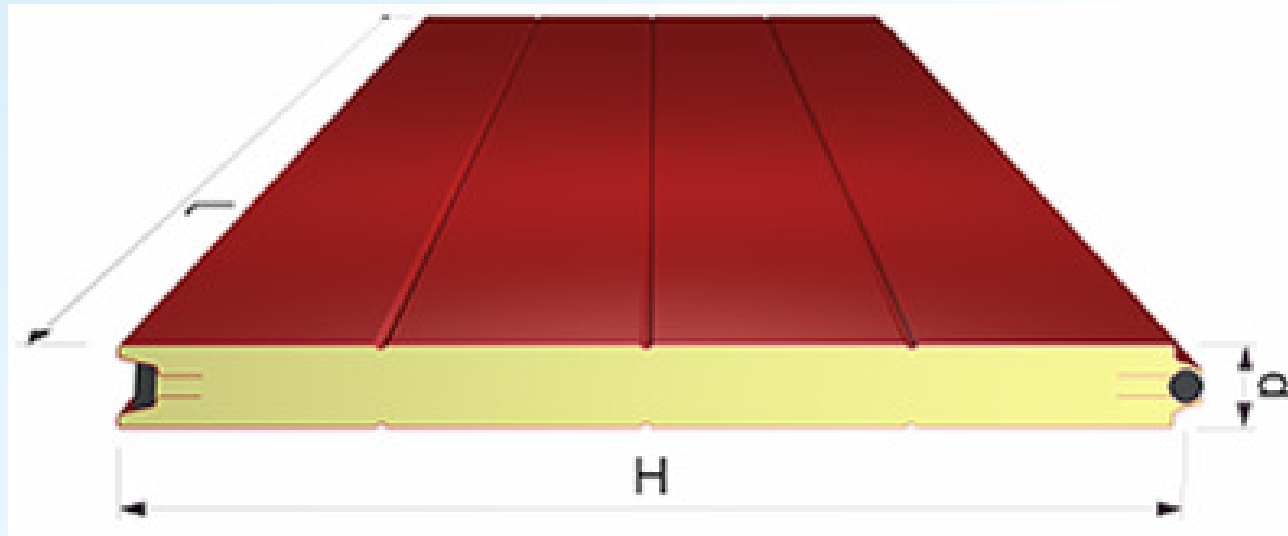
- Cold storage element



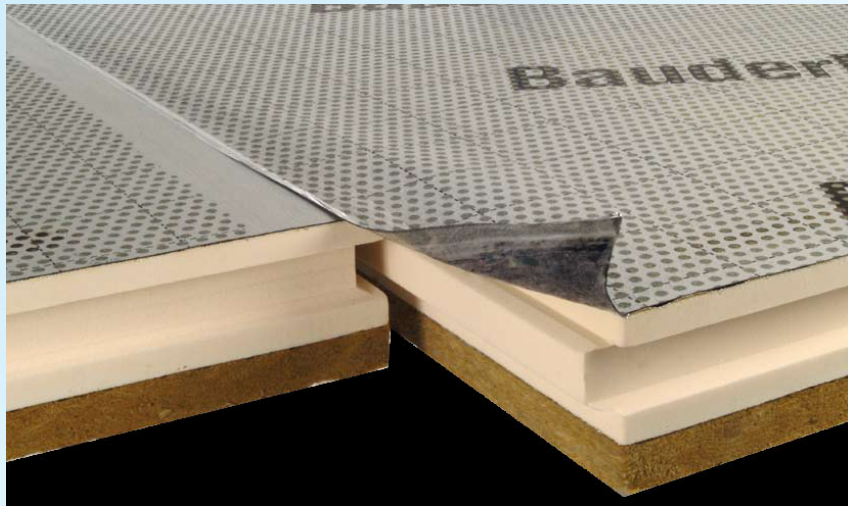
Sandwich Panels



- Sectional doors



Insulation boards

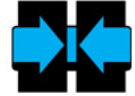


rigid facings

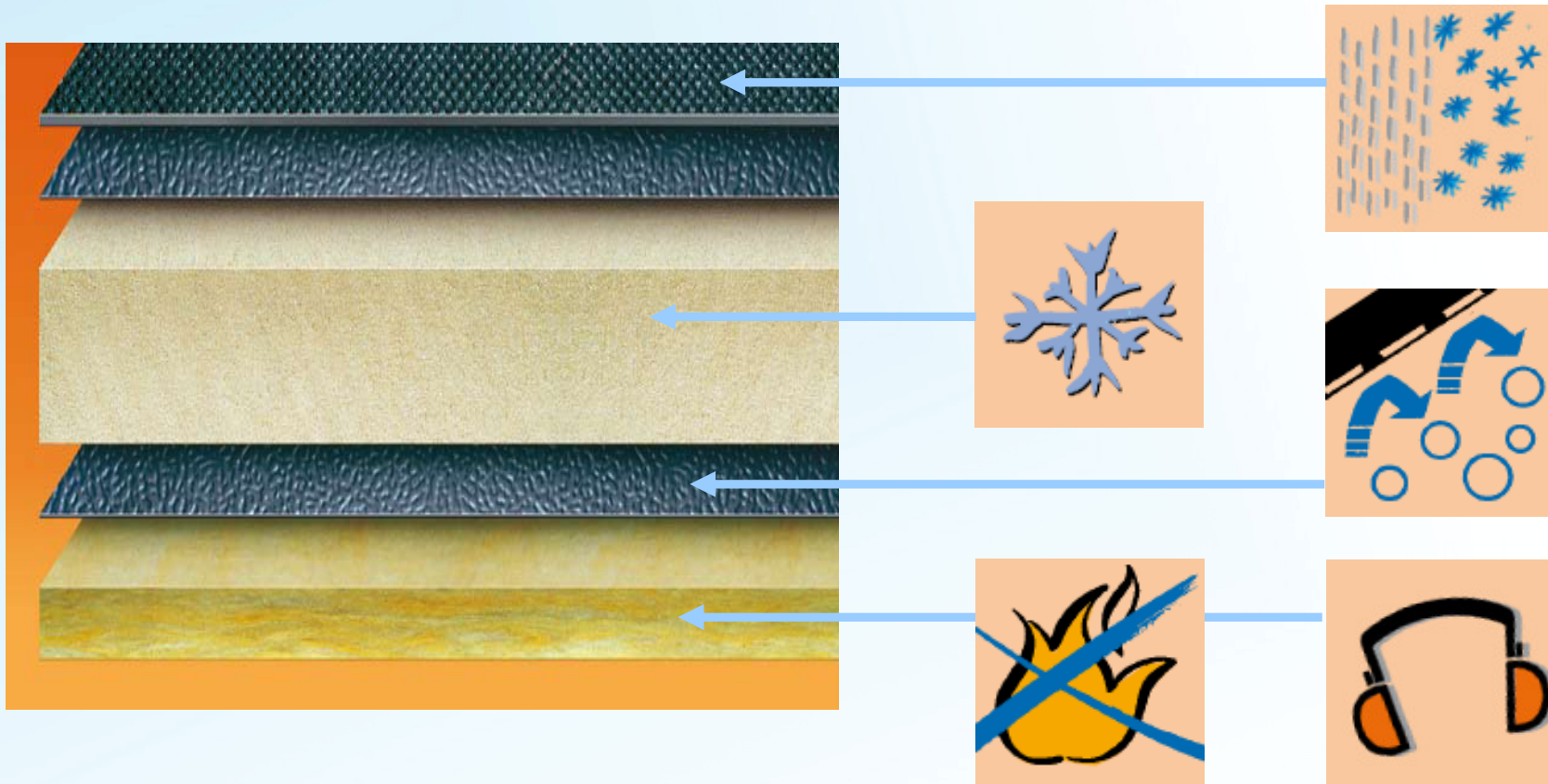


flexible facings

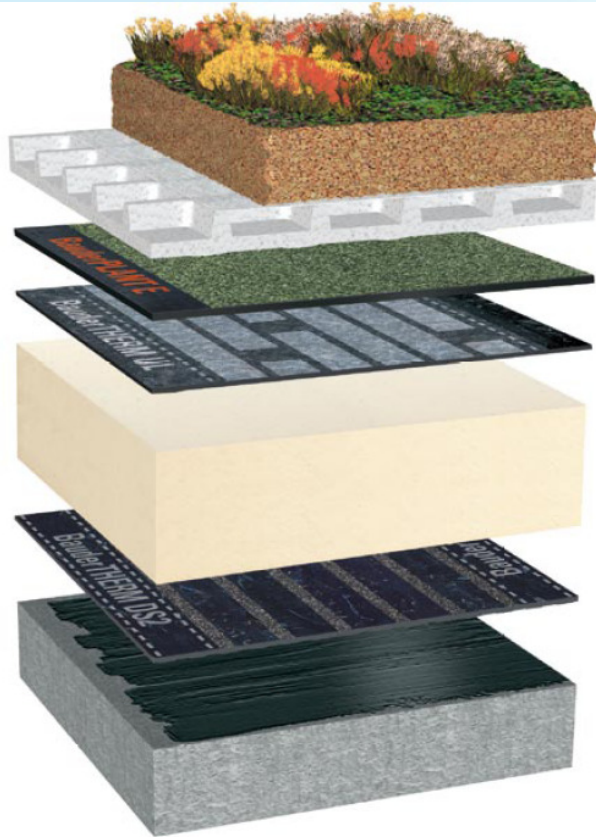
Insulation boards (manifold designs)



Combination of different properties



Insulation boards

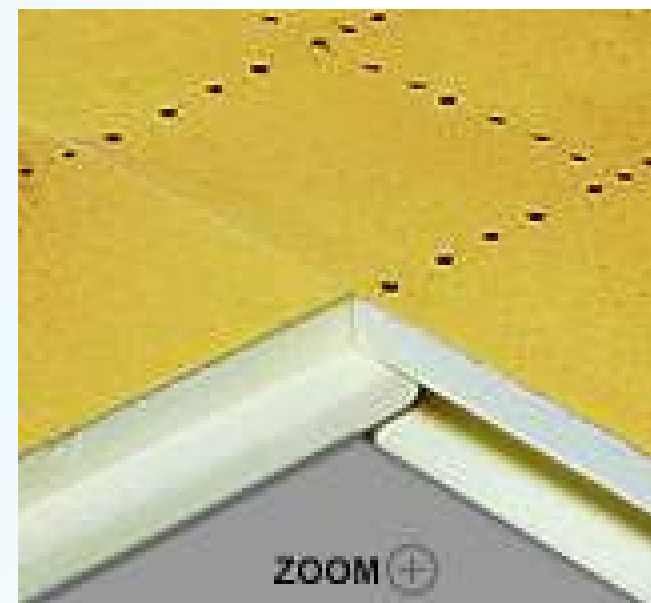
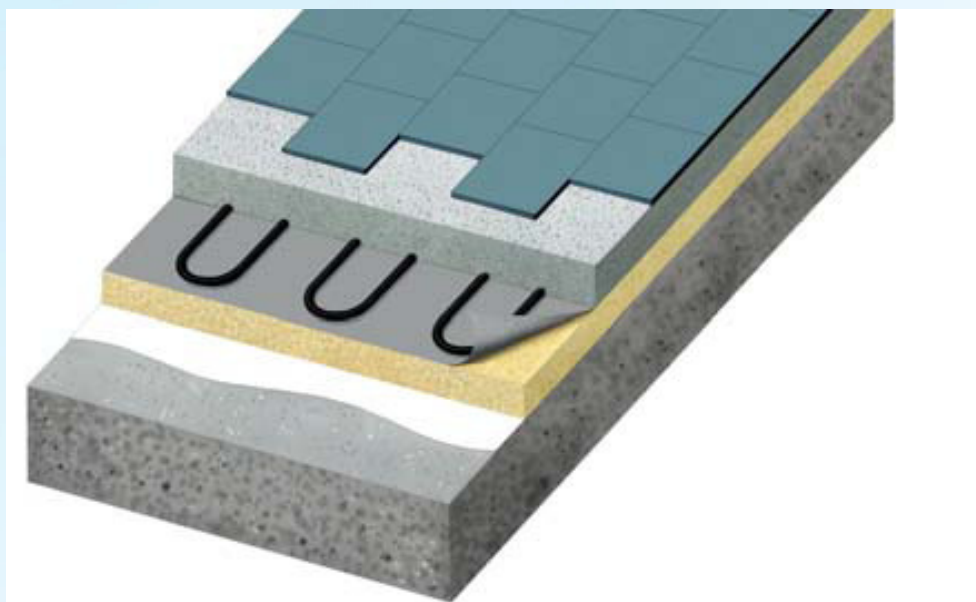


Systemaufbau-Beispiel:
BauderPIR M mit zweilagiger Bitumen-Abdichtung
und Dachbegrünung

- Combination of different materials??

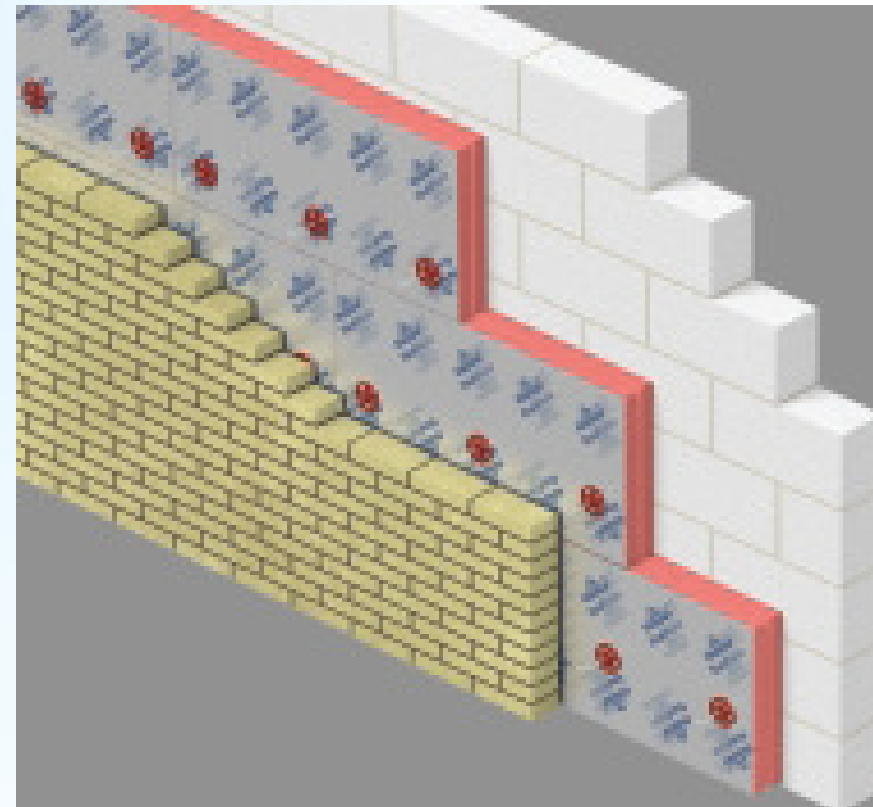
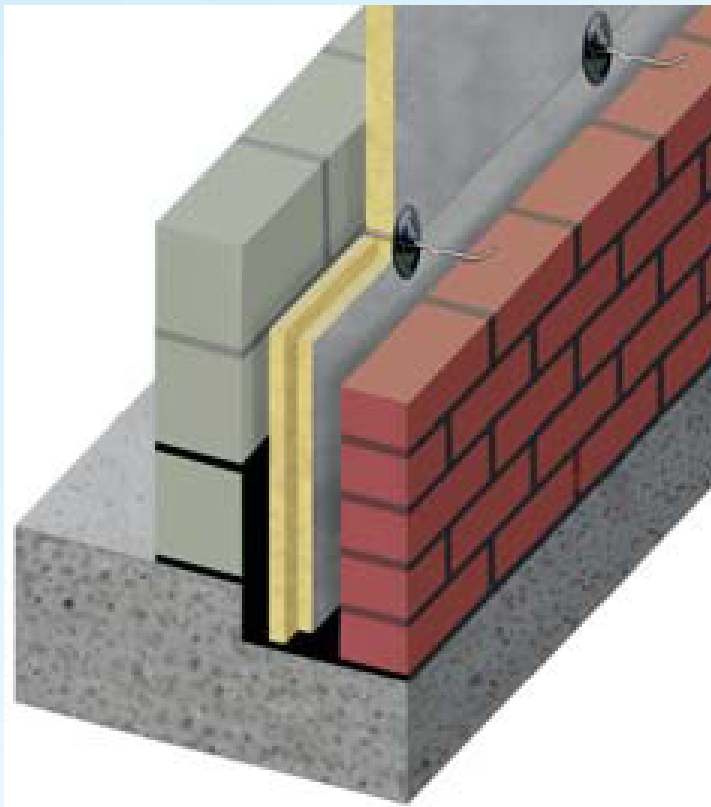
Insulation boards

- Floor insulation

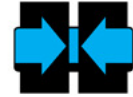


Insulation boards

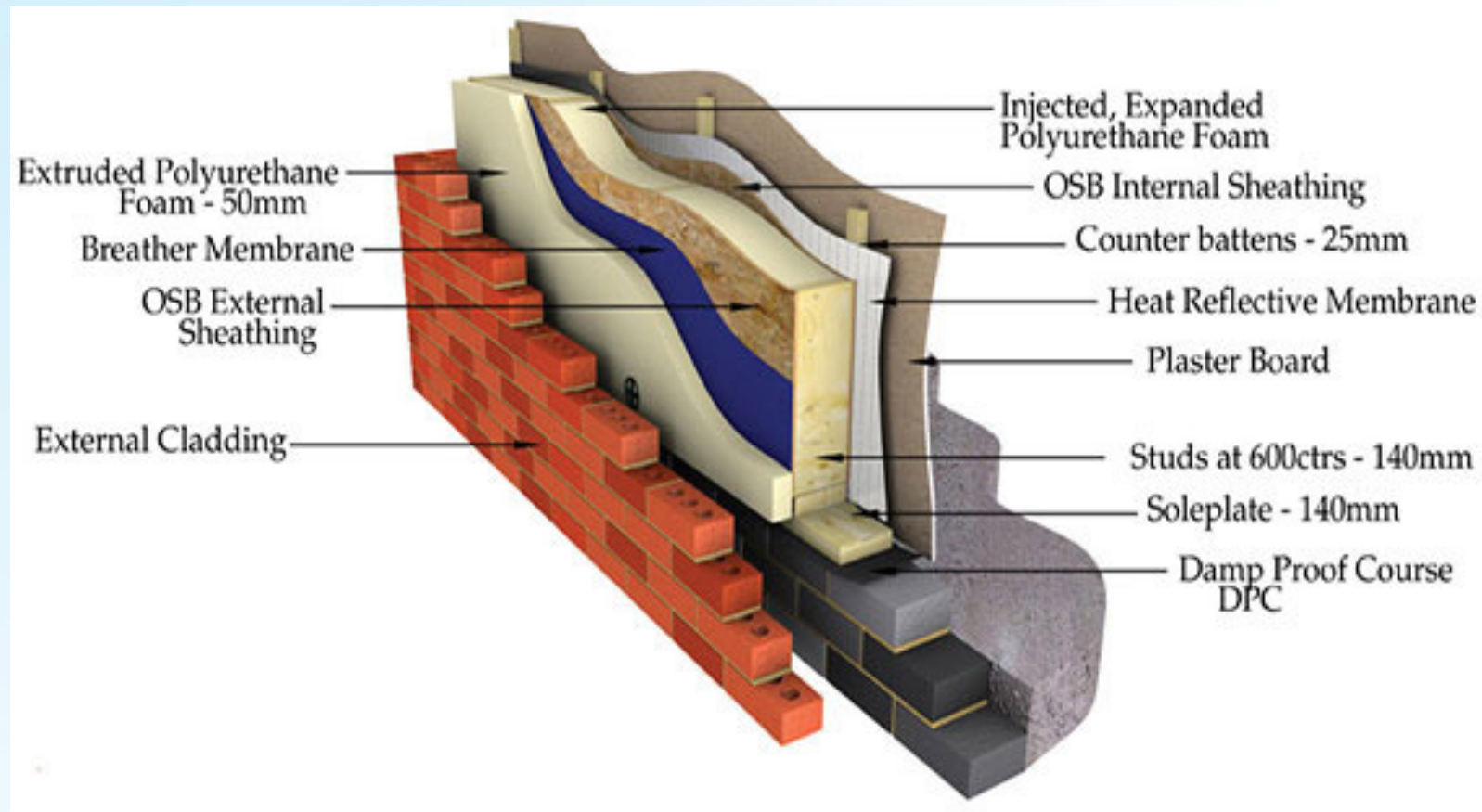
- Wall insulation (inner and outer wall)



Insulation boards

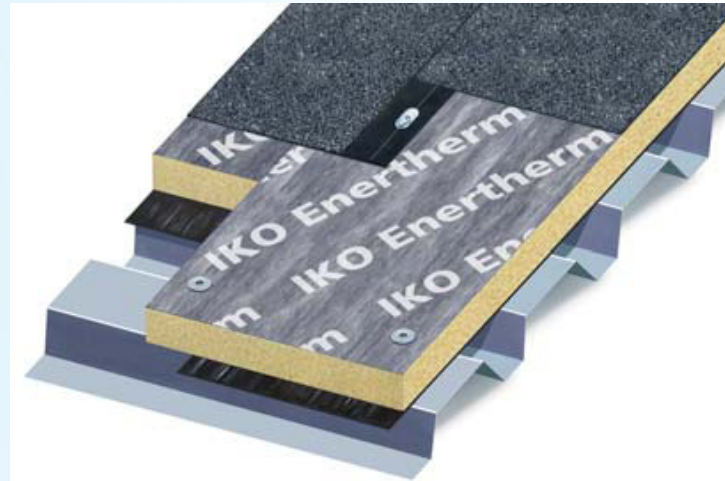
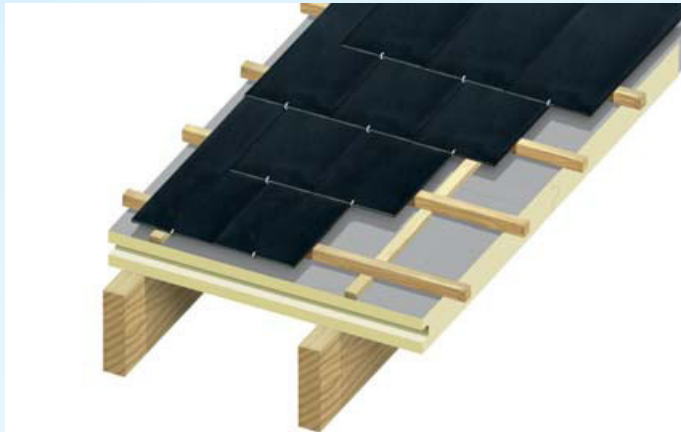


- Wall insulation (inner and outer wall)



Insulation boards

- roof insulation
(flat and standard roof)



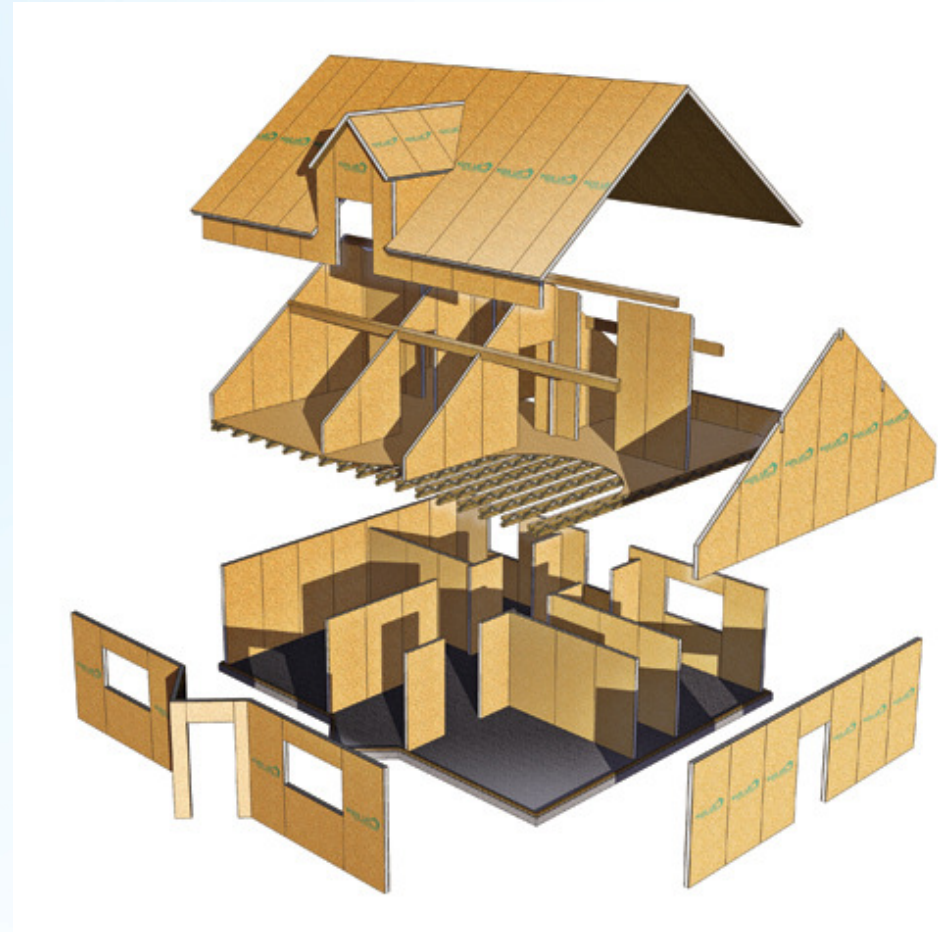
Insulation boards

- Agricultural application



Insulation boards

- Prebuilt houses

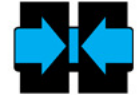


Insulation boards

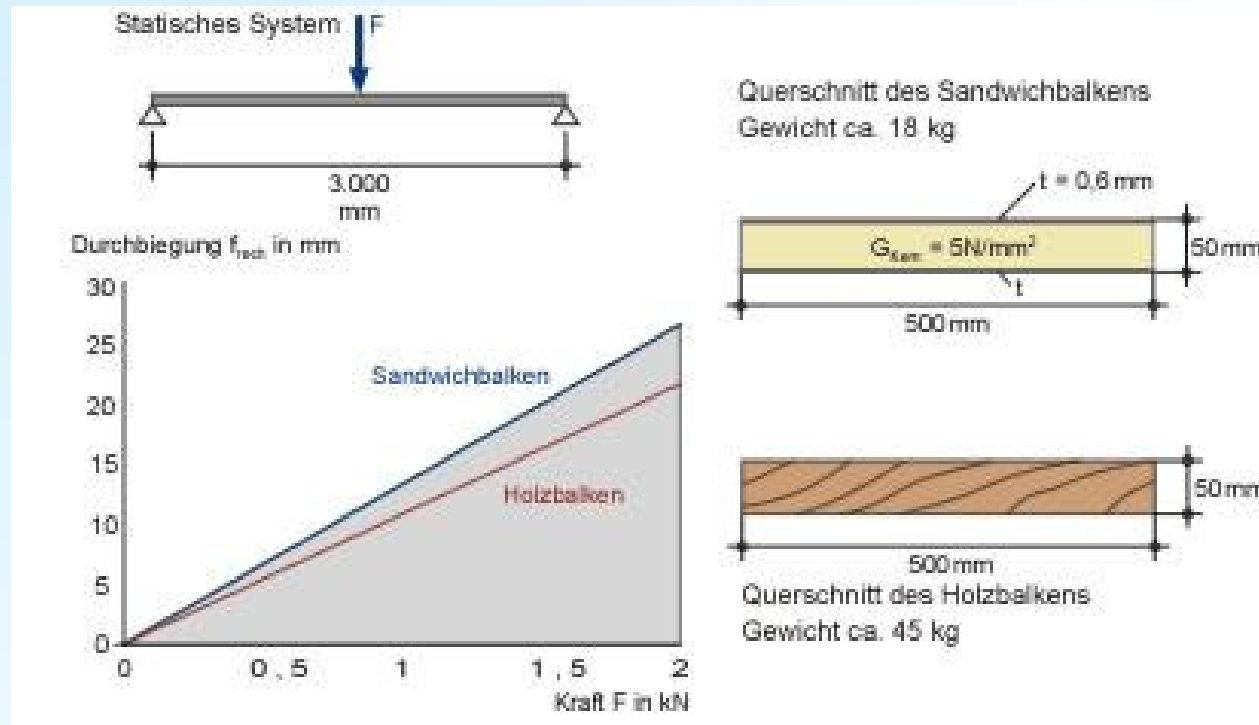
- Prebuilt houses



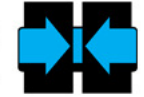
Sandwich elements



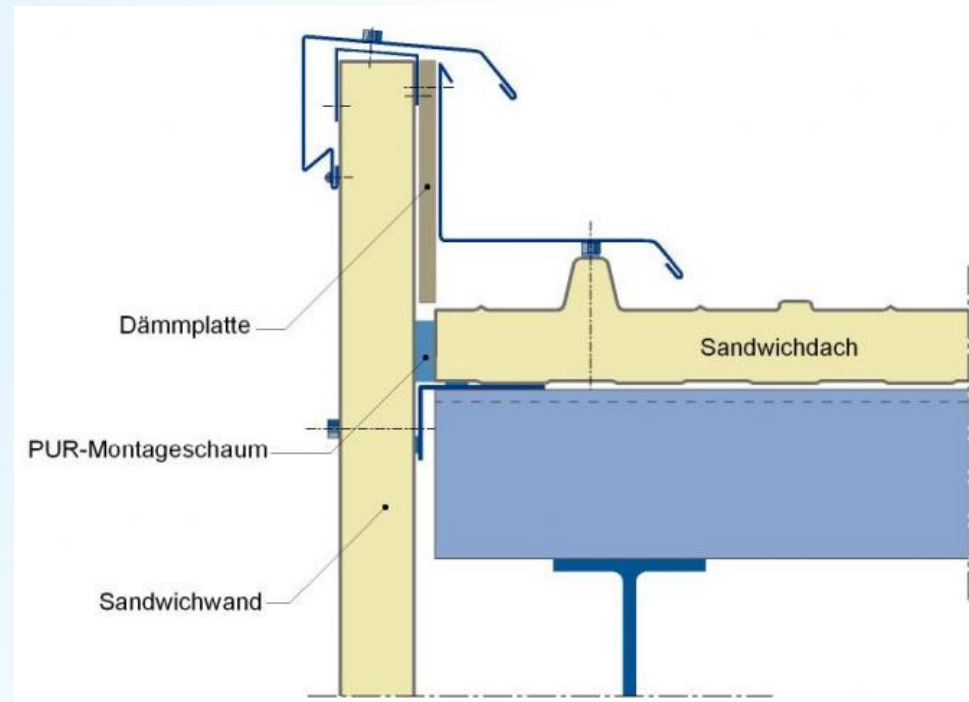
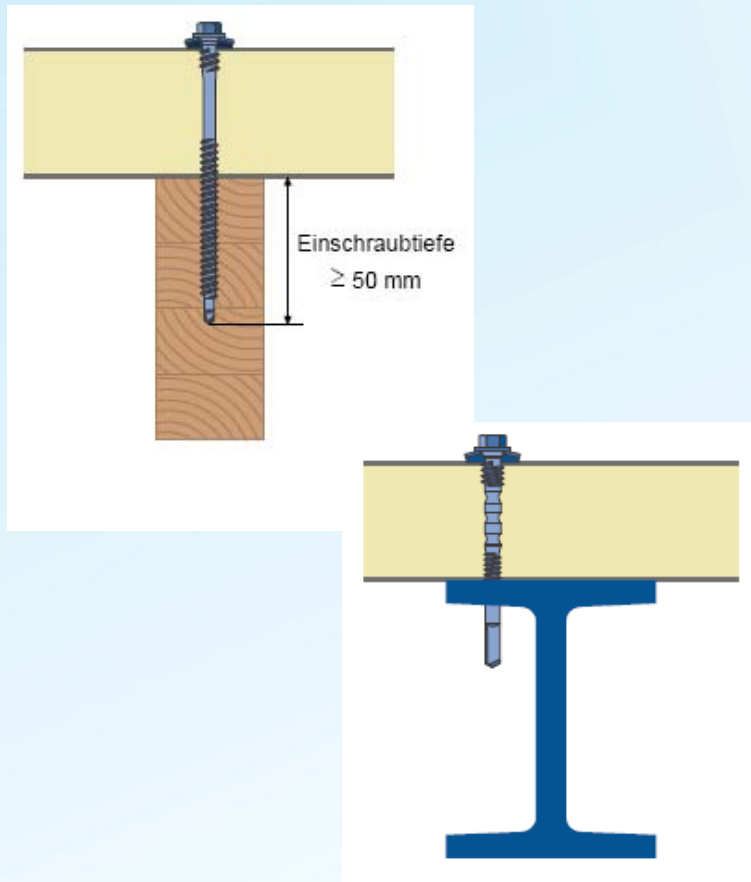
Purpose: stability



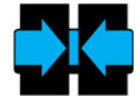
Sandwich elements



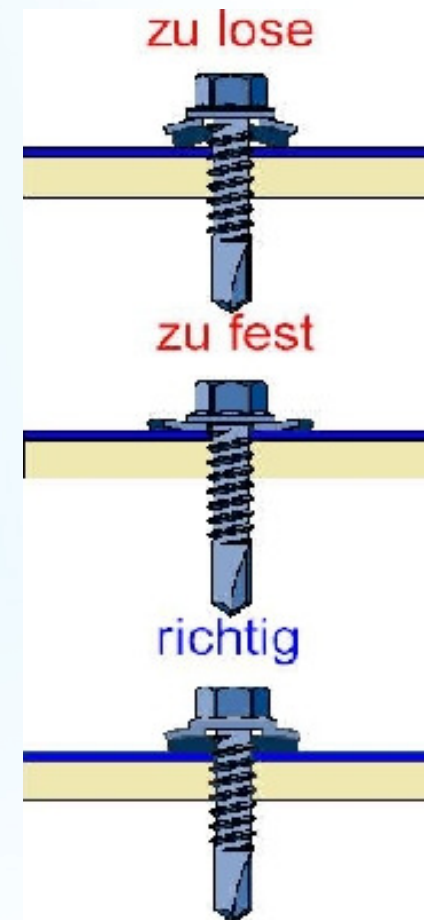
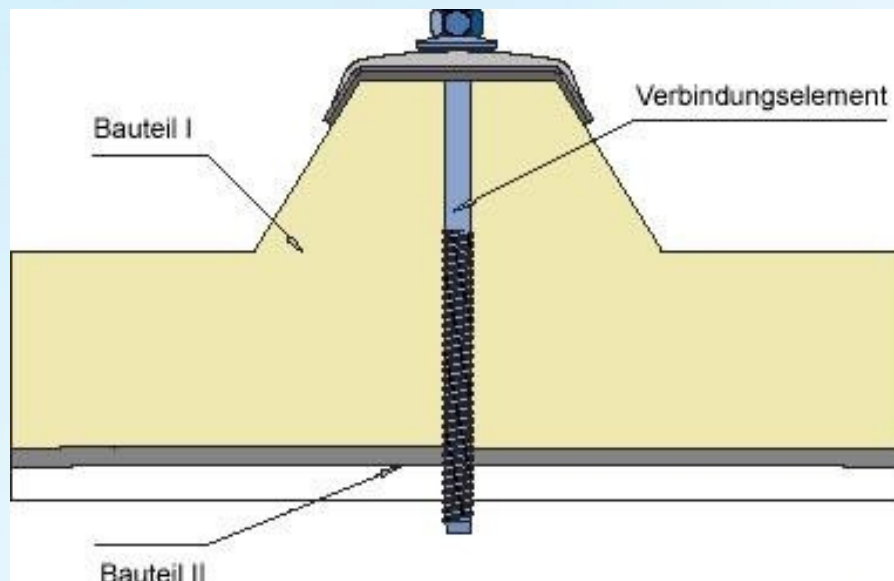
Purpose: easy fixation



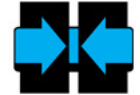
Sandwich element



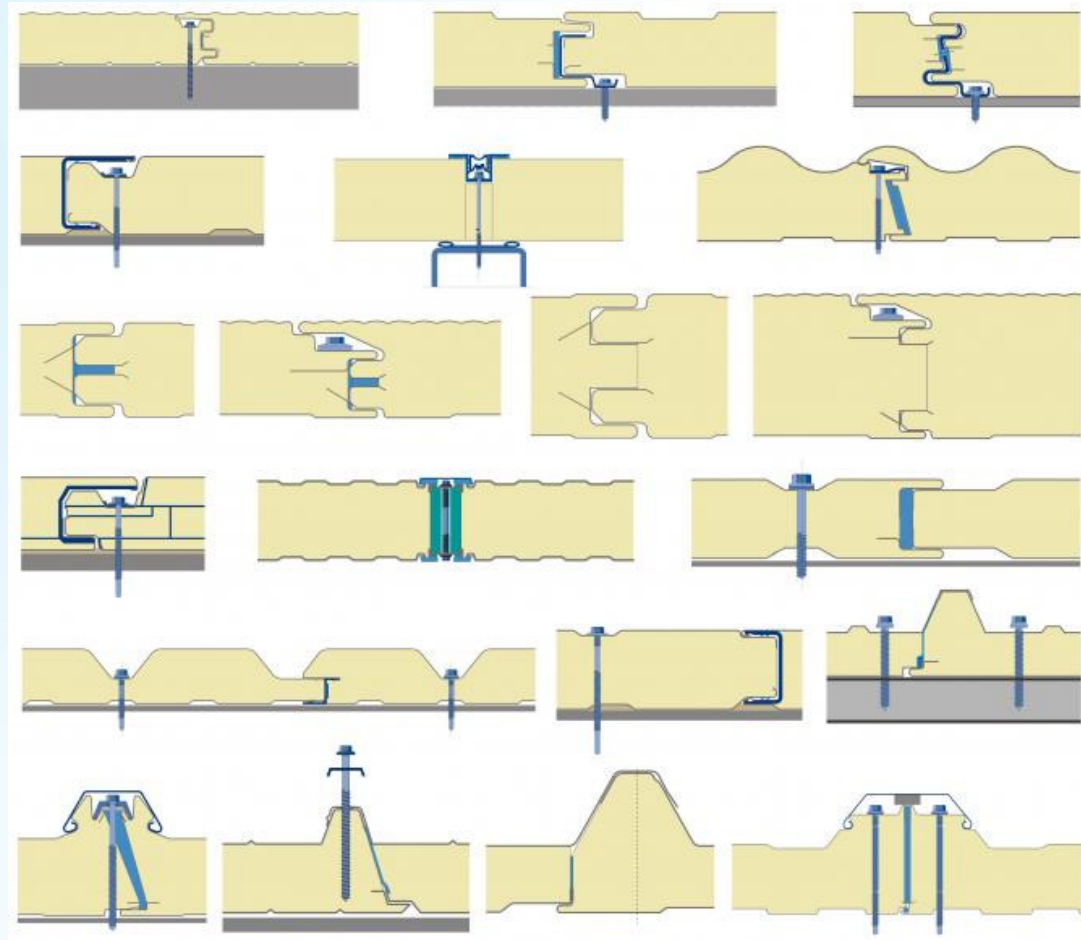
Purpose: easy fixation



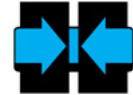
Element Sealing



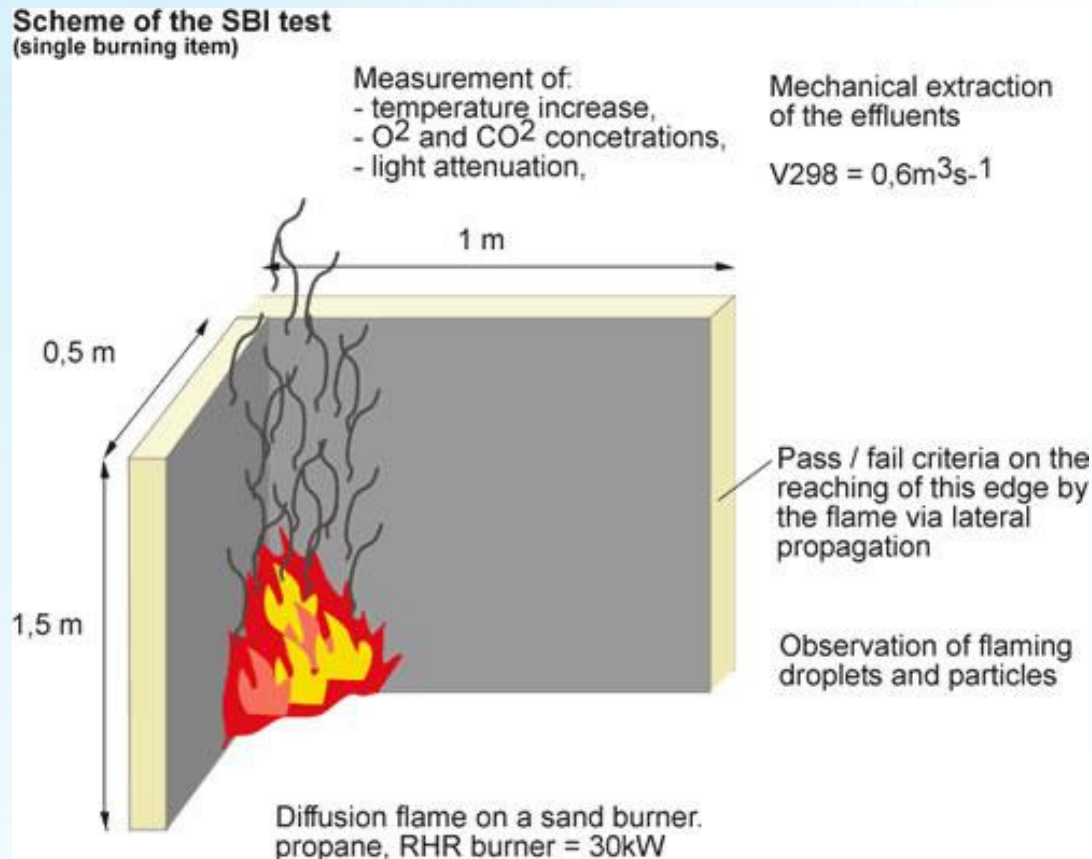
- Prevents penetration of water/vapour
- Achieves wind tightness
- Reduces energy losses



Sandwich elements

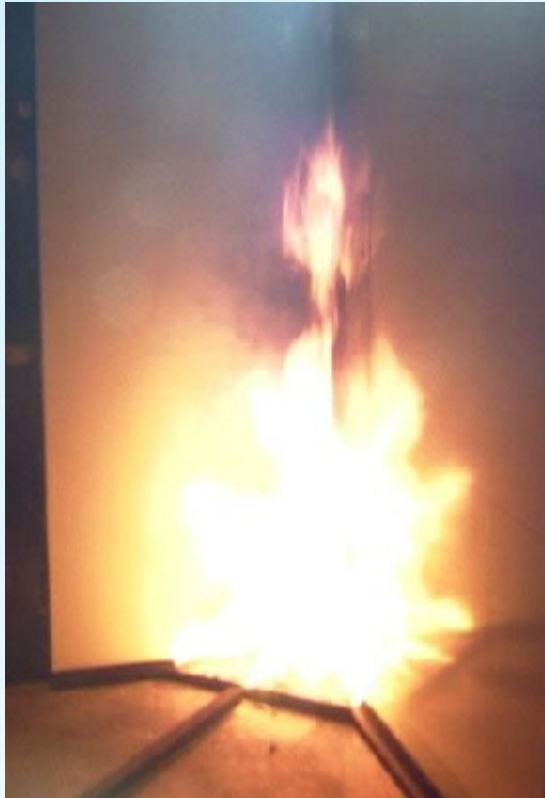


- Fire tests



Sandwich elements

- Fire tests

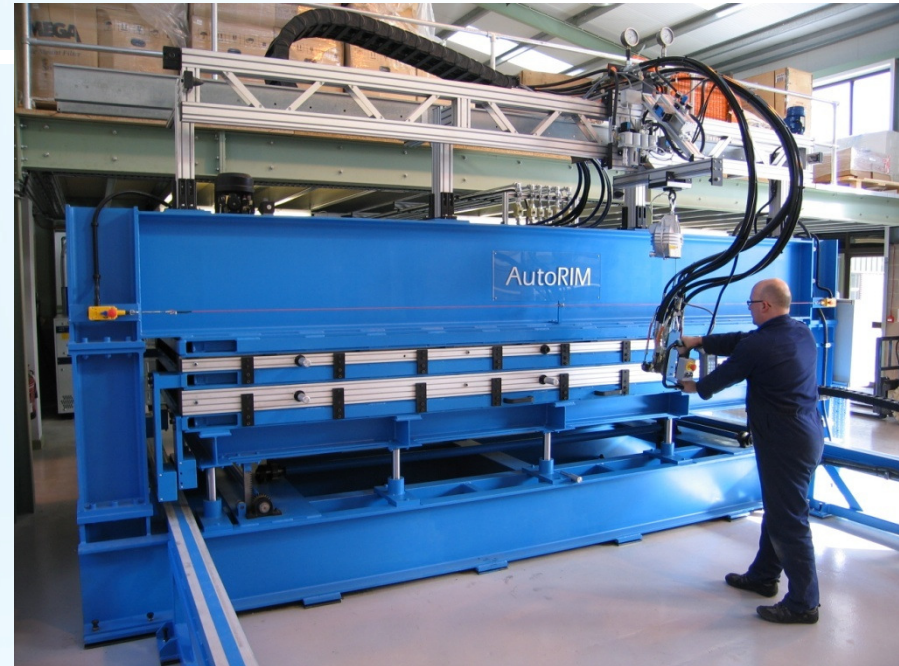


Discontinuous Production Process



Hennecke TopLine multi-head producing panels for temperature conditioned storage

Discontinuous Production Process



4.2m x 1.8m 1+1 side loading production system with mix head carriage and panel restraint

Discontinuous Production Process

2no. 6.5m x1.5m Side loading
1+1 panelformers with
integrated Hennecke
BaseLine unit



Discontinuous Production Process



8.1m x 3.1m panel-former
producing PUR insulated timber
frame housing



Discontinuous Production Process



Integrated Hennecke high pressure dispensing unit with production equipment for the manufacture of off site buildings

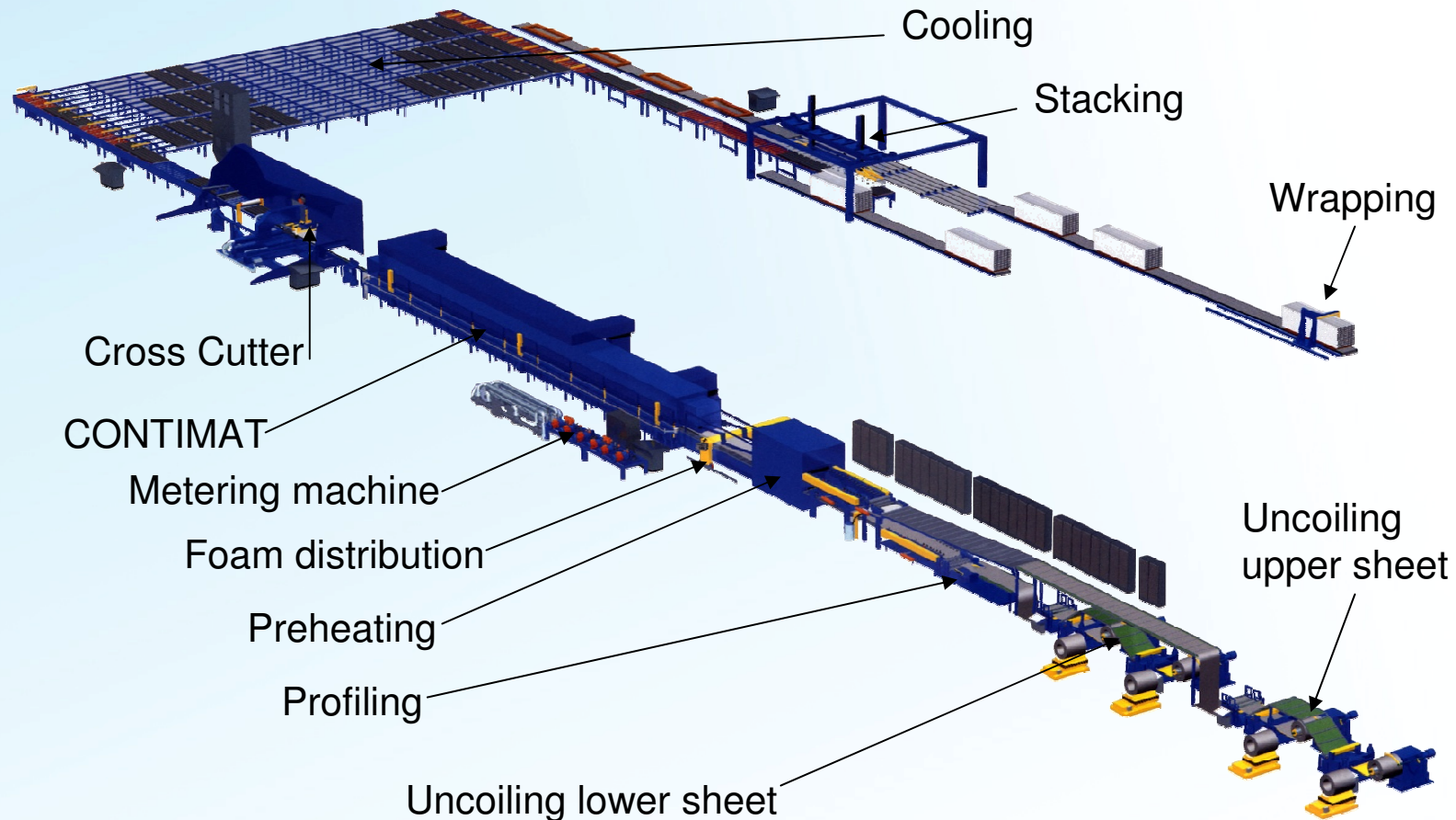
Discontinuous Production Process



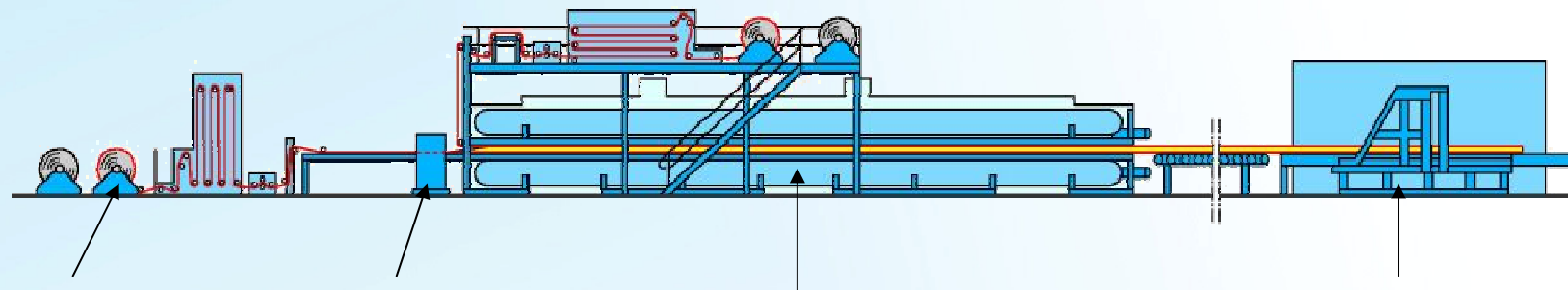
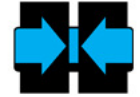
OSB faced PUR insulated building panels



Continuous Production Process (Steel facings)



Continuous Production Process with flexible facings (Isolation Boards)

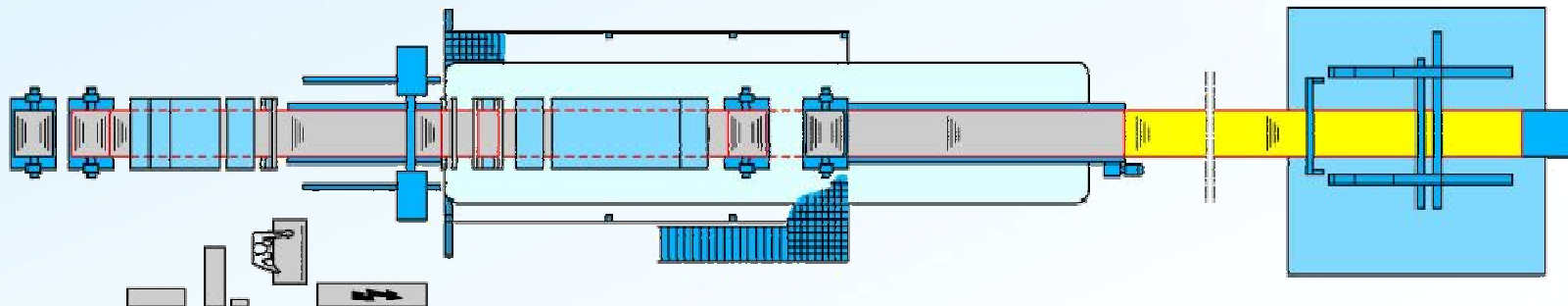


Uncoiling of flexible facings

Foam application

High speed CONTIMAT for curing

Cutting and cooling



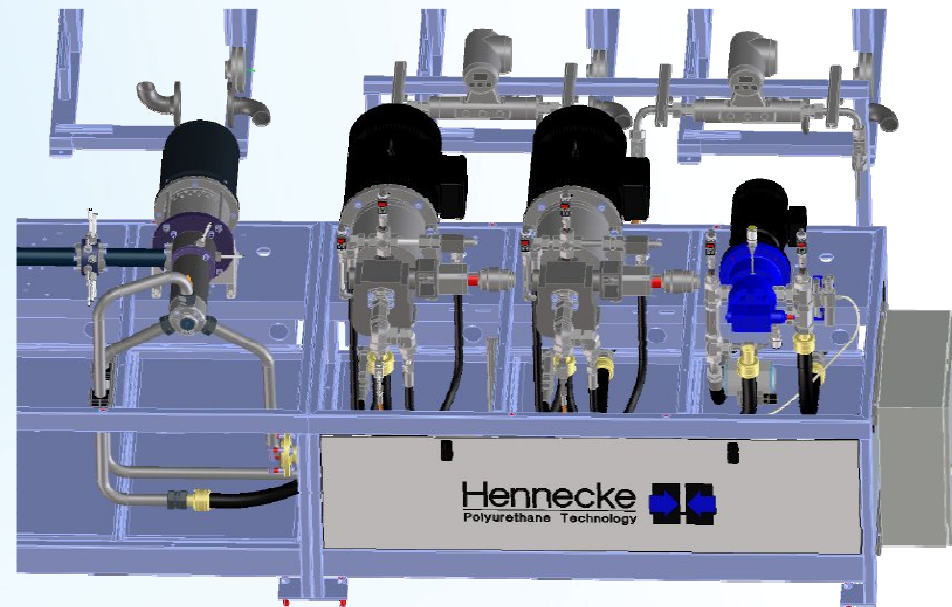
New Mixing Technology

Task

- Homogenization and creation of a fine dispersion
- Higher mixing energy required optimized mixing chamber (Diameter and Length)
- Fast acceleration of the droplets (leads to integration of the droplets by stretching them)
- Cross-blade-mixer with several mixing zones leads to repeated acceleration and deceleration of the dispersed liquid droplets

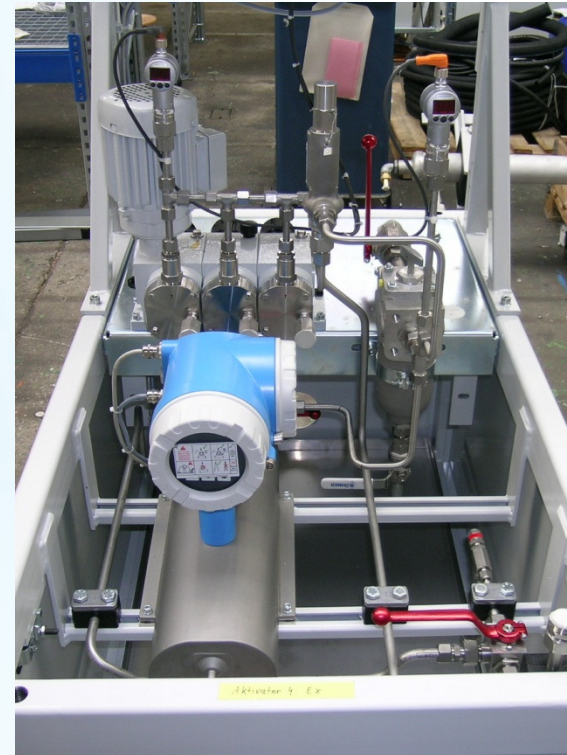
Hennecke's Mixing and Metering Machines

- efficient mixing with improved mixing device
- customised metering pumps depending on
 - viscosity
 - density
 - quantity
 - toxicity
 - flammability
- gas loading device for finest cell distribution
- high-pressure mixheads for optimised component mixing



Special Metering Pumps for Additives and Activators

output quantity: 0,01 - 3 l/min



viscosity: 1 - 10.000 mPas

Hennecke's Technology

Key parameters for high panel quality:

- efficient mixing and precise metering of liquid raw materials
- homogenous and reproducible foam distribution
- even and parallel curing zone within Hennecke CONTIMAT
- stable process temperature within Hennecke CONTIMAT
- precise and rectangular cut of sandwich element



Hennecke's Sandwich Panel CONTIMAT Lines



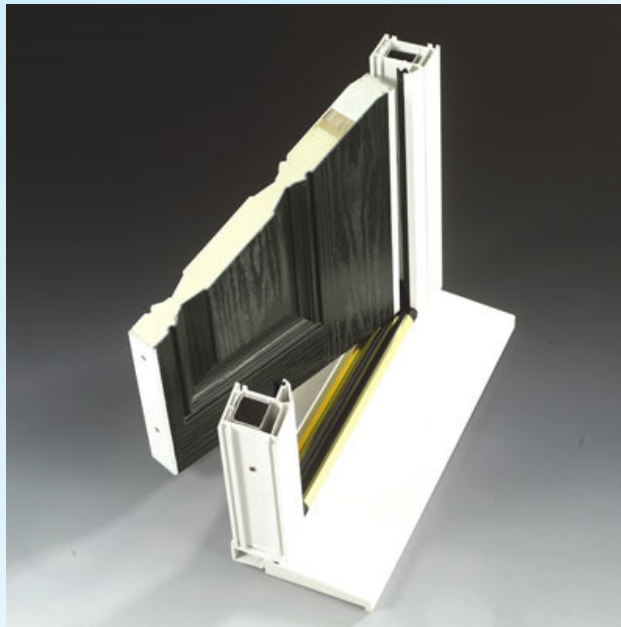
- Hennecke, supplier for premium Sandwich Panel Lines.
- Hennecke has delivered the majority of Sandwich Panel and Insulation board lines worldwide.
- The CONTIMAT, for excellent element and surface grades.
- High plant efficiency and energy saving design.
- CONTIMAT, designed for high developed PIR and PUR raw material systems.
- High quality control by Hennecke process analysing system

Other PU Applications in the building industry



Pipe insulation for effective energy transportation

Other PU Applications in the building industry



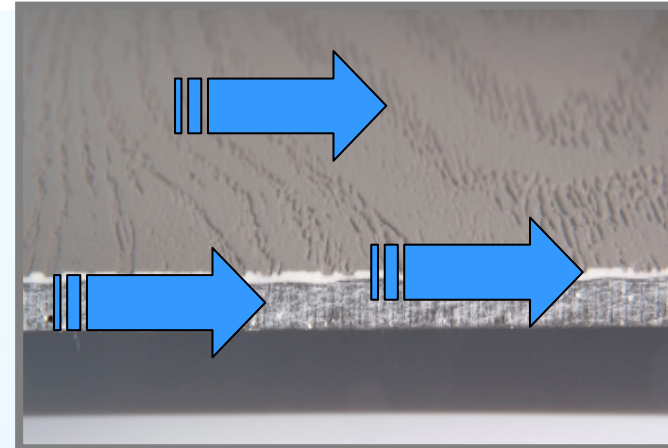
Doors made of PU



Frams and doors Insulated with PU

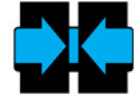
Other PU Applications in the building industry

Project „Side panels for SPAs“

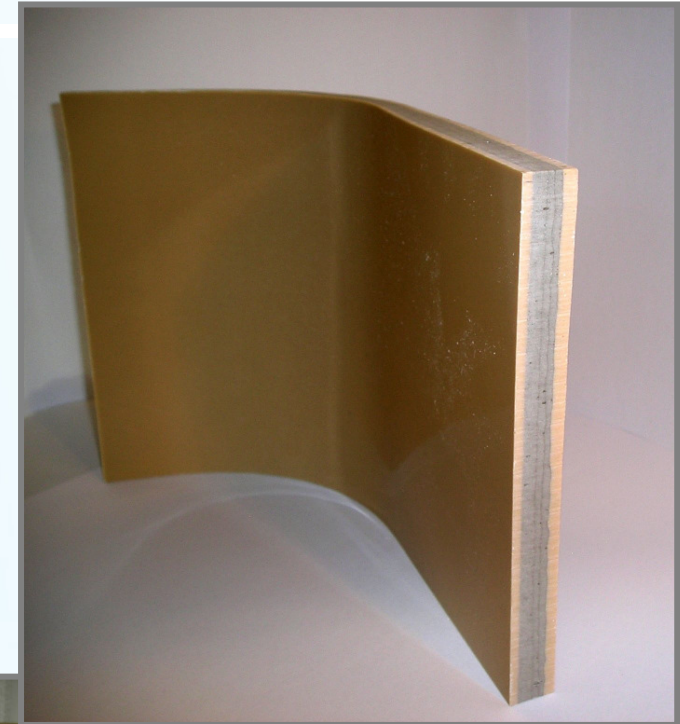
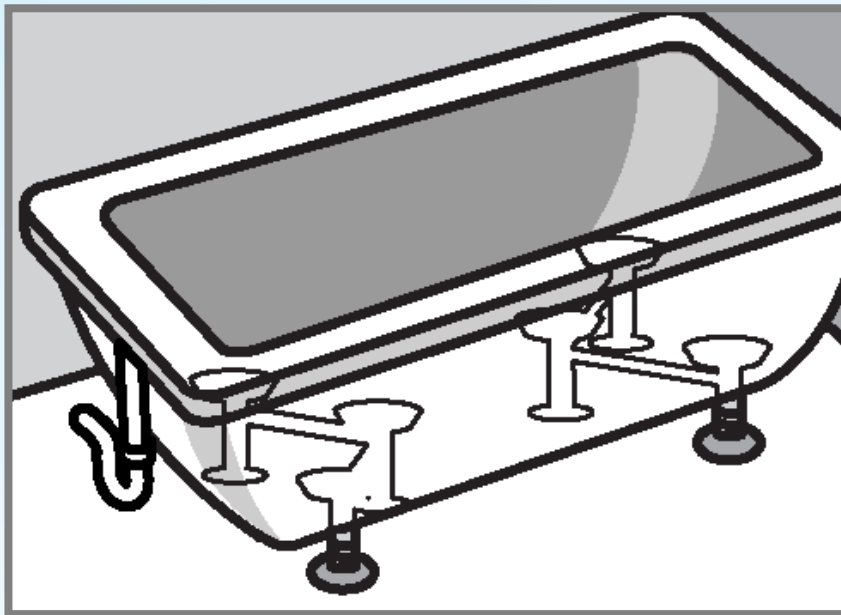


- Spraying of a coloured coat (IMC In-Mould Coating)
- PUR spraying of a barrier coat
- PUR glass fibre reinforced spray coat

Other PU Applications in the building industry

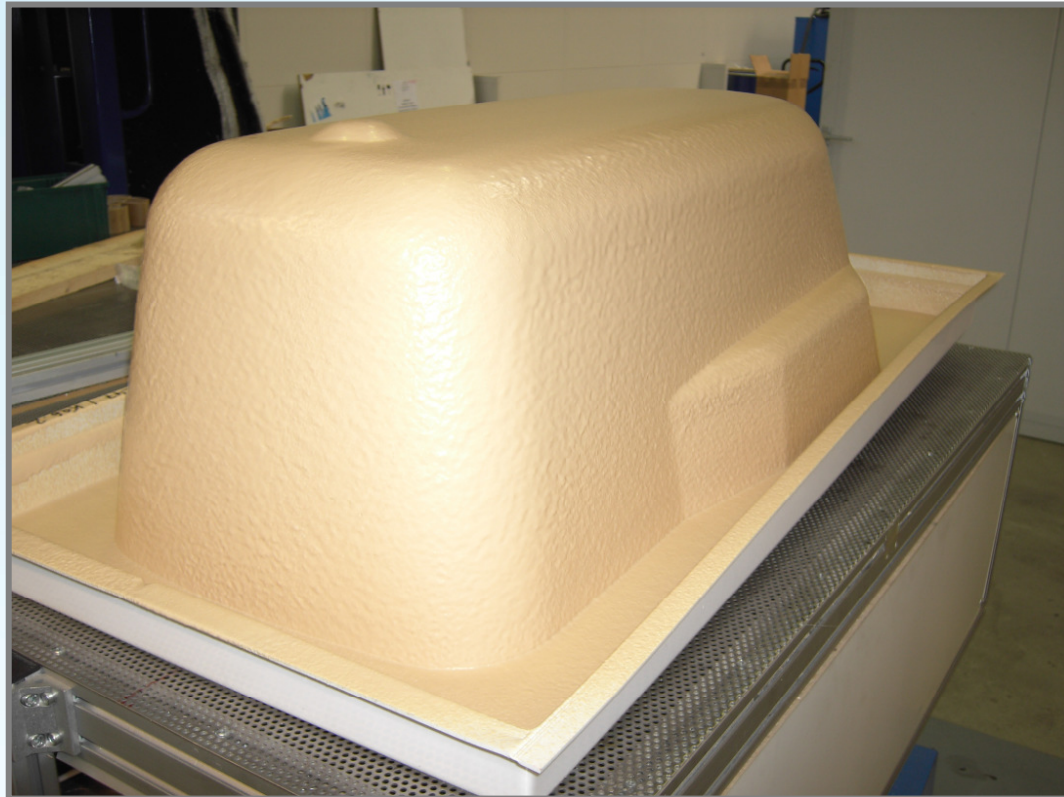


- Constructing sandwich layers
- Direct mounting of bathtub socket
- Temperature insulation
- Reduced acoustic emissions



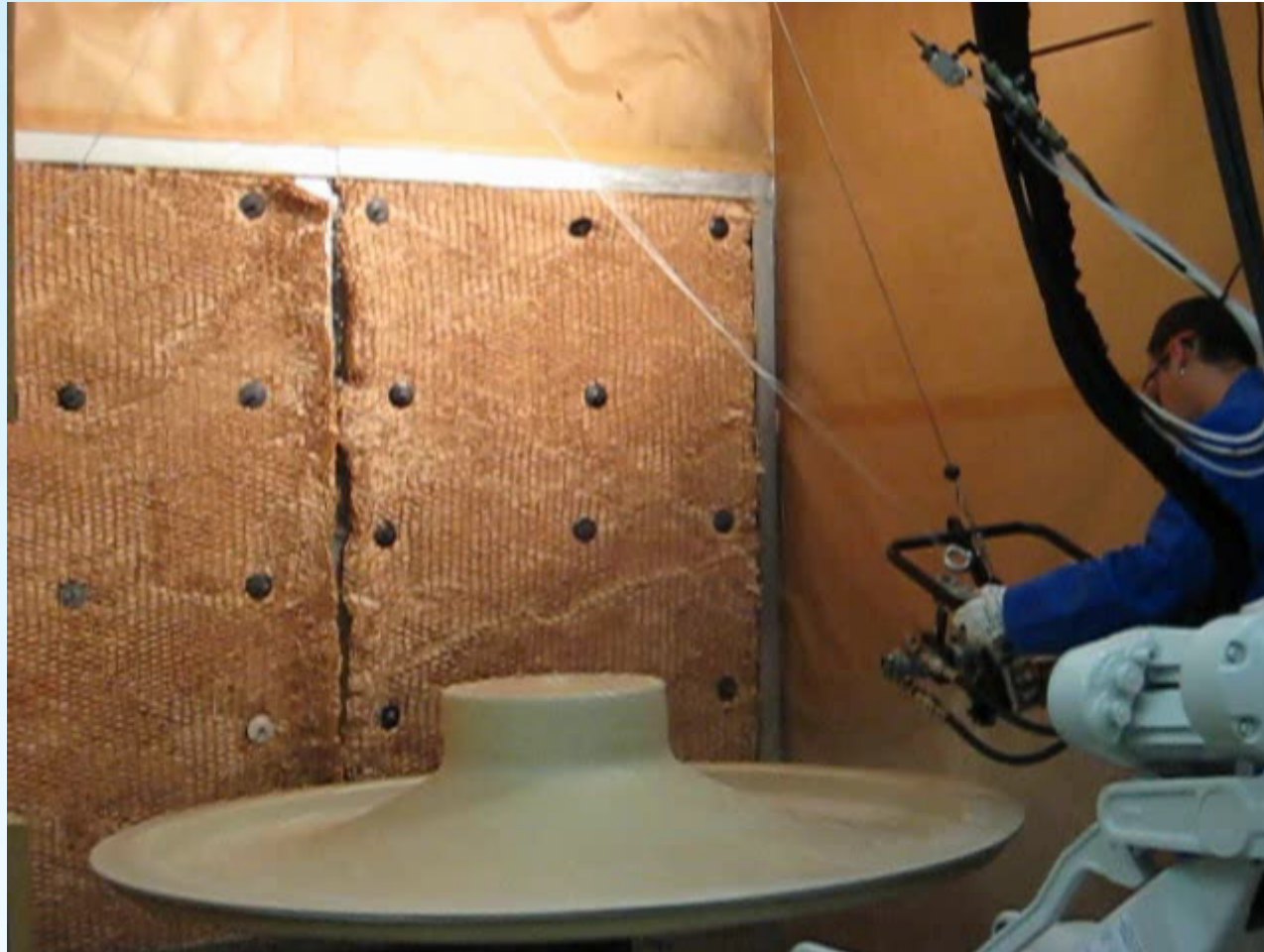
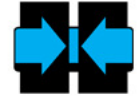
Other PU Applications in the building industry

Reinforced thermoformed foil

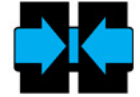


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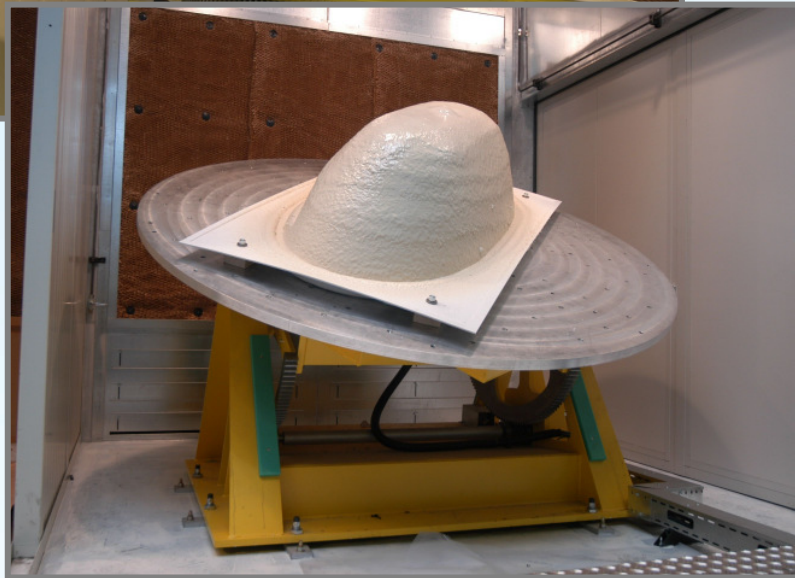
Other PU Applications in the building industry



Manual spray cycle with glass



What can we develop with you?



Hennecke in Germany


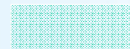



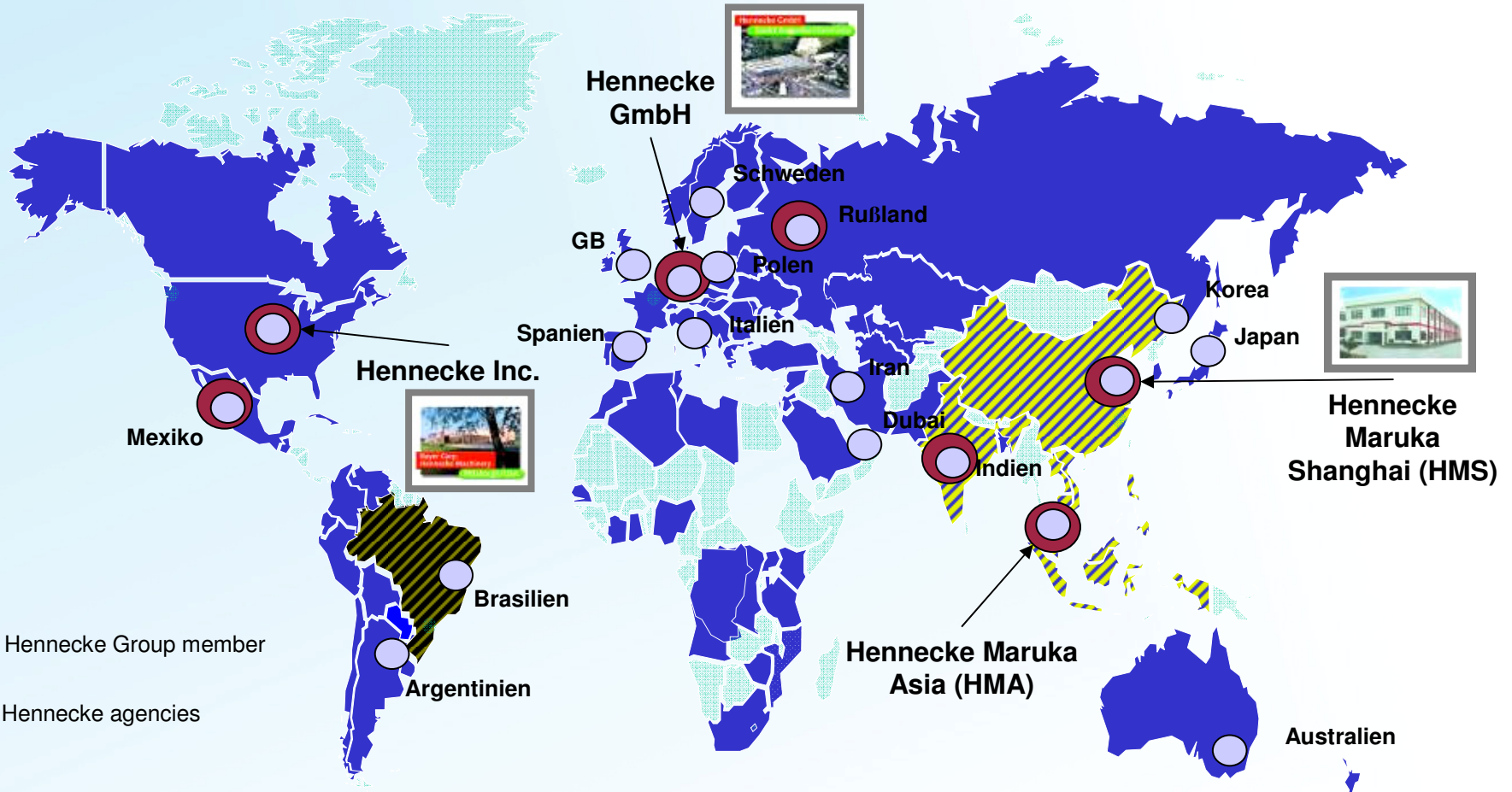
History



- 1945** Founding of the company by Karl Hennecke
- 50ties** Development of the first High-Pressure machine
- 1967** Bayer takes majority of the Hennecke shares
- 1975** Bayer takes 100% ownership
- 2005** Celebration of Hennecke's 60th anniversary
- 2008** Adcuram takes 100% ownership



Hennecke Worldwide

-  Hennecke is represented
-  Hennecke is not represented
-  Big growth in PUR industry



-  Hennecke Group member
-  Hennecke agencies

Product Lines

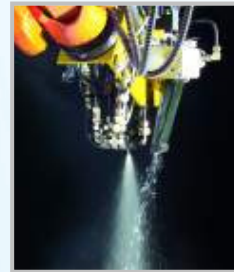
Metering Machines



Automotive



PUR-CSM



Refrig. Appliances



Sandwich Elements



Slabstock



360° Service



FASCINATION

FASCINATION PUR



PUR