

Prestressed pressure tunnels and shafts

Autor(en): **Uherkovich, Igor / Fink, Francis**

Objektyp: **Article**

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

Band (Jahr): **11 (1980)**

PDF erstellt am: **23.09.2024**

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

Nutzungsbedingungen

Die ETH-Bibliothek ist Anbieterin der digitalisierten Zeitschriften. Sie besitzt keine Urheberrechte an den Inhalten der Zeitschriften. Die Rechte liegen in der Regel bei den Herausgebern.

Die auf der Plattform e-periodica veröffentlichten Dokumente stehen für nicht-kommerzielle Zwecke in Lehre und Forschung sowie für die private Nutzung frei zur Verfügung. Einzelne Dateien oder Ausdrucke aus diesem Angebot können zusammen mit diesen Nutzungsbedingungen und den korrekten Herkunftsbezeichnungen weitergegeben werden.

Das Veröffentlichen von Bildern in Print- und Online-Publikationen ist nur mit vorheriger Genehmigung der Rechteinhaber erlaubt. Die systematische Speicherung von Teilen des elektronischen Angebots auf anderen Servern bedarf ebenfalls des schriftlichen Einverständnisses der Rechteinhaber.

Haftungsausschluss

Alle Angaben erfolgen ohne Gewähr für Vollständigkeit oder Richtigkeit. Es wird keine Haftung übernommen für Schäden durch die Verwendung von Informationen aus diesem Online-Angebot oder durch das Fehlen von Informationen. Dies gilt auch für Inhalte Dritter, die über dieses Angebot zugänglich sind.

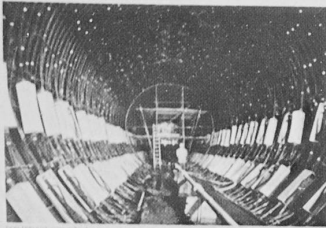


Photo: Tunnelbau - Projekt: Flughafen-Unterführung, St. Gallen

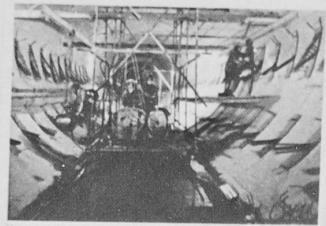
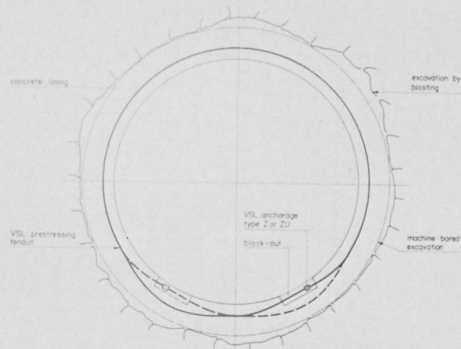
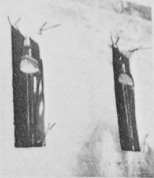


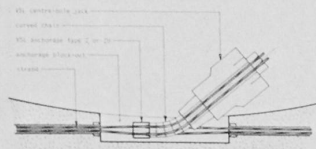
Photo: Tunnelbau - Projekt: Flughafen-Unterführung, St. Gallen

Stressing Anchorage

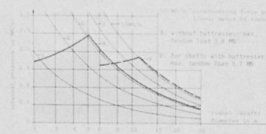


• VSL stressing anchorage type Z and ZU (block type)
• VSL stressing tendon (steel)
• VSL prestressing tendon

Stressing Principle



Range of Application



Prestressed Tunnel and Shaft Connections

Pumped storage scheme (Zürich-Münche, Italy)



Calculated / Measured Deformations



Calculated deformations
Measured deformations
Comparison of calculated and measured deformations

Representative Projects

PRESSURE TUNNELS

PIASTRA-ADDONDI, ITALY 1973/74	1200 m	1.2 m	1.2 m
Max. internal pressure	1.2 MPa	1.2 MPa	1.2 MPa
TALINO, SARONNO, ITALY 1973/74	400 m	1.2 m	1.2 m
Max. internal pressure	1.2 MPa	1.2 MPa	1.2 MPa
OSERAR-GRIMEL, SWITZERLAND 1971	100 m	1.2 m	1.2 m
Max. internal pressure	1.2 MPa	1.2 MPa	1.2 MPa
CHIVASSO-PIASTRA, ITALY 1974/75	400 m	1.2 m	1.2 m
Max. internal pressure	1.2 MPa	1.2 MPa	1.2 MPa

SURGE SHAFTS

BRASINONE, ITALY 1972/74	100 m	1.2 m	1.2 m
Max. internal pressure	1.2 MPa	1.2 MPa	1.2 MPa
TALINO, SARONNO, ITALY 1973/74	400 m	1.2 m	1.2 m
Max. internal pressure	1.2 MPa	1.2 MPa	1.2 MPa
CHIVASSO-PIASTRA, ITALY 1974/75	400 m	1.2 m	1.2 m
Max. internal pressure	1.2 MPa	1.2 MPa	1.2 MPa



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 conditions 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.