

BIGWOOD



Interreg
Italia-Österreich
European Regional Development Fund



- Transnational Network
- Platform for Stakeholders
- Design tools for information and education
- Mockups and Prototypes for research and development

BIGWOOD creates an interregional network to enforce large-volume timber constructions and reduce existing barriers.

unibz



bigwood.projects.unibz.it
#bigwoodproject

think BIG in WOOD



Il progetto Interreg BIGWOOD

Gli edifici in legno sono in crescita in tutto il mondo e si sono già affermati dal punto di vista ecologico. Nel settore dell'edilizia a più piani, tuttavia, la fiducia nel legno come materiale da costruzione è ancora troppo scarsa in tutto il paese. Il progetto BIGWOOD si concentra sulla creazione di una rete sovraregionale per superare i pregiudizi e le barriere che esistono contro l'edilizia multipiano e di grandi volumi in legno.

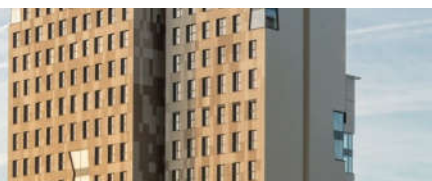
think BIG in WOOD

unibz

pro:Holz
Tirolo

universität
innsbruck

centro
consorzi



BIGWOOD



Interreg
Italia-Österreich
European Regional Development Fund



Durata del progetto

01/10/2019 – 31/03/2022

ERDF: 666.766,57 Euro

Total Budget: 883.831,28 Euro

- **Rete internazionale** / sovraregionale sul tema della costruzione in legno di grandi volumi tra i partner del progetto
- **Piattaforma** per i principali **stakeholders**, quali promotori immobiliari, pianificatori, politici, istituti di istruzione e di ricerca
- Creazione di **strumenti di progettazione** aggiornati allo stato dell'arte combinando soluzioni di sistema per strutture in legno a più piani
- Sviluppo e costruzione di un **mockup 1:1** a Bolzano e di modelli dimostrativi mobili

BIGWOOD – think BIG in WOOD

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Aspettativa soggettiva

energies

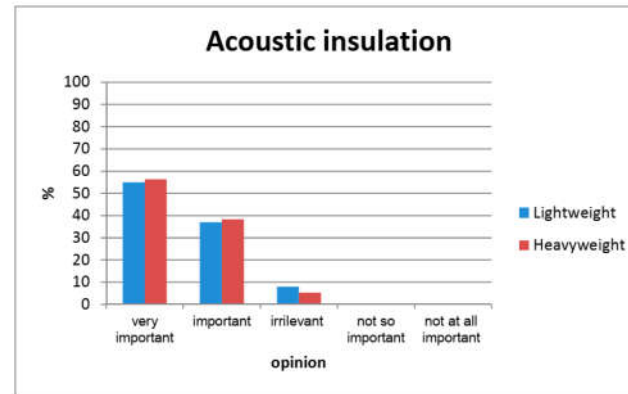
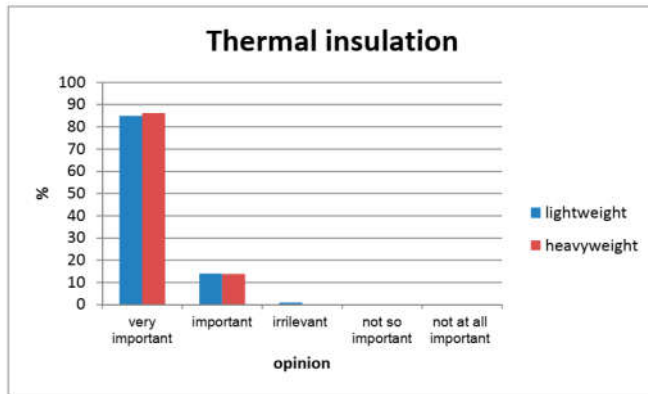
Article
Discriminating People's Attitude towards Building Physical Features in Sustainable and Conventional Buildings

Marco Caniato and Andrea Gasparella

Faculty of Science and Technology, Free University of Bozen-Bolzano, Bozen 39100, Italy; andrea.gasparella@unibz.it
 * Correspondence: marco.caniato@unibz.it

Received: 7 March 2019; Accepted: 10 April 2019; Published: 13 April 2019

Abstract: At the present time, buildings technologies for residential constructions are essentially divided into two groups. The first one is associated to conventional techniques using concrete, masonry or in general heavyweight structures, while the second one is associated to timber, e.g., sustainable glulam, crosslam, etc. (lightweight structures). Technicians, scientist, designers and non-expert people have their own stereotyped ideas and attitudes, related to thermal and sound insulation, structural stability, fire resistance, service equipment, heating and cooling systems, etc. **Keywords:** for people who is not strongly related to both construction processes and their attitude



Aspettativa soggettiva



Article
Discriminating People's Attitude towards Building Physical Features in Sustainable and Conventional Buildings

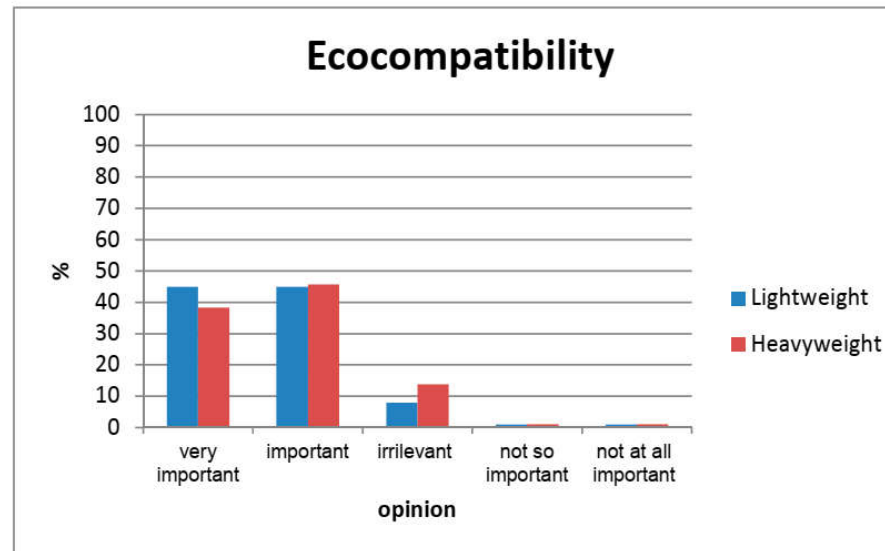
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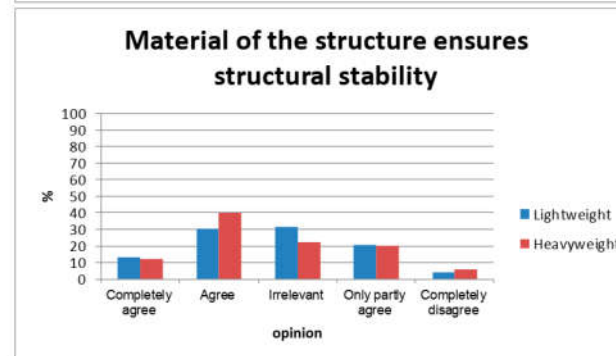
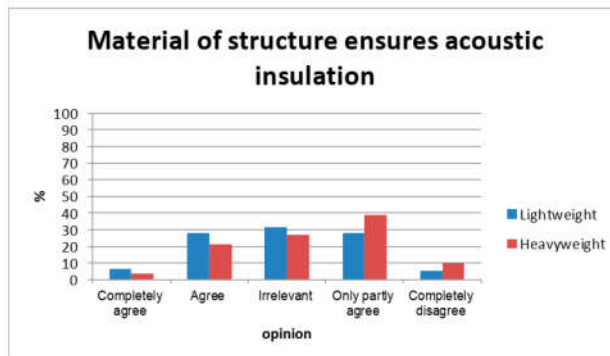
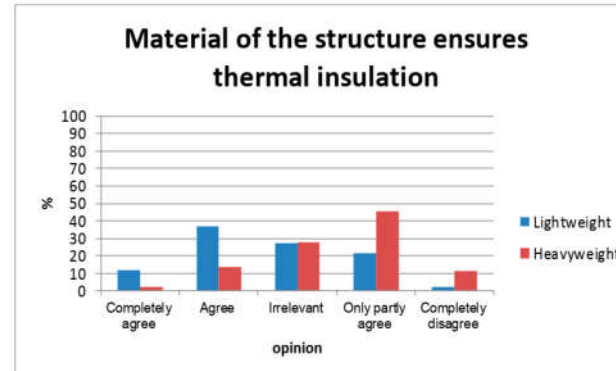
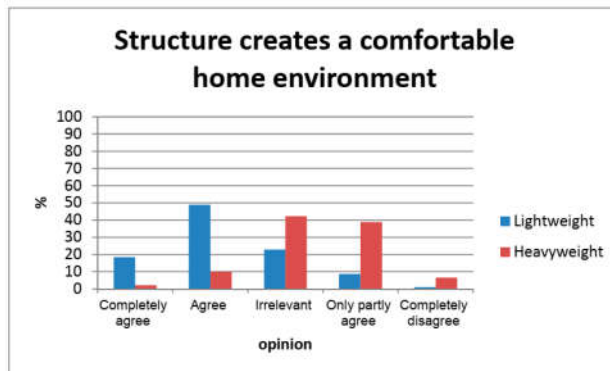
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Abstract: At the present time, buildings technologies for residential constructions are essentially divided into two groups. The first one is associated to conventional techniques using concrete, masonry or in general heavyweight structures, while the second one is associated to timber, e.g., sustainable glulam, crosslam, etc. (lightweight structures). Technicians, scientist, designers and non-expert people have their own stereotyped ideas and attitudes, related to thermal and sound insulation, structural stability, fire resistance, service equipment, heating and cooling systems, etc. Nevertheless, for people who is not strongly related to both construction procedure studies, analysis



Aspettativa soggettiva



problematiche



Instructions:
 Choose a value on the 10-point scale for how much you are bothered, disturbed or annoyed by each source of noise. If you are not bothered, disturbed or annoyed by any of the sources, choose 'Don't know'.

If you hear a small amount of noise AND you are NOT at all bothered by it, choose 0	If you are extremely bothered, disturbed or annoyed by it, choose 10	If you are bothered, disturbed or annoyed, choose a number from 1 to 9	If you do not hear anything at all, the source does not exist or if you cannot answer, choose 'Don't know'
Thinking about the last 12 months in your house, how much are you bothered, disturbed or annoyed by:			
1. Noise in general e.g. from neighbours, technical installations			
Thinking about the last 12 months in your house, how much are you bothered, disturbed or annoyed by these sources of noise?			
2. Neighbours, daily living e.g. people talking, audio, TV through the walls (what is heard)			
3. Neighbours, daily living e.g. people talking, audio, TV through the floors (what is heard)			
4. Neighbours, Music with bass and drums			
5. Neighbours, footstep noise, i.e. you hear when they walk on the floor			
6. Neighbours, rattling or tinkling noise from your own furniture when the neighbours move on the floor above you			
7. Staircases, access balconies etc. people taking, doors being closed			
8. Staircases, access balconies etc. footsteps or other impact sounds			
9. Water installations, plumbing, using or flushing WC, shower			
10. Climate installations, heaters, air condition, air terminal devices			
11. Service installations, elevators, laundry machinery, ventilation machinery			
12. Premises, garages, shops, offices, pubs, restaurants, nearby shops or other, heard indoors with windows closed			
13. Traffic (cars, buses, trams or aircraft), heard indoors with windows closed			
14. Open traffic, heard within your dwelling with doors closed			
Before moving to the apartment, how important was the second installation to you, with respect to:			
15. Noise in general e.g. from neighbours, technical installations			
Also you consent or optative with respect to:			
16. Noise in general e.g. from neighbours, technical installations			
Comments (Mention the important sources of noise, type of premises, neighbour activities etc.)			

- 5. Neighbours; footstep noise, i.e. you hear when they walk on the floor |
- 6. Neighbours; rattling or tinkling noise from your own furniture when the neighbours move on the floor above you |





Parametri

- 1) Coefficiente di fonoassorbimento
- 2) Resistenza al flusso
- 3) Rigidità dinamica



Parametri

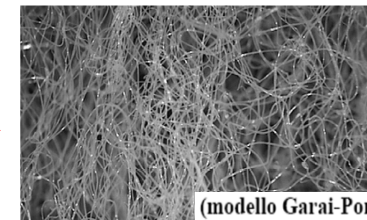
1) Coefficiente di fonoassorbimento



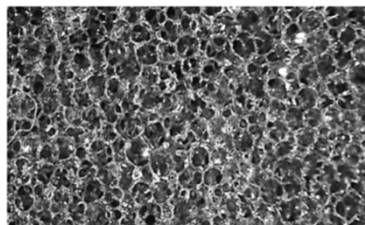
INGRANDIMENTO 10X

MATERIALI FIBROSI O POROSI:

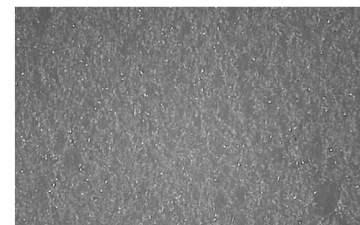
- Fibre di roccia
- Fibre di vetro
- Fibre di poliestere
- Poliuretani espansi (a cellula aperta)
- Resine melamminiche (a cellula aperta)
- Feltri
- Altri materiali di riciclo



(modello Garai-Pompoli)



(modello Wu-Qunli)

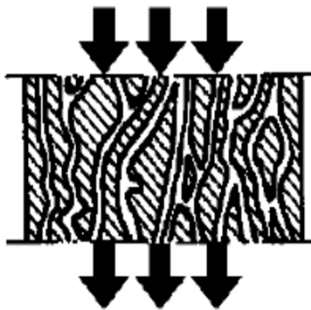


(modello Delany-Bazley)



Parametri

2) Resistenza al flusso



$$\sigma_s = \frac{\Delta P}{U}$$

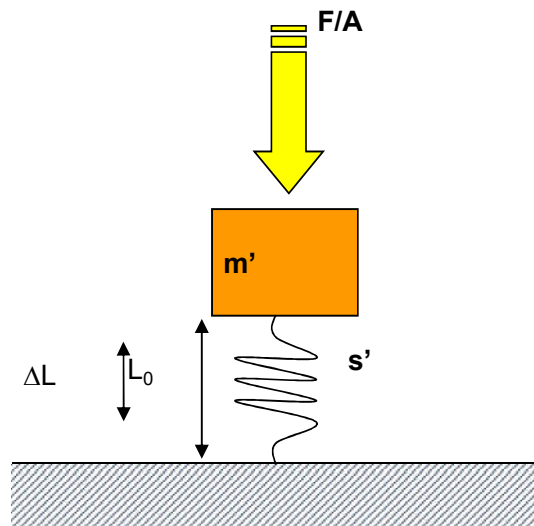
Differenza di pressione

Velocità del flusso



Parametri

3) Rigidità dinamica

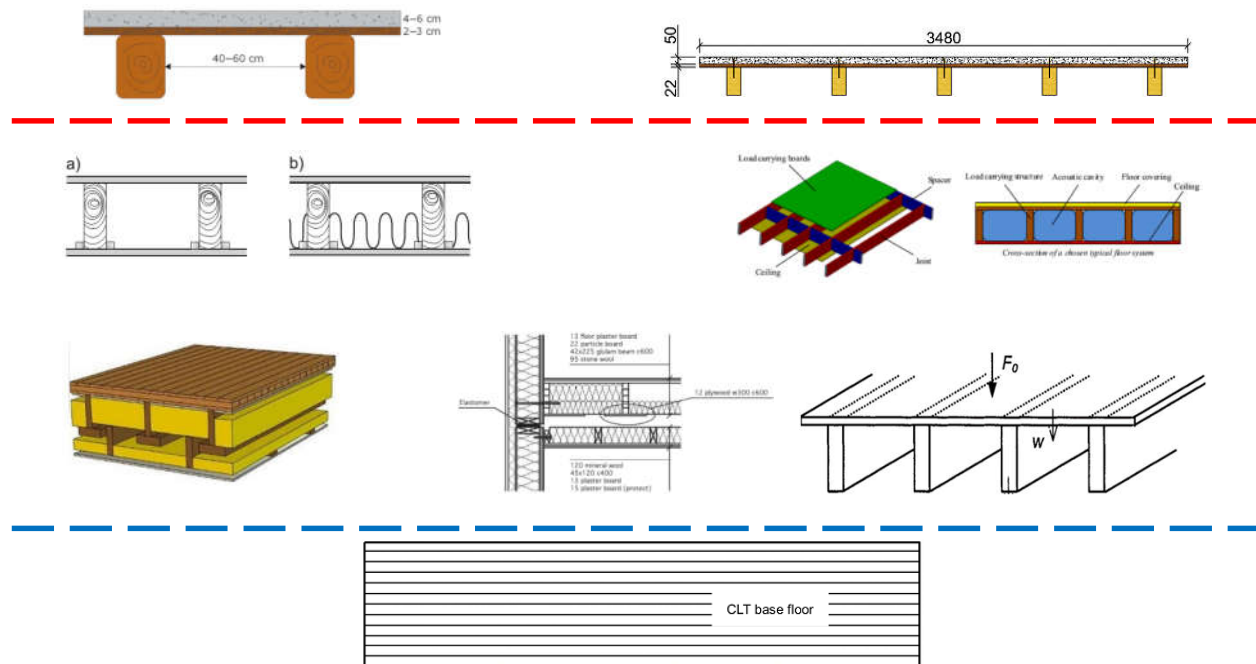


$$f_0 = \frac{1}{2\pi} \sqrt{\frac{s'}{m'}}$$

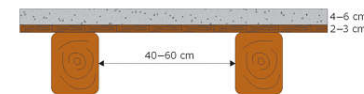
$$\Delta L_{n_{\text{pavimentogalleggiante}}} = 30 \log \frac{f}{f_0}$$



Rumore da calpestio



Rumore da calpestio

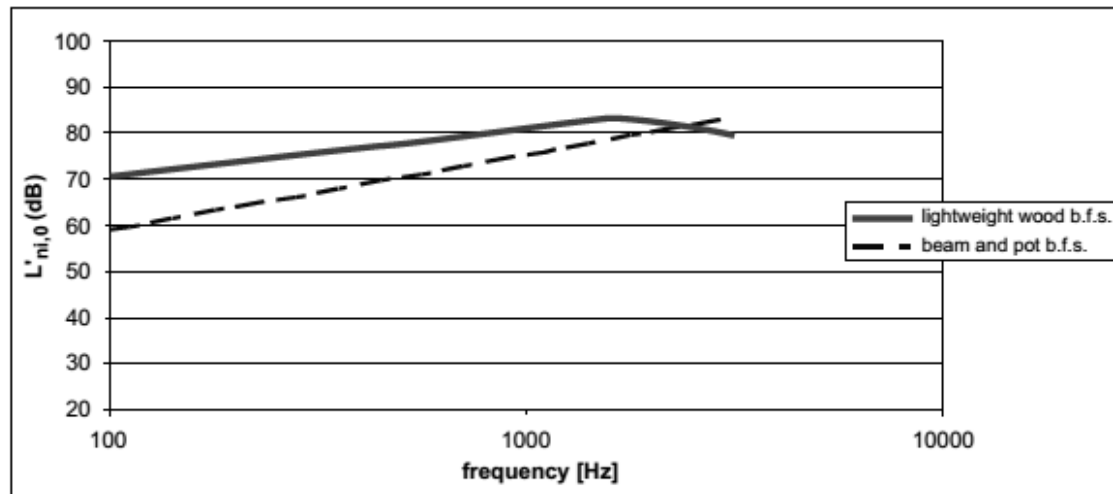


$$L_{n,eq,avg} = 10.4 \cdot \log(f) + 50 \text{ dB} \quad \text{for } f < 1600 \text{ Hz}$$

$$L_{n,eq,avg} = -6.1 \cdot \log(f) + 129 \text{ dB} \quad \text{for } f > 1600 \text{ Hz}$$

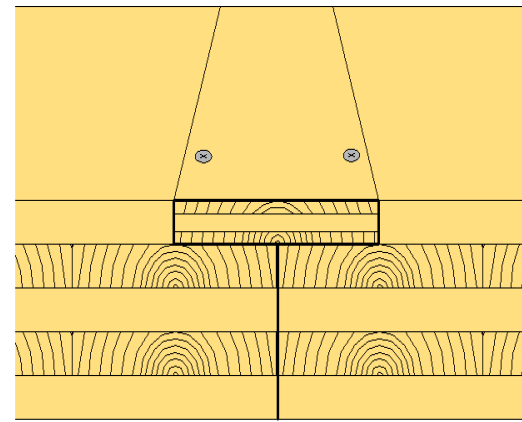


Rumore da calpestio

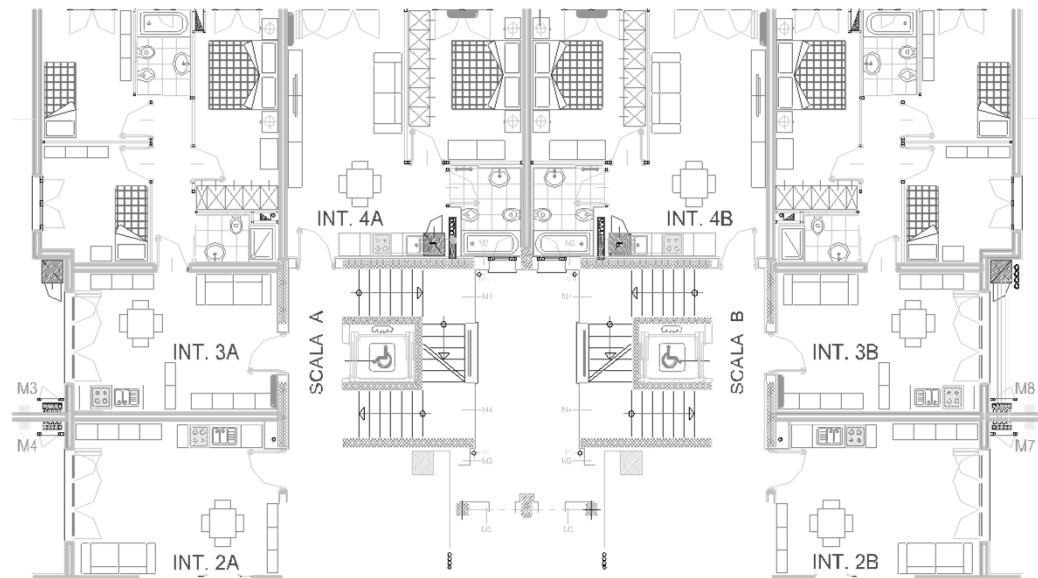




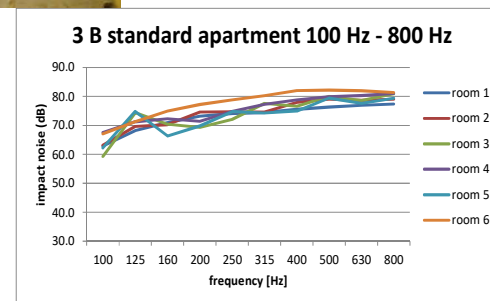
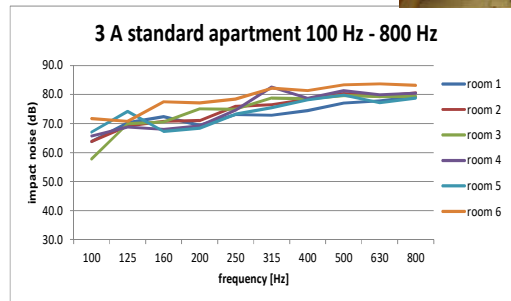
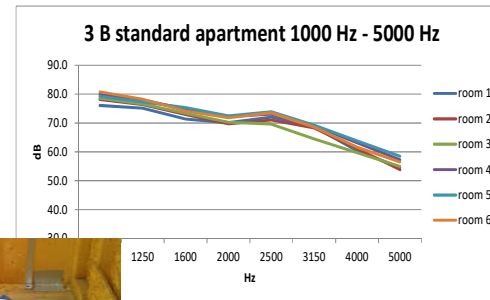
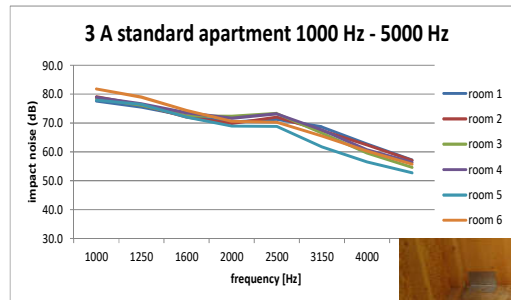
Rumore da calpestio



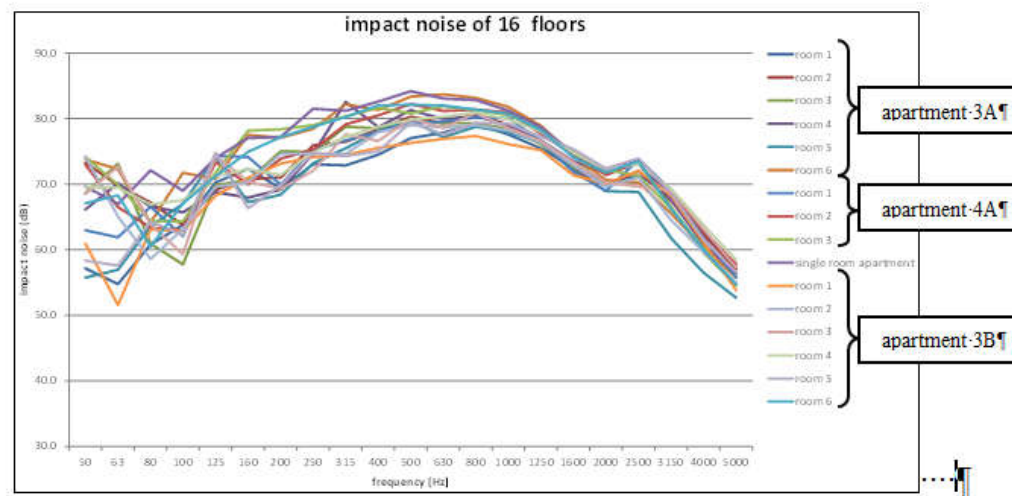
Rumore da calpestio



Rumore da calpestio



Rumore da calpestio



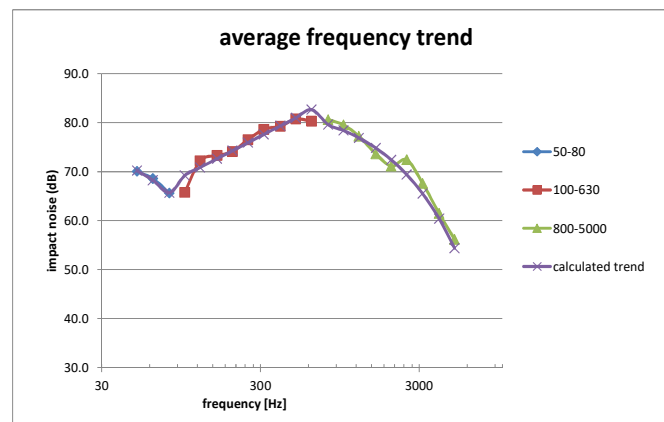
Rumore da calpestio

$$L_{n,eq,avg} = -0.15 (f) + 77.7 \quad (\text{dB})$$

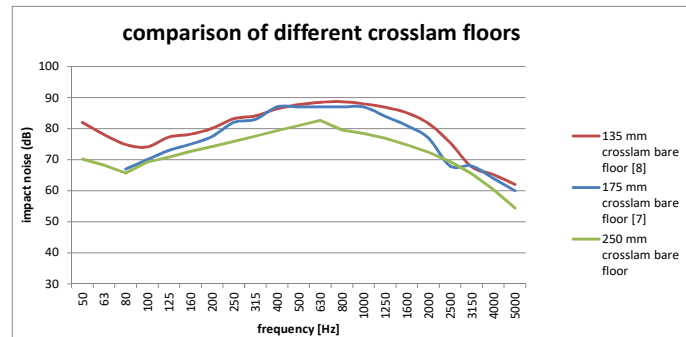
$$L_{n,eq,avg} = 7.26 \log (f) + 35.6 \quad (\text{dB})$$

$$L_{n,eq,avg} = -0.006 (f) + 84.4 \quad (\text{dB})$$

for $50 < f < 80$ Hz
 for $100 < f < 630$ Hz
 for $800 < f < 5000$ Hz



Rumore da calpestio

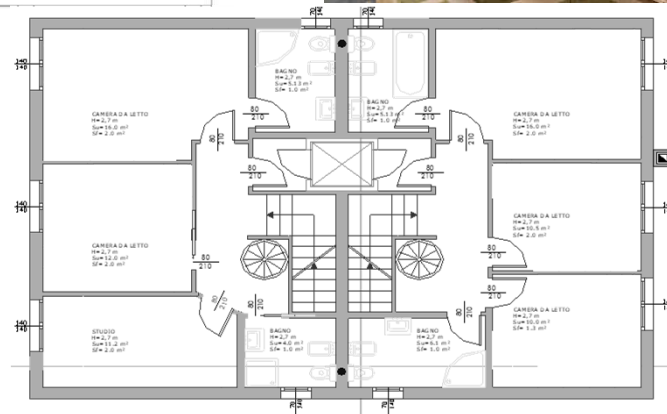
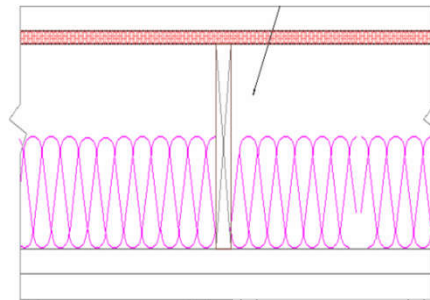


$$L_{n,w,eq,corrected} = 134.5 - 25 \cdot \log(m') \quad (\text{dB})$$

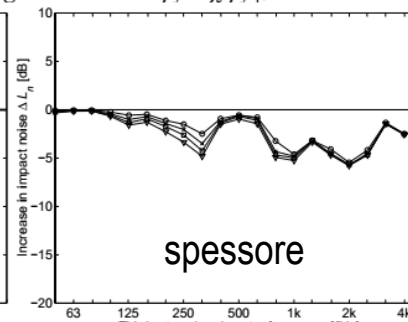
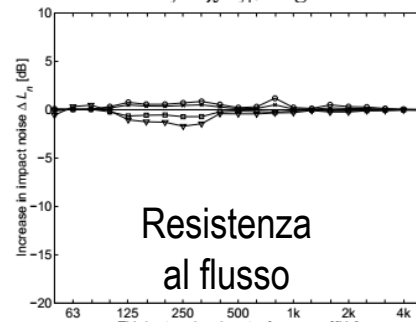
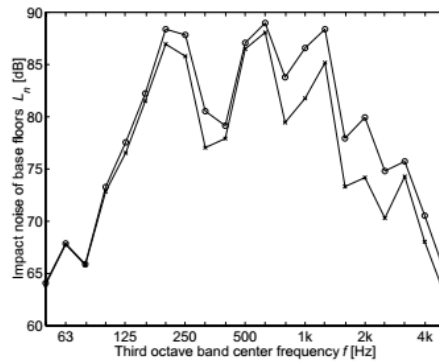
	135 mm bare floor	175 mm bare floor	250 mm bare floor
Measured L_{nw}	88	85	80
ISO 12354-2	98.5	94.6	89.2
modified ISO 12354-2	87.7	84.9	81.0



Rumore da calpestio



Rumore da calpestio





Rumore da calpestio

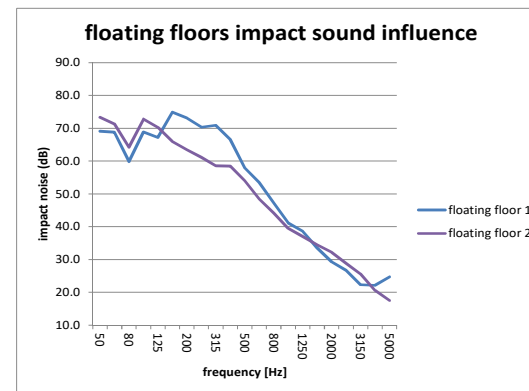
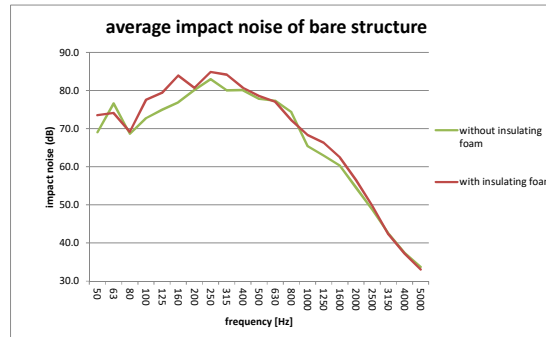


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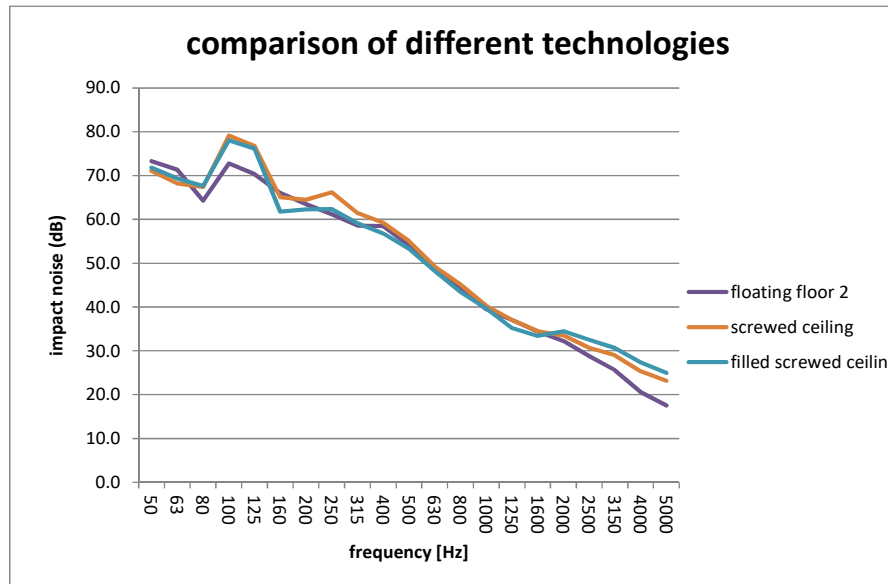
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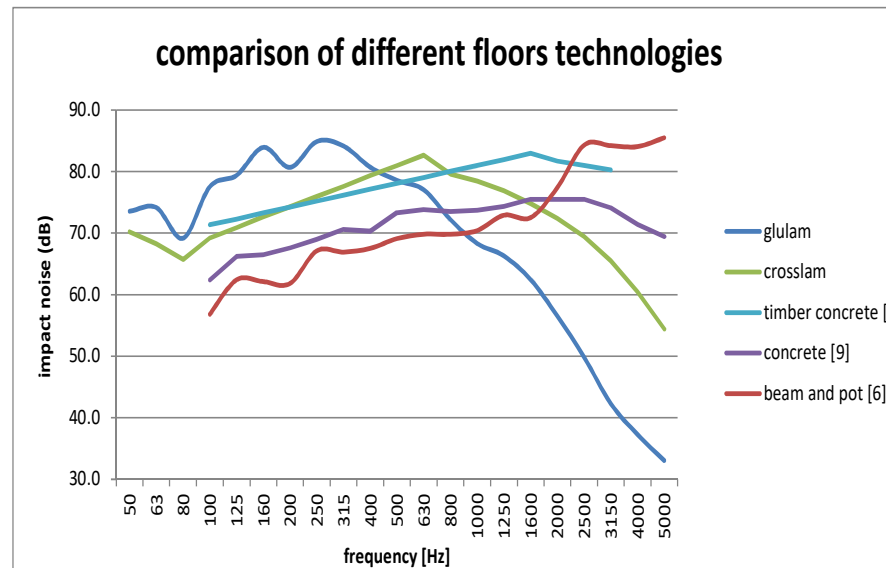
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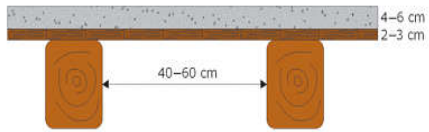
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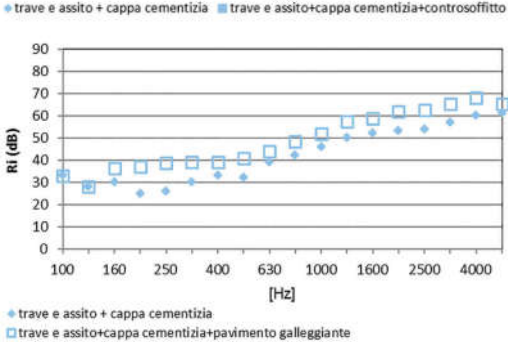
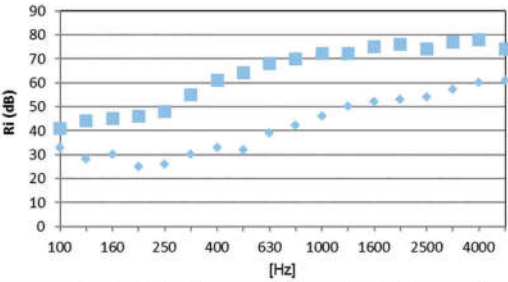
Rumore da calpestio



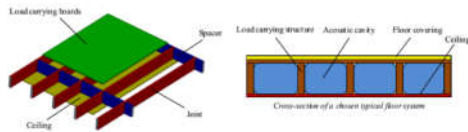
Rumore Aereo



Stratigrafia	
1)	Travi a sezione rettangolare di dimensione 8×12 cm, interasse 60 cm + assito in legno di spessore 2,2 cm
2)	Travi a sezione rettangolare di dimensione 8×12 cm, interasse 60 cm + doppio assito in legno incrociato di spessore 2,2+2,2 cm
3)	Travi a sezione rettangolare di dimensione 10×20 cm, interasse 75 cm + assito in legno di spessore 2,2 cm
4)	Travi a sezione rettangolare di dimensione 10×20 cm, interasse 75 cm + assito in legno di spessore 2,2 cm + cappa in calcestruzzo armato classe C20/25 collegata mediante barre in acciaio di classe S500 e diametro 8 mm
5)	Travi a sezione circolare di diametro 13+15 cm, interasse 50 cm + cappa in calcestruzzo armato alleggerito con elementi di sughero collegata mediante barre in acciaio di classe S500 e diametro 8 mm



Rumore Aereo

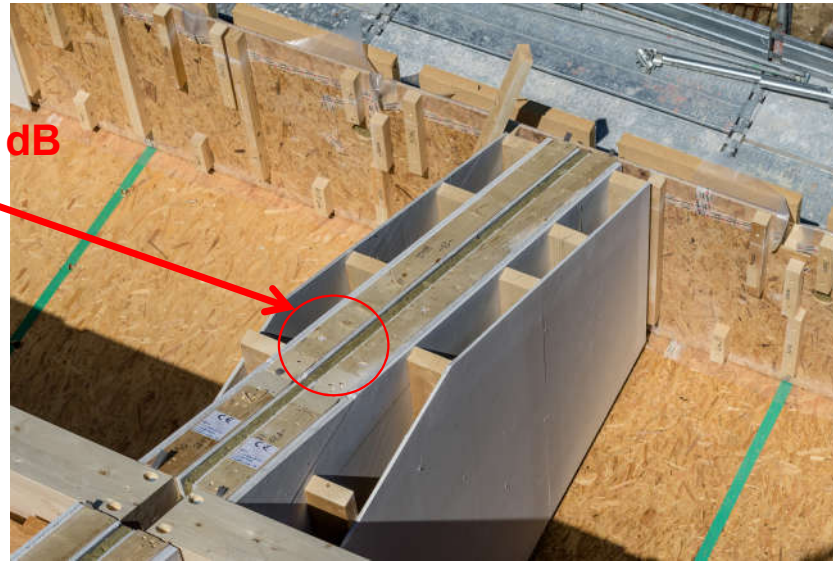


Stratigrafia
1) Parete semplice a telaio di legno con lana minerale interna di spessore 140 mm, lastre esterne in OSB spessore 15 mm
2) Parete semplice a telaio di legno con lana minerale interna di spessore 140 mm, lastre esterne in fibrogesso spessore 15 mm
3) Parete semplice a telaio di legno con lana minerale interna di spessore 140 mm, lastre esterne in fibrogesso spessore 15 mm e controparete singola con lana minerale interna di spessore 40 mm, lastre esterne in fibrogesso spessore 15 mm
4) Doppia parete a telaio di legno con lana minerale interna, intercapedine tra le due strutture di spessore 50 mm vuota, lastre interne in OSB spessore 10 mm e lastre esterne in cartongesso
5) Parete semplice a telaio di legno con lana minerale interna di spessore 140 mm e doppie lastre esterne in fibrogesso spessore 15+15 mm, controparete singola con telaio non a contatto, lana minerale interna di spessore 40 mm, lastra esterna in fibrogesso spessore 15 mm
6) Parete semplice a telaio di legno con lana minerale interna di spessore 140 mm e lastre in OSB spessore 15 mm, doppia controparete con lana minerale interna di spessore 40 mm e doppia lastra esterna in fibrogesso spessore 15 mm

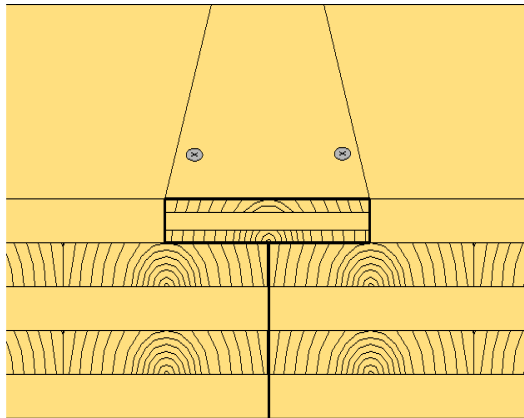


Rumore Aereo

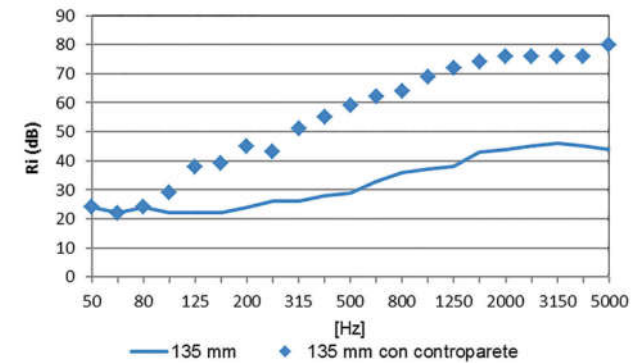
$R'_w > 60 \text{ dB}$



Rumore Aereo



Spessore [mm]	Massa superficiale [kg/m ²]	R _w (dB)
32	13	
80	36	
85	47	
94	47	
100	45	
135	68	
135	74	
175	90	

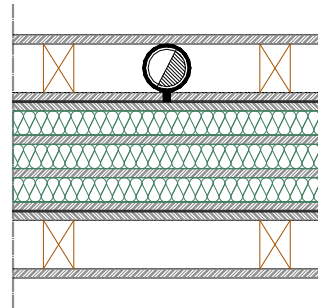


– Potere fonoisolante per parete crosslam spessore 135 mm e la stessa dotata di controparete



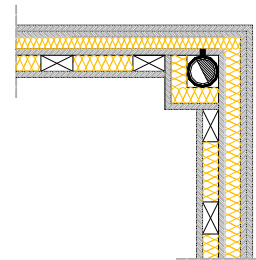
Rumore degli impianti

$$L_n = 10 \cdot \log \left(\sum 10^{\frac{L_{n,d}}{10}} + \sum 10^{\frac{L_{n,a}}{10}} + \sum 10^{\frac{L_{n,s}}{10}} \right) \quad dB$$



$$L_{n,A} = 25,3 \text{ dB(A)}$$

$$L_{n,A, \text{ measured}} = 25.2 \text{ dB(A)}$$



$$L_{n,A} = 35.8 \text{ dB(A)}$$

$$L_{n,A, \text{ measured}} = 35.3 \text{ dB(A)}$$





GRAZIE PER L'ATTENZIONE

Ing. PhD Marco Caniato

Facoltà di Scienze e Tecnologie, Libera università di Bolzano

mcaniato@unibz.it

