Ecological Houses Project

Sustainable and affordable multi scale housing

bbuilding
Sistema Casa

Ecological Houses Project

Sustainable and affordable multi scale housing

Combination of:

- **an Innovative Construction Ecological Material**
- **a simple and effective and Prefab Construction System**
- **state of art bio-climatic Engineering**
- **smart multi scale Architecture urban design**

PROOF
Field records of success cases in Italy France Switzerland & Barhain

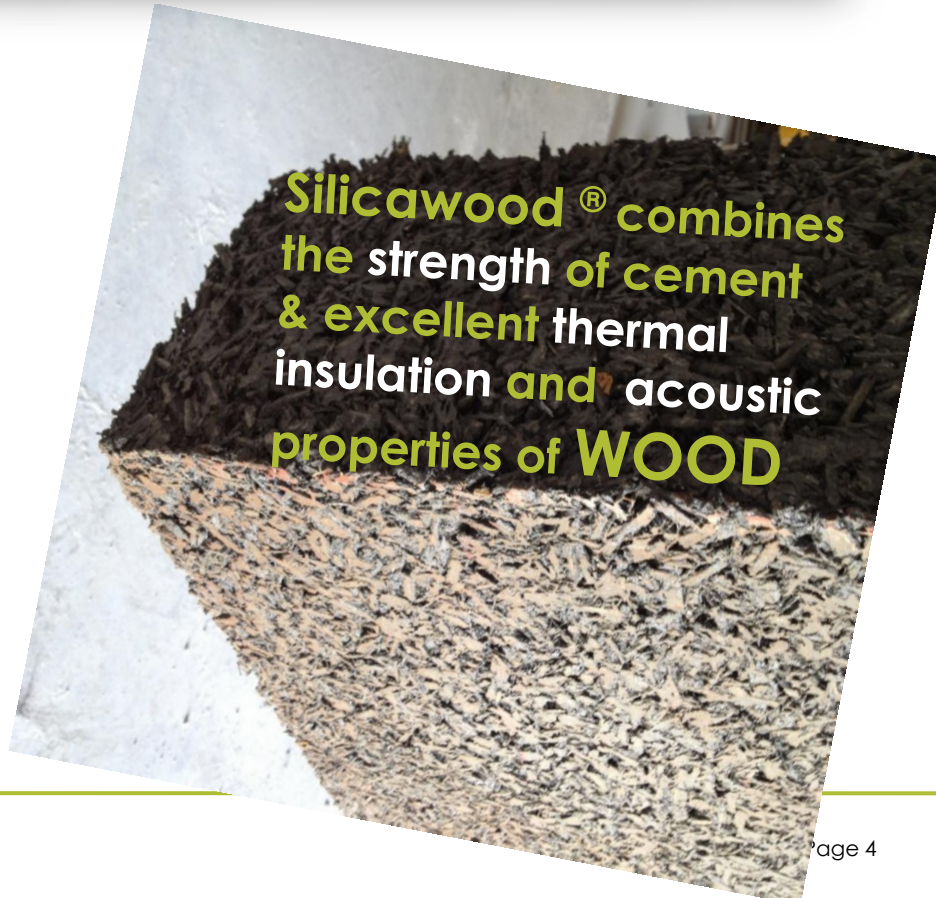
A large impact innovation

BBuilding Material & Process

Silicawood®
is a special type of concrete, formed by the ingenious combination of **WOOD CHIPS** and Silica mixed with cement

Silicawood®

Light Weight Structural Construction Material



Waste Wood Recycling Sustainable Development

Silicawood®

A Silicawood® Production Plant consumes an average **2000-3000 ton/month of SCRAP WOOD**

100 Houses
200 m²/month

Eco sustainability: every 3 m² of walls (33 cm thick) capture and permanently trap about 270m³ of CO^2

BBuilding Prefab Process

Precast walls

Lifted vertical in 12 hours

- Monolithical thickness range 18- 40 cm
- Structural self load bearing solid walls (anti-seismic certified)
- Zero condensate risk and very high permeability to steam
- Walls are transpiring
- Resistance to cyclic frosting and defrosting in severe weather conditions (un plastered walls)
- Thermal insulation (thermal conductivity U= 0,119 W/mk)
- Sound absorption properties (10 cm with plaster = 38 dB)
- Certified fire resistance (10 cm with plaster = REI 180)

BBuilding Costruction System

DRY JOINTED

SELF LOAD BEARING SOLID WALLS

BBuilding **200 m²** house requires
- **only 5 days**
- **only 3 non specialized workers + a crain operator**

- **No need for multilayer plastering for interior or exterior finishing. Walls are delivered flat and only a single layer of plaster is needed on either side**
- **Doesn't permit rising of water within walls due to capillarity effect.**
- **Excellent thermic displacement in walls and roof (over 12 hours for a 10cm wall)**
- **Total absence of thermal bridges**

BBuilding House System

OUTSTANDING ACOUSTIC INSULATION < 53 dB!! In 27 cm

Tiberio Palace Hotel Naples

FAST!!!!! 220 rooms plugged in 30 days

BBuilding House System

QUANTITY

A Silicawood® **plant** has the capacity to produce material/year for:

n. **1000** houses commercial 120 m² (walls 30 cm thick)

n. **2000** affordable social housing commercial 120 m² (walls 18 cm thick 2 shifts 20 hours/day)

20.000 Silicawood® blocks 20x20x40/**per day**

BBuilding House System

CONSTRUCTION SPEED & SIMPLICITY

BBuilding Construction Method

avg. speed: 40 m²/day commercial surface

(PREFAB houses with dry jointed walls built by 3 non specialized workers + crane operator ONLY)

Silicawood® Blocks 20x20x40

weight 1/3 of the traditional blocks and reduce building time by 20%

KEY FEATURES BBuilding House System

QUALITY

- **Robustness and safety** 4 story building is resistant to earthquakes
- **Acoustic Insulation** -Very high < 53dB
- **Fire Resistance** doesn't burn
- **Wellness of living** far superior inside the house (especially in hot climates)

ENERGY SAVING

Silicawood® blocks contribute to a **saving 35%** of energy for cooling

Bbuilding Bio- Climatic Engineering

can produce up to **60% ~ 80% saving** of the electrical power (kWh) for running the house

ECO COMPATIBILY

Waste & Scrap wood recycling

- CO2 emission reduction and credits saving
- **80% of volume of walls are made with scrap wood !!!**

PRICING FACTS BBuilding House System

In Italy

Prefab House Structure costs ~20% less of traditional house

North Italy (Ravenna)

Proven !!

At comparable building costs
vs traditional **BBuilding HS** provides
40% total energy saving
80% reduction building time

North Italy (Cuneo)

PRICING FACTS BBuilding House System

In the Kingdom of Bahrain

Silicawood® Blocks 20x20x40 cost 20% less of traditional concrete blocks.

At comparable building costs use of
Silicawood® Blocks
provide
35% energy saving (Thermal Insulation)
+30% (Acoustic insulation improvement)

In accordance with

contax partners
empowering success

مجموعة الكبيسي
AL KOBAISI GROUP

White papers: Energetic and Structural Comparisons

In order to prove the characteristics and quality of **Silicawood®** panels and BBuilding Construction System we propose the abstracts of 2 studies that directly compare the performance of a residential **Villa in Riffa View Manama Villa 374 Lagune Barhain** from Energetic and Structural point of view.

Thermo physics Simulation in Manama, Bahrain

White paper:
Energy Efficiency & Cost Computing Comparison Between Traditional Local Buildings in Concrete and Silicawood® Panel Technology by BBuilding.

Operational SAVING of 30%-40% of the energy bill (KWh) per house.
Installed power for HVAC system can be reduced by 50%

In term of savings this means that if the Kingdom of Bahrain is going to deploy a power plant oil generator with a peak power of **600 MW** of electricity, assuming a medium grid efficiency of 0,36, it can fulfill the energy demands of approximately **6660 houses** like the Riffa Views Villas (V = 660 m3, S/V = 0,6; Coefficient of comparison between Transparent surface area and Opaque/Matt surface area: Stransp/Sop = 0,2).
The count of same house type built in **Silicawood®** and re-engineered according to BBuilding Bioclimatic construction knowhow **could exceed 9500 units** absorbing the same power mentioned power while and keeping a higher level of thermal & humidity comfort conditions inside the houses.

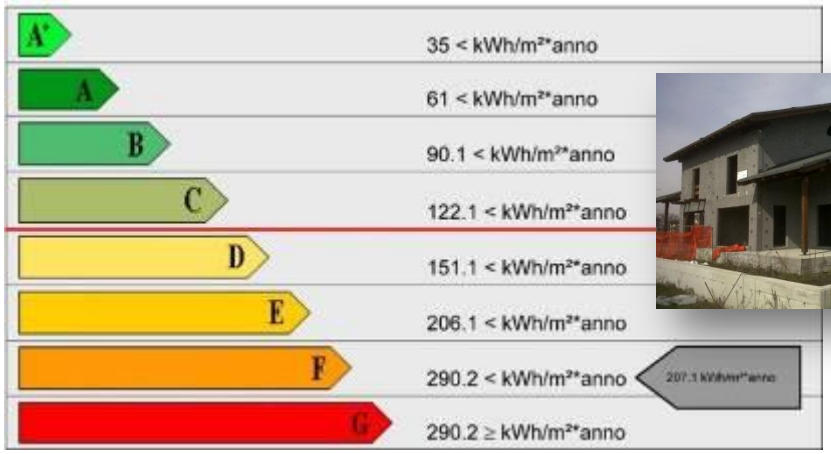
The Simulation proves that it takes:
600 mega watt POWER STATION to run -> 6660 traditional houses
OR -> 9500 Silicawood® houses

Energetic Efficiency Comparisons

Traditional building raw shell

Energy consumption European class F

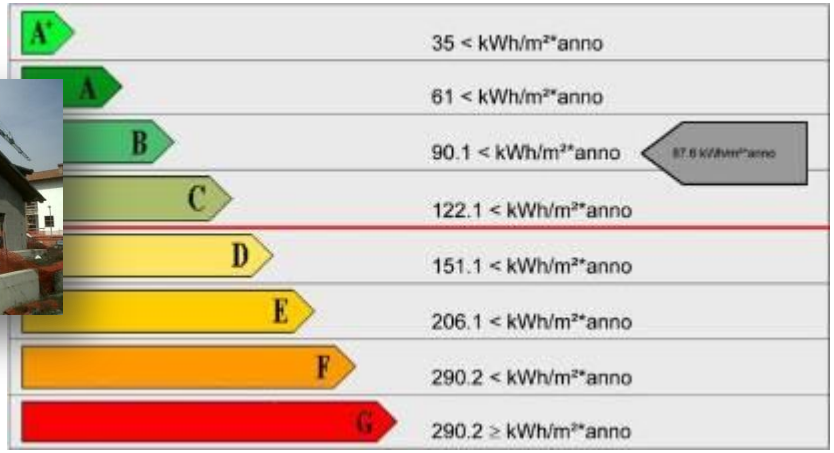
207,1 KWh/m² year



BBuilding building raw shell

Energy consumption European class B

87,7 KWh/m² year

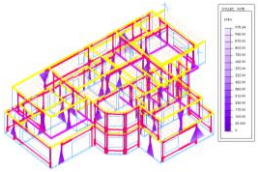


High energy performance and ultimate living comfort.

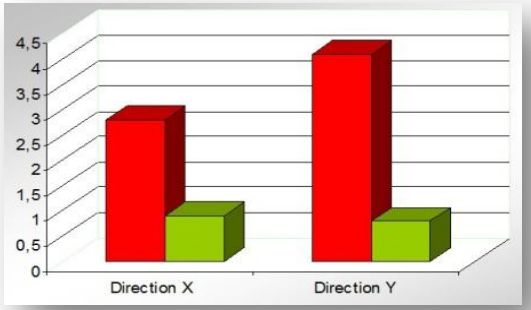
Estimated saving around 85% energy needed for cooling each unit of surface exposed (1 m² of opaque/matt area in Silicawood® material)

White papers: Energetic and Structural Comparisons

Seismic Simulation in Manama, Bahrain



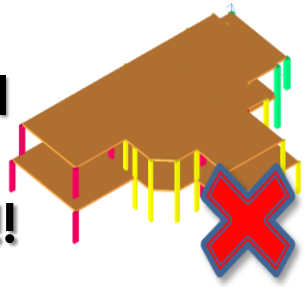
White paper:
Comparative analysis of the static behavior of a Bahrain residential villa built in reinforced concrete or in Silicawood®/BBuilding structure undergoing seismic action.



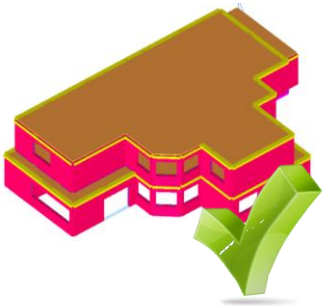
Abstract
The scope of this study was to compare the structural behavior of the same house built in traditional armed cement pillar frame and self load bearing Silicawood® panels.

The simulation is conducted by FEA is conducted in term of stresses and displacements of the construction under the equivalent force of an **earthquake of magnitude 6 of the Richter scale** (This is the same magnitude earthquake that struck northern Italy in May 2012 destroying entire towns).

Existing Traditional House Crushed !!!



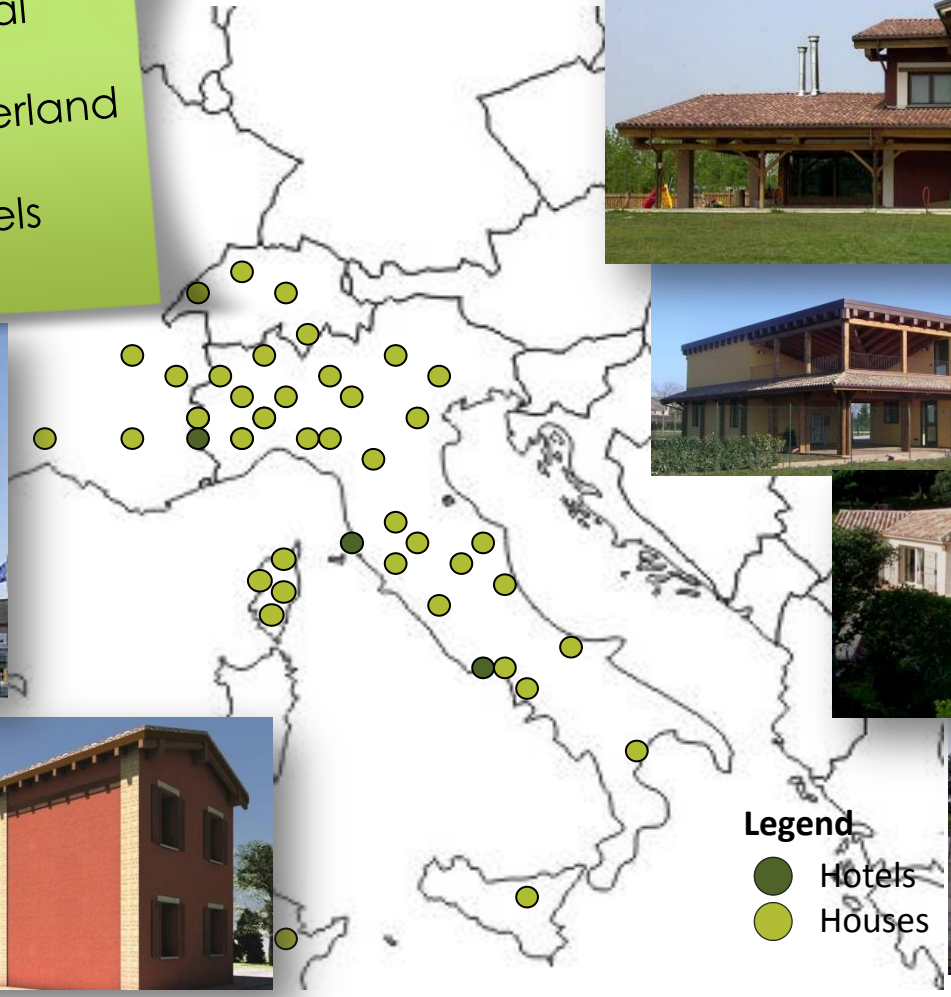
Structural performance of a residential **Villa in Riffa View Manama Villa 374 Lagune Barhain**



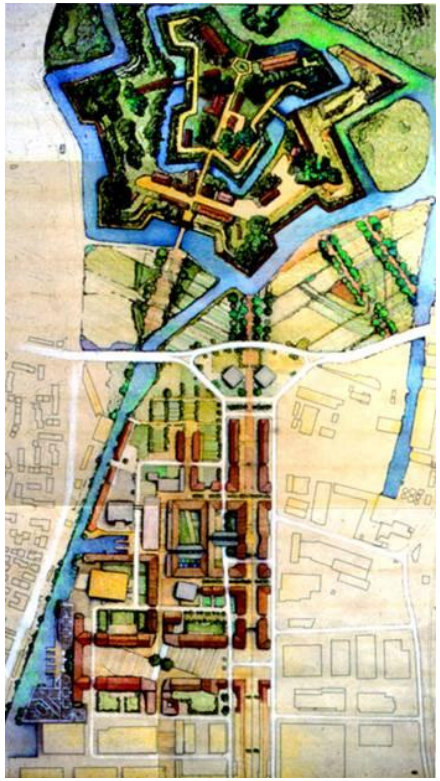
Silicawood® House Stands!!!!!

Achievements in Europe (Italy – France – Switzerland)

Over **130** low rise residential houses in the **last 15 years** built in Italy, France, Switzerland and Tunis
3 prestigious high rise hotels



Multi-scale Substainable Architecture



UPCYCLING OF A VENETIAN SUBURB THROUGH RE-ESTABLISHING THE URBAN TEXTURE WITH VERY FEW DEMOLITIONS AND NEW CONSTRUCTIONS

MULTI-SCALE ARCHITECTURE

- Shared civic spaces
- Sited buildings and urban textures
- Micro-cities and towns
- Solar urban plots

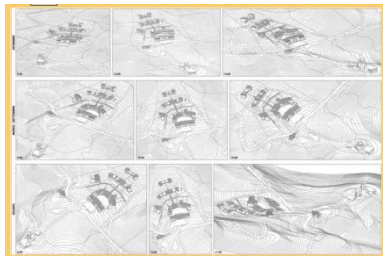
In collaboration with:

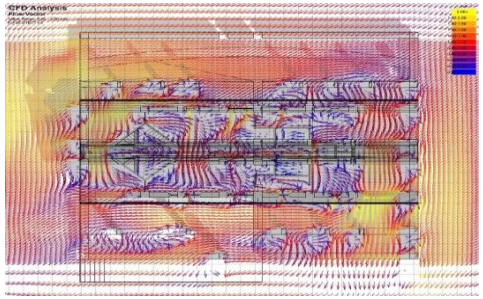
SYNERGIA Progetti

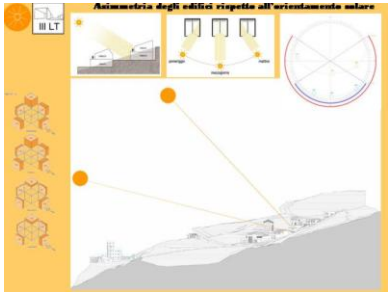
BIOCLIMATIC CONSTRUCTION STATEGIES

- Solar asymmetry of building facades
- Massive building envelope
- Simple and quick construction
- Use of local, durable and recyclable materials

Architectural Design Innovation







Wind simulation for a demostrative building realized in ITER – The Centre for Alternative Technologies in Spain Tenerife island

SYNERGIA Progetti

A Solar ecovillage currently under construction in Umbria, central Italy.
The bioclimatic village as seen by the sun in different seasons and times .

NATURAL CLIMATIZATION

- Sunspaces, porticos, earth integrated systems
- Natural ventilation and lighting
- Indoor and outdoor microclimatic quality
- Use of renewable sources

INTEGRATION TECHNOLOGICAL-SYSTEMS

- Wastewaters and rainwaters recycling
- Solar Collectors, thermal and photovoltaic
- Urban vegetable gardens

Summery BBuilding Ssilicawood®

- **AFFORDABLE** (scrap wood costs less than sand and aggregates)
- **SUSTAINABLE** (energy consumption & yearly bill BHD/kWh is reduced)
- **DURABLE** (house is robust and appreciates value in time)
- **FAST** (relief of social tensions for housing - benefits for the builder)
- **LOCAL DESIGN** (nice- comfortable and living wellness)
- **ECOLOGICAL** (large scale wood recycling is appreciable - Furthering ecological developments to reduce environmental impact)

and

- **MULTI SCALE BIO-CLIMATIC ARCHITECTURE** (large scale energy efficiencies and enhancement of collaborative dwelling well being in public and open spaces as well as in house interiors)

BBuilding Company history and profile

1920 Establishment of Bonelli S.p.A. principally a sawmill for timber work in Prazzo, north west Italy.

1960-1990 High specialization in the wood engineering and constructions industry (long haul bridges, building facades, acoustic linings of music halls, roofs, fire proof doors).

1990 From wood waste a new development: **Silicawood®**, first exploited for highway acoustic barriers (400 km in the French Alps and on the Rome -Milan highway). This innovative material was patented in1992 and shortly afterwards a new Bonelli production was purposely plant built.

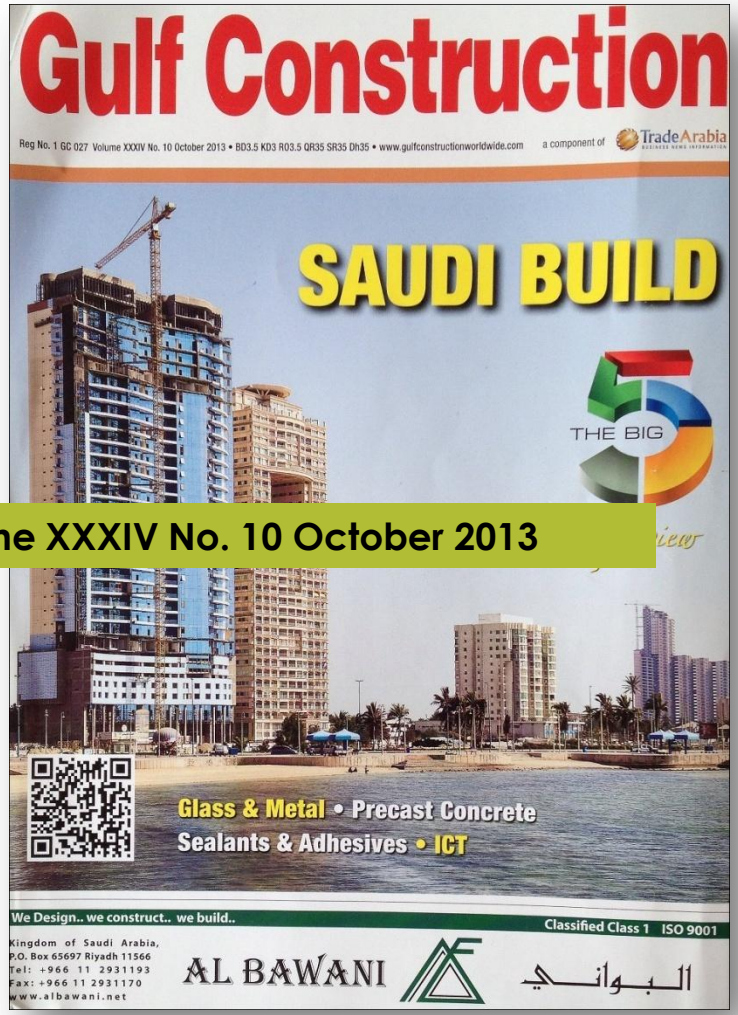
1992 **First ecological house** successfully built with a innovative construction system (self load bearing walls dry jointed).

1993-2007 Over 120 houses built between Italy, France and Switzerland, turnover ecological houses business only, around 4,5 Mln €, turnover 8 Mln €, 70 employees, 1 plant in north west Italy and 2 plants in France.

2008-2009 In response to the changing market conditions Beppe Bonelli,grandson of the founder Bonelli, sold the Timber Saw Milling Bonelli S.p.a and spinned off the entire **Silicawood®** ecological house division establishing a new company **BBuilding Srl**

2010 The original **Silicawood®** undergoes an innovative technological improvement and the BBuilding Engineering system is refined for compliancy with the new severe ant seismic specifications for the Italian residential houses.

2014 Plans to start up operations **Silicawood®** **PRODUCTION PLANT** with a JV Company in the **Kingdom of Barhain**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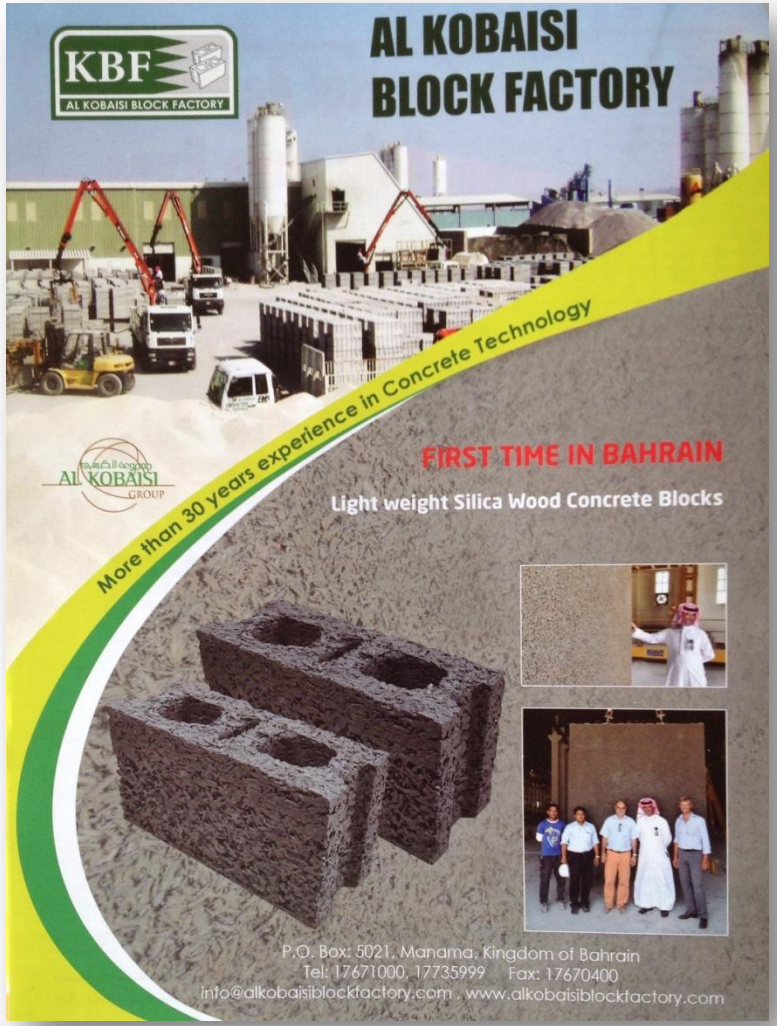
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