CIVIL ENGINEERING MUSEUM OF IST

Exhibition on Portuguese Bridges

A tribute to Edgar Cardoso

June 15 - December 22, 2026 (Except August)

7th fib Congress, Lisbon, June 15-19, 2026

Exhibition on Portuguese Bridges

A tribute to Edgar Cardoso

Themes:

- Edgar Cardoso
- Bridge over Tagus River
- Other steel bridges
- Eminent engineers
- Historic documents on bridges and other constructions
- Vasco da Gama Bridge
- Júlio Appleton
- Bridges over the Zambezi and Save rivers in Mozambique
- GPBE - Portuguese Group on Structural Concrete
- fib - International Federation of Structural Concrete
- Portuguese bridges from romans to 1998
- Watercolour paintings by Fernando Silva Ferreira

The catalogue select some of the documents and objects of the exhibition.

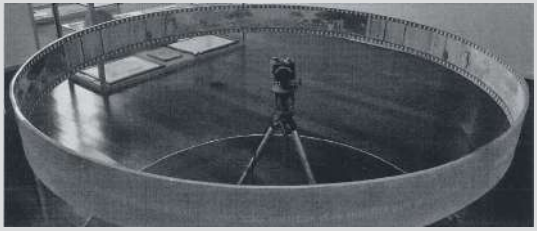
Civil Engineering Museum of IST
Portuguese Bridges
A tribute to Edgar Cardoso

The 7th *fib* Congress will take place at Culturgest, with additional initiatives hosted at the Instituto Superior Técnico (IST), University of Lisbon (UL). One of these initiatives is the exhibition Portuguese Bridges: *A Tribute to Edgar Cardoso*, dedicated to one of Portugal's most influential bridge designers and a former professor at IST. The exhibition is curated by Júlio Appleton, himself a structural engineer, former IST professor, and recipient of the fib Medal of Merit.

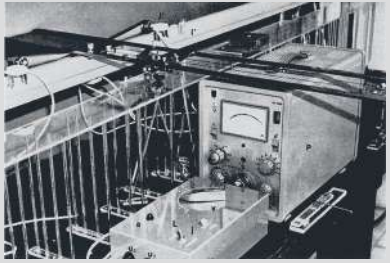
The exhibition will be on display at the Civil Engineering Museum of IST-UL throughout the 7th *fib* Congress. It features models, photographs, drawings, books, medals, and film footage documenting the construction of major Portuguese bridges, including the *Arrábida Bridge* over the Douro River (1959-1963). The bridges were selected by Júlio Appleton, and the exhibited items were collected by him over the course of his professional career. While not intended to be an exhaustive overview of all major bridges or distinguished Portuguese engineers of the twentieth century, the exhibition offers a carefully curated perspective on landmark works in Portuguese bridge engineering, with particular emphasis on Edgar Cardoso's legacy.

Edgar Cardoso

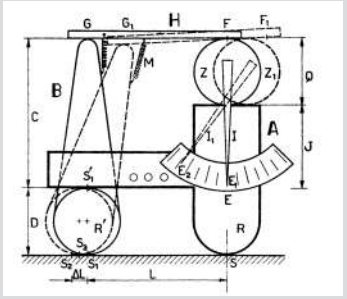
Instruments



Rotating Total Station



Mechanical - Electronic autoinfluenciograph



Mechanical Extensometers

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Portuguese Bridges
A tribute to Edgar Cardoso

Civil Engineer (FEUP 1937)
Engineer at JAE(1938-1951)
Full Professor of Bridges at IST (1951-1983)

Author of studies on more than 500 bridges, some of them famous and record-breaking, in Portugal, Mozambique, Angola, Macau, such as the Arrábida, Mosteiró and S. João bridges over the Douro River, the bridges over the Save and Zambezi rivers in Mozambique, the bridge over the Kwanza River in Angola and the Macau-Taipa bridge. Author of other special structures, such as a set of large buildings for the Coimbra University (faculties of Medicine, Mathematics and Humanities), the Sheraton Hotel and Aviz office skyscraper buildings in Lisbon and of the Funchal Airport runway extension over the sea (author of the 1st extension and conceptual design of the 2nd extension).

Author of several projects for the widening and strengthening of historic bridges with steel decks, including strengthening by prestressing.

Expert in the use of scale models for the design of highly complex and statically indeterminate structures. He created a structural testing laboratory and developed several instruments for the high-precision measurement of strains, displacements and rotations, both in physical models and in real structures. He developed the “autoinfluenciógrafo” — an automatic influence-line recorder — to obtain influence lines from scaled physical models.

25th of April Bridge over Tagus River in Lisbon

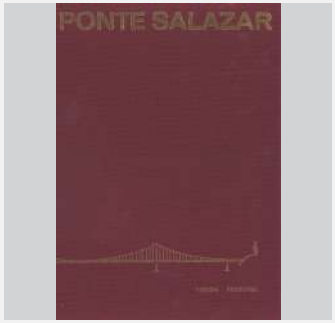
Historical proposals, Documents and memoralia

Date: 1966.

Location: IP7 Bridge over Tagus River between Lisbon and Almada.

Characteristics: 2277m suspended steel bridge with a central span of 1012,9m.The main towers are supported by reinforced concrete caissons, (on the south side 82,5m deep). The Alcântara viaduct with a total length of 947m has 76m prestressed concrete spans constructed by balanced cantileevers cast in situ.

Design and Construction: Steinman, Boynton, Gronquist, Tudor/ United States Steel E.C., Sopol.



Books on the two construction phases: on the left, Salazar Bridge, 1st phase (1966); on the right, 25th of April Bridge with the introduction of the railway.

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At the top left, the Alcântara viaduct access during construction.
At the top midle, Alcântara Viaduct seen from South to North.
At the top right, Alcântara Viaduct railway line.

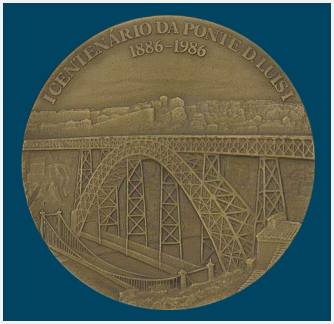
Commemorative medal for the inauguration of the Salazar bridge. (Nowadays, 25th of April)

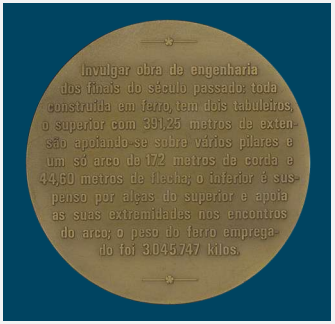
Other steel Bridges

Maria Pia Bridge over the Douro River

Above, sculpture of the Maria Pia bridge.

Below , the commemorative medal of the centenary of the Luis I Bridge.





Date: 1877. Not in use since 1991.

Location: Porto / Gaia.

Characteristics: Hinged steel arch railway bridge with a total length of 354m and a 160m span, 42,6m high arch. The width of the arch increases from the crown to the springs. The deck with spans of 28,7m to 37,4m was launched from the abutments.

Design and Construction: Seyrig / Eiffel.

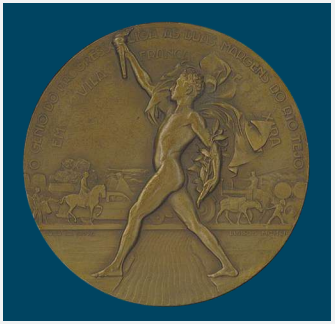
Marechal Carmona Bridge over the Tagus River

Date: 1951.

Location: Vila Franca de Xira.

Characteristics: 517,5m long bridge with steel bowstring decks with 103,5m spans supported by reinforced concrete piers. Access viaducts in reinforced concrete girder decks with 21m spans.

Design and Construction: Steinman, Boynton, Gronquist, Tudor/ United States Steel E.C., Sopol.

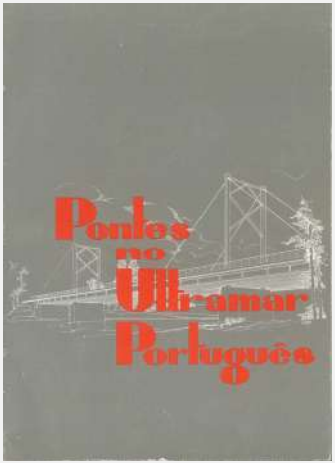


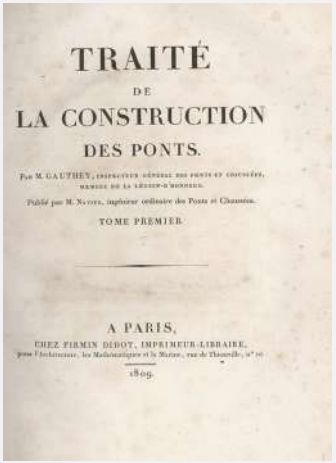
On the left, the illustrated book about the construction of the bridge and next, the commemorative medal of the inauguration of the Marechal Carmona Bridge.

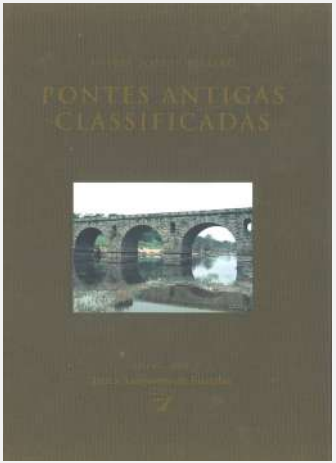
Historic Documents on Bridges and other Constructions

Documents and memoralia

Periodical of Public Works and Mines (1870, 1876);
Masonry Bridges(1809, 1813);
Aqueduct of Alcântara;
Le Béton Armé- Morsch;
Tejo Cement Industry;
Monier catalogue;
Vicente Ferreira- Bridges.




TRAITÉ
DE
LA CONSTRUCTION
DES PONTS.
TOME PREMIER.
A PARIS,
CHEZ FIRMIN DIDOT, IMPRIMEUR-LIBRAIRE,
1809.



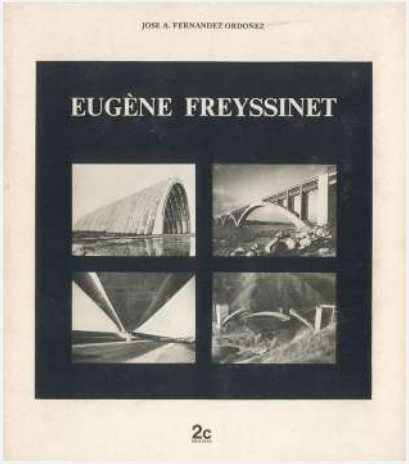
Historical documents about bridges and other constructions are essential for understanding the engineering and social advances of civilizations. These documents, frequently found in papers and books, detail the construction methods, the materials used, and the logistical challenges faced in constructions. They serve as valuable historical records that preserve knowledge for future generations.

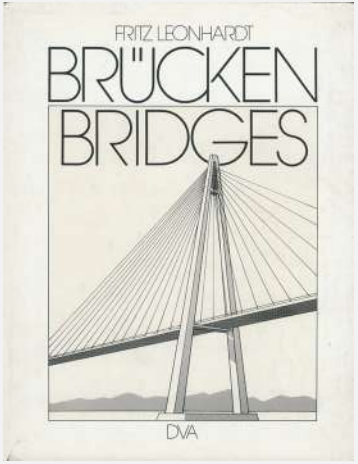
Eminent Engineers

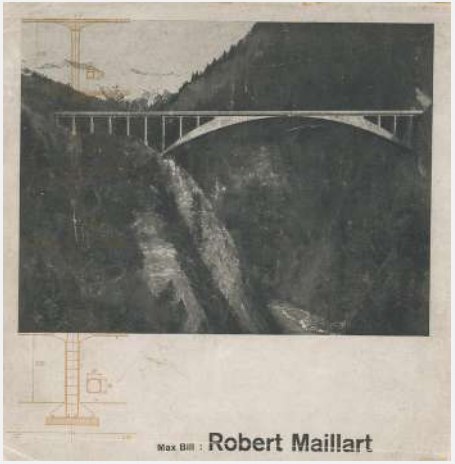
Documents and memoralia

Maillart (1872-1940);
Freyssinet (1879-1962);
Nervi (1891-1979);
Leonhardt (1913-2000);
Walther (1928);
Schlaich (1934-2021).

History has known many great engineers since the earliest civilizations. Determining who the 'best' are is probably an impossible task, but we recognize some engineers for their pioneering role in civil engineering as a profession. Some of them revolutionized many of the techniques that we still use today.







Vasco da Gama Bridge

Date: 1998.
Location: Lisbon.
Characteristics: 12,34km, of which 9,25km in the Tejo estuary, including the 830m Main Cable Stayed Bridge with a central span of 420m, the 6531m Central Viaduct with current prestressed concrete box girders 78,6m spans and the 3825m South Viaduct constructed with launching girders with spans of 45 m. Width of the deck of 29,3m. Pile foundations.
Concessionary: Lusoponte.

Design and Construction: Europe Études, Proponte/ Trafalger House, Campenon Bernard, Teixeira Duarte, Mota.

Edition of a commemorative coin for the inauguration of the bridge (the national currency at the time was still the escudo).

Júlio Appleton

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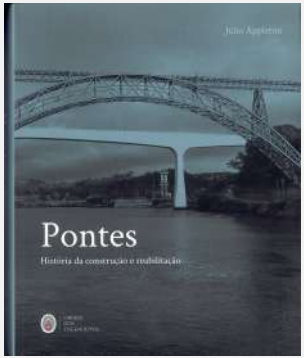


Academic and Professional degrees

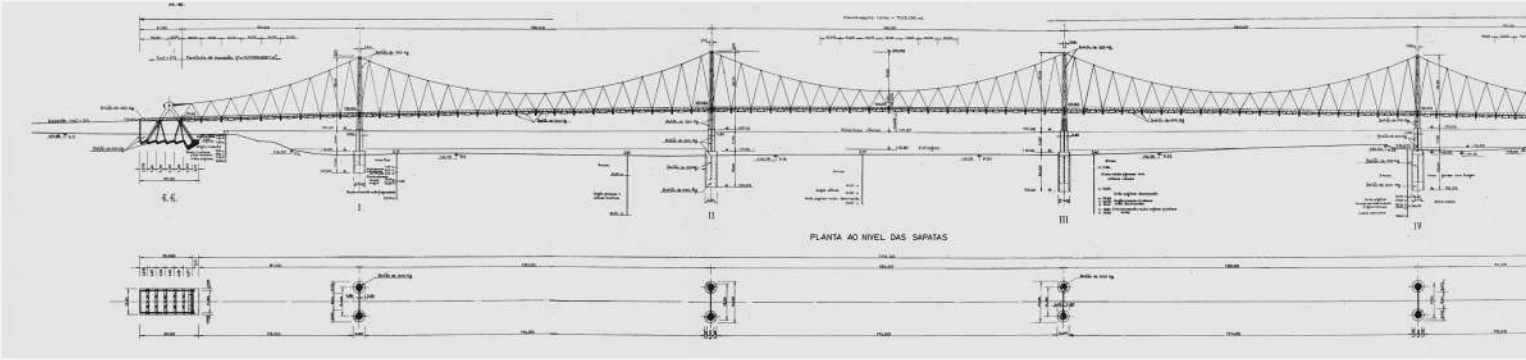
Graduation in Civil Engineering (IST – 1971)
MSc in Concrete Structures and Technology
(Imperial College – 1976)
PhD in Civil Engineering (Imperial College – 1979)
Full professor of Concrete Structures (IST – 1986)
Specialist in Structures - Institution of Engineers (1998).

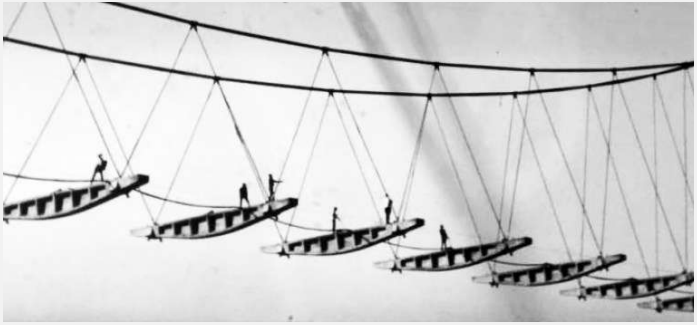
Curator of this exhibition, the objective is to present the historical framework of the construction of masonry , steel and concrete bridges, books and historical objects from his private collection.

He devoted a large part of his academic and professional life to the design and rehabilitation of bridges. Aiming to pass on the experience and knowledge he published several books on structures engineering.

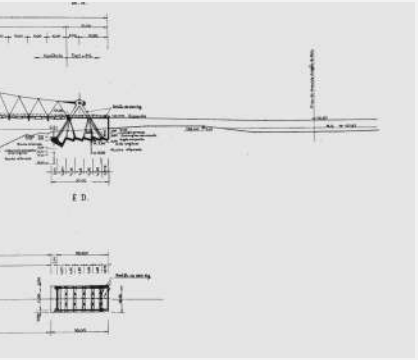
Bridges over the Zambezi and Save Rivers in Mozambique

Longitudinal section of Bridge over Zambezi River





Zambezi Bridge
to the left, side view of the prestressed reinforced concrete deck during assembly.
To the right, Reinforcement details of the bridge abutment.



Bridge Towers over the Save River

Bridge over Zambezi River

Date: 1972.

Location: Tete, Mozambique.

Characteristics: Multi-suspension bridge 90m+3x180m+90m without rigidity deck beam but with two longitudinal stiffening cables over the entire bridge, main funicular, cables and inclined hanger cables (similar to the Save Bridge 100m+3x210m+100m, dated from 1962). The deck with is a prestressed concrete girder10m span longitudinal beams. supported in cross beams. The hanger cables are anchored on the transverse beams and the funicular cables are fixed in the prestressed concrete abutments.

Design and Construction: Edgar Cardoso/Ermoque Empreiteiros de Maçambique, SARL.

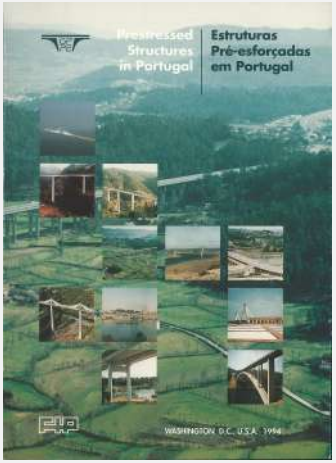
GPBE

Portuguese Group on Structural Concrete

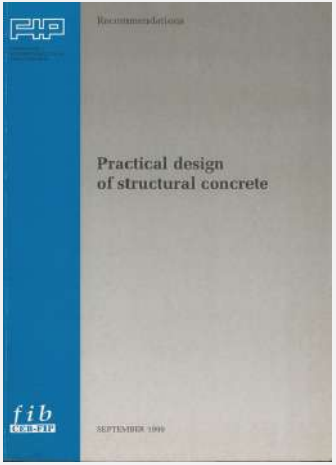
Documents and memoralia

Structural concrete constructions in Portugal (Quadrennial publication from 1994 to 2026); Congress Proceedings and memoralia.

Medal of the 2nd national meeting on prestressed structures.



Documents and memoralia



Model codes and Recommendations;
Guidance documents;
Bulletin d'information;
Structural Concrete-Journal of fib.

Portuguese Bridges from Romans to 1998

Vila Formosa Bridge over the Seda River on the old EN 369

Date: Century I / II
Location: EN 369, near Alter do Chão on the Roman Road connecting Lisbon to Merida.

Vasco da Gama Bridge over the Tagus River on the A12

Date: 1998
Location: Lisbon

Fernando Silva Ferreira

Watercolour paintings

Born 1951, an artist, mechanical engineer from IST and researcher at LNEC.
His work is represented in various museums, banks, municipalities, Institution of Engineers and LNEC.

He presented his work in various individual exhibitions, and he got several awards for his paintings.

Exhibition organization

Curator: Júlio Appleton
Technical Committee:
Eduardo Júlio, Jorge Proença, Albano Sousa
Design: Rui Luz
Video: Joana Appleton
Printing: prixartprintring S.P.A.

Lisbon, June 2026

CIVIL ENGINEERING MUSEUM OF IST

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