

COMUNE DI MONTEPRANDONE

REGIONE MARCHE

ASCOLI PICENO



INTERVENTO DI
RECUPERO E
RISANAMENTO
CONSERVATIVO
DELL'ANTICO
LAVATOIO COMUNALE
IN VIA BORGO
DA SOLE A
MONTEPRANDONE

PROGETTO ESECUTIVO

RELAZIONE DI CALCOLO

TAVOLA:

ET.03

SCALA:

DATA:

DIC. 2017

LOGO PROGETTAZIONE



CUBE SRL
SOCIETA' DI INGEGNERIA

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I COLLABORATORI:



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COMUNE DI MONTEPRANDONE

VER.	DATA	PROTOCOLLO INTERNO	REDATTO-PROGETTATO	VERIFICATO	ACQUISITO	APPROVATO
1	DATA 1	PROTOCOLLO 1	arch....	ing...	comune ...	comune ...
2	DATA 2	PROTOCOLLO 1	arch....	ing...	comune ...	comune ...
PERCORSO FILE		PERCORSO_FILE				

INTERVENTO LOCALE

RELAZIONE DI CALCOLO

DELLE STRUTTURE IN LEGNO LAMELLARE

Comune di MONTEPRANDONE
Provincia di ASCOLI PICENO
Ubicazione: c.da Borgo da Sole

PROGETTO:	Rifacimento copertura ex Lavatoio Comunale
PROGETTISTA:	Arch. Mirco Assenti
COMMITTENTE:	Arch. Mirco Assenti – Cube srl

Normativa di riferimento:

NUOVE NORME TECNICHE DELLE COSTRUZIONI:	D.M. 14 Gennaio 2008 – circolare 617 del 02-02-2009.
LEGNO LAMELLARE: NORME EUROPEE:	EC5
LEG. LAM.: ISTRUZIONI PER LA PROGETTAZIONE:	CNR-DT 206/2007
PROGETTAZIONE ELEMENTI IN ACCIAIO	D.M. 14 Gennaio 2008 – circolare 617 del 02-02-2009
E CEMENTO ARMATO:	CNR-UNI 10011, Giugno 1988

Progettista strutturale:
dott. Ing. Marco Forlini

San Benedetto del Tronto (AP), lì 26 ottobre 2017

Disegni n° 01 (tav 01)

Literatura: “BAUTABELLEN” Autore SCHNEIDER
DIN 1052 Teil 1 “Holzbauwerke; Berechnung und Ausführung”
DIN 1052 Teil 2 “Holzbauwerke; Mechanische Verbindungen”

NORMA UNI EN 14080:2013 per il CALCOLO del LEGNO MASSICCIO e LAMELLARE**CLASSI DI RESISTENZA per LEGNO MASSICCIO (latifolia "D" - conifera "C") e LEGNO LAMELLARE**

Valori caratteristici di resistenza, modulo elastico e densità	LEGNO MASSICCIO UNI EN 338			LEGNO LAMELLARE UNI EN 14080:2013					
	D24	C24	C30	GL24c	GL24h	GL28c	GL28h	GL30c	GL32h
$f_{m,g,k}$ – flessione	24,00	24,00	30,00	24,00	24,00	28,00	28,00	30,00	32,00
$f_{t,0,g,k}$ – trazione parallela	14,00	14,00	18,00	17,00	19,20	19,50	22,30	19,50	25,60
$f_{t,90,g,k}$ – trazione perpendicolare	0,60	0,50	0,60	0,50	0,50	0,50	0,50	0,50	0,50
$f_{c,0,g,k}$ – compressione parallela	21,00	21,00	23,00	21,50	24,00	24,00	28,00	24,50	32,00
$f_{c,90,g,k}$ – compressione perpendicolare	7,80	2,50	2,70	2,50	2,50	2,50	2,50	2,50	2,50
$f_{v,g,k}$ – taglio	4,00	2,50	3,00	3,50	3,50	3,50	3,50	3,50	3,50
Modulo Elastico (Gpa)	D24	C24	C30	GL24c	GL24h	GL28c	GL28h	GL32c	GL36c
$E_{0,mean}$ – Modulo Elastico Medio parallelo	11,00	11,00	12,00	11,00	11,50	12,50	12,60	13,00	14,20
$E_{0,05}$ – Modulo Elastico Caratteristico Parallelo	9,20	7,40	8,00	9,10	9,60	10,40	10,50	10,80	11,80
$E_{90,mean}$ – Modulo Elastico Medio perpendicolare	0,73	0,37	0,40	0,30	0,30	0,30	0,30	0,30	0,30
$G_{g,mean}$ – Modulo di Taglio Medio	0,69	0,69	0,75	0,65	0,65	0,65	0,65	0,65	0,65
densità caratteristica (kg/m^3)	520	350	380	365	385	390	425	390	440

VALORI DI DEFORMAZIONI LIMITE

	$W_{ist,Q}$ (combinazione rara) (combinazione iniziale)	$W_{net,fin}$ (con controfreccia) (combinaz. quasi permanente)	W_{fin} (senza controfreccia) (combinaz. quasi permanente)
Elementi in appoggio	<u>L/250</u> - <u>L/300</u>	<u>L/200</u> - <u>L/250</u>	<u>L/150</u> - <u>L/300</u>
Elementi a sbalzo	<u>L/125</u> - <u>L/150</u>	<u>L/100</u> - <u>L/125</u>	<u>L/75</u> - <u>L/150</u>

NORMATIVA EUROPEA DI RIFERIMENTO

UNI EN 1995-1-1	Eurocodice 5 – Progettazione delle strutture in legno – Regole generali – Regole comuni e regole per gli edifici
UNI EN 1995-2	Eurocodice 5 – Progettazione delle strutture in legno - Ponti
DIN 1052_2004	“Entwurth, Berechnung und Bernessung von Holzbauwerken – Allgemeine Bernessungsregeln und Bernessung fur den Hochbau”
UNI EN 338	“Classi di resistenza”
UNI EN 1194	“Strutture di legno lamellare incollato – Classi di resistenza e determinazione dei valori caratteristici”
UNI EN 1993-1-1	Eurocodice 3 – Progettazione delle strutture in acciaio – Parte 1-1: Regole generali – Regole generali e regole per gli edifici
DIN 18800_Teil 3	“Stahlbauten; stabilitätsfalle, plattenbeulen”, novembre 1990 – Costruzioni in acciaio, stabilità, piastre
UNI EN 1992-1-1	Eurocodice 2 – Progettazione delle strutture di calcestruzzo – Parte 1-1: Regole generali – Regole generali e regole per gli edifici
UNI EN 1995-1-2	Eurocode 5 – Design of timber structures. Part. 1-2: General Structural fire design

NORMATIVA ITALIANA DI RIFERIMENTO

NUOVE NORME TECNICHE PER LE COSTRUZIONI	D.M. 14 Gennaio 2008 – circolare 617 del 02-02-2009
ISTRUZIONI PER LA PROGETTAZIONE L'ESECUZIONE ED IL CONTROLLO DI STRUTTURE IN LEGNO	CNR-DT 206/2007
PROGETTAZIONE ELEMENTI IN ACCIAIO E CEMENTO ARMATO:	D.M. 14 Gennaio 2008 – circolare 617 del 02-02-2009 CNR-UNI 10011, Giugno 1988

LETTERATURA:

“MANUALE DELL'INGEGNERE” – Autore: Giuseppe Colombo

“ERLAUTERUNG ZU DIN 1052: 2004-08”

Beuth-Kommentar

“BAUTBELLEN” – Autore: Jurgen Schneider

Descrizione generale della struttura in legno lamellare

- Struttura caratterizzata da sei capriate in legno lamellare in semplice appoggio su strutture esistenti. Orditura secondaria costituita da travi di colmo e arcarecci di falda.

Tipo di analisi svolta, Origine e caratteristiche dei codici di calcolo

L'analisi Statica della struttura condotta è del tipo elastico-lineare.

L'analisi sismica della struttura è del tipo dinamico modale senza condensazione.

Il progetto è stato verificato con il metodo agli Stati Limite.

Gli elementi strutturali della seguente relazione di calcolo verranno risolte manualmente attraverso i principi della scienza delle costruzioni e/o con il supporto del programma di calcolo agli elementi finiti:

programma di calcolo **WinStrand 2005**

versione **2015 – 043 ottobre 2015**

autore e produttore **EN.EX.SYS. srl – via Tizzano 46/2 – 40033 Casalecchio di Reno (BO)**

numero licenza **FRLNMR0621**

titolare della licenza **Ing. Marco Forlini – via Alfieri,50 – 63074 San Benedetto del Tronto (AP)**

Tutti i risultati ottenuti dal programma agli elementi finiti sono stati controllati dal progettista attraverso verifiche di equilibrio tra reazioni vincolari e carichi applicati, comparazione tra i risultati dell'analisi e quelli di valutazione semplificata con la risoluzione manuale degli stessi schemi statici seguendo i principi della scienza delle costruzioni.

Combinazione delle azioni (vd. P.to 2.5.3 – D.M. 14-01-2008)

- Combinazione FONDAMENTALE, generalmente impiegata per gli stati limite ultimi (SLU):

$$Y_{G1}G_1 + Y_{G2}G_2 + Y_P P + Y_{Q1}Q_{K1} + Y_{Q2}\Psi_{02}Q_{K2} + Y_{Q3}\Psi_{03}Q_{K3} + \dots$$

- Combinazione caratteristica (RARA), generalmente impiegata per gli stati limite di esercizio (SLE) irreversibili, da utilizzarsi nelle verifiche alle tensioni ammissibili:

$$G_1 + G_2 + P + Q_{K1} + \Psi_{02}Q_{K2} + \Psi_{03}Q_{K3} + \dots$$

- Combinazione FREQUENTE, generalmente impiegata per gli stati limite di esercizio (SLE) reversibili:

$$G_1 + G_2 + P + \Psi_{11}Q_{K1} + \Psi_{22}Q_{K2} + \Psi_{23}Q_{K3} + \dots$$

- Combinazione QUASI PERMANENTE, per gli stati limite di esercizio (SLE), generalmente impiegata per gli effetti a lungo termine:

$$G_1 + G_2 + P + \Psi_{21}Q_{K1} + \Psi_{22}Q_{K2} + \Psi_{23}Q_{K3} + \dots$$

- Combinazione SISMICA, impiegata per gli stati limite ultimi (SLU) e di esercizio (SLE), connessi all'azione sismica E:

$$E + G_1 + G_2 + P + \Psi_{21}Q_{K1} + \Psi_{22}Q_{K2} + \dots$$

- Combinazione ECCEZIONALE, impiegata per gli stati limite ultimi (SLU) connessi alle azioni eccezionali di progetto A_d :

$$G_1 + G_2 + P + A_d + \psi_{21}Q_{K1} + \psi_{22}Q_{K2} + \dots$$

Coefficienti Parziali γ per le azioni o per il loro effetto nelle verifiche SLU

(vd. P.to 2.6.1 – Tab. 2.6.1 – D.M. 14-01-2008)

		coefficiente Y	EQU	A1 STR	A2 GEO
Carichi permanenti	favorevoli	Y_{G1}	0,9	1,0	1,0
	sfavorevoli		1,1	1,3	1,0
Carichi permanenti non strutturali	favorevoli	Y_{G2}	0,0	0,0	0,0
	sfavorevoli		1,5	1,5	1,3
Carichi variabili	favorevoli	Y_{Qi}	0,0	0,0	0,0
	sfavorevoli		1,5	1,5	1,3
Nel caso in cui i carichi permanenti non strutturali siano compiutamente definiti, si potranno adottare per essi gli stessi coefficienti validi per le azioni permanenti.					

Valori dei coefficienti di combinazione ψ

(vd. P.to 2.5.3 – Tab. 2.5.1 – D.M. 14-01-2008)

Categoria / Azione Variabile	ψ_{0j}	ψ_{1j}	ψ_{2j}
Categoria A – Ambienti ad uso residenziale	0,7	0,5	0,3
Categoria B – Uffici	0,7	0,5	0,3
Categoria C – Ambienti suscettibili di affollamento	0,7	0,7	0,6
Categoria D – Ambienti ad uso commerciale	0,7	0,7	0,6
Categoria E – Biblioteche, archivi, magazzini e ambienti ad uso industriale	1,0	0,9	0,8
Categoria F – Rimesse e parcheggi (per autoveicoli di peso < 30 kN)	0,7	0,7	0,6
Categoria G – Rimesse e parcheggi (per autoveicoli di peso > 30 kN)	0,7	0,5	0,3
Categoria H – Coperture	0,0	0,0	0,0
Vento	0,6	0,2	0,0
Neve (a quota < 1.000 m s.l.m.)	0,5	0,2	0,0
Neve (a quota > 1.000 m s.l.m.)	0,7	0,5	0,2
Variazioni Termiche	0,6	0,5	0,0

Struttura in CLASSE DI SERVIZIO 2 (strutture non esposte direttamente alle intemperie)**1. ANALISI DEI CARICHI****IPOTESI DI CARICO:****1.1 CARICO PERMANENTE**

Tegola in laterizio	0,50 kN/mq
Guaina impermeabilizzante	0,05 kN/mq
Pannello OSB 12mm	0,10 kN/mq
Pianella laterizio sp. 3 cm	0,54 kN/mq
Listoni abete 10x6 e 5x5	0,11 kN/mq
<hr/>	
	$g_{k2} = 1,30 \text{ kN/mq}$

1.2 CARICO NEVE

Zona II - MONTEPRANDONE
(Ascoli Piceno)

$q_s = \mu_i q_{sk}$ dove:
 μ_i = coeff. di forma della copertura:
 $\mu_i = 0.8$
 per $0^\circ < \alpha < 60^\circ$

$\mu_i = 0.00$
 per $\alpha > 60^\circ$

Sito: $a_s = 232 \text{ m}$
 $q_{sk} = 1,05 \text{ kN/mq}$
 per $a_s = 232 \text{ m} > 200 \text{ m}$

il carico uniforme sulla copertura
 sarà:
 $q_s = 1,05 \text{ kN/mq} * 0.8 \cong 0,84 \text{ kN/mq}$

$0,84 \text{ kN/mq}$

 $q_{k1} = 0,84 \text{ kN/mq}$

1.3 CARICO VENTO

Zona 3 – Marche

m.s.l.= 232

$$p = q_{\text{ref}} \cdot c_e \cdot c_p \cdot c_d$$

$$v_{\text{ref}}(T_R) = v_{\text{ref}} + k_a (a_s - a_0)$$

$$v_{\text{ref}}(T_R) = 27.00 \text{ m/sec}$$

$$q_{\text{ref}} = v_{\text{ref}}^2(T_R) / 1.6 \quad q_{\text{ref}} = 27,00^2 / 1600 = 0,456 \text{ kN/mq}$$

coefficiente di esposizione $c_e = c_e(z)$

classe di rugosità B

zona 3 – categoria III

H fuori terra $z = 4,5 \text{ m} > z_{\text{min}} = 5 \text{ m}$

$$\rightarrow c_e(z) = 1,708$$

$$c_d = 1$$

$$q = q_{\text{ref}} \cdot c_e \cdot c_d$$

$$q_{k2} = C_p \times 0,78 \text{ kN/mq}$$

coeff. di forma per struttura NON stagna
in funzione della variazione di
inclinazione della falda (pressione
esterna)

$$c_{pe} \text{ in falda} = -0,4$$

$$\text{per } \alpha < 15,0^\circ$$

$$c_{pe} \text{ sottovento} = -0,4$$

$$c_{pi} \text{ sopravento} = + 0,8$$

interno

risulta $c_p = - 1,2$ in depressione

Definizione della pericolosità sismica di base

Definizione della pericolosità sismica di base secondo le NTC 2008 tramite una griglia regolare che copre tutto il territorio nazionale. Nei nodi della griglia si calcola l'accelerazioni sismica massima attesa, e sulla base di quest'ultima vengono calcolati i parametri di pericolosità sismica:

coordinate del sito espresse in GRADI DECIMALI:	
Latitudine N	42.9199
Longitudine E	13.8335

Classe d'Uso dell'edificio	II
Vita Nominale Vn	50 anni
Coefficiente d'uso Cu	1,00
Periodo di Riferimento Vr	50 anni

Categoria di Sottosuolo	C
Categoria Topografica	T1

Stati Limite		Tr (anni)	Ag (g)	Fo (-)	T*c (s)
SLE	Operatività	-	-	-	-
SLE	Danno	50	0,066	2,458	0,290
SLU	Salvaguardia Vita	475	0,182	2,453	0,331
SLU	Prevenzione Collasso	-	-	-	-

- En.Ex.Sys. WinStrand

Structural Analysis & Design

Ditta produttrice:

En.Ex.Sys. s.r.l. - Via Tizzano 46/2 - Casalecchio di Reno (Bologna)

Sigla:

WinStrand 2005

Piattaforma software:

Microsoft Windows 2000/XP Home/XP Professional

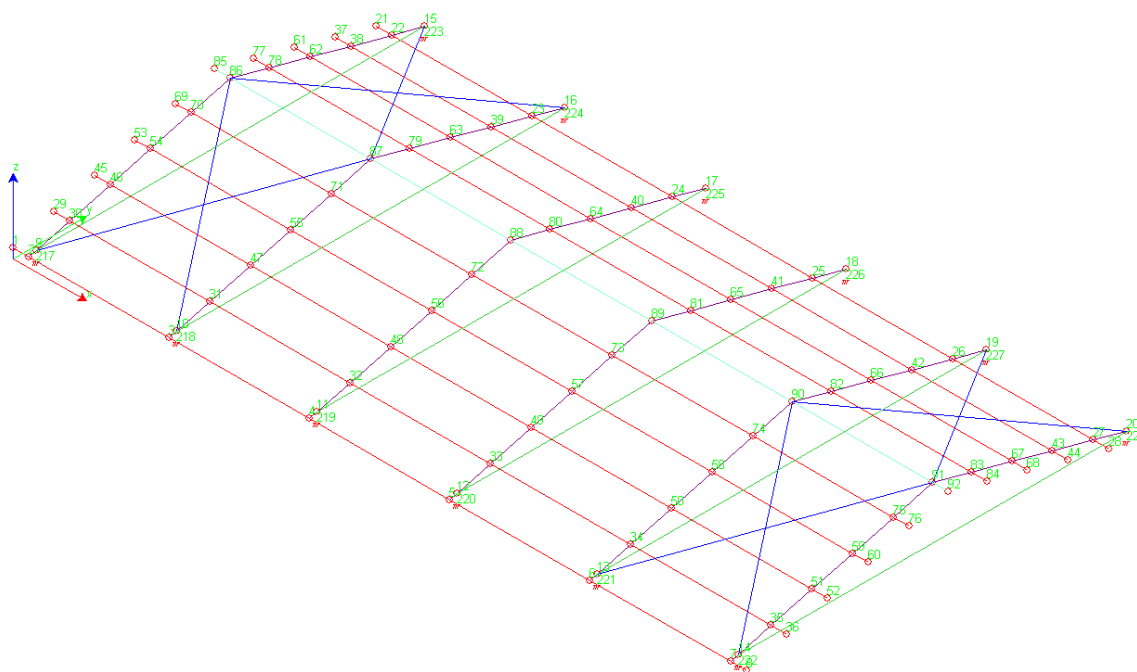
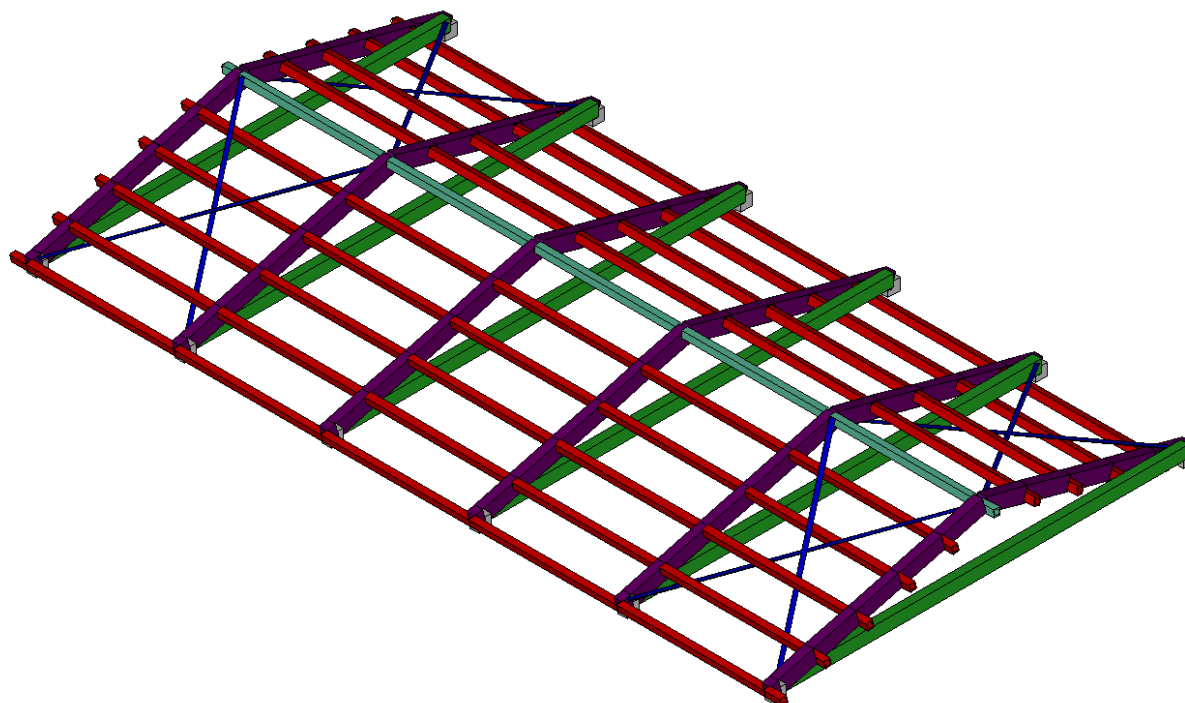
Documentazione in uso:

Manuale teorico - Manuale d'uso

Campo di applicazione:

Analisi statica e dinamica di strutture in campo elastico lineare.

Modello strutturale



Elementi finiti implementati

- Truss.
- Beam (Modellazione di Travi e Pilastri).
- Travi su suolo elastico alla Winckler.
- Plinti su suolo elastico alla Winckler.
- Elementi Shear Wall per la modellazione di pareti di taglio.
- Elementi shell (lastra/piastra) equivalenti.
- Elementi Isoparametrici a 8 Nodi Shell (lastra/piastra).

Schemi di Carico

- Carichi nodali concentrati.
- Carichi applicati direttamente agli elementi.
- Carichi Superficiali.

Tipo di Risoluzione

- Analisi statica e/o dinamica in campo lineare con il metodo dell'equilibrio.
- Fattorizzazione LDL^T .
- Analisi Statica:
 - - modellazione generale 6 gradi di libertà per nodo.
 - ipotesi di solai infinitamente rigidi nel proprio piano (3 gradi di libertà per nodo + 3 per impalcato).
- Analisi dinamica. (Nel caso di analisi modale gli autovettori ed autovalori possono essere calcolati mediante *subspace iteration* oppure tramite il *metodo dei vettori di Ritz*):
 - - Via statica equivalente.
 - Modale con il metodo dello spettro di risposta.

Normativa di riferimento

La normativa italiana cui viene fatto riferimento nelle fasi di calcolo e progettazione è la seguente:

- Legge n. 1086 del 5 Novembre 1971. *"Norme per la disciplina delle opere di conglomerato cementizio armato, normale e precompresso, ed a struttura metallica"*.
- Legge n. 64 del 2 Febbraio 1974. *"Provvedimenti per le costruzioni con particolari prescrizioni per le zone sismiche"*.
- D.M. del 3 Marzo 1975. *"Approvazione delle norme tecniche per le costruzioni in zone sismiche"*.
- D.M. del 3 Marzo 1975. *"Disposizioni concernenti l'applicazione delle norme tecniche per le costruzioni in zone sismiche"*.

- D.M. del 3 Ottobre 1978. "Criteri generali per la verifica della sicurezza delle costruzioni e dei carichi e sovraccarichi".
- D.M. del 14 Febbraio 1992. "Norme Tecniche per l'esecuzione delle opere in C.A. normale e precompresso e per le strutture metalliche".
- Istruzioni per la valutazione delle: Azioni sulle Costruzioni. (C.N.R. 10012/85)
- D.M. del 9 Gennaio 1996. "Norme Tecniche per il calcolo, l'esecuzione ed il collaudo delle strutture in cemento armato, normale e precompresso e per le strutture metalliche".
- D.M. del 16 Gennaio 1996. "Norme tecniche relative ai «Criteri generali per la verifica di sicurezza delle costruzioni e dei carichi e sovraccarichi»".
- D.M. del 16 Gennaio 1996. "Norme tecniche per le costruzioni in zone sismiche"
- Ordinanza n. 3274 del 20 Marzo 2003. "Primi elementi in materia di criteri generali per la classificazione sismica del territorio nazionale e di normative tecniche per le costruzioni in zona sismica"
- Ordinanza n. 3316. "Modifiche ed integrazioni all'ordinanza del Presidente del Consiglio dei Ministri n. 3274 del 20 Marzo 2003"
- D.M. del 14 Gennaio 2008 "Approvazione delle nuove norme tecniche per le costruzioni"

Indice

- [Analisi dinamica](#)

Analisi dinamica

Convenzioni adottate

Nella presente versione del programma **WinStrand** l'analisi in campo dinamico della struttura può essere condotta per via *statica equivalente* ovvero per via *modale* facendo uso, per il calcolo della risposta, dello spettro di pseudo accelerazioni fornito dal regolamento italiano.

Nel caso di analisi dinamica condotta per via *statica equivalente* le azioni di piano vengono calcolate facendo riferimento al punto **C.6.1.1.** delle **norme tecniche per le costruzioni in zona sismica** e cioè, definiti:

W_i

peso dell'*i*-esimo impalcato valutato tenendo conto dei carichi permanenti e dei coefficienti riduttivi relativi alle condizioni di carico accidentali

K_{hi}

coefficiente ottenuto tenendo conto del coefficiente di intensità sismica e dei coefficienti di risposta, fondazione, struttura. Ovvero:

$$K_{hi} = C \times R \times E \times \beta \times \eta_i$$

dove (indicando con h_j l'altezza del *j*-esimo piano)

$$\eta_i = h_i \frac{\sum_{j=1}^n W_j}{\sum_{j=1}^n W_j h_j}$$

L'azione tagliante sul'*i*-esimo piano vale:

$$F_i = K_{ki} \times W_i$$

A tale azione tagliante viene poi associato (qualora il rapporto fra i lati D e B dell'edificio sia superiore a 2.5 in accordo al punto **C.6.1.2** delle norme citate) il momento torcente di piano:

$$M_i = \sum_{j=1}^n D_j F_j$$

Nel caso di analisi dinamica condotta per via *modale* il programma provvede al calcolo dei modi di vibrare della struttura facendo uso dell'algoritmo noto in letteratura tecnica come *Subspace Iteration*. Una volta *M-Ortonormalizzati* gli autovettori la risposta massima relativa all' i -esimo modo di vibrare viene valutata con la formula:

$$S_{iMax} = \frac{L_{ni} \times Sa(T_i)}{M_{ni} \times a_i^2}$$

nella quale:

$$Sa(T) = C \times R(T) \times s \times \beta \times g$$

con:

$$C = (S-2)/100$$

$$L_{ni} = \{f_i^T\} [M] \{I\} \text{ e}$$

$$M_{ni} = \{f_i^T\} [M] \{f_i^T\}$$

I simboli che compaiono nelle espressioni precedenti hanno il seguente significato:

e
coefficiente di fondazione;

b
coefficiente di struttura;

g
accelerazione di gravità

w_i
 i -esima frequenza associata all' i -esimo autovettore;

R(T_i)
coefficiente di risposta ricavato dallo spettro di *pseudoaccelerazioni* del regolamento;

S
Grado di sismicità;

f_i
 i -esimo autovettore;

M
matrice delle masse;

I
vettore di trascinamento;

Per cui il campo di spostamenti indotto dall'*i-esimo* modo di vibrare sulla struttura vale:

$$V_i = \phi_i \times S_{Max}$$

Il programma per ogni direzione di ingresso del sisma quindi valuta il campo di spostamenti nodali e il campo di sollecitazioni nel generico elemento secondo la formula di quadratura:

$$S = \sqrt{\sum_{i=1}^n S_i^2}$$

dove:

n
numero di modi (≥ 3) considerati in soluzione

S_i
generica componente di spostamento o di sollecitazione indotta dallo *i-esimo* modo di vibrare nell'elemento.

In output vengono inoltre riportate, per ogni direzione di ingresso del sisma e per ogni modo di vibrare, le cosiddette *masse modali efficaci*. In particolare considerando la *j-esima* direzione di ingresso del sisma e denotando con il pedice *i* le grandezze relative all'*i-esimo* modo di vibrare, vengono forniti in output la grandezze:

- Il modo di vibrare (si noti che per ogni direzione di ingresso il *sub-set* di modi di vibrare utilizzato può cambiare essendo i modi di vibrare scelti in modo tale da fornire il massimo fattore di partecipazione L_{ij}).
- Il fattore di partecipazione L_{ij} (altrimenti noto in letteratura tecnica come g_{ij}).
- Il rapporto percentuale fra il fattore di partecipazione del primo modo considerato ed il generico modo (pari a $100 L_{ij}/L_{1j}$).
- La massa modale Em_{ij} efficace relativa all'*i-esimo* modo ($Em_{ij}=L_{ij}^2/M_{ij}$).
- Il rapporto fra la massa modale efficace dell'*i-esimo* modo e la massa modale efficace totale, calcolato come $100 Em_{ij} / Em_{Tot j}$.
- La percentuale, cumulativa, della massa modale considerata sommando via via i contributi dovuti ai singoli modi di vibrare e pari a $100 \sum_i (Em_{ij} / Em_{Tot j})$. Tale valore è pari al 100% per un'analisi dinamica completa.

Dati generali relativi all'analisi dinamica

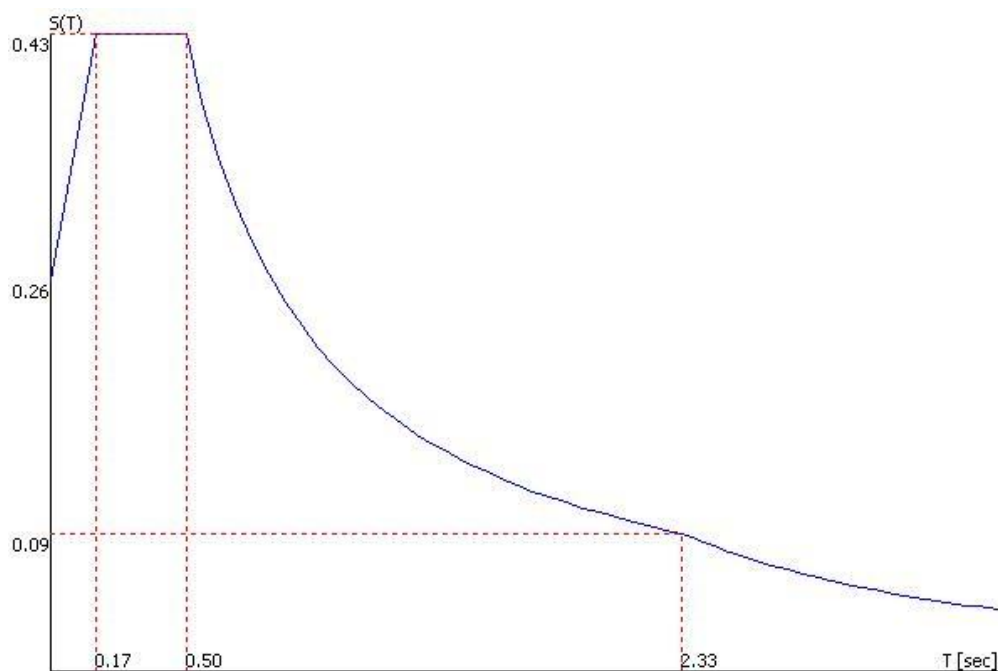
Spettro in accordo con TU 2008

- Montepreandone AP Longitudine 13.8335 Latitudine 42.9199
- Tipo di Terreno C
- Coefficiente di amplificazione topografica (S_T) 1.0000
- Vita nominale della costruzione (V_N) 50.0 anni
- Classe d'uso II coefficiente C_U 1.0
- Classe di duttilità impostata Bassa
- Fattore di struttura massimo q_0 per sisma orizzontale 1.50
- Fattore di duttilità K_R per sisma orizzontale 1.00

- Fattore riduttivo regolarità in altezza K_R 1.00
- Fattore riduttivo per la presenza di setti K_W 1.00
- Fattore di struttura q per sisma orizzontale 1.50
- Fattore di struttura q per sisma verticale 1.50
- Smorzamento Viscoso (0.05 = 5%) 0.05

TU 2008 SLV H

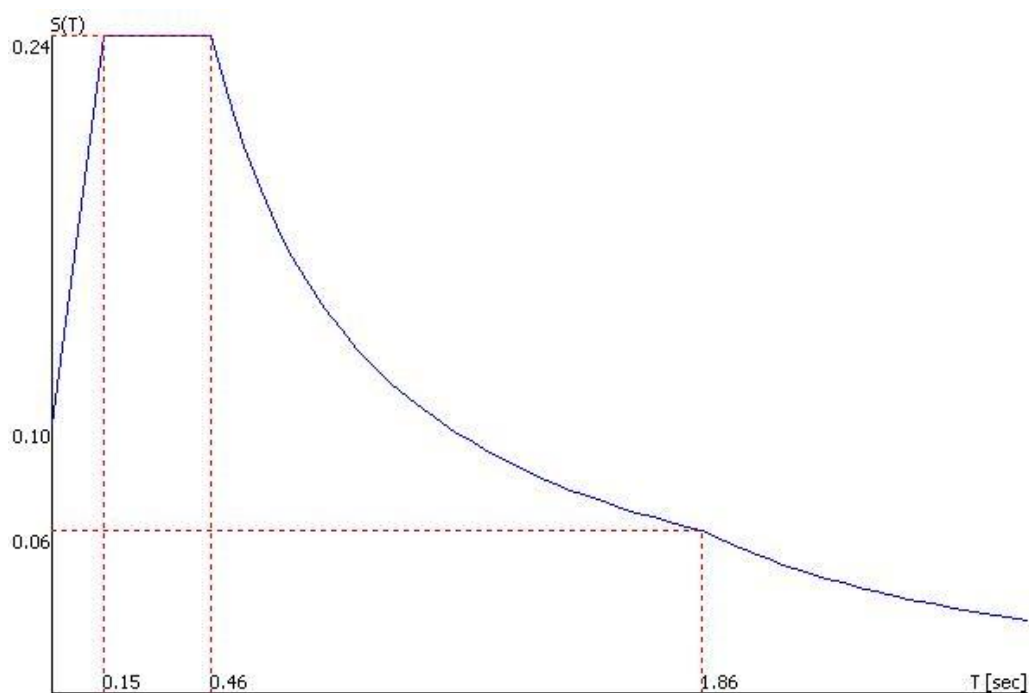
- Probabilità di superamento (P_{VR}) 10.0 e periodo di ritorno (T_R) 475 (anni)
- S_s 1.433
- T_B 0.17 [sec]
- T_C 0.50 [sec]
- T_D 2.33 [sec]
- a_g/g 0.1817
- F_o 2.4526
- T_C^* 0.3310



TU 2008 SLD H

- Probabilità di superamento (P_{VR}) 63.0 e periodo di ritorno (T_R) 50 (anni)
- S_s 1.500
- T_B 0.15 [sec]
- T_C 0.46 [sec]

- T_D 1.86 [sec]
- a_g/g 0.0661
- F_o 2.4585
- T_C^* 0.2902



Fattori di partecipazione per il calcolo delle masse

Cond. Carico 1 cnd1-p.p. 1.0000

Cond. Carico 2 cnd2-perm 1.0000

Cond. Carico 3 cnd3-neve 0.0000

Cond. Carico 4 cnd4-vento Dep 0.0000

Angoli d'ingresso del Sisma

- SLV Direzione 1 Angolo in pianta 0.00 [°]
- SLV Direzione 2 Angolo in pianta 90.00 [°]
- SLD Direzione 3 Angolo in pianta 0.00 [°]
- SLD Direzione 4 Angolo in pianta 90.00 [°]

Analisi Modale via Vettori di Ritz

Direzione d'ingresso 1 angolo 0.00 [°] SLV

Primi autovalori e modi di vibrare della struttura.

Modo	Autovalore	Frequenza [rad/sec]	Periodo [sec]	Coefficiente Risposta
1	2.39645e+003	48.954	0.13	0.3875
2	2.41633e+003	49.156	0.13	0.3870
3	2.59367e+003	50.928	0.12	0.3826
4	2.60564e+003	51.046	0.12	0.3823

Modo	Autovalore	Frequenza [rad/sec]	Periodo [sec]	Coefficiente Risposta
5	2.97098e+003	54.507	0.12	0.3745
6	3.00500e+003	54.818	0.11	0.3739
7	3.04746e+003	55.204	0.11	0.3731
8	3.21317e+003	56.685	0.11	0.3701
9	3.72666e+003	61.046	0.10	0.3623
10	3.98907e+003	63.159	0.10	0.3589
11	4.07619e+003	63.845	0.10	0.3578
12	4.75308e+003	68.943	0.09	0.3506
13	4.77914e+003	69.131	0.09	0.3504
14	1.35253e+004	116.298	0.05	0.3139
15	1.46865e+004	121.188	0.05	0.3117
16	1.65630e+004	128.697	0.05	0.3087
17	2.74160e+004	165.578	0.04	0.2979
18	2.83238e+004	168.297	0.04	0.2973
19	4.91630e+004	221.727	0.03	0.2884
20	5.75057e+004	239.804	0.03	0.2863
21	7.67286e+004	276.999	0.02	0.2828
22	1.41566e+005	376.253	0.02	0.2769
23	2.06311e+005	454.215	0.01	0.2740
24	6.67147e+005	816.791	0.01	0.2679
25	2.78085e+006	1667.587	0.00	0.2641

Direzione d'ingresso 2 angolo 90.00 [°] SLV

Primi autovalori e modi di vibrare della struttura.

Modo	Autovalore	Frequenza [rad/sec]	Periodo [sec]	Coefficiente Risposta
1	2.39645e+003	48.954	0.13	0.3875
2	2.41633e+003	49.156	0.13	0.3870
3	2.59366e+003	50.928	0.12	0.3826
4	2.60564e+003	51.046	0.12	0.3823
5	2.91562e+003	53.996	0.12	0.3756
6	3.02212e+003	54.974	0.11	0.3736
7	3.04773e+003	55.206	0.11	0.3731
8	3.11862e+003	55.845	0.11	0.3718
9	3.72371e+003	61.022	0.10	0.3623
10	3.98900e+003	63.159	0.10	0.3589
11	4.07618e+003	63.845	0.10	0.3578
12	4.75288e+003	68.941	0.09	0.3506
13	4.75308e+003	68.943	0.09	0.3506
14	1.38601e+004	117.729	0.05	0.3132
15	1.55988e+004	124.895	0.05	0.3102
16	2.55046e+004	159.702	0.04	0.2993
17	4.30621e+004	207.514	0.03	0.2903
18	4.50227e+004	212.185	0.03	0.2897
19	4.92124e+004	221.839	0.03	0.2884
20	7.19520e+004	268.239	0.02	0.2835
21	9.45574e+004	307.502	0.02	0.2806
22	1.21587e+005	348.694	0.02	0.2782
23	2.25415e+005	474.778	0.01	0.2734
24	5.40724e+005	735.339	0.01	0.2688
25	1.45925e+006	1207.994	0.01	0.2655

Direzione d'ingresso 3 angolo 0.00 [°] SLD

Primi autovalori e modi di vibrare della struttura.

Modo	Autovalore	Frequenza [rad/sec]	Periodo [sec]	Coefficiente Risposta
1	2.39645e+003	48.954	0.13	0.3875
2	2.41633e+003	49.156	0.13	0.3870
3	2.59367e+003	50.928	0.12	0.3826

Modo	Autovalore	Frequenza [rad/sec]	Periodo [sec]	Coefficiente Risposta
4	2.60564e+003	51.046	0.12	0.3823
5	2.97098e+003	54.507	0.12	0.3745
6	3.00500e+003	54.818	0.11	0.3739
7	3.04746e+003	55.204	0.11	0.3731
8	3.21317e+003	56.685	0.11	0.3701
9	3.72666e+003	61.046	0.10	0.3623
10	3.98907e+003	63.159	0.10	0.3589
11	4.07619e+003	63.845	0.10	0.3578
12	4.75308e+003	68.943	0.09	0.3506
13	4.77914e+003	69.131	0.09	0.3504
14	1.35253e+004	116.298	0.05	0.3139
15	1.46865e+004	121.188	0.05	0.3117
16	1.65630e+004	128.697	0.05	0.3087
17	2.74160e+004	165.578	0.04	0.2979
18	2.83238e+004	168.297	0.04	0.2973
19	4.91630e+004	221.727	0.03	0.2884
20	5.75057e+004	239.804	0.03	0.2863
21	7.67286e+004	276.999	0.02	0.2828
22	1.41566e+005	376.253	0.02	0.2769
23	2.06311e+005	454.215	0.01	0.2740
24	6.67147e+005	816.791	0.01	0.2679
25	2.78085e+006	1667.587	0.00	0.2641

Direzione d'ingresso 4 angolo 90.00 [°] SLD

Primi autovalori e modi di vibrare della struttura.

Modo	Autovalore	Frequenza [rad/sec]	Periodo [sec]	Coefficiente Risposta
1	2.39645e+003	48.954	0.13	0.3875
2	2.41633e+003	49.156	0.13	0.3870
3	2.59366e+003	50.928	0.12	0.3826
4	2.60564e+003	51.046	0.12	0.3823
5	2.91562e+003	53.996	0.12	0.3756
6	3.02212e+003	54.974	0.11	0.3736
7	3.04773e+003	55.206	0.11	0.3731
8	3.11862e+003	55.845	0.11	0.3718
9	3.72371e+003	61.022	0.10	0.3623
10	3.98900e+003	63.159	0.10	0.3589
11	4.07618e+003	63.845	0.10	0.3578
12	4.75288e+003	68.941	0.09	0.3506
13	4.75308e+003	68.943	0.09	0.3506
14	1.38601e+004	117.729	0.05	0.3132
15	1.55988e+004	124.895	0.05	0.3102
16	2.55046e+004	159.702	0.04	0.2993
17	4.30621e+004	207.514	0.03	0.2903
18	4.50227e+004	212.185	0.03	0.2897
19	4.92124e+004	221.839	0.03	0.2884
20	7.19520e+004	268.239	0.02	0.2835
21	9.45574e+004	307.502	0.02	0.2806
22	1.21587e+005	348.694	0.02	0.2782
23	2.25415e+005	474.778	0.01	0.2734
24	5.40724e+005	735.339	0.01	0.2688
25	1.45925e+006	1207.994	0.01	0.2655

Direzione di Ingresso del Sisma 1 Angolo 0.00

Coefficienti di partecipazione e masse modali efficaci per i vari modi di vibrare:

Modo	Li (gi)	Li / L1	Emi=Li^2/Mi	Emi/EmTot	Sum.Emi/EmTot
7	-2.87208e+001	100.0	8.24886e+002	57.1	57.1
2	1.19135e+001	41.5	1.41932e+002	9.8	66.9
11	1.16936e+001	40.7	1.36740e+002	9.5	76.3

Modo	Li (gi)	Li / L1	Emi=Li^2/Mi	Emi/EmTot	Sum. Emi/EmTot
24	1.00312e+001	34.9	1.00624e+002	7.0	83.3
20	-9.46082e+000	32.9	8.95071e+001	6.2	89.5
4	-7.15447e+000	24.9	5.11865e+001	3.5	93.0
25	5.34167e+000	18.6	2.85334e+001	2.0	95.0
14	-5.10878e+000	17.8	2.60996e+001	1.8	96.8
22	-3.89650e+000	13.6	1.51827e+001	1.1	97.9
23	3.18028e+000	11.1	1.01142e+001	0.7	98.6
21	-2.15154e+000	7.5	4.62913e+000	0.3	98.9
6	1.97116e+000	6.9	3.88549e+000	0.3	99.1
19	1.52313e+000	5.3	2.31994e+000	0.2	99.3
15	-1.10481e+000	3.8	1.22061e+000	0.1	99.4
16	9.15961e-001	3.2	8.38984e-001	0.1	99.4
9	7.37623e-001	2.6	5.44088e-001	0.0	99.5
17	-5.20392e-001	1.8	2.70808e-001	0.0	99.5
12	2.96895e-001	1.0	8.81464e-002	0.0	99.5
18	-1.78148e-001	0.6	3.17368e-002	0.0	99.5
8	9.31633e-002	0.3	8.67940e-003	0.0	99.5
10	-4.89226e-005	0.0	2.39342e-009	0.0	99.5
13	-4.40525e-006	0.0	1.94062e-011	0.0	99.5
5	5.52084e-007	0.0	3.04796e-013	0.0	99.5
3	5.51477e-007	0.0	3.04127e-013	0.0	99.5
1	5.79760e-008	0.0	3.36122e-015	0.0	99.5

Direzione di Ingresso del Sisma 2 Angolo 90.00

Coefficienti di partecipazione e masse modali efficaci per i vari modi di vibrare:

Modo	Li (gi)	Li / L1	Emi=Li^2/Mi	Emi/EmTot	Sum. Emi/EmTot
45	-1.96843e+001	100.0	3.87471e+002	26.8	26.8
44	1.61920e+001	82.3	2.62182e+002	18.1	44.9
43	1.58405e+001	80.5	2.50921e+002	17.4	62.3
39	-1.09608e+001	55.7	1.20139e+002	8.3	70.6
42	-9.18032e+000	46.6	8.42783e+001	5.8	76.4
40	8.71391e+000	44.3	7.59322e+001	5.3	81.7
47	7.92695e+000	40.3	6.28365e+001	4.3	86.0
30	-7.83836e+000	39.8	6.14399e+001	4.2	90.3
41	6.15933e+000	31.3	3.79374e+001	2.6	92.9
49	4.59148e+000	23.3	2.10817e+001	1.5	94.4
46	-4.58819e+000	23.3	2.10515e+001	1.5	95.8
50	4.18308e+000	21.3	1.74981e+001	1.2	97.0
37	-4.07030e+000	20.7	1.65673e+001	1.1	98.2
48	-3.19698e+000	16.2	1.02207e+001	0.7	98.9
26	2.59229e+000	13.2	6.71998e+000	0.5	99.4
33	1.94740e+000	9.9	3.79238e+000	0.3	99.6
35	1.53933e+000	7.8	2.36955e+000	0.2	99.8
28	-9.96281e-001	5.1	9.92577e-001	0.1	99.8
38	-8.14672e-003	0.0	6.63690e-005	0.0	99.8
36	8.72352e-006	0.0	7.60998e-011	0.0	99.8
32	6.69064e-006	0.0	4.47647e-011	0.0	99.8
27	-2.70451e-006	0.0	7.31440e-012	0.0	99.8
29	-1.60160e-006	0.0	2.56511e-012	0.0	99.8
31	-8.02424e-007	0.0	6.43884e-013	0.0	99.8
34	1.66513e-007	0.0	2.77265e-014	0.0	99.8

Direzione di Ingresso del Sisma 3 Angolo 0.00

Coefficienti di partecipazione e masse modali efficaci per i vari modi di vibrare:

Modo	Li (gi)	Li / L1	Emi=Li^2/Mi	Emi/EmTot	Sum. Emi/EmTot
57	-2.87208e+001	100.0	8.24886e+002	57.1	57.1
52	1.19135e+001	41.5	1.41932e+002	9.8	66.9
61	1.16936e+001	40.7	1.36740e+002	9.5	76.3
74	1.00312e+001	34.9	1.00624e+002	7.0	83.3

Modo	Li (gi)	Li / L1	Emi=Li^2/Mi	Emi/EmTot	Sum.Emi/EmTot
70	-9.46082e+000	32.9	8.95071e+001	6.2	89.5
54	-7.15447e+000	24.9	5.11865e+001	3.5	93.0
75	5.34167e+000	18.6	2.85334e+001	2.0	95.0
64	-5.10878e+000	17.8	2.60996e+001	1.8	96.8
72	-3.89650e+000	13.6	1.51827e+001	1.1	97.9
73	3.18028e+000	11.1	1.01142e+001	0.7	98.6
71	-2.15154e+000	7.5	4.62913e+000	0.3	98.9
56	1.97116e+000	6.9	3.88549e+000	0.3	99.1
69	1.52313e+000	5.3	2.31994e+000	0.2	99.3
65	-1.10481e+000	3.8	1.22061e+000	0.1	99.4
66	9.15961e-001	3.2	8.38984e-001	0.1	99.4
59	7.37623e-001	2.6	5.44088e-001	0.0	99.5
67	-5.20392e-001	1.8	2.70808e-001	0.0	99.5
62	2.96895e-001	1.0	8.81464e-002	0.0	99.5
68	-1.78148e-001	0.6	3.17368e-002	0.0	99.5
58	9.31633e-002	0.3	8.67940e-003	0.0	99.5
60	-4.89226e-005	0.0	2.39342e-009	0.0	99.5
63	-4.40525e-006	0.0	1.94062e-011	0.0	99.5
55	5.52084e-007	0.0	3.04796e-013	0.0	99.5
53	5.51477e-007	0.0	3.04127e-013	0.0	99.5
51	5.79760e-008	0.0	3.36122e-015	0.0	99.5

Direzione di Ingresso del Sisma 4 Angolo 90.00

Coefficienti di partecipazione e masse modali efficaci per i vari modi di vibrare:

Modo	Li (gi)	Li / L1	Emi=Li^2/Mi	Emi/EmTot	Sum.Emi/EmTot
95	-1.96843e+001	100.0	3.87471e+002	26.8	26.8
94	1.61920e+001	82.3	2.62182e+002	18.1	44.9
93	1.58405e+001	80.5	2.50921e+002	17.4	62.3
89	-1.09608e+001	55.7	1.20139e+002	8.3	70.6
92	-9.18032e+000	46.6	8.42783e+001	5.8	76.4
90	8.71391e+000	44.3	7.59322e+001	5.3	81.7
97	7.92695e+000	40.3	6.28365e+001	4.3	86.0
80	-7.83836e+000	39.8	6.14399e+001	4.2	90.3
91	6.15933e+000	31.3	3.79374e+001	2.6	92.9
99	4.59148e+000	23.3	2.10817e+001	1.5	94.4
96	-4.58819e+000	23.3	2.10515e+001	1.5	95.8
100	4.18308e+000	21.3	1.74981e+001	1.2	97.0
87	-4.07030e+000	20.7	1.65673e+001	1.1	98.2
98	-3.19698e+000	16.2	1.02207e+001	0.7	98.9
76	2.59229e+000	13.2	6.71998e+000	0.5	99.4
83	1.94740e+000	9.9	3.79238e+000	0.3	99.6
85	1.53933e+000	7.8	2.36955e+000	0.2	99.8
78	-9.96281e-001	5.1	9.92577e-001	0.1	99.8
88	-8.14672e-003	0.0	6.63690e-005	0.0	99.8
86	8.72352e-006	0.0	7.60998e-011	0.0	99.8
82	6.69064e-006	0.0	4.47647e-011	0.0	99.8
77	-2.70451e-006	0.0	7.31440e-012	0.0	99.8
79	-1.60160e-006	0.0	2.56511e-012	0.0	99.8
81	-8.02424e-007	0.0	6.43884e-013	0.0	99.8
84	1.66513e-007	0.0	2.77265e-014	0.0	99.8

- [En.Ex.Sys. WinStrand](#)
- [Analisi dinamica](#)

Tipo di analisi Statica + Dinamica senza condensazione

Numero di condizioni di carico ... : 4

Numero di combinazioni di carico . : 9

Condizione

1	cnd1-p.p.
2	cnd2-perm
3	cnd3-neve
4	cnd4-vento Dep
5	Sisma 0SLV
6	Sisma 90SLV
7	Sisma 0SLD
8	Sisma 90SLD

Combinazioni di carico:**Combinazioni agli Stati Limite Ultimi****Combinazione di carico numero**

1	cmb1-perm
2	cmb2-perm+neve
3	cmb3-perm+venDep

Comb.\Cond 1 2 3 4

1	1.3	1.3		
2	1.3	1.3	1.5	
3	1	1		1.5

Combinazioni agli Stati Limite di Salvaguardia della Vita**Combinazione di carico numero**

4	Sisma 0 / 90
5	Sisma 90 / 0

Comb.\Cond 1 2 5 6

4	1	1	1	0.3
5	1	1	0.3	1

Combinazioni RARE Stati Limite di Esercizio**Combinazione di carico numero**

6	SLE1-iniziale
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Comb.\Cond 1 2 3

6	1	1	1
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Combinazioni QUASI PERMANENTI Stati Limite di Esercizio**Combinazione di carico numero**

7	SLE2-finale
---	-------------

Comb.\Cond 1 2 3

7	1.8	1.8	1
---	-----	-----	---

Combinazioni agli Stati Limite di Danno**Combinazione di carico numero**

8	Sisma 0 / 90
9	Sisma 90 / 0

Comb.\Cond 1 2 7 8

8	1	1	1	0.3
9	1	1	0.3	1

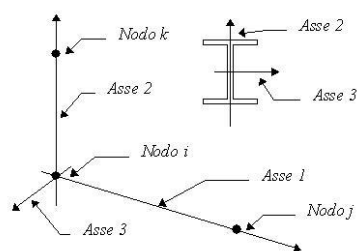
Indice

- [Elementi tipo biella](#)
- [Elementi tipo trave](#)
- [Sollecitazioni nelle bielle](#)
- [Sollecitazioni nelle travi](#)

Elementi tipo biella (truss)**Convenzioni adottate**

Nel seguito viene riportato per ogni elemento:

- Il nodo iniziale **i**;
- Il nodo finale **j**;
- Il nodo **k** che definisce l'orientamento nello spazio della terna riferimento locale dell'elemento.



- Il valore di S_0 ovvero l'azione assiale cui si suppone soggetto l'elemento.
- Il tipo di materiale di cui è costituito l'elemento.
- Il tipo di sezione che ne definisce le caratteristiche inerziali.
- La lunghezza.

Va rilevato che:

- Il valore di S_0 interviene (se diverso da zero) esclusivamente nella definizione della matrice di rigidezza dell'elemento (secondo la nota formulazione della matrice di rigidezza geometrica K_G) e non fornisce alcun contributo all'equilibrio globale dei nodi terminali dell'elemento.
- Il correlativo carico viceversa può, a discrezione dell'operatore, intervenire nell'equilibrio strutturale secondo i coefficienti di interazione specificati nelle combinazioni di carico.

Caratteristiche dei Materiali:

Tipo	Modulo Elastico [kg/cm ²]	ν	alfa [1/°C]	Peso Specifico [kg/m ³]	Commento
1	115000.0	0.380	0.000010	385.0	Legno GL24h
2	2100000.0	0.330	0.000012	7850.0	Acciaio

Sezioni Impiegate:

Sezione	Materiale	Tipo di Sezione	Parametri Dimensionali Commenti
1	1	Rett.	B= 14 H= 20 [cm] catena cm 14x20
2	2	Rett.	B= 6 H= 0 [cm] piatto mm 4x60

Caratteristiche Inerziali:

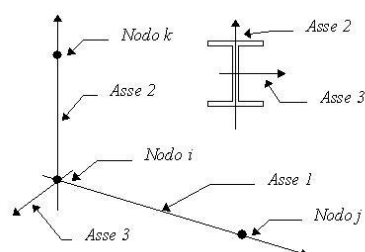
Sezione	Materiale	Area [cm ²]	Jt [cm ⁴]	J2 [cm ⁴]	J3 [cm ⁴]	J23 [cm ⁴]	Xx	Yy
1	1	280.00	9961	9333	4573	0	1.2	1.2
2	2	2.40	0	0	7	0	1.2	1.2

Elementi tipo trave**Convenzioni adottate**

Ogni elemento tipo trave viene identificato da:

- Il nodo iniziale **i**;
- Il nodo finale **j**;
- Il nodo **k** che definisce l'orientamento nello spazio della terna riferimento locale dell'elemento.

La terna di riferimento locale della trave risulta essere così disposta:



Vengono riportati i valori di efficacia dei vincoli alle estremità dello elemento (variabili fra 0 e 100%), nei due piani **1-2** e **1-3** della trave in corrispondenza dei nodi, dando quindi la possibilità di considerare aste non perfettamente incastrate (coefficienti **Vi12**, **Vj12**, **Vi13**, **Vj13**).

Caratteristiche dei Materiali:

Tipo	Modulo Elastico [kg/cm ²]	ν	alfa [1/°C]	Peso Specifico [kg/m ³]	Commento
1	115000.0	0.380	0.000010	385.0	Legno GL24h
2	2100000.0	0.330	0.000012	7850.0	Acciaio

Sezioni Impiegate:

Sezione	Materiale	Tipo di Sezione	Parametri Dimensionali Commenti
1	1	Rett.	B= 14 H= 24 [cm] puntoni cm 14x24
2	1	Rett.	B= 10 H= 12 [cm] colmo cm 10x12
3	1	Rett.	B= 10 H= 12 [cm] arcarecci cm 10x12

Caratteristiche Inerziali:

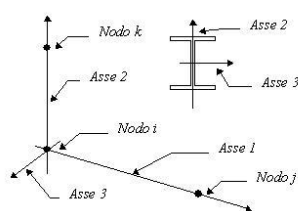
Sezione	Materiale	Area [cm ²]	Jt [cm ⁴]	J2 [cm ⁴]	J3 [cm ⁴]	J23 [cm ⁴]	Xx	Yy
1	1	336.00	13613	16128	5488	0	1.2	1.2
2	1	120.00	1918	1440	1000	0	1.2	1.2
3	1	120.00	1918	1440	1000	0	1.2	1.2

Sollecitazioni nelle bielle**Convenzioni adottate**

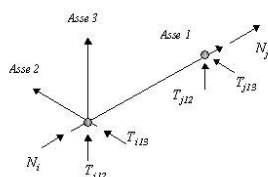
Le sollecitazioni negli elementi biella sono da intendersi nel sistema di riferimento locale dell'elemento.

L'orientamento della terna locale dell'elemento biella nello spazio è definita a mezzo del nodo **K**

La terna di riferimento locale dell'elemento è così disposta:



Per quanto concerne i segni positivi assunti per le varie componenti di sollecitazione si assumono come positivi i versi e le sollecitazioni così diretti:



Per ogni biella vengono riportate, nelle varie combinazioni di carico, le componenti di sollecitazione alle estremità dell'elemento.

Comb. Nodo **N** **T1-2** **T1-3**
 [kg] **[kg]** **[kg]**

1	14	-2227.4	48.5	0.0
	20	2227.4	48.5	0.0
2	14	-3679.8	48.5	0.0
	20	3679.8	48.5	0.0
3	14	-263.5	37.3	0.0
	20	263.5	37.3	0.0
4	14	-2481.2	37.3	0.0
	20	2481.2	37.3	0.0
5	14	-1787.5	37.3	0.0
	20	1787.5	37.3	0.0
1	13	-2970.9	48.5	0.0
	19	2970.9	48.5	0.0
2	13	-4940.5	48.5	0.0
	19	4940.5	48.5	0.0
3	13	-329.9	37.3	0.0
	19	329.9	37.3	0.0
4	13	-1602.1	37.3	0.0
	19	1602.1	37.3	0.0
5	13	-1832.7	37.3	0.0
	19	1832.7	37.3	0.0
1	12	-3170.7	48.5	0.0
	18	3170.7	48.5	0.0
2	12	-5291.4	48.5	0.0
	18	5291.4	48.5	0.0
3	12	-329.1	37.3	0.0
	18	329.1	37.3	0.0
4	12	-2249.4	37.3	0.0
	18	2249.4	37.3	0.0
5	12	-2098.3	37.3	0.0
	18	2098.3	37.3	0.0
1	11	-3170.7	48.5	0.0
	17	3170.7	48.5	0.0
2	11	-5291.4	48.5	0.0
	17	5291.4	48.5	0.0

Comb. Nodo		N [kg]	T1-2 [kg]	T1-3 [kg]
3	11	-329.1	37.3	0.0
	17	329.1	37.3	0.0
4	11	-2441.4	37.3	0.0
	17	2441.4	37.3	0.0
5	11	-2155.9	37.3	0.0
	17	2155.9	37.3	0.0
1	10	-2970.9	48.5	0.0
	16	2970.9	48.5	0.0
2	10	-4940.5	48.5	0.0
	16	4940.5	48.5	0.0
3	10	-329.9	37.3	0.0
	16	329.9	37.3	0.0
4	10	-2805.3	37.3	0.0
	16	2805.3	37.3	0.0
5	10	-2193.7	37.3	0.0
	16	2193.7	37.3	0.0
1	9	-2227.4	48.5	0.0
	15	2227.4	48.5	0.0
2	9	-3679.8	48.5	0.0
	15	3679.8	48.5	0.0
3	9	-263.5	37.3	0.0
	15	263.5	37.3	0.0
4	9	-842.6	37.3	0.0
	15	842.6	37.3	0.0
5	9	-1295.9	37.3	0.0
	15	1295.9	37.3	0.0
1	9	360.4	5.2	0.0
	87	-358.1	5.2	-0.0
2	9	601.8	5.2	0.0
	87	-599.5	5.2	-0.0
3	9	22.6	4.0	0.0
	87	-20.8	4.0	-0.0
4	9	-97.4	4.0	0.0
	87	99.2	4.0	-0.0
5	9	122.5	4.0	0.0
	87	-120.8	4.0	-0.0
1	86	71.1	5.2	-0.0
	10	-73.3	5.2	0.0
2	86	114.3	5.2	0.0
	10	-116.6	5.2	-0.0
3	86	4.0	4.0	-0.0
	10	-5.8	4.0	0.0
4	86	384.6	4.0	-0.0
	10	-386.4	4.0	0.0
5	86	184.2	4.0	-0.0
	10	-186.0	4.0	0.0
1	86	183.9	5.2	-0.0
	16	-186.2	5.2	0.0
2	86	305.5	5.2	-0.0
	16	-307.7	5.2	0.0
3	86	14.6	4.0	-0.0
	16	-16.3	4.0	0.0
4	86	648.7	4.0	0.0
	16	-650.4	4.0	-0.0
5	86	308.5	4.0	-0.0

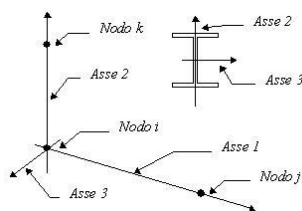
Comb. Nodo	N	T1-2	T1-3
	[kg]	[kg]	[kg]
	16	-310.2	4.0 0.0
1	15	242.9	5.2 0.0
	87	-240.6	5.2 -0.0
2	15	403.1	5.2 0.0
	87	-400.8	5.2 -0.0
3	15	11.5	4.0 0.0
	87	-9.8	4.0 -0.0
4	15	-344.6	4.0 0.0
	87	346.3	4.0 -0.0
5	15	54.9	4.0 0.0
	87	-53.2	4.0 -0.0
1	13	73.3	5.2 -0.0
	91	-71.1	5.2 0.0
2	13	116.6	5.2 -0.0
	91	-114.3	5.2 0.0
3	13	5.8	4.0 -0.0
	91	-4.0	4.0 0.0
4	13	-253.4	4.0 -0.0
	91	255.1	4.0 0.0
5	13	-5.9	4.0 -0.0
	91	7.7	4.0 0.0
1	90	358.1	5.2 0.0
	14	-360.4	5.2 -0.0
2	90	599.5	5.2 0.0
	14	-601.8	5.2 -0.0
3	90	20.8	4.0 0.0
	14	-22.6	4.0 -0.0
4	90	622.2	4.0 0.0
	14	-624.0	4.0 -0.0
5	90	337.2	4.0 0.0
	14	-339.0	4.0 -0.0
1	20	242.9	5.2 0.0
	90	-240.6	5.2 -0.0
2	20	403.1	5.2 0.0
	90	-400.8	5.2 -0.0
3	20	11.5	4.0 0.0
	90	-9.8	4.0 -0.0
4	20	736.4	4.0 0.0
	90	-734.6	4.0 -0.0
5	20	379.2	4.0 0.0
	90	-377.4	4.0 -0.0
1	19	186.2	5.2 0.0
	91	-183.9	5.2 -0.0
2	19	307.7	5.2 0.0
	91	-305.5	5.2 -0.0
3	19	16.3	4.0 0.0
	91	-14.6	4.0 -0.0
4	19	-354.2	4.0 0.0
	91	356.0	4.0 -0.0
5	19	8.9	4.0 0.0
	91	-7.1	4.0 -0.0

Sollecitazioni nelle travi

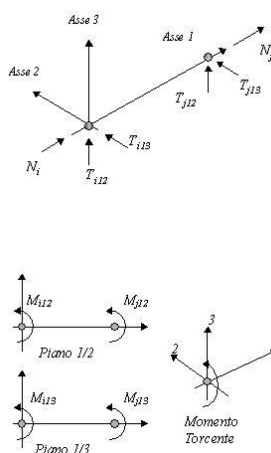
Convenzioni adottate

Le sollecitazioni nelle travi sono da intendersi nel sistema di riferimento locale dell'elemento, e si riferiscono all'asta. L'orientamento della trave nello spazio è definito a mezzo del nodo K.

La terna di riferimento locale dell'asta è così disposta:



Per quanto concerne i segni positivi assunti per le varie componenti di sollecitazione si assumono come positivi i versi e le sollecitazioni se così diretti:



Per ogni trave vengono riportate, nelle varie combinazioni di carico, le componenti di sollecitazione alle estremità dell'asta.

Comb. Nodo	N	T1-2	T1-3	Mt	M1-3	M1-2
	[kg]	[kg]	[kg]	[kgm]	[kgm]	[kgm]
1 83	1808.2	-410.6	48.7	-20.7	-6.1	-304.4
91	-1805.1	422.3	-48.7	20.7	-29.0	4.5
2 83	2976.3	-681.3	83.0	-35.2	-10.1	-502.4
91	-2973.2	692.9	-83.0	35.2	-49.7	7.7
3 83	50.8	-4.5	8.7	0.3	-5.5	-6.4
91	-48.3	13.5	-8.7	-0.3	-0.8	-0.1
4 83	2104.4	-403.7	-109.2	-22.8	28.0	-296.4
91	-2101.9	412.7	109.2	22.8	51.0	5.9
5 83	1721.9	-306.5	-9.5	-16.9	6.1	-227.4
91	-1719.4	315.5	9.5	16.9	1.1	3.0
1 75	1901.9	-408.3	-49.8	18.9	6.7	-298.2
91	-1898.8	420.0	49.8	-18.9	29.2	0.0
2 75	3135.0	-677.6	-84.8	32.4	11.1	-492.1
91	-3131.8	689.3	84.8	-32.4	50.0	0.0
3 75	59.5	-4.3	-8.9	-0.4	5.5	-6.3
91	-57.1	13.3	8.9	0.4	0.8	0.0
4 75	1967.5	-409.0	106.1	21.8	-26.0	-297.7
91	-1965.0	418.0	-106.1	-21.8	-50.5	0.0
5 75	1512.3	-371.3	2.8	17.8	-3.4	-270.5
91	-1509.9	380.3	-2.8	-17.8	1.8	0.0
1 27	1982.4	234.6	24.8	-5.1	-10.4	-276.2
43	-1979.1	-222.4	-24.8	5.1	-8.2	447.5

Comb.	Nodo	N [kg]	T1-2 [kg]	T1-3 [kg]	Mt [kgm]	M1-3 [kgm]	M1-2 [kgm]
2	27	3263.5	382.8	41.8	-8.8	-17.5	-456.1
	43	-3260.3	-370.6	-41.8	8.8	-13.9	738.6
3	27	183.2	9.8	17.5	-0.0	-6.8	-5.5
	43	-180.7	-0.4	-17.5	0.0	-6.4	9.3
4	27	2273.4	236.2	114.3	-10.8	-33.7	-258.9
	43	-2270.9	-226.8	-114.3	10.8	-52.7	433.4
5	27	1930.3	174.3	46.8	-7.3	-15.2	-202.1
	43	-1927.8	-165.0	-46.8	7.3	-19.9	332.5
1	20	2039.6	447.4	9.3	0.2	0.9	0.0
	27	-2036.9	-437.4	-9.3	-0.2	-6.6	271.1
2	20	3358.4	735.3	16.0	-0.0	1.4	0.0
	27	-3355.7	-725.3	-16.0	0.0	-11.2	447.5
3	20	226.9	12.9	12.1	-0.1	-1.3	0.0
	27	-224.9	-5.2	-12.1	0.1	-6.1	5.5
4	20	2337.6	422.8	132.3	-6.9	-81.1	0.0
	27	-2335.5	-415.2	-132.3	6.9	-13.4	256.8
5	20	1993.5	327.8	43.6	-3.5	-23.5	0.0
	27	-1991.4	-320.2	-43.6	3.5	-7.2	198.5
1	26	3209.5	369.9	-3.1	-1.9	1.9	-428.1
	42	-3206.2	-357.7	3.1	1.9	0.5	701.0
2	26	5343.1	611.3	-5.2	-3.3	3.1	-712.6
	42	-5339.8	-599.2	5.2	3.3	0.8	1166.5
3	26	240.9	6.8	-0.9	-0.1	0.5	-2.0
	42	-238.4	2.5	0.9	0.1	0.2	3.6
4	26	2005.8	187.6	121.6	-6.3	-35.3	-242.2
	42	-2003.3	-178.2	-121.6	6.3	-56.5	382.3
5	26	2641.5	214.0	35.1	-2.6	-9.7	-257.6
	42	-2639.0	-204.7	-35.1	2.6	-16.9	423.9
1	19	3301.3	711.4	8.2	-1.9	-2.9	-0.0
	26	-3298.6	-701.4	-8.2	1.9	-2.2	432.9
2	19	5496.2	1180.9	13.7	-3.3	-4.8	-0.0
	26	-5493.5	-1171.0	-13.7	3.3	-3.6	720.6
3	19	311.5	7.0	1.4	-0.1	-0.4	-0.0
	26	-309.4	0.7	-1.4	0.1	-0.4	1.9
4	19	2084.9	397.5	150.7	-6.2	-86.6	0.0
	26	-2082.8	-389.8	-150.7	6.2	-9.5	241.2
5	19	2743.2	426.5	50.3	-2.5	-27.8	-0.0
	26	-2741.1	-418.9	-50.3	2.5	-4.2	259.0
1	81	3108.5	-660.4	-10.8	-0.6	3.3	-479.7
	89	-3105.3	672.1	10.8	0.6	4.5	-0.0
2	81	5187.5	-1102.9	-18.2	-1.0	5.6	-798.3
	89	-5184.4	1114.6	18.2	1.0	7.5	-0.1
3	81	22.4	1.2	-0.7	-0.0	0.1	-2.4
	89	-20.0	7.8	0.7	0.0	0.4	0.0
4	81	2364.5	-458.5	-112.1	-4.8	25.4	-334.8
	89	-2362.1	467.5	112.1	4.8	55.8	2.9
5	81	2598.6	-427.2	-37.2	-1.5	9.0	-311.3
	89	-2596.2	436.2	37.2	1.5	17.9	1.2
1	65	3201.6	-316.7	2.8	-0.6	0.3	-721.8
	81	-3198.3	328.9	-2.8	0.6	-2.4	479.7
2	65	5342.4	-531.1	4.7	-1.0	0.6	-1201.2
	81	-5339.1	543.3	-4.7	1.0	-4.1	798.3
3	65	93.3	3.0	-0.1	-0.0	0.1	-3.6
	81	-90.8	6.3	0.1	0.0	-0.0	2.4
4	65	2449.9	-214.9	-59.6	-4.8	53.7	-504.1

Comb. Nodo		N [kg]	T1-2 [kg]	T1-3 [kg]	Mt [kgm]	M1-3 [kgm]	M1-2 [kgm]
	81	-2447.4	224.2	59.6	4.8	-11.7	370.9
5	65	2717.1	-193.2	-16.7	-1.5	16.1	-471.2
	81	-2714.6	202.6	16.7	1.5	-4.6	322.1
1	41	3293.9	27.0	0.7	-0.6	-0.2	-706.2
	65	-3290.6	-14.8	-0.7	0.6	-0.4	721.9
2	41	5496.0	40.7	1.2	-1.0	-0.3	-1175.4
	65	-5492.8	-28.6	-1.2	1.0	-0.6	1201.4
3	41	164.2	4.9	0.1	-0.0	0.0	-3.5
	65	-161.7	4.5	-0.1	0.0	-0.1	3.6
4	41	2534.1	7.5	50.0	-4.8	24.6	-493.7
	65	-2531.6	1.9	-50.0	4.8	-59.5	561.0
5	41	2832.7	-30.8	15.6	-1.5	7.1	-459.3
	65	-2830.2	40.1	-15.6	1.5	-17.9	488.4
1	73	3110.2	-653.0	9.8	0.6	-2.9	-474.4
	89	-3107.0	664.7	-9.8	-0.6	-4.1	0.0
2	73	5190.2	-1090.8	16.4	1.0	-5.0	-789.6
	89	-5187.1	1102.5	-16.4	-1.0	-6.9	0.0
3	73	22.5	1.4	0.7	0.0	-0.1	-2.2
	89	-20.1	7.6	-0.7	-0.0	-0.4	0.0
4	73	2229.1	-498.4	105.2	5.1	-22.1	-362.1
	89	-2226.7	507.4	-105.2	-5.1	-54.0	0.0
5	73	2149.5	-559.3	34.2	1.6	-7.7	-405.9
	89	-2147.1	568.3	-34.2	-1.6	-17.0	0.0
1	79	2933.8	-661.1	34.0	1.9	-11.1	-475.7
	87	-2930.6	672.8	-34.0	-1.9	-13.5	-4.5
2	79	4884.3	-1104.2	57.9	3.3	-18.7	-791.6
	87	-4881.1	1115.9	-57.9	-3.3	-22.9	-7.6
3	79	27.9	1.2	1.2	0.1	-0.3	-2.5
	87	-25.5	7.8	-1.2	-0.1	-0.5	0.1
4	79	2880.3	-615.2	-125.7	-3.6	26.6	-438.4
	87	-2877.9	624.2	125.7	3.6	64.3	2.0
5	79	2636.2	-472.9	-23.3	-0.4	3.1	-340.0
	87	-2633.8	481.9	23.3	0.4	13.9	-0.5
1	63	3025.5	-317.4	-13.5	1.9	0.3	-714.8
	79	-3022.3	329.6	13.5	-1.9	9.8	472.2
2	63	5037.0	-532.3	-22.9	3.3	0.6	-1189.4
	79	-5033.7	544.5	22.9	-3.3	16.6	785.6
3	63	99.0	3.1	0.5	0.1	-0.4	-3.8
	79	-96.4	6.3	-0.5	-0.1	0.0	2.6
4	63	2966.7	-156.7	-60.5	-3.6	54.0	-666.4
	79	-2964.2	166.0	60.5	3.6	-10.5	432.1
5	63	2753.8	-176.3	-24.5	-0.4	16.8	-516.4
	79	-2751.3	185.6	24.5	0.4	1.3	336.9
1	39	3117.4	26.2	-1.9	1.9	0.9	-698.8
	63	-3114.2	-14.1	1.9	-1.9	0.5	713.9
2	39	5189.9	39.5	-3.2	3.3	1.6	-1162.8
	63	-5186.6	-27.3	3.2	-3.3	0.8	1187.8
3	39	169.9	5.0	-0.3	0.1	0.0	-3.6
	63	-167.4	4.4	0.3	-0.1	0.2	3.9
4	39	3052.8	15.9	46.6	-3.6	25.8	-647.5
	63	-3050.3	-6.5	-46.6	3.6	-58.3	664.6
5	39	2869.6	-31.5	12.4	-0.4	8.6	-502.6
	63	-2867.1	40.9	-12.4	0.4	-16.9	515.6
1	23	3209.5	369.9	3.1	1.9	-1.9	-428.1

Comb. Nodo		N [kg]	T1-2 [kg]	T1-3 [kg]	Mt [kgm]	M1-3 [kgm]	M1-2 [kgm]
	39	-3206.2	-357.7	-3.1	-1.9	-0.5	701.0
2	23	5343.1	611.3	5.2	3.3	-3.1	-712.6
	39	-5339.8	-599.2	-5.2	-3.3	-0.8	1166.5
3	23	240.9	6.8	0.9	0.1	-0.5	-2.0
	39	-238.4	2.5	-0.9	-0.1	-0.2	3.6
4	23	3137.3	354.2	126.2	-3.5	-38.1	-386.3
	39	-3134.8	-344.9	-126.2	3.5	-57.1	651.1
5	23	2980.9	264.0	39.3	-0.4	-12.3	-300.8
	39	-2978.4	-254.7	-39.3	0.4	-17.1	504.6
1	16	3301.3	711.4	-8.2	1.9	2.9	0.0
	23	-3298.6	-701.4	8.2	-1.9	2.2	432.9
2	16	5496.2	1180.9	-13.7	3.3	4.8	0.0
	23	-5493.5	-1171.0	13.7	-3.3	3.6	720.6
3	16	311.5	7.0	-1.4	0.1	0.4	0.0
	23	-309.4	0.7	1.4	-0.1	0.4	1.9
4	16	3218.3	647.0	137.6	-3.5	-82.0	-0.0
	23	-3216.2	-639.4	-137.6	3.5	-6.0	394.2
5	16	3083.2	501.4	36.2	-0.4	-22.8	-0.0
	23	-3081.1	-493.8	-36.2	0.4	-0.4	304.9
1	7	-31.8	-135.5	-23.8	-49.4	10.9	-5.7
	14	32.4	137.7	23.8	49.4	-7.6	-13.1
2	7	-52.1	-221.9	-39.7	-80.8	18.0	-9.6
	14	52.7	224.2	39.7	80.8	-12.5	-21.0
3	7	-23.5	-3.8	-9.3	-1.5	7.2	0.1
	14	24.0	5.5	9.3	1.5	-5.9	-0.7
4	7	-29.0	-111.8	14.8	-39.8	13.3	-1.8
	14	29.4	113.5	-14.8	39.8	-12.5	-13.2
5	7	-10.0	-113.5	-6.7	-38.1	10.4	-4.7
	14	10.5	115.2	6.7	38.1	-8.3	-12.3
1	67	1865.9	-195.6	25.1	-15.5	-7.9	-459.2
	83	-1862.7	207.7	-25.1	15.5	-11.0	307.9
2	67	3071.5	-326.6	42.7	-26.4	-13.3	-757.8
	83	-3068.2	338.7	-42.7	26.4	-18.7	508.3
3	67	94.8	0.2	17.8	0.2	-6.1	-9.6
	83	-92.3	9.1	-17.8	-0.2	-7.3	6.2
4	67	2151.8	-91.5	-24.6	-18.3	47.8	-448.6
	83	-2149.3	100.8	24.6	18.3	-30.7	298.5
5	67	1788.9	-109.2	4.7	-12.8	10.7	-343.7
	83	-1786.4	118.6	-4.7	12.8	-14.1	230.2
1	14	2137.4	449.7	-17.8	-1.9	2.5	13.1
	35	-2134.8	-439.8	17.8	1.9	8.5	259.5
2	14	3524.0	739.0	-29.9	-2.8	4.0	21.0
	35	-3521.3	-729.0	29.9	2.8	14.3	428.8
3	14	236.1	13.1	-16.8	0.1	4.0	0.7
	35	-234.0	-5.4	16.8	-0.1	6.2	5.0
4	14	2191.4	435.5	-129.5	4.4	80.7	13.2
	35	-2189.3	-427.9	129.5	-4.4	-4.1	253.4
5	14	1674.7	406.9	-49.7	-1.1	25.9	12.3
	35	-1672.6	-399.2	49.7	1.1	3.7	236.8
1	35	2079.0	236.9	-25.6	3.3	10.0	-264.5
	51	-2075.7	-224.7	25.6	-3.3	9.2	437.6
2	35	3427.2	386.5	-43.3	6.0	17.0	-437.2
	51	-3423.9	-374.3	43.3	-6.0	15.5	722.5
3	35	192.2	10.0	-17.8	-0.0	6.8	-4.9
	51	-189.7	-0.7	17.8	0.0	6.6	8.9

Comb.	Nodo	N [kg]	T1-2 [kg]	T1-3 [kg]	Mt [kgm]	M1-3 [kgm]	M1-2 [kgm]
4	35	2130.8	243.4	-109.8	8.3	33.3	-165.0
	51	-2128.3	-234.0	109.8	-8.3	49.8	433.0
5	35	1638.6	218.6	-48.0	2.9	15.8	-212.8
	51	-1636.0	-209.2	48.0	-2.9	20.4	395.7
1	32	3386.5	378.0	1.2	-0.6	-0.6	-411.1
	48	-3383.2	-365.9	-1.2	0.6	-0.3	690.1
2	32	5649.8	624.7	2.0	-1.0	-1.0	-685.0
	48	-5646.6	-612.5	-2.0	1.0	-0.5	1149.0
3	32	235.1	7.0	0.0	-0.0	-0.0	-1.2
	48	-232.6	2.4	-0.0	0.0	-0.0	3.0
4	32	2631.7	286.2	-117.8	4.3	34.9	-341.6
	48	-2629.1	-276.8	117.8	-4.3	54.0	573.8
5	32	2380.4	324.2	-35.3	1.2	10.4	-365.7
	48	-2377.9	-314.8	35.3	-1.2	16.3	603.8
1	48	3294.6	34.4	1.4	-0.6	-0.4	-689.9
	56	-3291.3	-22.2	-1.4	0.6	-0.7	711.1
2	48	5497.0	52.8	2.4	-1.0	-0.6	-1148.6
	56	-5493.7	-40.6	-2.4	1.0	-1.2	1183.7
3	48	164.3	5.1	0.1	-0.0	0.0	-3.0
	56	-161.7	4.2	-0.1	0.0	-0.1	3.3
4	48	2567.5	38.8	-49.3	4.3	-22.6	-573.0
	56	-2565.0	-29.4	49.3	-4.3	56.8	590.6
5	48	2335.2	77.8	-14.7	1.2	-6.7	-603.4
	56	-2332.6	-68.4	14.7	-1.2	16.9	617.8
1	56	3202.8	-309.3	3.6	-0.6	0.0	-711.0
	72	-3199.5	321.5	-3.6	0.6	-2.7	474.4
2	56	5344.3	-519.0	6.1	-1.0	0.0	-1183.5
	72	-5341.0	531.2	-6.1	1.0	-4.6	789.7
3	56	93.4	3.3	-0.1	-0.0	0.1	-3.3
	72	-90.9	6.1	0.1	0.0	-0.0	2.2
4	56	2499.9	-262.6	60.2	4.3	-50.0	-590.6
	72	-2497.4	272.0	-60.2	-4.3	7.5	394.5
5	56	2278.9	-284.4	19.3	1.2	-14.6	-617.8
	72	-2276.4	293.8	-19.3	-1.2	1.1	415.6
1	72	3110.2	-653.0	-9.8	-0.6	2.9	-474.4
	88	-3107.0	664.7	9.8	0.6	4.1	0.0
2	72	5190.2	-1090.8	-16.4	-1.0	5.0	-789.6
	88	-5187.1	1102.5	16.4	1.0	6.9	0.0
3	72	22.5	1.4	-0.7	-0.0	0.1	-2.2
	88	-20.1	7.6	0.7	0.0	0.4	0.0
4	72	2427.9	-544.5	91.9	4.3	-18.0	-395.3
	88	-2425.5	553.5	-91.9	-4.3	-48.5	0.0
5	72	2209.1	-573.1	24.9	1.2	-4.3	-415.9
	88	-2206.7	582.1	-24.9	-1.2	-13.7	0.0
1	3	-49.6	-163.3	-51.0	34.3	-1.6	5.4
	10	50.2	165.6	51.0	-34.3	8.6	-28.0
2	3	-81.3	-267.6	-83.8	56.1	-2.7	9.1
	10	81.9	269.9	83.8	-56.1	14.2	-46.0
3	3	-38.7	-4.5	-7.9	1.0	0.1	-0.1
	10	39.1	6.2	7.9	-1.0	1.0	-0.7
4	3	-26.0	-126.6	5.5	24.4	11.5	9.4
	10	26.5	128.3	-5.5	-24.4	-4.2	-26.7
5	3	-9.6	-137.9	-28.0	26.0	3.2	6.8
	10	10.1	139.6	28.0	-26.0	2.9	-24.8

Comb. Nodo		N [kg]	T1-2 [kg]	T1-3 [kg]	Mt [kgm]	M1-3 [kgm]	M1-2 [kgm]
1	10	3205.1	720.5	13.2	-1.0	-5.0	28.0
	31	-3202.4	-710.5	-13.2	1.0	-3.1	410.5
2	10	5333.3	1196.0	21.9	-1.8	-8.3	46.0
	31	-5330.6	-1186.0	-21.9	1.8	-5.1	683.9
3	10	302.0	7.1	0.8	-0.2	-0.4	0.7
	31	-300.0	0.5	-0.8	0.2	-0.1	1.4
4	10	2867.8	683.3	-129.5	3.9	80.1	26.7
	31	-2865.8	-675.6	129.5	-3.9	4.7	391.1
5	10	2343.1	658.5	-32.6	1.0	21.6	24.8
	31	-2341.1	-650.9	32.6	-1.0	0.0	378.7
1	31	3114.0	379.0	0.2	-1.0	0.7	-405.8
	47	-3110.7	-366.8	-0.2	1.0	-0.8	685.5
2	31	5181.3	626.3	0.4	-1.8	1.1	-675.9
	47	-5178.1	-614.2	-0.4	1.8	-1.4	1141.1
3	31	231.6	7.0	-0.0	-0.2	0.1	-1.4
	47	-229.1	2.4	0.0	0.2	-0.0	3.2
4	31	2801.9	376.0	-117.6	3.9	36.4	-383.6
	47	-2799.4	-366.6	117.6	-3.9	52.3	658.7
5	31	2306.7	351.2	-36.1	1.0	11.6	-373.3
	47	-2304.2	-341.8	36.1	-1.0	15.6	622.6
1	47	3022.4	35.3	4.0	-1.0	-1.6	-683.2
	55	-3019.2	-23.2	-4.0	1.0	-1.4	705.1
2	47	5029.1	54.5	6.9	-1.8	-2.7	-1137.2
	55	-5025.8	-42.3	-6.9	1.8	-2.4	1173.6
3	47	160.7	5.1	0.4	-0.2	-0.0	-3.2
	55	-158.2	4.3	-0.4	0.2	-0.3	3.5
4	47	2732.7	56.9	-43.8	4.0	-24.4	-655.1
	55	-2730.2	-47.5	43.8	-4.0	54.8	678.4
5	47	2261.4	84.7	-12.1	1.0	-7.8	-620.1
	55	-2258.9	-75.4	12.1	-1.0	16.2	637.7
1	55	2931.0	-308.3	15.8	-1.0	-1.2	-706.0
	71	-2927.7	320.5	-15.8	1.0	-10.6	470.1
2	55	4876.9	-517.3	26.9	-1.8	-2.1	-1175.0
	71	-4873.6	529.5	-26.9	1.8	-18.1	782.4
3	55	89.8	3.2	-0.4	-0.2	0.3	-3.4
	71	-87.3	6.1	0.4	0.2	-0.1	2.4
4	55	2659.4	-189.3	60.6	4.0	-52.0	-680.0
	71	-2656.8	198.7	-60.6	-4.0	8.6	449.2
5	55	2203.0	-259.8	25.3	1.0	-15.8	-638.8
	71	-2200.5	269.2	-25.3	-1.0	-2.2	427.5
1	71	2839.7	-652.0	-31.7	-1.0	10.1	-473.7
	87	-2836.5	663.7	31.7	1.0	12.7	0.0
2	71	4724.9	-1089.2	-53.8	-1.8	17.1	-788.4
	87	-4721.8	1100.8	53.8	1.8	21.6	0.0
3	71	18.8	1.4	-1.0	-0.2	0.3	-2.2
	87	-16.4	7.6	1.0	0.2	0.5	0.0
4	71	2581.4	-627.9	124.2	3.9	-25.2	-455.3
	87	-2579.0	636.9	-124.2	-3.9	-64.4	0.0
5	71	2128.8	-595.3	23.7	1.0	-3.0	-431.8
	87	-2126.4	604.3	-23.7	-1.0	-14.2	0.0
1	70	1901.9	-408.3	49.8	-18.9	-6.7	-298.2
	86	-1898.8	420.0	-49.8	18.9	-29.2	0.0
2	70	3135.0	-677.6	84.8	-32.4	-11.1	-492.1
	86	-3131.8	689.3	-84.8	32.4	-50.0	0.0
3	70	59.5	-4.3	8.9	0.4	-5.5	-6.3

Comb. Nodo		N [kg]	T1-2 [kg]	T1-3 [kg]	Mt [kgm]	M1-3 [kgm]	M1-2 [kgm]
	86	-57.1	13.3	-8.9	-0.4	-0.8	0.0
4	70	891.3	-238.1	184.2	-8.1	-36.8	-174.6
	86	-888.9	247.1	-184.2	8.1	-96.3	0.0
5	70	1189.4	-320.0	84.4	-13.7	-15.4	-233.6
	86	-1187.0	329.0	-84.4	13.7	-45.8	0.0
1	15	2039.6	447.4	-9.3	-0.2	-0.9	-0.0
	22	-2036.9	-437.4	9.3	0.2	6.6	271.1
2	15	3358.4	735.3	-16.0	0.0	-1.4	-0.0
	22	-3355.7	-725.3	16.0	-0.0	11.2	447.5
3	15	226.9	12.9	-12.1	0.1	1.3	-0.0
	22	-224.9	-5.2	12.1	-0.1	6.1	5.5
4	15	928.2	239.1	118.7	-6.2	-82.7	-0.0
	22	-926.1	-231.5	-118.7	6.2	-3.5	144.2
5	15	1570.7	272.7	31.7	-0.4	-25.7	-0.0
	22	-1568.7	-265.1	-31.7	0.4	2.1	164.8
1	22	1982.4	234.6	-24.8	5.1	10.4	-276.2
	38	-1979.1	-222.4	24.8	-5.1	8.2	447.5
2	22	3263.5	382.8	-41.8	8.8	17.5	-456.1
	38	-3260.3	-370.6	41.8	-8.8	13.9	738.6
3	22	183.2	9.8	-17.5	0.0	6.8	-5.5
	38	-180.7	-0.4	17.5	-0.0	6.4	9.3
4	22	895.6	109.6	76.7	-2.1	-18.0	-150.0
	38	-893.1	-100.2	-76.7	2.1	-40.3	229.7
5	22	1517.0	136.3	10.6	3.5	-0.3	-169.5
	38	-1514.4	-127.0	-10.6	-3.5	-8.1	271.4
1	38	1924.2	19.5	-25.3	10.3	9.2	-449.9
	62	-1921.0	-7.3	25.3	-10.3	9.8	460.0
2	38	3167.7	28.1	-42.7	17.6	15.5	-742.7
	62	-3164.4	-15.9	42.7	-17.6	16.5	759.2
3	38	139.0	5.0	-17.8	-0.1	6.6	-9.3
	62	-136.5	4.4	17.8	0.1	6.8	9.5
4	38	858.1	-4.3	16.5	1.1	37.8	-232.7
	62	-855.6	13.6	-16.5	-1.1	-48.3	233.3
5	38	1454.2	-12.5	-7.5	4.6	15.8	-273.7
	62	-1451.7	21.8	7.5	-4.6	-9.8	279.7
1	62	1865.9	-195.6	-25.1	15.5	7.9	-459.2
	78	-1862.7	207.7	25.1	-15.5	11.0	307.9
2	62	3071.5	-326.6	-42.7	26.4	13.3	-757.8
	78	-3068.2	338.7	42.7	-26.4	18.7	508.3
3	62	94.8	0.2	-17.8	-0.2	6.1	-9.6
	78	-92.3	9.1	17.8	0.2	7.3	6.2
4	62	810.3	-193.9	-62.2	4.8	59.5	-232.8
	78	-807.8	203.3	62.2	-4.8	-14.5	158.7
5	62	1386.5	-140.0	-30.7	8.8	21.5	-279.0
	78	-1384.0	149.3	30.7	-8.8	0.5	188.2
1	54	1960.6	-193.2	26.7	-13.7	-8.4	-451.1
	70	-1957.3	205.4	-26.7	13.7	-11.6	301.6
2	54	3231.7	-322.9	45.3	-23.6	-14.3	-744.7
	70	-3228.4	335.1	-45.3	23.6	-19.7	497.9
3	54	103.7	0.5	17.9	0.3	-6.1	-9.4
	70	-101.1	8.9	-17.9	-0.3	-7.3	6.2
4	54	932.3	-198.2	64.7	-4.6	-58.5	-263.7
	70	-929.8	207.6	-64.7	4.6	11.1	177.8
5	54	1231.6	-184.5	35.3	-9.9	-22.4	-350.5
	70	-1229.1	193.8	-35.3	9.9	-4.0	236.2

Comb.	Nodo	N	T1-2	T1-3	Mt	M1-3	M1-2	
		[kg]	[kg]	[kg]	[kgm]	[kgm]	[kgm]	
	1	46	2019.8	21.9	26.6	-8.5	-9.5	-440.0
		54	-2016.6	-9.7	-26.6	8.5	-10.4	451.9
	2	46	3329.5	31.8	45.0	-14.8	-16.2	-726.6
		54	-3326.3	-19.6	-45.0	14.8	-17.6	745.9
	3	46	147.9	5.3	17.9	0.1	-6.5	-8.9
		54	-145.4	4.1	-17.9	-0.1	-6.9	9.3
	4	46	965.2	12.4	-11.6	0.0	-37.1	-262.9
		54	-962.7	-3.0	11.6	-0.0	43.7	264.1
	5	46	1267.3	38.5	12.4	-3.3	-16.7	-346.0
		54	-1264.8	-29.2	-12.4	3.3	6.7	350.9
	1	30	2079.0	236.9	25.6	-3.3	-10.0	-264.5
		46	-2075.7	-224.7	-25.6	3.3	-9.2	437.6
	2	30	3427.2	386.5	43.3	-6.0	-17.0	-437.2
		46	-3423.9	-374.3	-43.3	6.0	-15.5	722.5
	3	30	192.2	10.0	17.8	0.0	-6.8	-4.9
		46	-189.7	-0.7	-17.8	-0.0	-6.6	8.9
	4	30	988.5	133.0	-69.5	4.1	17.6	-255.6
		46	-986.0	-123.6	69.5	-4.1	35.3	260.1
	5	30	1295.9	185.4	-5.8	0.8	-0.6	-240.0
		46	-1293.4	-176.1	5.8	-0.8	5.1	343.9
	1	9	2137.4	449.7	17.8	1.9	-2.5	13.1
		30	-2134.8	-439.8	-17.8	-1.9	-8.5	259.5
	2	9	3524.0	739.0	29.9	2.8	-4.0	21.0
		30	-3521.3	-729.0	-29.9	-2.8	-14.3	428.8
	3	9	236.1	13.1	16.8	-0.1	-4.0	0.7
		30	-234.0	-5.4	-16.8	0.1	-6.2	5.0
	4	9	1008.9	278.8	-101.3	8.3	76.7	7.8
		30	-1006.8	-271.2	101.3	-8.3	-17.4	159.7
	5	9	1319.9	359.9	-19.6	5.0	21.3	10.7
		30	-1317.9	-352.2	19.6	-5.0	-10.2	208.7
	1	2	-31.8	-135.5	23.8	49.4	-10.9	-5.7
		9	32.4	137.7	-23.8	-49.4	7.6	-13.1
	2	2	-52.1	-221.9	39.7	80.8	-18.0	-9.6
		9	52.7	224.2	-39.7	-80.8	12.5	-21.0
	3	2	-23.5	-3.8	9.3	1.5	-7.2	0.1
		9	24.0	5.5	-9.3	-1.5	5.9	-0.7
	4	2	-9.5	-101.3	50.4	35.9	-3.8	-7.6
		9	9.9	103.0	-50.4	-35.9	-0.5	-7.8
	5	2	-4.1	-110.3	26.2	37.0	-7.5	-6.4
		9	4.6	112.0	-26.2	-37.0	4.4	-10.7
	1	78	1808.2	-410.6	-48.7	20.7	6.1	-304.4
		86	-1805.1	422.3	48.7	-20.7	29.0	4.5
	2	78	2976.3	-681.3	-83.0	35.2	10.1	-502.4
		86	-2973.2	692.9	83.0	-35.2	49.7	7.7
	3	78	50.8	-4.5	-8.7	-0.3	5.5	-6.4
		86	-48.3	13.5	8.7	0.3	0.8	-0.1
	4	78	754.6	-204.5	-182.3	8.2	36.7	-155.2
		86	-752.2	213.5	182.3	-8.2	94.7	0.3
	5	78	1316.9	-246.8	-78.0	12.5	13.3	-185.1
		86	-1314.5	255.8	78.0	-12.5	42.6	1.3
	1	51	2019.8	21.9	-26.6	8.5	9.5	-440.0
		59	-2016.6	-9.7	26.6	-8.5	10.4	451.9
	2	51	3329.5	31.8	-45.0	14.8	16.2	-726.6
		59	-3326.3	-19.6	45.0	-14.8	17.6	745.9

Comb. Nodo		N [kg]	T1-2 [kg]	T1-3 [kg]	Mt [kgm]	M1-3 [kgm]	M1-2 [kgm]
3	51	147.9	5.3	-17.9	-0.1	6.5	-8.9
	59	-145.4	4.1	17.9	0.1	6.9	9.3
4	51	2069.8	36.5	-53.5	12.2	-22.1	-433.9
	59	-2067.3	-27.1	53.5	-12.2	60.3	449.7
5	51	1598.7	45.8	-31.9	6.9	-1.0	-397.2
	59	-1596.2	-36.4	31.9	-6.9	24.5	406.6
1	59	1960.6	-193.2	-26.7	13.7	8.4	-451.1
	75	-1957.3	205.4	26.7	-13.7	11.6	301.6
2	59	3231.7	-322.9	-45.3	23.6	14.3	-744.7
	75	-3228.4	335.1	45.3	-23.6	19.7	497.9
3	59	103.7	0.5	-17.9	-0.3	6.1	-9.4
	75	-101.1	8.9	17.9	0.3	7.3	6.2
4	59	2015.6	-112.9	22.7	17.3	-45.3	-449.0
	75	-2013.1	122.2	-22.7	-17.3	29.6	299.7
5	59	1556.6	-158.9	-9.1	13.7	-8.7	-406.0
	75	-1554.1	168.2	9.1	-13.7	16.2	272.8
1	6	-49.6	-163.3	51.0	-34.3	1.6	5.4
	13	50.2	165.6	-51.0	34.3	-8.6	-28.0
2	6	-81.3	-267.6	83.8	-56.1	2.7	9.1
	13	81.9	269.9	-83.8	56.1	-14.2	-46.0
3	6	-38.7	-4.5	7.9	-1.0	-0.1	-0.1
	13	39.1	6.2	-7.9	1.0	-1.0	-0.7
4	6	-34.0	-132.5	85.4	-28.5	13.5	-0.4
	13	34.4	134.2	-85.4	28.5	-17.0	-17.4
5	6	-12.0	-139.6	55.2	-27.2	4.3	3.9
	13	12.5	141.4	-55.2	27.2	-9.3	-22.0
1	13	3205.1	720.5	-13.2	1.0	5.0	28.0
	34	-3202.4	-710.5	13.2	-1.0	3.1	410.5
2	13	5333.3	1196.0	-21.9	1.8	8.3	46.0
	34	-5330.6	-1186.0	21.9	-1.8	5.1	683.9
3	13	302.0	7.1	-0.8	0.2	0.4	0.7
	34	-300.0	0.5	0.8	-0.2	0.1	1.4
4	13	1902.8	468.4	-149.2	5.2	87.6	17.4
	34	-1900.7	-460.8	149.2	-5.2	9.2	267.1
5	13	2053.6	594.1	-51.0	1.7	28.7	22.0
	34	-2051.5	-586.4	51.0	-1.7	4.1	341.5
1	34	3114.0	379.0	-0.2	1.0	-0.7	-405.8
	50	-3110.7	-366.8	0.2	-1.0	0.8	685.5
2	34	5181.3	626.3	-0.4	1.8	-1.1	-675.9
	50	-5178.1	-614.2	0.4	-1.8	1.4	1141.1
3	34	231.6	7.0	0.0	0.2	-0.1	-1.4
	50	-229.1	2.4	-0.0	-0.2	0.0	3.2
4	34	1849.9	229.7	-117.2	5.3	35.2	-266.8
	50	-1847.4	-220.3	117.2	-5.3	53.3	432.8
5	34	2021.1	307.3	-34.3	1.7	9.8	-338.3
	50	-2018.6	-297.9	34.3	-1.7	16.0	554.8
1	50	3022.4	35.3	-4.0	1.0	1.6	-683.2
	58	-3019.2	-23.2	4.0	-1.0	1.4	705.1
2	50	5029.1	54.5	-6.9	1.8	2.7	-1137.2
	58	-5025.8	-42.3	6.9	-1.8	2.4	1173.6
3	50	160.7	5.1	-0.4	0.2	0.0	-3.2
	58	-158.2	4.3	0.4	-0.2	0.3	3.5
4	50	1794.7	29.6	-49.2	5.3	-22.3	-432.6
	58	-1792.1	-20.2	49.2	-5.3	56.6	442.3
5	50	1980.0	76.5	-15.8	1.7	-6.2	-553.4

Comb. Nodo		N [kg]	T1-2 [kg]	T1-3 [kg]	Mt [kgm]	M1-3 [kgm]	M1-2 [kgm]
	58	-1977.5	-67.2	15.8	-1.7	17.2	566.8
1	58	2931.0	-308.3	-15.8	1.0	1.2	-706.0
	74	-2927.7	320.5	15.8	-1.0	10.6	470.1
2	58	4876.9	-517.3	-26.9	1.8	2.1	-1175.0
	74	-4873.6	529.5	26.9	-1.8	18.1	782.4
3	58	89.8	3.2	0.4	0.2	-0.3	-3.4
	74	-87.3	6.1	-0.4	-0.2	0.1	2.4
4	58	1735.8	-309.5	37.2	5.3	-50.4	-442.1
	74	-1733.2	318.9	-37.2	-5.3	24.3	300.2
5	58	1925.9	-295.9	4.1	1.7	-14.9	-567.4
	74	-1923.4	305.3	-4.1	-1.7	12.0	382.8
1	74	2839.7	-652.0	31.7	1.0	-10.1	-473.7
	90	-2836.5	663.7	-31.7	-1.0	-12.7	0.0
2	74	4724.9	-1089.2	53.8	1.8	-17.1	-788.4
	90	-4721.8	1100.8	-53.8	-1.8	-21.6	0.0
3	74	18.8	1.4	1.0	0.2	-0.3	-2.2
	90	-16.4	7.6	-1.0	-0.2	-0.5	0.0
4	74	1672.1	-412.1	170.6	5.3	-40.2	-299.9
	90	-1669.7	421.0	-170.6	-5.3	-82.8	0.0
5	74	1856.0	-530.5	64.7	1.7	-16.6	-385.2
	90	-1853.6	539.5	-64.7	-1.7	-30.0	0.0
1	5	-50.0	-190.0	-16.0	2.4	0.5	0.3
	12	50.6	192.2	16.0	-2.4	1.7	-26.5
2	5	-81.9	-311.4	-26.0	3.9	0.9	0.5
	12	82.5	313.6	26.0	-3.9	2.7	-43.3
3	5	-38.6	-5.2	0.7	0.0	-0.0	-0.0
	12	39.1	7.0	-0.7	-0.0	-0.1	-0.8
4	5	-27.6	-149.2	36.2	-0.3	14.4	2.8
	12	28.1	150.9	-36.2	0.3	-16.3	-23.9
5	5	-6.7	-160.8	0.4	0.9	4.2	0.6
	12	7.1	162.5	-0.4	-0.9	-3.6	-23.3
1	12	3477.7	719.5	0.9	0.6	-0.6	26.5
	33	-3475.0	-709.5	-0.9	-0.6	0.0	411.4
2	12	5802.0	1194.3	1.4	1.0	-0.9	43.3
	33	-5799.3	-1184.3	-1.4	-1.0	0.1	685.5
3	12	305.5	7.2	-0.0	0.0	0.0	0.8
	33	-303.4	0.5	0.0	-0.0	-0.0	1.2
4	12	2483.9	598.4	-155.1	5.0	90.3	23.9
	33	-2481.8	-590.7	155.1	-5.0	8.1	317.8
5	12	2354.6	633.9	-45.3	1.6	26.5	23.3
	33	-2352.6	-626.3	45.3	-1.6	2.2	358.8
1	33	3386.5	378.0	-1.2	0.6	0.6	-411.1
	49	-3383.2	-365.9	1.2	-0.6	0.3	690.1
2	33	5649.8	624.7	-2.0	1.0	1.0	-685.0
	49	-5646.6	-612.5	2.0	-1.0	0.5	1149.0
3	33	235.1	7.0	-0.0	0.0	0.0	-1.2
	49	-232.6	2.4	0.0	-0.0	0.0	3.0
4	33	2424.9	318.4	-119.1	5.1	35.7	-318.5
	49	-2422.4	-309.0	119.1	-5.1	54.3	527.5
5	33	2318.4	333.9	-35.7	1.6	10.8	-358.8
	49	-2315.9	-324.5	35.7	-1.6	16.2	589.9
1	49	3294.6	34.4	-1.4	0.6	0.4	-689.9
	57	-3291.3	-22.2	1.4	-0.6	0.7	711.1
2	49	5497.0	52.8	-2.4	1.0	0.6	-1148.6

Comb. Nodo		N [kg]	T1-2 [kg]	T1-3 [kg]	Mt [kgm]	M1-3 [kgm]	M1-2 [kgm]
	57	-5493.7	-40.6	2.4	-1.0	1.2	1183.7
3	49	164.3	5.1	-0.1	0.0	-0.0	-3.0
	57	-161.7	4.2	0.1	-0.0	0.1	3.3
4	49	2363.3	45.5	-51.0	5.1	-22.2	-528.0
	57	-2360.7	-36.2	51.0	-5.1	57.7	541.5
5	49	2273.9	79.8	-15.4	1.6	-6.7	-589.9
	57	-2271.4	-70.4	15.4	-1.6	17.4	603.1
1	57	3202.8	-309.3	-3.6	0.6	-0.0	-711.0
	73	-3199.5	321.5	3.6	-0.6	2.7	474.4
2	57	5344.3	-519.0	-6.1	1.0	-0.0	-1183.5
	73	-5341.0	531.2	6.1	-1.0	4.6	789.7
3	57	93.4	3.3	0.1	0.0	-0.1	-3.3
	73	-90.9	6.1	-0.1	-0.0	0.0	2.2
4	57	2298.4	-239.0	55.2	5.1	-50.3	-541.3
	73	-2295.9	248.4	-55.2	-5.1	11.5	362.9
5	57	2218.4	-277.3	15.3	1.6	-15.4	-603.0
	73	-2215.9	286.7	-15.3	-1.6	4.6	406.1
1	4	-50.0	-190.0	16.0	-2.4	-0.5	0.3
	11	50.6	192.2	-16.0	2.4	-1.7	-26.5
2	4	-81.9	-311.4	26.0	-3.9	-0.9	0.5
	11	82.5	313.6	-26.0	3.9	-2.7	-43.3
3	4	-38.6	-5.2	-0.7	-0.0	0.0	-0.0
	11	39.1	7.0	0.7	0.0	0.1	-0.8
4	4	-30.4	-152.2	62.0	-3.8	13.9	-2.6
	11	30.9	153.9	-62.0	3.8	-19.1	-18.1
5	4	-7.5	-161.7	29.1	-2.2	4.3	-1.0
	11	8.0	163.4	-29.1	2.2	-7.0	-21.6
1	11	3477.7	719.5	-0.9	-0.6	0.6	26.5
	32	-3475.0	-709.5	0.9	0.6	-0.0	411.4
2	11	5802.0	1194.3	-1.4	-1.0	0.9	43.3
	32	-5799.3	-1184.3	1.4	1.0	-0.1	685.5
3	11	305.5	7.2	0.0	-0.0	-0.0	0.8
	32	-303.4	0.5	-0.0	0.0	0.0	1.2
4	11	2693.0	552.7	-157.0	4.2	91.4	18.1
	32	-2690.9	-545.0	157.0	-4.2	8.2	342.8
5	11	2417.4	620.2	-48.4	1.2	28.0	21.6
	32	-2415.3	-612.6	48.4	-1.2	2.7	366.3
1	25	3386.3	370.6	-0.3	-0.6	0.1	-433.0
	41	-3383.0	-358.5	0.3	0.6	0.2	706.5
2	25	5649.7	612.6	-0.6	-1.0	0.1	-720.9
	41	-5646.5	-600.4	0.6	1.0	0.3	1175.8
3	25	235.1	6.8	-0.1	-0.0	0.1	-1.9
	41	-232.6	2.6	0.1	0.0	0.0	3.5
4	25	2617.1	289.4	119.7	-4.8	-33.6	-303.7
	41	-2614.6	-280.0	-119.7	4.8	-56.8	548.2
5	25	2944.1	245.7	36.0	-1.5	-10.1	-278.7
	41	-2941.6	-236.3	-36.0	1.5	-17.1	475.7
1	18	3478.0	712.1	0.4	-0.6	-0.1	-0.0
	25	-3475.3	-702.1	-0.4	0.6	-0.1	433.3
2	18	5802.7	1182.2	0.6	-1.0	-0.2	-0.0
	25	-5800.1	-1172.2	-0.6	1.0	-0.2	721.4
3	18	305.5	6.9	0.3	-0.0	-0.1	0.0
	25	-303.4	0.7	-0.3	0.0	-0.1	1.9
4	18	2696.8	549.3	161.1	-4.8	-90.8	0.0
	25	-2694.8	-541.6	-161.1	4.8	-10.3	334.3

Comb. Nodo		N [kg]	T1-2 [kg]	T1-3 [kg]	Mt [kgm]	M1-3 [kgm]	M1-2 [kgm]
5	18	3045.4	473.7	48.7	-1.5	-27.3	0.0
	25	-3043.3	-466.0	-48.7	1.5	-3.2	287.9
1	80	3108.5	-660.4	10.8	0.6	-3.3	-479.7
	88	-3105.3	672.1	-10.8	-0.6	-4.5	-0.0
2	80	5187.5	-1102.9	18.2	1.0	-5.6	-798.3
	88	-5184.4	1114.6	-18.2	-1.0	-7.5	-0.1
3	80	22.4	1.2	0.7	0.0	-0.1	-2.4
	88	-20.0	7.8	-0.7	-0.0	-0.4	0.0
4	80	2559.8	-514.0	-96.9	-4.1	20.6	-371.8
	88	-2557.4	523.0	96.9	4.1	49.7	-2.7
5	80	2657.2	-443.9	-25.5	-1.1	4.9	-322.4
	88	-2654.8	452.8	25.5	1.1	13.7	-0.5
1	64	3201.6	-316.7	-2.8	0.6	-0.3	-721.8
	80	-3198.3	328.9	2.8	-0.6	2.4	479.7
2	64	5342.4	-531.1	-4.7	1.0	-0.6	-1201.2
	80	-5339.1	543.3	4.7	-1.0	4.1	798.3
3	64	93.3	3.0	0.1	0.0	-0.1	-3.6
	80	-90.8	6.3	-0.1	-0.0	0.0	2.4
4	64	2645.9	-244.9	-63.6	-4.1	53.3	-561.1
	80	-2643.3	254.2	63.6	4.1	-8.2	335.8
5	64	2775.9	-202.2	-20.2	-1.1	16.0	-488.4
	80	-2773.4	211.6	20.2	1.1	-1.4	311.6
1	40	3293.9	27.0	-0.7	0.6	0.2	-706.2
	64	-3290.6	-14.8	0.7	-0.6	0.4	721.9
2	40	5496.0	40.7	-1.2	1.0	0.3	-1175.4
	64	-5492.8	-28.6	1.2	-1.0	0.6	1201.4
3	40	164.2	4.9	-0.1	0.0	-0.0	-3.5
	64	-161.7	4.5	0.1	-0.0	0.1	3.6
4	40	2730.5	2.6	48.7	-4.1	24.9	-547.2
	64	-2728.0	6.8	-48.7	4.1	-59.1	504.3
5	40	2891.6	-32.2	14.0	-1.1	7.7	-475.3
	64	-2889.1	41.6	-14.0	1.1	-17.7	471.4
1	24	3386.3	370.6	0.3	0.6	-0.1	-433.0
	40	-3383.0	-358.5	-0.3	-0.6	-0.2	706.5
2	24	5649.7	612.6	0.6	1.0	-0.1	-720.9
	40	-5646.5	-600.4	-0.6	-1.0	-0.3	1175.8
3	24	235.1	6.8	0.1	0.0	-0.1	-1.9
	40	-232.6	2.6	-0.1	-0.0	-0.0	3.5
4	24	2813.8	254.0	120.1	-4.0	-33.7	-332.4
	40	-2811.3	-244.6	-120.1	4.0	-56.9	493.1
5	24	3003.1	235.1	36.0	-1.1	-10.1	-287.3
	40	-3000.6	-225.7	-36.0	1.1	-17.0	459.2
1	17	3478.0	712.1	-0.4	0.6	0.1	0.0
	24	-3475.3	-702.1	0.4	-0.6	0.1	433.3
2	17	5802.7	1182.2	-0.6	1.0	0.2	0.0
	24	-5800.1	-1172.2	0.6	-1.0	0.2	721.4
3	17	305.5	6.9	-0.3	0.0	0.1	0.0
	24	-303.4	0.7	0.3	-0.0	0.1	1.9
4	17	2893.7	497.1	160.4	-4.0	-90.6	0.0
	24	-2891.6	-489.4	-160.4	4.0	-10.1	302.3
5	17	3104.5	458.0	47.7	-1.1	-27.1	0.0
	24	-3102.4	-450.3	-47.7	1.1	-2.9	278.3
1	82	2933.8	-661.1	-34.0	-1.9	11.1	-475.7
	90	-2930.6	672.8	34.0	1.9	13.5	-4.5

Comb. Nodo		N [kg]	T1-2 [kg]	T1-3 [kg]	Mt [kgm]	M1-3 [kgm]	M1-2 [kgm]
	2	82	4884.3	-1104.2	-57.9	-3.3	18.7
		90	-4881.1	1115.9	57.9	3.3	22.9
	3	82	27.9	1.2	-1.2	-0.1	0.3
		90	-25.5	7.8	1.2	0.1	0.5
	4	82	1760.1	-357.3	-175.5	-6.3	42.8
		90	-1757.6	366.3	175.5	6.3	83.8
	5	82	2300.2	-395.5	-67.1	-2.6	17.7
		90	-2297.8	404.5	67.1	2.6	30.6
	1	66	3025.5	-317.4	13.5	-1.9	-0.3
		82	-3022.3	329.6	-13.5	1.9	-9.8
	2	66	5037.0	-532.3	22.9	-3.3	-0.6
		82	-5033.7	544.5	-22.9	3.3	-16.6
	3	66	99.0	3.1	-0.5	-0.1	0.4
		82	-96.4	6.3	0.5	0.1	-0.0
	4	66	1842.6	-304.2	-40.4	-6.3	53.2
		82	-1840.1	313.6	40.4	6.3	-25.0
	5	66	2416.5	-220.5	-5.8	-2.6	15.3
		82	-2414.0	229.9	5.8	2.6	-12.0
	1	42	3117.4	26.2	1.9	-1.9	-0.9
		66	-3114.2	-14.1	-1.9	1.9	-0.5
	2	42	5189.9	39.5	3.2	-3.3	-1.6
		66	-5186.6	-27.3	-3.2	3.3	-0.8
	3	42	169.9	5.0	0.3	-0.1	-0.0
		66	-167.4	4.4	-0.3	0.1	-0.2
	4	42	1924.7	-8.8	49.9	-6.3	24.1
		66	-1922.1	18.1	-49.9	6.3	-59.2
	5	42	2531.2	-38.9	16.6	-2.6	6.4
		66	-2528.7	48.3	-16.6	2.6	-18.4
	1	43	1924.2	19.5	25.3	-10.3	-9.2
		67	-1921.0	-7.3	-25.3	10.3	-9.8
	2	43	3167.7	28.1	42.7	-17.6	-15.5
		67	-3164.4	-15.9	-42.7	17.6	-16.5
	3	43	139.0	5.0	17.8	0.1	-6.6
		67	-136.5	4.4	-17.8	-0.1	-6.8
	4	43	2208.2	20.0	54.6	-13.9	24.1
		67	-2205.6	-10.6	-54.6	13.9	-62.9
	5	43	1859.2	-5.2	28.9	-8.5	2.8
		67	-1856.7	14.6	-28.9	8.5	-23.6
	1	1	0.0	0.0	-0.0	0.0	-0.0
		2	0.0	21.0	-5.6	0.0	-0.8
	2	1	0.0	0.0	-0.0	0.0	0.0
		2	0.0	34.3	-9.2	0.0	-1.3
	3	1	0.0	0.0	0.0	-0.0	-0.0
		2	0.0	0.6	-4.3	0.0	-0.6
	4	1	2.3	2.2	-3.0	0.0	0.0
		2	-2.3	14.0	-1.3	0.0	0.2
	5	1	0.7	0.1	-2.2	0.0	-0.0
		2	-0.7	16.0	-2.1	0.0	0.0
	1	2	-23.8	114.5	-26.0	5.7	11.7
		3	23.8	72.6	-24.1	-5.7	-9.2
	2	2	-39.7	187.6	-42.7	9.6	19.2
		3	39.7	119.1	-39.4	-9.6	-15.1
	3	2	-9.3	3.2	-19.2	-0.1	7.8
		3	9.3	2.0	-19.4	0.1	-8.1
	4	2	-24.5	87.3	-16.0	7.6	3.9

Comb. Nodo		N [kg]	T1-2 [kg]	T1-3 [kg]	Mt [kgm]	M1-3 [kgm]	M1-2 [kgm]
	3	24.5	56.7	-22.5	-7.6	-12.0	0.0
5	2	-18.1	87.7	-18.5	6.4	7.0	39.3
	3	18.1	56.3	-20.1	-6.4	-9.0	0.0
1	3	27.2	90.7	-25.4	0.3	10.8	34.3
	4	-27.2	96.4	-24.8	-0.3	-10.0	-41.4
2	3	44.1	148.6	-41.7	0.5	17.7	56.1
	4	-44.1	158.1	-40.5	-0.5	-16.3	-67.9
3	3	-1.5	2.6	-19.3	-0.0	8.0	1.0
	4	1.5	2.7	-19.3	0.0	-8.1	-1.1
4	3	43.4	68.3	-13.2	-2.3	0.3	24.4
	4	-43.4	75.7	-25.3	2.3	-15.5	-33.7
5	3	30.8	69.5	-17.3	-0.9	5.5	26.0
	4	-30.8	74.4	-21.3	0.9	-10.4	-32.2
1	4	11.2	93.6	-25.1	-0.0	10.5	39.1
	5	-11.2	93.6	-25.1	0.0	-10.5	-39.1
2	4	18.0	153.3	-41.1	-0.0	17.2	64.0
	5	-18.0	153.3	-41.1	0.0	-17.2	-64.0
3	4	-0.8	2.6	-19.3	0.0	8.0	1.1
	5	0.8	2.6	-19.3	-0.0	-8.0	-1.1
4	4	9.2	71.2	-14.0	-1.0	1.5	29.1
	5	-9.2	72.8	-24.5	1.0	-14.6	-31.0
5	4	10.6	71.7	-17.7	-0.3	6.1	29.7
	5	-10.6	72.2	-20.9	0.3	-10.0	-30.3
1	5	27.2	96.4	-24.8	-0.3	10.0	41.4
	6	-27.2	90.7	-25.4	0.3	-10.8	-34.3
2	5	44.1	158.1	-40.5	-0.5	16.3	67.9
	6	-44.1	148.6	-41.7	0.5	-17.7	-56.1
3	5	-1.5	2.7	-19.3	0.0	8.1	1.1
	6	1.5	2.6	-19.3	-0.0	-8.0	-1.0
4	5	0.5	72.6	-13.0	-2.5	0.2	29.9
	6	-0.5	71.4	-25.6	2.5	-16.0	-28.5
5	5	17.9	73.5	-17.6	-0.5	5.8	31.0
	6	-17.9	70.5	-21.0	0.5	-10.2	-27.2
1	6	-23.8	72.6	-24.1	-5.7	9.2	-0.0
	7	23.8	114.5	-26.0	5.7	-11.7	-52.3
2	6	-39.7	119.1	-39.4	-9.6	15.1	-0.0
	7	39.7	187.6	-42.7	9.6	-19.2	-85.7
3	6	-9.3	2.0	-19.4	0.1	8.1	-0.0
	7	9.3	3.2	-19.2	-0.1	-7.8	-1.6
4	6	-10.8	55.2	-14.8	-1.8	2.5	-0.0
	7	10.8	88.8	-23.8	1.8	-13.7	-42.0
5	6	-14.0	55.8	-17.8	-4.7	6.1	-0.0
	7	14.0	88.2	-20.8	4.7	-10.0	-40.4
1	7	0.0	21.0	-5.6	-0.0	0.8	2.9
	8	-0.0	0.0	-0.0	0.0	-0.0	0.0
2	7	0.0	34.3	-9.2	-0.0	1.3	4.8
	8	-0.0	0.0	-0.0	0.0	-0.0	0.0
3	7	-0.0	0.6	-4.3	0.0	0.6	0.1
	8	0.0	0.0	-0.0	-0.0	-0.0	-0.0
4	7	-2.3	18.6	-6.4	0.0	1.2	3.0
	8	2.3	-2.5	2.1	-0.0	0.0	0.0
5	7	-0.6	17.4	-3.7	-0.0	0.4	2.6
	8	0.6	-1.3	-0.6	0.0	0.0	0.0
1	29	0.0	-0.0	0.0	0.0	-0.0	-0.0

Comb. Nodo		N [kg]	T1-2 [kg]	T1-3 [kg]	Mt [kgm]	M1-3 [kgm]	M1-2 [kgm]
	30	0.0	37.1	-10.0	0.0	-1.4	-5.2
2	29	0.0	-0.0	0.0	0.0	-0.0	-0.0
	30	0.0	62.7	-16.8	0.0	-2.4	-8.8
3	29	0.0	0.0	0.0	0.0	-0.0	-0.0
	30	0.0	-0.8	-7.7	0.0	-1.1	0.1
4	29	2.3	2.2	-2.8	0.0	0.0	0.0
	30	-2.3	26.4	-4.9	0.0	-0.3	-3.4
5	29	0.8	-2.0	-3.3	0.0	0.0	-0.0
	30	-0.8	30.6	-4.4	0.0	-0.2	-4.6
1	30	-7.8	165.8	-45.6	5.0	19.9	0.0
	31	7.8	165.8	-43.2	-5.0	-16.8	-0.0
2	30	-13.4	279.9	-77.1	8.4	33.6	0.0
	31	13.4	279.9	-72.9	-8.4	-28.4	-0.0
3	30	-1.1	-3.7	-34.1	-0.1	14.1	-0.0
	31	1.1	-3.7	-34.2	0.1	-14.2	-0.0
4	30	-13.3	127.5	-21.9	6.7	-1.4	-0.0
	31	13.3	127.5	-46.5	-6.7	-29.4	-0.0
5	30	-6.9	127.5	-30.8	5.6	9.9	-0.0
	31	6.9	127.5	-37.6	-5.6	-18.3	-0.0
1	31	5.2	165.8	-45.0	0.2	19.2	0.0
	32	-5.2	165.8	-43.9	-0.2	-17.9	-0.0
2	31	8.1	279.9	-75.9	0.4	32.5	0.0
	32	-8.1	279.9	-74.1	-0.4	-30.2	-0.0
3	31	-0.2	-3.7	-34.2	-0.0	14.3	-0.0
	32	0.2	-3.7	-34.2	0.0	-14.2	0.0
4	31	11.2	127.5	-18.6	-2.1	-5.1	0.0
	32	-11.2	127.5	-49.7	2.1	-33.8	-0.0
5	31	8.6	127.5	-29.4	-0.8	8.3	0.0
	32	-8.6	127.5	-38.9	0.8	-20.2	-0.0
1	32	3.1	165.8	-44.4	-0.0	18.5	0.0
	33	-3.1	165.8	-44.4	0.0	-18.5	0.0
2	32	4.8	279.9	-75.0	-0.0	31.2	0.0
	33	-4.8	279.9	-75.0	0.0	-31.2	-0.0
3	32	-0.2	-3.7	-34.2	0.0	14.2	0.0
	33	0.2	-3.7	-34.2	-0.0	-14.2	0.0
4	32	3.2	127.5	-19.0	-0.9	-4.7	0.0
	33	-3.2	127.5	-49.4	0.9	-33.2	0.0
5	32	5.1	127.5	-29.6	-0.3	8.5	0.0
	33	-5.1	127.5	-38.7	0.3	-19.9	0.0
1	33	5.2	165.8	-43.9	-0.2	17.9	0.0
	34	-5.2	165.8	-45.0	0.2	-19.2	0.0
2	33	8.1	279.9	-74.1	-0.4	30.2	0.0
	34	-8.1	279.9	-75.9	0.4	-32.5	0.0
3	33	-0.2	-3.7	-34.2	0.0	14.2	-0.0
	34	0.2	-3.7	-34.2	-0.0	-14.3	-0.0
4	33	-1.5	127.5	-18.0	-2.3	-5.9	0.0
	34	1.5	127.5	-50.3	2.3	-34.4	-0.0
5	33	4.8	127.5	-29.4	-0.5	8.3	0.0
	34	-4.8	127.5	-38.9	0.5	-20.2	-0.0
1	34	-7.8	165.8	-43.2	-5.0	16.8	0.0
	35	7.8	165.8	-45.6	5.0	-19.9	0.0
2	34	-13.4	279.9	-72.9	-8.4	28.4	0.0
	35	13.4	279.9	-77.1	8.4	-33.6	0.0
3	34	-1.1	-3.7	-34.2	0.1	14.2	0.0
	35	1.1	-3.7	-34.1	-0.1	-14.1	-0.0

Comb.	Nodo	N [kg]	T1-2 [kg]	T1-3 [kg]	Mt [kgm]	M1-3 [kgm]	M1-2 [kgm]
4	34	2.1	127.5	-20.2	-1.5	-3.2	0.0
	35	-2.1	127.5	-48.1	1.5	-31.7	0.0
5	34	-2.3	127.5	-29.7	-4.0	8.5	0.0
	35	2.3	127.5	-38.7	4.0	-19.8	0.0
1	35	0.0	37.1	-10.0	0.0	1.4	5.2
	36	-0.0	-0.0	0.0	-0.0	0.0	-0.0
2	35	0.0	62.7	-16.8	0.0	2.4	8.8
	36	-0.0	-0.0	0.0	-0.0	0.0	-0.0
3	35	0.0	-0.8	-7.7	0.0	1.1	-0.1
	36	-0.0	0.0	0.0	-0.0	0.0	-0.0
4	35	-2.3	32.6	-8.8	-0.0	1.4	5.1
	36	2.3	-4.0	1.2	0.0	-0.0	-0.0
5	35	-0.6	32.5	-5.6	-0.0	0.5	5.1
	36	0.6	-3.9	-2.1	0.0	-0.0	0.0
1	21	0.0	-0.0	-0.0	0.0	-0.0	0.0
	22	0.0	37.1	10.0	0.0	1.4	-5.2
2	21	0.0	0.0	0.0	0.0	-0.0	0.0
	22	0.0	62.7	16.8	0.0	2.4	-8.8
3	21	0.0	-0.0	-0.0	0.0	-0.0	0.0
	22	0.0	-0.8	7.7	0.0	1.1	0.1
4	21	2.3	3.7	0.8	0.0	-0.0	0.0
	22	-2.3	24.9	6.9	0.0	0.9	-3.0
5	21	0.6	3.6	-2.7	0.0	-0.0	-0.0
	22	-0.6	25.0	10.4	0.0	1.8	-3.0
1	22	-15.5	165.8	44.5	-5.0	-18.4	-0.0
	23	15.5	165.8	44.4	5.0	18.3	-0.0
2	22	-25.8	279.9	75.1	-8.5	-31.1	-0.0
	23	25.8	279.9	74.9	8.5	30.9	-0.0
3	22	-5.4	-3.7	34.0	0.1	-14.0	-0.0
	23	5.4	-3.7	34.3	-0.1	14.4	-0.0
4	22	-22.5	127.5	18.6	-6.6	5.5	0.0
	23	22.5	127.5	49.8	6.6	33.5	0.0
5	22	-16.1	127.5	29.6	-3.6	-8.4	0.0
	23	16.1	127.5	38.7	3.6	19.8	-0.0
1	23	-4.1	165.8	44.5	-0.3	-18.6	-0.0
	24	4.1	165.8	44.4	0.3	18.5	0.0
2	23	-6.9	279.9	75.1	-0.5	-31.4	-0.0
	24	6.9	279.9	74.9	0.5	31.2	0.0
3	23	-3.1	-3.7	34.2	0.0	-14.3	-0.0
	24	3.1	-3.7	34.2	-0.0	14.2	-0.0
4	23	3.8	127.5	18.2	2.4	5.6	0.0
	24	-3.8	127.5	50.1	-2.4	34.3	0.0
5	23	-2.7	127.5	29.5	0.8	-8.4	-0.0
	24	2.7	127.5	38.8	-0.8	20.1	0.0
1	24	-3.4	165.8	44.4	0.0	-18.5	0.0
	25	3.4	165.8	44.4	-0.0	18.5	0.0
2	24	-5.8	279.9	75.0	0.0	-31.3	0.0
	25	5.8	279.9	75.0	-0.0	31.3	0.0
3	24	-2.7	-3.7	34.2	-0.0	-14.2	0.0
	25	2.7	-3.7	34.2	0.0	14.2	-0.0
4	24	-3.3	127.5	18.1	1.1	5.9	0.0
	25	3.3	127.5	50.2	-1.1	34.3	0.0
5	24	-4.7	127.5	29.3	0.3	-8.2	0.0
	25	4.7	127.5	39.0	-0.3	20.3	0.0

Comb. Nodo		N [kg]	T1-2 [kg]	T1-3 [kg]	Mt [kgm]	M1-3 [kgm]	M1-2 [kgm]
1	25	-4.1	165.8	44.4	0.3	-18.5	-0.0
	26	4.1	165.8	44.5	-0.3	18.6	0.0
2	25	-6.9	279.9	74.9	0.5	-31.2	-0.0
	26	6.9	279.9	75.1	-0.5	31.4	0.0
3	25	-3.1	-3.7	34.2	-0.0	-14.2	0.0
	26	3.1	-3.7	34.2	0.0	14.3	-0.0
4	25	-11.2	127.5	18.1	2.7	6.0	0.0
	26	11.2	127.5	50.3	-2.7	34.3	0.0
5	25	-7.2	127.5	29.2	0.7	-8.0	0.0
	26	7.2	127.5	39.1	-0.7	20.4	0.0
1	26	-15.5	165.8	44.4	5.0	-18.3	-0.0
	27	15.5	165.8	44.5	-5.0	18.4	0.0
2	26	-25.8	279.9	74.9	8.5	-30.9	-0.0
	27	25.8	279.9	75.1	-8.5	31.1	0.0
3	26	-5.4	-3.7	34.3	-0.1	-14.4	-0.0
	27	5.4	-3.7	34.0	0.1	14.0	-0.0
4	26	-2.0	127.5	18.4	0.5	5.5	0.0
	27	2.0	127.5	49.9	-0.5	33.9	0.0
5	26	-9.9	127.5	29.3	1.8	-8.1	-0.0
	27	9.9	127.5	39.0	-1.8	20.2	0.0
1	27	0.0	37.1	10.0	0.0	-1.4	5.2
	28	-0.0	0.0	0.0	-0.0	-0.0	-0.0
2	27	0.0	62.7	16.8	0.0	-2.4	8.8
	28	-0.0	0.0	0.0	-0.0	-0.0	-0.0
3	27	-0.0	-0.8	7.7	0.0	-1.1	-0.1
	28	0.0	0.0	0.0	-0.0	0.0	-0.0
4	27	-2.4	30.6	10.4	0.0	-1.8	4.6
	28	2.4	-2.0	-2.7	-0.0	0.0	-0.0
5	27	-0.8	26.7	11.4	-0.0	-2.1	3.5
	28	0.8	1.9	-3.8	0.0	0.0	-0.0
1	45	0.0	0.0	-0.0	0.0	0.0	0.0
	46	0.0	37.1	-10.0	0.0	-1.4	-5.2
2	45	0.0	-0.0	0.0	0.0	0.0	0.0
	46	0.0	62.7	-16.8	0.0	-2.4	-8.8
3	45	0.0	-0.0	0.0	0.0	-0.0	-0.0
	46	0.0	-0.8	-7.7	0.0	-1.1	0.1
4	45	4.3	3.4	-2.7	0.0	0.0	0.0
	46	-4.3	25.1	-5.0	0.0	-0.3	-3.0
5	45	1.4	-1.9	-3.3	0.0	0.0	0.0
	46	-1.4	30.5	-4.4	0.0	-0.2	-4.5
1	46	-1.0	165.8	-45.8	2.5	20.1	-0.0
	47	1.0	165.8	-43.1	-2.5	-16.7	-0.0
2	46	-1.7	279.9	-77.3	4.2	34.0	0.0
	47	1.7	279.9	-72.7	-4.2	-28.3	-0.0
3	46	-0.1	-3.7	-34.1	-0.0	14.1	0.0
	47	0.1	-3.7	-34.2	0.0	-14.2	-0.0
4	46	-11.8	127.5	-24.3	3.5	1.8	-0.0
	47	11.8	127.5	-44.0	-3.5	-26.4	0.0
5	46	-2.9	127.5	-31.6	2.8	10.9	-0.0
	47	2.9	127.5	-36.8	-2.8	-17.4	-0.0
1	47	-4.9	165.8	-44.9	0.2	19.1	0.0
	48	4.9	165.8	-43.9	-0.2	-17.9	0.0
2	47	-8.3	279.9	-75.9	0.3	32.3	0.0
	48	8.3	279.9	-74.1	-0.3	-30.1	-0.0
3	47	-0.6	-3.7	-34.2	-0.0	14.2	-0.0

Comb. Nodo		N [kg]	T1-2 [kg]	T1-3 [kg]	Mt [kgm]	M1-3 [kgm]	M1-2 [kgm]
	48	0.6	-3.7	-34.2	0.0	-14.2	-0.0
4	47	-9.9	127.5	-20.9	-1.0	-2.4	0.0
	48	9.9	127.5	-47.5	1.0	-30.8	0.0
5	47	-3.1	127.5	-30.1	-0.4	9.1	0.0
	48	3.1	127.5	-38.3	0.4	-19.4	0.0
1	48	-5.1	165.8	-44.4	-0.0	18.5	0.0
	49	5.1	165.8	-44.4	0.0	-18.5	0.0
2	48	-8.7	279.9	-75.0	-0.0	31.3	0.0
	49	8.7	279.9	-75.0	0.0	-31.3	0.0
3	48	-0.6	-3.7	-34.2	0.0	14.2	-0.0
	49	0.6	-3.7	-34.2	-0.0	-14.2	-0.0
4	48	-2.9	127.5	-21.5	-0.5	-1.6	0.0
	49	2.9	127.5	-46.9	0.5	-30.1	0.0
5	48	-0.6	127.5	-30.4	-0.1	9.5	0.0
	49	0.6	127.5	-38.0	0.1	-19.0	0.0
1	49	-4.9	165.8	-43.9	-0.2	17.9	0.0
	50	4.9	165.8	-44.9	0.2	-19.1	-0.0
2	49	-8.3	279.9	-74.1	-0.3	30.1	0.0
	50	8.3	279.9	-75.9	0.3	-32.3	-0.0
3	49	-0.6	-3.7	-34.2	0.0	14.2	0.0
	50	0.6	-3.7	-34.2	-0.0	-14.2	0.0
4	49	4.0	127.5	-20.4	-1.2	-3.0	-0.0
	50	-4.0	127.5	-48.0	1.2	-31.5	-0.0
5	49	1.0	127.5	-30.1	-0.3	9.2	0.0
	50	-1.0	127.5	-38.2	0.3	-19.3	-0.0
1	50	-1.0	165.8	-43.1	-2.5	16.7	-0.0
	51	1.0	165.8	-45.8	2.5	-20.1	0.0
2	50	-1.7	279.9	-72.7	-4.2	28.3	0.0
	51	1.7	279.9	-77.3	4.2	-34.0	0.0
3	50	-0.1	-3.7	-34.2	0.0	14.2	-0.0
	51	0.1	-3.7	-34.1	-0.0	-14.1	0.0
4	50	11.0	127.5	-22.5	-0.5	-0.3	0.0
	51	-11.0	127.5	-45.8	0.5	-28.9	0.0
5	50	3.9	127.5	-30.3	-1.9	9.4	-0.0
	51	-3.9	127.5	-38.0	1.9	-19.0	0.0
1	51	0.0	37.1	-10.0	-0.0	1.4	5.2
	52	-0.0	0.0	0.0	0.0	0.0	-0.0
2	51	0.0	62.7	-16.8	0.0	2.4	8.8
	52	-0.0	-0.0	0.0	-0.0	0.0	0.0
3	51	0.0	-0.8	-7.7	0.0	1.1	-0.1
	52	-0.0	0.0	-0.0	-0.0	0.0	-0.0
4	51	-4.2	33.9	-8.7	-0.0	1.4	5.5
	52	4.2	-5.4	1.0	0.0	-0.0	0.0
5	51	-1.2	33.1	-5.5	-0.0	0.5	5.3
	52	1.2	-4.5	-2.1	0.0	-0.0	-0.0
1	37	0.0	0.0	0.0	0.0	-0.0	-0.0
	38	0.0	37.1	10.0	0.0	1.4	-5.2
2	37	0.0	0.0	0.0	0.0	-0.0	0.0
	38	0.0	62.7	16.8	0.0	2.4	-8.8
3	37	0.0	0.0	-0.0	0.0	0.0	-0.0
	38	0.0	-0.8	7.7	0.0	1.1	0.1
4	37	4.4	5.9	0.5	0.0	0.0	-0.0
	38	-4.4	22.7	7.2	0.0	0.9	-2.4
5	37	1.3	4.6	-2.3	0.0	0.0	-0.0
	38	-1.3	24.0	10.0	0.0	1.7	-2.7

Comb. Nodo		N [kg]	T1-2 [kg]	T1-3 [kg]	Mt [kgm]	M1-3 [kgm]	M1-2 [kgm]
1	38	-0.5	165.8	44.7	-2.4	-18.8	-0.0
	39	0.5	165.8	44.1	2.4	18.1	-0.0
2	38	-0.9	279.9	75.5	-4.1	-31.8	-0.0
	39	0.9	279.9	74.5	4.1	30.5	-0.0
3	38	-0.3	-3.7	34.0	0.0	-14.0	-0.0
	39	0.3	-3.7	34.3	-0.0	14.4	-0.0
4	38	-12.0	127.5	21.6	-3.3	1.6	-0.0
	39	12.0	127.5	46.7	3.3	29.8	0.0
5	38	-3.0	127.5	30.7	-1.8	-9.8	-0.0
	39	3.0	127.5	37.6	1.8	18.5	-0.0
1	39	-5.5	165.8	44.4	-0.2	-18.5	-0.0
	40	5.5	165.8	44.4	0.2	18.5	0.0
2	39	-9.3	279.9	75.0	-0.4	-31.2	-0.0
	40	9.3	279.9	75.0	0.4	31.2	0.0
3	39	-1.6	-3.7	34.2	0.0	-14.2	-0.0
	40	1.6	-3.7	34.2	-0.0	14.3	0.0
4	39	-12.1	127.5	20.9	1.1	2.3	-0.0
	40	12.1	127.5	47.4	-1.1	30.8	0.0
5	39	-4.7	127.5	30.3	0.4	-9.4	-0.0
	40	4.7	127.5	38.0	-0.4	19.0	0.0
1	40	-6.5	165.8	44.4	0.0	-18.5	0.0
	41	6.5	165.8	44.4	-0.0	18.5	0.0
2	40	-11.1	279.9	75.0	0.0	-31.3	-0.0
	41	11.1	279.9	75.0	-0.0	31.3	0.0
3	40	-1.8	-3.7	34.2	-0.0	-14.2	0.0
	41	1.8	-3.7	34.2	0.0	14.2	0.0
4	40	-4.2	127.5	21.1	0.5	2.0	0.0
	41	4.2	127.5	47.2	-0.5	30.5	0.0
5	40	-2.4	127.5	30.3	0.2	-9.4	0.0
	41	2.4	127.5	38.1	-0.2	19.1	0.0
1	41	-5.5	165.8	44.4	0.2	-18.5	-0.0
	42	5.5	165.8	44.4	-0.2	18.5	0.0
2	41	-9.3	279.9	75.0	0.4	-31.2	-0.0
	42	9.3	279.9	75.0	-0.4	31.2	0.0
3	41	-1.6	-3.7	34.2	-0.0	-14.3	-0.0
	42	1.6	-3.7	34.2	0.0	14.2	0.0
4	41	4.9	127.5	20.9	1.4	2.4	-0.0
	42	-4.9	127.5	47.5	-1.4	30.9	0.0
5	41	0.4	127.5	30.1	0.4	-9.1	-0.0
	42	-0.4	127.5	38.3	-0.4	19.4	0.0
1	42	-0.5	165.8	44.1	2.4	-18.1	-0.0
	43	0.5	165.8	44.7	-2.4	18.8	0.0
2	42	-0.9	279.9	74.5	4.1	-30.5	-0.0
	43	0.9	279.9	75.5	-4.1	31.8	0.0
3	42	-0.3	-3.7	34.3	-0.0	-14.4	-0.0
	43	0.3	-3.7	34.0	0.0	14.0	-0.0
4	42	11.9	127.5	21.1	0.1	2.1	-0.0
	43	-11.9	127.5	47.3	-0.1	30.6	0.0
5	42	4.2	127.5	29.9	0.8	-8.9	-0.0
	43	-4.2	127.5	38.4	-0.8	19.5	0.0
1	43	0.0	37.1	10.0	-0.0	-1.4	5.2
	44	-0.0	0.0	-0.0	0.0	0.0	-0.0
2	43	0.0	62.7	16.8	-0.0	-2.4	8.8
	44	-0.0	0.0	-0.0	0.0	0.0	-0.0

Comb. Nodo		N [kg]	T1-2 [kg]	T1-3 [kg]	Mt [kgm]	M1-3 [kgm]	M1-2 [kgm]
3	43	0.0	-0.8	7.7	-0.0	-1.1	-0.1
	44	-0.0	0.0	-0.0	0.0	-0.0	-0.0
4	43	-4.5	32.5	9.7	-0.0	-1.7	5.1
	44	4.5	-4.0	-2.1	0.0	-0.0	-0.0
5	43	-1.4	26.9	10.7	0.0	-1.9	3.5
	44	1.4	1.6	-3.1	-0.0	-0.0	0.0
1	53	0.0	0.0	-0.0	0.0	-0.0	-0.0
	54	0.0	37.1	-10.0	0.0	-1.4	-5.2
2	53	0.0	-0.0	-0.0	0.0	-0.0	-0.0
	54	0.0	62.7	-16.8	0.0	-2.4	-8.8
3	53	0.0	-0.0	-0.0	0.0	0.0	-0.0
	54	0.0	-0.8	-7.7	0.0	-1.1	0.1
4	53	5.7	3.6	-2.0	0.0	-0.0	-0.0
	54	-5.7	25.0	-5.6	0.0	-0.5	-3.0
5	53	1.8	-2.4	-3.0	0.0	0.0	-0.0
	54	-1.8	30.9	-4.6	0.0	-0.2	-4.7
1	54	-0.0	165.8	-45.9	-0.7	20.3	0.0
	55	0.0	165.8	-42.9	0.7	-16.6	0.0
2	54	-0.3	279.9	-77.5	-1.3	34.2	-0.0
	55	0.3	279.9	-72.5	1.3	-27.9	0.0
3	54	0.0	-3.7	-34.1	0.1	14.1	0.0
	55	-0.0	-3.7	-34.2	-0.1	-14.3	0.0
4	54	-9.5	127.5	-36.0	0.1	16.5	0.0
	55	9.5	127.5	-32.3	-0.1	-11.8	0.0
5	54	-0.6	127.5	-35.1	-0.8	15.4	0.0
	55	0.6	127.5	-33.2	0.8	-12.9	0.0
1	55	-11.8	165.8	-45.0	0.1	19.2	-0.0
	56	11.8	165.8	-43.9	-0.1	-17.8	-0.0
2	55	-20.2	279.9	-75.9	0.2	32.4	-0.0
	56	20.2	279.9	-74.0	-0.2	-30.1	0.0
3	55	0.8	-3.7	-34.2	0.0	14.2	-0.0
	56	-0.8	-3.7	-34.2	-0.0	-14.3	-0.0
4	55	-4.3	127.5	-30.5	-0.5	9.7	-0.0
	56	4.3	127.5	-37.8	0.5	-18.8	-0.0
5	55	-3.2	127.5	-32.9	-0.3	12.7	-0.0
	56	3.2	127.5	-35.4	0.3	-15.8	-0.0
1	56	-14.0	165.8	-44.4	0.0	18.5	0.0
	57	14.0	165.8	-44.4	-0.0	-18.5	0.0
2	56	-23.8	279.9	-75.0	0.0	31.2	0.0
	57	23.8	279.9	-75.0	-0.0	-31.2	0.0
3	56	1.0	-3.7	-34.2	0.0	14.2	0.0
	57	-1.0	-3.7	-34.2	-0.0	-14.2	-0.0
4	56	-9.0	127.5	-31.3	-0.1	10.6	0.0
	57	9.0	127.5	-37.0	0.1	-17.8	0.0
5	56	-4.9	127.5	-33.3	-0.0	13.2	0.0
	57	4.9	127.5	-35.0	0.0	-15.3	0.0
1	57	-11.8	165.8	-43.9	-0.1	17.8	-0.0
	58	11.8	165.8	-45.0	0.1	-19.2	0.0
2	57	-20.2	279.9	-74.0	-0.2	30.1	-0.0
	58	20.2	279.9	-75.9	0.2	-32.4	0.0
3	57	0.8	-3.7	-34.2	-0.0	14.3	-0.0
	58	-0.8	-3.7	-34.2	0.0	-14.2	0.0
4	57	-11.0	127.5	-30.0	-0.5	9.0	0.0
	58	11.0	127.5	-38.4	0.5	-19.5	0.0
5	57	-5.2	127.5	-33.0	0.0	12.8	0.0

Comb.	Nodo	N [kg]	T1-2 [kg]	T1-3 [kg]	Mt [kgm]	M1-3 [kgm]	M1-2 [kgm]
	58	5.2	127.5	-35.3	-0.0	-15.7	0.0
1	58	-0.0	165.8	-42.9	0.7	16.6	0.0
	59	0.0	165.8	-45.9	-0.7	-20.3	0.0
2	58	-0.3	279.9	-72.5	1.3	27.9	0.0
	59	0.3	279.9	-77.5	-1.3	-34.2	0.0
3	58	0.0	-3.7	-34.2	-0.1	14.3	0.0
	59	-0.0	-3.7	-34.1	0.1	-14.1	0.0
4	58	11.0	127.5	-34.0	1.5	13.9	0.0
	59	-11.0	127.5	-34.3	-1.5	-14.4	0.0
5	58	5.6	127.5	-33.7	1.3	13.6	0.0
	59	-5.6	127.5	-34.6	-1.3	-14.7	0.0
1	59	-0.0	37.1	-10.0	0.0	1.4	5.2
	60	0.0	0.0	-0.0	-0.0	-0.0	-0.0
2	59	0.0	62.7	-16.8	0.0	2.4	8.8
	60	-0.0	0.0	0.0	-0.0	-0.0	-0.0
3	59	-0.0	-0.8	-7.7	0.0	1.1	-0.1
	60	0.0	0.0	0.0	-0.0	-0.0	-0.0
4	59	-5.6	34.4	-8.1	0.0	1.2	5.6
	60	5.6	-5.9	0.4	-0.0	-0.0	-0.0
5	59	-1.5	33.8	-5.3	-0.0	0.4	5.5
	60	1.5	-5.2	-2.3	0.0	0.0	-0.0
1	61	0.0	-0.0	0.0	0.0	-0.0	0.0
	62	0.0	37.1	10.0	0.0	1.4	-5.2
2	61	0.0	0.0	0.0	0.0	-0.0	0.0
	62	0.0	62.7	16.8	0.0	2.4	-8.8
3	61	0.0	-0.0	-0.0	0.0	0.0	0.0
	62	0.0	-0.8	7.7	0.0	1.1	0.1
4	61	5.9	6.6	-0.2	0.0	0.0	0.0
	62	-5.9	22.0	7.9	0.0	1.1	-2.1
5	61	2.0	5.7	-2.5	0.0	-0.0	0.0
	62	-2.0	22.9	10.1	0.0	1.8	-2.4
1	62	0.2	165.8	44.9	0.8	-19.0	0.0
	63	-0.2	165.8	43.9	-0.8	17.8	0.0
2	62	0.0	279.9	75.9	1.4	-32.1	0.0
	63	-0.0	279.9	74.1	-1.4	30.0	-0.0
3	62	0.1	-3.7	34.0	-0.1	-14.0	0.0
	63	-0.1	-3.7	34.3	0.1	14.4	-0.0
4	62	-9.6	127.5	32.6	-0.4	-12.2	0.0
	63	9.6	127.5	35.7	0.4	16.1	0.0
5	62	0.1	127.5	34.2	-0.1	-14.1	0.0
	63	-0.1	127.5	34.2	0.1	14.2	0.0
1	63	-11.4	165.8	44.5	-0.1	-18.6	0.0
	64	11.4	165.8	44.4	0.1	18.5	0.0
2	63	-19.6	279.9	75.1	-0.2	-31.4	0.0
	64	19.6	279.9	74.9	0.2	31.2	0.0
3	63	0.9	-3.7	34.1	-0.0	-14.2	0.0
	64	-0.9	-3.7	34.2	0.0	14.3	0.0
4	63	-3.6	127.5	31.4	0.7	-10.8	0.0
	64	3.6	127.5	37.0	-0.7	17.7	0.0
5	63	-1.7	127.5	33.5	0.4	-13.4	0.0
	64	1.7	127.5	34.8	-0.4	15.1	0.0
1	64	-13.5	165.8	44.4	0.0	-18.5	-0.0
	65	13.5	165.8	44.4	-0.0	18.5	-0.0
2	64	-23.1	279.9	75.0	0.0	-31.2	-0.0

Comb. Nodo		N [kg]	T1-2 [kg]	T1-3 [kg]	Mt [kgm]	M1-3 [kgm]	M1-2 [kgm]
	65	23.1	279.9	75.0	-0.0	31.2	-0.0
3	64	1.1	-3.7	34.2	-0.0	-14.2	-0.0
	65	-1.1	-3.7	34.2	0.0	14.2	-0.0
4	64	-8.3	127.5	31.6	0.2	-11.1	-0.0
	65	8.3	127.5	36.7	-0.2	17.4	0.0
5	64	-3.3	127.5	33.4	0.1	-13.3	-0.0
	65	3.3	127.5	34.9	-0.1	15.2	-0.0
1	65	-11.4	165.8	44.4	0.1	-18.5	-0.0
	66	11.4	165.8	44.5	-0.1	18.6	-0.0
2	65	-19.6	279.9	74.9	0.2	-31.2	-0.0
	66	19.6	279.9	75.1	-0.2	31.4	0.0
3	65	0.9	-3.7	34.2	0.0	-14.3	0.0
	66	-0.9	-3.7	34.1	-0.0	14.2	0.0
4	65	-10.4	127.5	31.2	0.7	-10.6	-0.0
	66	10.4	127.5	37.1	-0.7	18.0	-0.0
5	65	-3.7	127.5	33.1	0.0	-12.9	-0.0
	66	3.7	127.5	35.2	-0.0	15.6	-0.0
1	66	0.2	165.8	43.9	-0.8	-17.8	-0.0
	67	-0.2	165.8	44.9	0.8	19.0	-0.0
2	66	0.0	279.9	74.1	-1.4	-30.0	-0.0
	67	-0.0	279.9	75.9	1.4	32.1	-0.0
3	66	0.1	-3.7	34.3	0.1	-14.4	-0.0
	67	-0.1	-3.7	34.0	-0.1	14.0	-0.0
4	66	11.7	127.5	31.8	-1.4	-11.1	-0.0
	67	-11.7	127.5	36.6	1.4	17.2	-0.0
5	66	6.5	127.5	33.0	-0.4	-12.7	-0.0
	67	-6.5	127.5	35.3	0.4	15.6	-0.0
1	67	-0.0	37.1	10.0	-0.0	-1.4	5.2
	68	0.0	0.0	-0.0	0.0	0.0	-0.0
2	67	-0.0	62.7	16.8	0.0	-2.4	8.8
	68	0.0	0.0	-0.0	-0.0	0.0	-0.0
3	67	-0.0	-0.8	7.7	-0.0	-1.1	-0.1
	68	0.0	0.0	-0.0	0.0	-0.0	0.0
4	67	-5.7	32.7	9.0	0.0	-1.5	5.2
	68	5.7	-4.2	-1.4	-0.0	-0.0	0.0
5	67	-1.5	26.1	10.5	-0.0	-1.9	3.3
	68	1.5	2.4	-2.8	0.0	-0.0	0.0
1	69	0.0	0.0	-0.0	0.0	0.0	0.0
	70	0.0	37.1	-10.0	0.0	-1.4	-5.2
2	69	0.0	0.0	-0.0	0.0	0.0	0.0
	70	0.0	62.7	-16.8	0.0	-2.4	-8.8
3	69	0.0	0.0	-0.0	0.0	0.0	0.0
	70	0.0	-0.8	-7.7	0.0	-1.1	0.1
4	69	4.8	2.7	-1.8	0.0	0.0	0.0
	70	-4.8	25.9	-5.8	0.0	-0.6	-3.3
5	69	0.9	-2.7	-2.9	0.0	0.0	0.0
	70	-0.9	31.3	-4.8	0.0	-0.3	-4.8
1	70	-23.1	165.8	-45.3	-3.5	19.6	0.0
	71	23.1	165.8	-43.6	3.5	-17.5	-0.0
2	70	-39.6	279.9	-76.4	-5.9	33.1	0.0
	71	39.6	279.9	-73.6	5.9	-29.6	-0.0
3	70	9.0	-3.7	-34.0	0.1	13.9	0.0
	71	-9.0	-3.7	-34.3	-0.1	-14.4	-0.0
4	70	-65.8	127.5	-43.5	-1.1	26.1	0.0
	71	65.8	127.5	-24.8	1.1	-2.7	0.0

Comb.	Nodo	N [kg]	T1-2 [kg]	T1-3 [kg]	Mt [kgm]	M1-3 [kgm]	M1-2 [kgm]
5	70	-38.6	127.5	-37.2	-3.1	18.1	0.0
	71	38.6	127.5	-31.2	3.1	-10.6	-0.0
1	71	24.4	165.8	-44.2	0.0	18.1	0.0
	72	-24.4	165.8	-44.6	-0.0	-18.6	-0.0
2	71	41.1	279.9	-74.7	0.1	30.5	0.0
	72	-41.1	279.9	-75.3	-0.1	-31.3	-0.0
3	71	9.7	-3.7	-34.1	0.0	14.2	0.0
	72	-9.7	-3.7	-34.2	-0.0	-14.3	-0.0
4	71	-39.4	127.5	-39.0	-1.8	20.3	0.0
	72	39.4	127.5	-29.3	1.8	-8.3	-0.0
5	71	-16.1	127.5	-35.0	-0.8	15.2	0.0
	72	16.1	127.5	-33.3	0.8	-13.1	-0.0
1	72	37.7	165.8	-44.4	0.0	18.3	0.0
	73	-37.7	165.8	-44.4	-0.0	-18.3	-0.0
2	72	63.6	279.9	-75.0	0.0	31.0	0.0
	73	-63.6	279.9	-75.0	-0.0	-31.0	-0.0
3	72	10.3	-3.7	-34.2	0.0	14.2	0.0
	73	-10.3	-3.7	-34.2	-0.0	-14.2	-0.0
4	72	21.8	127.5	-39.4	-0.6	20.7	0.0
	73	-21.8	127.5	-28.9	0.6	-7.6	-0.0
5	72	4.8	127.5	-35.7	-0.2	16.1	0.0
	73	-4.8	127.5	-32.6	0.2	-12.2	-0.0
1	73	24.4	165.8	-44.6	-0.0	18.6	0.0
	74	-24.4	165.8	-44.2	0.0	-18.1	-0.0
2	73	41.1	279.9	-75.3	-0.1	31.3	0.0
	74	-41.1	279.9	-74.7	0.1	-30.5	-0.0
3	73	9.7	-3.7	-34.2	-0.0	14.3	-0.0
	74	-9.7	-3.7	-34.1	0.0	-14.2	-0.0
4	73	65.5	127.5	-39.6	-1.6	20.7	0.0
	74	-65.5	127.5	-28.7	1.6	-7.1	-0.0
5	73	15.4	127.5	-36.4	-0.2	16.8	0.0
	74	-15.4	127.5	-32.0	0.2	-11.3	-0.0
1	74	-23.1	165.8	-43.6	3.5	17.5	0.0
	75	23.1	165.8	-45.3	-3.5	-19.6	-0.0
2	74	-39.6	279.9	-73.6	5.9	29.6	0.0
	75	39.6	279.9	-76.4	-5.9	-33.1	-0.0
3	74	9.0	-3.7	-34.3	-0.1	14.4	0.0
	75	-9.0	-3.7	-34.0	0.1	-13.9	-0.0
4	74	25.9	127.5	-42.4	4.9	24.5	0.0
	75	-25.9	127.5	-25.9	-4.9	-3.8	0.0
5	74	-11.1	127.5	-36.5	4.2	17.1	0.0
	75	11.1	127.5	-31.9	-4.2	-11.4	-0.0
1	75	0.0	37.1	-10.0	-0.0	1.4	5.2
	76	-0.0	-0.0	-0.0	0.0	-0.0	0.0
2	75	0.0	62.7	-16.8	-0.0	2.4	8.8
	76	-0.0	-0.0	-0.0	0.0	-0.0	0.0
3	75	0.0	-0.8	-7.7	0.0	1.1	-0.1
	76	-0.0	-0.0	0.0	-0.0	0.0	0.0
4	75	-5.2	33.5	-7.9	-0.0	1.1	5.4
	76	5.2	-5.0	0.3	0.0	-0.0	0.0
5	75	-2.2	33.5	-5.4	-0.0	0.4	5.4
	76	2.2	-5.0	-2.3	0.0	-0.0	-0.0
1	77	0.0	-0.0	-0.0	0.0	0.0	-0.0
	78	0.0	37.1	10.0	0.0	1.4	-5.2

Comb.	Nodo	N [kg]	T1-2 [kg]	T1-3 [kg]	Mt [kgm]	M1-3 [kgm]	M1-2 [kgm]
2	77	0.0	-0.0	0.0	0.0	0.0	-0.0
	78	0.0	62.7	16.8	0.0	2.4	-8.8
3	77	0.0	0.0	0.0	0.0	-0.0	0.0
	78	0.0	-0.8	7.7	0.0	1.1	0.1
4	77	4.9	5.4	-1.8	0.0	-0.0	-0.0
	78	-4.9	23.1	9.4	0.0	1.6	-2.5
5	77	0.8	5.1	-3.3	0.0	-0.0	-0.0
	78	-0.8	23.4	10.9	0.0	2.0	-2.6
1	78	-23.6	165.8	44.3	3.5	-18.4	-0.0
	79	23.6	165.8	44.5	-3.5	18.7	0.0
2	78	-40.3	279.9	74.8	6.0	-31.1	-0.0
	79	40.3	279.9	75.2	-6.0	31.6	0.0
3	78	9.1	-3.7	33.9	-0.1	-13.8	-0.0
	79	-9.1	-3.7	34.4	0.1	14.5	0.0
4	78	-66.1	127.5	42.2	0.1	-24.4	0.0
	79	66.1	127.5	26.2	-0.1	4.4	0.0
5	78	-39.4	127.5	36.7	0.9	-17.6	0.0
	79	39.4	127.5	31.6	-0.9	11.1	0.0
1	79	23.9	165.8	43.7	-0.0	-17.4	0.0
	80	-23.9	165.8	45.1	0.0	19.2	0.0
2	79	40.4	279.9	73.8	-0.0	-29.4	0.0
	80	-40.4	279.9	76.2	0.0	32.5	0.0
3	79	9.8	-3.7	34.1	-0.0	-14.1	0.0
	80	-9.8	-3.7	34.2	0.0	14.3	0.0
4	79	-39.8	127.5	39.8	2.1	-21.4	-0.0
	80	39.8	127.5	28.5	-2.1	7.2	0.0
5	79	-17.4	127.5	35.7	0.9	-16.1	-0.0
	80	17.4	127.5	32.6	-0.9	12.3	0.0
1	80	37.5	165.8	44.4	-0.0	-18.4	-0.0
	81	-37.5	165.8	44.4	0.0	18.4	-0.0
2	80	63.3	279.9	75.0	-0.0	-31.0	-0.0
	81	-63.3	279.9	75.0	0.0	31.0	-0.0
3	80	10.4	-3.7	34.2	-0.0	-14.2	-0.0
	81	-10.4	-3.7	34.2	0.0	14.2	-0.0
4	80	21.3	127.5	40.1	0.8	-21.5	-0.0
	81	-21.3	127.5	28.3	-0.8	6.7	-0.0
5	80	3.6	127.5	35.9	0.2	-16.4	-0.0
	81	-3.6	127.5	32.4	-0.2	11.9	-0.0
1	81	23.9	165.8	45.1	0.0	-19.2	-0.0
	82	-23.9	165.8	43.7	-0.0	17.4	0.0
2	81	40.4	279.9	76.2	0.0	-32.5	-0.0
	82	-40.4	279.9	73.8	-0.0	29.4	0.0
3	81	9.8	-3.7	34.2	0.0	-14.3	-0.0
	82	-9.8	-3.7	34.1	-0.0	14.1	-0.0
4	81	64.6	127.5	40.8	1.9	-22.2	-0.0
	82	-64.6	127.5	27.5	-1.9	5.6	-0.0
5	81	14.0	127.5	36.3	0.3	-16.7	-0.0
	82	-14.0	127.5	32.0	-0.3	11.4	-0.0
1	82	-23.6	165.8	44.5	-3.5	-18.7	-0.0
	83	23.6	165.8	44.3	3.5	18.4	0.0
2	82	-40.3	279.9	75.2	-6.0	-31.6	-0.0
	83	40.3	279.9	74.8	6.0	31.1	0.0
3	82	9.1	-3.7	34.4	0.1	-14.5	-0.0
	83	-9.1	-3.7	33.9	-0.1	13.8	0.0
4	82	25.3	127.5	42.2	-4.6	-24.2	-0.0

Comb.	Nodo	N [kg]	T1-2 [kg]	T1-3 [kg]	Mt [kgm]	M1-3 [kgm]	M1-2 [kgm]
	83	-25.3	127.5	26.1	4.6	4.1	-0.0
5	82	-11.9	127.5	36.4	-2.3	-17.1	-0.0
	83	11.9	127.5	31.9	2.3	11.5	0.0
1	83	0.0	37.1	10.0	-0.0	-1.4	5.2
	84	-0.0	-0.0	-0.0	0.0	0.0	0.0
2	83	-0.0	62.7	16.8	-0.0	-2.4	8.8
	84	0.0	0.0	-0.0	0.0	0.0	-0.0
3	83	0.0	-0.8	7.7	-0.0	-1.1	-0.1
	84	-0.0	-0.0	-0.0	0.0	-0.0	0.0
4	83	-5.4	31.7	7.7	-0.0	-1.1	4.9
	84	5.4	-3.1	-0.0	0.0	-0.0	0.0
5	83	-2.3	26.0	10.4	-0.0	-1.8	3.3
	84	2.3	2.5	-2.7	0.0	0.0	0.0
1	85	0.0	-0.0	0.0	0.0	-0.0	0.0
	86	0.0	35.9	-0.0	0.0	-0.0	-5.0
2	85	0.0	-0.0	0.0	0.0	-0.0	0.0
	86	0.0	61.5	-0.0	0.0	-0.0	-8.6
3	85	0.0	-0.0	0.0	0.0	-0.0	0.0
	86	0.0	-0.5	-0.0	0.0	-0.0	0.1
4	85	3.8	3.9	-1.2	0.0	-0.0	-0.0
	86	-3.8	23.7	1.2	0.0	0.3	-2.8
5	85	0.0	5.5	-2.6	0.0	0.0	0.0
	86	-0.0	22.1	2.6	0.0	0.7	-2.3
1	86	-48.7	156.2	-0.5	4.5	0.6	58.4
	87	48.7	164.3	0.5	-4.5	0.6	-68.6
2	86	-73.7	267.5	-0.8	7.7	1.0	99.8
	87	73.7	281.8	0.8	-7.7	1.0	-117.6
3	86	5.9	-1.9	-0.0	-0.1	0.1	-0.3
	87	-5.9	-2.8	0.0	0.1	0.1	1.3
4	86	-179.5	138.9	-0.9	0.3	1.2	68.8
	87	179.5	107.7	0.9	-0.3	1.2	-29.8
5	86	-101.9	125.0	-0.3	1.3	0.4	51.0
	87	101.9	121.6	0.3	-1.3	0.4	-46.8
1	87	229.5	159.2	-0.3	0.0	0.3	64.6
	88	-229.5	161.3	0.3	-0.0	0.4	-67.3
2	87	388.3	272.9	-0.5	0.1	0.6	111.0
	88	-388.3	276.4	0.5	-0.1	0.6	-115.3
3	87	22.2	-2.6	-0.0	-0.0	0.0	-1.3
	88	-22.2	-2.1	0.0	0.0	0.0	0.8
4	87	-113.5	128.6	1.0	2.4	-1.2	57.4
	88	113.5	117.9	-1.0	-2.4	-1.2	-44.0
5	87	47.2	123.3	0.4	0.4	-0.5	50.7
	88	-47.2	123.3	-0.4	-0.4	-0.5	-50.6
1	88	208.9	160.3	0.0	-0.0	-0.0	66.3
	89	-208.9	160.3	-0.0	0.0	0.0	-66.3
2	88	353.7	274.6	0.0	-0.0	-0.0	113.5
	89	-353.7	274.6	-0.0	0.0	0.0	-113.5
3	88	20.8	-2.3	0.0	0.0	-0.0	-1.0
	89	-20.8	-2.3	-0.0	-0.0	0.0	1.0
4	88	146.2	132.5	0.9	1.0	-1.1	62.6
	89	-146.2	114.0	-0.9	-1.0	-1.1	-39.4
5	88	112.3	126.1	0.3	0.3	-0.3	54.6
	89	-112.3	120.5	-0.3	-0.3	-0.3	-47.7
1	89	229.5	161.3	0.3	-0.0	-0.4	67.3

Comb. Nodo	N	T1-2	T1-3	Mt	M1-3	M1-2
	[kg]	[kg]	[kg]	[kgm]	[kgm]	[kgm]
	90	-229.5	159.2	-0.3	0.0	-0.3
	89	388.3	276.4	0.5	-0.1	-0.6
2	90	-388.3	272.9	-0.5	0.1	-0.6
	89	22.2	-2.1	0.0	0.0	-0.0
3	90	-22.2	-2.6	-0.0	-0.0	-0.0
	89	438.6	131.0	1.2	2.6	-1.5
4	90	-438.6	115.6	-1.2	-2.6	-1.5
	89	212.8	127.2	0.3	1.1	-0.3
5	90	-212.8	119.4	-0.3	-1.1	-0.3
	89					
1	90	-48.7	164.3	0.5	-4.5	-0.6
	91	48.7	156.2	-0.5	4.5	-0.6
2	90	-73.7	281.8	0.8	-7.7	-1.0
	91	73.7	267.5	-0.8	7.7	-1.0
3	90	5.9	-2.8	0.0	0.1	-0.1
	91	-5.9	-1.9	-0.0	-0.1	-0.1
4	90	90.2	145.7	-0.3	-5.9	0.4
	91	-90.2	100.9	0.3	5.9	0.4
5	90	-20.9	133.0	-0.1	-3.0	0.1
	91	20.9	113.6	0.1	3.0	0.1
1	91	0.0	35.9	-0.0	0.0	0.0
	92	-0.0	-0.0	0.0	-0.0	0.0
2	91	0.0	61.5	-0.0	0.0	0.0
	92	-0.0	-0.0	0.0	-0.0	0.0
3	91	0.0	-0.5	-0.0	0.0	-0.0
	92	-0.0	-0.0	0.0	-0.0	0.0
4	91	-4.5	28.7	0.3	0.0	-0.1
	92	4.5	-1.1	-0.3	-0.0	-0.0
5	91	-2.4	23.6	2.4	-0.0	-0.7
	92	2.4	4.0	-2.4	0.0	-0.0

- [Elementi tipo biella](#)
- [Elementi tipo trave](#)
- [Sollecitazioni nelle bielle](#)
- [Sollecitazioni nelle travi](#)

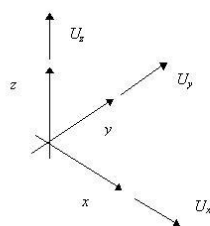
Indice

- [Spostamenti nodali](#)

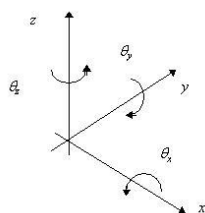
Spostamenti nodali

Convenzioni adottate

La terna di riferimento generale è destrorsa per cui si hanno i seguenti segni positivi per le componenti di spostamento nodale:



e per quanto riguarda le rotazioni:



Nel seguito vengono riportate, per ogni nodo (con esclusione dei nodi K che definiscono l'orientamento delle aste e quindi, essendo bloccati, hanno componenti di spostamento nulle), le componenti di spostamento in tutte le combinazioni di carico definite.

Nodo Comb.		Ux [cm]	Uy [cm]	Uz [cm]	Rx [°]	Ry [°]	Rz [°]
1	6	0.00	-0.07	0.06	-0.23	0.01	0.00
	7	0.00	-0.11	0.09	-0.34	0.02	0.00
	8	-0.00	-0.03	0.04	-0.13	0.01	-0.01
	9	-0.00	-0.04	0.04	-0.14	0.01	-0.00
2	6	0.00	-0.07	0.05	-0.23	0.01	0.00
	7	0.00	-0.11	0.08	-0.34	0.02	0.00
	8	-0.00	-0.04	0.03	-0.13	0.01	-0.01
	9	-0.00	-0.04	0.03	-0.14	0.01	-0.00
3	6	0.00	-0.10	0.08	-0.35	0.01	0.00
	7	0.00	-0.15	0.12	-0.53	0.02	0.00
	8	-0.00	-0.07	0.06	-0.25	0.01	-0.01
	9	0.00	-0.06	0.06	-0.24	0.01	-0.00
4	6	0.00	-0.11	0.08	-0.36	-0.00	0.00
	7	0.00	-0.16	0.12	-0.54	-0.00	0.00
	8	-0.00	-0.07	0.05	-0.24	0.00	-0.01
	9	-0.00	-0.06	0.05	-0.24	0.00	-0.00
5	6	-0.00	-0.11	0.08	-0.36	0.00	-0.00
	7	-0.00	-0.16	0.12	-0.54	0.00	-0.00
	8	-0.00	-0.06	0.05	-0.23	0.00	-0.01
	9	-0.00	-0.06	0.05	-0.24	0.00	-0.00
6	6	-0.00	-0.10	0.08	-0.35	-0.01	-0.00
	7	-0.00	-0.15	0.12	-0.53	-0.02	-0.00
	8	-0.00	-0.05	0.05	-0.20	-0.00	-0.01
	9	-0.00	-0.06	0.05	-0.23	-0.01	-0.00
7	6	-0.00	-0.07	0.05	-0.23	-0.01	-0.00
	7	-0.00	-0.11	0.08	-0.34	-0.02	-0.00
	8	-0.00	-0.06	0.04	-0.17	-0.00	-0.01
	9	-0.00	-0.05	0.04	-0.16	-0.01	-0.00
8	6	-0.00	-0.07	0.06	-0.23	-0.01	-0.00
	7	-0.00	-0.11	0.09	-0.34	-0.02	-0.00
	8	-0.00	-0.06	0.03	-0.17	-0.00	-0.01
	9	-0.00	-0.05	0.04	-0.16	-0.01	-0.00
9	6	0.00	-0.06	-0.00	-0.23	0.00	0.00
	7	0.00	-0.09	-0.00	-0.34	0.01	0.00
	8	0.00	-0.03	-0.00	-0.13	0.01	-0.01
	9	0.00	-0.03	-0.00	-0.15	0.00	-0.00
10	6	0.00	-0.08	-0.00	-0.35	0.01	0.00
	7	0.00	-0.12	-0.00	-0.53	0.01	0.00
	8	0.00	-0.05	-0.00	-0.25	0.01	-0.01
	9	0.00	-0.05	-0.00	-0.24	0.00	-0.00
11	6	0.00	-0.08	-0.00	-0.36	-0.00	0.00
	7	0.00	-0.12	-0.00	-0.54	-0.00	0.00
	8	0.00	-0.05	-0.00	-0.24	0.00	-0.01
	9	0.00	-0.05	-0.00	-0.24	0.00	-0.00
12	6	-0.00	-0.08	-0.00	-0.36	0.00	-0.00
	7	-0.00	-0.12	-0.00	-0.54	0.00	-0.00
	8	0.00	-0.05	-0.00	-0.23	0.00	-0.01

Nodo Comb.	Ux [cm]	Uy [cm]	Uz [cm]	Rx [°]	Ry [°]	Rz [°]
	9	0.00	-0.05	-0.00	-0.24	0.00
13	6	-0.00	-0.08	-0.00	-0.35	-0.01
	7	-0.00	-0.12	-0.00	-0.53	-0.01
	8	0.00	-0.04	-0.00	-0.20	-0.00
	9	-0.00	-0.04	-0.00	-0.23	-0.00
14	6	-0.00	-0.06	-0.00	-0.23	-0.00
	7	-0.00	-0.09	-0.00	-0.34	-0.01
	8	0.00	-0.05	-0.00	-0.17	0.00
	9	0.00	-0.04	-0.00	-0.16	-0.00
15	6	-0.00	-0.00	-0.00	0.23	-0.00
	7	-0.00	-0.00	-0.00	0.36	-0.00
	8	0.00	-0.00	-0.00	0.12	0.00
	9	-0.00	-0.00	-0.00	0.13	-0.00
16	6	0.00	0.00	-0.00	0.36	0.00
	7	0.00	0.00	-0.00	0.55	0.00
	8	0.00	0.00	-0.00	0.26	0.01
	9	0.00	0.00	-0.00	0.23	0.00
17	6	0.00	0.00	-0.00	0.37	0.00
	7	0.00	0.00	-0.00	0.56	0.00
	8	0.00	0.00	-0.00	0.24	0.00
	9	0.00	0.00	-0.00	0.22	0.00
18	6	-0.00	0.00	-0.00	0.37	-0.00
	7	-0.00	0.00	-0.00	0.56	-0.00
	8	0.00	0.00	-0.00	0.22	0.00
	9	0.00	0.00	-0.00	0.22	0.00
19	6	-0.00	0.00	-0.00	0.36	-0.00
	7	-0.00	0.00	-0.00	0.55	-0.00
	8	0.00	0.00	-0.00	0.20	0.00
	9	0.00	0.00	-0.00	0.21	0.00
20	6	0.00	-0.00	-0.00	0.23	0.00
	7	0.00	-0.00	-0.00	0.36	0.00
	8	0.00	0.00	-0.00	0.17	0.01
	9	0.00	0.00	-0.00	0.15	0.00
21	6	-0.00	-0.06	-0.24	0.20	-0.00
	7	-0.00	-0.09	-0.36	0.31	-0.01
	8	0.02	-0.05	-0.12	0.11	0.00
	9	0.01	-0.04	-0.14	0.12	0.00
22	6	-0.00	-0.06	-0.24	0.20	-0.00
	7	-0.00	-0.09	-0.36	0.31	-0.00
	8	0.02	-0.03	-0.12	0.11	0.01
	9	0.01	-0.03	-0.14	0.12	0.00
23	6	-0.00	-0.09	-0.37	0.32	0.00
	7	-0.00	-0.14	-0.55	0.48	0.00
	8	0.02	-0.06	-0.26	0.22	0.01
	9	0.01	-0.06	-0.23	0.20	0.00
24	6	-0.00	-0.09	-0.37	0.32	0.00
	7	-0.00	-0.14	-0.56	0.48	0.00
	8	0.02	-0.06	-0.24	0.21	0.01
	9	0.01	-0.06	-0.22	0.19	0.00
25	6	0.00	-0.09	-0.37	0.32	-0.00
	7	0.00	-0.14	-0.56	0.48	-0.00
	8	0.02	-0.06	-0.23	0.19	0.00
	9	0.01	-0.05	-0.22	0.19	0.00
26	6	0.00	-0.09	-0.37	0.32	-0.00
	7	0.00	-0.14	-0.55	0.48	-0.00
	8	0.02	-0.05	-0.20	0.17	0.00
	9	0.01	-0.05	-0.21	0.18	0.00
27	6	0.00	-0.06	-0.24	0.20	0.00
	7	0.00	-0.09	-0.36	0.31	0.00
	8	0.02	-0.04	-0.17	0.15	0.01

Nodo Comb.		Ux	Uy	Uz	Rx	Ry	Rz
		[cm]	[cm]	[cm]	[°]	[°]	[°]
	9	0.01	-0.04	-0.15	0.13	0.00	0.01
28	6	0.00	-0.06	-0.24	0.20	0.00	-0.00
	7	0.00	-0.09	-0.36	0.31	0.01	-0.00
	8	0.02	-0.03	-0.18	0.15	0.01	0.02
	9	0.01	-0.03	-0.15	0.13	0.00	0.01
29	6	-0.00	-0.00	-0.23	-0.20	0.00	-0.00
	7	-0.00	-0.00	-0.35	-0.30	0.00	-0.00
	8	0.02	0.02	-0.12	-0.11	0.01	-0.02
	9	0.01	0.01	-0.15	-0.13	0.00	-0.01
30	6	-0.00	-0.00	-0.23	-0.20	0.00	-0.00
	7	-0.00	-0.00	-0.35	-0.30	0.01	-0.00
	8	0.02	0.01	-0.13	-0.11	0.01	-0.02
	9	0.01	0.00	-0.15	-0.13	0.00	-0.01
31	6	0.00	0.01	-0.36	-0.31	0.01	0.00
	7	0.00	0.02	-0.54	-0.47	0.01	0.00
	8	0.02	0.00	-0.26	-0.22	0.01	-0.02
	9	0.01	0.01	-0.25	-0.21	0.01	-0.00
32	6	0.00	0.01	-0.36	-0.32	0.00	0.00
	7	0.00	0.01	-0.55	-0.47	0.00	0.00
	8	0.02	0.01	-0.24	-0.21	0.00	-0.02
	9	0.01	0.01	-0.24	-0.21	0.00	-0.01
33	6	-0.00	0.01	-0.36	-0.32	-0.00	-0.00
	7	-0.00	0.01	-0.55	-0.47	-0.00	-0.00
	8	0.02	0.01	-0.23	-0.20	0.00	-0.02
	9	0.01	0.01	-0.24	-0.21	0.00	-0.01
34	6	-0.00	0.01	-0.36	-0.31	-0.01	-0.00
	7	-0.00	0.02	-0.54	-0.47	-0.01	-0.00
	8	0.02	0.02	-0.21	-0.18	0.00	-0.02
	9	0.01	0.02	-0.23	-0.20	-0.00	-0.01
35	6	0.00	-0.00	-0.23	-0.20	-0.00	0.00
	7	0.00	-0.00	-0.35	-0.30	-0.01	0.00
	8	0.02	-0.01	-0.17	-0.15	0.00	-0.02
	9	0.01	0.00	-0.16	-0.14	-0.00	-0.01
36	6	0.00	-0.00	-0.23	-0.20	-0.00	0.00
	7	0.00	-0.00	-0.35	-0.30	-0.00	0.00
	8	0.02	-0.02	-0.17	-0.15	0.00	-0.02
	9	0.01	-0.00	-0.16	-0.14	0.00	-0.01
37	6	-0.00	-0.11	-0.44	0.10	0.00	0.00
	7	-0.00	-0.17	-0.66	0.16	0.00	0.00
	8	0.05	-0.08	-0.23	0.05	0.01	0.02
	9	0.02	-0.07	-0.25	0.06	0.00	0.01
38	6	-0.00	-0.11	-0.44	0.10	0.00	0.00
	7	-0.00	-0.17	-0.66	0.16	0.00	0.00
	8	0.05	-0.06	-0.23	0.05	0.01	0.02
	9	0.02	-0.06	-0.25	0.06	0.00	0.01
39	6	-0.00	-0.17	-0.68	0.16	0.01	-0.00
	7	-0.00	-0.25	-1.02	0.24	0.01	-0.00
	8	0.05	-0.12	-0.48	0.11	0.01	0.02
	9	0.02	-0.10	-0.42	0.10	0.00	0.00
40	6	-0.00	-0.17	-0.69	0.16	0.00	-0.00
	7	-0.00	-0.26	-1.04	0.24	0.00	-0.00
	8	0.05	-0.11	-0.44	0.10	0.00	0.02
	9	0.02	-0.10	-0.42	0.10	0.00	0.01
41	6	0.00	-0.17	-0.69	0.16	-0.00	0.00
	7	0.00	-0.26	-1.04	0.24	-0.00	0.00
	8	0.05	-0.10	-0.42	0.10	0.00	0.02
	9	0.02	-0.10	-0.41	0.10	0.00	0.01
42	6	0.00	-0.17	-0.68	0.16	-0.01	0.00
	7	0.00	-0.25	-1.02	0.24	-0.01	0.00
	8	0.05	-0.09	-0.37	0.09	0.00	0.02

Nodo Comb.		Ux	Uy	Uz	Rx	Ry	Rz
		[cm]	[cm]	[cm]	[°]	[°]	[°]
	9	0.02	-0.09	-0.39	0.09	-0.00	0.01
43	6	0.00	-0.11	-0.44	0.10	-0.00	-0.00
	7	0.00	-0.17	-0.66	0.16	-0.00	-0.00
	8	0.05	-0.08	-0.32	0.08	0.00	0.02
	9	0.02	-0.07	-0.28	0.07	-0.00	0.01
44	6	0.00	-0.11	-0.44	0.10	-0.00	-0.00
	7	0.00	-0.17	-0.66	0.16	-0.00	-0.00
	8	0.05	-0.06	-0.33	0.08	0.00	0.02
	9	0.02	-0.06	-0.28	0.07	0.00	0.01
45	6	-0.00	0.05	-0.43	-0.10	0.00	0.00
	7	-0.00	0.07	-0.65	-0.15	0.01	0.00
	8	0.05	0.04	-0.23	-0.05	0.01	-0.02
	9	0.02	0.04	-0.27	-0.06	0.00	-0.01
46	6	-0.00	0.05	-0.43	-0.10	0.01	0.00
	7	-0.00	0.07	-0.65	-0.15	0.01	0.00
	8	0.05	0.04	-0.24	-0.05	0.01	-0.02
	9	0.02	0.04	-0.27	-0.06	0.00	-0.01
47	6	-0.00	0.09	-0.67	-0.16	0.01	0.00
	7	-0.00	0.13	-1.00	-0.24	0.01	0.00
	8	0.05	0.05	-0.48	-0.11	0.01	-0.02
	9	0.02	0.06	-0.46	-0.11	0.01	-0.00
48	6	-0.00	0.08	-0.68	-0.16	0.00	0.00
	7	-0.00	0.13	-1.02	-0.24	0.00	0.00
	8	0.05	0.05	-0.45	-0.11	0.00	-0.02
	9	0.02	0.06	-0.45	-0.11	0.00	-0.01
49	6	0.00	0.08	-0.68	-0.16	-0.00	-0.00
	7	0.00	0.13	-1.02	-0.24	-0.00	-0.00
	8	0.05	0.06	-0.43	-0.10	0.00	-0.02
	9	0.02	0.06	-0.45	-0.11	0.00	-0.01
50	6	0.00	0.09	-0.67	-0.16	-0.01	-0.00
	7	0.00	0.13	-1.00	-0.24	-0.01	-0.00
	8	0.05	0.07	-0.38	-0.09	-0.00	-0.02
	9	0.02	0.07	-0.43	-0.10	-0.00	-0.01
51	6	0.00	0.05	-0.43	-0.10	-0.01	-0.00
	7	0.00	0.07	-0.65	-0.15	-0.01	-0.00
	8	0.05	0.03	-0.32	-0.08	-0.00	-0.02
	9	0.02	0.03	-0.30	-0.07	-0.00	-0.01
52	6	0.00	0.05	-0.43	-0.10	-0.00	-0.00
	7	0.00	0.07	-0.65	-0.15	-0.01	-0.00
	8	0.05	0.02	-0.32	-0.08	0.00	-0.02
	9	0.02	0.03	-0.30	-0.07	-0.00	-0.01
53	6	-0.00	0.06	-0.47	0.02	0.01	0.00
	7	-0.00	0.08	-0.72	0.03	0.02	0.00
	8	0.07	0.04	-0.26	0.02	0.00	-0.00
	9	0.02	0.04	-0.30	0.02	0.00	-0.00
54	6	-0.00	0.06	-0.48	0.02	0.02	0.00
	7	-0.00	0.09	-0.73	0.03	0.02	0.00
	8	0.07	0.04	-0.26	0.02	0.00	-0.00
	9	0.02	0.04	-0.30	0.02	0.01	-0.00
55	6	-0.00	0.10	-0.74	0.04	0.01	0.00
	7	-0.00	0.15	-1.12	0.06	0.01	0.00
	8	0.07	0.06	-0.53	0.02	0.00	-0.00
	9	0.02	0.07	-0.51	0.03	0.00	-0.00
56	6	-0.00	0.10	-0.76	0.04	0.00	0.00
	7	-0.00	0.15	-1.14	0.06	0.00	0.00
	8	0.07	0.06	-0.50	0.02	-0.00	-0.00
	9	0.02	0.07	-0.51	0.03	-0.00	-0.00
57	6	0.00	0.10	-0.76	0.04	-0.00	-0.00
	7	0.00	0.15	-1.14	0.06	-0.00	-0.00
	8	0.07	0.07	-0.48	0.03	-0.01	-0.00

Nodo Comb.	Ux [cm]	Uy [cm]	Uz [cm]	Rx [°]	Ry [°]	Rz [°]
	9	0.02	0.07	-0.50	0.03	-0.00
58	6	0.00	0.10	-0.74	0.04	-0.01
	7	0.00	0.15	-1.12	0.06	-0.01
	8	0.07	0.08	-0.42	0.03	-0.01
	9	0.02	0.07	-0.48	0.03	-0.01
59	6	0.00	0.06	-0.48	0.02	-0.02
	7	0.00	0.09	-0.73	0.03	-0.02
	8	0.07	0.03	-0.36	0.01	-0.01
	9	0.02	0.04	-0.33	0.02	-0.01
60	6	0.00	0.06	-0.47	0.02	-0.01
	7	0.00	0.08	-0.72	0.03	-0.02
	8	0.07	0.03	-0.36	0.01	-0.01
	9	0.02	0.04	-0.33	0.02	-0.01
61	6	-0.00	-0.12	-0.48	-0.02	0.01
	7	-0.00	-0.18	-0.73	-0.04	0.01
	8	0.07	-0.09	-0.25	-0.02	0.00
	9	0.02	-0.07	-0.28	-0.01	0.01
62	6	-0.00	-0.12	-0.49	-0.02	0.01
	7	-0.00	-0.18	-0.74	-0.04	0.02
	8	0.07	-0.06	-0.25	-0.02	0.00
	9	0.02	-0.07	-0.28	-0.01	0.01
63	6	-0.00	-0.18	-0.75	-0.04	0.01
	7	-0.00	-0.27	-1.13	-0.06	0.01
	8	0.07	-0.13	-0.53	-0.02	0.00
	9	0.02	-0.11	-0.47	-0.02	0.00
64	6	-0.00	-0.18	-0.77	-0.04	0.00
	7	-0.00	-0.28	-1.16	-0.06	0.00
	8	0.07	-0.12	-0.49	-0.02	0.00
	9	0.02	-0.11	-0.46	-0.02	0.00
65	6	0.00	-0.18	-0.77	-0.04	-0.00
	7	0.00	-0.28	-1.16	-0.06	-0.00
	8	0.07	-0.11	-0.47	-0.02	-0.01
	9	0.02	-0.11	-0.46	-0.02	-0.00
66	6	0.00	-0.18	-0.75	-0.04	-0.01
	7	0.00	-0.27	-1.13	-0.06	-0.01
	8	0.07	-0.10	-0.41	-0.03	-0.01
	9	0.02	-0.10	-0.43	-0.02	-0.00
67	6	0.00	-0.12	-0.49	-0.02	-0.01
	7	0.00	-0.18	-0.74	-0.04	-0.02
	8	0.07	-0.09	-0.36	-0.01	-0.01
	9	0.02	-0.08	-0.31	-0.01	-0.01
68	6	0.00	-0.12	-0.48	-0.02	-0.01
	7	0.00	-0.18	-0.73	-0.04	-0.01
	8	0.07	-0.06	-0.36	-0.01	-0.01
	9	0.02	-0.07	-0.31	-0.01	-0.01
69	6	0.00	0.02	-0.37	0.13	0.03
	7	0.00	0.03	-0.56	0.19	0.04
	8	0.06	0.01	-0.20	0.09	0.00
	9	0.02	0.02	-0.23	0.09	0.01
70	6	0.00	0.02	-0.38	0.13	0.03
	7	0.00	0.04	-0.58	0.19	0.04
	8	0.06	0.02	-0.20	0.09	0.01
	9	0.02	0.02	-0.24	0.09	0.01
71	6	0.00	0.05	-0.58	0.20	0.01
	7	0.00	0.08	-0.88	0.31	0.02
	8	0.06	0.03	-0.41	0.12	-0.00
	9	0.02	0.04	-0.39	0.13	0.00
72	6	0.00	0.05	-0.60	0.20	0.00
	7	0.00	0.07	-0.90	0.31	0.00
	8	0.06	0.03	-0.39	0.13	-0.01

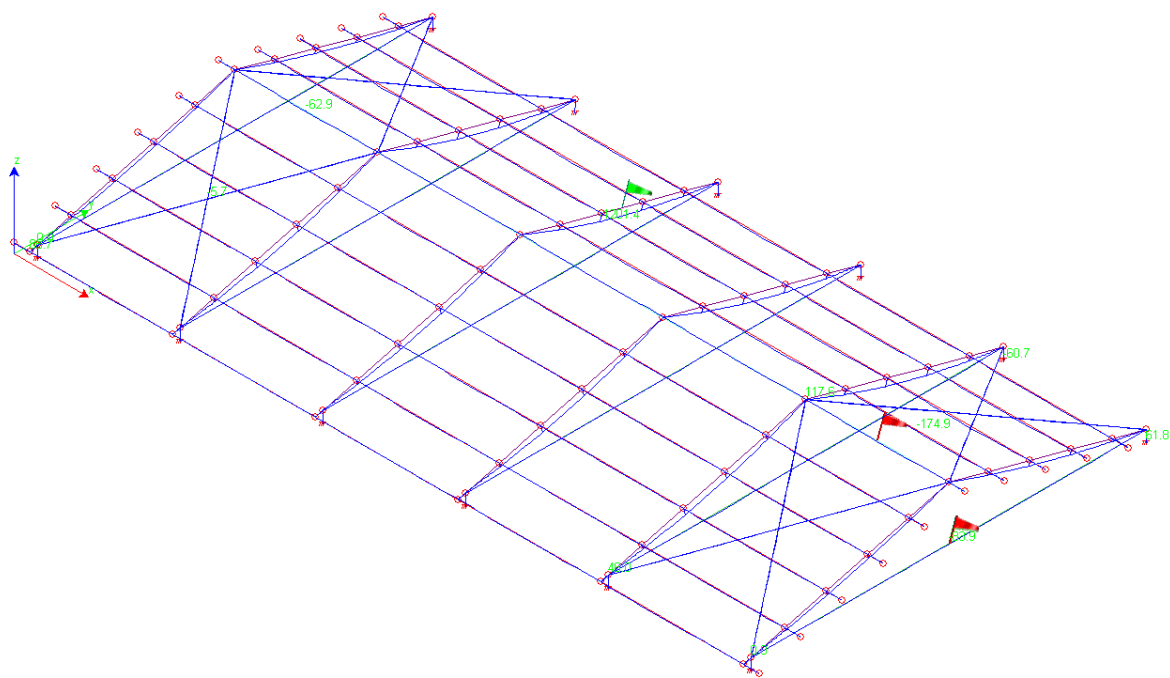
Nodo Comb.		Ux	Uy	Uz	Rx	Ry	Rz	
		[cm]	[cm]	[cm]	[°]	[°]	[°]	
	9	0.02	0.04	-0.40	0.14	-0.00	0.00	
	73	6	-0.00	0.05	-0.60	0.20	-0.00	0.00
	7	-0.00	0.07	-0.90	0.31	-0.00	0.00	
	8	0.06	0.03	-0.38	0.14	-0.01	0.01	
	9	0.02	0.04	-0.39	0.14	-0.00	0.00	
	74	6	-0.00	0.05	-0.58	0.20	-0.01	0.00
	7	-0.00	0.08	-0.88	0.31	-0.02	0.00	
	8	0.06	0.04	-0.33	0.15	-0.01	0.01	
	9	0.02	0.04	-0.37	0.14	-0.01	0.00	
	75	6	-0.00	0.02	-0.38	0.13	-0.03	-0.00
	7	-0.00	0.04	-0.58	0.19	-0.04	-0.01	
	8	0.06	0.01	-0.29	0.07	-0.03	0.00	
	9	0.02	0.02	-0.26	0.08	-0.02	-0.00	
	76	6	-0.00	0.02	-0.37	0.13	-0.03	-0.00
	7	-0.00	0.03	-0.56	0.19	-0.04	-0.01	
	8	0.06	0.02	-0.28	0.07	-0.03	0.00	
	9	0.02	0.02	-0.26	0.08	-0.02	-0.00	
	77	6	0.00	-0.08	-0.37	-0.13	0.02	-0.00
	7	0.00	-0.13	-0.57	-0.20	0.04	-0.01	
	8	0.06	-0.04	-0.19	-0.10	0.00	-0.01	
	9	0.02	-0.05	-0.22	-0.08	0.01	-0.01	
	78	6	0.00	-0.09	-0.39	-0.13	0.03	-0.00
	7	0.00	-0.13	-0.58	-0.20	0.04	-0.01	
	8	0.06	-0.05	-0.20	-0.10	0.01	-0.01	
	9	0.02	-0.05	-0.22	-0.08	0.01	-0.01	
	79	6	0.00	-0.13	-0.59	-0.21	0.01	0.00
	7	0.00	-0.19	-0.88	-0.31	0.01	0.00	
	8	0.06	-0.09	-0.41	-0.11	-0.00	-0.01	
	9	0.02	-0.08	-0.37	-0.12	0.00	-0.00	
	80	6	0.00	-0.13	-0.61	-0.21	0.00	0.00
	7	0.00	-0.20	-0.91	-0.31	0.00	0.00	
	8	0.06	-0.08	-0.39	-0.13	-0.01	-0.01	
	9	0.02	-0.08	-0.37	-0.12	-0.00	-0.00	
	81	6	-0.00	-0.13	-0.61	-0.21	-0.00	-0.00
	7	-0.00	-0.20	-0.91	-0.31	-0.00	-0.00	
	8	0.06	-0.08	-0.37	-0.13	-0.01	-0.01	
	9	0.02	-0.08	-0.36	-0.12	-0.00	-0.00	
	82	6	-0.00	-0.13	-0.59	-0.21	-0.01	-0.00
	7	-0.00	-0.19	-0.88	-0.31	-0.01	-0.00	
	8	0.06	-0.07	-0.32	-0.15	-0.01	-0.01	
	9	0.02	-0.07	-0.34	-0.13	-0.01	-0.00	
	83	6	-0.00	-0.09	-0.39	-0.13	-0.03	0.00
	7	-0.00	-0.13	-0.58	-0.20	-0.04	0.01	
	8	0.06	-0.06	-0.29	-0.07	-0.03	-0.01	
	9	0.02	-0.06	-0.25	-0.07	-0.02	0.00	
	84	6	-0.00	-0.08	-0.37	-0.13	-0.02	0.00
	7	-0.00	-0.13	-0.57	-0.20	-0.04	0.01	
	8	0.06	-0.07	-0.28	-0.07	-0.03	-0.01	
	9	0.02	-0.06	-0.24	-0.07	-0.02	0.00	
	85	6	0.01	-0.03	-0.17	-0.17	0.04	0.00
	7	0.01	-0.05	-0.26	-0.26	0.07	0.00	
	8	0.05	-0.01	-0.08	-0.13	0.02	-0.00	
	9	0.02	-0.02	-0.10	-0.11	0.02	-0.00	
	86	6	0.01	-0.03	-0.19	-0.17	0.05	0.00
	7	0.01	-0.05	-0.29	-0.26	0.07	0.00	
	8	0.05	-0.01	-0.09	-0.13	0.02	-0.00	
	9	0.02	-0.02	-0.11	-0.11	0.02	-0.00	
	87	6	0.01	-0.04	-0.28	-0.27	0.01	-0.00
	7	0.01	-0.06	-0.42	-0.41	0.02	-0.00	
	8	0.06	-0.03	-0.20	-0.14	-0.00	-0.00	

Nodo Comb.	Ux [cm]	Uy [cm]	Uz [cm]	Rx [°]	Ry [°]	Rz [°]
	9	0.02	-0.02	-0.18	-0.15	0.00
88	6	0.00	-0.04	-0.30	-0.27	0.00
	7	0.00	-0.06	-0.45	-0.41	0.00
	8	0.06	-0.03	-0.19	-0.16	-0.01
	9	0.02	-0.02	-0.18	-0.16	-0.00
89	6	-0.00	-0.04	-0.30	-0.27	0.00
	7	-0.00	-0.06	-0.45	-0.41	0.00
	8	0.05	-0.02	-0.18	-0.17	-0.01
	9	0.01	-0.02	-0.18	-0.16	-0.00
90	6	-0.01	-0.04	-0.28	-0.27	-0.01
	7	-0.01	-0.06	-0.42	-0.41	-0.02
	8	0.05	-0.02	-0.15	-0.19	-0.01
	9	0.01	-0.02	-0.16	-0.17	-0.01
91	6	-0.01	-0.03	-0.19	-0.17	-0.05
	7	-0.01	-0.05	-0.29	-0.26	-0.07
	8	0.05	-0.02	-0.15	-0.09	-0.04
	9	0.01	-0.02	-0.13	-0.10	-0.03
92	6	-0.01	-0.03	-0.17	-0.17	-0.04
	7	-0.01	-0.05	-0.26	-0.26	-0.07
	8	0.05	-0.02	-0.13	-0.09	-0.04
	9	0.01	-0.02	-0.11	-0.10	-0.03
217	6	0.00	-0.06	0.00	0.00	0.00
	7	0.00	-0.09	0.00	0.00	0.00
	8	0.00	-0.03	0.00	0.00	0.00
	9	0.00	-0.03	0.00	0.00	0.00
218	6	0.00	-0.08	0.00	0.00	0.00
	7	0.00	-0.12	0.00	0.00	0.00
	8	0.00	-0.05	0.00	0.00	0.00
	9	0.00	-0.05	0.00	0.00	0.00
219	6	0.00	-0.08	0.00	0.00	0.00
	7	0.00	-0.12	0.00	0.00	0.00
	8	0.00	-0.05	0.00	0.00	0.00
	9	0.00	-0.05	0.00	0.00	0.00
220	6	0.00	-0.08	0.00	0.00	0.00
	7	0.00	-0.12	0.00	0.00	0.00
	8	0.00	-0.05	0.00	0.00	0.00
	9	0.00	-0.05	0.00	0.00	0.00
221	6	0.00	-0.08	0.00	0.00	0.00
	7	0.00	-0.12	0.00	0.00	0.00
	8	0.00	-0.04	0.00	0.00	0.00
	9	0.00	-0.04	0.00	0.00	0.00
222	6	0.00	-0.06	0.00	0.00	0.00
	7	0.00	-0.09	0.00	0.00	0.00
	8	0.00	-0.05	0.00	0.00	0.00
	9	0.00	-0.04	0.00	0.00	0.00
223	6	0.00	0.00	0.00	0.00	0.00
	7	0.00	0.00	0.00	0.00	0.00
	8	0.00	0.00	0.00	0.00	0.00
	9	0.00	0.00	0.00	0.00	0.00
224	6	0.00	0.00	0.00	0.00	0.00
	7	0.00	0.00	0.00	0.00	0.00
	8	0.00	0.00	0.00	0.00	0.00
	9	0.00	0.00	0.00	0.00	0.00
225	6	0.00	0.00	0.00	0.00	0.00
	7	0.00	0.00	0.00	0.00	0.00
	8	0.00	0.00	0.00	0.00	0.00
	9	0.00	0.00	0.00	0.00	0.00
226	6	0.00	0.00	0.00	0.00	0.00
	7	0.00	0.00	0.00	0.00	0.00
	8	0.00	0.00	0.00	0.00	0.00

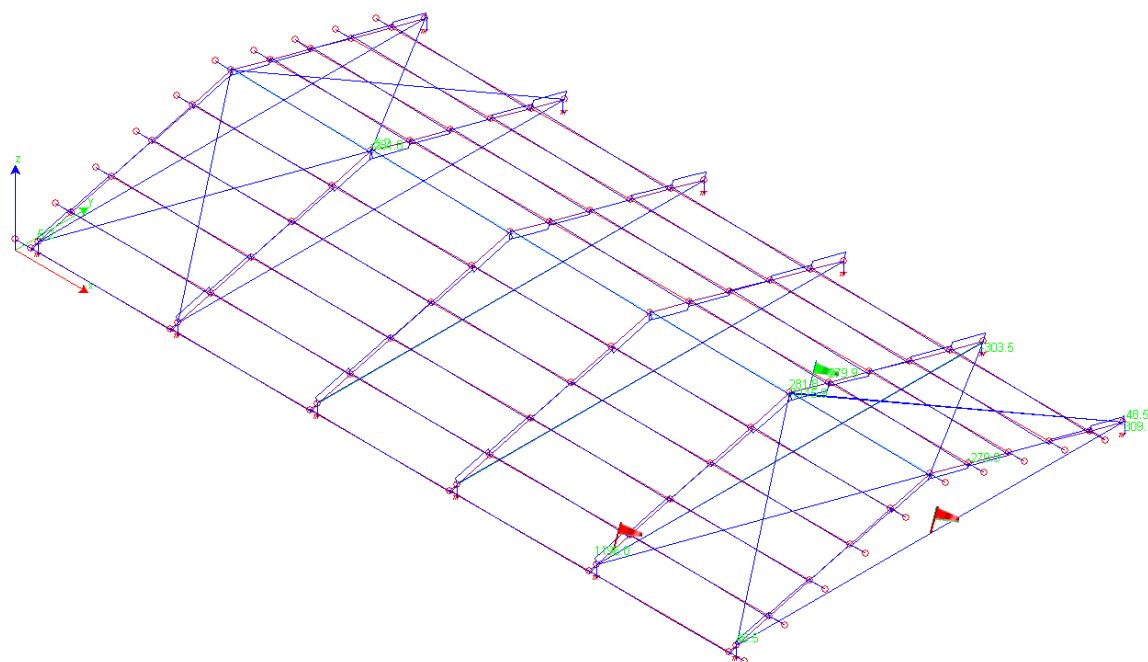
Nodo Comb.	Ux [cm]	Uy [cm]	Uz [cm]	Rx [°]	Ry [°]	Rz [°]
	9	0.00	0.00	0.00	0.00	0.00
227	6	0.00	0.00	0.00	0.00	0.00
	7	0.00	0.00	0.00	0.00	0.00
	8	0.00	0.00	0.00	0.00	0.00
	9	0.00	0.00	0.00	0.00	0.00
228	6	0.00	0.00	0.00	0.00	0.00
	7	0.00	0.00	0.00	0.00	0.00
	8	0.00	0.00	0.00	0.00	0.00
	9	0.00	0.00	0.00	0.00	0.00

- [En.Ex.Sys. WinStrand](#)
- [Spostamenti nodali](#)

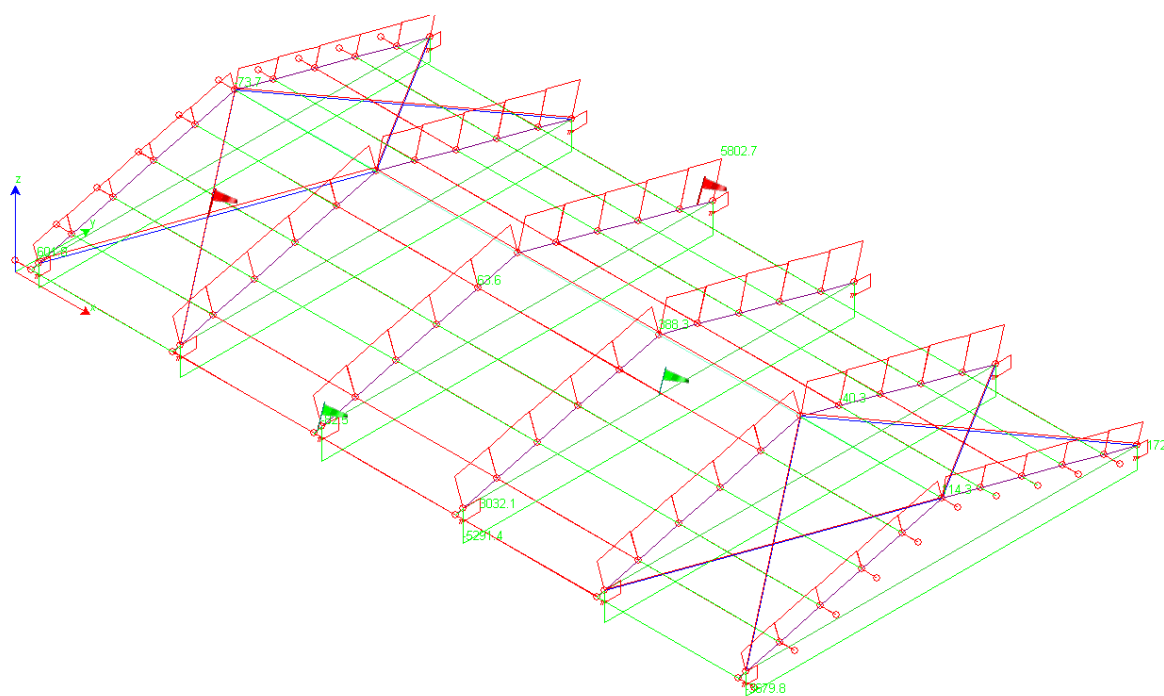
Struttura - Momento12 in combinazione di carico 2



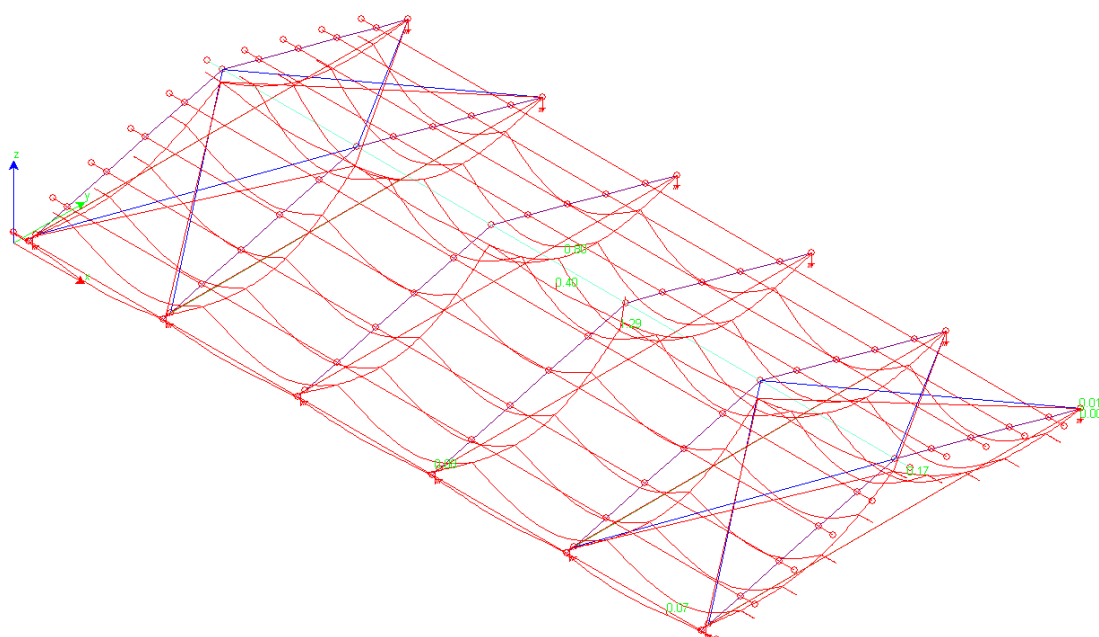
Struttura – Taglio 12 in combinazione di carico 2



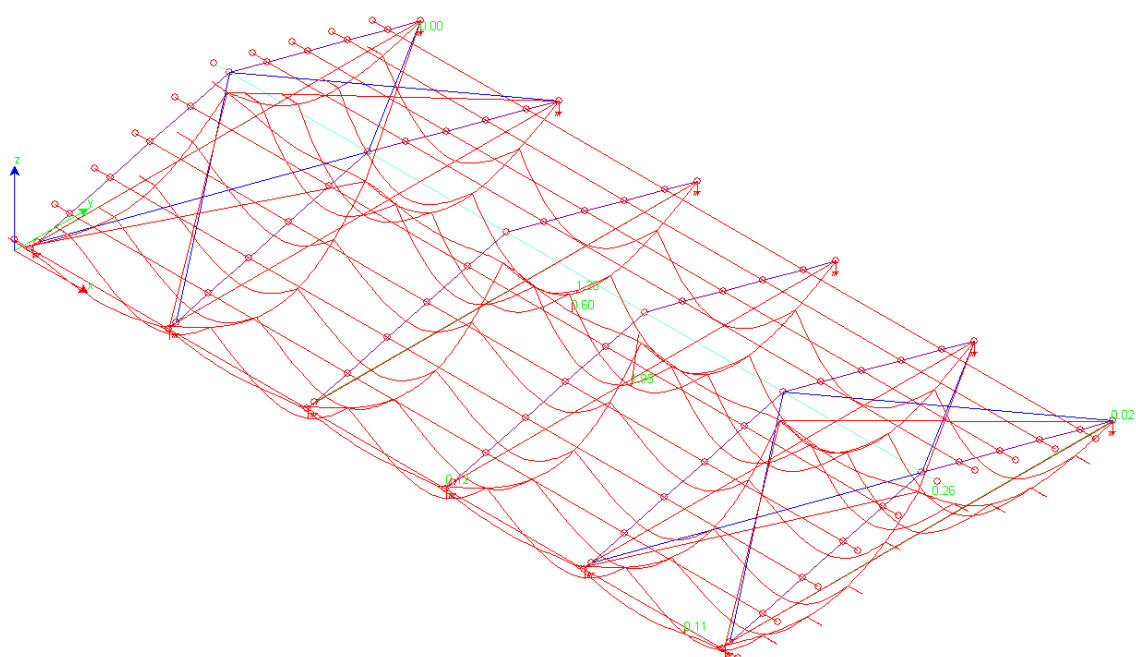
Struttura – Sforzo Assiale in combinazione di carico 2



Struttura - Deformata in combinazione di carico 6 – SLE iniziale



Struttura - Deformata in combinazione di carico 7 – SLE finale



Nota: I valori indicati di deformazione fanno sempre riferimento alla composizione delle deformazioni nelle tre direzioni $U_x+U_y+U_z$.

Riepilogo delle sollecitazioni massime sulle aste

Trave Sezione numero 1 Rett. puntoni cm 14x24

Sforzo normale	Min asta 5 12	-82.5 [kg]	Comb. 2	Max asta 18 25	5802.7 [kg]	Comb. 2
Taglio piano 1-2	Min asta 79 87	-1115.9 [kg]	Comb. 2	Max asta 10 31	1196.0 [kg]	Comb. 2
Taglio piano 1-3	Min asta 78 86	-182.3 [kg]	Comb. 4	Max asta 70 86	184.2 [kg]	Comb. 4
Momento torcente	Min asta 7 14	-80.8 [kgm]	Comb. 2	Max asta 2 9	80.8 [kgm]	Comb. 2
Momento Flet. piano 1-2	Min asta 41 65	-1201.4 [kgm]	Comb. 2	Max asta 3 10	46.0 [kgm]	Comb. 2
Momento Flet. piano 1-3	Min asta 70 86	-95.9 [kgm]	Comb. 4	Max asta 78 86	94.5 [kgm]	Comb. 4

Trave Sezione numero 2 Rett. colmo cm 10x12

Sforzo normale	Min asta 86 87	-179.5 [kg]	Comb. 4	Max asta 89 90	438.6 [kg]	Comb. 4
Taglio piano 1-2	Min asta 86 87	-281.8 [kg]	Comb. 2	Max asta 90 91	281.8 [kg]	Comb. 2
Taglio piano 1-3	Min asta 85 86	-2.6 [kg]	Comb. 5	Max asta 91 92	2.4 [kg]	Comb. 5
Momento torcente	Min asta 90 91	-7.7 [kgm]	Comb. 2	Max asta 86 87	7.7 [kgm]	Comb. 2
Momento Flet. piano 1-2	Min asta 86 87	-62.9 [kgm]	Comb. 2	Max asta 90 91	117.6 [kgm]	Comb. 2
Momento Flet. piano 1-3	Min asta 89 90	-1.5 [kgm]	Comb. 4	Max asta 89 90	1.5 [kgm]	Comb. 4

Trave Sezione numero 3 Rett. arcarecci cm 10x12

Sforzo normale	Min asta 78 79	-66.1 [kg]	Comb. 4	Max asta 73 74	65.5 [kg]	Comb. 4
Taglio piano 1-2	Min asta 30 31	-279.9 [kg]	Comb. 2	Max asta 30 31	279.9 [kg]	Comb. 2
Taglio piano 1-3	Min asta 54 55	-77.5 [kg]	Comb. 2	Max asta 58 59	77.5 [kg]	Comb. 2
Momento torcente	Min asta 6 7	-9.6 [kgm]	Comb. 2	Max asta 2 3	9.6 [kgm]	Comb. 2
Momento Flet. piano 1-2	Min asta 30 31	-174.9 [kgm]	Comb. 2	Max asta 2 3	85.7 [kgm]	Comb. 2
Momento Flet. piano 1-3	Min asta 33 34	-34.4 [kgm]	Comb. 4	Max asta 24 25	34.3 [kgm]	Comb. 4

Biella Sezione numero 1 Rett. catena cm 14x20

Sforzo normale	Min asta 11 17	-5291.4 [kg]	Comb. 2	Max asta 9 15	-263.5 [kg]	Comb. 3
Taglio piano 1-2	Min asta 9 15	-48.5 [kg]	Comb. 1	Max asta 9 15	48.5 [kg]	Comb. 1
Taglio piano 1-3	Min asta 9 15	0.0 [kg]	Comb. 1	Max asta 9 15	0.0 [kg]	Comb. 1

Biella Sezione numero 2 Rett. piatto mm 4x60

Sforzo normale	Min asta 19 91	-356.0 [kg]	Comb. 4	Max asta 20 90	736.4 [kg]	Comb. 4
Taglio piano 1-2	Min asta 19 91	-5.2 [kg]	Comb. 1	Max asta 19 91	5.2 [kg]	Comb. 1
Taglio piano 1-3	Min asta 86 16	-0.0 [kg]	Comb. 2	Max asta 9 87	0.0 [kg]	Comb. 2

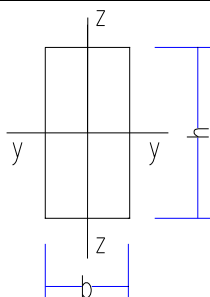
Trave sez.1) Puntoni della capriata

La sezione reale delle travi è cm 14x24 con tasche ad intaglio sui due lati di cm 2. Quindi verifico un sezione efficace cm 12x24 ridotta per intagli.

Legno Lamellare - GL24h	b (cm)	h (cm)	12,0	24,0
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CLASSE DI SERVIZIO	2
DURATA DEL CARICO	breve

γ_m	K_{mod}	K_{def}
1,45	0,90	0,80



sollecitazioni massime:	
N-traz.	-0.8 kN
N+compr.	58.1 kN
Ty	12.0 kN
Tz	1.9 kN
Mtorc	81 kNcm
My	1201 kNcm
Npressfles	-
Mz	96 kNcm

geometria:	
Lunghezza di calcolo	3,60 m
Loy	3,60 m
Loz	3,60 m
Kcrit	1,000
kc,z	0,3408
kc,y	0,8831

Eo,g,mean	Eo,g,05	E90,g,mean	Gg,mean
11.500 MPa	9.600 MPa	300 MPa	650 MPa

Resistenze di progetto:

f_{m,y,d}	f_{m,z,d}	f_{t,0,d}	f_{t,90,d}	f_{c,0,d}	f_{c,90,d}	f_{v,d}
16,33	-	-	-	14,90	-	2,17

Tensioni di progetto:

σ_{m,y,d}	σ_{m,z,d}	σ_{t,0,d}	σ_{t,90,d}	σ_{c,0,d}	σ_{c,90,d}	τ_{v,d}
10,50	-	-	-	2,02	-	0,63

Verifiche a Presso-Flessione: (verifica svolta in combinazione di carico 2)

$$\text{prima verifica di stabilità: } \frac{\sigma_{C,0,d}}{k_{C,Y} f_{C,0,d}} + \frac{\sigma_{M,Y,d}}{f_{M,Y,d}} < 1 \quad 0,80 < 1,00 \quad \text{verificato !}$$

$$\text{seconda verifica di stabilità: } \frac{\sigma_{C,0,d}}{k_{C,Z} f_{C,0,d}} + k_m \frac{\sigma_{M,Y,d}}{f_{M,Y,d}} < 1 \quad 0,85 < 1,00 \quad \text{verificato !}$$

$$\text{terza verifica di stabilità: } \left(\frac{\sigma_{M,d}}{k_{CRIT} f_{M,d}} \right)^2 + \frac{\sigma_{C,0,d}}{k_{C,Z} f_{C,0,d}} < 1 \quad 0,81 < 1,00 \quad \text{verificato !}$$

Verifica a Taglio: (verifica svolta in combinazione di carico 2)

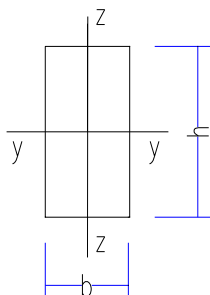
$$\text{verifica di resistenza: } \tau_{v,d} < f_{v,d} \quad 0,63 < 2,17 \quad \text{verificato !}$$

Trave sez.2) Verifica travetti di colmo

Legno Lamellare - GL24h	b (cm)	h (cm)	10,0	12,0
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CLASSE DI SERVIZIO	2
DURATA DEL CARICO	breve

γ_m	K_{mod}	K_{def}
1,45	0,90	0,80



sollecitazioni massime:	
N-traz.	-1.8 kN
N+compr.	4.4 kN
Ty	2.9 kN
Tz	0.1 kN
Mtorc	7 kNcm
My	118 kNcm
Mz	2 kNcm

geometria:	
Lunghezza di calcolo	2,35 m
Loy	2,35 m
Loz	2,35 m
Kcrit	1,000

E_{o,g,mean}	E_{o,g,05}	E_{90,g,mean}	G_{g,mean}
11.500 MPa	9.600 MPa	300 MPa	650 MPa

Resistenze di progetto:

f_{m,y,d}	f_{m,z,d}	f_{t,0,d}	f_{t,90,d}	f_{c,0,d}	f_{c,90,d}	f_{v,d}
16,39	-	-	-	-	-	2,17

Tensioni di progetto:

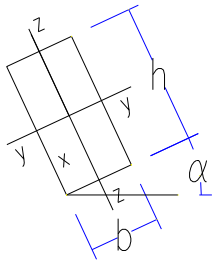
σ_{m,y,d}	σ_{m,z,d}	σ_{t,0,d}	σ_{t,90,d}	σ_{c,0,d}	σ_{c,90,d}	τ_{v,d}
5,00	-	-	-	-	-	0,36

Verifica a Flessione: (verifica svolta in combinazione di carico 2)verifica di resistenza: $\sigma_{m,y,d} < f_{m,y,d}$ 5,00 < 16,39 verificato !verifica di stabilità laterale: $\sigma_{m,y,d} < k_{CRIT} f_{m,y,d}$ 5,00 < 16,39 verificato !Verifica a Taglio: (verifica svolta in combinazione di carico 2)verifica di resistenza: $\tau_{v,d} < f_{v,d}$ 0,36 < 2,17 verificato !

Trave sez.3) Verifica arcarecci di falda (p=15°)

Legno Lamellare - GL24h	b (cm)	h (cm)	10,0	12,0
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CLASSE DI SERVIZIO	2	γ_m	K_{mod}	K_{def}
DURATA DEL CARICO	breve	1,45	0,90	0,80



sollecitazioni massime:	
N-traz.	-0.7 kN
N+compr.	0.7 kN
Ty	2.8 kN
Tz	0.8 kN
Mtorc	9 kNcm
My	175 kNcm
Mz	34 kNcm

geometria:	
Lunghezza di calcolo	2,35 m
Loy	2,35 m
Loz	2,35 m
Kcrit	1,000

E_{o,g,mean}	E_{o,g,05}	E_{90,g,mean}	G_{g,mean}
11.500 MPa	9.600 MPa	300 MPa	650 MPa

Resistenze di progetto:

f_{m,y,d}	f_{m,z,d}	f_{t,0,d}	f_{t,90,d}	f_{c,0,d}	f_{c,90,d}	f_{v,d}
16,39	16,39	-	-	14,90	-	2,17

Tensioni di progetto:

σ_{m,y,d}	σ_{m,z,d}	σ_{t,0,d}	σ_{t,90,d}	σ_{c,0,d}	σ_{c,90,d}	τ_{v,d}
7,50	2,00	-	-	0,06	-	0,36

Verifica a Flessione Deviata: (verifica svolta in combinazione di carico 2)

prima verifica di resistenza: $\frac{\sigma_{M,Y,d}}{f_{M,Y,d}} + k_m \frac{\sigma_{M,Z,d}}{f_{M,Z,d}} < 1$ 0,54 < 1,0 verificato !

seconda verifica di resistenza: $k_m \frac{\sigma_{M,Y,d}}{f_{M,Y,d}} + \frac{\sigma_{M,Z,d}}{f_{M,Z,d}} < 1$ 0,44 < 1,0 verificato !

verifica di stabilità laterale: $\sigma_{m,y,d} < k_{CRIT} f_{m,y,d}$ 7,50 < 16,39 verificato !

Verifica a Taglio: (verifica svolta in combinazione di carico 2)

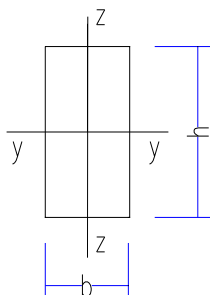
verifica di resistenza: $\tau_{v,d} < f_{v,d}$ 0,36 < 2,17 verificato !

Biella sez.1) Catena della capriata

Legno Lamellare - GL24h	b (cm)	h (cm)	14,0	20,0
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CLASSE DI SERVIZIO	2
DURATA DEL CARICO	breve

γ_m	K_{mod}	K_{def}
1,45	0,90	0,80



sollecitazioni massime:	
N-traz.	-53.0 kN
N+compr.	-
Ty	0.5 kN
Tz	-
Mtorc	-
My	-
Mz	-

geometria:	
Lunghezza di calcolo	6,90 m

E_{o,g,mean}	E_{o,g,05}	E_{90,g,mean}	G_{g,mean}
11.500 MPa	9.600 MPa	300 MPa	650 MPa

Resistenze di progetto:

f_{m,y,d}	f_{m,z,d}	f_{t,0,d}	f_{t,90,d}	f_{c,0,d}	f_{c,90,d}	f_{v,d}
-	-	13,11	-	-	-	2,17

Tensioni di progetto:

$\sigma_{m,y,d}$	$\sigma_{m,z,d}$	$\sigma_{t,0,d}$	$\sigma_{t,90,d}$	$\sigma_{c,0,d}$	$\sigma_{c,90,d}$	$\tau_{v,d}$
-	-	1,89	-	-	-	0,03

Verifica a Trazione: (verifica svolta in combinazione di carico 2)verifica di resistenza: $\sigma_{t,0,d} < f_{t,0,d}$ $1,89 < 13,11$ verificato !Verifica a Taglio: (verifica svolta in combinazione di carico 2)verifica di resistenza: $\tau_{v,d} < f_{v,d}$ $0,03 < 2,17$ verificato !

La sollecitazione max 3,6 kN di trazione viene affidata al nastro forato.