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Extreme Shelter

Test laboratory mountains: The Italian architect duo behind LEAP (living ecological alpine pods) design-builds modular solutions for harsh high-altitude environments, transitional and reversible in nature.

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Luca Gentilcore and Stefano Testa, founders of LEAPfactory, Turin, Italy, share a strong passion for alpine adventure and avant-garde architecture. “We love exploring the limits in both fields,” says Testa. “LEAP, to us, represents quality of life and a love for nature, particularly pure nature, and the devices humans build to survive — may these be sweaters, camping tents, or high-tech buildings. We do not limit ourselves or our activities.”

The mountains are their test lab. “The extreme conditions, the essential dialogue with a marvelous and strong nature, the loosening of human rules and customs — all this makes mountains the best setting for focusing our goals.”

Both men are avid mountaineers. “The mountains are where I feel free, and nature is the vehicle to look for the deepest sense of life. I spent thirty years of my life rock climbing around the world. I climb less often now; it’s still the best way for me to have time to breathe deeply and to find my balance,” tells Testa. A perfect day? “Climbing a perfect sequence of beautiful holds on a sunny rock wall and, at the end of the day, a dinner around the fire with my family and friends in a clearing, the scent of tree sap in the air.”

Continues the architect, “After many years of studying, practicing, and teaching architecture, LEAP is a way of bringing together my two souls — nature and artifice, technology and beauty. This is the path of LEAP design research.” Testa studied the masters of modernity, the Italian tradition of the fifties, and the radicals’ tenets of the seventies. He also worked with contemporary artists. “All these things influence my work today,” says Testa, yet he adds, “I love to think there is not one design style in

my work. Instead, there is a continuous search for the right answer to specific questions and places.”

To Gentilcore, the mountains have meant different things throughout different periods of his life — fun, exploration, culture, relationships with the force of nature and with other people. “The mountains for me evoke these emotions that have the power to remove the filters contemporary society imposes on us. In that sense, the mountains have become a fundamental component of life for me that I can’t do without.” Last summer, Gentilcore hiked with his wife, their two children, and a donkey through the wild landscapes of the Massif Central in France for fifteen days. “There, I felt really happy.”

Respect for the mountains is innate for Gentilcore. “It’s respect for nature itself and the culture that the mountains represent. I think this sentiment is originally part of all of us, but it is often clouded and hidden.” It has helped him discover how efficiently humans and nature respond to extreme, hostile environment. “To design for the mountains, we need to study successful sustainable solutions we can adapt to urban and ordinary contexts in the future.” He’s inspired by fields other than architecture that offer alternatives to the traditional way of building. “For the Gervasutti project, for example, we looked at aeronautics and boating; other times we have turned to the world of high-end furniture. For this reason, our projects are almost always new construction systems or new building types.”

Nuova Capanna Gervasutti, Mont Blanc, Courmayeur, Italy

Gentilcore and Testa relish untouched alpine nature. But if they do put a dwelling on a pristine





peak, blending in isn't the program. Above preservation, the designers aim to enrich the diversity and quality of an inhabited, inherited landscape.

Hence, when the Turin Alpine Club commissioned the new Gervasutti hut under the east face of the Grandes Jorasses in the Mont Blanc massif, the architects proposed what they now call "an ambitious solution." It worked. "The site is very complex: a very small terrace on a rock buttress, in the middle of Freboudze glacier," Gentilcore describes.

Rethinking the relationship between humankind, nature, and artifact, the two gave rise to a new generation of alpine bivouacs: an entirely prefabricated modular shelter that is airlifted by helicopter to its remote location and installed in only a few days, with minimized endeavor and without permanently altering the sensitive hosting place. "Modular design is a technical strategy to minimize the necessity of construction work on site. This is fundamental in fragile environments — and for our approach of 'living in nature on tiptoes,' " says Testa, who has a PhD in interior design and has taught interior design and architecture and urban design at the School of Architecture of the Politecnico di Milano and industrial design at the New Academy of Fine Arts, also in Milan.

Transporting the new Gervasutti refuge by small helicopter to its installation site, high up between Haute-Savoie in France and Aosta Valley in Italy, was a lofty feat. "The typical aircraft used in mountain regions can load around 800 kilograms (1,764 pounds) up to 3,000 meters (9,843 feet) above sea level, so we realized four modules, entirely equipped, within that weight limit," Gentilcore says. "At the same time, we had to guarantee very high mechanical resistance, due to the extreme environmental conditions. After several tries, we got to the final solution with an innovative prototype of a fiberglass shell."

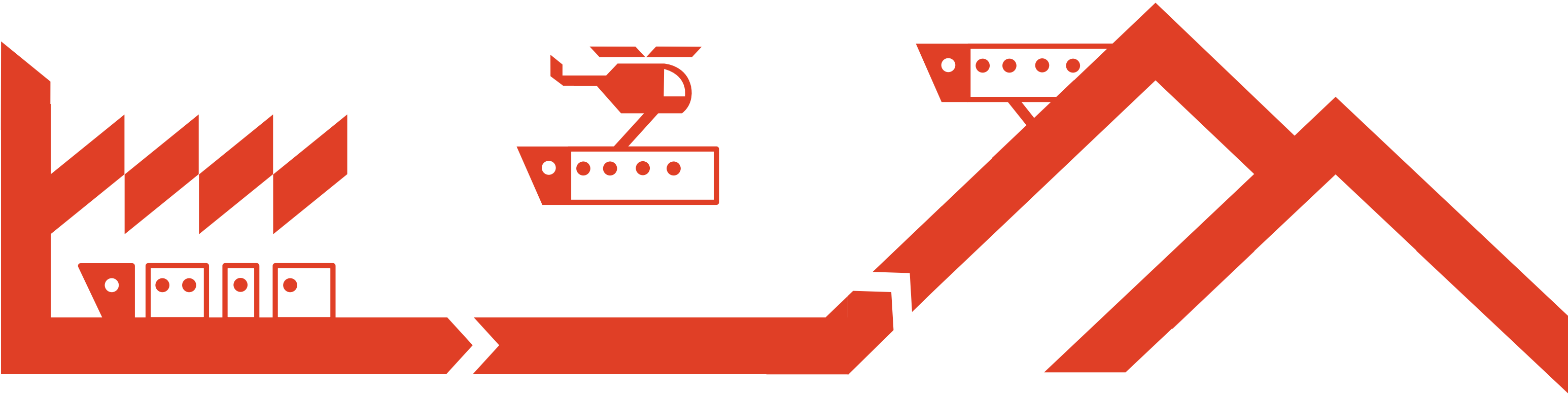
The high-tech tube thoroughly redefines the model of the traditional alpine bivouac built for survival, not comfort. "With the Gervasutti project, we aimed for something between a bivouac and a refuge," Gentilcore says. "The comfort comes from cutting-edge technology, much like with contemporary mountain gear and clothes. But its environmental footprint is way lower than that of a refuge."

Stand-Out Design

Gentilcore, who graduated cum laude in architecture from Politecnico di Torino in 2004, says much has been said about the aesthetic impact of the

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Gervasutti. “We thought, in the glacier landscape, there is no building tradition. And we didn't follow a mimetic approach relating to the strong natural environment. We designed a technical shape, and the shelter became an extraneous presence in the landscape.” The visual statement was purposive, beginning with the colors — white like the snow and the ice and red for visibility. The pattern is an homage to the traditional mountain sweater and, not least, part of LEAP's corporate design.

Gentilcore interposes, “We also have to say that the circulated photographic portraits of the Gervasutti are completely different from the tiny, diminishing presence of the building when observed in person in the surroundings of this majestic landscape.”

The new Gervasutti shelter has become a hiking destination. “Last year, more than 600 people signed the hut book,” says Gentilcore. “Before our installation, the Freboudze valley, one of the most beautiful valleys on the Italian side of the Mont Blanc massif, had just twenty visitors per year.”

Founding LEAPfactory

The partners reveal that the research and resources they invested in the Gervasutti project were utterly disproportionate to the realization of a single building. “We decided to found LEAPfactory and to develop a special building system, the LEAPs1, to commercialize it,” Gentilcore looks back. The year was 2013. The s1 was the first LEAP product.

The living ecological alpine pods are completely reversible by design, an essential ecological benefit of the s1 system. No concrete foundation. No ground alterations. “It leans on legs anchored to the rock with bolts,” Gentilcore explains. “Working at 3,000 meters of altitude is really hard — for the people and the ecosystem — so every activity on site needs to be minimized.” What's more, by virtue of the extreme lightness of s1's components, the number of required “heli rotations” (flights up the mountain and back) equals the number of modules. An individual module that sustains damage can be flown off site for repairs.

The modular structural sandwich-constructed shell, the quintessence of the s1 system, is made of a sophisticated synthetic composite compound, similar to materials used in manufacturing competition speedboats. An additional thermo-reflective insulation layer provides an advantageous microclimate inside the pod, even without a heating system. Warmth comes from thermal sources such as a cooking stove and even the inhabitants' body heat.

A photovoltaic film integrated into the pod's shell powers electrical devices. There is an Internet and a radio connection. A remotely controllable digital system monitors various functions of the s1, for example, energy autonomy, and provides information about internal and external weather conditions. The configurable single-function modules (entrance; living module with kitchen, dining area,

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and pantry; sleeping quarters; bathroom) allow for flexible functional programs. “The big window at the extremity, ‘the eyelid,’ as we call it, transforms the building into a landscape-watching machine,” Gentilcore says.

Eco Hotel LEAPrus 3912, Mount Elbrus, Caucasus, Russia

In September 2013, LEAPfactory installed an eco hotel for the North Caucasus Mountain Club as the first in a series of projects intended to encourage tourism in the region. LEAPrus 3912 comprises four tubes, built from prefab s1 modules, on the south side of Mount Elbrus, Russia. The refuge sits almost 4,000 meters (13,123 feet) above sea level along the standard route to the summit.

“The LEAPrus project was even more ambitious compared with Gervasutti,” Gentilcore says. “Fifty beds, a restaurant with kitchen, bathrooms with warm showers, heating in every room, a system to melt the snow to get water.” The hotel today operates year-round, hosting skiers in winter. “The off-grid functionality was demanding. We built a plant that produces energy from the sun and wind.”

Like the bivouac pod in Italy, the entire LEAPrus structure was installed in a few days, once again using helicopters. “We had less time than originally scheduled because all the operative helicopters in the region were in Sochi, busy with building the Olympic facilities. We remember the thirty-eight heli rotations over three mornings very well . . . and

the evening of the third day, when our staff rested in our buildings that were just assembled and outfitted with electrical light, heating, and the operative kitchen,” says Gentilcore. “A super spaghetti party was organized, after many Russian soups in the construction barracks the days before.”

That night, Gentilcore slept right in front of the eyelid. “I will never forget this experience, the main Caucasian mountain range beneath me, in the sunrise . . .”

Pod Lifestyle: LEAPs1 as Private Residence

Aside from the extreme conditions of Gervasutti and LEAPrus, Gentilcore says his company’s goal for the s1 system was to apply today’s best building practices, with particular focus on the ecological process. LEAPfactory has received many inquiries about the s1 as residential dwelling, although no one has realized it as tiny house or weekend cabin yet. “The LEAPs1 is a really sophisticated product, and it’s quite expensive,” says the architect. “We can imagine s1 as an efficient off-grid house in a beautiful forest . . . with the ease of moving it to a new place.” ▲

