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PRESTRESSED SLABS - DEVELOPMENTS IN EUROPE

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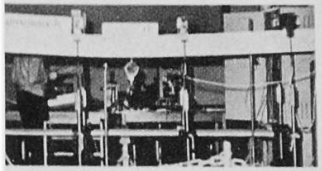
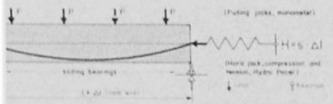
EARCH



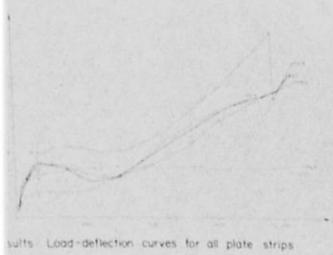
trip PS 4 – Test arrangement



ple of test arrangement for plate strips

	Plate thickness D [cm]	Plate strips thickness D [cm], width b [cm]					
		PS 1	PS 2	PS 3	PS 4	PS 5	[ ]
	3.60 ÷ 3.65	3.60	3.60	3.60	3.60	4.00	[cm]
	0.15	0.15	0.15	0.15	0.15	0.15	%
	free on all sides, line rocker bearings	∞	7.10^7	0	7.10^7	7.10^7	kg/m
		0	0	0	0.80	0	%
		1/20	1/20	1/20	1/20	1/33	
		1/29	1/29	1/29	1/29	1/47	

icteristics of test specimens

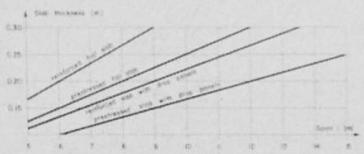


sults: Load-deflection curves for all plate strips

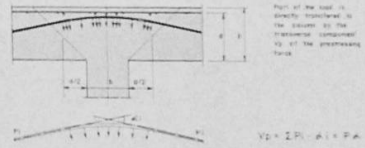
DESIGN

Scheme of load transfer by tendons

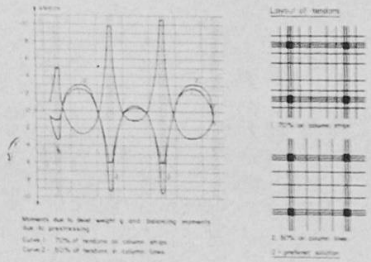
Slenderness of slabs



Punching mechanism

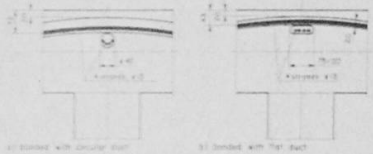


Distribution of tendons



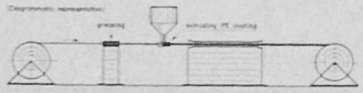
CONSTRUCTION

Excentricities

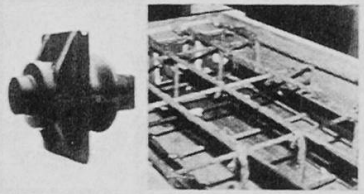


Unbonded monostrand

Extruding of unbonded monostrands



Monostrand stressing anchorage



EXAMPLES OF APPLICATION

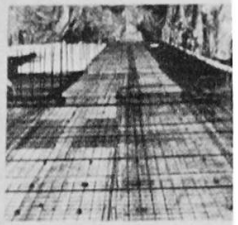
Multi-Storey Car Park, Saas-Fee, Switzerland

POST-TENSIONING WITH UNBONDED MONOSTRANDS

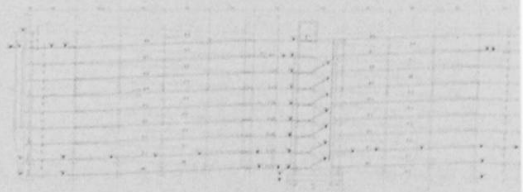
OWNER	Municipality of Saas-Fee
ENGINEER	Schneller-Schmidhalter-Ritz
CONTRACTOR	Aetnawerke & Kalbermatten AG
PRESTRESSING	Suiselectra AG Lyss/ch

Structure with 8 prestressed floors, 32.3 x 34.4 m each, for parking of 950 cars

Spans:	7.55/7.60 m
Thickness:	0.20 m
Loadings: dead load	2.0 kN/m²
live load	2.0 kN/m²
Prestressing steel:	3.7 kg/m²

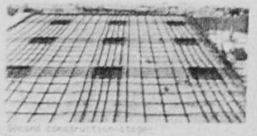


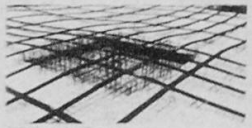
LONGITUDINAL SECTION



Underground Garage, Housing Complex Oed XII, Linz, Aus

POST-TENSIONING WITH BONDED TENDONS IN FLAT DUCTS





PRESTRESSED SLABS DEVELOPMENTS IN EUROPE

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The development of prestressed slabs in Europe was delayed in comparison with the USA and Australia.

Main reason for that delay was the missing of suitable standards and simplified design methods. With the research done (specially in Germany and Switzerland), standards and design methods could be established.

Today, recommendations are available in the United Kingdom (1) and have also been published by FIP (2). In Germany (3), Switzerland (4) and the Netherlands these standards are under preparation and will be issued shortly.

Most of the questions during the poster-session at the congress did concerne bonded versus unbonded solution, e.g. protection against corrosion, fire and earthquake behaviour.

Following the advantages respectively of unbonded and bonded systems.

Unbonded

- Maximum possible tendon drape
- No grouting required
- Corrosion protection of tendons also during transport, handling and placing
- Simple and fast placing of tendons
- Small friction losses
- Considerable dissipation of energy

Bonded

- Increased ultimate moment
- Local failures of tendons have only localised effects (e.g. in the case of fire, explosion and earthquake)

Finally, a summary of advantages of prestressed slabs:

. Economical
. Increased span lengths and span/depth ratios
. Reduced dead weights and building heights
. Deflection and crack free under permanent loading
. Improved punching shear resistance
. Reduced construction time due to early stripping

References:

1. Flat slabs in post-tensioned concrete with particular regard to the use of unbonded tendons-design recommendations.
Concrete Society Technical report No. 17, published 1979 by C & CA, Wexham Springs, Slough SL3 6PL.

2. Recommendations for the design of flat slabs in post-tensioned concrete (using unbonded and bonded tendons), FIP/2/5, May 1980, published by C & CA, Wexham Springs, Slough SL3 6PL.

3. DIN 4227, Teil 6 "Bauteile mit Vorspannung ohne Verbund"

4. SIA 162, Arbeitsgruppe 5, "Bruchverhalten von Platten"