



Building Skin

Skin is a multilayered, multipurpose organ that shifts from thick to thin, tight to loose, lubricated to dry, across the landscape of the body. Skin is a knowledge-gathering device responds to heat and cold, pleasure and pain. It lacks definitive boundaries flowing continuously from the exposed surfaces of the body to internal cavities. Ellen Lupton Skin 2002

When we first think of building skins, we probably first think of Frank Gehry's curved stainless and titanium cladding such as the museum in Bilbao or the Symphony Hall in LA, but building skin today is far more complex than just free-form compositional packaging attached to building frames. Building skins are environmental filters, they are boundaries of personal property and they act as the transition between inside and outside. Pure skins are building envelopes where the roof and the exterior walls form one seamless whole without a transition, just like the human body. They do not need to express the inside of the building (as classic Modernists claimed), since they have been removed from the structure of the building. This is much like the bones of our body which act in compression but require our pre-stressed tension skin to hold it all together. As a result, we are starting to see a whole new vocabulary for these architectural 'building skins'.

Fabric is a material that is well suited for creating building skins in that they are naturally doubly curved for strength, they provide waterproofing & insulation, they can be multilayered and can create complex curved surfaces with minimal seaming. Fabric skins have been around since the beginning of time with yurts and fabric & leather tents of ancient civilizations, but today with new materials, fabric can provide a permanence not known before.

One of the first examples in modern times was the parking structure at Neiges et Roches in Lausanne in 1964 designed by Frei Otto and built by Peter Stromeyer. Here fabric is used as a partially enclosed vertical cladding. The Schlumberger research buildings by Michael Hopkins in 1985 were the next step where the PTFE glass fabric roof came down to become walls and transition into clear glass panels. The Imagination Headquarters building in London by Imagination with Buro Happold had an interstitial skin which tied two old masonry buildings together with a new membrane. Originally the membrane was going to come right to the ground, but it was too radical at the time for the Building Department and was reduced in size. Our Phoenix Central Library Building in Arizona incorporated a tensile membrane system as a brise-soleil integrated with a glass curtain wall so that the fabric shaded the glass). The concept of shading as a completely enclosed permanent façade using fabric and glass was the Burj al Arab Hotel in Dubai. Here a PTFE glass skin facing south creates a shaded courtyard which serves as the building's atrium and joins onto the glass walls facing east and west. Nicholas Grimshaw's recent Space Science Centre in Leicester uses an ETFE inflated foil skin as the building façade which allows visual transparency with insulated foil

pillows. We now see lightweight membranes becoming an environmental building element to be used in conjunction with other more conventional materials such as steel and glass.

Now with nanofibers and the advent of intelligent fabrics, the future will include membrane structures with woven photovoltaic skins, active shading systems built into the skins, and eventually our building skins will become more and more like our own skin and those which exist in the natural world.

The above article was written by Nicholas Goldsmith, Senior Principal of FTL Design Engineering Studio, New York, USA.