



EUROVECAP 4.0

**Software for the structural calculation of
pre-stressed R.C. elements**





EUROVECAP 4.0

SOFTWARE FOR THE STRUCTURAL CALCULATION OF PRE-STRESSED R.C. ELEMENTS

- Eurovecap 4.0 is a robust and reliable software tool for the design of pre-stressed r.c. elements

Eurovecap is a computer program specifically developed to design, dimension and verify isostatic pre-stressed elements with bonded tendons, with or without collaborating screed.

- Eurovecap is the result of more than 20 years of updating

The program Eurovecap is born in half of the 90's, within a commitment of the company in computational programming aimed at perfecting and enhancing the design flow. Since then, Eurovecap is being evolving by implementing the main functionalities of other programs initially developed for internal use of the consultant.

- Eurovecap is today the reference software for the design of pre-stressed r.c. elements

Since then, Eurovecap experienced a spread diffusion among the technicians of pre-stressed concrete design, initially in Italy and later abroad, up to becoming the reference program for the calculation of pre-stressed concrete elements. It has attained today its 4th release.

- It is available in English, French and Italian

It is available in the following languages: English, French and Italian. The calculation methodology can be chosen between the approach of the Eurocodes or of the Italian structural code (NTC).

- It is based on calculation methodologies in accordance with the most advanced European normative

In addition to Eurovecap, the consultant produced several computer programs the calculation of for precast components, among which a tool for the verification of r.c. cross-sections subjected to bi-axial bending, a tool for the calculation of the thermal properties of precast concrete panels, a tool for the calculation of the thermal properties of the whole building, a tool for the calculation of the safety lines for the assemblage phase of precast elements.

- DLC consulting offers several additional programs solving complementary issues to the Eurovecap users



DESCRIPTION OF FUNCTIONALITIES

- Actions

The structural element, bare or with collaborating screed, can be subjected to distributed actions having linear variation or to concentrated forces or moments.

- Calculations performed according to uniaxial bending with checks at ULS for bending and shear and at SLS for deflection, stress and crack opening considering different phases

The element is studied as a simply supported isostatic (statically determined) beam with or without overhangs. Its geometry is described by trapezoids in the definition phase. The program solves the flexural behaviour of the element with reference to uniaxial bending, evaluating bending and shear strength at ULS and checking deflection, stresses and crack opening at SLS for all phases of the element, including lifting and transport.

- Graphical identification of the design deficiencies for a rapid check

All checks are clearly reported, highlighting those that do not align with the latest code provisions contained in the Eurocode 2 (UNI EN 1992-1-1/2005) or in the Italian NTC. The reference code can be selected between these two.

- Complete and customisable output calculation report in pdf or MS word

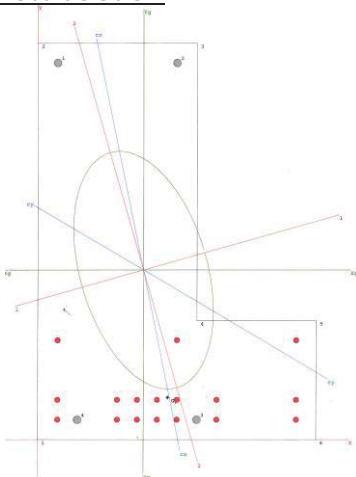
The software generates a customisable calculation report with pdf or MS word processing which contents can be selected among both input and output data.

- Available in different languages both for visualisation and for output calculation report

It is possible to choose the language (English, French or Italian) both for the software visualisation and for the calculation reports. The language of the program and of the report can be different.

- Section for optimisation of the position of pre-stressing for elements having asymmetric cross-section

For asymmetric elements or to study open profiles, a proper section is provided in the menu, in which the cross-section may be defined by points, including the definition of internal cavities. The horizontal position of the designed tendons can be optimised in order that the position of the centre of mass of the pre-stressing reinforcement is as close as possible to the conjugated axis of the section.



- Reliability guaranteed

The full description of the basic principle, field of application and normative references are reported in the user's manual of the software, together with solved case studies compared with solutions from the results of literature or other software.

- Section of description of material properties – pre-stressing steel

Caratteristiche dell'acciaio armonico

Ramo superiore inclinato Ramo superiore orizzontale

Modulo di elasticità E_p N/mm²

Tensione caratt. all'1% di def. sotto carico $f_p(1)k$ N/mm²

Tensione caratteristica di rottura f_{pk} N/mm²

Tensione di tessatura σ_{spi} N/mm²

Deformazione caratt. sotto carico massimo ϵ_{uk} %

Deformazione ultima di progetto dell'acciaio ϵ_{ud} %

Fattore di sicurezza parziale γ_p

Coefficiente di omogeneizzazione

Istantaneo iniziale al rilascio dei trefoli (Ep/Ec) $n_{p,iniz}$ Convenzionale per carichi di lunga durata (tenendo conto della viscosità) (Ep/Ec,eff) $n_{p,eff}$

 Calcolo automatico deformazione ultima di progetto

Diagramma tensioni - deformazioni dell'acciaio armonico

- Section of description of material properties – concrete

Caratteristiche calcestruzzo sezione

Resistenza a compressione caratteristica a 28 gg

R_{ck} N/mm² f_{ck} N/mm²

Resistenza a compressione caratteristica al taglio dei fili

R_{ckj} N/mm² f_{ckj} N/mm²

Resistenza media a trazione a 28 giorni

f_{ctm} N/mm²

al taglio dei fili

f_{ctmj} N/mm²

Fattore di sicurezza parziale γ_c

Fattore di riduzione della tensione di calcolo α

Calcolo automatico f_{ck} , f_{ctm} e parametri curva costitutiva

Diagramma tensioni - deformazioni del calcestruzzo sezione

ϵ_{c2} % ϵ_{cu2} %

n

- Section of description of the cross-section

Descrizione della sezione C.A.P. per trapezi

Nome sezione

Tabella trapezi della sezione C.A.P.

	Base Sup. (m)	Base Inf. (m)	Altezza (m)
▶	0,48	0,480	0,200
	0,480	0,270	0,105
	0,270	0,270	0,465
	0,270	0,480	0,060
	0,480	0,480	0,170
*			

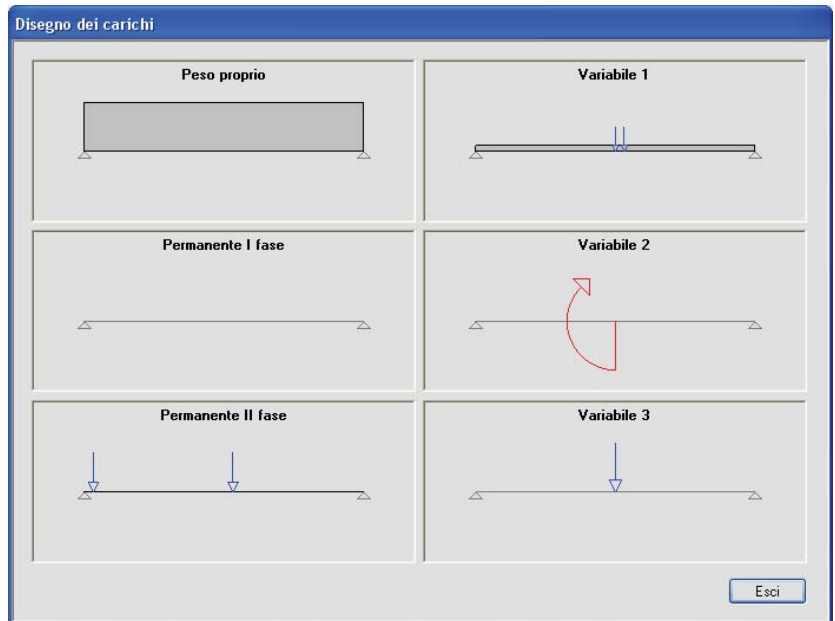
N° totale di trapezi

Altezza totale

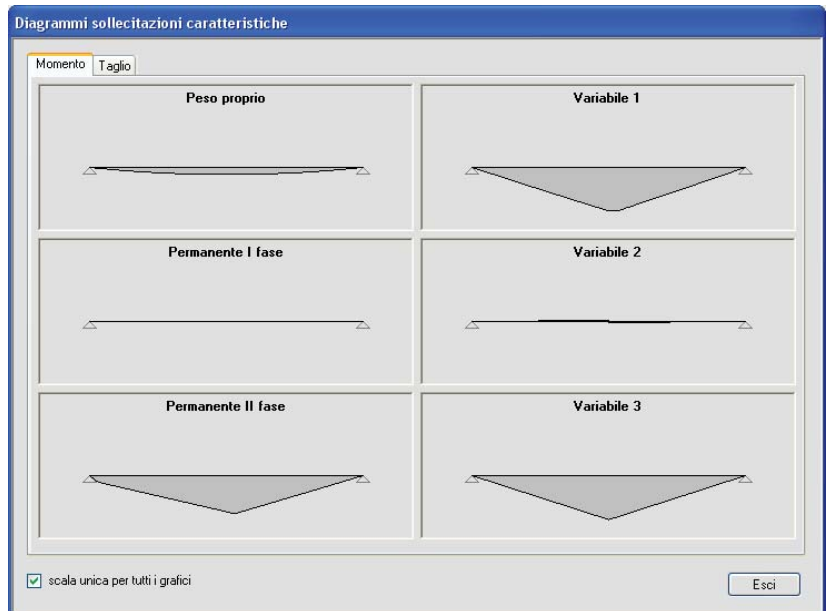
Larghezza massima

Descrivere la sezione procedendo dall'alto verso il basso. Unità di misura: metri.

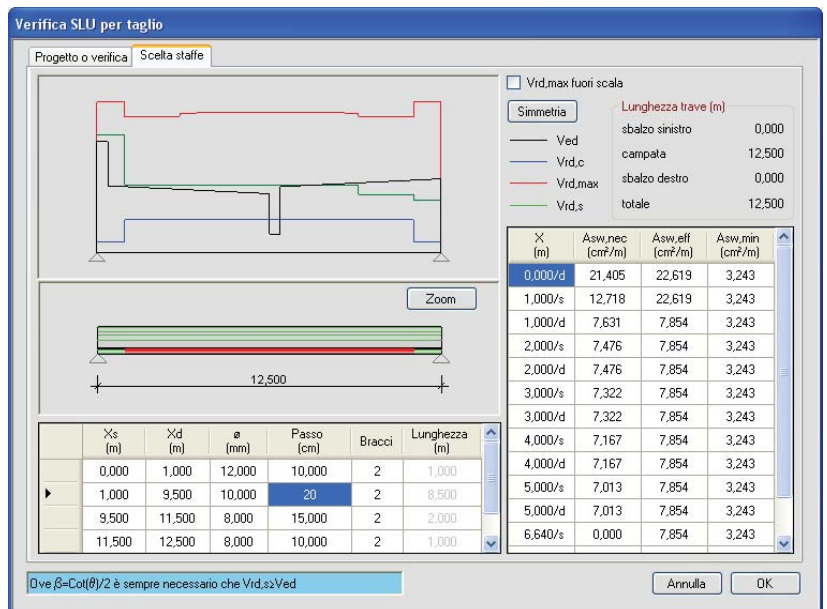
- Section of description of the external loads



- Section of diagrams



- Section of definition of the transversal reinforcement and check of shear strength



- Section of design and verification of the phases of lifting and transport

Posizione ganci e appoggi, caratteristiche dei materiali, forza di precompressione e coefficiente dinamico

Lunghezza totale: 12,500 m Peso proprio dell'elemento in cap: 114,07 kN
 Coefficiente dinamico ±: 0,150 Distanza del baricentro elemento dal bordo sinistro: 6,250 m

Fase di sollevamento Fase di trasporto

Posizione e forza nei singoli ganci

distanza del primo gancio dal bordo sinistro: 2,500 m
 distanza tra i ganci di sinistra: 1,250 m
 distanza dell'ultimo gancio dal bordo destro: 3,000 m
 distanza tra i ganci di destra: 1,500 m

ganci di sinistra: 25,35 kN
 ganci di destra: 31,69 kN

Caratteristiche del calcestruzzo

Rck: 55 N/mm² fck: 29,050 N/mm²
 n: 2,000 fctm: 2,935 N/mm²
 ρs2: 2,000 % ρsu2: 3,500 %
 γc: 1,400 α: 0,850

Coefficienti di omogeneizzazione

np: 7,00 ns: 7,00

Forza di precompressione

P = Pmi - Cp * (Pmi - Pmf) Cp: 0,000

 Calcolo automatico fck, fctm e parametri curva costitutiva

- Section of deflection check

Calcolo spostamenti

Sezione di verifica: 0,000, 1,000, 2,000, 3,000, 4,000, 5,000, **6,640**, 12,500

Modulo elastico cls:
 Eci: 30215,039 N/mm²
 Ecm: 35547,105 N/mm²
 Ecf: 41820,124 N/mm²

Valori di default

Spostamenti (dovuti alle azioni variabili):
 massimi
 minimi

spostamenti positivi verso il basso

Fase	Giorni	Probabili		Massimi		Minimi	
		Increment. (cm)	Totali (cm)	Increment. (cm)	Totali (cm)	Increment. (cm)	Totali (cm)
Pmi (el.)	0	-1,641	-1,641	-1,641	-1,641	-1,641	-1,641
Peso proprio (el.)	0	0,234	-1,406	0,234	-1,406	0,234	-1,406
Cadute di prec. (el.)	10	0,181	-1,225	0,181	-1,225	0,181	-1,225
Montaggio (visc.)	10	-1,617	-2,843	-2,555	-3,780	-0,797	-2,022
Perm. I fase (el.)	15	0,000	-2,843	0,000	-3,780	0,000	-2,022
Perm. II fase (el.)	15	0,887	-1,956	0,887	-2,893	0,887	-1,135
Tempo infinito (visc.)	>720	-0,305	-2,261	-0,482	-3,376	-0,150	-1,286
Comb. rara (el.)	>720	1,295	-0,966	1,295	-2,081	1,295	0,009
Quasi Perm. (el.)	15	0,000	-1,956	0,000	-2,893	0,000	-1,135
Tempo infinito (visc.)	>720	-0,305	-2,261	-0,482	-3,376	-0,150	-1,286
Comb. rara (el.)	>720	1,295	-0,966	1,295	-2,081	1,295	0,009

- Resume of the sectional verifications per section

Verifiche singola sezione - 6,640/s

Scelta Sezione | Caratt. geometriche | SLU Flessione | SLU Taglio | SLE Tens. complessive | SLE Tens. per fasi | SLE Tens. riassuntive | SLE fessurazione

Fasi di verifica: Pmi, Pmf, Pkt.inf, Pkt.sup, p, q, f, r, Pmi+p, Pkf.sup+g, Pkf.sup+g+q, Pkf.sup+g+f, Pkf.sup+g+r, Pkt.inf+g, Pkt.inf+g+q, Pkt.inf+g+f, **Pkf.inf+g+r**

Risultati della verifica:
 Sollecitazioni: P = 2545,90 kN M = 2687,95 kN m

Tensioni (N/mm²):

Cl. sezione	Arm. di precompressione	Arm. ordinaria sezione
Sup	29,624	397,915
Inf	-1519,837	-447,410

Cl. getto: Arm. ordinaria getto

	Sup	Inf	Xn	Xn,g
Sup			0,478	
Inf				

Diagramma deformazioni

Sezione parzializzata Sezione interamente reagente

TITLE Eurovecap

VERSION 4.x

PRODUCER DLC Consulting S.r.l. - Via Teocrito 47 - Milano

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OUR REFERENCES



Companies using EUROVECAP	Location
Italy	
Antonio Basso prefabbricati	Treviso (TV)
Effegi	Ferentino (FR)
E.ma prefabbricati	Buscate (MI)
Edilgori	Orte (VT)
Foresi prefabbricati	Grottole (MC)
Manini prefabbricati	Assisi (PG)
MC prefabbricati	Cardano al Campo (VA)
MC-Manini prefabbricati	Somaglia (LO)
Pizzarotti	Parma (PR)
Sicep	Belpasso (CT)
Truzzi prefabbricati	Poggio Rusco (MN)
Zecca prefabbricati	Cosio Valtellino (SO)
France	
Eurobeton	St Siméon de Bressieux (Lyon)
Spain	
PRAINSA	Zaragoza
Tunisia	
Sicep	Sbikha - Kairouan

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