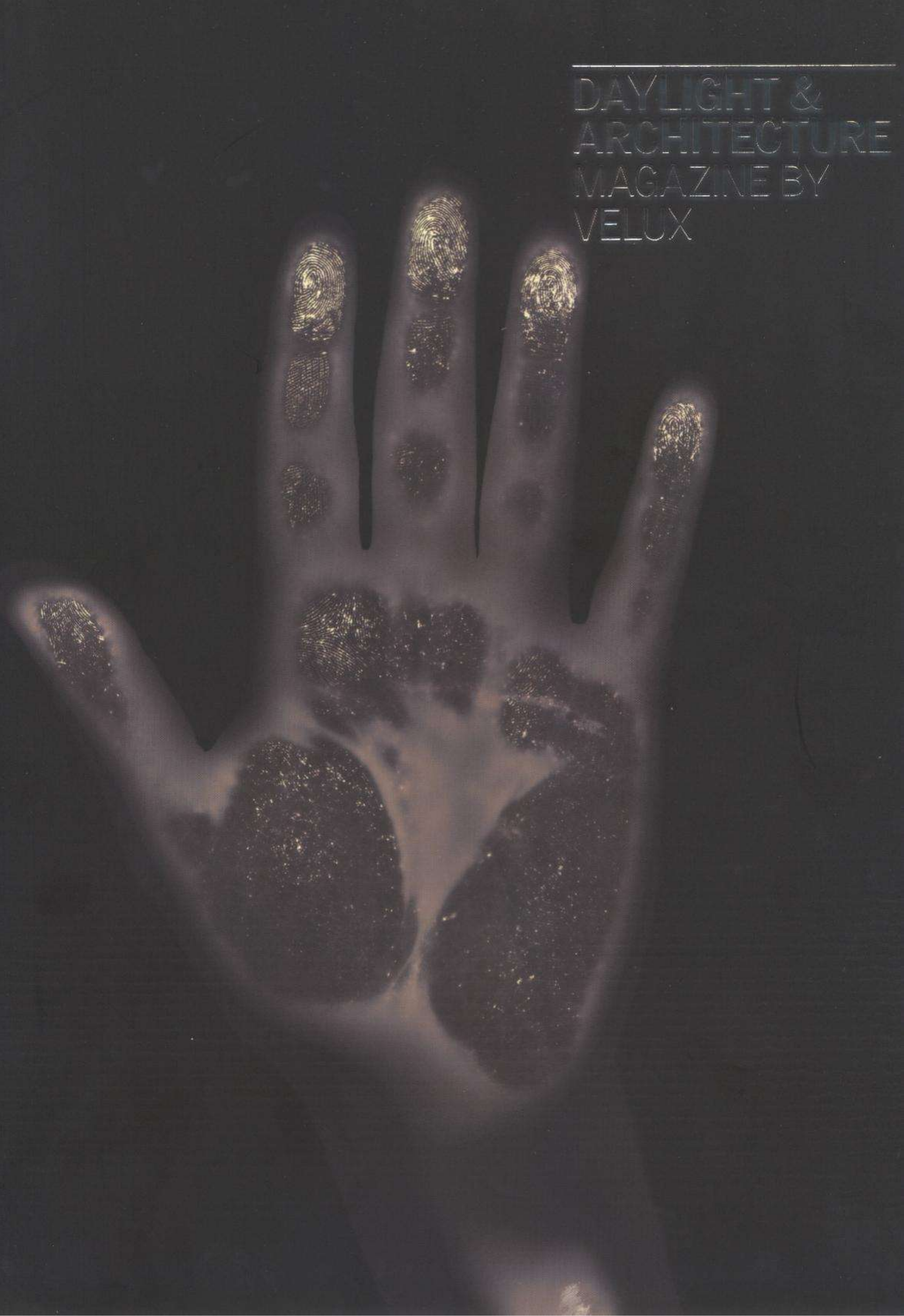
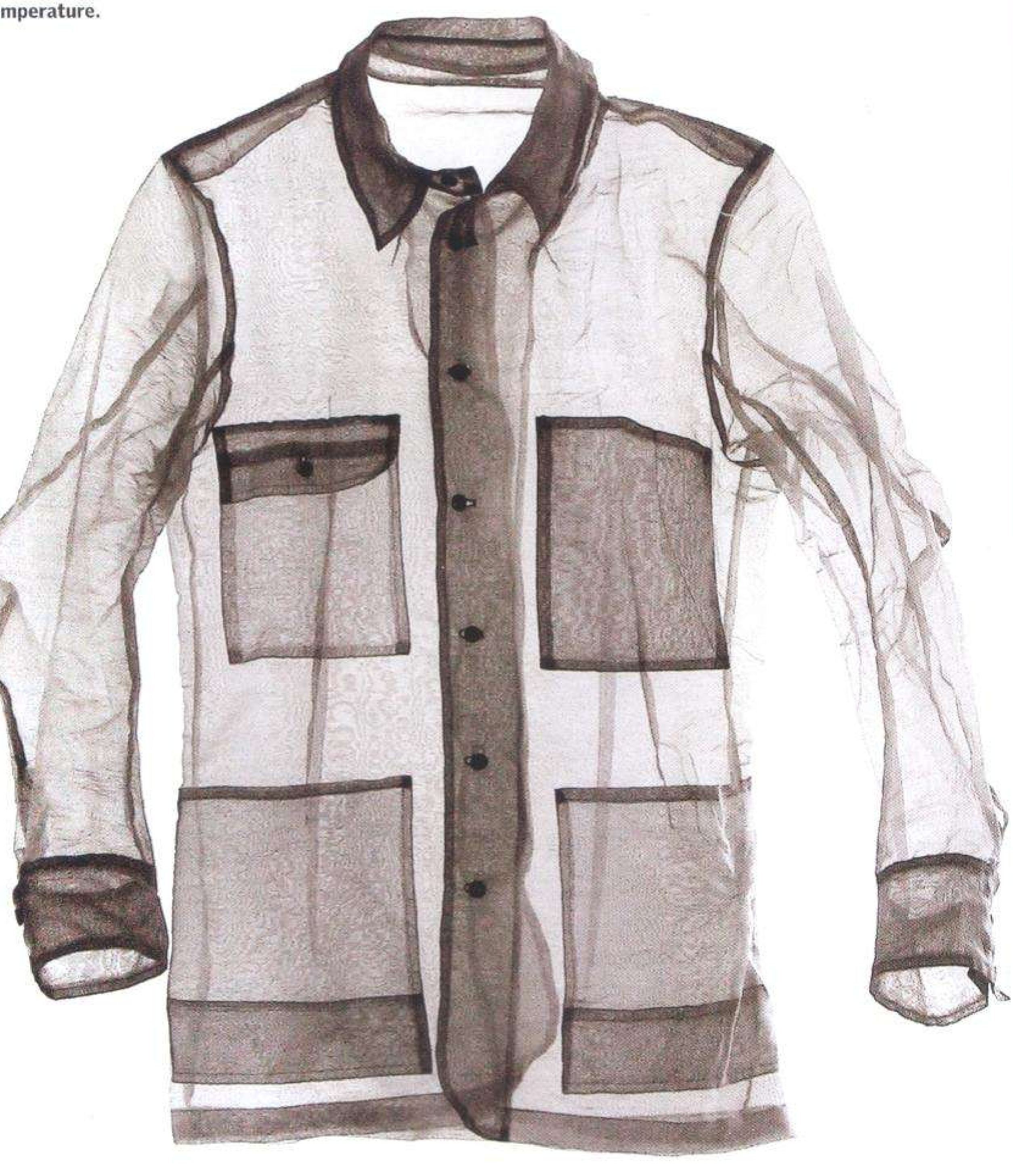
DAYLIGHT & ARCHITECTURE MAGAZINE BY VELUX

SPRING 2007 ISSUE 05 **TEXTURE & LIGHT** 10 EURO



***Below** Corpo Nove / Grado Zero Espace / Mauro Taliani: Oricalco, 2001*
For this particular shirt, a titanium alloy weave was developed that assumes a predetermined shape when the temperature changes. As a result, the shirt can be programmed in advance to roll up its sleeves automatically at a certain temperature.



MAN-MADE SKINS AND INTELLIGENT' MATERIALS

The influence of human skin and other natural skins on technology, design and architecture is manifold, ranging from its erotic appeal, its flexibility and its warm, soft touch to its abilities to adapt to temperature and lighting levels. Ellen Lupton writes: "Contemporary designers approach the surfaces of products and buildings as similarly complex, ambiguous forms. Manufactured skins are richly responsive substances that modulate the meaning, function and dimension of things."[12] Even the self-healing properties of skin have, to a certain degree, already been adopted in modern technology, such as automobile lacquers that can 'heal' small scratches due to their viscous, rather than solid, consistency. Another example is self-healing skins for pneumatic structures, whose inside is coated with a thin layer of polyurethane foam. When the membrane is punctured, the air pressure inside the pneumatic chamber forces the PU foam into the gap, thus closing it. This mechanism, which was derived from a similar process in the cell tissue of lianas, provides nearly 100% airtightnes for leakages up to 5 mm in diameter.

Clothing and buildings have often been called the second and third 'skins' of mankind, whose task it is to protect the human body. Ideally, they should therefore possess similar capacities of adaptation as our skin. One way to achieve this task is the development of 'intelligent' materials, which can reversibly change their properties when they are exposed to certain influences like heat, light, pressure, electrical or magnetic fields, or changes in the chemical composition of their surroundings. For example, Italian textile engineers have developed a fabric made of a shape memory alloy (SMA) which causes shirt sleeves to automatically roll up at a certain temperature. Peltier elements can be integrated into clothing to provide active cooling when an electric current is applied to them. The American 'No Contact' jacket fends off potential attackers by producing a tension of some 80,000 volts on its surface when a button is pressed.[13]

Smart technology also has its more poetic sides, though: The 'F+R Hugs' T-shirts, developed by the Cute Circuit company from Italy, come in pairs and communicate amongst them via bluetooth technology. When a person touches his or her T-shirt in a certain place, integrated power circuits in the partner's shirt will produce a similar movement or 'hug' in the same place.

In architecture, as in fashion design, the 'skin' analogy touches upon two aspects: the aesthetic and the functional. In a book about the German engineer Werner Sobek, Werner Blaser compares the inhabitant of a traditional building to a hermit crab that changes its dwelling whenever it has become too small or too large, or otherwise inadequate. Blaser then asks: "But is it right to use such unchanging methods of building construction in a world that itself is constantly changing? [...] the physical properties of our buildings remain constant, although internal and external environments permanently impose changes on them".[14] Blaser's book was published in 1999, and there has been considerable development in building technology since then. Nonetheless, the visionary concept of an ideal building skin that Sobek developed in the '90s is still relevant today. Rather than considering the building's skin as one multi-functional 'all-rounder', Werner Sobek suggested that, very much like human skin, it should be made up of highly specialised, mono-functional 'cells' that perform different tasks, such as light transmission, energy absorption or ventilation. Depending on budget and availability, the cells could be produced on different levels of technical sophistication, ranging from mechanically or electromechanically operated elements to those that function on a chemical and micro-biological level. According to Werner Sobek, "adaptive systems and mechanisms will be a natural part of our daily life in a few years. Automatic, self-learning distance controls for automobiles are already available today. Adaptive cardiac pacemakers, which do not work at a constant frequency but react to external physiological influences like movement, are under development, as are active prostheses and implants with sensory functions and actuators [...] In the building trade, adaptive systems for noise reduction and glasses with variable light transmission will be as common as the active manipulation of forces, deformations and vibrations, especially in light-weight load-bearing structures."

In 2004, Werner Sobek and his assistant Markus Holzbach from the ILEK institute at Stuttgart University constructed the experimental pavilion 'Paul' to demonstrate the potential of adaptive materials in buildings. 'Paul' is a cocoon-like, lightweight structure with a skin made up of various layers of membranes. These transmit daylight as well as emitting artificial (LED) light, provide thermal insulation through an innovative ceramic material, and store the heat from the sun's rays in a phase change material (phase change materials are microencapsulated paraffins that use excess heat to turn from solid to liquid, so they can store the heat energy without changing their temperature). Paul's skin is only 1.4 centimetres thick, but equivalent to the thermal mass of a 15 centimetre, massive wall. That said, Paul's construction is rather low-tech, the segments of its skin being linked only by velcro tape and thus capable of being mounted or dismounted manually.[15]

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[12] Ellen Lupton (ed.): *Skin. Surface, Substance + Design*, p. 23

[13] Axel Ritter: *Smart Materials*. Birkhäuser Verlag 2007, p. 16-19

[14] Werner Blaser: *Werner Sobek. Art of Engineering*. Birkhäuser Verlag 1999, p. 50

[15] http://www.tec21.ch/pdf/tec21_4120052942.pdf