Grove

At the 2015 Design Biennial Boston, a cluster of curious, oblong vessels propped on a metal armature invited onlookers to pop their heads into an enclosure created by the intersecting volumes of their papier-mâché-like skins. The cluster of 8- to 10-foot-tall, 4-foot-diameter forms is titled Grove. Brookline, Mass.–based GLD Architecture designed the installation to give people the experience of simultaneously inhabiting an intimate enclosure and a public space.

Grove represents a significant advancement in architectural form-making. By combining composite-based structural analysis with inflatable vinyl forms, GLD has developed a workflow that embeds structural logic into design from the very start—and at a low cost.

Principal Joel Lamere says the pillow-like forms are designed materially, as opposed to identifying the appropriate construction materials after design is completed. The team used Grasshopper, the physics engine Kangaroo, and the structural analysis program Karamba to simulate how Grove's forms would appear when inflated, which directly guided its fabrication. Patterns of vinyl sail material were cut and sewn into balloons that were inflated to act as the molds. These bulbous forms were then covered with layers of fiberglass strips and coated with resin. After an approximately 24-hour cure, the vinyl balloons were deflated and removed from the now-rigid fiberglass structures.

The digital simulation tools also informed the configuration of the 12 intersecting vessels, optimizing Grove's overall stability. Just 2 millimeters thick, the curvaceous shells are incredibly sturdy. "It's cladding and structure in a single surface," Lamere says. GLD has used a similar molding process to create furniture.

The jury selected Grove as much for its intriguing design as for the ideas behind it. "The intelligence of this fabrication process results in a highly sophisticated, formal ensemble," says juror Elizabeth Whittaker. —N.B.

JANE MESSINGER

Jury

Mic Patterson is founding principal of Los Angeles–based Design Tectonics, a consultancy that focuses on innovative façade technology applications and research. He was formerly the vice president of strategic development at Enclos. Patterson is a Ph.D. candidate in the University of Southern California School of Architecture with a focus on sustainable façade renovation practices.

Douglas Stockman, AIA, is a founding principal at El Dorado in Kansas City, Mo. He also serves on the Kansas State University College of Architecture, Planning, and Design Dean's Advisory Council, and is chair of the Downtown Council of Kansas City. Stockman received a B.Arch. from Kansas State University.

Elizabeth Whittaker, AIA, is founder and principal of Merge Architects in Boston. In 2015, she was a recipient of the AIA Young Architects Award and the Emerging Voices award from the Architectural League of New York. Whittaker received an M.Arch. from the Harvard Graduate School of Design, where she is an assistant professor in the practice of architecture.

Credits

Cricket Shelter: Modular Edible Insect Farm, page 112
Client: Randy Jayne Rosenberg
Design Firm: Terreform ONE, Brooklyn, N.Y. · Mitchell Joachim, Assoc. AIA, (co-founder and primary investigator); Jiachen Xu, Lissette Olivares, Cheto Castellano, Ivan Fuentealba, Sung Moon, Kamila Varela, Yucel Guven, Chloe Byrne, Miguel Lantigua-Inoa, AIA, Alex Colard, Melanie Fessel, Maria Aiolova, Assoc. AIA, Vivian Kuan (project management); Felipe Molina, Matthew Tarpley (research assistants)
Consultant: Seek Food · Robyn Shapiro
Fabricators: Shandor Hassan, Christian Hamrick
Funding: Art Works for Change; Terreform ONE
Photography: Mitchell Joachim, Matthew Tarpley
Special Thanks: David Stewart, Christian Hubert, Heather Lord, Scott Pobiner, New Lab, Brooklyn Navy Yard, GMD Shipyard, New York University Gallatin School of Individualized Study

BayArc: A Tidal Responsive Barrier, page 116
Design Firm: Skidmore, Owings & Merrill, San Francisco · Craig Hartman, FAIA (concept and interdisciplinary leader); Mark Schwettmann, AIA, Alex Cruz, Ross Findly, David Kwon (project team)
Project Adviser: Moffatt & Nichol
Drawings: Skidmore, Owings & Merrill
Structural Engineer: Mark Sarkisian, Eric Long, David Shook, Geoffrey Brunn
Marine Engineering Concept: Moffatt & Nichol · Dilip Trivedi, Richard Dornhelm

The Tower at PNC Plaza, page 118
Client: PNC Financial Services Group
Design Firm: Gensler, San Francisco · Doug Gensler, AIA (principal-in-charge); Hao Ko, AIA (principal and architectural design director); Benedict Tranel, AIA (principal and technical director); Lisa Adkins, AIA (project manager); Anastasia Huggins, AIA, David Hall, Gunwook Nam, Alison Wilkinson, AIA, Daniel Nauman, AIA, Jorge Barrero, AIA, Ethel Macleod, Eugene Lee, Joe Chisholm, Brent Van Gunten, AIA, Len Sciarra, Philip Kaefer, AIA, Joel McCullough, AIA, Rich Peake, Mariana Vaida, Jessica Yin, Yooju No (project team)
Rendering: Space Matrix; Tangram 3DS
Construction Manager: PJ Dick
Lighting Designer: Fisher Marantz Stone
Structural and M/E/P Engineer: BuroHappold
Sustainability Consultant: Paladino & Co.
Photography: Connie Zhou Photography

LELU Exit Sign, page 122
Client: Architectural Safety Components
Design Firm: Interloop—Architecture, Houston · Mark Wamble, Dawn Finley, AIA (design principals); Eric Hughes, Peter Muessig, Jack Mussett (project team)
Project Adviser: Architectural Safety Components · Sam Youdal
Consultant: Martin Co. · John Martin
Fabricators: Moore Fabrication · Kerry Krumbeck; Professionalized Products and Services · Jerry Huang; Southwest Electronic Energy Group · Alex Marin; Anodizing Graphics of Houston · Linda Sayers
Special Thanks: Underwriters Laboratories · Abdul Ahad (investigating engineer)

Tally, page 124
Design Firm: KieranTimberlake, Philadelphia · Roderick Bates, Stephanie Carlisle, Billie Faircloth, AIA, Elizabeth Friedlander, AIA, Ryan Welch (project team)
Development Partners: Autodesk; Thinkstep (previously PE International)
Project Team: Autodesk · Jonathan Rowe; Thinkstep · Heather Gaddoniex, Nick Santero, Maggie Wildnauer
Special Thanks: Emma Stewart, Jacky Liang

Pulled Plaster Panels, page 128
Design Firm: Young Projects, New York · Bryan Young, AIA (principal); Jon Cielo, AIA (project architect); Noah Marciniak, Samantha Eby, Nayoung Kim (project team)
Lighting Designer: Architectural Lighting · Rick Shaver
Structural Engineer: Silman · Nat Oppenheimer
Electrical Engineer: Engineering Solutions · John Ryan
Consultants: Butter and Eggs · Judy Dunne (interiors); Taocon (general contractor); Engineering Solutions · John Ryan (M/E/P engineering)
Drawings: Young Projects
Fabricators: Kammetal (stainless steel screen); Balmer Architectural Mouldings
Photography: Young Projects and Jon Cielo

Chicago Horizon, page 130
Client: Chicago Architecture Biennial, Chicago Park District
Design Firm: Ultramoderne, Providence, R.I. · Yasmin Vobis, Aaron Forrest, AIA, Emily Yen, Assoc. AIA, Tida Osotsapa, Will Gant, Hua Gao, Ronak Hingarh (project team)
Design Structural Engineer: Guy Nordenson and Associates · Brett Schneider
Structural Engineer of Record: Thornton Tomasetti
Architect of Record: Animate Architecture · Joe Lambke
Fabricator: Nordic Structures
Funding: BP; Chicago Park District; Chicago Architecture Biennial; Rhode Island School of Design; ReThink Wood; Nordic Structures
Photography: Naho Kubota
Special Thanks: Laura Briggs

Spray-On House, page 132
Design Firm: Patrick Tighe Architecture, Los Angeles · Patrick Tighe, FAIA, Zachary Teixeria, Evelina Sausina, Assoc. AIA, Risa Tsutsumi, Bran Arifin (project team)
Structural Engineer: Nous Engineering · Matt Melnyk
Consultant: Demilec
Fabricator: Machineous
Life-Cycle Assessment: Department of Civil and Environmental Engineering, School of Engineering, Stanford University
Prototype: Built at Southern California Institute of Architecture (SCI-Arc), as part of the SCI-Arc Gallery Series
Drawings, Renderings, and Photography: Courtesy Patrick Tighe Architecture
Special Thanks: SCI-Arc team

Vegas Altas Congress Center and Auditorium, page 134
Client: Junta de Extremadura
Design Firm: Pancorbo + de Villar + Chacón + Martín Robles, Madrid · Luis Pancorbo, José de Villar, Carlos Chacón, Inés Martín Robles (project team)
Drawings and Lighting Designer: Luis Pancorbo, José de Villar, Carlos Chacón, Inés Martín Robles
Structural Engineer: Mecanismo · Juan Rey, Pablo Vegas, Jacinto Ruiz Carmona
Electrical and Facilities Engineering: Úrculo Ingenieros · Rafael Úrculo, Sergio Rodríguez
Acoustics: Arau Acústica · Higini Arau
Models: Gilberto Ruiz
Construction: Placonsa · Eloy Montero; Julio Oreja (site manager)
Ropes Installation: Cotesi; Lastra & Zorrilla
Funding: Junta de Extremadura
Cost: €10,505,187 ($11.7 million, approx.)
Photography: Jesús Granada (building); Ignacio Bisbal Grandal (model)

Nanobiome Building Skin, page 136
Design Firm: Michael K Chen Architecture (MKCA), New York · Michael Chen, Justin Snider, AIA, Alan Tansey, Natasha Harper, Elena Hasbun, Braden Caldwell, AIA, Julian Anderson, AIA (project team)
Drawings: MKCA
Landscape Architect: Local Office Landscape Architecture · Walter Meyer, Jennifer Bolstad, AIA, Jenny Hindelang
Conservation Consultant: State University of New York College of Environmental Science and Forestry, Department of Environmental and Forest Biology · Danilo Fernando (associate professor and graduate program director)
Façade and Structural Engineer: Buro Happold
General Contractor: IA Construction Management
Manufacturer: Boston Valley Terra Cotta
Photography: MKCA

Infundibuliforms: Kinetic Tensile Surface Environments, page 138
Design Firms: Matter Design, Boston · RVTR, Ann Arbor, Mich., and Toronto · University of Michigan
Primary Investigators: Wes McGee, Geoffrey Thün, Kathy Velikov
Design Research Associate: Daniel Tish
Fabrication Assistants: Asa Peller, Dustin Brugman, Andrew Kremers, Andrew Wald, Iram Moreno Pinon
Wireless Sensing Adviser: Jerome Lynch
Technical Partners: Buckeye Polymers; Industrial Fabricating Systems; Beckhoff
Funding: Taubman College of Architecture and Urban Planning: 2016 Research Through Making Program; University of Michigan Office of Research: Small Projects Grant
Photography: Peter Smith

Timber Waste Modular Unit ("TwMU"), page 140
Design Firm and Fabricator: IKD, Boston · Yugon Kim, Tomomi Itakura (leaders); Yuki Kawae, Steven Hien, Brendan Casimir, David Morgan, Erin Kim, James Fan, Miguel Lorenzo Gumila (student research assistants)
Drawings: IKD
Funding: Heritage Museums & Gardens; Rhode Island School of Design
Photography: IKD
Special Thanks: Windy Hill Farm Sawmill

Grove, page 141
Client: Design Biennial Boston, Boston Society of Architects (BSA)
Design Firm and Fabricator: GLD Architecture, Brookline, Mass. · Joel Lamere, Cynthia Gunadi, Sophia Chesrow, Grigori Enikolopov, Zain Karsan, Dohyun Lee, Elizabeth Galvez (project team)
Drawings: GLD
Funding: Design Biennial Boston; GLD
Photography: Jane Messinger
Special Thanks: Rose F. Kennedy Greenway Conservancy, Boston Art Commission, Pinkcomma Gallery, BSA Space, Boston Mayor's Office of New Urban Mechanics, David Costanza, Sixto Cordero, Caitlin Mueller, Steven O. Anderson, John Skibo, Matt Wagers, Chris Dewart, Christopher Gunadi

Blooming Bamboo Home, page 142
Design Firm: H&P Architects, Hanoi, Vietnam · Doan Thanh Ha, Tran Ngoc Phuong, Chu Kim Thinh, Erimescu Patricia, Nguyen Van Manh, Nguyen Khanh Hoa, Nguyen Quynh Trang, Tran Quoc Thang, Pham Hong Son, Hoang Dinh Toan, Pham Quang Thang, Nguyen Hai Hue, Nguyen Khac Phuoc (project team)
Fabricator: H&P Architects
Photography: Doan Thanh Ha
Cost: $2,500
Special Thanks: Nguyen Tri Thanh