Spanners

PHOTO KURT HOFFMANN, ABRAMARKETING.COM

PHOTO DR. PETER ANDREW WYSS

Top: Sundial Bridge, California, USA; Right: Panorama Bridge, Langkawi, Malaysia

Exceptional grace, ingenuity and presence. Seldom do art and engineering come so dramatically together as in the bridge. *Ngiom* spans the globe in search of some of the newest and best

Some of the most powerful visual impressions we retain are of these dramatic, shadowy silhouettes standing like mighty sentinels, etched in our minds and imaginations.
The early suspension bridges, for example, appear almost like dreams, unreal in their unbelievable dimensions. The mind boggles at all that effort, all that muscle of man and machine, the very impetuosity in attempting to span the seemingly unbridgeable. With every generation, spans continue to get longer and longer. Wonder and amazement still fill us. For a bridge is more than a bridge. It's a metaphor. And in a very elemental way, it delights the child in each of us.

The first suspension bridges were largely American marvels, becoming part of the landscape of the Industrial Age in the New World. The early postcard pictures of New York inevitably include the Brooklyn Bridge; San Francisco has its most famous icon in the Golden Gate Bridge; and the Delaware River Bridge forms an integral part of the historic landscape of Philadelphia.

Two of Malaysia's more elegant bridges are technical cousins and in large part refinements of the great suspension bridges. However, they adopt the "cable-stayed" method, where cables of equal size are held directly by single pylons instead of smaller cables hung by large cables suspended between towers, as in the case of the suspension bridge. From a distance, the cables of the former look like a wall of thin threads. The pylons are like hands that hold up these thin threads, which in turn support a wafer-thin bridge. Part of the artistry of these cable-stayed bridges lies in the way that all the parts are made to be as thin as possible, in particular the pylons, which more resemble minimalist sculptures.

The Panorama Bridge in Langkawi almost wants to disappear into the landscape as it meanders between the trees, climbing along with the hills. The pylon that holds up the crossing acts like a mast of a ship, which appears to be as weightless as possible. All the parts are in tension, enabling them to be as thin as possible. These make a minimal intrusion into an ecologically sensitive environment, making the design intention clear: the possibility of working with and enjoying nature. The rightness of its construction becomes part of the artistry. This winding bridge was completed in 2004 and designed by Dr. Peter A. Wyss, Hoeltschi & Schurter and CEPAS Plan. Angkasa Jurutera Perunding implemented the bridge.

In not a dissimilar way, the Seri Wawasan Bridge in Putrajaya uses the cable-stayed method to minimize the materials used to hold up a bridge span of 168.5m. Instead of an understated pylon like that adopted for the Panorama Bridge in Langkawi, the

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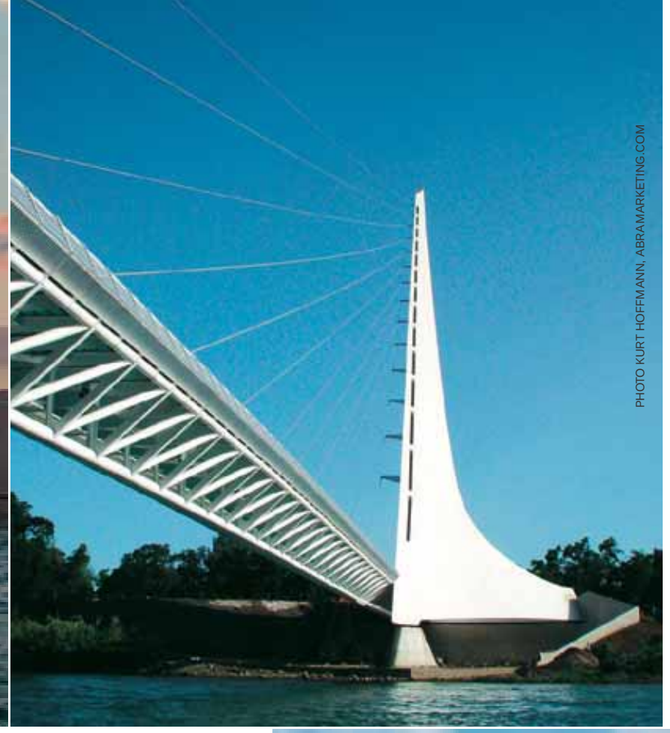

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Sri Wawasan Bridge setsmakea a dramatic statement with its inverted Y-pylon. There also is a hint of bravado in the design compared with other compression bridges found in Putrajaya, lending credence to the hope that Putrajaya can one day truly become the visionary city it purports to be. The Seri Wawasan Bridge was designed by PJS International and completed in 2003.

The longest cable-stayed bridge in the world to date is the Rion-Antirion Bridge in Greece, completed just a week before the start of the 2004 Summer Olympic Games in Athens. The bridge links the western mainland of Greece with one of the Peloponnese islands. Incidentally, the Olympic torchbearers were the first to officially cross its length, (including German soccer coach Rehhage, who won the Euro 2004 Championships for Greece). The bridge has a length of 2252m, sitting in deep water in an area which is also vulnerable to seismic activity and tsunami. The lead designer for the bridge was Berdj Mikaelian, an architect, which may explain why the bridge exudes such a delicate elegance; a laudable achievement considering the constraints posed by the difficult waters. It is now considered an engineering and aesthetic masterpiece.

At the forefront of cable-stayed bridge design today is Spanish architect and engineer, Santiago Calatrava, who has been building some of the most elegant bridges since the early 1990's. Calatrava's first major cable-stayed bridge was the Puente del Alamillo, designed for the World Expo in 1992 in Seville. The single reinforced concrete slanted pylon is purported to represent the soaring aspirations of the city of Seville. It has a 200m span.

In 1998, Calatrava designed the Puente de la Mujer in Buenos Aires, which is a footbridge and also acts as a swing bridge. It is unique in the way the mast rotates a portion of the bridge up to 90 degrees every time a large boat needs to pass.

Completed in 2004, the Sundial Bridge at Turtle Bay, over the Sacramento River in California, epitomizes both artistry and engineering refinement. The mast of the bridge serves as a sundial, which can actually be read in a garden north of the bridge. The deck is paved with transparent structural glass, with a view of the water as the bridge is crossed. The walkway and the water are stunningly illuminated at night. The bridge has a span of 213m over the water without any further support. The cable stays are designed to separate the minor paths from the major paths.

The Sundial Bridge epitomizes artistry in bridge design of the highest order. It no longer is just about achieving large spans with economy, and it no longer is just the narrative of human endeavors: the best of bridge design is now the synthesis of many things. Particularly, it manifests our understanding of the fragility of our natural environment. Building into the environment today is more than the display of scientific ingenuity; the capabilities today must also include poetic prowess and environmental awareness.

According to Turtle Bay Exploration Park's own brochure, the Sundial Bridge.

...celebrates human creativity and ingenuity, important themes of the 300 acre Turtle Bay Exploration Park. The steel, glass and granite span evokes a sense of weightlessness and the translucent, non-skid decking provides for spectacular viewing at night. The bridge is also environmentally sensitive to its river setting. The tall pylon and cable stays allow the bridge to avoid the nearby salmon-spawning habitat as there no supports in the water while encouraging public appreciation for the rivers. Plazas are situated at both ends of the bridge for public use; the north side plaza stretches to the water allowing patrons to sit at the river's edge.

This description could also serve as an apt summation of the modern ecological building.

All bridges ultimately deal with overcoming the constraints of span, just as skyscrapers ultimately deal with overcoming the constraints of height. Nearer to the ground, the bridge interacts endlessly with land and water, and with what flows over and under it, human and material rivers, as it were, becoming in the process not just mere technical marvels, but phenomenological marvels, that deal with all the human senses, in continuous engagement with the physical world. As demonstrated by the works of Calatrava, the cable-stayed method provides the best technical option so far in achieving this. We are likely to see ever more exciting, elegant – and extended – variations of the cable-stayed option as bridge design continues to evolve.

PHOTO PJS INTERNATIONAL

From far left: Rion-Antirion Bridge, Greece; Sundial Bridge; Seri Wawasan Bridge, Putrajaya, Malaysia