# Basisinfo Housingbau

*STATE-OF-THE-ART CONSTRUCTION TECHNOLOGY*

# *STATE-OF-THE-ART CONSTRUCTION TECHNOLOGY*

## BUILDING SOLUTIONS

- that bridge the gap between energy efficiency, affordability and high quality
- for houses, offices, warehouses, schools, hospitals, modular and mobile homes etc.
- without cement, steel or wood
- with significant savings in cost to build, time to build + energy cost to operate
- that allow complete structures from foundation to roof
- for exterior/interior walls, beams, columns, profiles and roofing

- for sustainability, durability, strength, fire resistance and waterproofing
- tested to resist catastrophic environmental conditions like floods, hurricanes + earthquakes
- for a better alternative due to inherent characteristics

## GROWING TRENDS

- **World demand** for houses clearly **exceeds supply** many times over
- **Lack of affordable homes + inability to build homes in a short time** are key factors among many others contributing to it, especially for low income classes
- **4 steadily growing trends** are of particular relevance in developing countries and industrialized regions:

**Growth of slums**

**Level of urbanization**

**Flow of refugees**

**Emerging medium class**

### GROWTH OF SLUMS

- **In 2001 1 billion people of the urban population worldwide were living in slums**
- **- 43% of urban population in developing regions = 870 million people**
- **- 78% of urban population in least developed countries = 140 million people**

**living in slums with new slums occurring all the time !**

according to a study conducted by

UN HABITAT
FOR A BETTER URBAN FUTURE

# GROWING TRENDS

## LEVEL OF URBANIZATION

- predicted to rise in Africa **from 34,2 %** (2000) **to 42,7 %** (2010)
- parallel the **urban population in Africa will grow by 1/3** leading to growth in demand for accommodation acceptable for human beings
- Analogous conclusions for **Asia, Latin America & Caribbean region**
- **by 2030** there will be **2 billion additional inhabitants** in the world
- **90%** of them will live across **developing countries**

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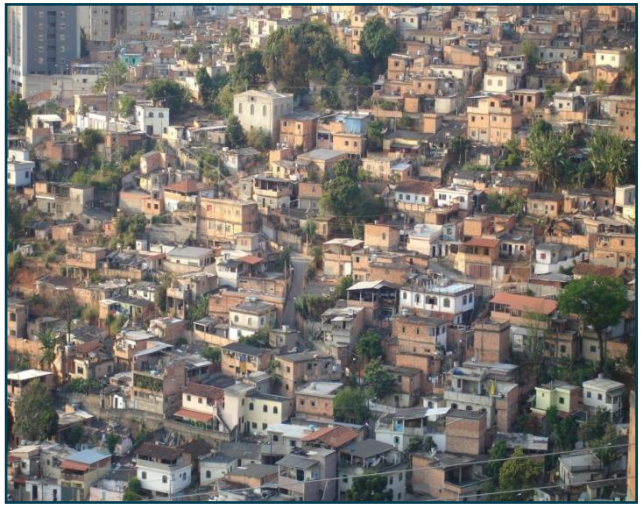
## FLOW OF REFUGEES

- **worldwide dislodged by**
  **- natural disaster**
  **- war**
  **- persecution**
  **- famine / poverty**
  **will cause further requirements**
- **5.5 million refugees accepted by 10 major countries end of 2003**

## EMERGING MEDIUM CLASS

- **Fast growing economies** of large countries like **Brazil**, **India**, **Russia** + **China require fast construction** for millions of affordable + safe homes
- Projected **demand** over the next decade: **> 170 million houses**

## GROWING TRENDS



### FACTS

**UN-Habitat estimates that**

- **3 billion people** will **require basic housing** over the next 24 years
- Only **new technologies of material** and **radically new construction processes** can make this happen

### SLUM HOUSING

Inadequate housing in urban areas that lack 1 or more of these elements tends to result in slums:

- **Durable housing** of a **permanent nature** that protects against extreme climate conditions

- **Sufficient living space** = not more than 3 people share 1 room
- Easy **access to safe water** in sufficient amounts at affordable rates

  Access to **adequate sanitation** in form of private/public toilets shared by a reasonable number of people
- **Security of tenure** that prevents forced evictions

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FOR A BETTER URBAN FUTURE

# *BASED ON ULTRA MODERN NEW COMPOSITE MATERIALS*

## *SUBJECT*

Load bearing insulating panel system, structural skins made of high-strength E-Glass fiber fabrics impregnated with fire-resistant polymeric epoxy resin + a core made of construction foam material

## *POINT OF POWER*

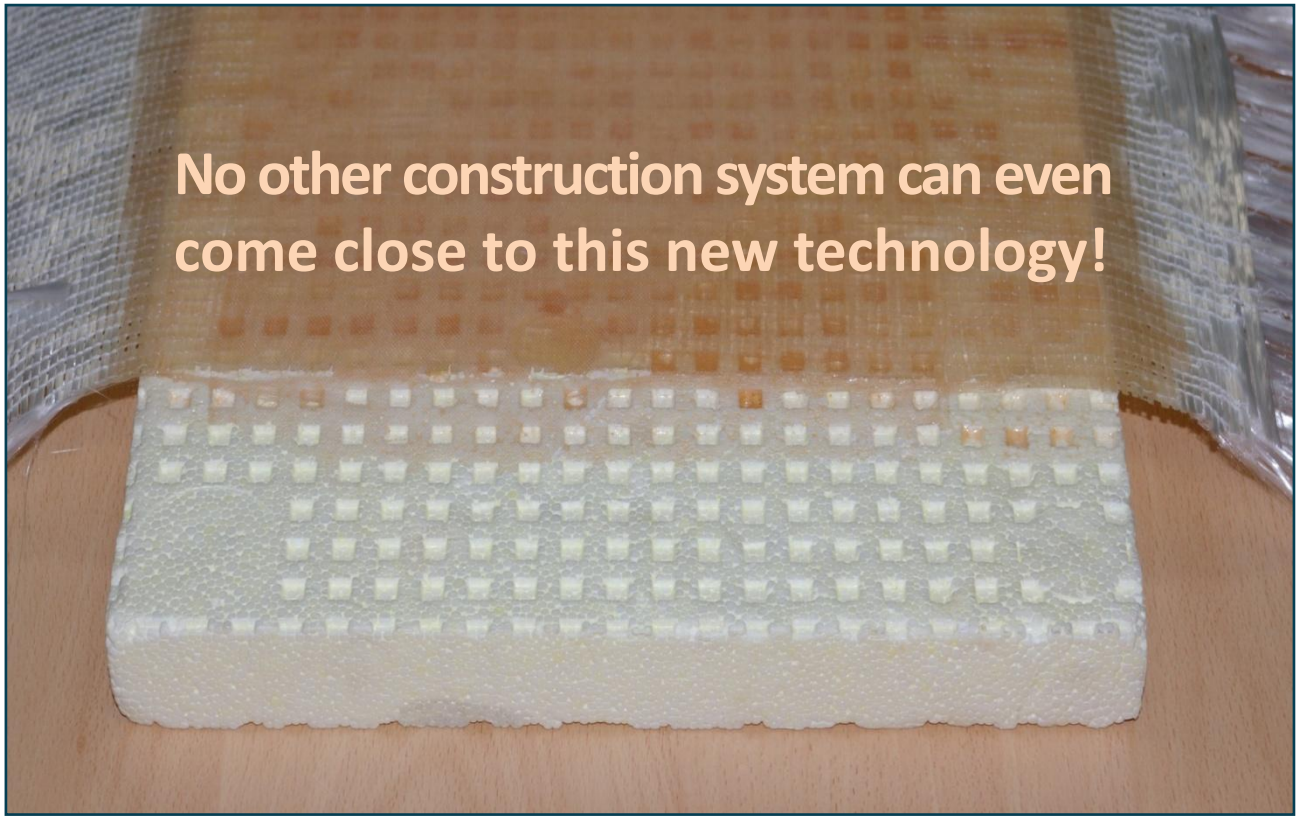
Ways of construction that haven´t been existing up to now

## *THE RESULT*

**H**ighest quality, at once dramatically cost, time and energy efficient

## *COMPETITIVE ADVANTAGE*

Specific know how being years ahead of the future mass markets for low cost housing and high end building




# *BASED ON NEW INDUSTRIAL PROCESSES*






## *PHYSICAL PROPERTIES*

- **ultra-light**, **extremely strong** (no cement, steel or wood elements)
- Load capacity: (up to) **10t/m² vertically, 2t/m² horizontally**
- Suitable even for **load-bearing walls** and **ceilings**
- **More flexible** than cement, steel, bricks
- **High tensile strength**
- **Strength can be varied** to meet specific customer requirements
- **100% waterproof**, buildings can be cleaned with high pressure water hose
- **Excellent thermal + sound insulation**

## PHYSICAL PROPERTIES

**STRONGER**

**THAN**

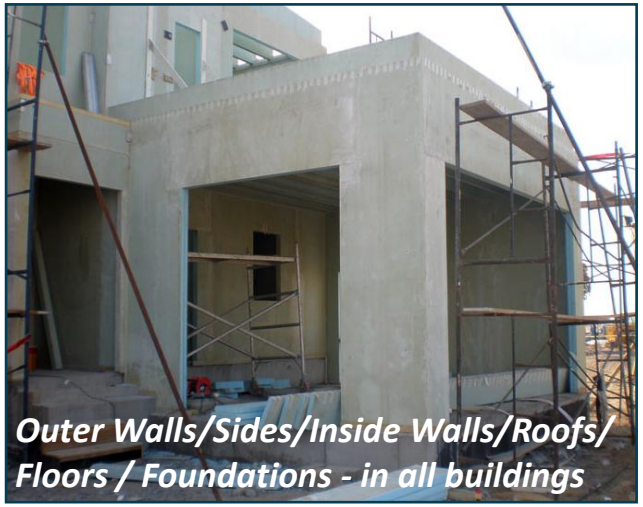
**CONCRETE**


Copying + imitation is

# CHEMICAL PROPERTIES

- **Non-flammable** + **self-supporting** (material tested at 1.250°C for 2h)
- **No emission of chemical substances** since the material is chemically neutral upon hardening
- **No unhealthy evaporation or smell**
- **Food authentic**
- **High level of chemical stability** against salt water and fuels
- **resistant to detrimental effects** of algae, fungicides, water and osmosis
- **Long life material** since it does not age per se

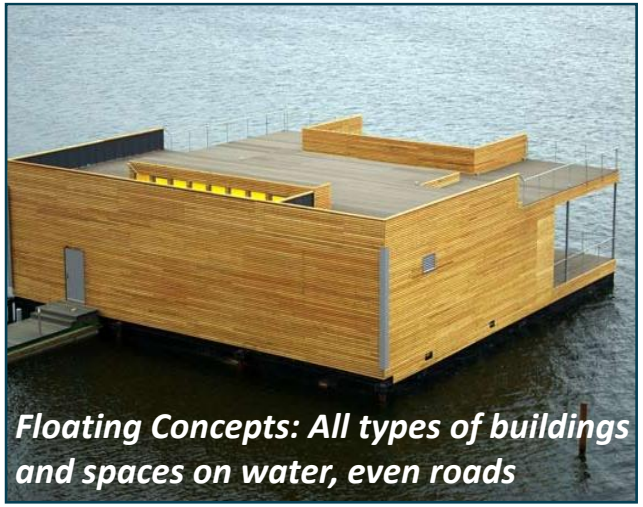
# CREATIVE WITH ONLY 1 PRODUCT



Outer Walls/Sides/Inside Walls/Roofs/
Floors / Foundations - in all buildings

Flooring
For Container + Highway Trailer

Mobile Home Container



Floating Concepts: All types of buildings
and spaces on water, even roads

Roofing

Furniture: wardrobes, boards,
tables, beds, chairs, benches

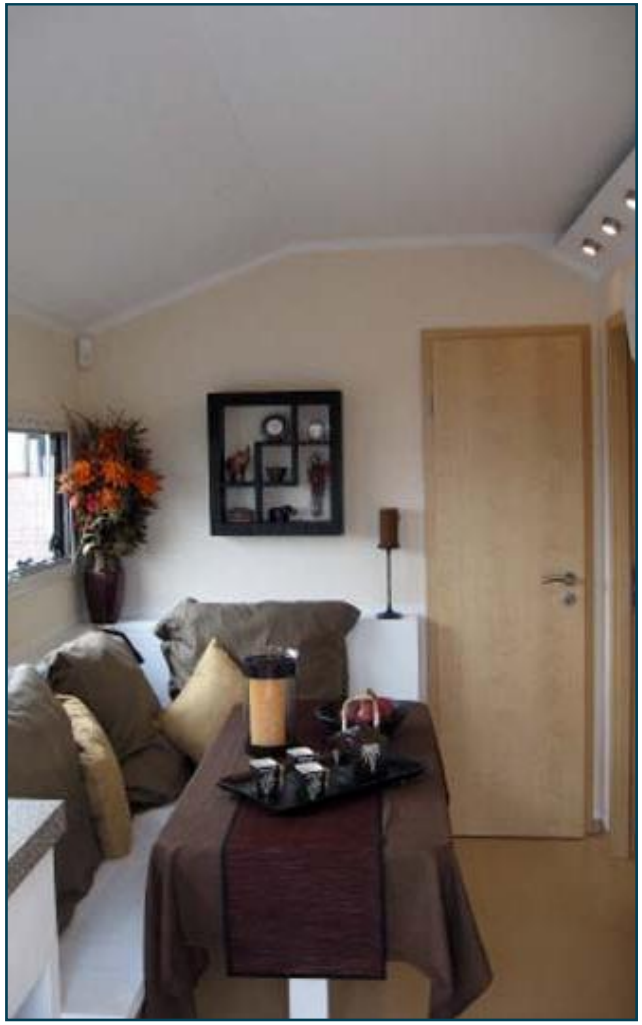
## *PIPING*

Walls are made by 2 panels + space between between them where all piping, water, electricity, etc. is placed

## *WINDOWS / DOORS*

Specially developed clamp profile for FCP constructions guarantees that a double gasket to the house exists and materials may extend without showing lacks

**Low energy windows** with optimal insulation power/noise reducing quality



# INFRASTRUCTURE

## House Finishing

## ECHNICAL INSTALLATION

### PING

Each wall is made by 2 panels and space between them where all piping, water, electricity, etc. is placed

### INDOWS + DOORS

Important details such as installation of windows and doors are solved in a new way. A clamp profile developed specially for CSP houses guarantees that a double gasket to the house exists and materials may extend without showing lacks

Low-energy windows with optimal insulation power/noise reducing quality











## ADDITIONAL TECHNOLOGIES

### COLLECTION + USE OF RAIN WATER

### WATER STORAGE / FLEXIBLE WATER TANKS

- Economic solution suited to **rapid deployment** of water storage depots for housing systems

### BIOLOGICAL PURIFICATION PLANT

- water filtration units with a closed-loop system for self-sufficiency in **water supply** and systems that **purify supply** and **wastewater** up to **drinking water quality**
- **No** need for **connection to a sewage treatment plant**
- With a closed-loop circulation system the **water stored** in the foundation **can be reused for a year or longer**
- The plant is **maintenance-free**, no external electricity is needed
- **Water saving** due to a specially developed **waterless toilet**

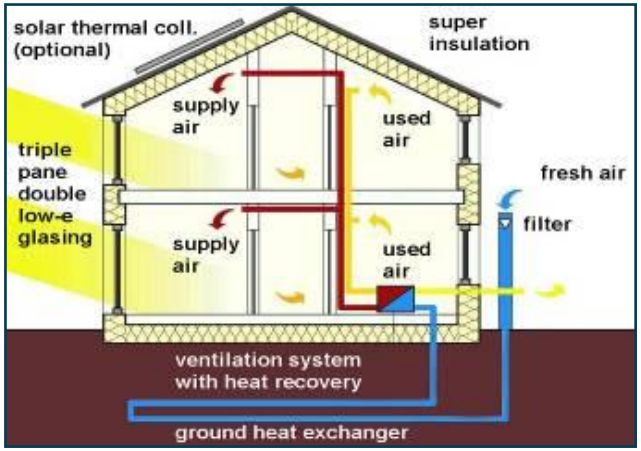
# ADDITIONAL TECHNOLOGIES

## SOLAR ENERGY

- Today, solar power is thought to be the cleanest, most reliable and plentiful energy resource available

## AIR CONDITION + HEATING SYSTEM

- Fresh air will be taken in through an **air condition system on the roof**, powered by solar energy
- Integrated batteries collect the energy to keep the system going during the night. This air is conducted by pipes through the cool tank water and after cooling it is lead in the living space
- In case of low temperatures the principal function is opposite, air will be warmed by tank water
- Integrated heating system for cold regions energized by the external gas bottle



# COMPLETE STRUCTURE - FOUNDATION TO ROOF

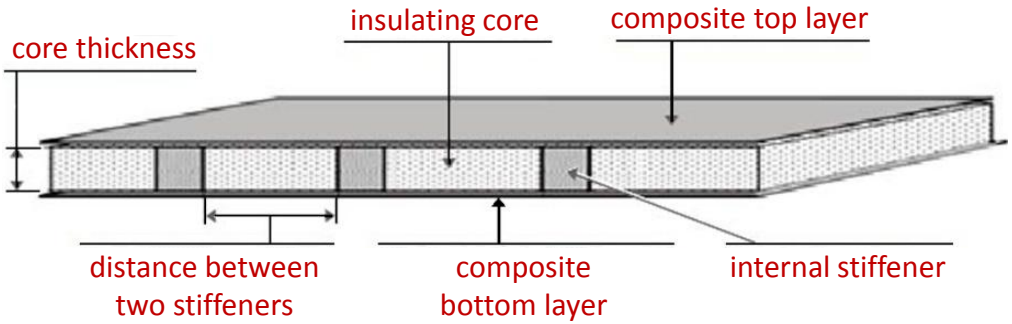
- Components for **exterior/interior walls**, **beams**, **columns** + **roofing**
- **The very same material** for entire structure including foundation
- **No** use of **steel**, **wood**, **cement** or **concrete** nearing completion
- Special bonding material to quickly fuse FCP to **1 single element**
- Construction **elements support each other** and the **structure**
- **Interior walls** may function as **supporting elements** eliminating the need for beams in many designs


**[PIR]**

Fiber Composite Skin Both Sides


FILLER PANEL

CORNER PANEL

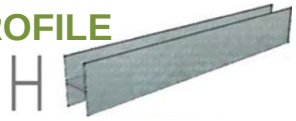



COLUMN

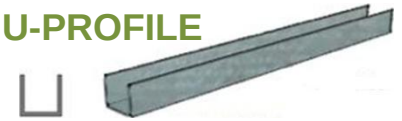
BEAM

INTERNAL H-PROFILE

L-PROFILE



H-PROFILE



U-PROFILE

# ARCHITECTURAL PROSPECTS

***Dimensions Of Construction***

Complete walls, different thicknesses, **absolute highest quality!**

Virtually **any type of building**, **in nearly any size**, **any dimension**, **shape** or **level of thickness** required

Structures fundamentally **up to 12 m high** (3 stories) without the need for columns, foundation or roof structure

***Retaining Architectural Freedom***

Any kind of size, form or strength needed can be done in **made-to-measure modules**, fully computer-controlled

Higher FCP structures may need a **steel skeleton** additionally !

***Material Coatings***

Virtually **any kind of individual coating** referring to structure or color, either in original shape (laminating) or customized (painting) on the inside or outside

**No optical difference** to normal clinker or brick

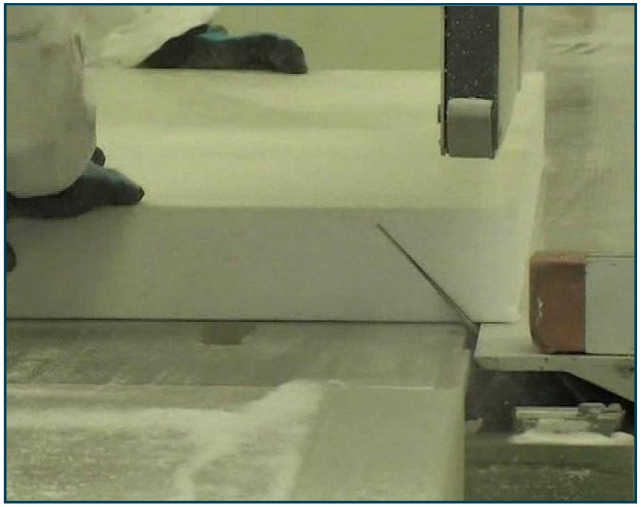
**Repairing** or **opening** for expansion or construction purposes

**Outer walls** can be secured against break-in/vandalism

**Floors/walls/ceilings** coverable with conventional material

# *RADICALLY NEW INDUSTRIAL PROCESSES*

- Industrial production processes which come up to even **highest standards** of the **aircraft industry**
- **experienced European engineers** of shipbuilding, composite construction **and other specialists**
- **R&D** in close **cooperation** with **top European engineering companies**, **Institutes** and **universities**
- Raw material supply through innovative **professionals for Epoxy systems** + composite development



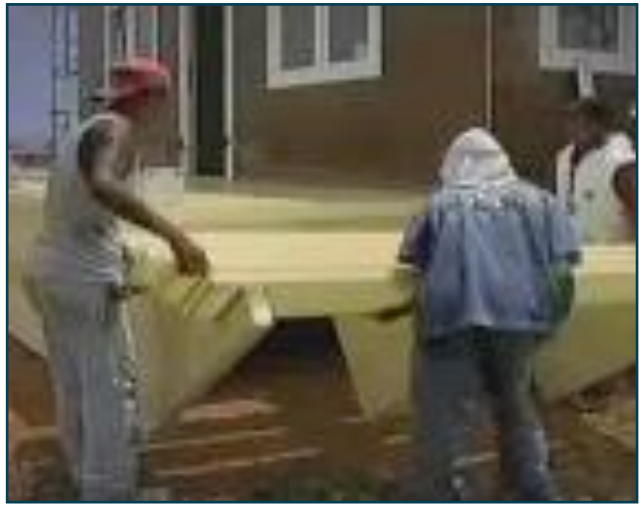
# FASTEST BUILDING PROCESS


- Assembling the whole structure with normal skilled labor after only 4h training on site
- **FCP plate** as **foundation** or Concrete ring option alternatively
- Easier + faster building than with any other material, **without heavy Machinery** or **electricity** on site
- **Extreme fast bonding** with special developed material
- **Fast cabling** and **piping**
- Houses can be completed in 1 or few days, **immediately habitable**

**JUST UNPACK AND GLUING !**

## ROAD-TO-ZERO-WASTE

- Efficient use of **raw material** in manufacturing and construction produces **very little waste**
- There is virtually **no building dirt** and **no noise** during he building-up of houses
- All **necessary facilities** are **pre-installed**
- FCP houses can be **disassembled + erected** in a new location **without** any **quality loss**
- **Recycling** of the materials is **easily possible** by shredding or grinding. It can be sold as raw material with profit



# LONG-TERM VALUE

## *No Material Changing*

- Since all raw materials are part of the same material family the "breathing" (expansion/shrinking) of the material is similar
- High quality composite material **in use** for more than **50 years**, **no negative effects** have been discovered

## *No Influences On Material*

- Withstanding all kinds of weather and environmental conditions
- No rot, swelling or deterioration over time

- FCP buildings are **100% UV protected, no distortion possible**
- FCP with very long lifespan, **no aging possible**

## *Virtually No Maintenance*

- FCP buildings can be cleaned with high pressure water hose; simple painting to keep the building looking as new

# *WITHSTANDING NATURAL DISASTERS*

## *Fire*

- FCP skins **won´t support combustion**: when being burned at **1250°C** the the fire doesn´t spread beyond the area of direct flame, the **structural integrity** is **not compromised**

## *Water/Flood*

- F*CP* are **absolutely waterproof**, especially **stable against salt water**
- Even after decades of permanent physical use **houses won´t become leak**

## *Hurricane/Tornado*

- **Structure** and **material safe** against damages from hurricanes/tornados (up to 300 km/h)
- **Special earth anchors** for different soils or **Concrete Ring Option**

## *Earthquake*

- Due to latest joint techniques and flexibility all FCP buildings are **earthquake resistant**

# NO CHEAPER CONSTRUCTION

## *Reduced Framing*

- **Substantial reduction** in number of items used to complete the shell. No need for steel, wood or concrete from foundation to roof

## *No Heavy Equipment*

- **No need for heavy machinery** like cranes or forklifts; eliminates the need for heavy traffic or concrete trucks

## *Reduced Labor Demands*

- On average, it takes **1/5 of the time** to build with FCP when compared with traditional block/mortar construction




## *Low Maintenance*

- **Minimal maintenance** is required (cleaning with water, coat of paint). In addition, FCP is completely inert and not a source of food for insects and rodents. No mold and algae will grow on the surfaces

# SUSTAINABLE QUALITY

## *Advanced Building Technology*

- FCP technology is inspired by sophisticated aerospace + maritime construction using advanced materials and innovations
- All components - frame, walls and roof - can be dismounted and are reusable without loss of strength and structural integrity
- Rigidity + strength of walls add Sustainability and allow for solutions that last decades

## *Energy Saving*

- Significant heat and cooling load

reduction in buildings compared with other construction materials/ technologies

## *Water Efficiency*

- Water collection, supply, water treatment + purification through integrated technologies
- **No need for sewage or wastewater treatment** plants in regions with adequate fresh water supply

## *Emission Reduction*

- Use of **FCP reduces greenhouse gas emissions**

## *Indoor Environmental Quality*

- **Unsurpassed healthy climate conditions;** no need to open a window/door **for** ventilation
- FCP lets earth magnetism through its structures

# *EXTREME ENERGY EFFICIENCY*

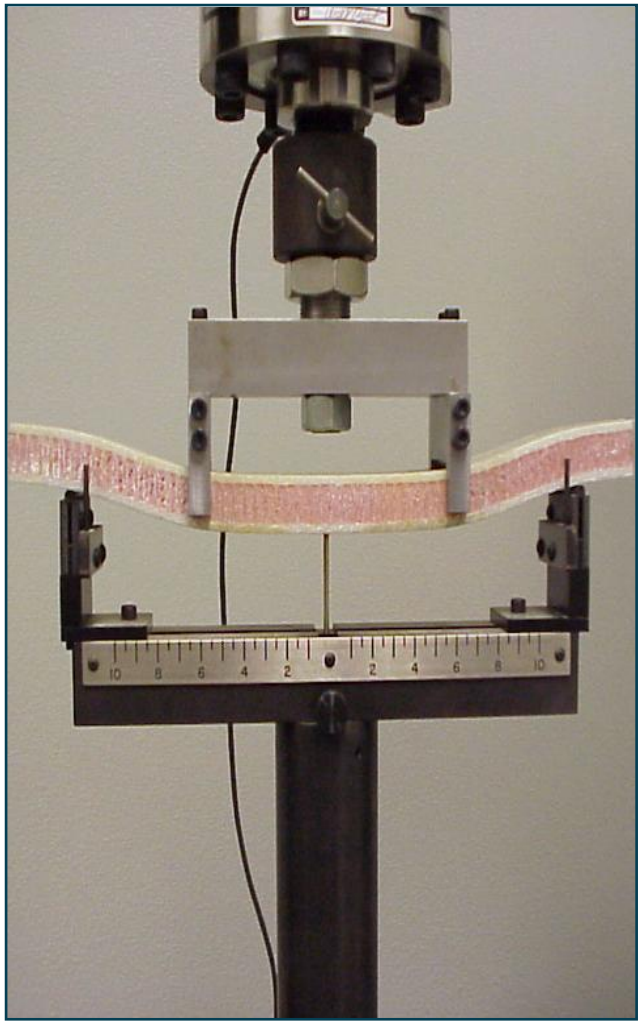
- **heat insulation parameters like no other material,** surpassing even German low-energy standard !
- **absolutely airtight**
- tests have shown loss/gain of 3˚C of unaided in-room temperature over 6 h period
- best prerequisites for building a ***Passive House***, the leading standard worldwide concerning energy saving
- requires a central ventilation system (with heat/cold recovery) to maintain a **high indoor air quality**


- **No heating or air condition system needed,** only a central ventilation system (with heat/cold recovery) to maintain a **high indoor air quality**
- **Permanently** equally supply with **fresh air**, always cleaned by filters
- **Unsurpassed comfortable healthy indoor climate conditions**, no need to open a window **/** door for ventilation

# WORLDWIDE TRANSPORTATION


- **Loading of a complete house in 1 ISO container**
- **Worldwide Cargo standard**

# TESTS + CERTIFICATES



## HEALTH CARE CERTIFICATE

- for the material used in construction components **(Germanischer Lloyd)**

## ACOUSTIC INSULATION

- acoustic absorption index: 28 db **(German engineer office)**

## FIRE RESISTANCE TEST F30

- passing German test type A, 950 C°, 30 min without burning **(German scientific expert lab)**

## LAMINATE FIRE TEST

- emission of Carbon monoxide during combustion up to 69x less than wood & its construction material derivates **(German chemistry company)**

## STATIC TESTS

- for all construction data/stress load **(German University/German scientific labs)**

## SWIMMING PROOF

- **(German engineer office)**

## ICE PROOF

- Nordic Ice Stability, highest class demand **(German engineer office)**

## TEMPERATURE INSULATION TEST

- heat insulation parameter like no other material, surpassing even German low-energy standard **(German test labs)**

# *AWARD WINNING TECHNOLOGY*

***2005***

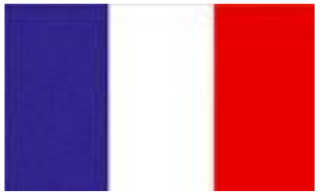
***PRIZE***
***FOR COMPETENCE***
***IN TECHNOLOGY***

**by Volkswagen**

***2007***

***CERTIFICATE***
***FOR EXCELLENCE***
***IN MATERIAL DEVELOPMENT***

**by Material ConneXion®**

***2008***

***OXYGEN AWARD***

***Position:***
***3rd-best Environment Project***

**by Les Respirations**

## *REFERENCES*

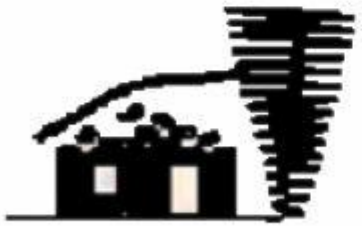
FCP technology has been **subject of** various **R&D-Projects** conducted by the **GERMAN university**

FCP technology has been supported **by** the **GERMAN government** within the frame of an energy campaign

FCP technology has been **recognized by** the **UNITED NATIONS** as a basis for **LOW COST HOUSING** concepts

# CONSTRUCTION MATERIAL

## Withstanding Natural Disasters

| | CSP Technology | Brick Walls | Wooden Walls |
|---|---|---|---|
| |  |  |  |
| Fire |  |  |  |
| Water/Flood |  |  |  |
| Hurricane/ Tornado |  |  |  |
| Earthquake |  |  |  |


Thanks for your attention!

# Housing Bau Team
# 2010

**Presentation by**

**Euromid International**