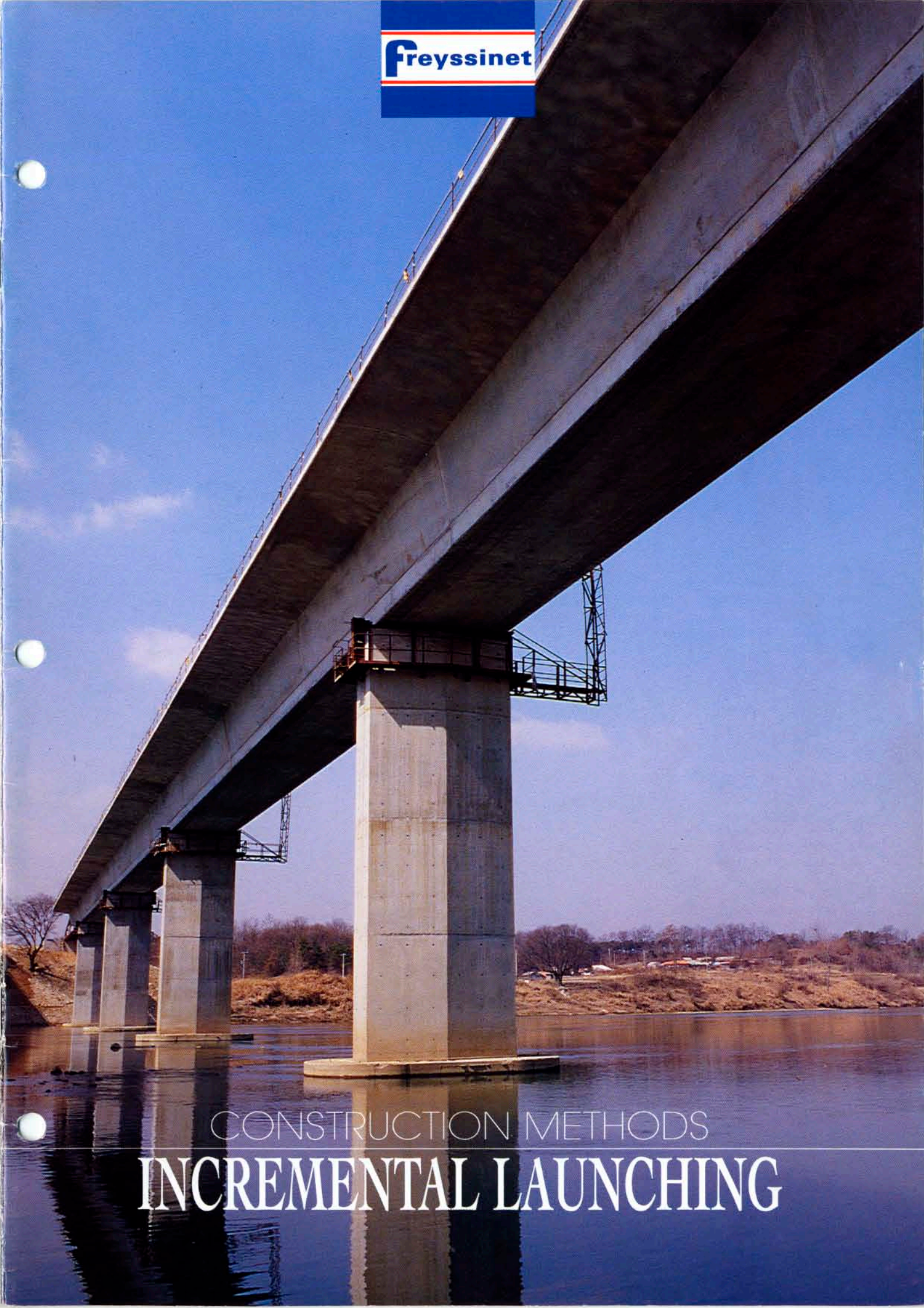


The logo for Freysinet, featuring the company name in a white, sans-serif font on a blue rectangular background with thin white horizontal lines above and below the text.

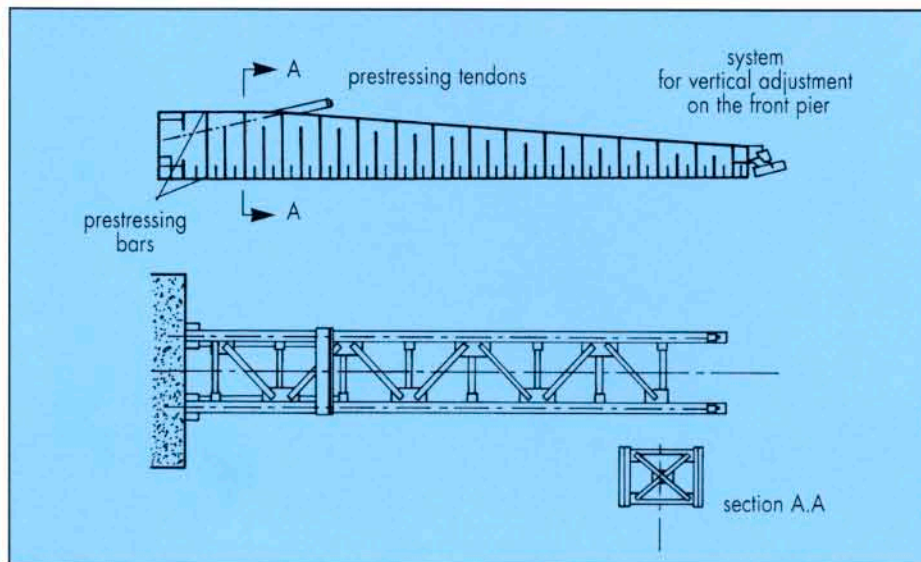
Freysinet

A large concrete bridge is shown under construction, spanning a wide river. The bridge consists of several tall, rectangular concrete piers supporting a long, continuous concrete beam. Scaffolding and construction equipment are visible on the bridge deck. The sky is clear and blue, and the river reflects the bridge and the sky. The overall scene is one of industrial construction in a natural setting.

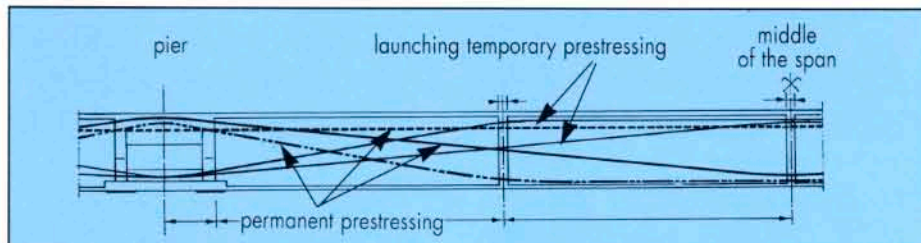
CONSTRUCTION METHODS  
**INCREMENTAL LAUNCHING**



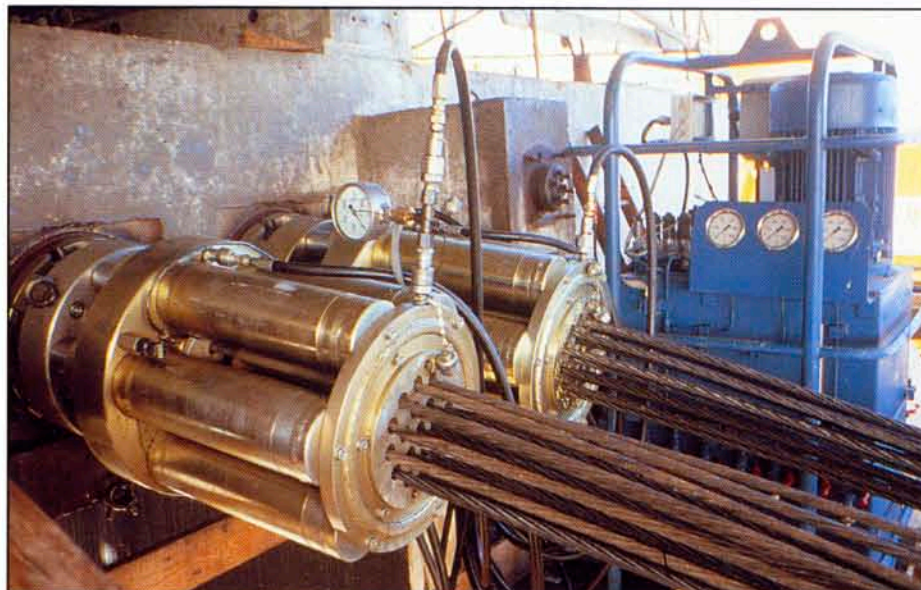
Jules Verne Viaduct - Amiens: launching nose



Launching nose



Typical prestressing layout



Jules Verne Viaduct - Amiens: launching hydraulic jacks

## ■ Prestressing

During the launching phase, the prestressing is centered, except at the deck extremity.

It can be achieved using two types of tendons:

- permanent tendons, internal or external;
- antisymmetrical tendons, in opposition to the permanent, external tendons, balancing the variations of bending moments during the launching phases.

## ■ External, detensionable prestressing

External prestressing, perfected by Freysinet, offers many advantages:

- simpler prefabrication, lighter structures;
- improvement of prestressing conditions (installation, grouting);
- possibility of inspecting and monitoring the structures: replacement of tendons if necessary;
- detensionable tendons, when ducts are grouted with petroleum wax.

## Launching equipment

Freysinet design and supply the special equipment and carry out the incremental launching of the structure:

- prefabrication bed and fixed or mobile formworks;
- launching beam;
- hydraulic jacks and automatic, electronic monitors;
- steel nose;
- sliding saddles and guiding devices.

## Special bearings

Two systems are used:

- 1 - Pulling system with strandlift jack (SL);
- 2 - Freysinet "Pushing Power Pack" (Pillar Bridge).

Pulling cables (strength in kN)			
Type of jack	Number of strands	15.7 Super strand Grade 1770 MPa	
		G.U.T.S.	Standard pulling force 50% G.U.T.S.
SL 12	1	265	132
SL 80	7	1 855	927
SL 150	12	3 180	1 590
SL 230	19	5 035	2 517
SL 450	37	9 805	4 902
SL 700	61	16 165	8 082
SL 1100	91	24 115	12 057



Pilar Bridge: general view

## PILAR BRIDGE

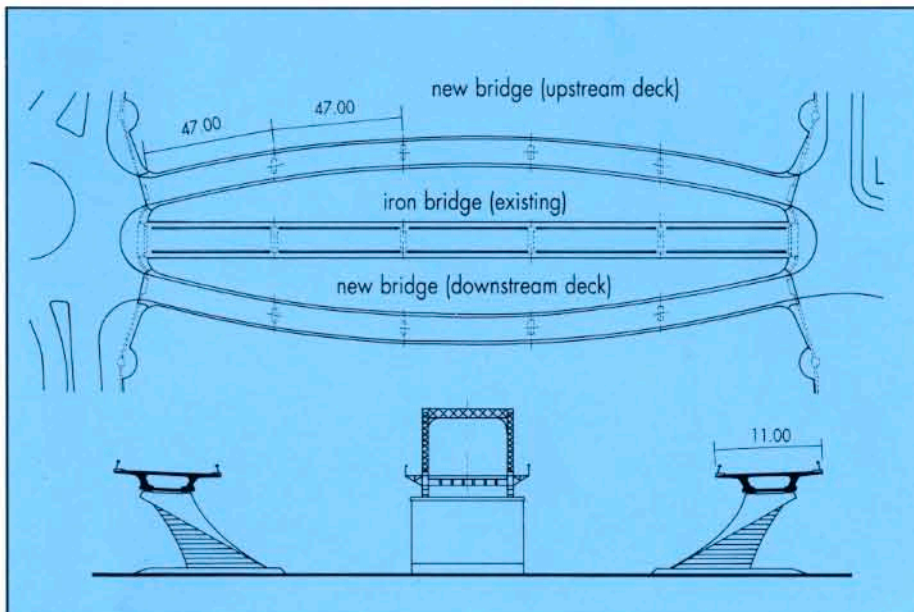
Saragossa - Spain

### Characteristics

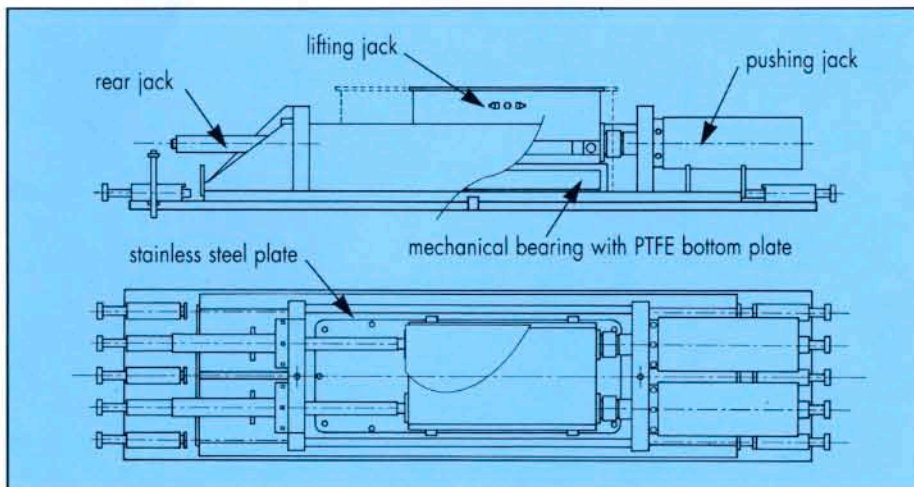
- Length: 2 bridges, each 235 m long.
- Total weight: 3,750 t.
- Spans: 5 x 47 m long spans per bridge.
- Radius of curvature:  $R = 460$  m.

### ■ Freysinet "Pushing Power Pack"

- Maximum horizontal force: 200 t.
- Maximum vertical force: 400 t.

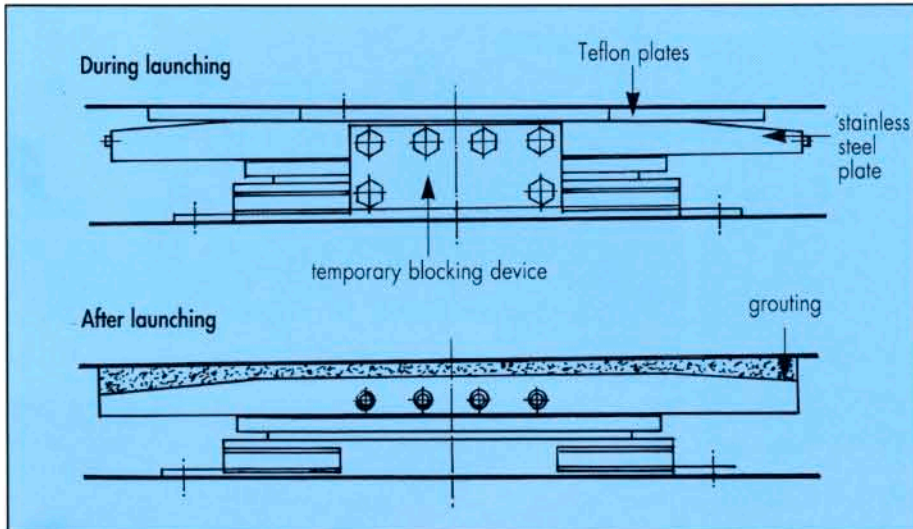


Plan view and Cross section



Freysinet "Pushing Power Pack"

- Client: Saragossa Municipality.
- Consultant: Carlos Fernandez Casado S.A.
- Contractor: OCISA.
- Prestressing and launching: Freysinet.



**Læwenberg bearings**



**Meys siez TGV Viaduct: general view**



**Meys siez TGV Viaduct: tensioning operations**

## LÆWENBERG VIADUCT

Switzerland

### Characteristics

Two viaducts

- Length: 665 m.
- Spans: 17 x 40.20 m long each.
- Total weight: 12,300 t.
- Straight alignment - Slope: 2.43 %.

#### ■ Launching

- Maximum force: 760 t.
- Hydraulic jacks: 4 x SL 230 type.
- Construction cycle: 7 days per 21 m long segment.

- Client: **Fribourg Canton.**
- Consultants: **GVH St Blaise S.A. and Brugger, Clement, Collaud.**
- Contractor: **Consortium L.H.L.S.C.**
- Incremental launching and mechanical bearings: **Freysinet.**

## MEYSSIEZ TGV VIADUCT

France

### Characteristics

- Length: 614 m.
- Spans: 13 x 49 m.
- Total weight: 18,860 t.
- Radius of curvature:  $R = 4,000$  m  
Slope: 1.8%.

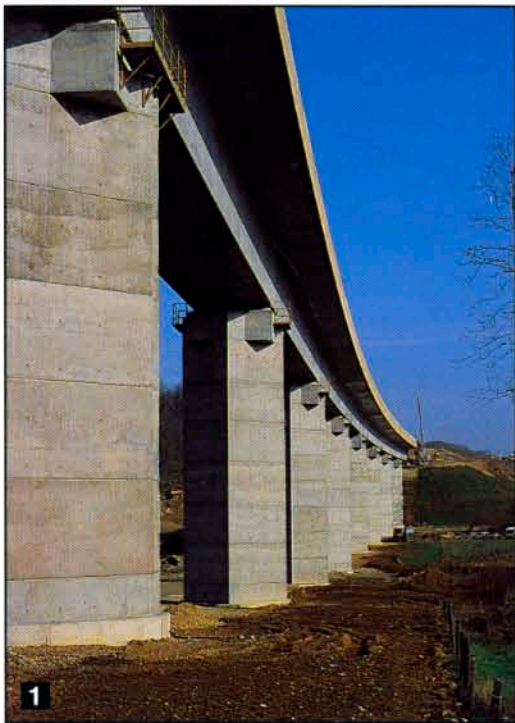
#### ■ Launching

- Maximum force: 950 t.
- Launching nose weight: 33 t.
- Hydraulic jacks.

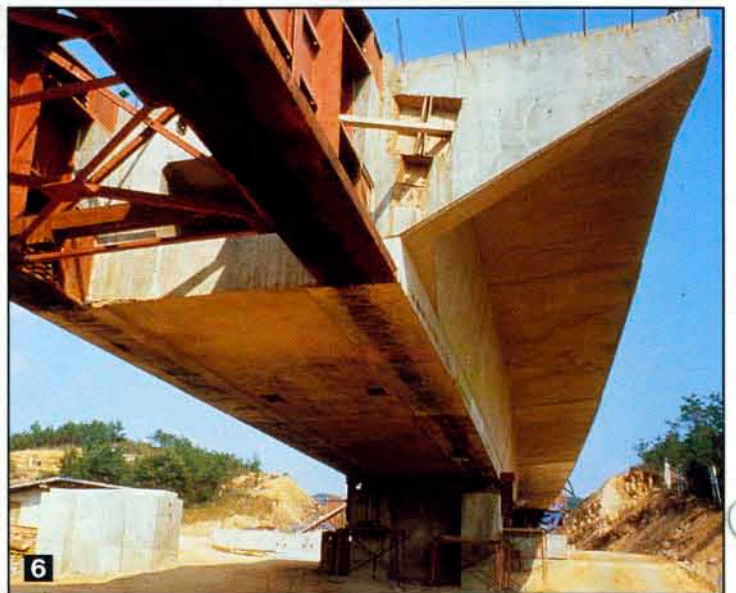
#### ■ Quantities

- Concrete: average depth: 0.98 m.
- Reinforcing steel: 124 kg/m<sup>3</sup>.
- Prestressing steel: 62 kg/ m<sup>3</sup>.

- Client: **SNCF (French Railways).**
- Consultant and Contractor: **Dumez.**
- Prestressing and launching: **Freysinet.**



CAD ID COMPO - PRINTED IN FRANCE



- Meys siez Viaduct (France) ①
- TGV Viaduct over the Saône river (France) ②
- Val de Durance Viaduct: external prestressing (France) ③
- Namhangang Bridge (Viel-Nam) ④
- Val de Durance Viaduct (France) ⑤
- Miho Bridge (Korea) ⑥

Photographs : Hausvirth  
Campeon Bernard SGE & Freyssinet Photographic Libraries