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Another Fine Mesh

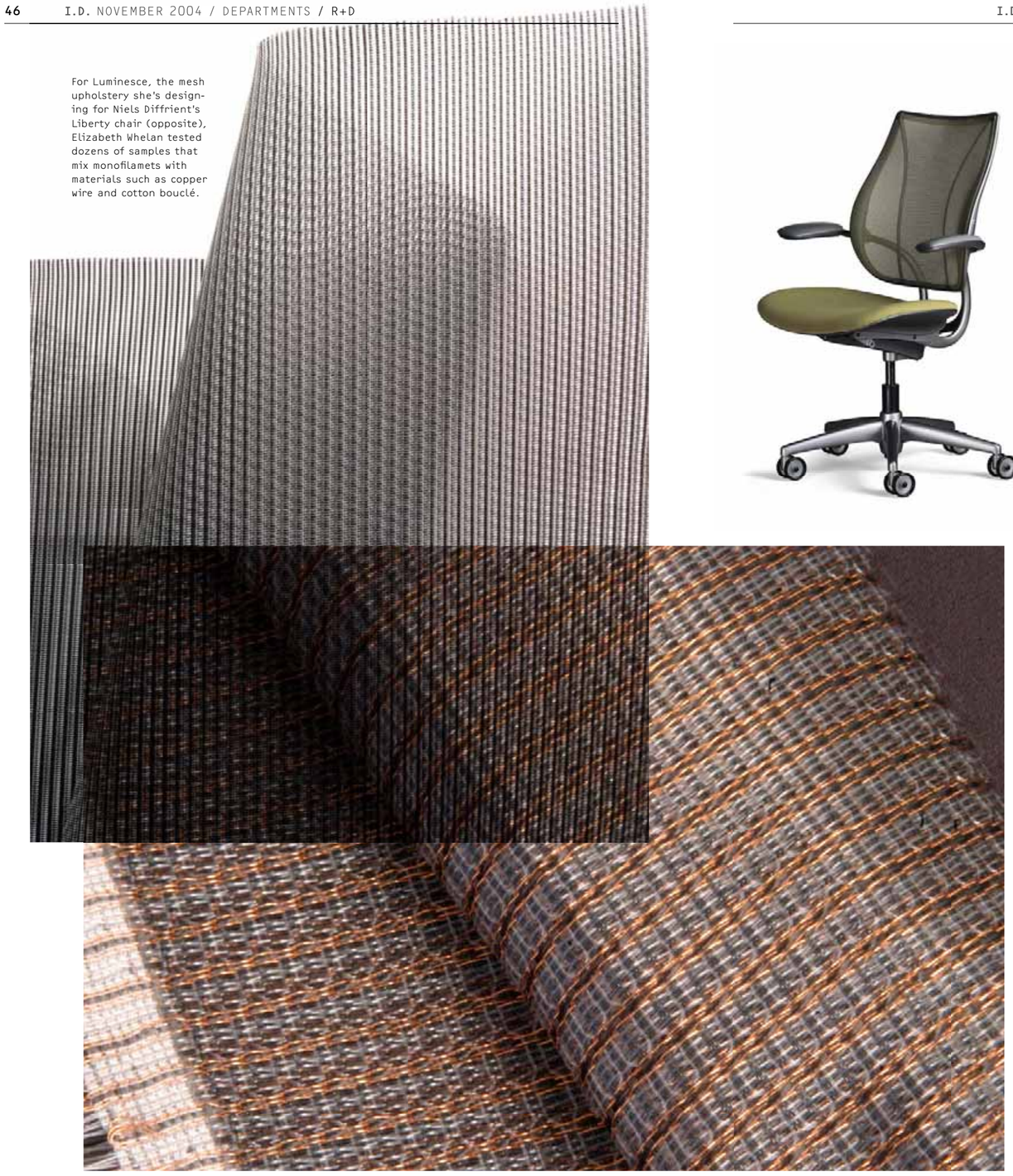
Humanscale's soon-to-be-released Liberty chair will feature a textile that cradles and supports the back.

BY JESSIE SCANLON

Elizabeth Whelan has been designing textiles since she was 6, when she first decided to ignore the pattern of a store-bought embroidery kit in favor of her own. She's created polypropylene wall coverings for Wolf-Gordon and Knoll, served as creative director at Raxon Fabrics, and taught at Rhode Island School of Design. But she's never taken on a project quite like this before. Working with ergonomics legend Niels Diffrient, Whelan is developing the mesh for Humanscale's new Liberty chair, unveiled at NeoCon in June and slated for release this fall.

"In my younger head, I'd start a project with an idea of what the textile should look like," she says. "I didn't think about how it would be used since upholstery has a variety of applications." The mesh in development, named Luminesce, is much more than a decorative covering, however. It's an integral part of the chair's support mechanism.

Whelan met Diffrient almost five years ago at NeoCon and first collaborated with him on the material for the Freedom chair, which was released by Humanscale in 1999. The goal then was to create a four-way stretch fabric that could be vacuum-molded and would withstand the punishing treatment task chairs routinely receive. With Luminesce, the aim was even more ambitious: She had to develop a textile that would satisfy Humanscale CEO Bob King's desire for a stylish chair and Diffrient's insistence on ergonomic support.



For Luminesce, the mesh upholstery she's designing for Niels Diffrient's Liberty chair (opposite), Elizabeth Whelan tested dozens of samples that mix monofilamets with materials such as copper wire and cotton bouclé.

"Mesh is a one-dimensional material, and body support is a three-dimensional objective," says Diffrient, who was initially dubious that the material could live up to his ergonomic standards.

"Mesh is breathable, has minimal environmental impact, and is easy to keep clean," King says. "And it has a light, translucent aesthetic that people are drawn to."

"Mesh is a one-dimensional material, and body support is a three-dimensional objective," offers Diffrient, who was initially dubious that the material could live up to his ergonomic standards. He came around when he realized that panels of mesh could be sewn together to fit the body like a tailored shirt, providing support without the addition of an external lumbar device. But not just any mesh would do. It had to be transparent, breathable, and not too stretchy.

Scouring the mills, Whelan found a mesh used in protective gear for motorcyclists that was translucent, just stretchy enough, and could be cut and seamed, which she and Diffrient assumed would be a manufacturing requirement. This gave the Liberty team a starting point. As Diffrient used the material to build design prototypes, Whelan began reverse engineering—picking it apart under the loop, analyzing its construction, testing the fibers. She then sat down at her Compudobby, the computer-controlled loom she uses to make quick structural and aesthetic studies. She tried fishing wire and various metals, nylons and polyesters, wool and cotton bouclés. "I call these weave sketches," she says, pulling out stacks of tests mounted in black posterboard frames with names like "bulky stripe" and "copper check." In all of the samples, the warp is a thin, strong, non-stretch polyester called Trevira. By varying the type and placement of the weft fibers—substituting a fat elastic yarn for a thin copper-coated monofilament, for instance, or changing the yarn sequence from ABAB to ABBA—Whelan achieved enormously different looks and textures.

She then sent the best of these sketches to a mill in Switzerland, where they were woven on an industrial loom. More than aesthetic explorations, the mill's samples were used to evaluate performance. Whelan ran all of the standard tests: crocking, pilling, tearing, and tensile strength, though she turned the test for abrasion resistance on its head. Rather than calculate the mesh's ability to withstand repeated rubbings from a sitter's clothing, she looked at the resistance of other fabrics when rubbed with the mesh. She began with a swatch of wool upholstery, and this fall will move on to apparel fabrics, comparing how long it takes the mesh and its competitors to wear out a wool gabardine suit. Because this isn't a typical test, there are no industry standards—one suit might withstand 5,000 double rubs without showing wear, while another might start abrading at 2,000. Whelan's primary concern is that her mesh outperform the competition.

As the chair evolved, the designers began to see how manufacturing requirements would affect the textile. Two early chair-back prototypes and a fully assembled chair in Whelan's New York studio all have mesh panels that were sewn together, creating noticeable ridges in the backrest. Beyond the aesthetic and comfort issues, seams are expensive. So the Liberty team is adapting a smoother bonding technique used in the production of disposable diapers, toothpaste tubes, and hundreds of other products.

Sonic welding, as it's called, uses rapid vibrations to heat the material's molecules until they fuse. Upon learning from the mill that the materials had to have the same melting point—roughly 104 degrees Fahrenheit—Whelan started converting all of her weaves to fire-retardant polyester monofilament. But this created another problem: Polyester is dyed at a higher temperature than nylon, and the resulting shrinkage would have affected the fabric's stretch and feel. After various tests, she realized that weave structure was more critical to the welding than melting point. Her latest samples are nylon/polyester blends that can be dyed at a lower temperature but form strong sonic bonds.

At press time, Whelan and her partners are still refining the mesh, waiting for more tests, and developing a new machine to make the sonic seaming process efficient and affordable. Luminesce will make its debut with the Liberty chair this fall, and other companies, including what Whelan describes as "a well-known sports company," have expressed interest.

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