Cable-Stayed Bridges: Key Design, Construction, and Management Issues

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Learn about wind induced cable vibrations and their mitigation
Learn how to avoid errors related to constructability issues
Learn strategies to avoid large discrepancies between engineers’ estimates and bid prices

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LOCATIONS AND ACCOMMODATIONS

Hotel Reservations must be made 4 weeks prior to the seminar. Rates apply only the day before and the last day of the seminar.

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CABLE-STAYED BRIDGES: KEY DESIGN, CONSTRUCTION, AND MANAGEMENT ISSUES

PURPOSE AND BACKGROUND

Cable-stayed bridges have provided economical solutions for long span crossings for several decades. Currently in the U.S., many more bridges of this type are being planned, designed, and are out for tender or are already under construction. However, this new form of bridge construction has not been without its problems, many of which have resulted in litigation. This very timely seminar will deal with both the design and construction aspects of cable-stayed bridges.

The seminar will cover aspects relating to planning, design, procurement, construction and maintenance of cable-stayed bridges. It will highlight the key issues of which you need to be aware to achieve success on cable-stayed bridge projects.

The seminar will discuss the different stages of a cable-stayed project and will provide strategies for how problems can be avoided, or mitigated once they occur. The interaction of various decisions in the planning and design process will be illustrated by discussing their consequences on the construction and maintenance of the structure.

The information provided in this seminar will allow managers of cable-stayed bridge projects to develop a good understanding of the key engineering and management issues that are unique to these structures. The important aspects of planning, designing, tendering, constructing and maintaining cable-stayed bridges will be examined in sufficient detail so that you will be able to ask the right questions during the development of the project and ensure that they are completely answered. This seminar will provide you with a series of tools that will make your next cable-stayed bridge project more successful.

SEMINAR GOALS

- Learn developments in design criteria for cable-stayed bridges
- Understand key design issues and construction methods for cable-stayed bridges
- Learn about wind induced cable vibrations and their mitigation
- Examine the possibilities of selecting among various cable-stayed bridge configurations
- Learn how to avoid errors related to constructability issues
- Learn strategies to avoid large discrepancies between engineers’ estimates and bid prices

LEARNING OUTCOMES

After attending this seminar you will have a good understanding of:

- Historic development of the cable-stayed bridge form
- Context where cable-stayed bridges are appropriate
- The pros and cons of various deck and tower configurations
- Superstructure and deck design issues
- Dead and live load carrying mechanisms
- Aerodynamic design and construction considerations
- Seismic criteria and design
- Effects of creep and shrinkage
- Cable types and installation technology
- Wind induced cable vibration mechanisms and their mitigation
- Construction methods and issues

FOLLOW-UP ACTIVITIES

Students’ achievement of the learning outcomes will be assessed through a series of problem-solving design exercises, class discussion following the presentation of each major topic, and through short case studies.

WHO SHOULD ATTEND?

This seminar will benefit federal, state and municipal engineers and administrators involved in the procurement and maintenance of cable-stayed bridges, as well as contractors and consultants interested in cable-stayed design-build and/or design-build-operate projects. It also will benefit contractors who wish to understand the key aspects of the erection engineering constraints and possibilities offered by various cable-stayed bridge designs and architects who are involved in cable-stayed bridge aesthetics and want to learn more about the other aspects relating to cable-stayed bridges.

SEMINAR INSTRUCTORS

DON BERGMAN, P.ENG

Don has 28 years of experience in design and erection engineering for long span cable-stayed bridges. His projects include the design or erection engineering of more than 25 cable-stayed bridges worldwide. He has functioned as the designer or design consultant for several of these projects. Most recently he has been in charge of final detailed design and construction engineering for the Golden Ears Bridge in Vancouver, the first multi-span cable-stayed bridge in North America, and the John I. Audubon Bridge in Louisiana, which will be the longest span cable-stayed bridge in North America when complete.

DR. ANDREW GREZIC, P.ENG., P.E.

joined Buckland & Taylor Ltd. in 1997. Since that time he has developed extensive experience in design check, detailed construction engineering analysis, modeling and design of erection schemes and temporary works for cable-stayed bridges. He has worked on design or construction engineering for seven cable-stayed bridges. He was the Project Manager for the detailed design and construction engineering of North Arm Bridge, the first extradosed bridge in North America.

DR. PETER TAYLOR, P.ENG., P.E.

has been actively involved in the design and construction of more than 20 cable-stayed bridges around the world for over 40 years. He has filled the roles of designer, contractor’s project manager and contractor’s erection engineer on a variety of cable-stayed bridges and thus has a wide appreciation of all aspects of these bridges.

Summary Outline

DAY 1 Introduction
- Overview of the seminar
- Brief review of the historic development of cable-stayed bridges, with particular emphasis on aspects unique to North America
- Discussion of defining features: cable fan arrangement, tower connections, main span span process

Planning and Bridge Concept Selection
- Project concept selection: is a cable-stayed bridge the appropriate choice? Cable-stayed bridge type selection
- Signature cable-stayed bridges

Design Development
- Successful strategies to deal with:
  - Selection of appropriate design criteria
  - What issues are well-covered by design codes?
  - Critical design issues: foundations, superstructure, aesthetics, seismic input and design, cables, fatigue

Strategies for Durability
- Principles and practice
- Rules of QA and QC
- Cable vibration and fatigue
- Strategies for trouble-free structure throughout its design life
- Strategies for dealing with the structure once it is in operation

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DESIGNING MODERN TIMBER BRIDGES

This DVD course examines the different types of timber bridge superstructures in use today, the basics of wood as an engineering material, and the different types of structural wood products, wood mechanical connections, and preservative treatments. Design procedures for wood construction are also reviewed. The course focuses on the design of two main types of timber bridge superstructures: 1) those composed of longitudinal girders with transverse decks, and 2) those composed of longitudinal decks, and covers the use of sawn lumber and glued-laminated timbers in both of these main superstructure types. The course concludes with a discussion of issues related to timber bridge inspection, maintenance, and rehabilitation.

In 6 hours.

0.6 CEUs

Tendering and Contract Documents
- Why are there so many claims based on deficient cable-stayed bridge designs?
- How to deal with this.
- Capital cost management prior to contract tender
- Designing for Constructability
- Overview of the construction process
- Understanding the role of the players
- Strategy for management of claims (part
- Review of Key Issues and Question Period

DAY 2

Case studies of half a dozen state of the art cable-stayed bridges which are either under construction or just completed in Europe, Asia and the US.

The case studies will cover:

- Project organization
- Construction description
- Key design features
- Technological advances
- Construction challenges and construction procedure
- Cost of bridge
- Review of construction schedule
- Comparison with similar structures

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