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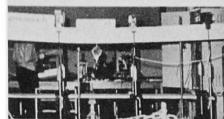
PRESTRESSED SLABS-DEVELOPMENTS IN EUROPE

P. Schluß
LOSINGER LTD
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SEARCH

The behaviour of prestressed concrete slabs
with 20 m slab depth in E. Switzerland
(Structural Engineering Service Federal
Institute of Technology Zurich, ETH)

2. A. LÖWEN, FRIEDEMIR AND TÜYÜK PLATE STRIPS
WITH CONSIDERATION OF UNBOUNDED TENDONS



trip PS 4 - Test arrangement

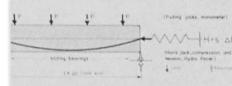


plate of test arrangement for plate strips

Number	Thickness of slab	Slab width thickness ratio with 1.0	Slab width thickness ratio with 0.5	Slab width thickness ratio with 0.25	Slab width thickness ratio with 0.125
1	1.00	1.00	1.00	1.00	1.00
2	1.25	1.25	1.25	1.25	1.25
3	1.50	1.50	1.50	1.50	1.50
4	1.75	1.75	1.75	1.75	1.75
5	2.00	2.00	2.00	2.00	2.00
6	2.25	2.25	2.25	2.25	2.25
7	2.50	2.50	2.50	2.50	2.50
8	2.75	2.75	2.75	2.75	2.75
9	3.00	3.00	3.00	3.00	3.00
10	3.25	3.25	3.25	3.25	3.25
11	3.50	3.50	3.50	3.50	3.50
12	3.75	3.75	3.75	3.75	3.75
13	4.00	4.00	4.00	4.00	4.00

Characteristics of test specimens



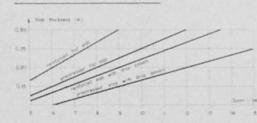
Graphs Load-deflection curves for all plate strips

DESIGN

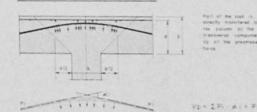
Scheme of load transfer by tendons



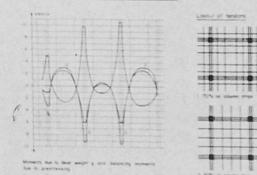
Slenderness of slabs



Punching mechanism

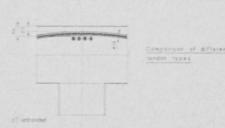
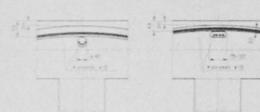


Distribution of tendons



CONSTRUCTION

Excentricities



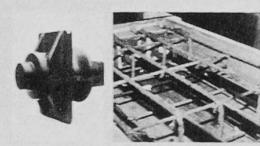
Unbonded monostrand



Extruding of unbonded monostrands



Monostrand stressing anchorage



EXAMPLES OF APPLICATION

Multi-Storey Car Park, Saas-Fee, Switzerland

POST-TENSIONING WITH UNBONDED MONOSTRINGS

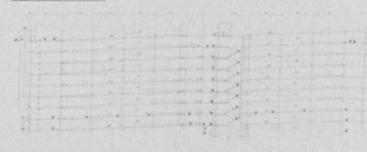
OWNER: Municipality of Saas-Fee
ENGINEER: Schmid Technik und Bauwirtschaft
CONTRACTOR: Aktiengesellschaft Betonbau AG, St. Gallen

PRESTRESSING:

- Span: 10.30 x 10.00 m
- Deck height: 0.80 m
- Concrete dead load: 2.0 t/m²
- Live load: 7.0 t/m²
- Prestressing stress: 3.7 kN/dm



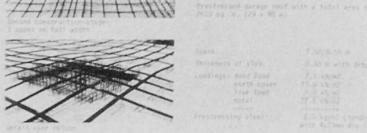
LONGITUDINAL SECTION



Underground Garage, Housing Complex Oed XII, Linz, Austria

POST-TENSIONING WITH BONDED TENDON IN FLAT SHEET

OWNER: Stadt Linz, Austria
ENGINEER: DPLG, Ing. H. Weissenböck
CONTRACTOR: Josef Kral & Sohn GmbH
PRESTRESSING: Schmid Technik und Bauwirtschaft



Reinforced garage roof with a total area of 2610 sq. m. (79 x 90 m)

- Dimensions of slab: 7.50 m wide x 30.00 m long
- Concrete dead load: 2.5 t/m²
- Concrete live load: 1.5 t/m²
- Soil load: 0.5 t/m²
- Total load: 4.5 t/m²
- Prestressing stress: 4.0 kN/dm with Autostress 400



PRESTRESSED SLABS DEVELOPMENTS IN EUROPE

Peter Schlub
Project Engineer
Losinger Ltd.,
Berne, Switzerland

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"