

Zeitschrift: IABSE congress report = Rapport du congrès AIPC = IVBH
Kongressbericht

Band: 11 (1980)

Artikel: Prestressed pressure tunnels and shafts

Autor: Uherkovich, Igor / Fink, Francis

DOI: <https://doi.org/10.5169/seals-11286>

Nutzungsbedingungen

Die ETH-Bibliothek ist die Anbieterin der digitalisierten Zeitschriften. Sie besitzt keine Urheberrechte an den Zeitschriften und ist nicht verantwortlich für deren Inhalte. Die Rechte liegen in der Regel bei den Herausgebern beziehungsweise den externen Rechteinhabern. [Siehe Rechtliche Hinweise.](#)

Conditions d'utilisation

L'ETH Library est le fournisseur des revues numérisées. Elle ne détient aucun droit d'auteur sur les revues et n'est pas responsable de leur contenu. En règle générale, les droits sont détenus par les éditeurs ou les détenteurs de droits externes. [Voir Informations légales.](#)

Terms of use

The ETH Library is the provider of the digitised journals. It does not own any copyrights to the journals and is not responsible for their content. The rights usually lie with the publishers or the external rights holders. [See Legal notice.](#)

Download PDF: 19.03.2025

ETH-Bibliothek Zürich, E-Periodica, <https://www.e-periodica.ch>

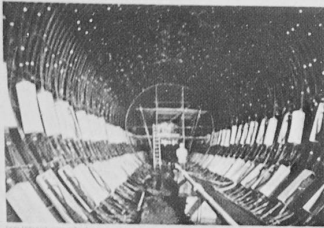


Photo: Tunnelbau - Projekt: Flughafen-Unterführung, St. Gallen, Switzerland, 1987/88

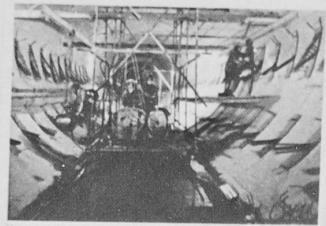
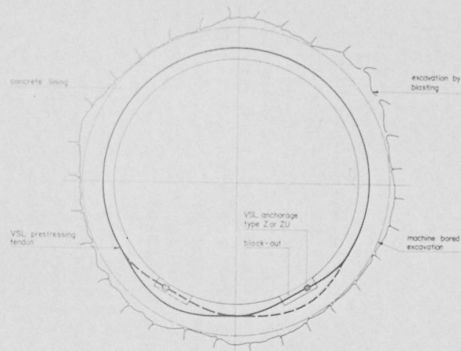
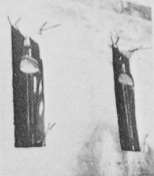


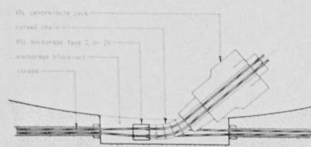
Photo: Tunnelbau - Projekt: Flughafen-Unterführung, St. Gallen, Switzerland, 1987/88

Stressing Anchorage

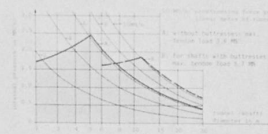


• VSL stressing anchorage type Z and ZU (ZU: ZU) • VSL stressing tendon • VSL prestressing tendon

Stressing Principle



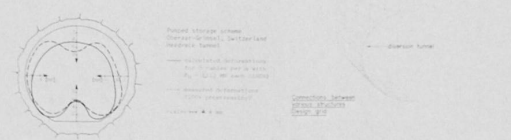
Range of Application



Prestressed Tunnel and Shaft Connections



Calculated / Measured Deformations



Representative Projects

PRESSURE TUNNELS

PIASTRA-ADDONDI, ITALY 1973/74	1200 m	1.2 m	1.2 m
TALINO, SARONNO, ITALY 1973/74	400 m	1.2 m	1.2 m
OSERAR-GRIMEL, SWITZERLAND 1971	100 m	1.2 m	1.2 m
CHIVASO-PIASTRA, ITALY 1974/75	400 m	1.2 m	1.2 m

SURGE SHAFTS

BRASINONE, ITALY 1973/74	10 m	1.2 m	1.2 m
TALINO, SARONNO, ITALY 1973/74	100 m	1.2 m	1.2 m
CHIVASO-PIASTRA, ITALY 1974/75	100 m	1.2 m	1.2 m



PRESTRESSED PRESSURE TUNNELS AND SHAFTS

Igor Uherkovich, Francis Fink
LOSINGER LTD., VSL International

Where in tunnels and shafts the lack of sufficient overburden does not permit the rock to accept the internal pressure, or where this pressure is so high that the watertightness is in doubt although the stability of the tunnel shell is not in question, the structure is usually provided with a steel lining. Very often, however, transportation to remote sites as well as difficult installation condition make such a lining very expensive. The idea was to use the already existing concrete backfill as an autonomous lining without the need of a steel shell. This is possible with the help of the prestressing technique, using annular tendons acting like barrel hoops. To avoid the need of buttresses to anchor the tendons a special "floating" type of anchorage and the relevant stressing equipment as shown on the opposite page have been developed.

Many problems in the structural design and the construction had to be solved since in view of the often unpredictable behaviour and embedment the design and construction of underground constructions cannot entirely be carried out on the basis of the principles applied for open-air structures. Prestressed tunnel linings subject to high water pressures require a special treatment of the contact surface between rock and concrete. After pressing the resulting gap between rock and concrete has to be filled using the traditional grouting techniques. Also important is the use of a suitable formwork construction to ensure a complete concrete filling.

The proposed solution is not only limited to straight cylindrical sections of tunnels and shafts but can also be applied economically for tunnel and shaft connections, by-passes, etc.

A number of prestressed pressure shaft and surge chamber projects have been carried out successfully using this method. Noticeable reductions in construction time and cost savings were achieved. Although all completed projects were done in highly developed countries, still further advantages can be expected by using this solution in developing countries.