AIR CONDITIONER
THE THIRD ANNUAL R+D AWARDS
THE WINNERS OF THE THIRD ANNUAL R+D AWARDS SHOW THAT EVEN WHILE THE ECONOMY IS DOWN, TECHNOLOGY IS FLOURISHING.

RESEARCH AND DEVELOPMENT may seem like luxuries right now, what with the global economy struggling to right itself. But if the third annual R+D Awards are any indication, the bust is motivating a major boom in architectural technology. Certainly, this year’s jurors—Lauren Crahan, Craig Hodgetts, and John Ronan, profiled on page 73—proved acutely aware that limited resources are inspiring a new trajectory in the building sciences. They spent two days paging through 110 entry binders, selecting 13 winning projects and products that do more with less.

Skidmore, Owings & Merrill (SOM) won four awards and was involved in a fifth; the firm’s well-documented and innovative projects proved so disparate that the jury saw no connection during the blind judging. (Before the Architect staff revealed the winners’ identities, the jury extensively praised one SOM entry, the Sustainable Form-Inclusion System, for its indie, “noncorporate” approach.) Manufacturers, too, earned major recognition this year. A recyclable broadloom carpet backing, a new method for installing roofing membranes, and an aluminum joist system for decks all exhibited a level of practicality that was too ingenious to be ignored.

Turn the page, and judge for yourselves.

TEXT BY KATIE GERFFIN AND AMANDA KOSON-HURLEY
PHOTO BY GIBBS + STARR
STYLIST: JAXON DRIVER FOR HALLEY RESOURCES
ACTIVE PHYTOREMEDIATION WALL SYSTEM

Green walls have been touted as a balm for cubicle-weary office workers for years, but the Center for Architecture Science and Ecology—a collaboration between Rensselaer Polytechnic Institute and Skidmore, Owings & Merrill—has created a new prototype that would work with a building’s existing HVAC system to reduce energy loads and improve indoor air quality. The Active Phytoremediation Wall System is a modular wall system of pods housing hydroponic plants. Because the plants’ roots are exposed, instead of being buried in soil, the plants’ air-cleaning capacity increases by 200 to 300 percent.

Air moves through a perforated air intake duct—a series of mini-jets are being developed to encourage airflow—and directly over the root system. This allows the rhizomes on the roots to essentially digest airborne toxins—VOCs, particulate matter, and other biological and chemical pollutants—without the plant itself becoming toxic (which is what happens when the toxins are taken in solely through the leaves). The cleaned air then flows out of each pod through a series of clean air ducts and is reintroduced to the environment.

The pods themselves are made from vacuum-formed plastic, and the form allows the maximum amount of air to reach the root rhizomes while using the minimum amount of material. On top of that, it creates a beautiful base for the plants. “I would move into an office with that instantly,” juror Craig Hodgetts said.

The wall system can be installed in large commercial interiors, but works equally well in small settings—a four-module system in an apartment would have the impact of 800 to 1200 houseplants. The first test-bed site will be PSAC II, an emergency response center in New York designed by the local office of SOM, where it will be the aesthetic centerpiece of the lobby. “Usually, remediation is either technically believable or aesthetically pleasing, but not both,” said John Ronan. “This one’s both.” K.G.
1. The Active Phytoremediation Wall System consists of hydroponic plants in bio- and phyto-filtration pods. The pods are installed in a modular screen which serves as a plenum and as ductwork for air movement. A support frame holds the pods in place and a drip irrigation system supplies fresh water to each plant. The roots are exposed to the air and receive water through absorbent wicks that are filled by reservoirs supplied by the drip system.

2. The system can be populated with foliage plants like ferns, or with crawling plants such as ivy or moss.
3. The air purification process works as follows: Ventilated outside air is brought into a building by the HVAC system. Oxygen is used up and toxins are added as the air is affected by people, finishes, and other contributors to poor indoor air quality. As the polluted air moves through the phytoremediation wall—largely by natural air circulation—flow—the root rhizomes digest the toxins and replenish the oxygen. Clean air is then returned to the interior environment.

4-6. The wall is currently undergoing a rigorous testing process. Test pods are vacuum-formed (4) and assembled, as are pieces of the modular duct framework which manage airflow through the system. Plants are installed, and the system is assembled (5) and then placed in a testing chamber (6) to measure the air-cleaning power of different plant species and the overall effectiveness of the system.
ECOWORX BACKING FOR BROADLOOM CARPET

SHAW INDUSTRIES MADE A COMMITMENT to cradle-to-cradle principles when it released its Ecoworx backing for modular carpet tile, a product that could be split from the nylon face fiber at a tile’s end of life and recycled into new backing. But when the company tried to apply the same technology to its broadloom carpets, it realized that the system simply did not translate. So the company’s materials engineers set to work creating a new system, one that dissolves the carpet into its original components.

The process involves shredding the carpet and immersing the pieces in a bio-based solution. The nylon face fibers detach and can be turned into caprolactum, which is the base for new nylon fibers. The solution-covered backing pieces are then heated; the solution evaporates and is reconstituted elsewhere, ready to be used again in the dissolution of more carpet. The backing pieces are then ready to be used to create new Ecoworx backing for new broadloom carpet. The ingenuity of the process intrigued the jury—“I was really impressed that they had the whole system worked out,” Craig Hodgetts said. “They have the chemistry going for them.”

The final element that had to be engineered was the carpet’s durability. The face fiber is made from fleece, which wears out quickly, so the engineers created a woven outer reinforcing layer and a special adhesive to extend the carpet’s life. Even so, John Ronan pointed out, “Carpet is a very limited life material. So, I think it makes it more important that you recycle it and how you recycle it.” But recycling only works if the carpet is returned to Shaw, and it is up to architects and contractors to do that. 

Ecoworx broadloom backing

Polymer pellets can be made into new backing

Pieces placed in bio-based solution

Backings separated from face fiber

Dissolving solution recovered for reuse

Recovered polymer separated out

Carpet chopped into pieces
1. ACTIVE PHYTOREMEDIATION WALL SYSTEM (PG 48)
   **Principal Investigator:** Center for Architecture Science and
   Ecology (A collaboration between Reussler: Polytechnic Institute
   of NY and Skidmore, Owings & Merrill) — Anna Oloye (CASI
   director, director of the New Ecologies graduate program at RPI),
   Jason Vona (associate professor, RPI, CASI), Ted Naga (assistant
   professor, RPI, CASI), Lulka Montoya (assistant professor of
   mechanical engineering, RPI), Paul Markevic (biologist/plant
   scientist, director, Cari Institute)
   **Researchers:** Emil Nisbet, Ana Aydogan
   **Testbed Site:** Public Safety Answering Center II, Bronx, N.Y.
   **Architect:** Skidmore, Owings & Merrill, New York — Carl Galko
   (technical partner), Gary Harvey (design partner),
   Peter Magli (managing partner); Bob Kostic (senior
   designer); Joseph Sacco (project manager); Carl Brown (technical
   coordinator); Julie Harmon (project team)

2. ECOWORK BACKING FOR
   BROADLOOM CARPET (PG 51)
   **Manufacturer:** Shaw Industries, Dalton, Ga. — Jeff Knight (senior
   chemist, technical development); Rick Haney, Jon Davis, Scott
   Upton (technicians, technical development); Kelly Ballew (sustainable
development engineer), Zach Breedlove (backings development
   engineer), Jeff Segars (technical director)

3. DYNAMIC DESCENT, NEW YORK (PG 52)
   **Architect:** Dean/Wolf Architects, New York — Kathryn Dean,
   Charles Wolf (principal); Stephen Munkler (project architect)
   **Contractor:** S&A renovations
   **Steel Fabricator:** Marya Laser
   **Structural Engineering Consultant:** Habe Engineering
   **M/E/P Engineering Consultant:** M.A. Rudrao

4. OASIS GENERATOR, DUBAI,
   UNITED ARAB EMIRATES (PG 54)
   **Architect:** Skidmore, Owings & Merrill, Chicago — Ross Winer
   (design partner); Colin Fruehan, Darla Minassian, Dan
   Nowell (architecture team); Aaron Matkina, Lauren Stromberg
   (structures team); Keith Benner, Herban Shin, Wei Wang
   (blackbox team); Andrew Dang, Shweta Manchanda,
   Michael Smirnoff (MEP team)

5. DRY JOIST AND DRY JOIST EZ (PG 56)
   **Manufacturer:** Wanso Deco, Camarillo, Calif. — Jon Bailey (vice
   president), Michael Yaffe (vice president, operations & business
   development)

6. SUSTAINABLE FORM INCLUSION SYSTEM (PG 57)
   **Architect:** Skidmore, Owings & Merrill, San Francisco — Craig
   Hartman (design partner); Mark Sarkisian (structural engineering
director); Eric Long (senior structural engineer)

7. VOUSSOIR CLOUD (PG 58)
   **Architect:** IwamotoScott Architecture, San Francisco — Lisa
   Iwamoto, Craig Scott (designers); Stephanie Lin (design/
   installation team writer), Manuel Dias, John Kim, Jonathan,
   Tiffany Moon (design/installation team); Chris Chaiminer,
   John Kim (scripting), Andrew Kudless (scripting consultant)
   **Engineers:** Ben Jasper — Paul Lord, Stephen Lewis,
   Matthew Meishe, Tim Berne
   **CATIA modeling:** Gaoi Song, Daniel Park
   **Installation:** SD-AEC, Los Angeles — Oliver Liao, Joanne Angeles
   (team leaders), David O’Reagan, ABT, Keyne Uchino,
   Zorzino Tangosso, Tim Frances, Ali Sierad, Jimmy Chan,
   Carmen Lee, Sarah Sturch, Beth Phillips, Maria Mejia, Lona
   Aven, Justin Rice, Nicholas Parnacek, Matthew Cavender,
   Vincent Wu
   **Materials:** Low-E technology
   **Laser Cutting:** Advanced Laser
   **Special thanks:** Greg Dito

8. RHINOBOURD ROOF ATTACHMENT SYSTEM (PG 63)
   **Manufacturer:** Eko Group, Canley, Mass. — Michael DiNardo
   (product development specialist), Joe Schwartz (director of
   technical services)

9. PIN-FUSE JOINT (PG 62)
   **Engineers:** Skidmore, Owings & Merrill, San Francisco — Mark
   Sarkisian (structural engineering director); Shana Bond, Jean-
   Pierre Chakar, Bipul Gan, Eric Long, Norville Mathis, Jon Raches
   (structural team members); Stanford University, Stanford,
   Calif. — Gregory Diekmann (collaborating team members)

10. TRUMP CAMPUS GATEHOUSE, DITZENGEN,
    GERMANY (PG 64)
    **Client:** Trump, Ditzingen, Germany
    **Architect:** Barlow Leibinger Architects, Berlin — Frank Barlow,
    Roger Leibinger (principal); Carter Kraft (design project
    architect), Carpel Haus (construction project architect)
    ** favored Engineer:** Roland Schmitt
    **Landscape:** Buch Kelter
    **Facades:** Arup Berlin (concept), Werner Sobek Ingenieur
    (retention)

11. TIKS BOOTH, NEW YORK (PG 66)
    **Clients:** Times Square Alliance, Theatre Development Fund;
    Coalition for Better Outfit
    **Architect:** Perkins Eastman, New York — I. Bradford Perkins,
    Nicholas Leahy, Charles Williams, Kazuaki Isham, Shara Shuri,
    Zhan Fang, Philip Newell, Virginia Shou, Luke You,
    Anna Krasnowska, Jessica Dorf, Meredith Harmon, CCR Park
    (project team)
    **Concept Architect:** Choi-Roopa Architects
    **Plaza Architect:** William Fellows Architects
    **Structural Engineer:** Foschi-Consulitants
    **Design and Fabrication Engineer:** Harman Clark, with
    CIC Innovation Glass
    **Glass Installation:** David Shidler, Innovation Glass
    **Booth Fabrication:** Memphord Roberts
    **Mechanical Subcontractor:** Syntal Mechanical
    **Electric Subcontractor:** KSE Electrical Contractors
    **Furniture Fabrication:** Lettuce Signs

12. SAN FRANCISCO DIGITAL
    CONTEXT MODEL (PG 68)
    **Architect:** Skidmore, Owings & Merrill, San Francisco —
    Craig Hartman, Katie Williams (leadership); Mark Schwantag,
    Will Harris, Lee Chow (conceptualization/execution), Arai Cruz,
    Mark Schwantag, Michael San, John Farrell, Yvon Lim,
    Hyun Cho, Na Young Kang, Sung Jung Park, Ivan Rodriguez,
    David Pelmo (construction/drawings)

13. LED STREETLIGHT, NEW YORK (PG 72)
    **Client:** City of New York
    **Prototype Team:** Office for Visual Interaction, New York — Enrique
    Perez, Joan Sundin, Werner Sobek, Lighting Science Group,
    IwamotoScott, Clare Tandy-Smith, LED Specialists
    **Concept Design:** Voss Associates, New York — Thomas P extents,
    Christoph Timmis, Joseph Somero, Jon Benner
    **Office for Visual Interaction, Werner Sobek
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