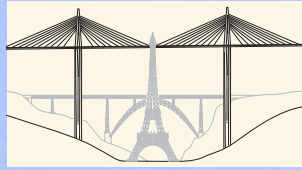
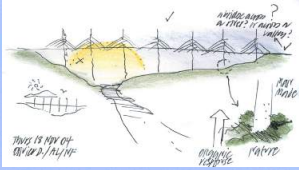


PRECISION ENGINEERING



BEHIND THE SCENES

Architect Sir Norman Foster's concept sketch, above left, shows his plan for the Millau Viaduct in France. Above right: A drawing of the bridge compares its size to the Eiffel Tower.

BRIDGING *Disciplines*

BRIDGE DESIGN SPANS MILLENNIA. BUT NOW IT'S TAKING ON A NEW FORM ENTIRELY, THANKS TO MASTERS OF ENGINEERING AND ARCHITECTURE WHO ARE INVENTING COLOSSAL PIECES OF ART.

By Stephen Wallis

It is sometimes said that bridges are the purest expression of the architect's art—all structure, gloriously exposed. Ever since the Romans pioneered the use of arch forms and cement masonry, architects have been devising magnificent, statement-making landmarks such as the Ponte Sant' Angelo in Rome, the Charles Bridge in Prague and the Rialto Bridge in Venice. In the 19th century, the advent of steel cables gave rise to a new breed of icons like New York's Brooklyn Bridge. And these days, advances in computer modeling and construction technology are opening up a world of possibilities, allowing designers to conceive stunning, once-unimaginable spans, even taking cues from DNA, Möbius strips and other complex forms.

"We're using digital techniques to model much more elaborate geometries," says Matt Carter, a bridge specialist at Arup, the engineering giant that has helped build everything from the world's tallest supertower in Dubai to an entire planned eco city in China.

Arup has worked on its share of superlative-inspiring bridges, including monumental highway spans such as France's Millau Viaduct (among the highest on the planet), as well as smaller-scale crossings like the Helix on Singapore's Marina Bay (the world's first curved

double-helix bridge). "There is definitely a trend toward trying to turn bridge projects into something more than just a bridge," says Carter.

And often that's the point, with more and more cities looking for bridges that will become new civic emblems. In London, Arup is partnering with designer Thomas Heatherwick on the Garden Bridge, a proposal for a spectacular, lushly planted pedestrian crossing over the Thames. "You have to think of it not as a bridge but as a new park in the center of London," says Carter.

With improvements in material strength and construction methods, bridge architects are increasingly able to do more with less and push boundaries. The big game changer is going to be 3D printing, which promises to unlock all kinds of design doors. "Instead of having forms constrained by the manufacturing process, 3D printing allows you to create any form you like," Carter explains. Plans are under way for a small, 3D-printed footbridge in Amsterdam. And while printing a large, multifunctional bridge is still a ways off, the dreamers are on the case, already trying to envision the unthinkable.

STEPHEN WALLIS is a former editor at Departures whose writing has appeared in a number of publications.