



RECTANGULAR SLAB

FINITE ELEMENT ANALYSIS AND DESIGN OF
RECTANGULAR SLAB PANEL
DESIGN | DETAILING | A01

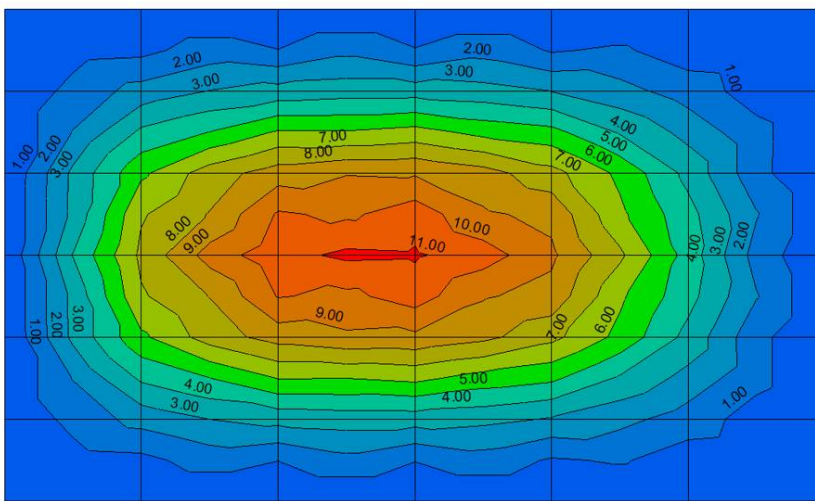
Summary

Design rectangular reinforced concrete flat slab panels with a variety of edge supports.

You can enter multiple load cases comprising of point loads, line loads, and UDLs, and combine these with ULS load factors.

The module calculates steel reinforcement using the formulae stipulated in the relevant design codes. Reinforcement is automatically added to the slab.

Long term deflections: Load case 1 (mm)



NOTE: Long term deflections to ACI318 9.5.2.3

Lx	(m)	14
Ly	(m)	8.2
Slab depth	(mm)	250
deff X-direction	(mm)	200
deff Y-direction	(mm)	220
Poisson's ratio		0.2
fck	(MPa)	25
fy	(MPa)	450
Density	(kN/m ³)	24
Self weight load factor		1.4
ψ _{cr} - creep factor (ACI318 :9.5.2.5)		2 ▼

Fixity of edges:

	Displacement	Rotation
Top Edge	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Bottom Edge	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Right Edge	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Left Edge	<input checked="" type="checkbox"/>	<input type="checkbox"/>

Paint contour diagrams

What makes this module special?

- Variety of edge supports
- Enter multiple load cases
- Automated bending schedule



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MEMBER	No OF	BARS PER MEMB	DIA	LENGTH	TOTAL NUM-BER	MARK	S.C	BENDING					
								A	B	C	D	Ex	
	1	42	Y10	2850	42	A	37	80					
		42	Y10	2850	42	B	20						
		41	Y10	1500	41	C	20						
		71	Y12	1750	71	D	20						
		70	Y12	1500	70	E	20						
		71	Y12	1750	71	F	20						
		70	Y12	1500	70	G	20						
		42	Y10	14850	42	H	20						
		57	Y10	9100	57	I	20						
		56	Y10	5000	56	J	20						

	8	10	12	16	20	25	32	40	TOT	Date
R										
Y		1052	407							1455
TOT		1052	407							1455

		Revision
http://www.prokon.com		Schedule No
		Slabbs

Detailed Description

Rectangular Slab designs rectangular or square reinforced concrete flat slab panels with a variety of edge supports to choose from, e.g., free, simply supported, or continuous. The module is suitable for designing slab panels with approximately rectangular or square layouts (use Sumo to design slabs with irregular panel layouts and openings).

Unfactored Loads			Unfactored Point Loads			Unfactored Line Loads				
Load case Number	Load Factor	UDL kN/m ²	P kN	x m	y m	L kN/m	x1 m	y1 m	x2 m	y2 m
1	1.4	2	4	4.19	6.45	4.10	2.44	4.05	10.03	6.65
	1.6	2	4	10.06	2.99	2	2.59	2.62	9.99	4.61
2	1.4	1	12	3.28	6.60					

Bending stresses and elastic deflection is calculated through a finite element analysis. When calculating the design bending moments, the module transforms the bending and torsional moments using the Wood and Armer equations.



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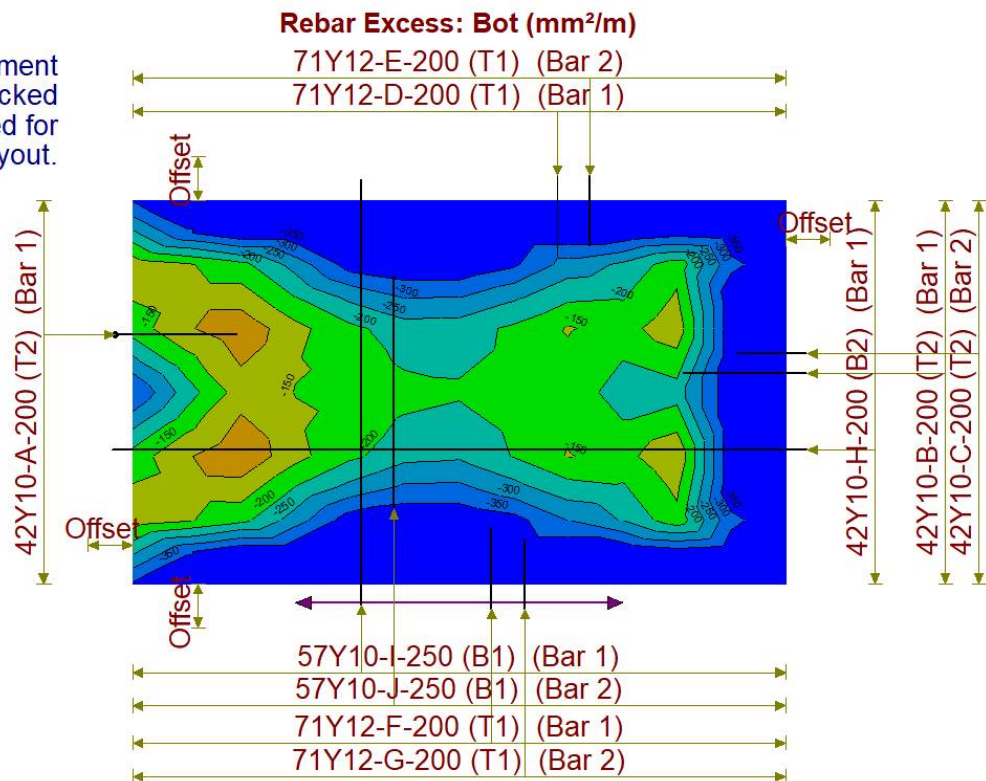
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Theory used in this module

The module calculates bending stresses and elastic deflection through a finite element analysis. Steel reinforcement is calculated using the formulae stipulated in the relevant design codes.

Elastic short-term deflections are calculated using the gross uncracked concrete section of the slab. When calculating long-term deflections, the module adjusts the stiffness of the slab based on the level of cracking, creep, and shrinkage. The calculation procedure is based on the approach in the American design code, ACI 318, which uses a time-dependent factor and for estimating creep behaviour.

Note: Default reinforcement should be checked and adjusted for suitability and layout.



Key Features

- Variety of edge supports
- Enter multiple load cases
- Automated Reinforcement
- Long term deflection



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Supported Design Codes

Design Codes

- ACI 318 - 1999
- ACI 318 - 2005
- ACI 318 - 2011
- ACI 318 - 2014
- ACI 318 - 2019
- AS 3600 - 2001
- AS 3600 - 2009
- AS 3600 - 2018
- BS 8110 - 1985
- BS 8110 - 1997
- CP 65 - 1999
- CSA A23.3-04 - 2010
- CSA-A23.3: 2019
- Eurocode 2 - 2004
- HK Concrete - 2004
- HK Concrete - 2013
- IS:456 - 2000
- NZ 3101 - 2006
- SABS 0100 - 2000
- SP 63.13330.2018