

# **Parallel strand stays. Static and fatigue strength**

Autor(en): **Xercavins, P. / Mondorf, P.E.**

Objekttyp: **Article**

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

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

PDF erstellt am: **08.05.2024**

Persistenter Link: <https://doi.org/10.5169/seals-11364>

## **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.



# PARALLEL STRAND CABLE STAYS - STATIC AND FATIGUE STRENGTH

P. XERCAVINS  
Technical Advisor, E.P.  
P.E. MONDORF  
Chief Engineer, M.Sc.

## RESUME

THE 7-WIRE STRAND USED IN PRESTRESSING CABLES MAY ALSO BE USED FOR CABLE STAYS PROVIDED THAT CERTAIN MEASURES ARE TAKEN TO ENSURE ADEQUATE FATIGUE STRENGTH.

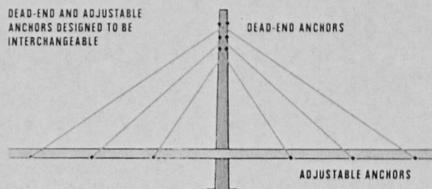
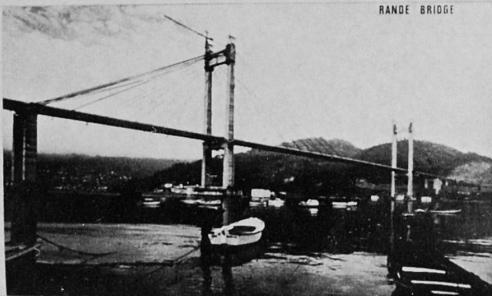
THESE MEASURES HAVE BEEN TESTED IN LABORATORIES AND THE RESULTS HAVE SHOWN THAT WITH PARALLEL STRANDS, CABLE STAYS OF THIS TYPE CAN HAVE VIRTUALLY THE SAME FATIGUE STRENGTH AS THAT OF THE INDIVIDUAL STRANDS OF WHICH THEY ARE CONSTITUTED.

TYPE	FORCE		45% G.U.T.S.	100% G.U.T.S.
	T kN	T kN		
37H15	441	4326	980	9613
61H15	727	7132	1616	15853
81H15	1084	10634	2410	23642

61H15 CABLE



RANDE BRIDGE



POLYETHYLENE SHEATH

DAMPER

STRAND POSITIONER

BEARING PLATE

NUT

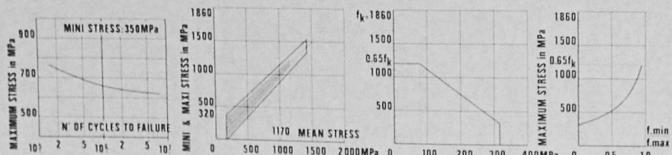
CAP

CEMENT GROUTED PARALLEL STRANDS

RESIN OR CEMENT GROUT FILLING

TAKING UP OF THE SLACK IN EACH STRAND USING SINGLE STRAND JACK

ADJUSTABLE ANCHOR



SMITH DIAGRAM AT  $2 \times 10^5$  CYCLES

MAXIMUM PERMISSABLE STRESS ACCORDING TO STRESS VARIATION IN: ABSOLUTE VALUE RELATIVE VALUE

## PARALLEL STRAND STAYS - STATIC AND FATIGUE STRENGTH

P. XERCAVINS

P.E. MONDORF

Technical Advisor, E.P.  
FREYSSINET INTERNATIONAL  
PARIS, FRANCE

Chief Engineer, M.Sc.  
FREYSSINET INTERNATIONAL  
PARIS, FRANCE

A type of stay has been developed using parallel prestressing strand anchored by special stay anchor devices which comprise the following parts :

- an anchorage block, which makes it possible to anchor the strands either by 3-piece jaws and wedge action, or by swaged grips,
- a trumpet, which permits the strands to arrive to the anchor block with the right angle and spacing,
- a trumpet extension (heavy steel pipe) the length and gauge of which have been selected in order to reduce the range of stresses transmitted to the anchorage,
- a light steel pipe used to extend the stay anchor device for structural reasons.

The stay anchor devices exist both in fixed and adjustable versions. In the adjustable version part of the trumpet length is replaced by a steel tube with an outer thread which allows adjustment by turning a collar. The anchors are filled with resin after stressing.

The bundle of parallel strands is enclosed by a polyethylene pipe which after the final stressing of the stay is filled with cement grout for protection against corrosion.

Generally a neoprene damper is inserted between the light steel pipe and the structure in order to restrict wind induced oscillations in the stays.

The strands may be threaded and tensioned one by one or the whole stay may be preassembled.

The stay cable may be assembled from parallel steel stands conforming to current standards for prestressed concrete strand, but additional fatigue requirements have to be specified. Typical WOHLER-curve and SMITH diagram for good quality prestressing strand are shown on the poster.

The static and dynamic strength of the described stay type has been checked through tests of models containing up to 19 strands of 15 mm nominal diameter undertaken by official laboratories in various countries. Such tests have shown that a fatigue life expectancy of  $2 \times 10^6$  cycles may be safely admitted within the performance band traced inside the SMITH-diagram of the individual strand.

From the performance band a linear relationship is deducted between the safe values of upper stress and stress range as shown graphically. The safe upper stress is also shown as a function of the ratio between stress range and upper stress.

The tests have further shown that the dynamic properties of a bundle of parallel strands are similar to those of a bundle of parallel wires.

Discussions around the POSTER concerned especially the dynamic strength of the stays, their durability, construction methods, damping of wind oscillations etc...

Parallel strand stays were used for such bridges as the BROTONNE bridge in FRANCE and RANDÉ bridge in SPAIN, both built in the late seventies.