




Università di Trieste
Dipartimento di Ingegneria e Architettura

Corso di
Costruzioni in Legno
a.a. 2019-2020

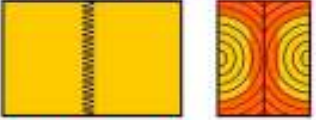
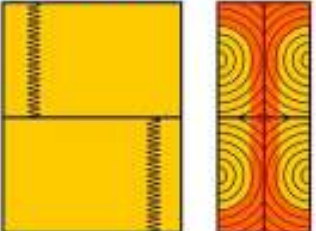

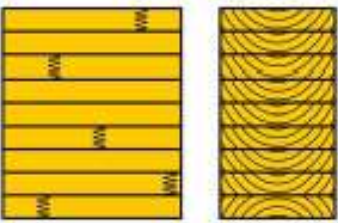
PRODOTTI A BASE DI LEGNO

Prof. Ing. Natalino Gattesco

PRODOTTI A BASE DI LEGNO

product	u [%]	dimensions	surface	additional
Sawn timber 	$\leq 20 \%$	slat: $t \leq 40$; $h < 80$ mm board: $t \leq 40$; $h \geq 80$ mm beam: $t \leq h \leq 3b$; $t > 40$ mm	unplaned / planed	
Round timber 	$\leq 20 \%$	$l \leq 20$ m $d \leq 300$ mm	unmoulded / moulded	unweakened cross sections: $f_{m,d}$ and $f_{c,d}$ 20 % higher
Finger jointed construction timber (KVH®) (KVH®-Si, KVH®-NSi) 	$15 \pm 3 \%$	$w = 60 - 120$ mm $h = 120 - 240$ mm	planed and moulded (edges)	add. grading rules (break-down, knottiness, checks, discoloration, etc.)

PRODOTTI A BASE DI LEGNO

product	u [%]	dimensions	surface	additional
Duo- Trio-beams 	≤ 15 %	Duo: w = 80 - 160; h = 100 - 240 mm Trio: w = 180 - 240; h = 100 - 240 mm	planed and moulded (edges)	
Multi girder 	≤ 15 %	build up of KVH®, Duo- and Trio-beams	planed and moulded (edges)	
Cross beam 	≤ 15 %	w = 80 - 200 mm; h = 100 - 260 mm l ≤ 12 m	planed and moulded (edges)	$h / w \leq 2$
Glued laminated timber (GLT) (BS 11, 14, 16, 18) 	8 - 15 %	w ≤ 220 (300) mm h ≤ 2000 (3000) mm l ≤ 30 (60) m	planed and moulded (edges)	thickness of lamellas t = 6 - 45 mm

PRODOTTI A BASE DI LEGNO

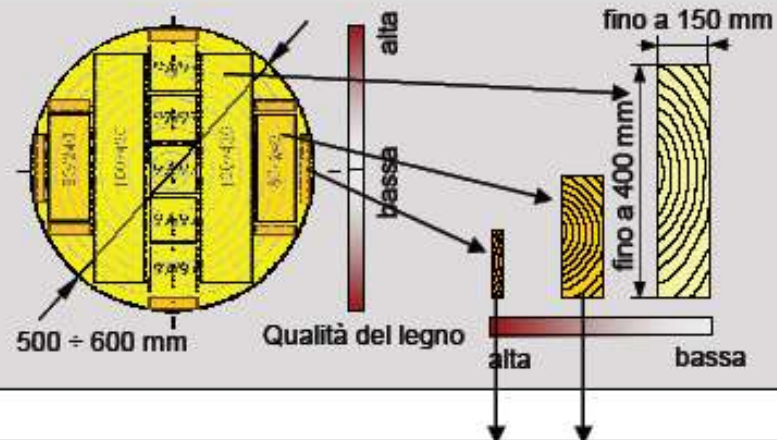
Lamellare incrociato (X-LAM)



PRODUZIONE X-LAM

STEP 0

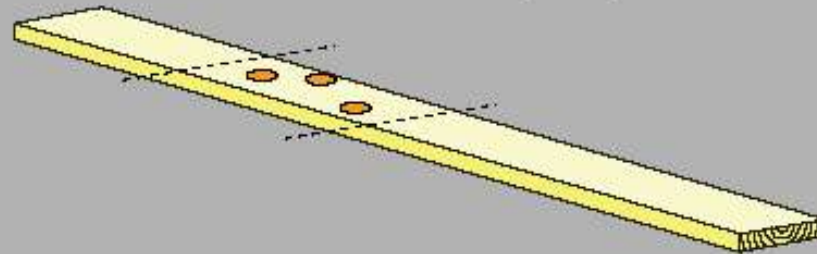
Tronco



Procedimento:
Sezione
Schema di taglio

STEP 1

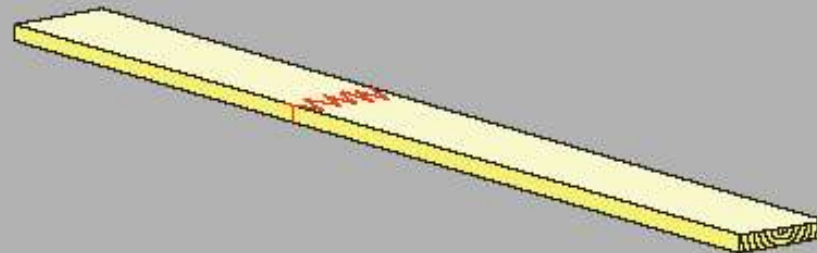
Tavole



Procedimento:
Classificazione
Eliminazione
difetti

STEP 2

Lamelle
giuntate a
pettine

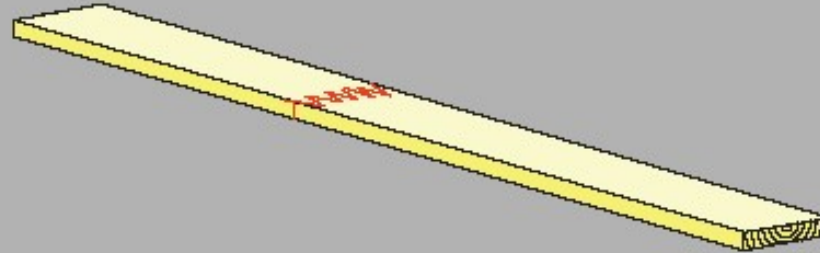


Procedimento:
Giunzione a
pettine

PRODUZIONE X-LAM

STEP 2

Lamelle giuntate a pettine

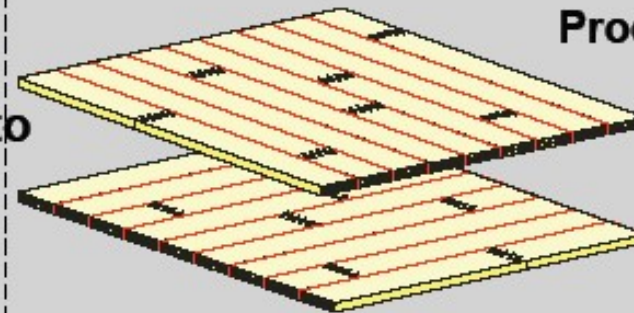


Procedimento:

Giunzione a pettine

STEP intermedio

Elemento monostrato

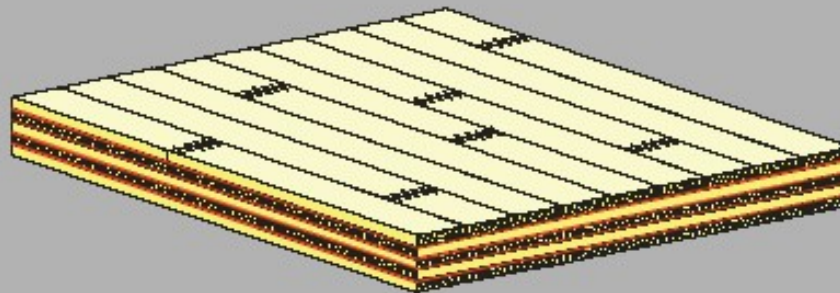


Procedimento:

Incollaggio laterale

STEP 3

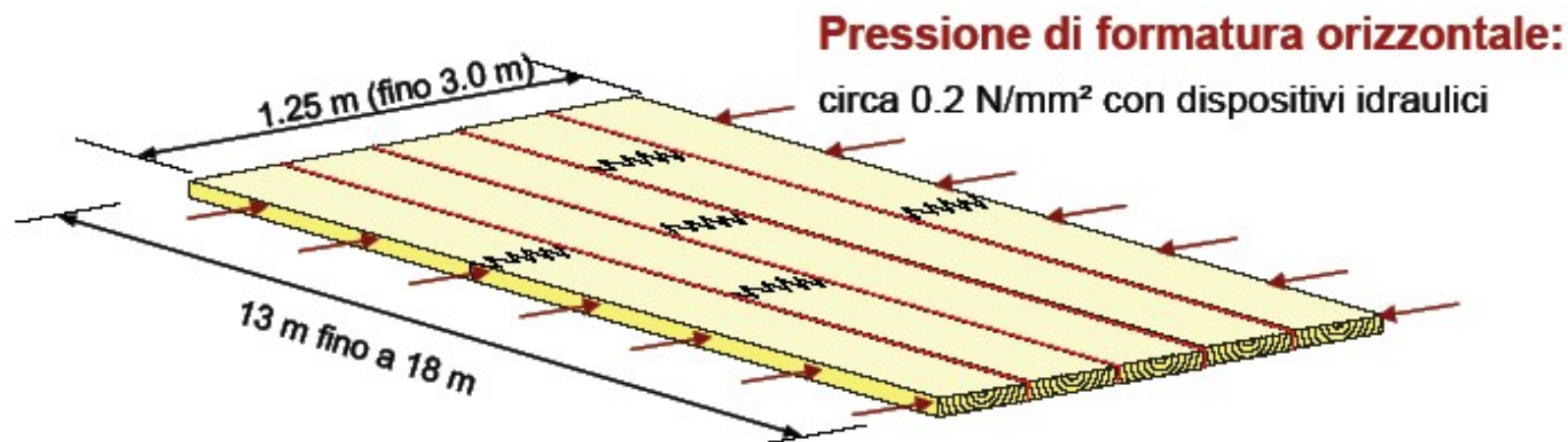
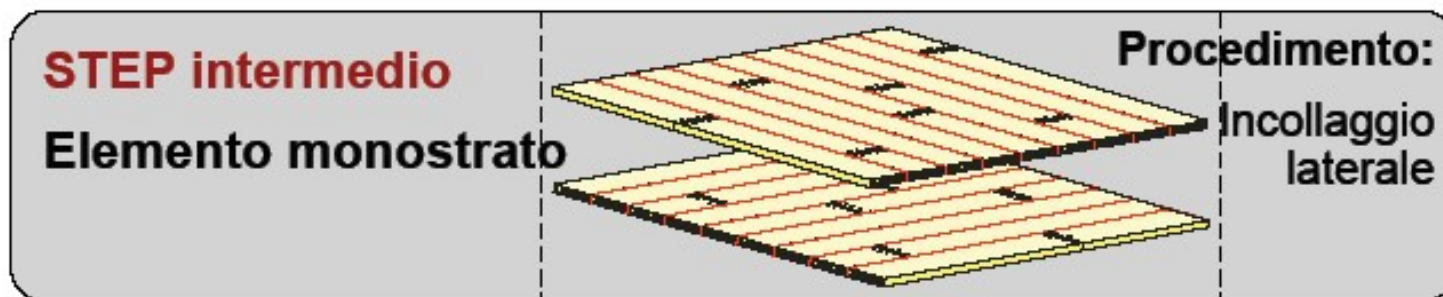
X-LAM



Procedimento:

Incollaggio superficiale

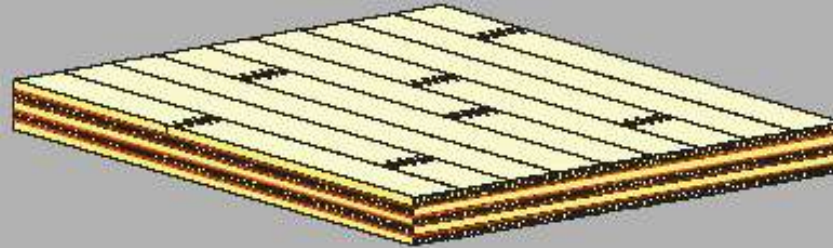
PRODUZIONE X-LAM



PRODUZIONE X-LAM

STEP 3

X-LAM



Procedimento:

**Incollaggio
superficiale**

Pressione di formatura verticale:

circa 0.6 N/mm^2 con **dispositivo idraulico**

$< 0.1 \text{ N/mm}^2$ sotto vuoto

circa 0.1 N/mm^2 con **graffe**

**con o senza pressione di formatura
orizzontale**



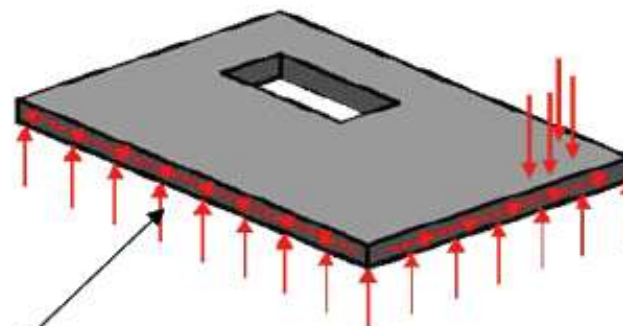
ASSEMBLAGGIO SOLAIO-PARETI

Veduta di 'Judenburg West'

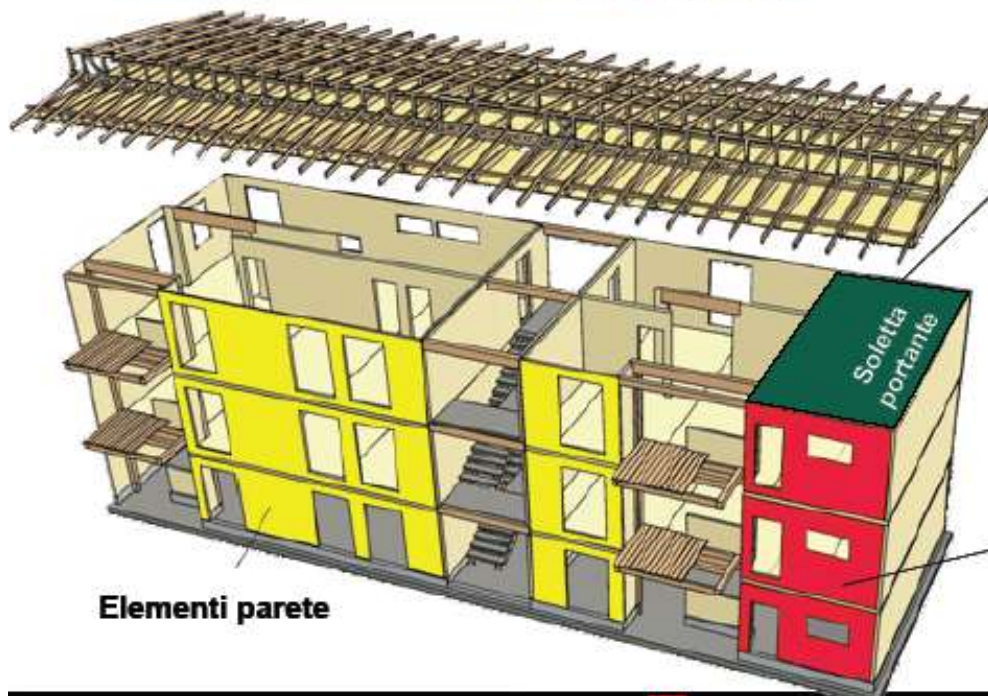
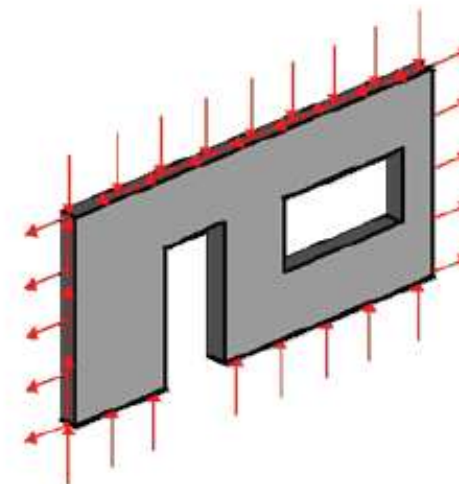


Modulo 1

Carichi perp. al piano – Soletta portante



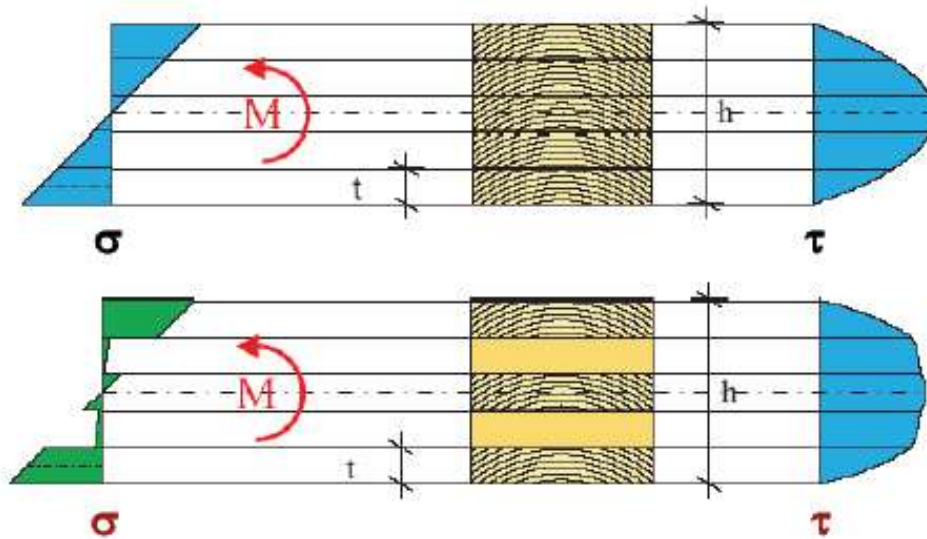
Carichi nel piano – Elementi parete



Elementi parete

VERIFICHE SOLAI

Procedimento di verifica (SLU)



- **Trazione/Compressione (0° alla fibratura)**

Flessione

$$\frac{\sigma_{t,0,d}}{f_{t,0,d}} + \frac{\sigma_{m,d}}{f_{m,d}} \leq 1$$

$$\frac{\sigma_{c,0,d}}{f_{c,0,d}} + \frac{\sigma_{m,d}}{f_{m,d}} \leq 1$$

- **Taglio**

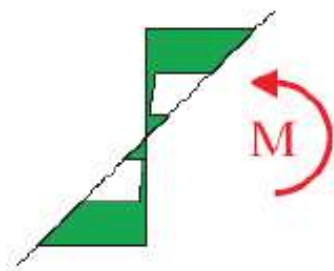
$$\frac{\tau_d}{f_{v,d}} \leq 1$$

- **Trazione/Compressione (90° alla fibratura)**

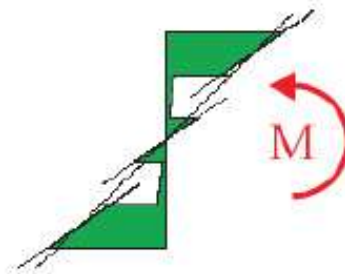
Taglio trasversale

$$\frac{\sigma_{t,90,d}}{f_{t,90,d}} + \frac{\tau_{R,d}}{f_{R,d}} \leq 1$$

$$\frac{\sigma_{c,90,d}}{f_{c,90,d}} + \frac{\tau_{R,d}}{f_{R,d}} \leq 1$$



Collegamento **rigido**



Collegamento **deformabile**

CONNESSIONI

Connessioni nelle costruzioni massicce di legno

Modulo 2

Parete-Soletta

Parete-Fondazione

Soletta-Soletta

Parete-Parete



CONNESSIONI

Connessioni nelle costruzioni massicce di legno

Modulo 2

Parete-Soletta



Parete-Fondazione

Soletta CLT

Parete-Parete

CONNESSIONI

Connessioni nelle costruzioni massicce di legno

Modulo 2



CONNESSIONI

Connessioni nelle costruzioni massicce di legno

Modulo 2



Parete-Fondazione



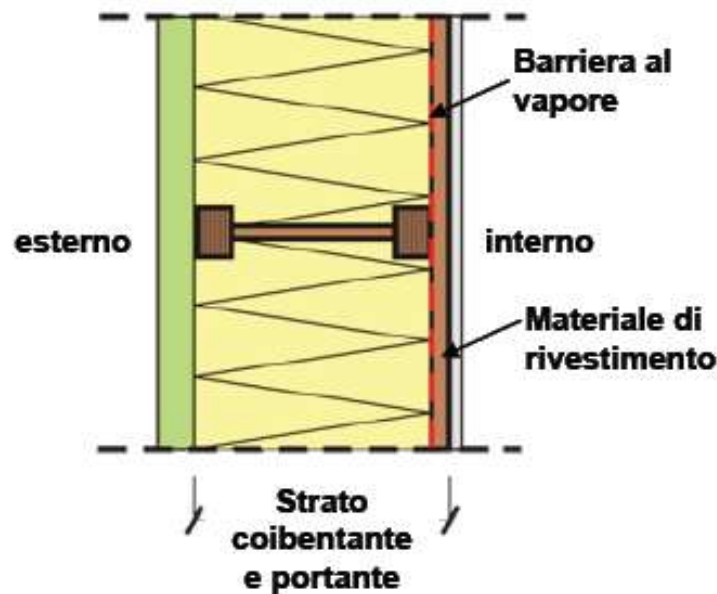
Parete-Parete

Soletta-Soletta

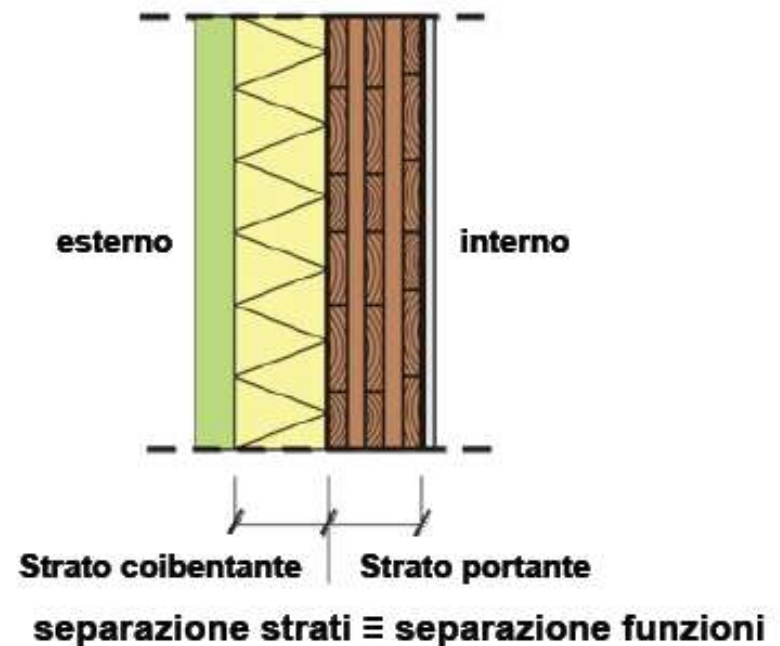


CONFRONTO TIPOLOGIE COSTRUTTIVE

Costruzione Leggera di Legno (TLC)



Costruzione Massiccia di Legno (TMC)



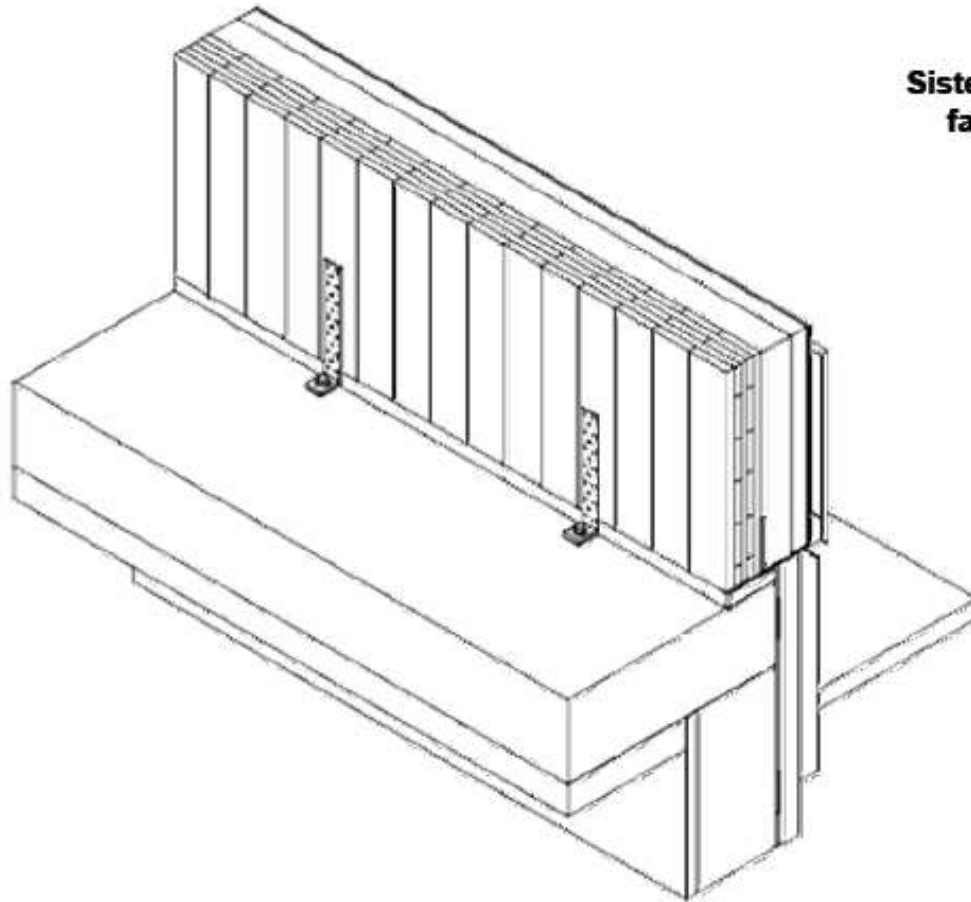
Confronto dei materiali

Prodotti lineari: legno strutturale, GLT, TJI, etc.
Rivestimento: pannelli di fibre, OSB, pannelli a 3 strati, pannelli di gesso, pannelli truciolari

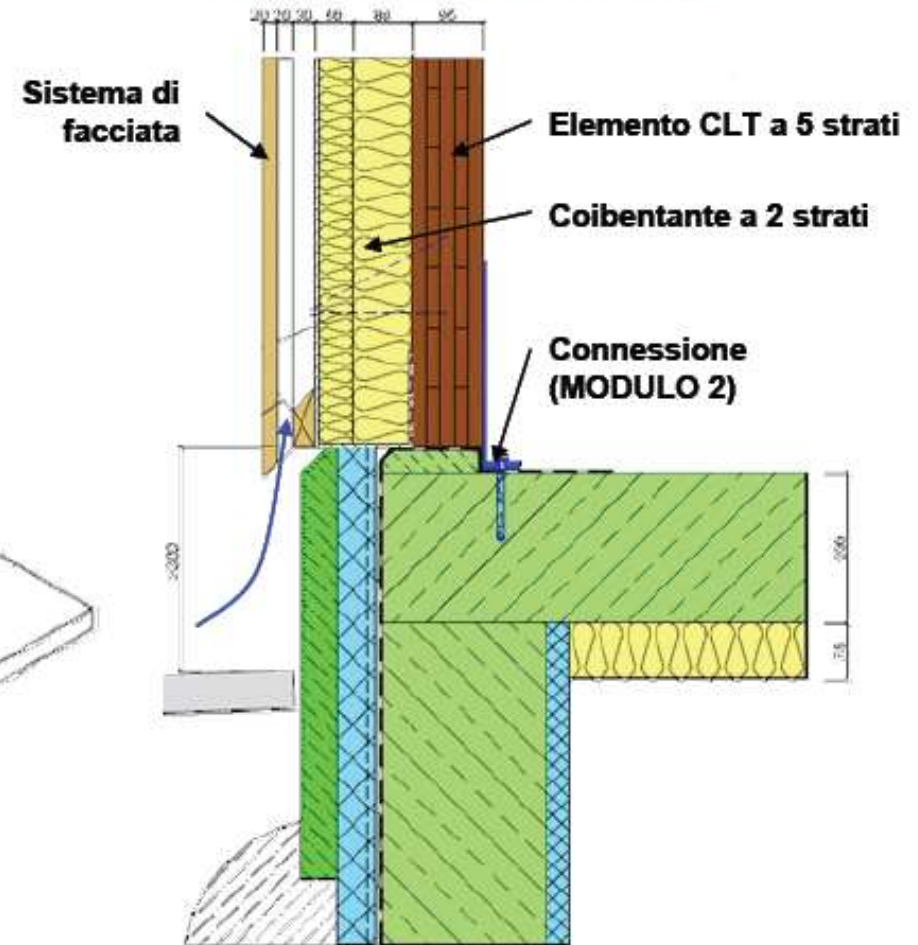
Prodotti bidimensionali elementi CLT omologati
prodotti multistrato a base di strand (nuovo sviluppo)

PARTICOLARI COSTRUTTIVI

Assonometria



Particolare costruttivo



ESEMPI DI COSTRUZIONI IN X-LAM

Case unifamiliari



Edifici multipiano



Capannoni industriali e uffici



Ponti di legno

