

INNOVATION

The methods and materials of design and construction will **change dramatically in the 21st century** as architects, engineers, scientists, and manufacturers join in **intense and creative collaborations**.

By Sara Hart

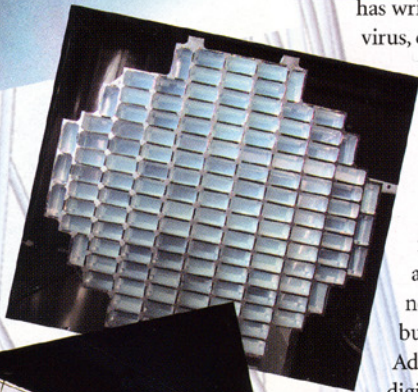
Innovation [the successful implementation of a new idea] has taken place, and continues to take place every day ... and most of it goes unnoticed," says architect and engineer Chris Luebke, who, as director for Global Foresight and Innovation at the international engineering firm Arup, should know. And, because exposing the unnoticed and evaluating potential for major change is the purpose of this supplement, we know that predicting actual innovations that will make it to the marketplace requires a crystal ball.

Without one, we look for a rational strategy, such as the one in Malcolm Gladwell's *The Tipping Point*. Gladwell defines a tipping point as "one dramatic moment in an epidemic when everything can change all at once." Gladwell's strategy is based on the behavior of epidemics. He has written that ideas, behaviors, and new products move through the population much like a virus, creating a tipping point only after they reach a critical mass.

In the multidisciplinary, economically vulnerable, intransigent world of building design and construction, epidemics are hard to start, and even harder to spread to critical mass. Conventional wisdom contends that the construction industry is not receptive to change, because innovation is too fraught with risk and unpredictability, and the industry is too diverse and, therefore, immune to radical transformation. That's a 20th-century truism. Today, evidence of a sea change can be found in the current wave of neologisms creeping into the vocabulary of architecture and construction, many of which seem to be oxymorons—mass customization, permanent flexibility, deployable structures, zero-net consumption, and even clean-coal burning. Both new materials and new ways of combining old ones are in development. Advances in materials science, increased private and public alliances, and the infiltration of digital technology into everything have conspired to create pockets of experimentation and unusual collaborations among architects, engineers, and manufacturers. Isolated pursuits do not a revolution make, but, as Gladwell emphasizes, "people are the natural pollinators of new ideas and trends." People figure prominently in this issue for that reason.

For the sake of clarity, it's important to distinguish between the three "I's"—improvement, innovation, and invention. Improvement is the ongoing, incremental enhancement of an existing product. Innovation, on the other hand, depends on collaboration, often between unlikely partners, and often involves the adaptation and application of technologies from other industries. Inventions are more complicated and can take decades to find commercial application. Aerogel (left) was invented in the 1930s, didn't find an application until NASA used it as insulation on its spaceships, and wasn't commercialized until last year when Cabot Corporation developed Nanogel for Kalwall's light panels. Now there are an estimated 800 new applications in development.

Improvement, innovation, and invention mingle and merge in all of the work shown, and in scores of laboratories, universities, factories, and garages. Some efforts won't gain momentum until they reach the critical mass necessary for tipping. We invite our readers to continue their own investigation. This content can be accessed from our Web site, www.archrecord.com, which contains a resource area with contact information for the architects, engineers, universities, federal agencies, and manufacturers who are presented. ■



At 99.8 percent air, aerogel (top) is the lightest solid in the world; it will be used as a particle collector (middle) on NASA's Stardust mission; Cabot Corporation developed Nanogel, a translucent form of the material, which doubles the insulation in Kalwall day lighting panels (bottom).

PHOTOGRAPH COURTESY OF NASA/JPL PROPULSION LABORATORY (TOP AND MIDDLE); NIKWAL (BOTTOM)