Example 3

BATAM TONTON CABLE STAYED BRIDGE INDONESIA

TDV was approached by VSL International in Bern Switzerland to assist in this project.
The bridge concept is an alternative to the original design which was envisaged as being constructed on full staging.

The Clients requirements to maintain the overall structural dimensions forced an extremely complex construction procedure.
The composite bridge deck comprises two, very light, concrete edge beams with transverse beams and a thin top slab. The stay cables which pass over two concrete A-Framed pylons support the composite deck on both sides.

TDV was part of the Consultant team and mainly responsible for the construction stage analysis, the full modelling, the structural analysis as well as the member design of this complex structure.

The photograph shows one of the last construction stages.

Modelling this cable-stayed-bridge was a very delicate procedure because of the very complicated sequence of construction stages which had to be simulated for the erection of every single segment:

The principles of the Construction Sequence are given below:
The edge-beams are cantilevered first.
The slab and the transverse beams are next concreted.
The transverse beams are individually pre-stressed.
The pre-stressing of the edge beams is applied in a few steps corresponding with the actual loading from the slab and cross-beams which are added to the deck at various stages.

The structural system of the main girder is therefore modelled as a grid, where the edge beams are composite, consisting of the edge beam itself and the subsequently assembled top slab.

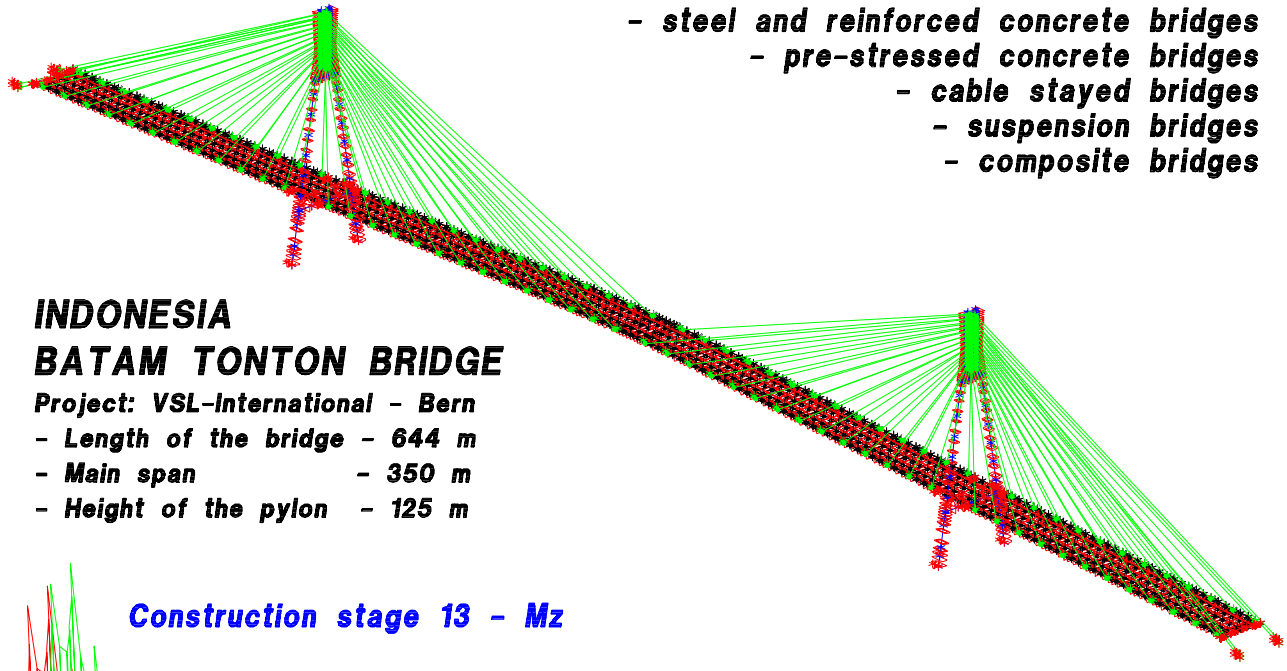
The drawings which show the structural modelling also include plots of the following:
- A moment diagram for both edge beams in a specific construction stage.
- Some typical 'eigenvectors' as an example from the dynamic analysis.
- Modelling of the pylon's head. This is a composite substructure with the outer columns being constructed in reinforced concrete and the central part, which houses the stay cable anchorages, being constructed in structural steel.

Contract:	Batam Tonton Bridge Indonesia
Client:	Indonesian Roads Authority
Consultant:	VSL International Switzerland
State of Construction:	Completed 1998
TDV Involvement:	General advice on construction stage analysis Member sizing check and modification Full Structural Analysis for Construction Stage and Final Stage Prestressed Concrete analysis 2nd Order Theory and Stability Dynamic analysis Full Ultimate Load Analysis Full deck pre-camber design The analysis was based on Indonesian standards. All computer application was based on TDV's RM SPACEFRAME software system.

PROGRAM SYSTEM RM – Spaceframe
Software for Bridge Engineering

ANATECH-SanDiego USA & Canada | **BT-Seoul** South Korea | **GIPAC-Coimbra** Portugal & Spain | **TDA-Oslo** Scandinavia

- steel and reinforced concrete bridges
- pre-stressed concrete bridges
- cable stayed bridges
- suspension bridges
- composite bridges

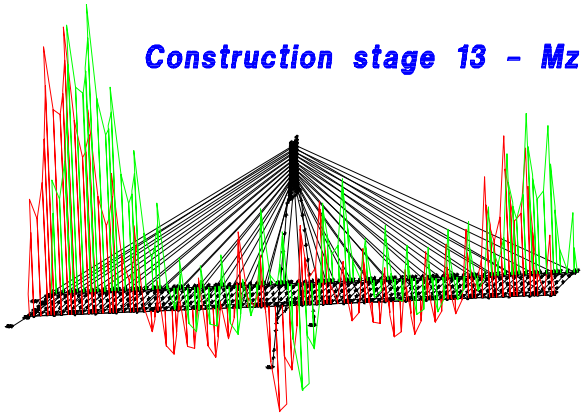


INDONESIA
BATAM TONTON BRIDGE

Project: VSL-International - Bern

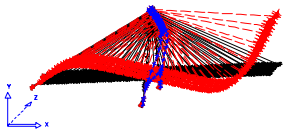
- Length of the bridge - 644 m
- Main span - 350 m
- Height of the pylon - 125 m

Construction stage 13 - Mz

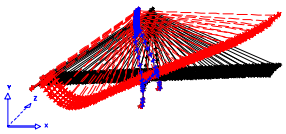


composite section - main girder

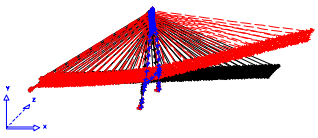
Dynamic Analysis



3. EIGENFORM: 0.462 Hz

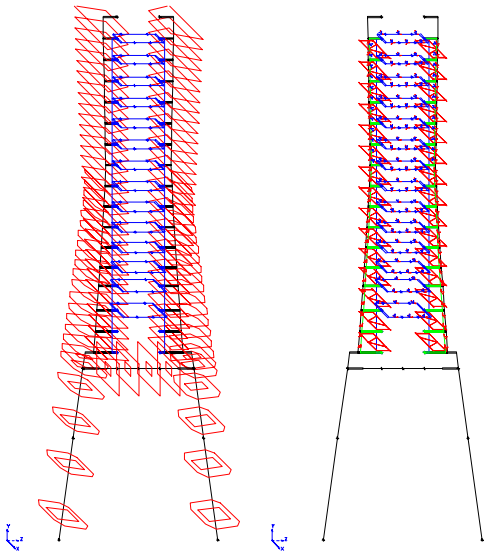


2. EIGENFORM: 0.267 Hz



1. EIGENFORM: 0.229 Hz

Pylon head in detail



TDV - Technische Datenverarbeitung GmbH
A-8010 Graz, Gleisdorfer Gasse 5, AUSTRIA

Tel. ++43 316 821531
Fax ++43 316 823552-12

E-mail: office@tdv.at
Internet: http://www.tdv.at