fabric architecture

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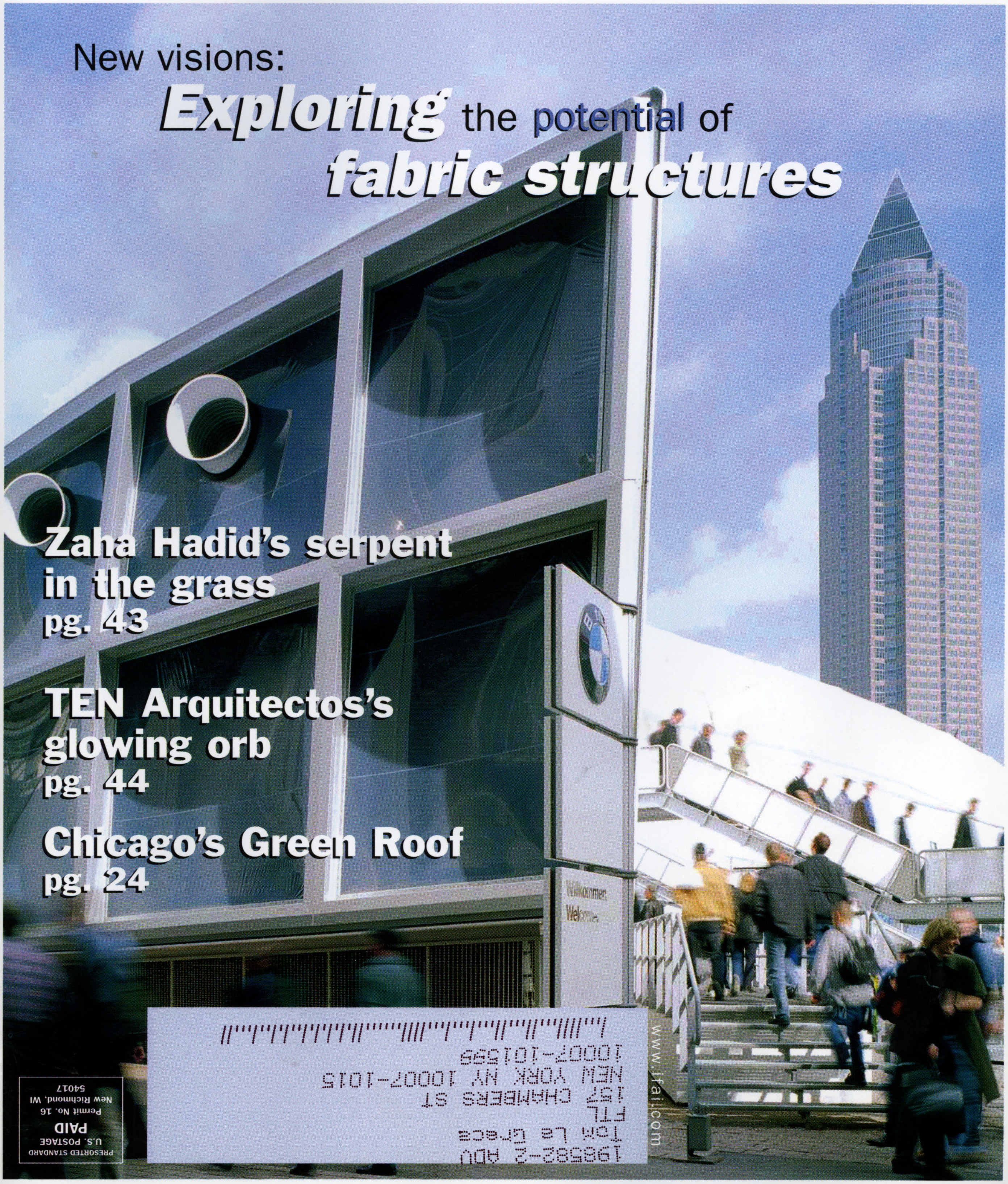

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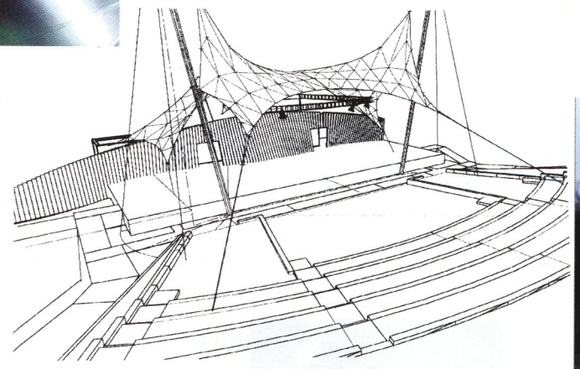


Classic Greek

MacMillian Smith & Partners' classically inspired amphitheater in Spartanburg, South Carolina throws in a modern twist

By Thomas G. Dolan

"We started off designing a roof cover for an outdoor amphitheater, but as the project progressed, it got more and more complex," says Ashish Soni, design manager of the NYC-based FTL Happold. "The canopy, instead of being designed in isolation, became integrated with the total environment, including the aesthetics, acoustics, lighting, backwall and backstage facilities."

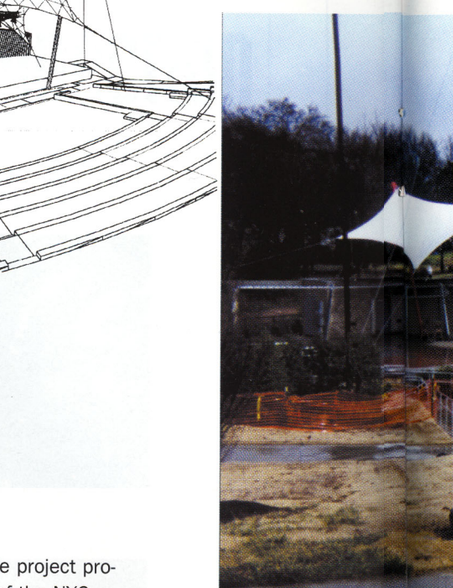
In about mid-2000, the Barnet family donated lands for a park in Spartanburg, S.C., and the Zimmerli family, along with the Barnet family and the city, built the amphitheater. The overall space is designed as a conventional outdoor Greek theater, in a semi-circle, with an angle of 60 degrees down to the stage area, giving the audience good sightlines. Grass steps alternate with stone steps to emphasize the natural setting. About 1000 people can sit on the lawn in the designated area, though the outlying areas can accommodate many more for really big events.

What was needed was some kind of shell to protect the performers from the elements. The park planners did quite a bit of shopping before they came across the traveling shell for the New York Philharmonic, designed by FTL Happold, which impressed them and led to FTL being given the job.

The personnel at FTL soon realized they had a number of challenges, for the canopy had to do much more than simply provide a covering for the stage area. The designer was FTL principal Nicholas Goldsmith with Ashish Soni the design manager and David Bott and Dawood Pandor the engineers.

"Finding the right geometry to balance the push and pull tensions is what brings a tensile structure into being," says Soni. "The fabric has to not only provide the covering and aesthetics, but perform a number of structural functions as well. In tensile structures you have to keep compression to a minimum in key locations because compression means mass, and mass makes it heavy."

Since the objective, from the start, was to develop a tensile membrane that had a minimum of compression elements, the design began with a three-mast system. However, the FTL team realized the membrane also had to provide acoustic quality. The problem was that the sound emanating from the membrane in the three-mast system was not very good. This led to four



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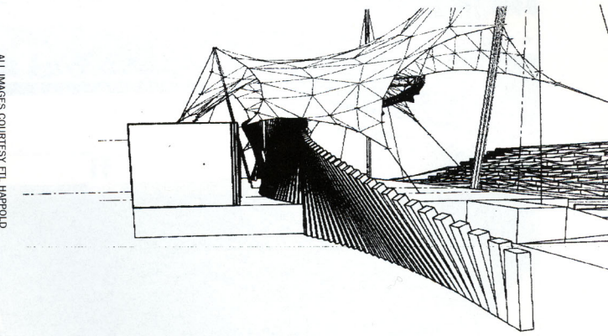
The 60-degree seating slope is modeled after Greek theater design, as is the semi-circular arrangement. The tensile membrane uses four masts to provide acoustic reflection to the audience.

masts. "To increase the reflections to the audience, the rear end needed to become more parallel to the stage, hence two rear masts," Soni explains. "The skin, with its two front peaks, gives a sense of enclosure." Soni adds, however, that the two back masts are higher so that "the front catenary forms a sweep into the audience, creating a dialogue with the audience and gives them a sense of a closer interaction with the performance." Another image Soni gives to describe the membrane is that of a sail. Though it does not flutter, it does the work of a sail, at the same time projecting an image of lightness.

In terms of acoustics, there were other elements than the canopy to be considered. Distracting noises had to be eliminated, which implied a backwall to serve as a backdrop and perform as a buffer between the support facilities and the performance zone. Yet it also had to reflect the intended sounds from the stage to the audience. A flat surface would not do the trick, Soni explains. A warped surface was needed. However, once the geometry was worked out, conventional pressed steel panels were modified to achieve the desired effect.



The undulating stage backwall provides a buffer between the backstage support area and performances.

An audio system was designed capable of fitting a variety of different performances, such as musical concerts, opera, dance, drama, orchestral groups and public addressing. The system is expandable and can be augmented as needed.

Lighting, as well as sound, is another component designed to bring performers and audience together. The lighting system has a generous amount of function and flexibility. The stage space is broken up into five equal areas: up and down stage, right, left, and center. There are several lighting groups that cover these areas. Soni describes the effect as "a paper lantern lit from within."

FTL also designed back of the house facilities, such as rest rooms and a dock area. These are easily accessible but hidden from view, while the canopy, which can cover an 85-member orchestra, is open so the viewer can see the natural settings on the other side.

Ron Smith, principal of the Spartanburg McMillan Smith & Partners, PLLC, the architect of record whose main role was the coordination of design and construction, says the fabric canopy makes the amphitheater "the first really contemporary structure in Spartanburg, It's the most unique piece of architecture in upstate South Carolina. It's our crown jewel."

Thomas G. Dolan is a freelance writer from Los Angeles, Calif., who frequently writes about architecture.

Project Data

Client: Zimmerli Amphitheater
Architect: McMillan Smith and Partners
Designer/ Engineer: FTL Happold
Fabricator: Birdair
Fabric: PVC-coated polyester