ACES Work Shop, Corfu, Greece, 2010, Photo Courtesy: PS-Mitsubishi, Presented by J.Yamazaki
Sumitomo Rubber Company

Full Page Advertisement
“Nihon-Keizai”
Economy News Paper
2010.04.10

PROOF is

I like this bridge!

Most High-performance and environment friendly tire’s choice of the most favorite bridge

Photo   Takuya Mori,       PS Mitsubishi,
courtesy: Masato Yamada,   Sumitomo Steel Wire

ACES WORKSHOP: INNOVATIVE MATERIALS AND TECHNIQUES IN CONCRETE CONSTRUCTION, CORFU, GREECE, OCT. 11 & 12, 2010
Ohmi-Ohtori (Big bird) Bridge (Ritto Bridge), Shigaraki, Shiga Prefecture, Japan

Statement of the Landscape Designer,
Tanja Wilcox,
Seattle, USA

Quoted from the Proceedings of the first *fib* congress 2002 Osaka

Concept - Bridge in Flight

The Bridge in Flight concept emphasizes the connection and integration of the bridge into the natural surrounding landscape. The flowing lines of the bridge were inspired by the dramatic mountainous terrain, with its layers of small to increasingly larger peaks. Graceful flowing lines and fluted piers create a smooth transition between the vertical and horizontal forms of the bridge piers and span. The bridge form creates a light, rhythmic span, which evokes a feeling of floating over the valley. The repetition of curved lines is reminiscent of the forms in a bird's wing, which gives a dynamic, fluid appearance to the bridge span. Scalloped concrete chevrons with a 1-m deep step, emphasize the taper of the pier and tower.

Miss Tanja Wilcox
landscape Designer/Planner
A. BRENNAN ASSOCIATES, LLC, Seattle, Washington, U.S.A.
Key technologies: Corrugated steel webs; Extradosed prestressing
The span length 153 m of end span corresponds in theory to approximately, 275 m (≈153 x 0.9 x 2), if it had two towers, 3 span continuous.
Capability to reduce depth of girder

for span corresponding to approximately 275m

If it were 3 span continuous
Final Dimensions
At *fib* Symposium in Orlando, USA, 2000, Ritto (now Ohmi Outori) Bridge was introduced as a model hoped to prove how international collaboration could be productive toward the first *fib* Congress to have been held in 2002 in Osaka.
A name, Dr.K, soon became to mean among contractors and design consultants, a restless pursuer and enforcer of only the best of construction expertise.
The looks of this bridge suffered from controversy by even some of the established designers and critics.

But, as has been seen in a newspaper advertisement, this bridge proved to be attractive for those who make high performance tires.
We are grateful to *fib*,
for giving our country an exceptional opportunity
to imaginatively create an attractive bridge.

Hosting *fib* event proved to give great and lasting pleasure.
We are also grateful to *fib*, for giving exceptional opportunity of international corporation.

France: Innovative technology
USA: Structural expression of bridge image
Japan: Structural design and construction
While Ritto Bridge was under construction, same in structural concept, design and construction became competitive.

First to complete was Himi- Bridge (Himi Yume Ohhashi) in Nagasaki, also by JH. Contractor was Sumitomo.

The looks of this bridge were much favored by even some of the established designers and critics, in contrast to controversy over the looks of its predecessor, Ritto (now Ohmi Ohtori) Bridge.
First to emerge, hybrid of extradosed prestressing and corrugated steel webs.

Himi-Yume bridge
Span 180m,
Girder depth 4m

JH / Sumitomo
Environment protection imposes restrictions on construction, i.e.,

noise, vibration, activities of large construction machineries are prohibitive.

One solution was tendency to build structures in smaller pieces.

In the case of bridge girders, from “segmental” element (larger element) to “fragmental” elements (smaller elements).
From “Segmental” (Larger element) to “Fragmental ” (Smaller element)

In this case, Incremental launching

1. Top slab is supported by ribs and struts. (Structure configuration)
2. Corrugated steel webs.
3. Stay-in-place precast concrete form for slab casting
4. Cast-in-situ top slab

Katsurajima viaduct

Original Author: O. Nakamura, A. Kasuga
Element 1. Corrugated Steel Webs

Original Author: Osamu Nakamura, Akio Kasuga, Sumitomo - Mitsui

JH
Element 2. Ribs

Original Author: Osamu Nakamura, Akio Kasuga, Sumitomo - Mitsui

JH
Element 3. Struts

Original Author: Osamu Nakamura, Akio Kasuga, Sumitomo - Mitsui
Element 4. Precast Panels as Stay-in-place Forms for Cast-in-Situ Deck Slabs

Contractor: Sumitomo - Mitsui

JH
In the case of cantilever construction, newer method is to construct bridge girders in parts, and the timing of construction of parts is staggered in longitudinal direction.
Corrugated steel are stiff enough to support weight of modified travelers, and fresh concrete (colored green) of the current cast-in-situ segment.

Timing of casting top and bottom slabs is staggered.

Akabuchi-gawa bridge

JH/
Sumitomo
Original Authors: Kasuga, Mashiko and Taira
Timing of casting concrete in edge girders and slab is staggered.
Another new idea of incremental launching method of construction is to use corrugated steel webs for launching noses.

The corrugated webs are added with stiffness and strength by attaching bottom flanges made of ultra high strength concrete, DUCTAL, for Torisaki-gawa bridge construction.

The launching noses become parts of the end span by adding bottom and top flanges, and thus not wasted.

Conventional method of incremental launching construction uses steel girders for launching noses, which are scrapped after completion of the launching.
“Fragmental”
construction, further pursued
In case of, Incremental launching

1. Corrugated steel webs.
2. Top slab is to be cast after launching.
3. Beneath the bottom edge of corrugated webs, attached are the prism made of ultra high strength “DUCTAL”

Torisaki-gawa bridge

JH/ Dr. Kadotani
Taisei
Photo: H. Musha
Pioneering work of corrugated steel in France

Study in France (1997) Maupre (or Charolle)

Dr. Jacque Combaut’s paper was translated by Mr. Ohura of P.S. Mitsubishi
Study in France, (1997), Dole
Study in France, 1997

Pioneers of Corrugated Steel Webs of France,
Campenon Bernard sge

Messieurs Philippe Caplain,
Alain Leveille

SETRA

Dr. Emmanuel Bouchon

Overall guidance: Dr. Virlogeux
For realization of bridges utilizing corrugated steel webs, there have been remarkable breakthroughs in technology made in France.

In our country, in realization of new innovations, there have been obstacles due to conservatism and potential risks, i.e., fear of failure and financial loss in case of failure, in both public owners and contractors.

Studies of this new technology were very careful under the leadership of Japan Highway Public Corporation, JH, and France was extremely helpful.
In those days (1997-2005, referred in this presentation) the leadership to put innovation into practice had been done by Japan Highway Public Corporation, JH.

That organization was defined as

**AUTONOMOUS PUBLIC AUTHORITY,**

at its inception in 1955.

JH had been functioning as defined, by capable and concerned in-house engineers.
Fear of failure has been overcome by

1. careful study,
2. preparing standards of materials, design and construction,
3. transparency by inviting external experts for projects.

After so called “privatization” in 2005, there is no leadership comparable to JH.

In coming era, realization of innovations will require creative treatment to overcome obstacles.

We see clue to solutions in ample resources and achievements of \textit{fib}.
Next presentation (by Kadotani) will deal with methods, innovations, some results of experiments, aimed to obtain confidence in constructing bridges good for both builders and environment incorporating corrugated steel webs.
END