

## The Extensive Cladding of Drammen Bridge, Norway

**Dag Ivar YTREBERG**

Ass. Design Manager  
Aas-Jakobsen  
Oslo, Norway  
[diy@aaj.no](mailto:diy@aaj.no)

**Svein Erik JAKOBSEN**

Design Manager  
Aas-Jakobsen  
Oslo, Norway  
[sej@aaj.no](mailto:sej@aaj.no)

**Ola Håvard HOLE**

Supervision Manager  
NPRA  
Drammen, Norway  
[ola.hole@vegvesen.no](mailto:ola.hole@vegvesen.no)

### Summary

Drammen Bridge is an example of how modern needs in the society has affected the design of a large infrastructure project, and increased its environmental quality, sustainability and operation by introducing a special tailored bridge enclosure system covering a large part of the whole bridge structure. With a total area of approximately 50.000m<sup>2</sup>, it is believed to be one of the largest of its kind in the world.

The Drammen Bridge is the longest bridge viaduct in Norway. The concrete bridge from the seventies was expanded from two lanes to four by constructing a parallel bridge upstream. In order to make the two separate structures look like one, a steel / aluminum cladding was introduced. This paper describes the background, design, construction and experiences of this environmental effort. The project was finished and opened in 2007.

The cladding serves the following purposes:

- Make the superstructure look like one bridge
- Introduction of an asymmetrical geometry of the bridge underneath
- Reduce wind drag
- Keep the bridges free from pigeons
- Better the bridge climate and thereby extend lifetime.

The cladding consists of a steel frame support system attached to the bridge and cover plates of aluminium sandwich type. One major challenge in the design was that the bridges move differently in longitudinal direction due to a diversing number of expansion joints in the bridge superstructures. Therefore, the cladding has a longitudinal joint in between the two bridges allowing for relative movement. The steel frame support system is attached to the superstructure through steel bars with adjustable length. In this way each panel can be adjusted to perfect alignment. This also makes it possible to change panels later.

The cladding has a cost of approximate NOK 100 mill, i.e. approximate USD 20 mill.

The project is a great success, and has proved that it is worth while to invest in esthetics.

**Keywords:** Architectural design, special tailored enclosure system.

## 2. Steel&Aluminium enclosure system

The plate elements are fixed to the frames using bolt rivets. In 2004, test sections of the enclosure system were erected beneath the bridge in order to find the most suitable material for plates. The aluminium sandwich plates of 4mm thickness were found to be overall most beneficial. The chosen plates were manufactured by Alucobond of Switzerland.



Fig. 1: *Cross section showing enclosure system (3D plot by P.A.Larsen)*

For the selection of plates, two main issues were focused on: Appearance and durability. For these issues, the following items were vital: Colour, brightness, flatness, uniformity, discolouration, maintenance.

For the design of the cladding it was important to optimize both production, transportation as well as installation, this due to the very large amount of plates. The very strict tolerances implied an advanced system for supporting and adjusting each panel beneath the bridge. Also it was very important to seal the cladding to avoid birds coming in.

The bridge leaves a rain shade under the middle of the bridge of approximately 15 m. To make use of this area, park facilities for a number of public activities are established. This has become very popular for the citizens of Drammen.



Fig.2: *View from underneath the bridge*