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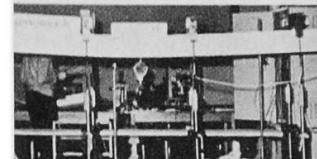
PRESTRESSED SLABS-DEVELOPMENTS IN EUROPE

P Schub
LOSINGER LTD
Berne - Switzerland

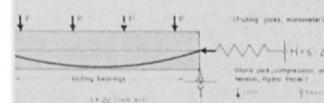
SEARCH

THE DEVELOPMENT OF PRESTRESSED CONCRETE SLABS
D.M.A. Dr. H. Röhl, Inst. für Stahlbau
und Strukturmechanik (ETH), Zürich, 1975

W. A. JONES: PLATE STRIPS AND PLATE STRIPS
POST-TENSIONED WITH UNBONDED TENDONS



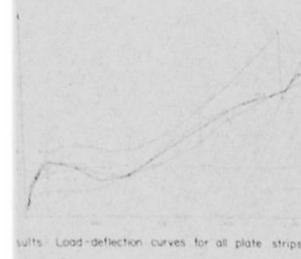
trip PS 4 - Test arrangement



Example of test arrangement for plate strips

Slab No.	Plates, mm	Plate strip thickness, mm, width 1.0 m
PS 1	8.00 x 3.00	0.15
PS 2	3.00	3.00
PS 3	3.00	3.00
PS 4	3.00	3.00
PS 5	1.00	1.00
PS 6	1.00	1.00
PS 7	1.00	1.00
PS 8	1.00	1.00
PS 9	1.00	1.00
PS 10	1.00	1.00
PS 11	1.00	1.00
PS 12	1.00	1.00
PS 13	1.00	1.00
PS 14	1.00	1.00
PS 15	1.00	1.00
PS 16	1.00	1.00
PS 17	1.00	1.00
PS 18	1.00	1.00
PS 19	1.00	1.00
PS 20	1.00	1.00
PS 21	1.00	1.00
PS 22	1.00	1.00
PS 23	1.00	1.00
PS 24	1.00	1.00
PS 25	1.00	1.00
PS 26	1.00	1.00
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PS 30	1.00	1.00
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PS 34	1.00	1.00
PS 35	1.00	1.00
PS 36	1.00	1.00
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PS 80	1.00	1.00
PS 81	1.00	1.00
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PS 95	1.00	1.00
PS 96	1.00	1.00
PS 97	1.00	1.00
PS 98	1.00	1.00
PS 99	1.00	1.00
PS 100	1.00	1.00

Characteristics of test specimens



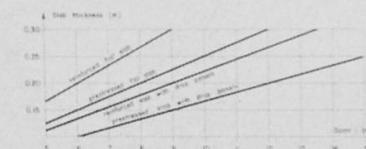
Results: Load-deflection curves for all plate strips

DESIGN

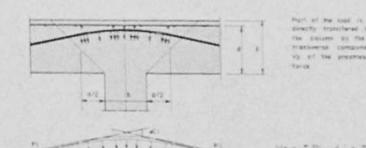
Scheme of load transfer by tendons



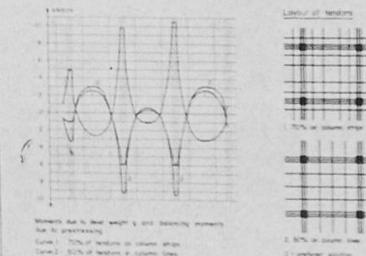
Slenderness of slabs



Punching mechanism

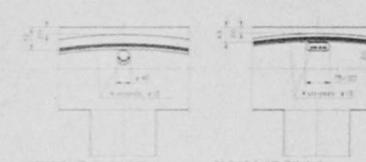


Distribution of tendons



CONSTRUCTION

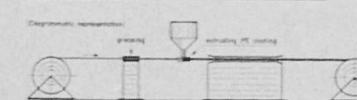
Excentricities



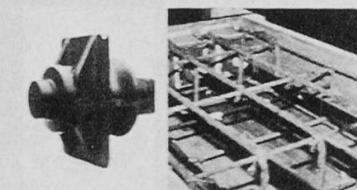
Unbonded monostrand



Extruding of unbonded monostrands



Monostrand stressing anchorage



EXAMPLES OF APPLICATION

Multi-Storey Car Park, Saas-Fee, Switzerland

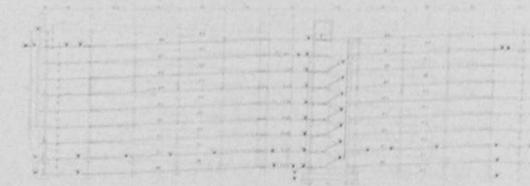
POST-TENSIONING WITH UNBONDED MONOSTRANDS

OWNER: Municipality of Saas-Fee
ENGINEER: Schmidleitner & Partner AG
CONTRACTOR: Ateliers de la Chaux-de-Fonds AG
PRESTRESSING: Spannerton AG Lyssach

Span: 7.50/7.60 m
Thickness: 0.20 m
Loadings: dead load 2.0 kNm/m
live load 7.0 kNm/m
Prestressing load: 3.7 kNm/m



LONGITUDINAL SECTION



Underground Garage, Housing Complex Oed XII, Linz, Austria

POST-TENSIONING WITH BONDED TENDONS IN FLAT DUCTS

OWNER: Wohnungsbaubetrieb Linz
ENGINEER: Dipl. Ing. R. Heesemann
CONTRACTOR: Josef Pfeifl & Sohn Linz
PRESTRESSING: Sonderbau GmbH, Linz

Prestressed garage roof with a total area of 2610 sq. m. (79 x 90 m).
Second construction stage: 3 spans of 70 ft width.





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"