ECOLOGICALLY DESIGNED, UNIVERSAL EXTERIOR THERMAL UPGRADE SYSTEMS

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Outline (looking through a crystal ball)

- Different EIFS – on wood insulation, on SPF
- Different climates: make it climatic stucco
- Foam needs fire protection (2 kinds) and weather protection (climatic stucco)

Systems good for all buildings, and most climates

- Prof. Norbert Lechner - 5 min input improve ICF systems, market China, US tornado regions

Conclusion – in April 2012 we will establish a public/private consortium at Syracuse U
German HD wood-fiber insulation

Insulation boards: From R 3.75 per inch

HDP-Q11 standard

UD-Q11 protect

FD-Q11 protect

Insulation boards for roofs, walls, ceilings, acoustics, etc.
Details of stucco application on the wood-fiber insulation board
Stucco on wood-fiber board the fastest growing cladding system in Germany
1. Shelf angle for mounting brick veneer in front of the foam
1. Metal profile for hanging external stone cladding
System 2 (3 patents): trimmed foam (right), basecoat (left), protective barrier removed for photo

Late Mike BELLEAU inventor, EIFS on SPF
Polyurethane foams in exterior thermal upgrades – 20 years of experience

EIFS on SPF, Vermont high school, windows protected, before /after surface trimming
A thin synthetic stucco applied – finished Vermont high school project
System 3: to reduce PU surface trimming use good stucco (photo in the region of Alps)
But beware of a North American plaster that decays within 10 years (Vancouver condo)
8 stucco samples with A and WVP data from good (6) to bad (1,2,3)

Private data
Water absorption coefficient of acrylic stucco from NE building site

\[ A_{\text{avg}} = 0.0009 \text{ kg/m}^2\text{s}^{1/2} \]
Compare wetting and drying rates of different type of stucco?

- **Traditional 3-coat stucco**,
  
  **SU** $A = 0.16 \text{ kg/m}^2\text{s}^{1/2}$
  
  **TUD** $A = 0.17-0.01 \text{ kg/m}^2\text{s}^{1/2}$,
  
  avg. $A = 0.074 \text{ kg/m}^2\text{s}^{1/2}$

- **Lime mortar** - drying rate = clay brick, cement mortar 10x slower = concrete

  **NE**: Acrylic finish $A = 0.0009 \text{ kg/m}^2\text{s}^{1/2}$

  100 times lower than traditional stucco
Misconception of 3-coat stucco

- In N and NE of the USA and Canada one often sees the misconception of “protecting” stucco from the water ingress by using a “barrier” stucco
- Use of modern polymeric modifiers combined with the use of Water Resistive Barriers (WRB) elevates the concept of “barrier stucco” to a fundamental mistake!
Water enters along the crack but it dries through the “barrier stucco finish”
Barrier stucco

- Stucco taken from areas of failure had low water absorption.
- Acrylic finishing had A-coef. 10x lower than the lowest TU Dresden.
- Drying rate of this stucco was 10x lower than that tested at TUD or 100 time lower than traditional lime-cement stucco.
Any thermal upgrade system needs breathe moisture outside and have a moist. storage

- In EIFS on SPF system the first moisture storage element was either OSB, or the existing masonry,

- A sufficient moisture storage in climatic stucco is to allow for day / night moisture oscillations.

- Thermal upgrade should not modify MC on the surface of old masonry and in long run induce its drying.
Conclusions -1-

- Polyurethane controls heat, air and water vapor flow through the BE
- Stucco, gypsum or HD mineral or even wood fiber insulation provide the fire protection
- Climatic stucco provide the rain control

These systems are good:

- All buildings (old / new) & all climates
What if we had a composite panel designed as a moisture buffer to control indoor environment (RH) and fire risk a panel that is permeable enough and durable enough to be used either on outside or on the inside?

It could have market in the exterior insulation systems in the US and interior in China on concrete buildings
Conclusion 3: public-private research consortium at Syracuse U

Manufacturing members
1 (2) foam systems (different blowing agents)
1 (2) types of fire protective boards
1 climatic stucco and 1 ICF manufacturer

Other interests
1 project manager
1 (2) testing laboratories
2 - 3 architects/ engineers to ensure the path from the design intent to field performance
Thank you for your attention

Time for questions