TIMBER BUILDINGS IN ITALY
BEFORE AND AFTER L’AQUILA

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WE ARE...

Legnopiù

Engineering bureau
Established in 2003
Turnover 0,5 M€
6 associates + 4 staff

[Image of a group of people in a meeting room]
SUMMARY

2008

2,500 homes/year (trend +20%)

1-2 storey family houses

2009, April 6: L’Aquila earthquake
Ag = 0.68g
308 died

2011

6,000 homes/year (trend +40%)

multi-storey apartments
Before
L’Aquila
After
Conclusion
“Mrs. and Mr. BIANCHI”

2005  1,000 homes/year (trend +15%)

2008  2,500 homes/year (trend +20%)
76 companies, 50% of them <8 homes/year
key factors: comfort and energy saving
direct competitor: hollow bricks
Schools and other public buildings
Timber structures were already used for permanent or semi-permanent houses after recent earthquakes:

1980 Campania e Basilicata
1997 Umbria e Marche
2002 Molise
Laws, standards and research

1995  Eurocode 5 (not formally adopted in Italy)

2005  Issue of “equivalence” law (not in force)

2007  CNR guidelines

2008  Revision of “equivalence” law (still not in force)

2008  SOFIE project completed
Training and promotion

2008: Italy was the 2nd European market for GL and CLT
The CLT phenomenon

Key features: perceived solidity, thermal mass

Key limitation: absence from standards (EC5 and CE marking)
POPULATION AND FAMILIES (%).
Total in 2008: 60 M people, 21 M families.

Key factors: immigration, mobility, singles.
HOUSING STARTS, INCLUDING RESTORATION

- 62% of the houses are >50 years old.
- 52% never maintained.

Residential units in 2008: 22 Millions
Rate of HS: 1% / year

62% of the houses are >50 years old.
52% never maintained
SALES OF RESIDENTIAL UNITS (X 1.000)
2,6% of stock in 2009

Real estate value since 2005: -3% per year. Smaller units.

Need for new housing units in 2009: 430,000. But few money.
Before
L’Aquila
After
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2009, April 6: L’Aquila earthquake
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PROGETTO CASE
3-storey permanent buildings (apartments) around the city, on damping foundations
50% timber structures

MAP
1 and 2-storey “temporary” homes in rural areas
100% timber structures

OTHER BUILDINGS
Private houses, small churches, small schools...
The equivalence law (NTC) was enforced from July 1, 2009.

**PROGETTO CASE**
15,000 people
4,449 flats (2,238 timber)
56 % CLT
44 % Light Frame

**MAP**
7,000 people
3,384 houses
52 % CLT
43 % Light Frame
5 % Blockhouse
PROGETTO CASE

An open design+build competition
52 entries for 30 “batches” (5 buildings each batch)
16 proposals selected (8 with timber structures)

1 week for the competition (design proposal)
1 month for the executive design
80 days to deliver each building

9 months after the earthquake:
4,449 flats (50% with timber structures)
185 buildings (92 with timber structures)

Average costs:
1,318 € (2,190 NZD)/m² for the buildings
503 € (830 NZD)/m² for the damping foundations
OUR DESIGN

All CLT. Damping not necessary. Ready in 75 days.
OUR DESIGN

Details are simple and easy to understand in the yard.
OUR DESIGN

Narrow CLT panels: more joints, but higher flexibility.
OUR DESIGN

Safety without scaffolding (2 weeks for carpentry ready).
OUR DESIGN

All dry construction. Prefab toilet. Cables only in walls.
OUR DESIGN

Durability: fibercement ventilated wall over cork insulation.
OUR DESIGN

The first delivery: 75 days after the basement is ready.
OUR DESIGN

7 buildings
6 types of apartments (32-74 m²)
189 apartments
75 days average delivery time each building (excluding foundations, including furniture)
1.180 Euro/m² (excluding foundations)
33 kWh/m²-year energy consumption
58 dB sound insulation, wall between units
51 dB sound insulation, floor between units
62 dB sound transmission, floor between units
40 dB sound insulation, exterior wall
OUR DESIGN – Life Cycle Analysis

3 materials, 3 databases, independent evaluation

timber: 452 t
concrete: 2.341 t
OTHER TIMBER DESIGNS – ARCH LEGNO

CLT + GL.
Concrete slab.
Scaffolding.
Rendering on rockwool.
OTHER TIMBER DESIGNS – LOG ENGINEERING

- Detached balconies
- Scaffolding
- High prefab
OTHER TIMBER DESIGNS – WOOD BETON

All CLT. Prefab stairs. Scaffolding. Rendering on rockwool.
OTHER TIMBER DESIGNS – ILLE AND BELWOOD

100% LF. Scaffolding. Fibercement ventilated wall.
OTHER TIMBER DESIGNS – SAFWOOD

All CLT nailed/glued. Scaffolding. Thermowood + rendering.
OTHER TIMBER DESIGNS – WOLF

All LF. High prefab. Scaffolding. Rendering on rockwool.
Before
L’Aquila
After
Conclusion
“BIANCHI & Co. Developments/Trust/Bank/...”

- 6,000 homes/year (4% of Italian housing starts)
- Trend for 2012: +40%
- The 1st European market for GL and CLT
- >150 companies, many “new entries”
- Key factors: time and price
- Direct competitor: concrete frame + gasbeton
Still, for a timber building 4-storey or higher, the “structural system” needs a specific permission from the Ministry of Infrastructures.

The **biggest issue** for the consolidation and growth of the timber construction market is “keep durability and quality at its best”.
A few 4- and even 5-storey timber structures are being built, without any “specific permission”. The competition is now already quite tough.
TWO DESIGN EXAMPLES. SAME ARCHITECT, BUT...

Not “born” for timber structures: irregular layout.

Since the beginning, designed for timber with a concrete core.
8-STOREY  ALL CLT

First (and only) Ministry permission: 6 months procedure.
8-STOREY     ALL CLT

Rough dimensioning based on robustness criteria

120 mm
140 mm
160 mm
180 mm
200 mm
8-STOREY ALL CLT

Fully checked also for wind gusts, earthquake, deformations, fire (60’)

SEZIONE BB1
12-STOREY    GL + CLT + concrete staircase

20 out of 130 entries (15%) use timber structures:
• 17 are 5-storey
• 3 are 12-storey.

The attention of the Italian construction industry is now focused on timber structures.
12-STOREY  GL + CLT + concrete staircase

Timber structure around a concrete core.
12-STORY GL + CLT + concrete staircase

Use of timber strength:
< 62% posts
< 79% beams

Fire safety: R90
12-STOREY GL + CLT + concrete staircase

CLT floor: 284 mm
GL post: twin 600x200 mm
12-STOREY  GL + CLT + concrete staircase

Joints fully designed and checked under all actions.
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CHANGING MIND-SETS...

...that’s what L’Aquila brought into Italian timber business.
BUT TO REACH OUR OBJECTIVES...

...we now need more than just passion and bravery.
THANK YOU
FOR YOUR ATTENTION

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