

# Energy Efficiency through Material Efficiency:

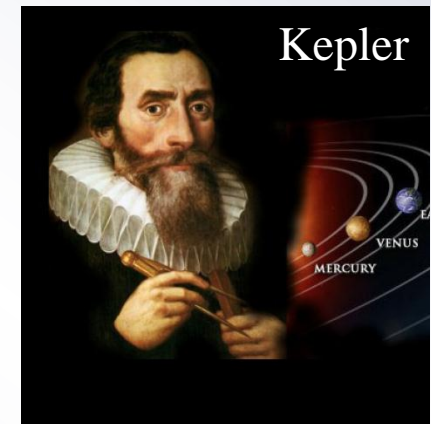
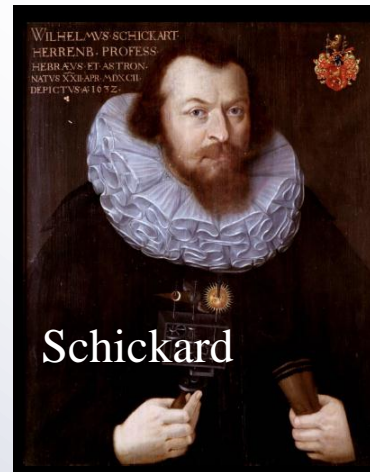
new class of clean hybrid construction and building material

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- construction materials will be replaced by composite materials in many applications
- fibre and resin being constantly further developed e.g. by the chemical industry

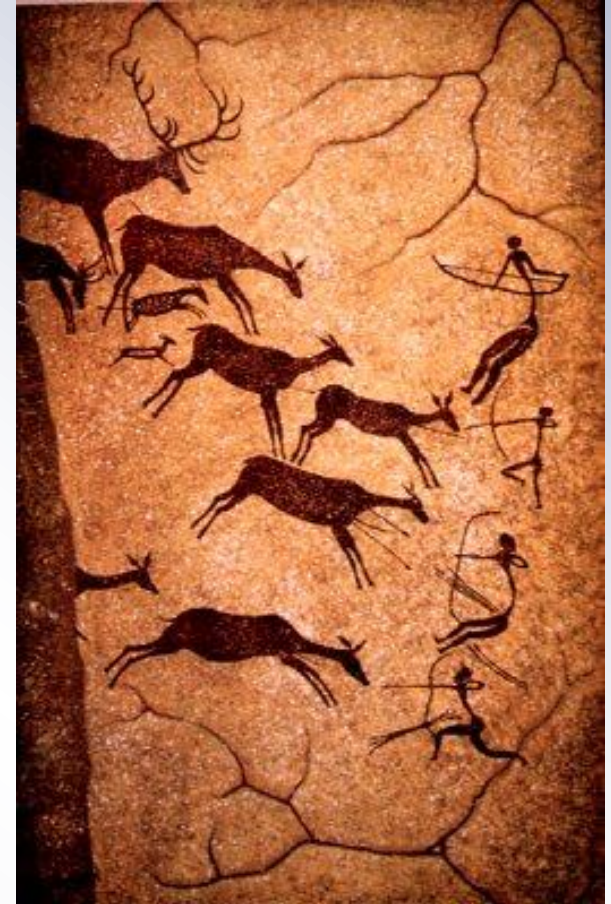
Principally exactly these fibre and resins have been used by our ancestors and still achieved breakthrough technology and scientific development.







They were using:  
Fibres, resin  
and . . .



. . . minerals



. . . from the natural mineral factory earth



fibers and resin – so called Fiber Composites – **alone** cannot serve as future mass materials

- **high production cost**
- not easy to form
- crash safety ?
- uneasy to repair
- pollution, recycling ?
- **high production energy**
- difficult to combine/glue with common materials

pure Carbon fiber composite CFRP



## Key question

Which material partner will be best fitting in order to bring down **costs and energy consumption** of fiber composite material?

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- steel
- aluminum
- foamed metals
- wood
- foam (PUR)
- glass, foamed glass
- plastics
- minerals

Carbon fiber manteled granite slab



- natural mineral resources
  - unlimited availability
  - sustainable, non-corrosive
  - better insulation properties compared to metals
  - not flammable
  - regenerative and recyclable
  - Same specific weight like Aluminum
  - low thermal expansion
  - inherent damping
  - material properties perfectly fitting with carbon fiber



Lets take a closer look at what is possible with a combination of natural stone, high performance resin and fibres ...



## introducing MineralCompositeTechnology MCT® and CFM® CarbonFiberMineral

- Structure made from Granite and Carbon fibre
- Preload/Prestress Technology

Profile from 2,5 mm CFM® plates





## challenges for chemical industry

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Carbon fibre and resin are able to bind CO<sub>2</sub> within the material, so the chemical industry has the chance by reinforcement of

developing GHG efficient resins and fibres

from bio oil - from algae oil for example -

plus: Carbon fibers can be produced with the energy of focussed sunlight

————→ CO<sub>2</sub> reducing building and construction materials

————→ large potential to bind Carbon in Carbon fibre  
and the resin as well

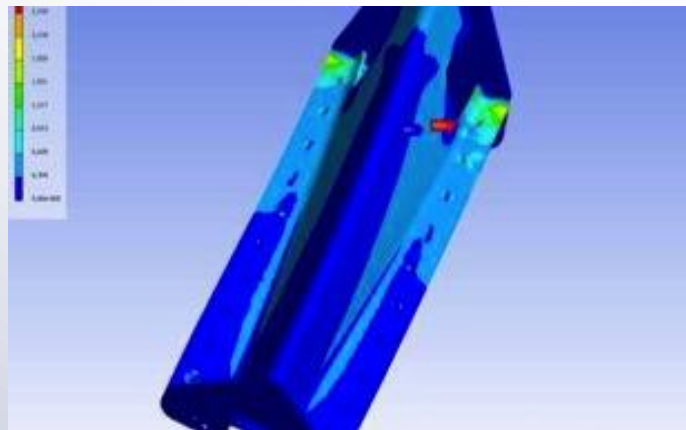
# Products based on MineralCompositeTechnology MCT®



TC<sub>1</sub>® - invisible cooking appliance kitchen worktop

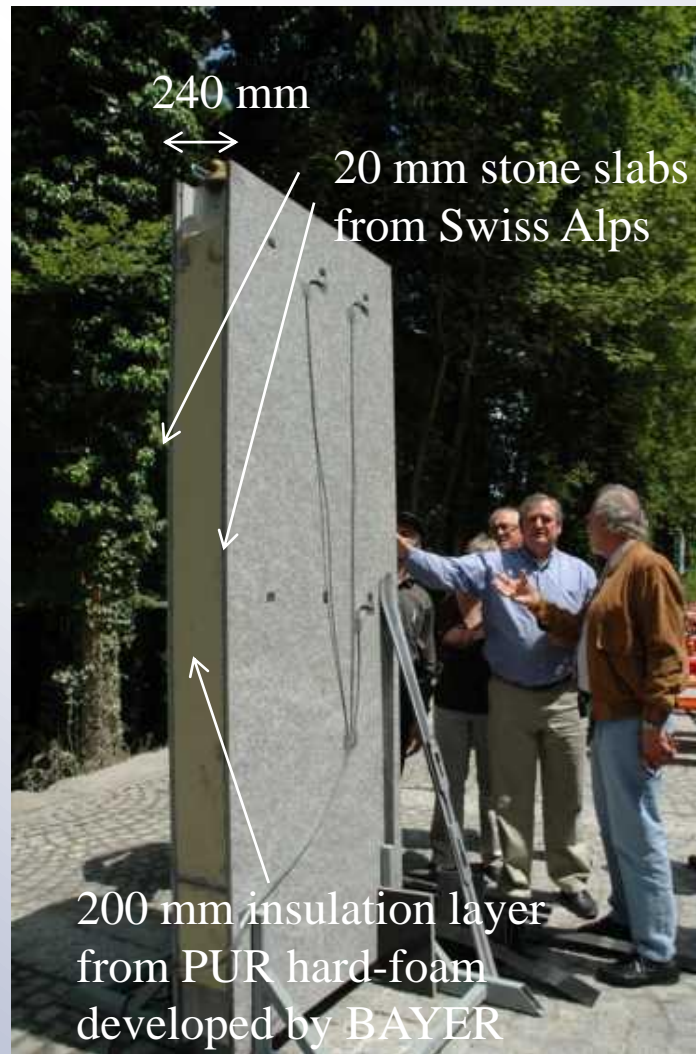


Award winning zai “spada” ski with  
CFM® core



Fast moving camera arm out of CFM® - plates

## new class of self supporting housewall elements



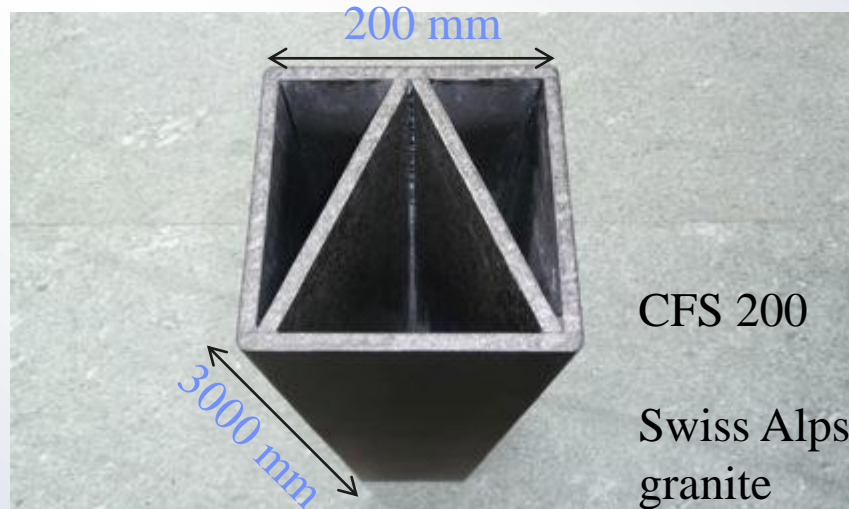
Comparison with concrete wall of same stability, load before breakage per running meter : 110 tons

- 4 x lighter
  - concrete wall 1350 kg
  - CFM<sup>®</sup> wall 335 kg
- 40% less production energy needed
- insulation in line with Swiss Minergy<sup>®</sup> Standard

Use of material, which was formally used for cladding only, takes over structural function

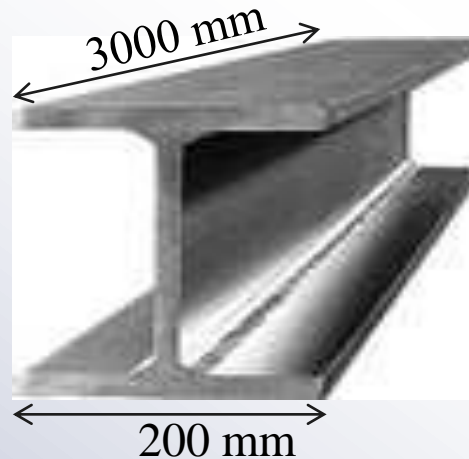
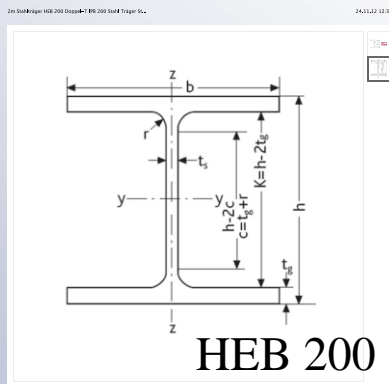


## column out of CFM<sup>®</sup> in comparison to steel I-beam at same stability



comparison of structure from  
CFM<sup>®</sup> and steel, profile 200 mm x 200 mm,  
vertical collapse load 150 Tons  
(100 x VW Golf 6)

- **2 x lighter** (3 m length)
  - steel 195 kg
  - CFM<sup>®</sup> 105 kg



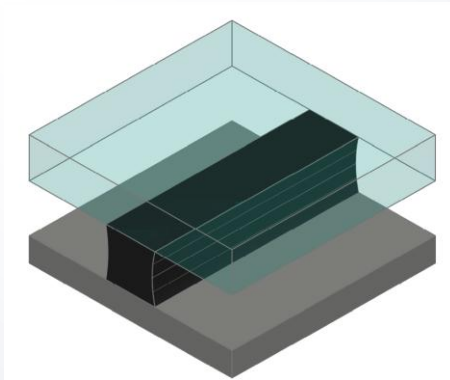
- **70% less production energy**  
translates according to German  
energy mix

- steel: **301 kg of CO<sub>2</sub>**

**versus**

- CFM<sup>®</sup>: **90 kg of CO<sub>2</sub>**

## completely new possibilities for glass facades



CFM<sup>®</sup> in combination with glass: enabling glass to become self supporting

under development with:

- University of Munich for Applied Sciences



in cooperation with German industry and 50% financing from German Government (ZIM):

- Seele Sedak GmbH & Co. KG
- Peer Technologies GmbH & Co. KG

## first prototype in 2014

- first house made from CFM<sup>®</sup> materials in 2014
- collaboration project with **Germanwatch e.V.** and the **City of Unterföhring**, near Munich
- partly funded by **BMWi** / German Government



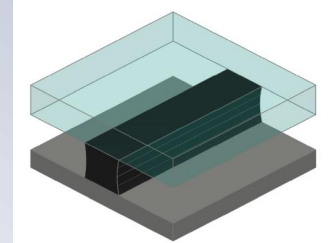
- insulation will be in line with SwissMinergy<sup>®</sup> Standard



# Summary



CFM<sup>®</sup> provides new  
esthetic building material systems  
with self supporting glass and granite structures



- increasing degree of **freedom in architecture** —→ creating desire
- **less material** needed at much **less weight** —→ increasing **cost efficiency**
- increasing **energy efficiency** —→ **less production energy** and  
—→ **better insulation**





Thank You very much for Your Attention

