

BEYOND

BY LEXUS

A JOURNAL ON DESIGN AND CRAFTSMANSHIP



THE ONE

NEXT LEVEL

How the dynamic Lexus LF-FC, the brand's new and innovative flagship concept, represents the future of the marque.

P 27

THE REVEAL

CALL OF THE WILD

The iconic Lexus LX has been revamped. It's now bigger, bolder, and more luxurious, as much at home off road as it is in the city.

P 40

THE ROAD

MOUNTAIN MAN

Runner Adam Campbell is one of the most passionate endurance athletes in the world. Can he persuade all of us to gear up?

P 66

THE REPORT

SPACE RACE

Organizations around the world are vying to become the first truly reliable space tourism company. Who will get there first? We report.

P 80

ISSUE N°



INTRODUCTION

Design, among other endeavors, is driven by inspiration. Sometimes that inspiration comes from the past. Equally, it can spring from looking to the future, aspiring to moments and needs yet to be fulfilled. Both types of inspiration reveal intriguing results, allowing us to create cars that are original and unique, infused with unexpected character. Take the flagship Lexus LS, launched in 1990, which aligned to this ideology and set benchmarks for design, technology, and experience. And now the new LF-FC flagship model, revealed at the Tokyo Motor Show, which once again emphasizes our effort not only to exceed existing benchmarks but to establish new ones.

In this issue of BEYOND BY LEXUS, we continue the theme of peering into the past and peeking into the future by highlighting the timelessness of quality, craftsmanship, and design. In our An Element feature, we acknowledge history by celebrating Naguri-style aluminum, a contemporary piece of in-cabin luxury that takes inspiration from traditional Japanese craft. And in The One, we point to the future with a presentation of our new flagship concept, the progressive LF-FC.

Elsewhere in this issue, we take the revamped Lexus LX through Japan's mountainous Gunma Prefecture; we profile the world-class mountain runner Adam Campbell, who hopes to inspire others with his passion for outdoor pursuits; and we capture the sporty RC F on Japan's iconic Irohazaka roads. We also report on another exciting and future-thinking industry: commercial space travel. Is Earth's orbit soon to become an accessible tourist destination?

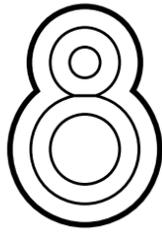
With the eighth issue of BEYOND BY LEXUS, we continue to recognize and celebrate inspiring individuals and companies working to drive us into a better, more engaging future. At Lexus, we consider ourselves to be one of those companies, and it's a pleasure to have you along for the ride.

TOKUO FUKUICHI

President
Lexus International



ISSUE N°



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A regular contributor to BEYOND's The Intelligence section, the London-based Siddall wrote this issue's Human Nature feature on South Tyrol's new mountain museum.

BRANDON R. REYNOLDS
WRITER

Reynolds lives in Los Angeles and writes for West Coast publications including *SF Weekly*. The first car that Reynolds, the writer of this issue's The Lab story, ever drove was a Lexus.

ARIC CHEN
WRITER

Chen is curator of design and architecture at Hong Kong's new M+ museum. For this issue, he wrote an essay on China's changing relationship with design.

THOMAS ALBDORF
PHOTOGRAPHER

Albdorf's work has appeared in the likes of *Bloomberg Businessweek* and *Wallpaper*. BEYOND flew the Viennese photographer to London to shoot still lifes for The Intelligence.

SARAH PARKER
SET DESIGNER

Parker, a London-based set designer, counts *Vogue* and Dior as clients. She showed off her green-fingered side while styling the "Green House" shoot in this issue's The Intelligence.

LAURENT BURST
PHOTOGRAPHER

Burst has shot for clients ranging from *GQ* to UBS. This issue took the Swiss-born photographer to Geza Schoen's Berlin studio, where he discovered the first perfume he actually liked.

Illustrations by Robert Nippoldt

7

THE
INTELLIGENCE

From a peek into virtual reality to a sneak preview of a new Guggenheim, The Intelligence is an edit of global goings-on.



20

THE GETAWAY
WIND DOWN

Snaking up and around 48 hairpin bends, Irohazaka is one of Japan's most jaw-dropping routes.

22

AN ELEMENT
RETURN OF THE ART

The Naguri-style finish inside the Lexus GS F is an impressive blend of old-world craftsmanship and new technology.



24

THE ICON
LOOKING SHARP

Eighty-two years old and still anything but blunt: the legacy of Caran d'Ache's Swiss Pencil-Sharpening Machine.

27

THE ONE
NEXT LEVEL

Is the LF-FC the Lexus of the future? We show the sporty concept sedan against stunning Icelandic backdrops.

32

HUMAN NATURE
UP IN THIN AIR

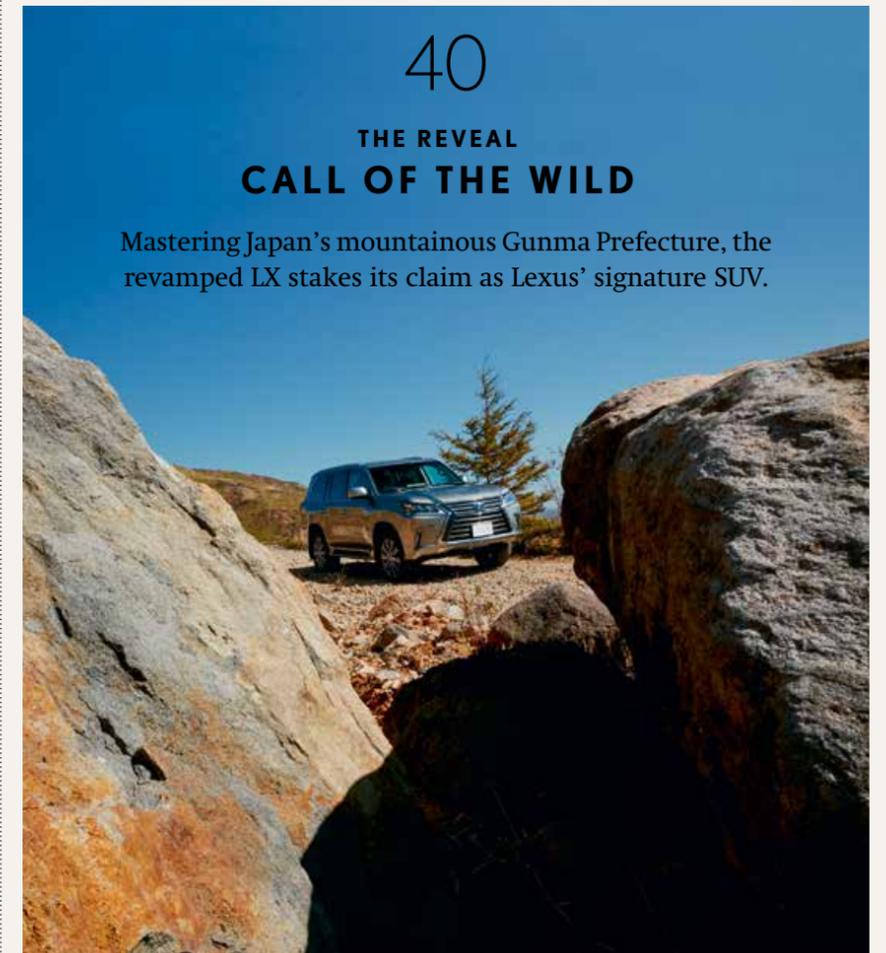
A new Zaha Hadid-designed museum crowns South Tyrol's Mount Kronplatz. We visit the 2,275-meter-high site.



40

THE REVEAL
CALL OF THE WILD

Mastering Japan's mountainous Gunma Prefecture, the revamped LX stakes its claim as Lexus' signature SUV.



CONTENTS

54

PIT STOP
MAGNUM OPUS

On the site of a world-famous music event, a team of Austrian architects has built a parking garage fit for a festival.

59

BLUEPRINT
ON THE NOSE

Geza Schoen does more than create intoxicating scents; he bottles emotions. The German perfumer shows us how.



66

THE ROAD
MOUNTAIN MAN

Adam Campbell is one of the world's foremost endurance athletes – and he wants you to run, too. We follow him on a road trip into Canada's vast backcountry.



80

THE REPORT
SPACE RACE

Around the world, various companies are working hard to fly tourists into space on a regular basis. But who will do it first?



90

THE LAB
MUSIC TO OUR
EARS

There are two parts of a car that are meant to sound good: the engine and the audio system. Mark Levinson looks after the latter.



96

AT WORK WITH LEXUS
TAKEAKI KATO

As the brain behind models such as the Lexus NX, the chief engineer Takeaki Kato is a very busy man. We spend a moment with him.

THE INTELLIGENCE

From the bottom of the ocean to the plateaus of Java, we've scoured the globe for the latest goings-on in design, travel, food, and technology

FIRST TO
FINNISH

How a young Franco-Japanese architecture firm will build the next Guggenheim
P11



ROOT OF
LUXURY

Beetroot fan? The chef Tomas Reger conjures up an inspired autumnal dish
P18



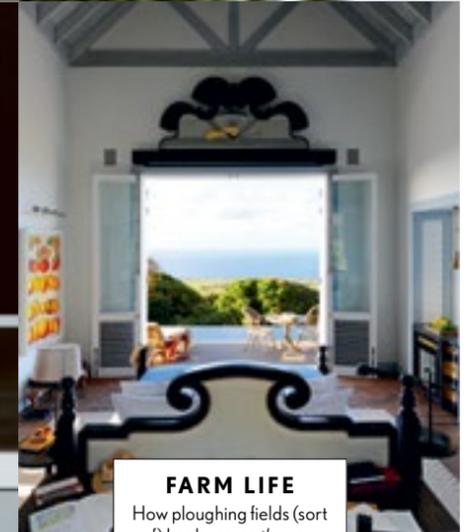
NOTE
PERFECT

Tech pioneers have discovered a way to send scents digitally. But how does it work?
P9



FARM LIFE

How ploughing fields (sort of) has become the new luxury holiday pursuit
P8



REAP AND REST

The once-humble working farm is taking on a new identity as a high-end holiday hideaway



MESASTILA RESORT

Desa Losari, Grabag
56100 Central Java, Indonesia
mesahotelsandresorts.com
Offering tours of its vast 494-acre coffee plantation, this remote Indonesian resort boasts panoramic views of the eight surrounding volcanoes that hem the property in. Guests can enjoy healthy cooking, with ingredients sourced from the resort's organic vegetable farm.

Illustrations by Lewis Stringer

Holidays were once a scheduled pause in the year for enforced idleness, but now, in a digitalized world that comes hand in hand with deskbound everydays, vacationers are increasingly looking for authentic, back-to-nature experiences – albeit with a dose of luxury comforts. A growing breed of hoteliers are consequently tapping into this consumer demand, managing luxury farmhouse properties that provide windows into agricultural life. From Oxfordshire's Soho Farmhouse, a recently opened

rural mecca for London's social elite, to Mesastila, a Javanese coffee plantation offering tours of its 494-acre estate, these five-star farms provide a valuable education in local farming practices and age-old, preindustrial methods of food production. Offering a chance for self-improvement while allowing essential downtime, farmhouse holidays soothe the millennial traveler's eco-conscience. Don't be afraid of getting too down and dirty, however. There's little danger of getting mud on your boots. — *Alicia Kirby*



KITTITIAN HILL

Saint Paul Capisterre Parish
Saint Kitts and Nevis
kittitianhill.com

Kittitian Hill is the Caribbean's most ambitious sustainable resort, boasting a 400-acre stretch of organic farmland and an edible golf course (fruit and vegetables are grown between the fairways). The property's centerpiece is a five-star hotel that is powered by renewable energy.

ANTICA CORTE PALLAVICINA

3 Strada Palazzo due Torri
43010 Polesine Parmense, Italy
acpallavicina.com

Foodies make the journey to this 14th-century castle and refined *agriturismo* to taste chef and owner Massimo Spigaroli's *culatello di Zibello* – Italy's most expensive cut of ham, which comes from a herd of prized black pigs that are reared on-site.



TORRE DE PALMA

Herdade de Torre de Palma
7450-250 Monforte, Portugal
torredepalma.com

Located in the Alentejo region, this wine hotel has a history dating back to the 14th century, serving up locally produced wine from its lush plot of farmland. Architect João Mendes Ribeiro has recently given the existing farmhouse a smartly whitewashed, contemporary-rural update.

CREAM OF THE CROP

The fresh produce from our farms' sun-filled vineyards, lush plains, and organic orchards:



Pineapples are grown on Kittitian Hill's edible golf course.



Antica Corte Pallavicina is famous for homemade ham.



Aragonez grapes are used in Torre de Palma's red wine.

Photography by Thomas Alsdorf and styling by Sarah Parker

SCENT SENT

Technological pioneers are experimenting with methods to transport scent across the world. One new platform, oNotes, does just that

Back in June 2014, brains in the tech world were celebrating a rather odd moment that could potentially forever change the way we communicate. The smell of macarons and champagne was digitally transported by Harvard professor David Edwards and a former student, Rachel Field, from Paris to New York. More than a year later, the prospect of the service being available to everyone is no longer just a fun proposition: it's an imminent reality.

So how does it work? For the scent-messaging platform oNotes (developed by the aforementioned professor) the sender takes a picture with a connecting app and tags it with one or more scents, which the receiver can play through a cylindrical object called an oPhone. The oPhone can also be topped up with scent cartridges called oChips, which can then be linked to books, songs, and films for multisensory enjoyment. While oNotes allows people to communicate scents to fellow app users, what Edwards is really excited about is what this technology can do in terms of health. "Over the last couple of years, issues like Alzheimer's and Parkinson's and even autism have allowed medical science to explore the relevance of scent and scent delivery to memory and health," he says.

Edwards isn't the first person to successfully experiment with transporting scent. Back in 2014, US bacon giant Oscar Mayer released an award-winning app



The smell of macarons transported from Paris to New York? The oPhone by oNotes makes it possible

called Wake Up and Smell the Bacon, which releases the smell of frying bacon alongside one's morning alarm. Elsewhere, Japanese company Scentee has developed premade cartridges that can be ordered and attached to an iPhone to deliver scents to friends and family. "With 55 percent of communication being nonverbal, wouldn't you like the option of sending a message without saying a word?" a spokesperson for the brand says.

But oNotes is spearheading the movement. Edwards has plans to collaborate with one of the world's biggest fragrance houses, but he is more excited about what else this technology can impact. "Any brand that represents an experience, product, or service that has an aromatic value will have this opportunity

WHY SMELL?

Smell, perhaps more than any other sense, can awaken strong emotions and memories from the past. Smells that conjure cognitive recognition stimulate the deepest parts of the brain, helping counteract neurological diseases such as Alzheimer's and Parkinson's. Health benefits aside, scent delivery could also become an integral part of the enjoyment of video games, books, and films, intensifying the audience's emotions in a similar way to music.

for a scent brand, a scent logo, or a scent escape," he says. "The digital revolution has engulfed our lives, and the fact that we have only two of our senses acting for us is not normal. What we're doing is inevitable. We are excited about leading this movement." — *Liv Siddall*

ESSAY

DESIGN, MADE IN CHINA

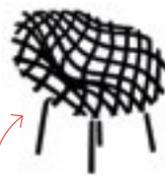
Innovators in China, a country synonymous with mass production, are redefining the nation's design output. Can they bring the scene up to global speed?

In a country rife with slogans – among the favorites of its current president, Xi Jinping, are “The Chinese Dream” and “The Four Comprehensives” – another one often heard these days goes something like this: “From Made in China to Designed in China.” To be sure, China has been pushing its creative potential recently, largely on the grounds that its future prosperity depends on it, as the government works to shift the country's economy from its dependence on low-cost manufacturing toward high-margin innovation.

More important than slogans, however, are the people who are driven by creativity itself. And fortunately for China, an energetic crop of emerging young designers – members of a generation immersed in the Internet, often schooled abroad, and well connected to the wider world – have been taking up the mantle of Chinese design.

For many, “designed in China” means redefining the phrase “made in China.” Now an annual fixture in Milan during the Salone del Mobile, PINWU, a studio founded

by Zhang Lei with partners Christoph John, from Germany, and Zhang's Serbian wife, Jovana, has made it its mission to create new vocabularies for time-honored Chinese crafts. From the pair's base in Yuhang, near the city of Hangzhou, on China's east coast, where they recently opened a nonprofit design library, the designers work with local craftspeople to create chairs made almost entirely of rice paper, pared-down tables with seamless porcelain tops, and gravity-defying vases and tableware of self-supporting silk. “It's about fusing Chinese traditional craft with modern design,” says Zhang, who also curates collections of wares made by himself and other Chinese designers that push the possibilities of local materials such as bamboo, mud, silk, copper, and paper.



PINWU's rice paper chair is both weightless and solid



Femininity meets futurism in Masha Ma's collections



Zhang and PINWU are not alone in mining the social, cultural, and regenerative potential of craft. There's also Kanjian, a social enterprise founded by the contemporary folk musician Dadawa which pairs contemporary designers with craftsmen from China's ethnic minority groups, or Hong Kong-based Elaine Ng Yan Ling, a onetime TED fellow known for her experimental, high-tech textiles – and, increasingly, her collaborations that modernize the work of craftsmen in rural Guizhou.

What these and other designers also share is a desire to move beyond others' expectations of China, and even China's expectations of itself. The recent blockbuster exhibition *China: Through the Looking Glass*, at the Metropolitan Museum of Art, in New York, brought into focus the West's long-standing fascination with China, as expressed in fashion. But viewers won't find a single dragon, peony, or embroidered cloud in the work of rising Chinese fashion designers like Uma Wang, Qiu Hao, and current darling Masha Ma, the 30-year-old Central Saint Martins graduate known for her clean cuts and looks informed by a side of China that, as she has said, “can only be found beneath the surface.”

Still, Ma and her peers are looking decidedly forward. And so are the legions of young Chinese who are designing new features for the social media platform WeChat; developing products for the trailblazing smartphone maker Xiaomi; building new drones for pioneering Chinese start-ups like DJI; or just fiddling around with their Arduino open-source electronic prototyping platforms among the booming maker communities in cities like Shenzhen. “China is complicated, and you have to always try to embrace the chaos,” Ma says. Indeed, whoever said that chaos breeds creativity was right. — *Aric Chen*

Illustrations by Studio Takeuma

Photo: Courtesy Moreau Kusunoki Architectes @ Bruno L&Y

THE BUILDING

THE FINNISH LINE

Following an unprecedented open call for pitches, a French-Japanese architecture firm has been selected to design a Guggenheim Museum in Helsinki



MEET THE ARCHITECTS

Husband-and-wife duo Nicolas Moreau and Hiroko Kusunoki met while in Tokyo, where they were both employed by renowned architectural firms – Moreau worked at SANAA and for Kengo Kuma; Kusunoki was hired by Shigeru Ban. In 2008 they left Japan together so that Moreau could helm the French outpost of Kengo Kuma's studio. Three years later, they founded their own practice.

PORTFOLIO

POLYTECHNIC SCHOOL OF ENGINEERING

Bourget-du-Lac, France
A new building for the Polytechnic faculty of the University of Savoie, featuring a sprawling terrace with views over Lake Bourget.
Opening 2016

HOUSE OF CULTURES AND MEMORIES

Cayenne, French Guiana
A museum, art gallery, and education center with a mix of colonial and contemporary architecture.
Opening 2017

PARIS DISTRICT COURT PLAZA

Paris, France
A 9,000-square-meter plaza for the new Renzo Piano-designed Paris District Court building.
Opening 2017

HUNGARIAN NATIONAL GALLERY

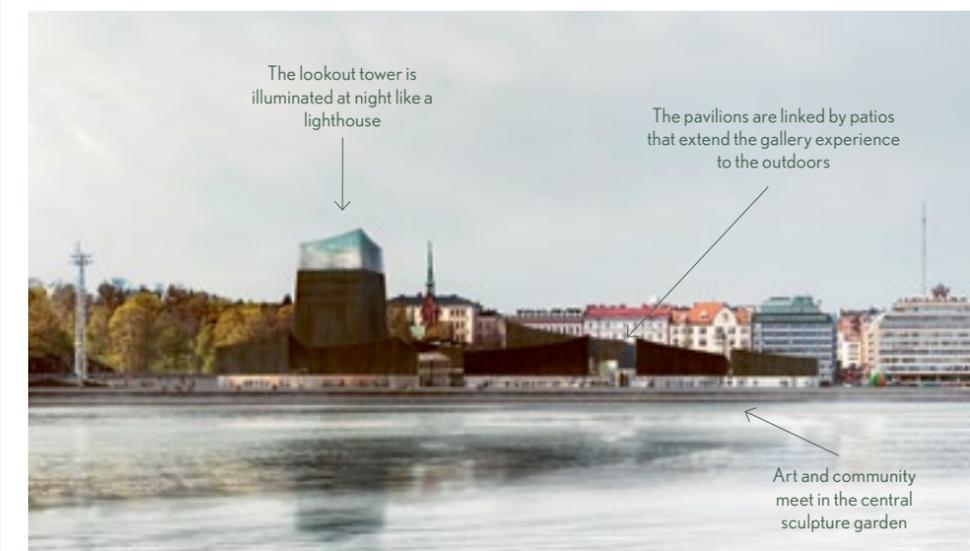
Budapest, Hungary
A new National Gallery in Budapest, to be created in collaboration with SANAA and Snøhetta.
Opening 2017

Chosen from 1,715 anonymous submissions, the winning design for the future Guggenheim Helsinki museum was crafted by Moreau Kusunoki Architectes, a selection based on the firm's integration of the surroundings: the port promenade, the neighboring marketplace, the local timber industry. The design features a charred timber lookout tower that oversees a cluster of buildings; space can expand or contract as necessary.

The Guggenheim Foundation decided to open an outpost in the Finnish capital (the launch date for which is yet to be confirmed) because of the city's fast-growing urban area and its location at the intersection of Europe and Russia. A first for the foundation, the competition aimed to catalyze a global exchange of ideas about architecture, urbanism, and public buildings. The jury – chaired by dean emeritus

of the Graduate School of Architecture at Columbia University, Mark Wigley – selected six finalists after a thorough sift.

The winning entrants, Nicolas Moreau and Hiroko Kusunoki, a French-Japanese married couple, have known each other for more than a decade. Their shared experiences are complemented by their cultural differences, generating a constant creative dialogue. In 2011 they founded their namesake Parisian agency, and have since undertaken such notable projects as the plaza for the Paris District Court. For this particular project, their challenge was mixing two scales: the tourist experience of approaching the territory from Europe and the small village feel of the locale. The jury lauded the sense of community Moreau Kusunoki evoked, matching both the Finnish context and a modern museum. — *Sarah Moroz*



FROM THE SHORT LIST



HaasCookZemrich STUDIO2050
The entry consisted of five shingled, looming, vertical towers bathed in light.



Asif Khan
The London-based studio's design was short-listed for its glass silhouette.

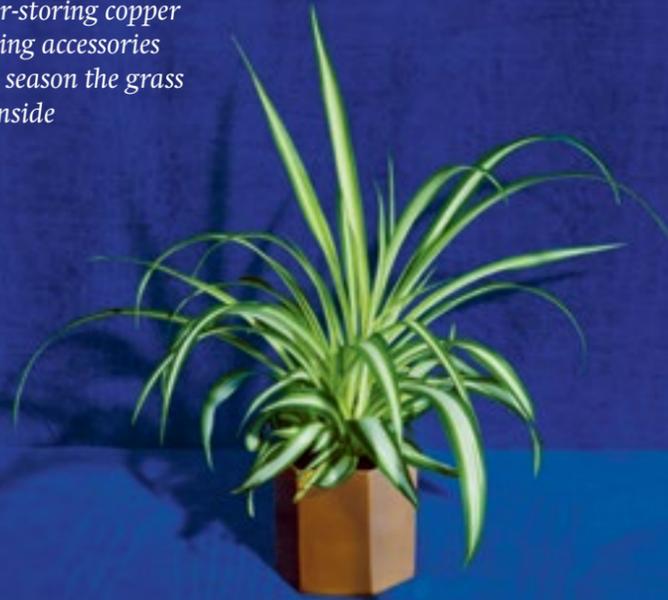
THE EDIT

GREEN HOUSE

From indoor planters to water-storing copper pots, a new array of gardening accessories combine style and stems. This season the grass is greener on the inside



HANGING PLANTER by Dana Bechert
Carved porcelain, parachute cord



HEXAGON POT by Ferm Living
Solid brass with matte polish



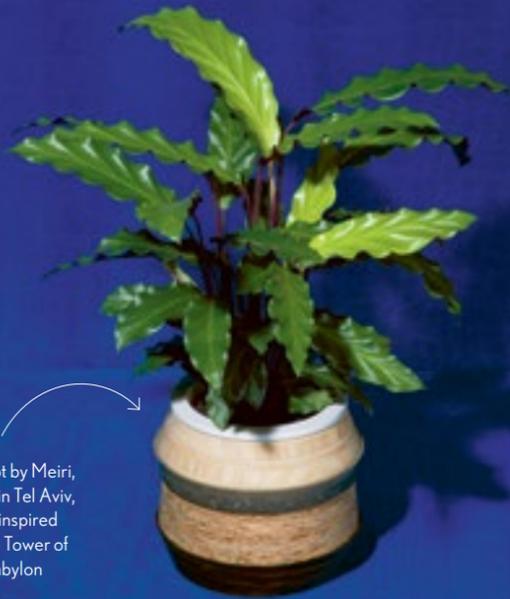
PLANT WALL by Ferm Living
Iron wire with powder coating



This planter from the US design house Yield contains a separated one-inch reservoir

SPUN PLANTER by Yield Design Co.
Handmade from a single piece of copper

BABILUS VASE by Nir Meiri
Stacked rings of bamboo and chipboard



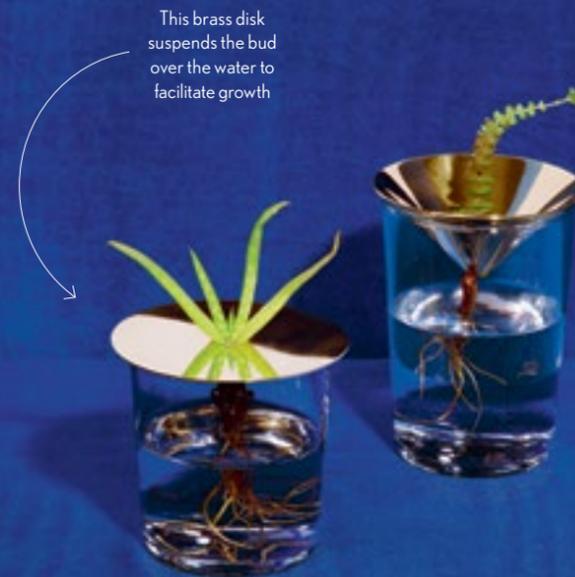
This pot by Meiri, based in Tel Aviv, was inspired by the Tower of Babylon

PLANT STAND by Ferm Living
Iron wire with powder coating



Photography by Thomas Albdorf
Styling by Sarah Parker

FLOATING FOREST by Michael Anastassiades
Polished brass and glass



This brass disk suspends the bud over the water to facilitate growth

UTILITY VASE by Luur Design
Stoneware cast from plaster blocks



A WORK OF MAGIC

How one US technology start-up is bridging the gap between reality and virtual worlds in a truly pioneering leap

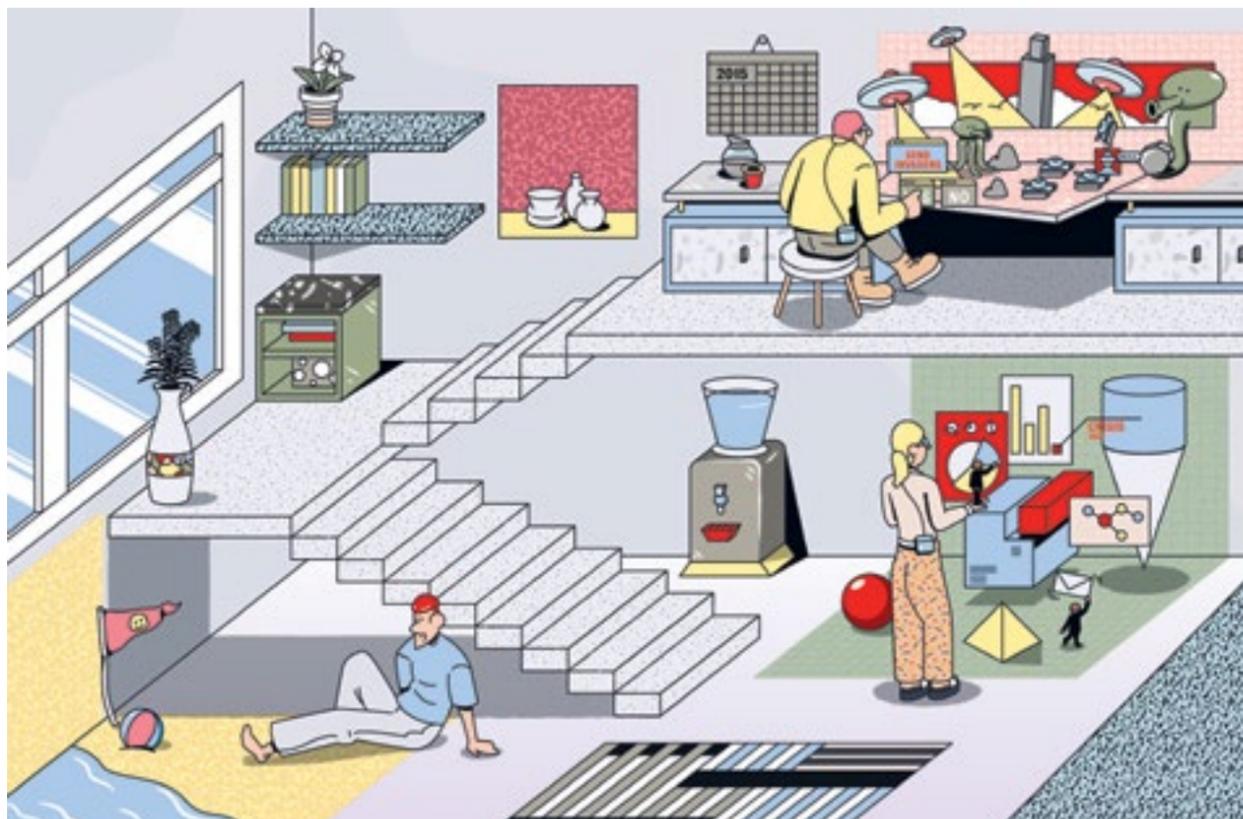


Illustration by Tanawat Sakdawisarak

Major organizations and smaller start-ups are working on virtual reality technology in a race to be the first to reveal plans that will revolutionize how we interact with one another. And the company rumored to be winning this race is Magic Leap, headed by founder Rony Abovitz. The Florida-based start-up has been pledged more than \$500 million in funding from Google, Qualcomm Incorporated, and private investors, but its mission remains surprisingly simple: firmly believing that the gadgets we rely on remove us from the world around us, Magic Leap wants to adjust them so that they promote creativity, respect human biology, and, above all, feel as natural as possible.

This is what distinguishes Magic Leap from its competitors. Whereas Microsoft's HoloLens offers high-definition holograms that make objects "come to life in your world" via an

IN FOCUS
Notoriously secretive, Magic Leap is only revealing tantalizing hints at its progress every so often. In August 2015, news broke that it had recently applied for 97 different patents, including one that looks to be a virtual reality contact lens, so headsets need not always be worn.

untethered headset, Magic Leap offers wearable technology that can fully transform the entire scene around the user, integrating 3-D objects into our vision. Its "goggles" work by projecting light into the user's eyes and bouncing it off to multiple focal points in the room, and the company is creating light fields inspired by those that our eyes make when taking in our surroundings. — LS

EARLY ATTEMPTS AT VIRTUAL REALITY

1935	1960	1968	1991
In <i>Pygmalion's Spectacles</i> , Stanley G. Weinbaum introduces goggles that transport wearers to a fictional world.	Cinematographer Morton Heilig builds a console called the Sensorama, which includes a display and odor emitters.	Science fiction becomes reality when Ivan Sutherland creates a headset that generates virtual environments.	The Virtuality Group creates a simple VR headset for a video game booth. Nintendo and others soon follow.

THE SEA'S THE LIMIT

While much of the world's attention is focused on outer space, one man has devoted himself to the opposite



GRAHAM HAWKES
Founder and Chief Technology Officer, DeepFlight

Why is underwater travel important?

It's not. What is important is access to our oceans. We live on an ocean planet, and having access to that part of it is critical to our understanding and managing of it. The oceans are critical to the health of our planet and hold resources which can sustain human life going forward. We can all benefit from gaining access to the oceans, but the curious and open-minded will be first in line. After all, you cannot protect what you don't know.

What is DeepFlight?

I thought we needed to access the full depths of the oceans, and to do so we couldn't just sink to 11,000 meters. We need to move through the water efficiently. My design goal was to bring the weight of a submarine down so significantly that you would no longer need a large, expensive mothership to operate from. Our crafts launch from yachts, beaches, and boat ramps. With 94 percent of our oceans unexplored, every dive provides the opportunity to see sights no human has ever seen before.

Tell us about Dragon.

It dives effortlessly and is the only submarine capable of a vertical dive on pure thrust. It's so safe and easy to control that anyone can drive it.

What have been your personal highlights of diving in these vehicles?

I took a wheelchair-bound friend for a dive and watched the pure joy on her face. I also took a dive with Sir Richard Branson in Mexico to look for great white sharks. When we found one, we started screaming like schoolboys.

What does the future hold for submarine tourism?

We envision DeepFlight tour bases in locations all over the world. Imagine going on holiday to a resort and finding DeepFlight Dragons lined up on the beach like Jet Skis for guests to go out and explore with.

INTO THE DEEP



Weighing 1,800 kilograms and measuring five meters in length, the Dragon is a lightweight submarine.



The DeepFlight Dive Manager (DDM), a monitoring technology, shown here, offers piloting assistance.



The Dragon can stop and hover over ancient shipwrecks, and even cruise alongside big animals.

Everyone's talking about space tourism, but what about those who are putting their efforts into making deep sea journeys an exhilarating and viable option for the more adventurous traveler? Mechanical engineer Graham Hawkes grew up dreaming of designing airplanes. But after a brief stint designing underwater vehicles for the military, Hawkes is now at the helm of DeepFlight, a California organization designing privately owned submarines that allow people to safely fly through the ocean to depths of 120 meters.

Unsurprisingly, the idea of flying one's own personal submarine through the ocean has been well received by both the marine world and the general public. Luxury hotels worldwide are already recruiting their own fleets for patron use, and many curious, independent enthusiasts are eager to experience one of Hawkes's submarines. One of the strongest selling points of the craft is safety: each is positively buoyant, so it automatically floats back up to the surface. "Where traditional submarines are heavy, complex to operate, and offer a two-dimensional, elevator-like experience," Hawkes says, "DeepFlight has introduced the lightest personal submarines on the market and the concept of underwater flight." Here, he speaks with BEYOND about the potential DeepFlight has to redefine our relationship with the ocean. — LS

THE INGREDIENT

A MATTER OF TASTE

Licorice is a divisive ingredient that is currently experiencing an inventive resurgence. We talk to two chefs about their standout culinary interpretations

Photography by Thomas Albdorf and illustration by Peter James Field



LUKE DALE-ROBERTS
The Test Kitchen, Cape Town

One of South Africa's most highly regarded chefs, British-born Luke Dale-Roberts heads the only African restaurant on the San Pellegrino World's 50 Best Restaurants list.

ON THE SAVORY SIDE



Use your hands to break the licorice root into pieces.



Grind the root pieces in a mortar and pestle until fine.



Dust the ground licorice powder over the langoustine.

"When I was a child, my mother used to give me licorice instead of chocolate," says Luke Dale-Roberts, the owner and head chef of The Test Kitchen, an award-winning restaurant in Cape Town.

A fan of experimenting with unusual ingredients and concocting bold, thoughtful flavor combinations, Dale-Roberts decided in early 2015 to revisit his licorice-based food memory through his cooking – by introducing a dish on his menu unofficially named *blinisoise*.

Made up of a chilled blini cream, barbecued langoustine *en gelée*, and finely minced langoustine *tataki*, the dish is inventively garnished with a delicate dusting of licorice powder sourced from an esteemed French supplier, whose name is a closely guarded secret that the chef won't divulge. With the natural sweetness from the chemical glycyrrhizin making licorice up to 50 times sweeter than sugar, a tiny dose of it is enough to complement the smokiness of the barbecued langoustine.

"Licorice has the ability to amplify and elongate flavors," says Dale-Roberts. "And just like star anise, it also goes extremely well with langoustine."

The dish pays homage to the blini by transforming the yeast pancake into a dense, chilled foam. It is served with langoustine *tataki* and a delicate slab of meaty langoustine, encased in a jelly that Dale-Roberts painstakingly cooks from a consommé made from barbecued langoustine shells, topped with licorice powder.



Blinisoise



An ancient, aniseed-tinged root, licorice has traditionally been used in herbal medicine for its antiviral, anti-inflammatory properties. Today, it is perhaps best known in the form of a black, sweet-chewy confectionery.



ROBERT MCLEARY
The Modern Pantry, Finsbury Square, London

Robert McLeary is the head chef at The Modern Pantry's second site. For seven years, he has worked alongside Anna Hansen, the inspirational chef and owner of the restaurants.

ON THE SWEET SIDE



Use a knife to peel the sticks of licorice root.



Add a handful of peeled sticks to the simmering custard.



Infuse overnight. Remove the sticks before serving.

The Modern Pantry's two London restaurants are known for experimenting with unusual flavors, and one ingredient that head chef Robert McLeary has a soft spot for is licorice. It can be found in everything from bar snacks that include macadamia nuts delicately dusted with licorice salt to a beef fillet that McLeary cures with a beetroot, soy, ginger, and licorice juice. McLeary's latest ode to the ancient root, however, is a licorice and urfa chili sugar doughnut.

"When you're using licorice in desserts, you have to tread much more carefully and find a balance so the flavor doesn't take over," says McLeary. "In savory dishes, you cook licorice with much bolder flavors, so there isn't the same danger."

It took years for McLeary and his business partner Anna Hansen to settle on sourcing from Lakrids, a specialist licorice supplier from which they source licorice powder, paste, and juice sticks. Containing a black, gooey-sticky extract obtained from boiling licorice root, the juice sticks pack the most powerful punch. McLeary states, "I love licorice. It turns every dish – sweet and savory – into something so unique. You can't compare it to anything else." — AK

McLeary's punchy little pastry is deep-fried with a rich filling of chocolate custard cream and butter. Once cooled, he finishes the doughnut ball off with a subtle dusting of Turkish urfa chili and a pinch of powdered licorice for a smoky-sweet aniseed-tinged kick.

Doughnut



THE RECIPE

TAKING ROOT

Tomas Reger, the head chef at Dubai's new INTERSECT BY LEXUS boutique gallery, introduces a personal favorite recipe from his kitchen



Photography by Baker & Evans

“Being associated with Lexus means that our cooking relies on the same principles of attention to detail, use of the best possible materials, and a great team,” explains Tomas Reger, the head chef at INTERSECT BY LEXUS in central Dubai. Here, at the manufacturer's new boutique gallery and retail concept space – the only one besides the Tokyo location – Reger and his team serve up “feel-good food, using simple, seasonal

ingredients,” as the Czech Republic-born chef likes to describe their cooking. “Rice cooked with beetroots was my childhood comfort dish, so I wanted to feature it on the INTERSECT BY LEXUS menu,” he says. “It is important to us that our dishes have the right textures, flavors, and colors – and they have to be fun, too. Our barley risotto, prepared with a variety of crispy and soft heritage beetroots, ticks all these boxes.” — *Annick Weber*

BEETROOT AND BARLEY RISOTTO

Serves four

Ingredients

500 g barley | 500 ml water | 500 ml beetroot juice | 50 ml olive oil | 100 g finely chopped shallots | 20 g finely chopped garlic | 1 bunch of parsley | 8 pieces of baby heritage beets: gold, Chioggia, red, white, or any other flavorful variety | 1 red beetroot cut into thin strips for garnish (keep in ice water to get it extra crispy) | 400 g sour cream | parsley cress | coriander cress | chives

1. Soak the barley in water overnight. The next day, strain the barley, reserving the soaking liquid. Sauté the shallots and garlic in a little olive oil for two minutes. Add the barley and half the beetroot juice and cook for 15 minutes in a pressure cooker. Finish with fresh beetroot juice, and season with salt and pepper.

2. To cook the beets, make a bed of parsley in the steamer basket of a pressure cooker (or a steamer over boiling water) and put the beets on top. Cook on high for 20 minutes. The fragrant steam will permeate the vegetables. Cool and peel. They can be prepared ahead and reheated in the oven just before serving.

3. To plate, spoon the barley risotto on a plate and arrange the different varieties of beets on top. Spoon the sour cream in the center and garnish with the herbs.

THE DESTINATION

ZEALOUS ZAGREB

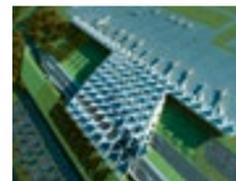
With a dynamic, forward-thinking arts scene, iconic architecture, and sophisticated nightlife, Zagreb, Croatia, is one of Europe's lesser-known cultural jewels



Customers peer at high-quality products at the Croatian Design Superstore

IN AND OUT

The Croatian capital is a strategically located hub for air travel to and from Europe. Zagreb International Airport, however, is slightly ailing – it was last upgraded more than 20 years ago – so Zaha Hadid Architects designed a concept for a new terminal to maximize its appeal to the national and international markets. The proposed environmentally efficient terminal will provide a worthy gateway to the city.



More than two decades since Croatia gained independence, the country's capital, Zagreb, has emerged as diverse, bustling, and vibrant. Steeped in artistic heritage, it is on a par with Europe's other, more boutique cultural destinations, such as Leipzig and Vienna. Gothic, Renaissance, and baroque architecture is interjected with socialist housing, Brutalist concrete, and contemporary minimalism. Three renowned art academies, founded in 1896, are attached to the University of Zagreb, and the city's numerous theaters, museums, and galleries have established a firmly rooted creative scene.

Highlighting the city's distinct cultural point of view, the annual Zagreb Film Festival, held at a variety of venues, is a valuable platform for emerging European filmmakers. But while Zagreb has a number of nationally funded cultural venues, it is the grassroots creative scene that is the city's lifeblood. At the forefront is Lauba, an independent contemporary gallery, restaurant, and store. Housed in old Austrian-Hungarian army stables, it shows international and Croatian artists and hosts forward-thinking music and performance events. Major Croatian contemporary artworks, taken from founder Tomislav Kličko's collection, are also regularly exhibited. Across the city, the Croatian Design Superstore features a showroom presenting furniture, lighting, and accessories; a working studio; and a coffee shop. Ruder Novak-Mikuli and Marija Ruzic's elegant wood furniture, Ana Tevi's Traveler lamp (a fusion of art deco with '50s modern), and the organic shapes of Lidia Boševski's ceramics – all exhibited in-store – are a concise viewpoint on the country's refined aesthetic. Today, Zagreb is a culturally evolving city. Its complex history and diverse aesthetic influence have led to a scene in which the country's existing artistic lineage will continue to develop in an internationally relevant way. — *William Oliver*

WHERE TO EAT

Bistro Fotić

A modern take on Croatian fare, served in an old photo club. The decor features vintage cameras and other paraphernalia. Gajeva 25, 10000 Zagreb bistrofotic.com



Esplanade Zagreb Hotel

The restaurant at the city's grandest hotel (opened in the early 1900s as a layover for Orient Express passengers) offers traditional haute cuisine. Mihanoviceva 1, 10000 Zagreb esplanade.hr

SHOPPING

Croatian Design Superstore

Design shop and exhibition space hosting emerging Croatian designers. Marticeva 4, 10000 Zagreb croatiansuperstore.com

Vinoteka Bornstein

Zagreb's oldest wine shop specializes in local labels. Kaptol 19, 10000 Zagreb bornstein.hr

GALLERIES AND MUSEUMS

Lauba

Avant-garde art and events. Filipovica 23a, 10000 Zagreb lauba.hr



Museum of Contemporary Art

Opened in 2010, the complex houses the country's largest collection of modern and contemporary art. Dubrovnik 17, 10000 Zagreb msu.hr



The journey is the destination on an exhilarating drive along Irohazaka, two mountain roads that wind their way through Japan's stunning Nikko National Park

Photography by Takahashi Yasumura

1 UP TO THE LAKE

Irohazaka is a pair of zigzagging roads located in the mountains of Japan's Tochigi Prefecture. The newer road, which dates from 1965, is used for uphill traffic; the other, built in 1954, is for downhill use only. With a length of just under eight kilometers each, and an ascent/descent of more than 400 meters, they connect the town of Nikko to Lake Chuzenji, which lies at the foot of the sacred Mount Nantai volcano.

2 ALPHABETICAL ORDER

I-ro-ha are the first three (of 48) syllables found in the old Japanese alphabet (as opposed to the modern Japanese alphabet, which starts with *a-i-u*), and the suffix *zaka* means "slope." The name Irohazaka stands for the number of hairpin turns - 48 in total - that the sloping roads wind up and around. At each curve, from bottom to top and back, one of the 48 characters from the ancient alphabet is displayed in consecutive order.

3 CHANGING OF THE SEASONS

It takes around 30 minutes to drive the full extent of Irohazaka, and the trip is particularly scenic in autumn when the leaves are the most colorful in the mountains. Here, a Lexus RC F coupe corners an Irohazaka hairpin on an autumnal afternoon.



4 PARK LIFE

Irohazaka lies in the middle of Nikko National Park, which boasts lush forests, waterfalls, and hot springs - the latter being linked to the volcanic activity in the area. The small town of Chuzenjiko Onsen, on the shores of Lake Chuzenji, is a popular visitor magnet not only for its natural hot springs but also for the Kegon waterfall, one of the most impressive in the area.

RETURN OF THE ART

An ancient craft form makes a luxury return

Text by Sam Mitani and photography by Mikio Hasui

The all-new Lexus GS F possesses many new features—a powerful V-8 engine, for example, and an impressive taut suspension system—but it’s not just the technology that makes this car special. Look closely inside the cabin and you’ll notice new trim pieces on the dashboard, center console, and doors that appear fresh but exude a strong sense of traditional Japanese craftsmanship. Lexus calls it Naguri-style aluminum.

The word *Naguri* comes from a millennia-old Japanese wood-shaving technique. To repel bugs, local craftspeople would remove bark from chestnut trees, and onto the bare surface beneath they would carve random, artistic patterns. The practice became a revered art form in the 16th century—Sen No Rikyu, a renowned tea master, took a liking to the finished wood’s appearance and used it to decorate his tearooms. But when the shogun era came to an end in the late 19th century—as the old samurai way of life was gradually replaced by Western practices—Naguri’s popularity steadily declined. Now only a handful of wood-carving specialists exist.

Ayumi Kido, executive chief designer of Tecno Art Research Co., a Lexus design hub, recalls how the brand first came to use the technique. “Associates at Yamaha, a close partner of ours, informed us that one of their longtime suppliers had developed a new way of treating aluminum,” she says. “They thought it would make for really unique trim pieces for our sportier cars, and when we saw it, we agreed.” She continues: “We felt that the Naguri-style finish provided a sense of traditional Japanese art, as well as embracing the spirit of *takumi*.”

The manufacturing process remains a closely guarded secret. Access to the building in which Naguri materials are made is severely restricted. No one from outside the company is allowed in. “When I visited the supplier, the workers there provided a wonderful tour,” Kido says, “but they didn’t reveal much about where or how the Naguri-style aluminum was made. They’re very secretive about the process.”

What she does know is that thin sheets of high-quality aluminum are run through a machine in which dozens of special blades shave intricate patterns onto their surfaces. Once an entire sheet is completed, it is finished with a special, dark-colored paint that provides a smooth, protective surface that enhances the freshly shaved patterns.

While traditional Naguri woodwork is known for its variety of patterns, Lexus decided to go with a conventional diamond pattern for the GS F because it exuded a classy, sporty flair. That being true, Yoichiro Kitamura, group manager of Lexus’ Color Design Department, said that his team is still experimenting with the style’s possibilities, and not just with Naguri. “In the future,” Kitamura said, “we would like to create new Lexus values by taking inspiration from other types of craft, too.”

THE CLOSE-UP

The Naguri-style aluminum that Lexus is using in the new GS F is produced by a supplier named Altechno, which is based in Japan’s Nagano Prefecture. For this model, Lexus chose to use a conventional but still iconic diamond pattern, shown in the detail below.



LOOKING SHARP

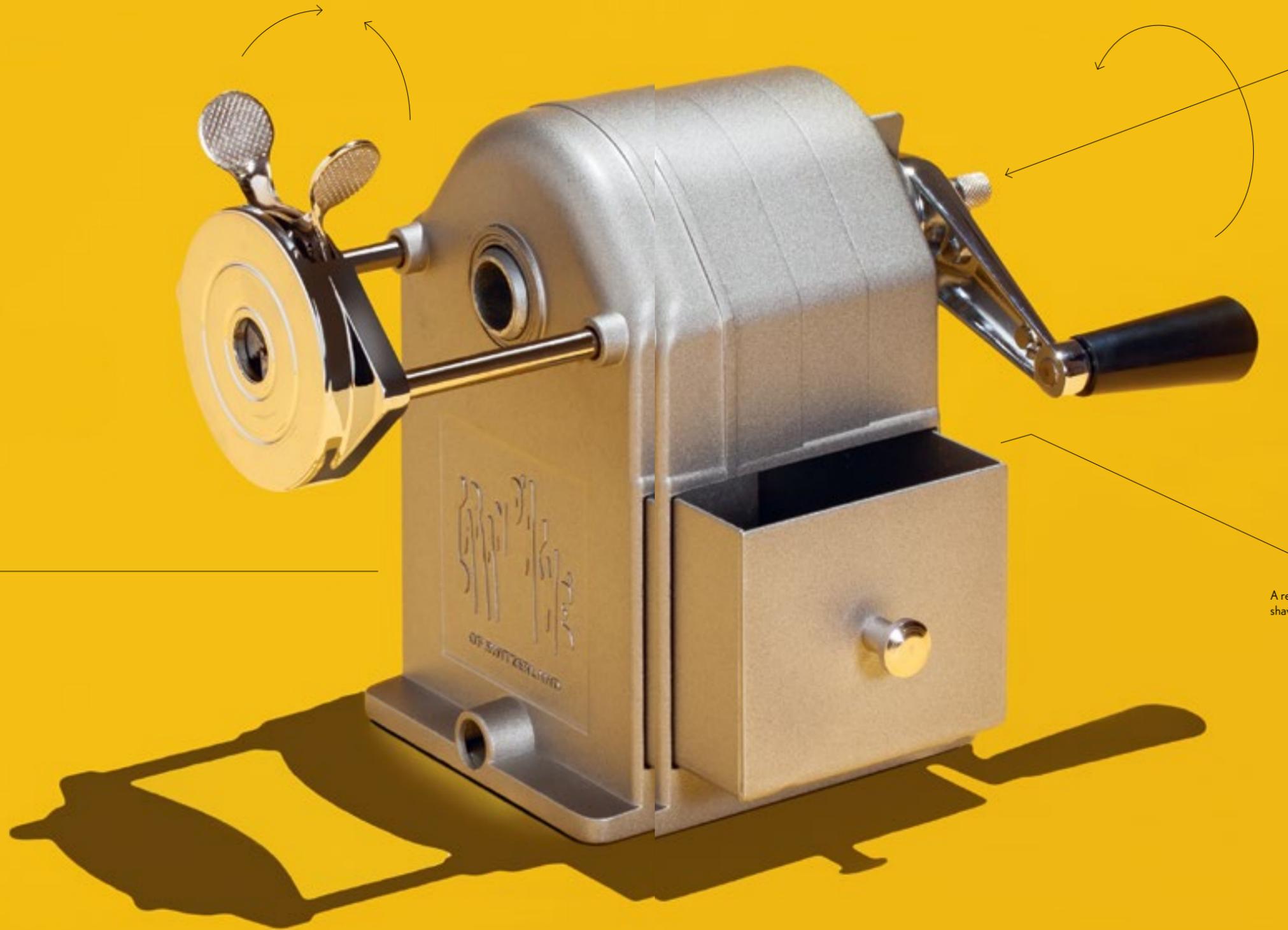
How Caran d'Ache's elegant Pencil-Sharpening Machine has been getting to the point for generations

The Pencil-Sharpening Machine's holding mechanism keeps the pencil steady during sharpening.

A button in the center of the crank lets the user choose point length.

The long descenders of the logo's letters are a reference to the work of the French cartoonist from whom Caran d'Ache took its name. Find out why when you turn the page.

A removable metal drawer collects shavings and keeps the table clean.



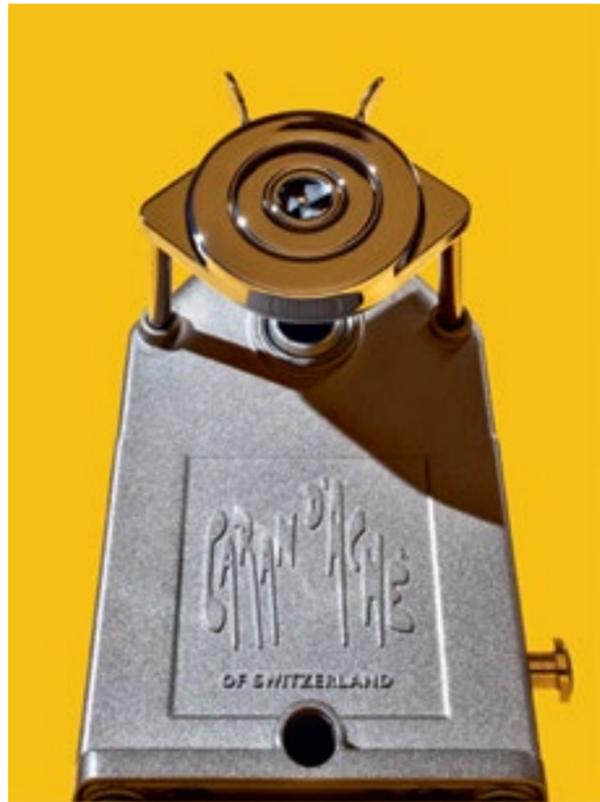
100 YEARS OF CARAN D'ACHE

1915	1924	1933	1953	1970	2015
Switzerland's only pencil factory opens in Geneva	Entrepreneur Arnold Schweizer buys the factory and renames it Caran d'Ache	The Swiss Pencil-Sharpening Machine hits the market	The latest addition to the range: the ballpoint pen	Caran d'Ache reveals its first fountain pen	In celebration of a major milestone, the centennial collection launches

In 1915 a small factory opened on the outskirts of Geneva, Switzerland, and churned out the first Swiss-made pencil. Production in the area made sense. Western Switzerland was rich in skilled craftspeople trained in the region's century-old watch-making industry. And with the French Alps to the south and the leafy banks of Lake Geneva to the northeast, the immediate surroundings of the factory were abundant with the key natural resources – mountain graphite and wood – necessary to manufacture the product to which it had dedicated itself. When the Swiss-German entrepreneur Arnold Schweizer purchased the factory in 1924, he came up with a new name for the company: Caran d'Ache, a reference to the moniker of a popular Russian-born French illustrator, who had named himself after the Russian word for his favorite tool, karandash, meaning “pencil.”

Every pencil, however, also needs a sharpener. For Caran d'Ache, the self-proclaimed

Maison de Haute Écriture (House of Fine Writing), and to this day Switzerland's only pencil maker, it was only a matter of time until it would branch out into making the tool on which the precision and efficiency of the finest pencil depends. In 1933 it launched its first attempt at a sharpener – the Swiss Pencil-Sharpening Machine, which weighed in at 1.1 kilograms. Composed of 25 hand-assembled metal parts, its design combined industrial methods and Swiss craftsmanship. At the time, dull pencils were commonly pointed with small, hand-cranked prism sharpeners or, more primitively, knives, but Caran d'Ache honed the technology. Unlike the brittle and crooked tips that manual sharpeners created (human hands inevitably rotated the pencil unevenly), the Swiss-made utensil produced a perfectly pointed tip.



Now 82 years old, the Caran d'Ache pencil sharpener is a feat of Swiss engineering

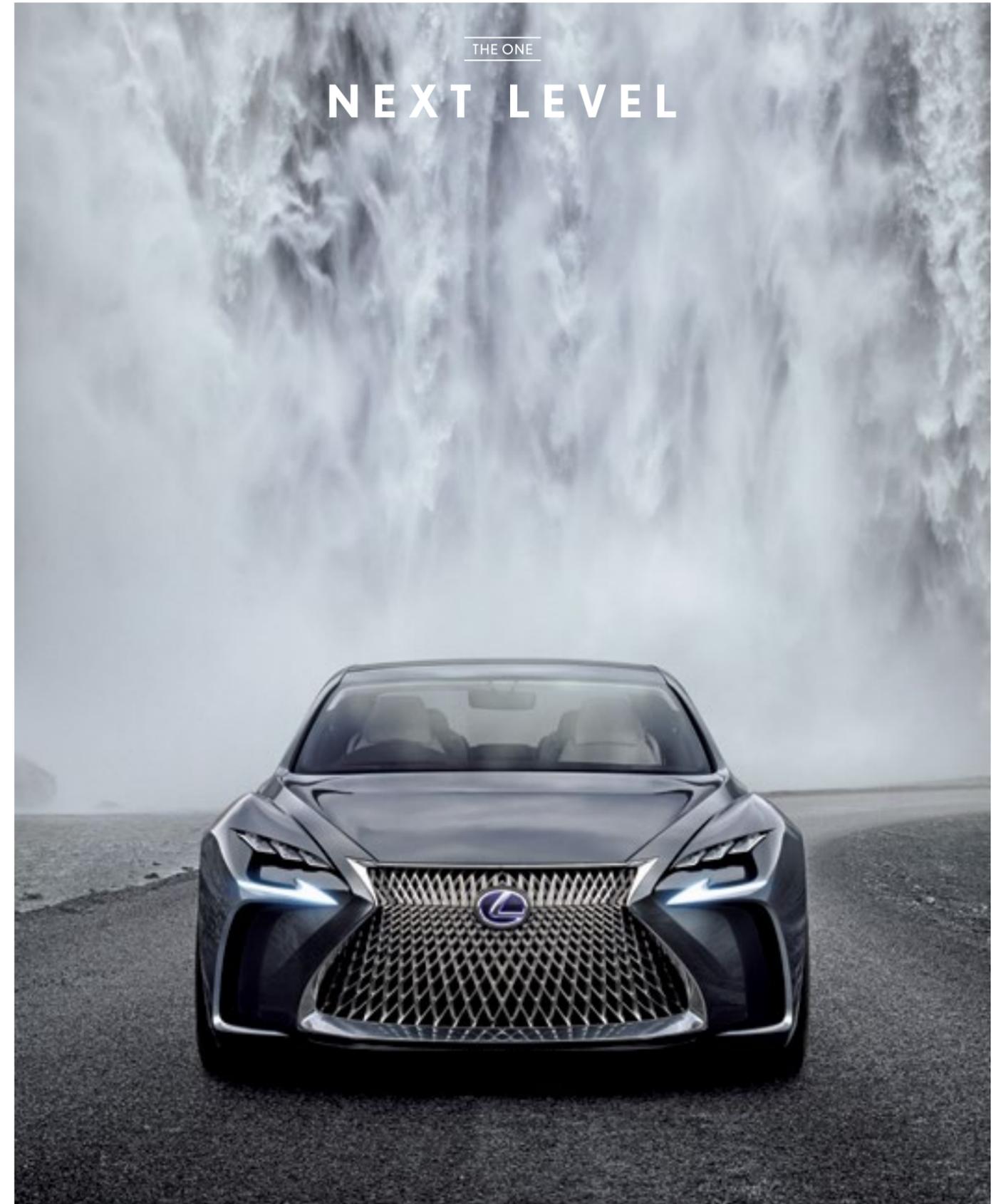
Equipped with a screw clamp, it was designed to be mounted to a desk and stay there, stable enough for its robust mechanism to perform at its best. Two strong butterfly clips pinch and hold the pencil steadily, allowing it to rotate evenly when the user turns the crank at the back of the machine. This operates a set of cylindrical cutters placed at a diverging angle to each other, which – a few pencil rotations later – shave off the excessive wood casing in equal proportions and sharpen the graphite to a fine but sturdy tip. A built-in drawer holds the shavings, keeping the desktop neat.

With its table-mounted position, the device was always within easy reach of its deskbound users. “In the 1930s, Caran d'Ache's main client base was institutional – offices, public administrations, and schools,” explains Julien Meynent, head of writing instrument production at Caran d'Ache. “The ballpoint pen was yet to be invented

at the time, so people used a lot of graphite pencils. Caran d'Ache invented the Swiss Pencil-Sharpening Machine to offer institutional clients a mechanical, solid, and lasting tool to keep their pencils pointy.”

Eighty-two years down the line, the time-tested tool still looks the same and functions similarly. In an age of ballpoint pens, computers, and even battery-operated sharpeners, the machine is no longer the utilitarian necessity it used to be; in fact, with its hand crank and butterfly clips, it might appear like a relic from the past. Caran d'Ache, however, counts it among its best sellers for this very reason: it has become a collector's piece, a beloved memory of a time when objects were meticulously engineered to last for generations.

THE ONE
NEXT LEVEL



Introducing the sporty Lexus LF-FC, the brand's all-new flagship concept

Text by Sam Mitani and photography by Greg White





"THE LF-FC IS NOT JUST A SHOWCASE OF FUEL-CELL TECHNOLOGY. IT TAKES A PEEK AT THE FUTURE POTENTIAL OF THE LEXUS LUXURY VEHICLE AS A WHOLE"

When Lexus unveiled the LF-FC at the 44th Tokyo Motor Show in October, the brand offered a sneak peek into the future. The svelte four-door flagship concept sedan is large, and its dynamic forms are exact and exciting. But while the LF-FC's exterior styling is worthy of note, it is what lurks beneath that is particularly groundbreaking.

The "FC" in the model's name stands for "fuel cell," which references the car's revolutionary new fuel-cell drive system. Using a fuel-cell stack that mixes two elements that are abundant in nature – hydrogen and oxygen – the LF-FC produces electricity from a small battery, removing the need for a gas-guzzling gasoline engine and the necessity for heavier batteries. The benefits add up. Unlike conventional electric vehicles, refuelling a fuel cell-powered unit only takes a few minutes. It's also amazingly clean – water vapor is the only emission. Power is transferred to the ground via in-wheel-motors at each front wheel (along with its rear wheel drivetrain), making the model an all-wheel-drive vehicle.

The styling of the original concept vehicle is bold and dynamic. From every angle the sedan appears elegant and sporty (there are cues taken from Grand Touring models here). Its overall demeanor is characterized by a swooping roofline and a low, wide, aggressive stance. The front end features an evolved version of Lexus's trademark spindle grille (it features a new mesh design), while L-shaped daytime running lights jut out from the front fenders. The rear is highlighted by striking taillights, which seem to be floating in midair.

But the LF-FC's true character is revealed in its profile. Its silhouette is nothing like that of any other luxury sedan, flowing from front to rear in the manner of a four-door coupe. It possesses a character line that Takeshi Tanabe, product general manager of the Global Design Division, describes as having a slingshot effect – it starts from the A-pillar and sweeps through the roof and down the C-pillar before swinging back toward the front of the body.

The model's interior is elegant and simple. According to Tanabe, the cabin was designed to allow "humans to coexist with the machinery, and not for humans to have to adapt to it." The bottom portion of the cabin provides stability, which can be seen in the sturdy foundation of the seats and the side bolsters. The top half (from the hips up) encourages freedom of movement. Seating surfaces are lined with fine Aniline leather, and the dash and doors feature a new wood treatment that showcases the work of Lexus *takumi* (master craftsmen). "The wood panels are made of many pieces of cut wood that have been bonded together," Tanabe says. "It provides a multi-textured effect that gives the interior a high dose of opulence."

Styling is important to Lexus, but so, too, is technology. The LF-FC features a next-generation human machine interface that can be operated by simple gestures, so there is no need to touch a panel or controls. (It can be used to control systems like the stereo and ventilation.) And a brand-new, unique heads-up display system provides navigational instructions (in the form of directional arrows) as if they were screened onto the road in front of the driver.◌

U P

I N

T H I N

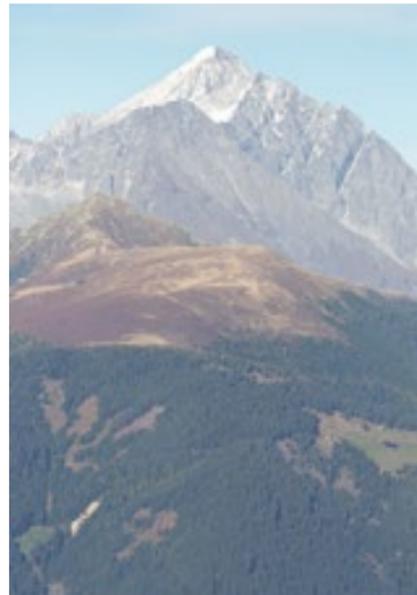
A I R

The final chapter in a mammoth museum project has recently been completed – and the result is a master class in sky-high engineering

Text by Liv Siddall
Photography by Alfredo Piola

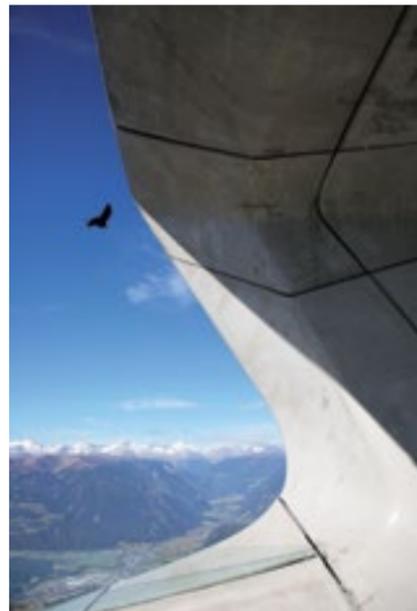
To reach the peak of Mount Kronplatz, a 2,275 meter-tall heap in South Tyrol, in northeastern Italy, visitors can choose to drive carefully up a rocky mountain road, hitch a lift in a hair-raising cable car, or trek five hours by foot. The summit, however one reaches it, is a wide expanse of prairie-like land, brown-green in the summertime, home to a couple of chips-and-beer restaurants and an 18-ton iron Peace Bell that doesn't appear to chime on the hour. In the winter months, people come here to ski. In the summer, they access the summit in order to paraglide or, more recently, to visit a new museum etched into the earth.





Clockwise from top left: The entrance to the museum; a hulking rock in the Dolomites rises in the distance; Zaha Hadid's flowing concrete forms frame the surrounding landscape; up close with mountaineering legend Reinhold Messner

Right: A concrete form launches out of the Kronplatz peak, offering visitors one of the many views of the mountains



His daughter, Magdalena, has played a key role in getting the project's final installments off the ground.

While many mountaineers climb for sport or the feeling of conquest, Messner famously prefers to think of the process as an art form. In Les Guthman's 2012 documentary *Messner*, the mountaineer describes climbing the face of a mountain as painting – tracing an imaginary line across nature that only he can see and that remains with him forever. The Messner Mountain Museum project is his quest to share with the world beliefs like these on mountaineering. Each museum is built in a different Tyrolean location, and each has its own subject matter. The first, Juval, was built in 1995 and adopted the theme "The Magic of the Mountains." Then came Dolomites (Rock), Ortles (Ice), Firmian (The Enchanted Mountain), and Ripa (The Mountain People). Corones is inspired by the subject "The Supreme Discipline of Mountaineering." "Each of the six museums occupies a unique location," Magdalena says, "which helps relate the museum's theme to the collections and the architecture. The geographical locations, relics, and works of art are as one."

MMM Corones was opened on July 24, 2015, by Messner himself, who stood two miles above sea level on a windy platform, speaking to a rather unexpected crowd of hundreds. Locals were surprised at the turnout – it was the first time most realized that Messner wasn't just a local celebrity but a worldwide hero. That Zaha Hadid, perhaps the planet's most famous living architect, designed the structure

A Zaha Hadid-designed structure that juts five ways out of the mountainside, the MMM Corones is the final installment of a two-decade-old museum project initiated by Reinhold Messner, the legendary mountaineer. Messner is one of the greatest mountain men, and his personal achievements are vast. He has conquered all 14 of the highest mountains in the world. He was the first man to ascend Mount Everest without oxygen. Concerned with the effect that lugging heavy equipment – technical gear, communication devices – up a mountain would have on his experience, he would regularly climb with as little aid as pos-

sible, often alone, with only a small rucksack on his back. In most cases he climbed even without mountaineering pegs as a way of paying respect to the rock. Frostbite has cost him seven toes.

He is regarded as something of a demigod in this part of the world, and, because he grew up in South Tyrol, his connection with the mountains of his youth forms the bedrock of his career and the inspiration for this project, a series of six museums built to convey Messner's passion for the mountains that have shaped his life. Corones is the sixth, appropriate, given that he now resides again in the area (with his family and a herd of yaks).



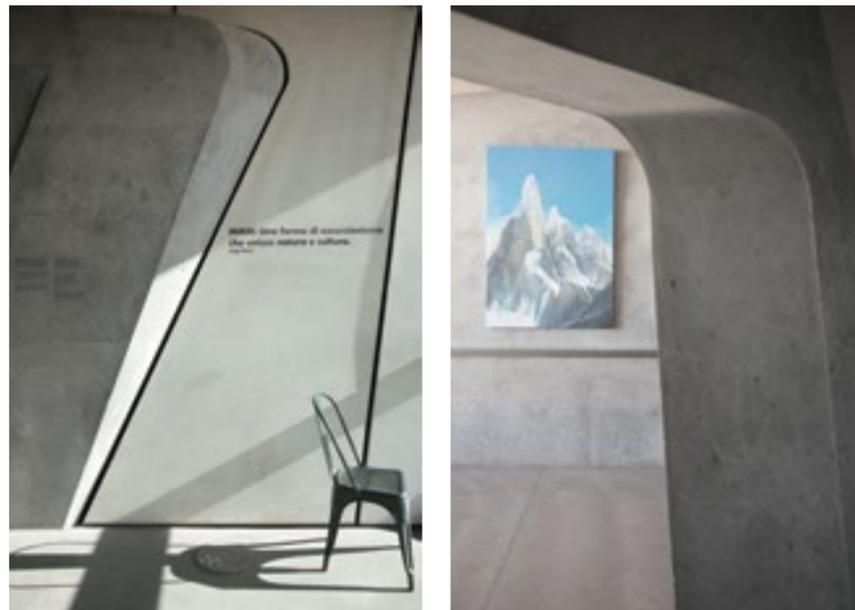
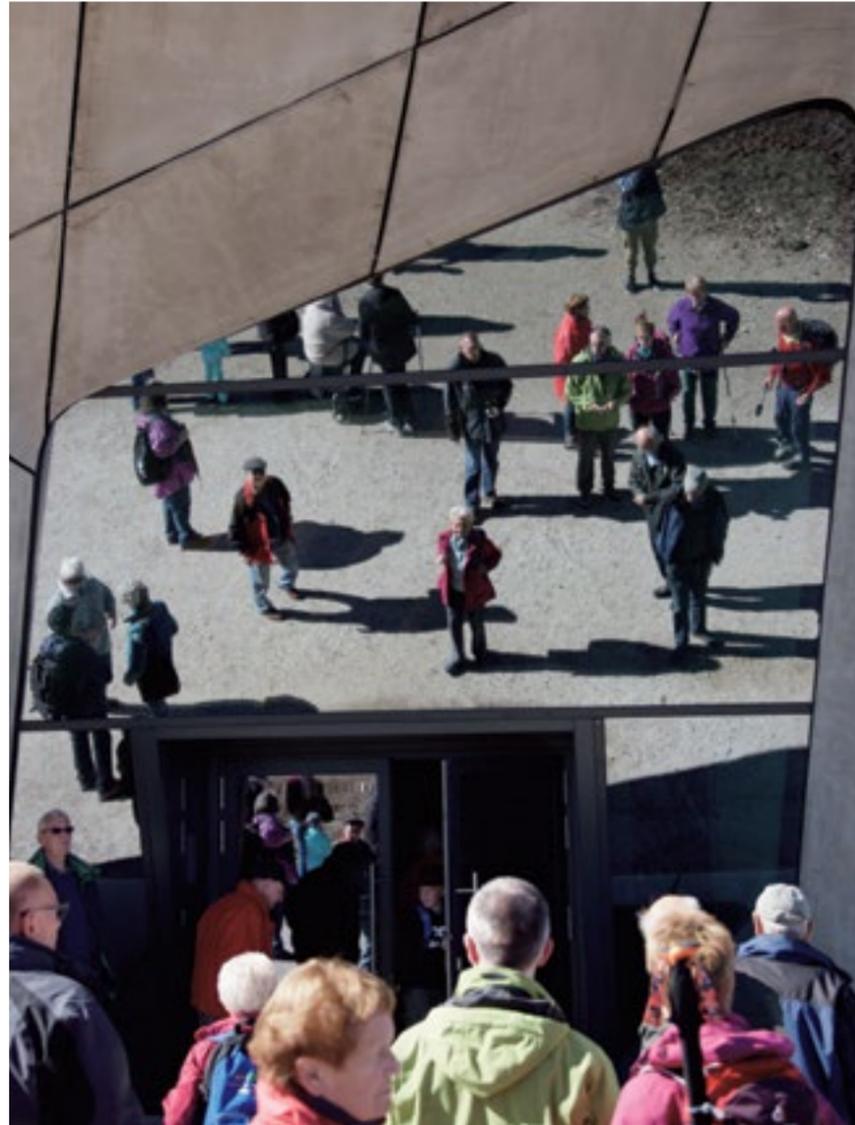
THE ARCHITECTS HAD TO BUILD A STRUCTURE IN THE SAME HAZARDOUS CONDITIONS THAT THE MUSEUM WOULD HAVE TO WITHSTAND FOR DECADES TO COME

added to the buzz around the launch – many traveled to see the building regardless of what was inside – as did the delay of the project’s opening by a full year.

Creating such a structure at ground level would have been hard enough. For Hadid and the local architecture firm with which she partnered, Skirama Kronplatz, additional challenges came in waves. They were working at 2,275 meters above sea level. No asphalt roads reach the summit. In the winter, perilous cold can reach minus 20 degrees Celsius, snow piles in heaped mounds, winds in the area drive hard. They had to build a structure in the same hazardous conditions that the museum would have to withstand for decades to come.

And that’s not taking into account a tricky brief: to create a museum that is a *part of the mountain*. “Messner wanted to have an underground museum with different windows facing particular mountains,” says Andrea Del Frari, director of Skirama Kronplatz. “For the architects, that was challenging because they had to plan in reverse. At the beginning, we thought it would be very difficult to bring together Messner and Zaha. Messner’s museum is inspired by the Dolomites, very angular and rocky. Zaha’s trademark style is completely different: no angles, fluidity, a very harmonic way with lines. But Zaha and Messner were very happy to work on this project together.”

The final result is a sleek concrete structure built *into* Kronplatz’s summit. Those jutting, slanted blocks protrude from a pile of grassy earth, masking the interior of the museum. Each window is filled with panes of mirrored glass designed so that, even if visitors are staring at the museum, they’re really looking at the mountains



Left: A visitor leaves the museum to take in the views

Opposite page, top: Visitors from around the world are presented with their reflections as they enter. Bottom: Smooth, streamlined museum interiors

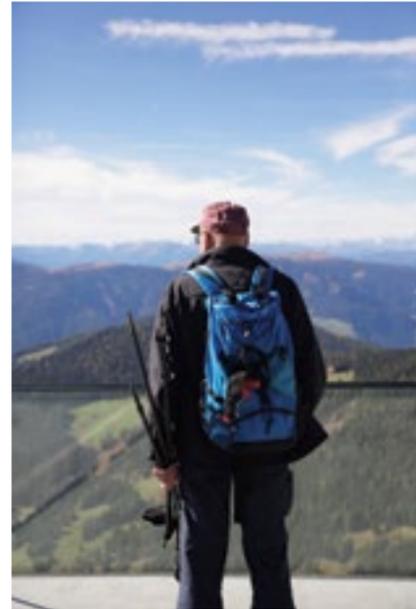
surrounding it. The windows at the rear face Mount Heiligkreuzkofel, a mountain that Messner conquered in 1968, which, he says, was the most difficult to climb of his life.

The museum's interior feels church-like. Through the museum's mirrored glass doors, past clusters of tourists using the windows for selfies, visitors are immersed in a cool concrete entrance hall. Despite that the building is partially underground, Del Frari was keen to ensure that visitors would not feel as though they were "in a hole." Concrete slabs across the walls and ceiling lead the eye straight to the back windows overlooking the valley, drawing your attention once more to the mountains.

An exhibition curated by Messner, with the help of Magdalena, is full of artwork related to the museum's theme – with a few spiritual tidbits thrown in for good measure. The first room is filled with oil paintings from the last century in antique frames, interspersed with climbing objects and artifacts – the walking stick/pole of Johann Santner from 1880; the thick rope and pickax owned by Hermann Delago, from 1900. The paintings are all similar in that they champion what Messner believes in: the spirituality and power of the mountains and the inspiration that they provide to humanity. Most are chaotic, expressive, and textured. "Reinhold Messner decides what he would like to show and tell," says Agathe Fischnaller, a researcher involved in curation for the MMM. "He knows the mountain history like no one else. The pieces of art are used to tell mountain stories. For us, reminiscent

objects, art, quotations, and the look of the building go hand in hand. For Messner, it's important that the visitor dives into a world that belongs usually only to the mountaineers."

There is a steady queue of visitors entering the museum throughout the day. It's popular for all the right reasons, and its subject matter is accessible enough to appeal to almost anyone. "Everyone is welcome: mountain enthusiasts or not," says Magdalena. "If we can stimulate these visitors and show them how versatile the issue is, then we're satisfied. MMM provides the visitor with a unique experience at the interface between nature and culture, a place where we can learn what the mountains really mean to us." ☺



Top: A visitor looks out at the Dolomites from a museum balcony

Bottom: Concrete has been transformed into inviting seating in the museum's screening room



A visitor looks at a detailed painting of the Dolomites covered in snow. Messner and his team have filled the museum with paintings and photographs as well as interesting and locally-relevant mountaineering equipment

THE REVEAL



CALL OF THE WILD

The Lexus LX has been refreshed and revamped. Bigger and bolder, the brand's iconic flagship SUV remains one of the few luxury utility vehicles that is able to combine urban comfort with serious off-road credentials

Text by Sam Mitani and photography by Mikio Hasui



The Lexus LX emerges from the mist at dawn in Japan's mountainous Gunma Prefecture. The brand's iconic SUV has been completely restyled. The rear, for example, now features new wraparound taillights and an evolved rear bumper. A new standard-issue panoramic-view camera provides images of the surrounding terrain, which is extremely handy when hitching or maneuvering a trailer.

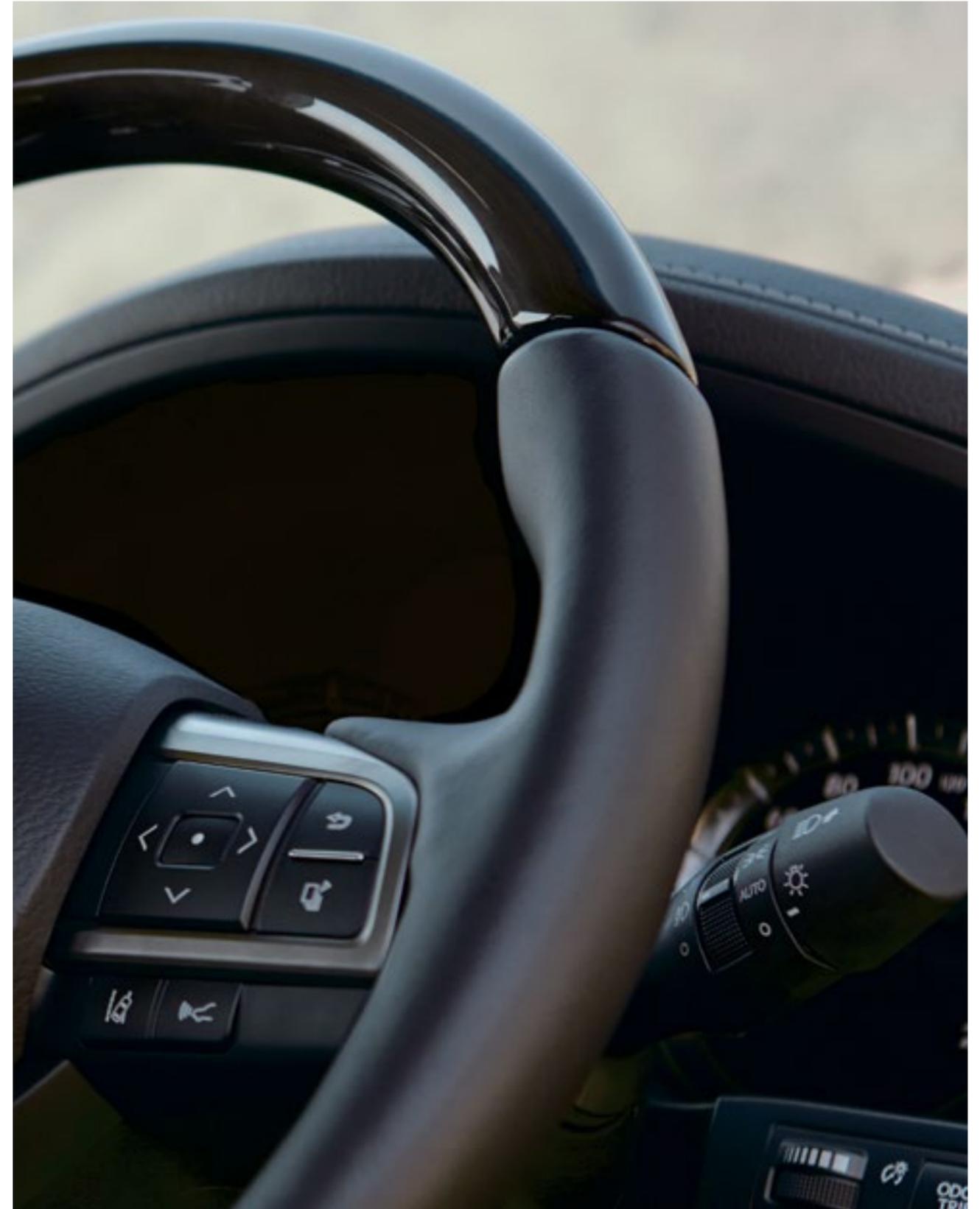






Elements of the Lexus L-finesse design philosophy are visible in the aggressive presentation of the C-pillar and the arrow-shaped window line, bordered with elegant satin chrome. Twenty-inch, 10-spoke wheels and bulging fenders spice up the SUV's profile.





The LX's interior is large (it seats eight people) and luxurious. A freshly designed three-spoke steering wheel takes center stage, while high-grade leather surfaces, accented by elegant wood trim, are used throughout the cabin. A new analog clock sits in a housing carved from a single ingot of aluminum and features LED indicators.



The LX is powered by the largest engine ever fitted to a Lexus; the formidable 5.7-liter V-8 engine produces 377 PS. The V-8 cylinder block is die-cast in a lightweight yet strong aluminum alloy.





LEXUS LX 570

LENGTH	5,065 mm
HEIGHT	1,910 mm
WIDTH	1,980 mm
WHEELBASE	2,850 mm
SEATING CAPACITY	8
DRIVEN WHEELS	AWD
ENGINE TYPE	3UR-FE
CYLINDERS	8
ENGINE OUTPUT	277kW / 377PS
TORQUE	534Nm / 3,200rpm
TRANSMISSION	8 Super ECT
SUSPENSION	Front: Double Wishbone, Rear: Trailing Link
TIRE	275/50R21

When the team behind the Erl Tyrolean Festival, an annual classical music and opera festival in Austria, planned a building to host a new, second music festival, they realized that the site was missing one fundamental element – a parking garage

MAGNUM OPUS

Text by Emma Forrest
Photography by Adrian Gaut

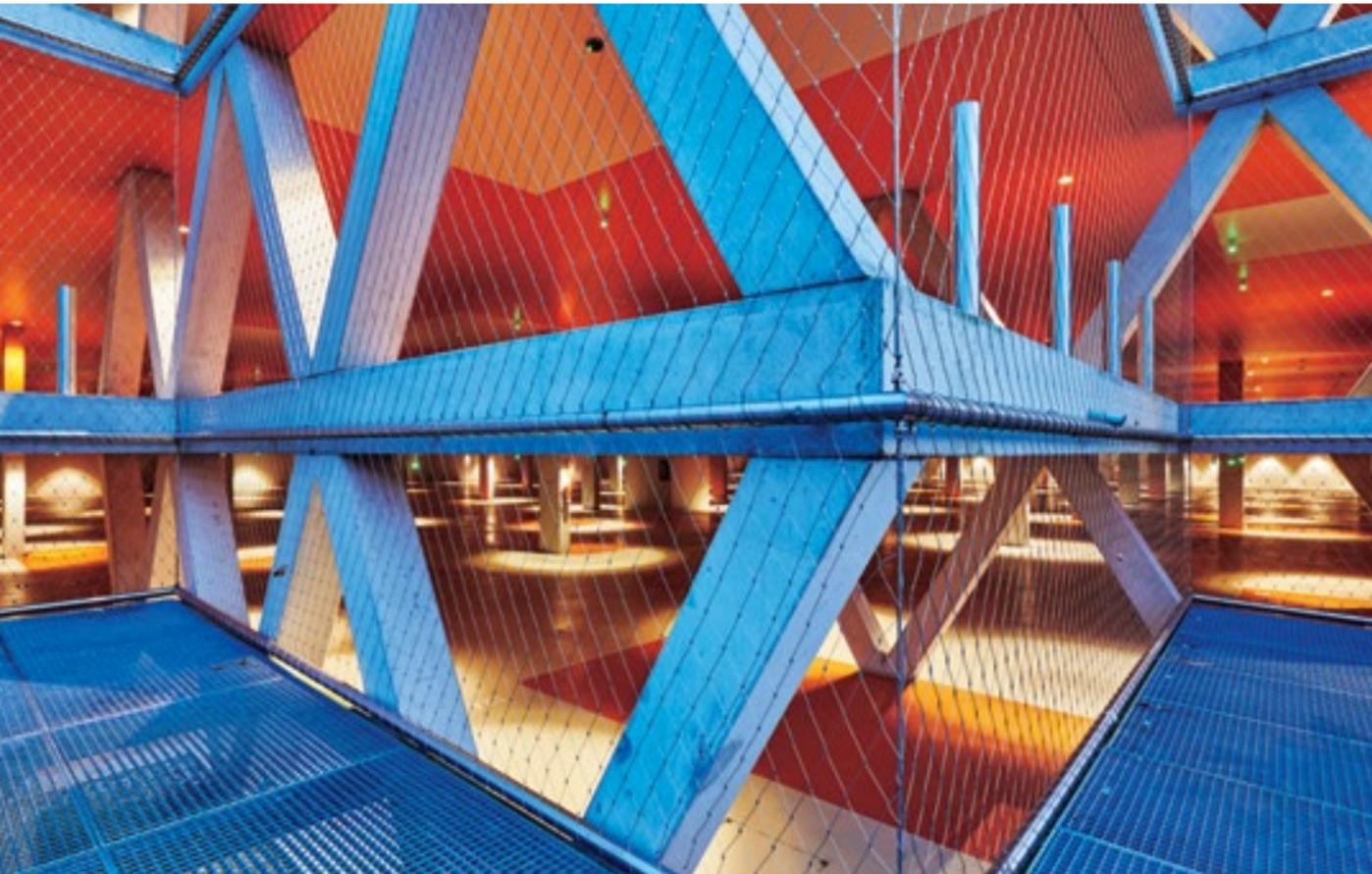
In 1959 the architect Robert Schuller built the Passionsspielhaus, a festival hall in the Austrian village of Erl, designed to stage the Passion plays that had been performed by locals every six years since the mid-17th century. Almost half of the village's 1,500 inhabitants took part in the shows – dramatic depictions of the trials of Jesus Christ – and all were fully committed to their

parts. Village men were known to grow their beards long, all to better convince the audience of their roles.

Austria's largest orchestra theater, the Passionsspielhaus, can accommodate an audience of up to 1,500 people, and with its cavernous, rustic structure it has the ideal acoustics for staging large musical works. In 1998 it became famous for hosting



The parking garage at the festival site at night, in luminescent orange



The garage's architect, of the firm Kleboth Lindinger Dollnig, created a space that he says feels like a stage

ON SITE



The Erl Tyrolean Festival site comprises two halls. The original building (left) was built in 1959 and has staged Passion plays ever since. A newer building (right) opened in 2012 and stages a winter festival, for which the new parking garage comes in very handy.

the Erl Tyrolean Festival, a pioneering summertime musical event founded by visionary Austrian conductor Gustav Kuhn, but problems began to arise from its lack of modern facilities – there is no foyer in the building, no cloakrooms or rehearsal spaces, and, crucially, no heating. When Kuhn aired the idea of creating a new building in which to hold a winter festival so his troupe could extend their offering and perform works by Bach, Handel, Haydn, and Mozart, among others, the festival's

president, Hans Peter Haselsteiner, agreed to fund it. The green light was given for a new, modern building to be designed by the Viennese firm Delugan Meissl Associated Architects. A winter festival was in the works.

The striking, ultramodern Festspielhaus festival hall sits about 50 meters from the Passionsspielhaus. It opened in 2012. Its auditorium has 732 seats and a cutting-edge acoustic setup, including a 160-square-meter orchestra pit – the largest in the world. But more productions caused a hitch: more visitors. In the summer, the site's original parking garage would overflow, so festivalgoers would park on grass verges, outside the local swimming pool, even in local meadows, before strolling to the festival hall. The new festival was to take place in December, when the streets are carpeted with snow and slush, and a 10- to 15-minute walk in high heels or handmade Italian Oxfords in a blizzard is an unappealing prospect. Kuhn and Haselsteiner concluded that the newly expanded site needed a dedicated parking garage, and they invited the Austrian architectural firm of Kleboth Lindinger Dollnig to build it.

What they came up with is an elegant, three-story parking garage that has become as much of an architectural landmark as the two spectacular festival houses it services. Whereas the white Passionsspielhaus building stands out in the green landscape during the summer when it is in use, and is camouflaged by snow in winter, the black, jagged form of the Festspielhaus does the reverse, blending in with the dark pine forest in the summer and creating a theatrical contrast with the snow dur-



The building cuts into the sloping landscape so as not to detract from the architecture of the main festival halls

ing the winter festival. The garage, meanwhile, is designed to integrate into its environment throughout the seasons, draped with green vegetation in the summer, its white concrete structure blending into the snow in winter. Its unusual design and flamboyant orange color scheme, however, provide visual drama year-round.

"You start the event when you enter the garage," explains its architect, Gerhard Dollnig. "It's the starting block of the event. People arriving are well dressed, in nice cars. If you open the door of your car and step out, your shoes should touch something beautiful and inspiring. Garages are normally dark, gray, with no colors, no inspiration. This we wanted to change."

Set in a plot carved into a slope in an area of outstanding natural beauty, 500 meters from the festival hall, the 14,000-square-meter building launched in time to accommodate 450 cars at the first winter festival in December 2012. Its neat integration into the slope allowed each level to have its own entrance from the existing road. Tucked away beneath the meadow, it is invisible from the festival halls – though a newer wooden building with reception rooms and luxury ac-



The architects used graphic V- and X-shaped supporting pillars throughout the garage to create an immediate sense of drama

commodations now sits on top of it – and its striking facades show only to the north.

Along the main road, a series of Y-shaped metal columns lean toward the road and stretch back toward the imposing concrete wall, creating a canopy over the external stairwell that leads pedestrians between the three floors to the shuttle bus service or the path to the festival halls on the ground floor. At the end of the wall, a simple arch frames a young sycamore maple and gives a sense of the building's full height.

Along the other side, X-shaped concrete beams reach between the floors, supporting the idea that each story is different. The structure is completely open apart from a cladding of steel netting that is lightly covered with creeper, exposing the parking garage's colorful interior.

Its interior distinguishes it from other parking garages. While garages are typically industrial and functional, their dark ceilings cluttered with exposed electrical cables, air-conditioning tubes, and water pipes, this one is free of all these unattractive devices, which are hidden behind concrete surfaces.

"Here there is no black ceiling," says Dollnig. "It was important to us that the floor and ceiling were flat, so there was nothing that we didn't like on the surfaces. It gave us the opportunity to work with color."

The orange and light gray colors are crucial to the garage's success. Each floor has a different color combination, with a sort of chessboard of painted areas, to indicate the parking



spaces. By remembering the color scheme, festivalgoers can find their cars: light gray dominates the floors, and orange the ceiling, on the first level; there's an orange floor and ceiling on the second level; and the third level has an orange floor and light gray ceiling.

"A very important fact is that we colored the ceiling," says Dollnig. "Usually it's on the floor and walls, but if you pass by, you never see the floor, always the ceiling. It makes it magic."

The orange color, associated with roadwork in Austria, works well with both the green landscape and the concrete surfaces, he says. The colors of the parking garage create a very different feeling depending on the season and time of day. In daylight the light, bright colors make it look cool in the summer, and

"A VERY IMPORTANT FACT IS THAT WE COLORED THE CEILING. USUALLY IT'S ON THE FLOOR AND WALLS, BUT IF YOU PASS BY YOU NEVER SEE THE FLOOR, ALWAYS THE CEILING. IT MAKES IT MAGIC"



The exterior of the garage, which can accommodate 450 cars at a time

blend into the snowy background in winter. When the light is on at night, it looks cozy and welcoming, like a fire or a festive decoration.

Dollnig describes the garage as the audience's stage: out of the darkness, the people parking on these three brightly lit platforms are on show as they step out of cars, stroll across the floor, and walk down the steps to head toward the evening's performance.

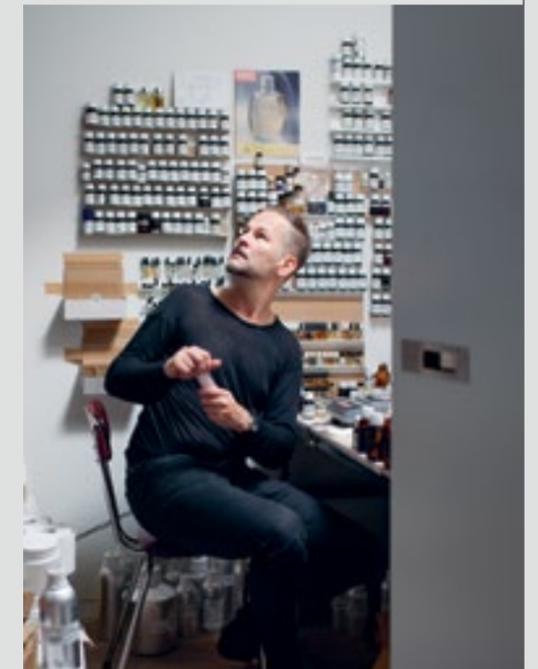
"This is the stage of the audience," says Dollnig. "There are 450 cars inside, with four people in each, so about a thousand people are coming outside, well-dressed people of all ages, in different colors. The garage becomes something of a theater."

ON THE NOSE



For the German perfumer Geza Schoen, creating fun, unconventional fragrances is a serious endeavor. We visit his Berlin laboratory

Text by Kimberly Bradley
Photography by Laurent Burst



Left: Geza Schoen experiments with an ingredient applied to a perfume test strip

Above: Schoen in his Berlin home lab, surrounded by hundreds of bottled scents



A distant view of Central Berlin, seen from the roof of Schoen's home

Independent perfumer Geza Schoen knows what works for him. “Fresh, spicy, balsamic, woody, and animalic,” he says resolutely. “Those are qualities you’ll always find in my perfumes.” At 46, Schoen has been in the business of making scents for a quarter century and has developed “hundreds, if not thousands,” of fragrances, most famously Molecule 01, an aroma that plays with perception. With Schoen, scent takes on unfamiliar and eccentric dimensions. Not everyone can smell Molecule 01 from the bottle, for example. One formulation of Wode, another Schoen fragrance, is applied as a cobalt blue “paint.” His Beautiful Mind series celebrates female intelligence. And he has done special fragrances for offbeat clients like Bombay Sapphire and the art-book publisher Steidl. It’s a formidable list of iconic olfactory experiences, but Schoen – whose name in German means “beautiful” or “lovely” – is remarkably low key. His airy loft apartment, essentially a glass box built atop a nondescript building in Berlin’s trendy Neukölln district, is home and lab in one.

The living room is smattered with floor cushions and playful art by the likes of Joseph Beuys, some of it leaned against the wall. Across the space, a table full of tiny spray bottles with cryptic handwritten labels leads to a closet-like lab lined with hundreds of bottled ingredients and a high-precision digital scale. Home and man, the latter dressed all in black, are both minimalist and maximalist – serious, but also affable and expressive. “I love Bauhaus, but as you can see, I also love kitsch,” he says, laughing.

The fragrances, too, embody contradiction. Molecule 01 is simple yet disarmingly complex. Described by a multitude of wearers as woody, dry, sensual, and velvety, it possesses a sillage (perfumer parlance for the “trail” a scent leaves behind its wearer) that sometimes seems to disappear but then, strangely, can be detected again weeks later on clothing or a paper blotter. Yet Molecule 01 is made of a single ingredient – a chemical aroma called Iso E Super, developed in a lab decades ago. Until Schoen isolated it (in the early 1990s, he put it on a friend and went to a bar, and within 10 minutes a woman approached, asking who smelled so delicious), it had been used in formulations like Lancôme’s Trésor and Dior’s Fahrenheit. “When you’re training to become a perfumer, you analyze fragrances,” says Schoen.

“FRESH, SPICY, BALSAMIC, WOODY, AND ANIMALIC – THOSE ARE QUALITIES YOU’LL ALWAYS FIND IN MY PERFUMES”

“I realized that all the ones I liked contain a lot of Iso E Super. This one single chemical was so sublime that from that day on it stuck in my mind.” Molecule 01 launched in 2006 and now has a cult following.

Schoen’s fascination with smell goes much further back than his professional career. At the age of only 13, the budding perfumer developed the ability to differentiate more than 100 fragrances, an unconventional passion of which he can’t explain the origins, but one that was perhaps encouraged by unusual surroundings. “I was raised in Kassel, the city that hosts the Documenta art exhibition, and my father was an art teacher, my mother a kindergarten teacher,” he says. “When you grow up in a family where art is celebrated, it opens possibilities. My father was already getting samples of materials for his art, and I started writing postcards to German perfumers, and they flooded me with samples.”

After school or football, Schoen would go home and sniff the vials in his collection. During trips abroad as an exchange student or backpacker, he would collect additional samples and further refine his nose. (“Really, anyone can do this,” he claims. “It’s a matter of practice.”) In 1992, at age 23, he was admitted into the training program

– in the German apprenticeship tradition – at German fragrance and flavor maker Haarmann & Reimer (which is now Symrise), in Holzminden, a small city in central Germany. He was hired and stayed for 12 years, developing scents for commercial brands like Diesel, but ultimately left the constricts of the corporate world to go freelance. In 2005 he moved to Berlin, a city in which he had wanted to live for more than a decade and, as he says, is one of the most democratic places he knows.

Schoen is the sole indie perfumer in the German capital, and one of a handful of freelancers around the world who develop their own scents and sensibilities. He still consults with major companies – he recently created fragrances for La Biosthétique’s spa line – but in the past decade his most notable aromas have been for niche brands like Biehl, Ormonde Jayne, and Clive Christian, and for his own Escentric Molecules series. The rise of unusual, smaller companies is a reflection of shifts in the fragrance industry. “Since the 1980s, many ingredients, like musk, have been forbidden,” he says. “Ninety-eight percent of what you find on the commercial market is produced by three companies. People notice that it all smells the same and get bored.” The perfumer also explains that the technological



SCHOEN IN SHORT

Obsessed with fragrance at an early age, Schoen has been identifying individual scents since he was 13 years old. Now a respected nose in the perfume industry, he creates fragrances for his own line, Escentric Molecules, as well as for a variety of companies, including Biehl, Ormonde Jayne, Clive Christian, and the art-book publisher Steidl.



Schoen’s huge catalogue of scents is bottled in watertight containers that sit in neat rows on shelves in his lab (also shown on next page)





Schoen sniffs scents applied to blotting strips in his airy, glass box-like Berlin home

development of synthetic ingredients “stopped about 10 years ago”; innovations now come from fractionalizing natural ingredients. It is possible, for example, to lop off the top notes of patchouli and isolate the rather polarizing scent only to its beautiful dry-down, the deeper mid- and bottom notes that evolve after initial application.

Schoen isn’t interested in creating a name-sake brand (“With all due respect to [respected perfumer] Frédéric Malle, it’s not for me; I like to be anonymous when I walk down the street”), but he does take his surname’s essence as a kind of overall principle: “We always look for the beautiful but also the different.” The process of creating a new fragrance often begins with a familiar base mixture (“I could create something entirely new, but it often doesn’t smell good; we’re socialized to gravitate toward the familiar”), which he then plays with, documenting each step so the

scent can be duplicated. Inspirations range from a client brief to the scent of an exotic tree on his balcony. Shuffling through a few loose papers on his living room table, which list undecipherable formulas resembling cookbook recipes, Schoen discusses the more philosophical side of his calling. “Right now, society is teaching us that smelling isn’t that important,” he says. “We look at things more. There’s less socializing.

“SOCIETY IS TEACHING US THAT SMELLING ISN’T THAT IMPORTANT. WE LOOK AT THINGS MORE - THE SENSE OF SMELL IS BEING REPRESSED BY LOGIC”

Everyone surfs the Internet on their phones. It’s such a shift. It’s not very sensual, this whole experience. The sense of smell is being repressed by logic.”

He pauses, then sprays a paper strip with a new fragrance made of ingredients including Peruvian pepper and, of course, a good shot of Iso E Super. It’s heady and exhilarating, and utterly embodies each of the words he uses to describe his signature style. (He later goes to his lab and mixes me a small bottle, and, yes, I’ve worn it every day since.) Along with his old perfumer friends Mark Buxton and Bertrand Duchaufour, Schoen is launching a new brand soon, the name still under wraps. Each man developed one scent for the line; this is his. The bottles are sleek and quadratic. On each is a removable caricature-like magnet representing each perfumer. “You can leave it on the bottle; you can put it on your fridge,” says Schoen. Bauhaus and kitsch indeed.

Illustration by Lewis Stringer

KEY INGREDIENTS

Schoen’s laboratory is filled with hundreds of ingredients, each bottled and shelved and ready to be called on in the creation of a new fragrance. Here, we list some of his favorites, from lab-made components like Iso E Super to naturals like patchouli.

1.



2.



3.



4.



5.



6.



7.



8.



9.



- 1. Patchouli 2. Lime 3. Cedar 4. Iris
- 5. Ambroxan 6. Pink pepper 7. Synthetic musk
- 8. Vetiver 9. Iso E Super

MOUNTAIN MAN

The Canadian endurance runner Adam Campbell has climbed some of the world's highest and most grueling peaks, often in astoundingly quick times. He also happens to be an environmental lawyer. We follow him on the road through the vast Canadian backcountry

Text by Alex Moshakis and photography by Jesse Chehak





Left: Endurance runner Adam Campbell after a wet practice session, near Vancouver

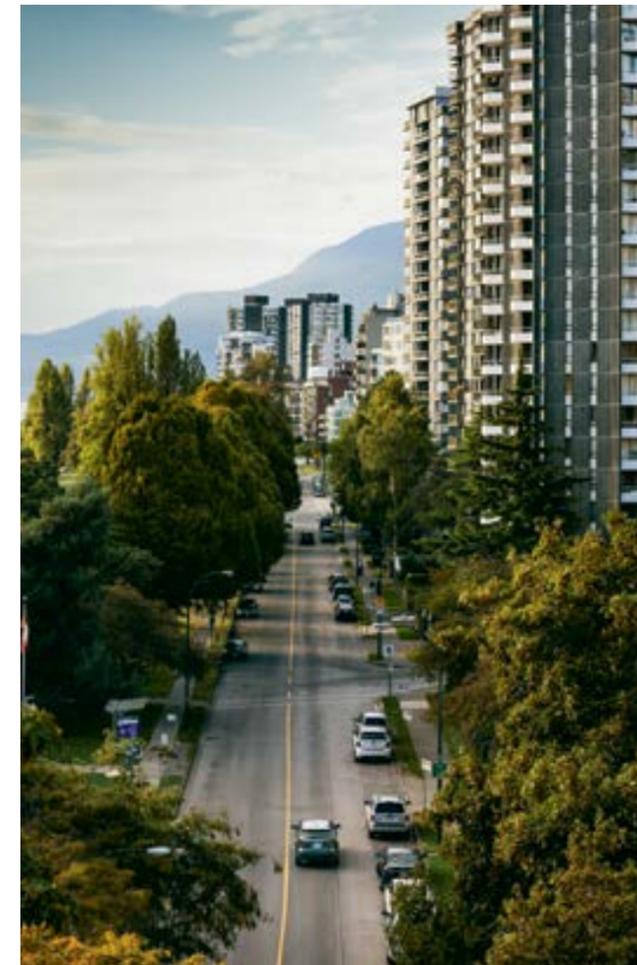
On a cool Sunday morning in September, Adam Campbell stood in an asphalt parking lot wearing a lightweight fluorescent yellow jacket, preparing to run up a mountain. It was 6:45 a.m. and raining. Adjacent to the lot was a dense alpine forest pitch black beyond the first line of trees, and past that was the base of Mount Revelstoke, a 2,000-meter-high peak whose summit Campbell, one of the world's leading endurance runners, was hoping to soon reach. He had woken up an hour ago, excited about a run he thought would be technical, but shorter than most others he completes. It would take him roughly four and a half hours, he figured, but he planned to take things relatively easy. He'd barely bothered with breakfast.

Campbell was in Revelstoke, British Columbia, a former railway town 640 kilometers northeast of Vancouver, to take part in the Glacier Grind, a 44-kilometer ultramarathon in which 82 runners were also participating. Competitors stood in small, brightly colored clusters at the start line. Most were discussing tactics, although not all appeared to be serious athletes – a frightening observation, given that the race covered some of Canada's most treacherous terrain. Equipment varied. Some runners wore full-leg training tights, others just calf-length compression socks. Most wore lightweight baseball caps, but only a handful had accessorized them with headlamps. Everyone was traveling light. An event organizer stood at a makeshift table rifling through participants' bags, checking items off a list of mandatory equipment. "You can't officially race without a jacket, a hat, a water vessel, and bear spray," she told one woman, who kept hold of the necessities but binned the rest, including a pair of thick-looking leggings. It was 12 degrees Celsius at the start line and a reported five degrees at the summit. Better to be cold and nimble, it seemed, than warm and slow.

Campbell, who is five feet seven and weighs 127 pounds, with the physique of a professional jockey, was quietly watching events unfold. Every now and then he would recognize a runner whom he had met at previous meets, and they'd catch up. Now 36 years old, Campbell has been running ultras for nine years, and he considers himself an ambassador for the

sport. As a member of an elite group of endurance athletes, he travels internationally to race up and down peaks of inordinate size, often in mind-boggling times. He races throughout mountain ranges in Canada, his home country, and the United States. But he has also competed much farther afield: across the French Jura; up and down Mount Fuji, Japan; in the Atlas Mountains in Morocco, the Alps in France, the Pyrenees in Andorra, the Dolomites in Italy; even in East Lingshan, a mountainous region in western China. Few of the ultras in which he participates span less than a grueling 50 kilometers – a distance longer than a marathon. (An ultra is a footrace longer than 42 kilometers.) But whereas marathons commonly weave through the central districts of major cities, which are both easier to navigate and mostly flat, carpeted in smooth gray tarmac, the races in which Campbell takes part are steep and hazardous, regularly marked by unrelenting terrain. While climbing to precipitously high levels, mountain runners must dart through moss and mud, over rocks and roots, up sharp scree and, at summit level at least, icy banks. (Race winners are usually those who don't lose for longest.) In the winter,

WHEN, WITH A SMILE, ADAM CAMPBELL TELLS PEOPLE THAT HE HAS A MOUNTAIN IN HIS BACKYARD, HE IS NOT ENTIRELY JOKING



when serious snowfall makes it difficult to successfully run up and down mountains, Campbell navigates them on skis, often alone and for many hours at a time. He lives in Canmore, a small town 80 kilometers west of Calgary, in the province of Alberta, and his home, a three-bedroom cabin that is regularly used by other mountain athletes as a base from which they can quickly gain access to pristine backcountry, lies in a valley that is surrounded on all sides by Alberta's Rockies. When, with a smile, he tells people that he has a mountain in his backyard, he is not entirely joking.

Because Campbell believes mountain running can be for the many, rather than just the few, he is a partner at 5 Peaks Adventures, a for-profit organization created to increase the popularity of mountain running through a series of nationally significant races, which makes him a co-organizer of the Glacier Grind, a 5 Peaks meet. This was the race's inaugural event. It was also the first time Parks Canada, the governing body responsible for protecting the country's significant natural sites, had allowed an ultra to take place within Revelstoke's limits. This is both good for mountain running and, Parks Canada believes, even greater for the local environment. The race is a new event in an ecologically low-impact sport that over the

past decade has gained significant traction not just in Canada but around the world. But it is also an important opportunity for the state to raise awareness of some of its less accessible, virtually impeccable natural landscapes – "a vertical world of giant cedars, deep valleys, lush alpine meadows, and incredible views of glacier-clad peaks," as Jacolyn Daniluck, a Parks Canada spokesperson, described the landscape.

Left: Campbell drives a Lexus NX out of Vancouver, a city in which he once lived, and where he first started to run trails seriously



Above: Campbell on a practice run in Squamish, an area he calls a mountaineer's playground, 60 kilometers north of Vancouver.
Opposite: The NX is driven along a mountain road beneath the Stawamus Chief, a large granite dome popular among climbers

For most runners, the views were the draw, but they would be hard earned. Five minutes before the race began, participants congregated at the start line. Campbell started to jog around the lot (to “shake out the nerves,” he later said, which he still experiences before every race), and every now and then he would stop and hop nervously on the spot. When, 30 seconds before the race started, high-tempo music blaring through the event’s Tannoy system gave way to an excited organizer’s rapturous countdown, Campbell joined a small group of elite runners at the front of the pack. Next thing he heard was the starter’s gun. And then he was gone.

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Campbell had arrived in Revelstoke the night before, following a daylong drive from Vancouver, the city in which he first began to run mountain trails seriously, close to a decade ago. Campbell has been a high-functioning athlete since he was 16 years old. Born in Southampton, England, his father moved to Nigeria on a work contract, taking the family with him. Campbell grew up there, on the coast, mostly outdoors. “We didn’t really have that much TV,” he said. “So we were always outside playing, just developing this natural fitness.” In high school, he started playing sports

– soccer, tennis, rugby, swimming, sailing – and the more he won, which he did fairly often, the more competitive he became. “You’d see it even when he and his brother played board games,” Campbell’s mother, Wendy Swinton, said. “He absolutely wanted to win.” (As Campbell recalls: “I used to flip the board if I was losing.”)

In Campbell’s last few years of high school, his parents sent him to Canada, their home country, to a boarding school in Ontario that placed equal emphasis on academia and athletics. Campbell excelled at both. When he realized that he was able to run more quickly than most of his schoolmates, he started training for triathlons, calling on the swimming he grew up doing in Nigeria. The first triathlon he entered happened to be the Canadian junior championships, at which he finished in the top 10. And, just like that, he was on the national junior team.

Campbell excelled at the triathlon and, at the age of 21, decided to dedicate himself to the sport. He was invited to join the Canadian National Team, trained to compete at the Beijing Olympics, but never quite made it. (He went anyway, as the team’s manager, just to be “close to my buddies,” he said.) After the Olympics, he enrolled at university to study law. It was 2008, and he was 29: a law student who couldn’t dismiss a serious penchant for run-



Left: Campbell breaking the world record for the fastest marathon in a business suit. Below left: Campbell, in a bright orange Arc'teryx jacket, looks out at Howe Sound from the Lexus. Below right: Campbell in the Lexus NX, on his way to Revelstoke, 640 kilometers from Vancouver



Left: Campbell visits the Arc'teryx design headquarters in North Vancouver. As an athlete sponsored by the brand, he regularly gives the design team feedback on new product

ning. But what kind to do? “I had always loved trail running,” he said, “and doing stuff in the mountains. And I always knew I was quite good at it. I’d gone as far as I could doing the triathlon thing, so I thought I’d try something new.” He entered a national mountain race and almost immediately made the Canadian mountain running team. Then he went to the World Long Distance Mountain Running Challenge, a mountain marathon event in Interlaken, Switzerland, and finished 11th – among a field of thousands. “It was my first big international mountain race,” Campbell said, “so I was like, ‘Okay, maybe I’m pretty good at this.’” He’d never before run more than three hours in one stint, but soon he began to run for much longer: 50-kilometer races, 50-mile races, 100-mile races; five, 10, 20 hours at a time. In 2014 he ran the Hardrock 100, a 100-mile mountain race in Colorado that has a total elevation climb of 10,360 meters (Mount Everest is 8,848 meters tall). Halfway round, more than 10 hours into the race, the ground in front of him was struck by lightning, electrifying his body and throwing him onto the floor. His headlamp was fried, but he remained intact, and he finished the race in just under 26 hours. He came in third.



Campbell has since returned to Hardrock (he placed third again earlier this year), and he continues to race internationally. He is one of a group of 10 or so runners who form a chasing pack behind Kilian Jornet, the 28-year-old Spanish runner whom the *New York Times* has called “the most dominating endurance athlete of his generation.” The pair are friends (much like all high-profile mountain runners – the sport is close knit), and they regularly race against each other. They also share similarities in form: over rutted, uneven ground, both Campbell and Jornet remain firmly upright, gracefully balletic, their arms waving above their heads as part of a tricky balancing act. Uphill, Campbell shortens his steps and maintains a high cadence; on the way back down, he reduces all contact with the floor, letting gravity do the hard work. He once referred to mountain running as “a kind of dance,” calling to mind, not inaccurately, the concepts of rhythm, precise footwork, improvisation, and, in a way, performance.

But whereas Jornet makes a living from running – he is the only professional mountain runner in the world – Campbell does not. Apart from the views, and a significant sense of accomplishment, ultramarathons offer few rewards, least of all monetary. Campbell is sponsored by several sports equipment manufacturers – including the Canadian premium outfitters Arc'teryx and the French firm Salomon – that subsidize costs to help him reach certain high-profile events and offer small salaries to help runners get by, although Campbell refers to this type of existence as “kind of dirt bagging it a little bit.” That life is fine, but it’s not for him. Instead, he bills 40 hours a week as general counsel to a consultancy firm addressing water rights, which he considers “one of the most important global issues facing the world right now.” Mountain running is time consuming – to maintain the fitness levels necessary to compete at the highest international standards, Campbell must log an average of up to 30 hours of serious running a week – so his bosses adapt schedules accordingly, or let Campbell do it for himself. Still, the two activities are similar in theory. “Running is huge [for me],” Campbell said out on the

Right: Campbell, halfway through the drive from Vancouver to Revelstoke, fills the NX with gas at a local Husky. British Columbia’s mountains, which Campbell regularly runs, rise in the background



road. “It’s about nature, health, goals.” So, he said, is the other work he’s doing. “On an environmental level, it’s a very important piece of the puzzle.”

Mountain running is hard. Runners, who are often small and lightweight, loaded with tightly coiled energy, must be capable of navigating unrelenting terrain for upwards of three hours at a time, and often for much longer. In the sort of 100-mile races in which Campbell competes, runners can experience severe altitude sickness, acute headaches, mental malaise, dehydration, grueling temperature slides, misfiring thermoregulation, and hallucinations, as well as more obvious physical problems, such as intensely fatigued muscles. Some athletes, including both Campbell and Jornet, will run for six hours without taking anything by mouth except fresh stream water and trailside berries – so they’re quicker (less gear) but prone to bouts of potentially dangerous light-headedness. For these

reasons, mountain runners cannot be *just* runners; they must also be wilderness survival experts – the sort of mountain folk who know what to do when already-extreme situations turn awry: when a cornice slips from beneath a running shoe, say, or when lightning strikes the ground at their feet. Campbell faces these kinds of scenarios regularly, and he is well aware of his sport’s dangers. “You spend enough time in a mountain town, around mountain athletes,” he said, “and you’re going to know people that have died.”

For those who would never choose to clamber up and down a mountain – who run, perhaps, but only recreationally, in a park – Campbell’s sport is more than a little astounding. When asked if he ever considers what others think of what he does, he nodded. “We understand it’s a bit weird,” he said, “that it might be a bit difficult to understand.” But his reasons for running are clear and plentiful. He absolutely adores nature. He loves developing a connection with the landscapes through which he runs – as seasons change, as weather shifts. And he loves (almost even more so) developing connections with his fellow runners. Community, which in mountain running seems built on the sharing of prerace mantras, all of them unfailingly positive (“that’s awesome,” “supercool,” “you’ve got this, man”), is important, especially during midrace lows, which are frequent. Campbell finds running empowering, the way it rewards hard work. “You put the time in,” he said, “you get better.” And he likes the common experience it represents, the democratizing accessibility of it all, that anybody can pick up a pair of shoes and just run.

SOME MOUNTAIN ATHLETES, INCLUDING CAMPBELL, WILL RUN FOR SIX HOURS WITHOUT TAKING ANYTHING BY MOUTH EXCEPT FRESH STREAM WATER AND TRAILSIDE BERRIES

Which is what other people like, too. And there are a lot of them. Mountain running is booming. “It’s just human nature,” Lauri van Houten, executive director of the International Skyrunning Federation (ISF), a respected series of global mountain races, said. “People want to go higher, further. They’re fired by curiosity, the challenge.” To van Houten, mountain running’s popularity surge was inevitable. As more people begin running, especially during a recession, when cheaper pursuits gain traction, more impressive locations are required. “First there were marathons,” she said. “Then off-road running, then trails, and then mountains.” The ISF helps organize 141 races in 36 countries. The organization’s first race featured seven runners. (That was in 1995, three years after the Italian mountaineer Marino Giacometti pioneered races across Mont Blanc.) Now, 400,000 people compete in ISF races annually, and the number of applicants is far higher. (You can’t have 10,000 people running up and down a mountain at the same time, van Houten said, even though some races have enough application numbers for that to happen.) Elite athletes are driven by the same enthusiasm as the amateur athletes competing in the same races. “You’re running to some of the most spectacular places in the world,” van Houten said. “You’re on top of a mountain, surrounded by incredible nature. The views below will just blow your mind.”



Left: The Revelstoke Railway Museum. Below: Glacier Grind participants at the Revelstoke Railway Museum, anticipating a motivational talk by Campbell. Opposite: Campbell, at the Coquihalla Pass, stops to stretch



On the night before the Glacier Grind race, runners were invited to a small public space at the Revelstoke Railway Museum, in which the event's organizers had set up a makeshift registration center. Runners, who spanned the gamut of age and athletic ability, were asked to sign liability waivers before being handed their race numbers and maps. When most had registered, Campbell gave a short motivational talk in which he emphasized the rare opportunity Parks Canada had granted them all by allowing them to run through such hallowed landscapes. Campbell's talk, which was incredibly positive – a morale-boosting celebration of running and nature – was followed by a speech by Ellie Greenwood, a two-time 100-kilometer world champion, and then a lecture by representatives of Parks Canada. The latter received the most attention. "We're here to talk to you about safety," one of three employees said, "and we have something to get your adrenaline going." People laughed. Rumors of bear sightings had earlier coursed through the room, and in a heartbeat a Parks Canada representative had confirmed them. "There have been grizzlies found on the trail," the employee said. And then, in a tone meant to placate but that wasn't entirely convincing: "This is normal in a national park. We just want to make sure everyone's briefed."

To the average runner, the news would have been terrifying. To the Glacier Grind attendees, it barely caused alarm. At Canadian ultras, bears come as standard, like the cold. And besides, there were more pressing concerns: the weather,

which was closing in; which protein bars to choose and, given their weight, how many to take; whether to pack a third layer, should temperatures fall below zero. When the Parks Canada employees brought the group together to practice a loud mid-run chant meant to ward off wildlife, most joined in as if they were taking part in a pantomime. And when the group later discussed the most successful way to use bear spray – with careful patience, it turns out – sections of the audience giggled.

As soon as the talks ended, a group of runners at the back of the room huddled close to discuss the race. The topic of bears did dominate the conversation, but the crowd also talked about the cold, and the forecasted rain, and the sheer massiveness of the race. When conversation subsided and the group fell silent, one diminutive runner perked up with a line that the group considered a joke, but which many of the rest of us would not. "He who doesn't die," she announced matter of factly, "wins."

The town of Revelstoke is surrounded on all sides by mountains that are covered at base level by vast expanses of compact forest (cedars so ancient and giant they block sunlight from the ground); then by alpine meadows, lakes, and waterfalls; and, finally, by fields of scree and vast, snowy glaciers. Weather conditions can be intense and mercurial. The morning on which the runners set off, the valley had filled with a dense fog, but by the time many reached the summit – up and over the clouds, 2,000 meters above sea level – they experienced patches of brilliant sunshine. High points offered views onto a blanket of heavy mist below.

Campbell had reached the summit in less than three hours. At one point he took a wrong turn, which had both added a couple of miles onto his journey and temporarily cost him the lead. When I caught up with him, 90 minutes into the race, on a rare section of flat, grassy trail, he was still loose and almost sweat free, and he was wearing a wide smile. He was first again, and he had enjoyed running the extra distance – he referred to the mishap as "bonus miles."

When Campbell runs, he does so to win, no matter the conditions or the quality of opposition. Something primal drives him, he said. "I always feel like I'm being chased by something. There's a lot of pride there. Fight or flight." The same was true at Revelstoke, although

Glacier Grind attendees have their backpacks checked for necessary equipment: an extra jacket, a hat, a water vessel, and bear spray.





A local runner before the race in the closest thing ultramarathoners have to a uniform: a fluorescent lightweight jacket and a cap

RUNNERS, WHO SPANNED THE GAMUT OF AGE AND ATHLETIC ABILITY, WERE ASKED TO SIGN LIABILITY WAIVERS BEFORE BEING HANDED THEIR RACE NUMBERS AND MAPS



Campbell before the race, about to start looping the parking lot to "shake out the nerves"



Runners, a mixture of seasoned ultramarathoners and curious first-timers, line up at the start line in an asphalt parking lot



The British ultramarathon runner Ellie Greenwood, a two-time 100-kilometer world champion



A local runner before the race (shown left) and immediately afterward (above)



Clockwise from top:
Post-race snacks –
bananas, chips, coffee
– are set on a table at the
finishing line; large vats
of a sodium-rich energy
drink feature at various
aid stations up and down
the mountain; a runner
holds a can of bear spray,
which is one of four
mandatory race items
all athletes were told to
take with them. Opposite:
Campbell, surrounded
by giant cedar trees, runs
through a rare flat section
of the race



the competition quickly dropped off, and for most of the race Campbell was running solo, far ahead of the rest of the pack. When he reached the finish line, he looked like he'd gone for a 15-minute jog rather than a four-and-a-half-hour schlep. He'd eaten two protein gels (500 calories combined) and drunk 600 milliliters of water. He was neither out of breath nor obviously tired. His calves were marked by mud, but he did not move gingerly, as might be expected. The first thing he said was: "That was a real mountain race," by which he meant that the course was harder than he thought it would be. But then his face revealed a smile:

"You should see the moss up there." At a number of points in the race, Campbell had run past patches of luminescent green carpet – peat moss – and the imagery had stayed with him, to such an extent that he was sharing his experience with everyone he could. Buzzing, he took one race organizer through a detailed reenactment, describing with great enthusiasm what he'd seen – soft spores in remarkable hues similar to those of the jackets he wears. When he finished, he turned away from the start line and walked toward a table lined with carb-heavy food to load up. Then, to nobody in particular, he said, "That was awesome.☺"



THE TOWN OF REVELSTOKE SITS ON THE BANKS OF THE COLUMBIA RIVER, FIVE KILOMETERS SOUTH OF THE HULKING REVELSTOKE HYDROELECTRIC DAM. VANCOUVER IS 640 KILOMETERS TO THE SOUTHWEST; CALGARY IS 415 KILOMETERS TO THE EAST. THE AREA IS PRIME BEAR COUNTRY; BOTH BLACK AND GRIZZLY BEARS ROAM THE VAST LANDSCAPES, AS VISITORS TO THE REGION ARE MADE WELL AWARE.

LEXUS NX 200t F SPORT	LENGTH	4,630 mm	CYLINDERS	4
	HEIGHT	1,645 mm	ENGINE OUTPUT	175kW / 238PS
	WIDTH	1,845 mm	TORQUE	350Nm / 1,650-4,000rpm
	WHEELBASE	2,660 mm	TRANSMISSION	6 Super ECT
	SEATING CAPACITY	5	SUSPENSION	Front: MacPherson Struts
	DRIVEN WHEELS	AWD		Rear: Double Wishbone
	ENGINE TYPE	8AR-FTS	TIRE	225/60 R18



The Lexus NX en route to the summit of Mount Revelstoke. It is the only mountain in the national park system whose peak visitors can reach after a short walk from their car



Campbell midway through the Glacier Grind. The race winds up the 2,000-meter-high Mount Revelstoke, through forest so dense the floor receives little direct sunshine

AROUND THE BEND

Ultramarathons are often incredibly social affairs. The races are organized by running enthusiasts, and the trails are minded by local volunteers as well as family members, who hike up to high points in the early morning, before the runners beat them there. As athletes of varying speed complete the course, they are presented with aid stations at which protein-rich food is laid out for midrace sustenance. At Revelstoke, standard gear also included bear spray, a form of pepper spray used to deter unwanted animals.

S P A C E

R A C E



The Boeing CST-100 Starliner will soon take paying civilians into space. Who will be onboard?

If we're to believe those who are at the forefront of the aerospace industry, it won't be long until average folks will be able to fly into space. But when, really, will it happen? And who will get us there first?

Text by Ryan Bradley



Photograph by Jesse Chehak

The town of Mojave, California, lies within sight of the southern tip of the Sierra Nevada, on the flats, out in the desert that gave the town its name. Wind howls down from the mountains and across the land. The foothills of the range caught enough rain and runoff that it was once, not long ago, slightly grassy. Antelope grazed; the Tehachapi people hunted; a soda river flowed from an alkaline lake 160 kilometers to the north. Then came the railroad: first a camp, then a town, and finally a station, the terminus of the Southern Pacific. Two hundred and sixty-six kilometers north was San Francisco. The trip from one end to the next took three days.

The railroad brought business to the area. Minerals – gold, silver, copper – soon arrived to be shipped north, then south to Los Angeles once the railway stretched farther. An aqueduct was built to carry water from the soda river, and that water fed the city, helping it to grow unlike any city had before. When the world first went to war, Los Angeles became a center for an entirely new form of transport: flight. Mojave built an

The vast and incredibly dusty Mojave Desert, home to the Mojave Air and Spaceport and a number of the most impressive space tourism organizations

airstrip in 1935, first for airplanes to haul gold and silver to market. The strip was paved in 1941, about the time the world went to war again, and the aerospace industry blossomed.

Soon, men attached to rockets soared into orbit and around the earth – then they landed on the moon. By the 1980s, the Mojave airstrip was the takeoff and landing point for some of the most epic flights in human history, including the first nonstop, unrefueled, solo, round-the-world journey, which took place in a plane named Voyager. Voyager's pilot, Dick Rutan, was a former Air Force lieutenant. Dick's younger brother, Burt, an engineer, had been in the Air Force, too, designing experimental aircraft before starting his own shop in Mojave. For Virgin Atlantic, he built the GlobalFlyer, which in 2005 adventurer Steve Fossett flew around the world nonstop, unrefueled, in a week less than Dick did in Voyager.

Burt Rutan also built the first privately built and funded manned craft to reach space. SpaceShipOne took off and landed at Mojave. It was 2004. That same year, Richard Branson formed

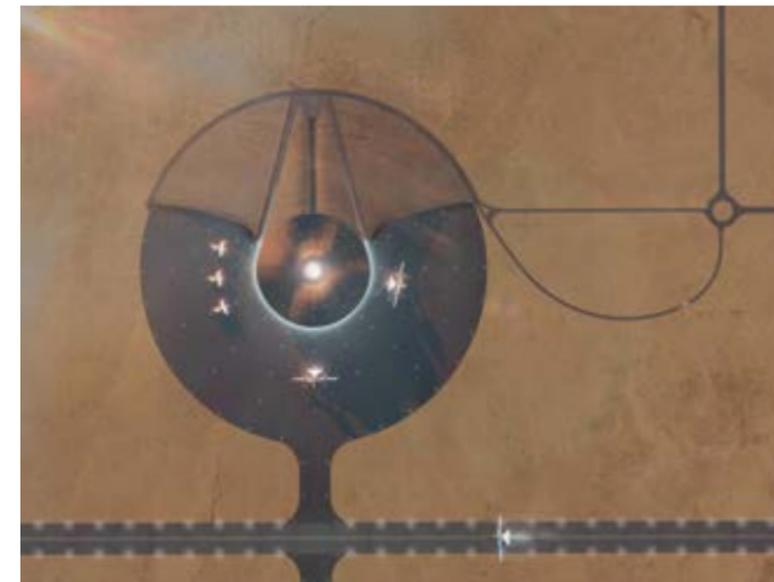
Virgin Galactic, which would use SpaceShipOne and its descendant to bring paying clients beyond the atmosphere, again and again, routinely, like any other airline company. Rutan then built SpaceShipTwo – the shuttle that Virgin and Branson planned to use to get into suborbital space. Back in 2006, Branson predicted that the first launch, with a craft full of paying clients, would be just two years away. Two years passed; then, he said, it would be two more; then 2010 came and went.

Still, it was coming, this thing: space tourism. You didn't have to be an elite member of the military or a highly trained scientist, just a paying client. It was coming; it was close.

The problem was time, and the scale of it. It had taken a half century to move from a rail

(TO THE SKY)

Companies around the world are racing to be the first to offer regular travel into space. Here are four of those most likely to succeed.



© WENN Ltd / Alamy Stock Photo

The Virgin Galactic headquarters, Spaceport America, in the New Mexico desert

station to an airstrip, and even then the airstrip was primitive – years passed before a pavement arrived, then more years between the pavement and regular flights, the kind where any paying client might hop aboard. It had taken another half century to move into space, and here we are again in those in-between years, where commercialization is at hand but hasn't yet arrived. You can hear how close we're getting from the folks at Boeing, which has now built a space plane of its own.

BOEING

The company that builds 747s also makes spaceships. Its X-37 is a reusable, unmanned spacecraft that it took over from NASA and now launches with the help of the United States Air Force. But the company's real space aims are more in line with its core business, and the CST-100 Starliner is exactly that. It's a Crew Space Transportation capsule, capable of holding several people, and able to stay in orbit for 7-10 months and dock with the ISS. Chris Ferguson, the director of crew and mission operations for the CST-100, says that it should be in "rental car mode" – meaning in use by NASA, the Russians, or whoever else is paying – within the next five years.

John Mulholland, vice president of commercial programs at Boeing, was recently explaining this relative timescale problem, and how close we were, to a group of reporters. The company was in the process of readying a new craft for a big public debut. It would launch next year, undergoing a series of unmanned flight tests before adding humans in 2017. The CST-100 (CST is an abbreviation for Crew Space Transportation) was to be a sort of replacement for NASA's shuttle, only capsule shaped and more versatile. Boeing is building the capsule alongside a much newer company, Bigelow Aerospace, which is owned and run by a former Las Vegas real estate magnate, Robert Bigelow, famous for founding Budget Suites of America – and believing in extraterrestrials.

Boeing will celebrate its 100-year anniversary next year, and Mulholland, anticipating a battery of questions about how soon the CST-100 would offer regular trips to and from the International Space Station (ISS) for paying clients, put things in perspective. "I want to share a story," he began. "I was visiting my daughter in Pittsburgh, and we went to a cemetery, and on a tombstone I noticed a Wright Flyer. The name on the tombstone was Calbraith Perry Rodgers. Now, Calbraith Perry Rodgers flew from New York to LA. He was the first. It took him two months. He had 12 near-fatal crashes. There were three train cars' worth of spare parts following him.

"A HUNDRED YEARS AGO, NOBODY WOULD HAVE IMAGINED WHAT WE ARE TALKING ABOUT NOW: COMMERCIAL SPACE. WE'RE ON THE CUSP OF SOMETHING INCREDIBLE"

When he finally got to LA, he had just two of the original parts he left with, an oil pan and a strut, and the plane itself didn't survive. That was 100 years ago." (It was a little more than 100 years ago – 1911 – but still.)

"Now," Mulholland continued, "there are hundreds of flights across the country every day. Nobody would have imagined then what we are talking about now: commercial space. We're on the cusp of something incredible. And it will be as dramatic and unpredictable as that first transcontinental flight. Where we are today is where Rodgers was then, right where the whole idea of commercial crew is kicking off."



BOEING IN FLORIDA

In September, Boeing opened a new facility devoted to the manufacturing of the CST-100. Based at NASA's Kennedy Space Center, in Florida, the factory-like building (official title: the Commercial Crew and Cargo Processing Facility, or C3PF) will provide space for assembly and processing for launch. Boeing engineers are currently manufacturing a test version (shown here), which won't make it into space but will be put through a number of essential tests.



Below: The CST-100 before and (in paper form) after



Above: An image of the CST-100 is displayed onto a hangar wall at the opening of the C3PF. Left: A section of the Boeing CST-100 Structural Test Article rests on a test stand

Above: Assembly begins on the test CST-100 spacecraft. The final model will be designed for 60 hours of flight



The implication was clear: this is not just coming; we are not just close; but it's happening now, in a messy and haphazard way, but still happening, if you know where to look. In fact, it has been happening for much longer than you might think.

The first space tourist – that is, a nonprofessional, military-trained astronaut – arrived in 1984. McDonnell Douglas, an aircraft company, paid NASA \$40,000 to fly an employee, Charles D. Walker, in the shuttle. The next year a senator came aboard and took to orbit, and the year after that, a congressman. Each had been a big supporter of NASA funding. Various spaceflight participant programs in the 1980s and 1990s opened NASA up to applications from the general public, but these efforts folded after the Challenger disaster, in 1986.

THE GOAL TODAY AT SPACE ADVENTURES IS TO FIND MORE CLIENTS LIKE GREG OLSEN, FOLKS WHO ARE LOOKING FOR SOMETHING NEW AND DIFFERENT

In 2000 a former Jet Propulsion Laboratory engineer who had made millions in investment management paid a Russian company called MirCorp to take him up to the ISS. Dennis Tito trained with the Russian Federal Space Agency, but then, when he and the cosmonauts arrived at the Johnson Space Center in Florida for further training, NASA turned Tito away. Undeterred, Tito founded the Florida-based Space Adventures Ltd., which helped secure his passage on the Soyuz TM-32 mission. He orbited the earth for nearly eight days, and the trip cost him \$20 million. The age of commercial space tourism had officially arrived. It was 2001.

The next year Space Adventures sent South African entrepreneur Mark Shuttleworth in a Soyuz-TM, a Russian-built crew transporter that was compatible with the ISS. Shuttleworth paid a reported \$20 million, too. But Tom Shelley, the current CEO of Space Adventures, points to Greg Olsen, the company's third client, as the more prototypical future space tourist. Though he is also a millionaire many times over and an engineer by training, it was not his lifelong dream to be an astronaut. As Shelley retells it: "He was sitting in Starbucks, looking for something new and different, and read about us and what we could do." Shelley is perhaps more typical of the



An access platform at the Boeing facility. The CST-100 will launch on a 58.3-meter-tall rocket, hence its height

SPACE ADVENTURES

The original space tourist agency, Space Adventures is still the company for deep-pocketed wannabe astronauts to get a ride past the atmosphere. It was responsible for coordination with the Russian Space Agency and NASA to get the first space tourist into orbit, and the second and the third – seven in all. It also offers a mission to circumnavigate the moon, for about \$100 million per seat (its two seats are sold out; the mission should launch in a few years), as well as a space walk option for its ISS trips, which adds about \$15 million and several days to a \$20 million, weeklong experience. Training can take up to six months.

direction of the industry, too. He's not a space nerd, either. His background is in marketing for a quality-management company. "The industry I was in before was pretty dull," he admits. The goal today at Space Adventures is to find more clients like Olsen, folks who are looking for something new and different, but who are not necessarily inveterate space geeks (they'll find Space Adventures, the thinking goes). The company has sent eight people into space, five under Shelley's watch.

Space Adventures has become the more or less de facto travel agency for trips into space with the full astronaut experience. "We've gained more experience," Shelley says. "And we've added the circumlunar mission to the portfolio." Circumlunar? "That's out around the moon and back," he clarifies. "We've sold that. We have

customers under contract for that mission.” People are always looking for “alternatives” at Space Adventures, the atypical, which orbiting the earth and going out to the ISS is becoming. They’re also looking for alternatives to the Soyuz, which the company relies on to take its clients into space, the same way NASA contracts with the Soyuz to take astronauts to the ISS. Boeing’s CST-100 will be that alternative, but there are others, too. The American organization Bigelow Aerospace is building its own inflatable orbital systems, which will offer a roomier alternative to the ISS as permanent, live-aboard satellites. SpaceX, the Elon Musk-founded company that builds rockets and delivers payloads to the ISS, isn’t designing for humans yet, but could be. Lockheed Martin and NASA are constructing a new capsule, Orion, for potential Mars and meteor missions, but these systems have a way of trickling down and potentially reaching the wider public. “Soyuz is tremendous,” Shelley says. “It’s been in operation for 50 years, and it’s incredibly successful. But it’d be nice to have a choice.”

This is how the around-the-moon mission would work: a Soyuz, with room for two paying passengers, launches, and another rocket, with additional living space, follows it. They dock in low earth orbit, then both dock with the space station, then the extra habitation module breaks away and heads to the moon and returns to the ISS, ready to make the trip again in the future. This will be ready in “probably three to four years,” Shelley says. It’s a head start on Space Adventures’s competition, which is growing, but which is still addressing the issue of getting humans into space and back safely.

Today there are dozens of such upstarts, some of them quite large and well funded. Virgin Galactic is perhaps the best known and has already sold hundreds of tickets for its initial flights, though those have yet to occur. These flights, 100 kilometers above the surface of the earth, with five or so minutes in space, are vastly different from those offered by Space Adventures, which take place 300 or 400 kilometers higher, and

BIGELOW AEROSPACE

Blow-up, inflatable spacecraft seem silly, but Bigelow is extremely serious about them. The company bought patents for its inflatables directly from NASA and is launching a pod that will dock with the ISS later this year or early next year. Within two years a much larger pod is coming, and within five years a standalone craft, which should act as an alternative to the station, as a lab or a boarding house – which one doesn’t matter as long as the client is paying. Robert Bigelow, the founder and CEO of Bigelow Aerospace, made hundreds of millions on budget motels and is similarly minded here: he’d like to help folks get to these zero-gravity living quarters, and he has the means to do so. The company already has contracts with NASA, SpaceX, and even a small company that makes buggies – for the moon.

for 10 or 12 days at a time. But at a cost of a few hundred thousand dollars versus several million dollars, Space Adventures is reaching a larger pool of potential clients. This excites Shelley and others. Rather than worrying over Virgin and other suborbital upstarts, these companies will feed the public’s imagination. They will make space – actually living in space – that much more of a possibility. “It’s complementary,” Shelley says of the suborbital upstarts like Virgin. “It’s an entry point.”

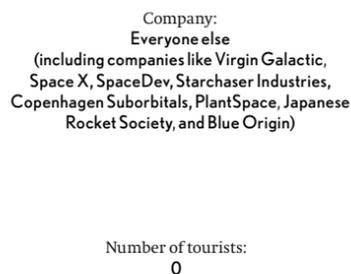
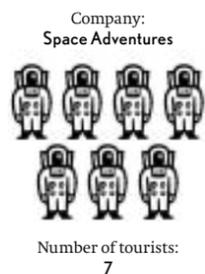
Even Elon Musk’s SpaceX and the Virginia-based Orbital Sciences (which has a nearly \$2 billion contract with NASA to launch cargo up to the ISS) don’t faze Shelley. After all, his company deals in the logistics of getting the average Joe (the wealthy kind) into space, not the nitty-gritty hardware of the business. More rockets simply means more options. The Jeff Bezos-founded Blue Origin has been far more secretive, though its New Shepard spacecraft will go farther into space than many others (120 kilometers), and it’s developing an escape module for NASA, which could benefit future tourists, too. And as for Bigelow, its BA-330 system is a veritable space hotel – the 330 stands for 330 meters squared, which is nearly as large as the whole of ISS, and will be yet another new destination to offer to potential Space Adventures clients. Its deployment is planned for sometime in the 2020s.

THAT COPENHAGEN SUBORBITALS HAS LAUNCHED REAL ROCKETS SEVERAL KILOMETERS ABOVE THE EARTH (AND ONCE AS FAR AS 8.5 KILOMETERS) IS ASTONISHING. THAT IT HAS DONE SO FOR A FRACTION OF THE COST IS ALL THE MORE SO

The only real upstarts that might – and it’s a big might – pose a threat are the true outliers, those not based in Russia or the United States, or those in any other nation with an existing deep-pocketed space infrastructure. Spaceport Sweden and Copenhagen Suborbitals are hoping to offer true alternative means of reaching space. Copenhagen Suborbitals is the most radical of all players in this new space race: it’s a nonprofit, nongovernmental, mostly volunteer, open-source space program. That it has launched real rockets, even one with full-scale human models inside, several kilometers above the earth (and once as far as 8.5 kilometers) is astonishing. That it has done so for a fraction of the cost – some 70,000 euros per launch versus several million – is all the more so. Copenhagen Suborbitals even has

SPACE TOURISTS - SO FAR

Until now, one company, Space Adventures, has dominated the space tourism race, sending more paying civilians into orbit than all other companies combined. Here’s how the numbers add up.



Moon: 384,400 km

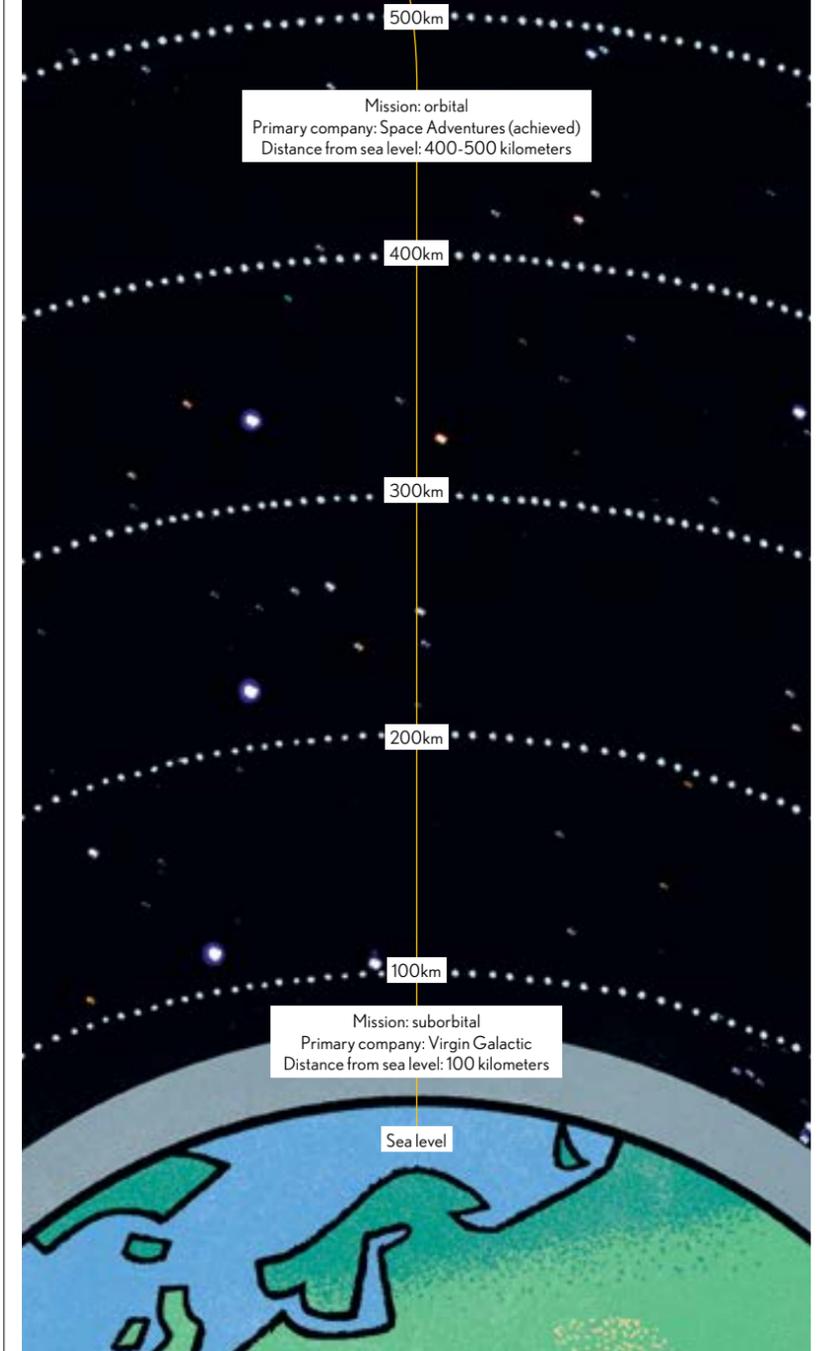
Mission: circumlunar
Primary company: Space Adventures
Distance: around the moon and back

two spacecraft prototypes: one micro, the other for deep space, each named after the Danish astronomer Tycho Brahe. Neither has carried a human into space, nor will for quite some time, if ever. Getting to space is complicated, and expensive. Copenhagen Suborbitals has only one full-time employee (its cofounder, Kristian von Bengtson) and is financed by public donations.

Spaceport Sweden is, like Space Adventures, not in the hardware business but rather a booster of space tourism and the overall space industry. The company’s goal is to develop into something like the Mojave Air and Space Port but on a wider scale in all of Europe. It’s based in Kiruna, in the far north, north of the Arctic Circle, up in Lapland. The company signed an agreement with Virgin Galactic that would make it Virgin’s first launch site outside the United States. Both Spaceport Sweden and Virgin optimistically planned for SpaceShipTwo flights to depart and land by 2015 – which of course didn’t happen. SpaceShipTwo crashed in October, 2014; its splintered and folded-up hulk landed in the desert outside Mojave, where Virgin Galactic’s headquarters reside, and where the future of space tourism can be seen up close today.

THE MISSIONS

Of the numerous companies hoping to launch tourists into space, few are doing it in exactly the same way. Here, we show the range of planned flights.



IF ALL ELSE FAILS, GET A LIFT

Out of the wilds of Canada grows a tower (or, at least, plans and patents for a tower) unlike any the world has seen: 20 kilometers high, made rigid by pressurized gas inside inflatable Kevlar cells. Inside the tower is an elevator that will take people up close to space. Thoth Technology is serious about this space elevator – the concept of which predates the 20th century – but building 20 times higher than the world's current tallest building (Dubai's Burj Khalifa) raises more than just eyebrows. The torque will be enormous, the weather at such high altitudes relentlessly brutal. Still, the company says it could build a scale model to 1.5 kilometers within five years, and it estimates the finished \$5 billion structure will save 30 percent of the fuel costs of reaching space. With such high savings, what once seemed silly suddenly does not.

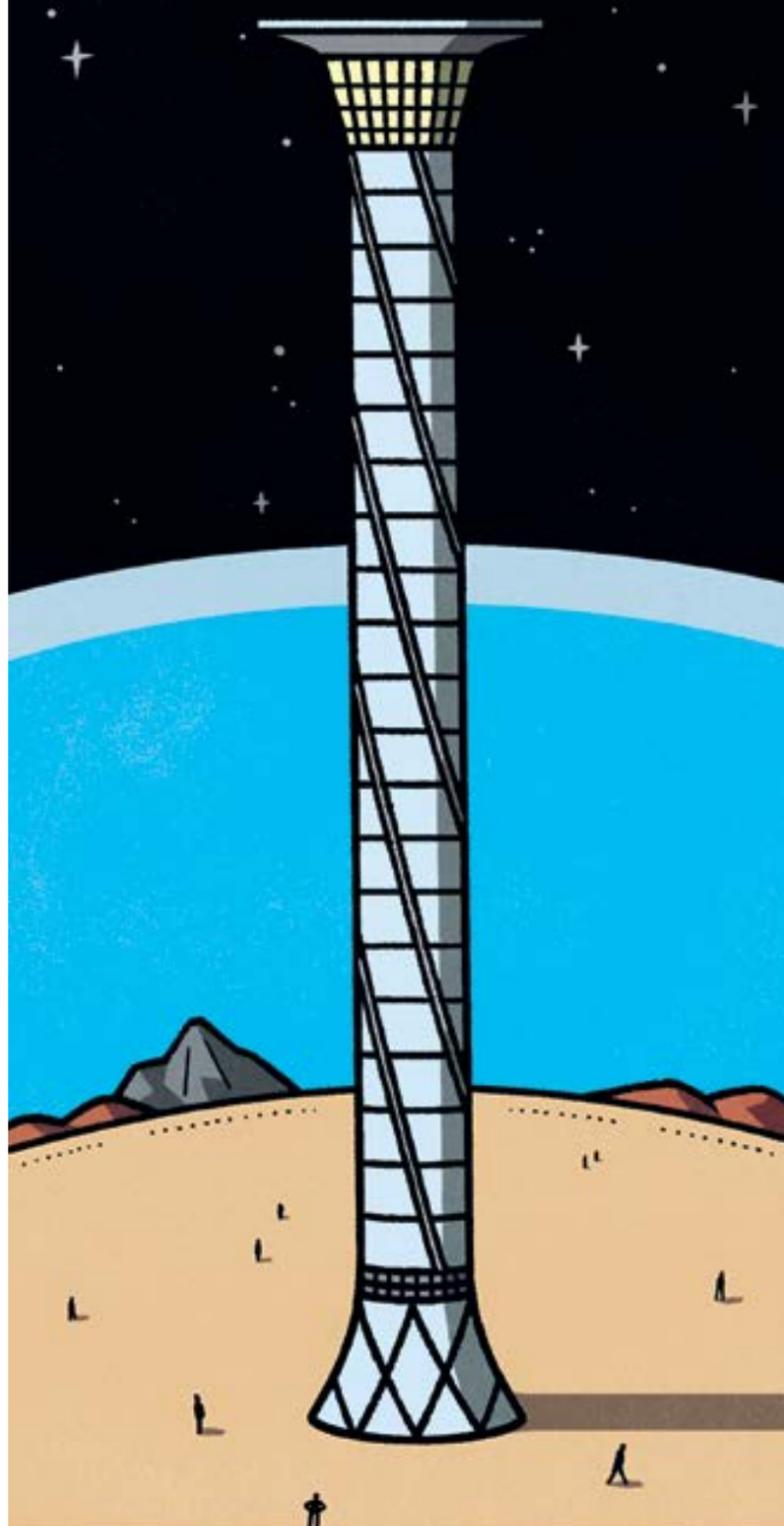


Illustration by Studio Takeuma

An entrance to the Mojave Air and Space Port, which features a Rotary Rocket concept first developed in the 1990s



Photograph by Jesse Chehak

Compared to most American towns, Mojave is tiny and bleak. Posted throughout are large signs quoting scripture. One, next to an old library turned into a doughnut café, reads: “God opposes the proud / and gives grace to the humble.” Drive through town and, on the outskirts, you’ll begin to see in the distance enormous structures – hangars – and farther still a lineup of 747s, dozens of them. Small signs for exotic-sounding, heavily acronymed companies spring up alongside the road like wildflowers as you approach. XCOR Aerospace is one. It’s building a suborbital commercial craft called the Lynx, which will cruise up to 100 kilometers, then drift back down to the Mojave airfield, which it is expected to do at least four times a day. It seats two, and at least one ticket has been sold for it, for \$95,000, though ticket prices have recently increased to \$150,000. The final component of the craft, its wings, will be attached later this year. Then test flights will begin.

Past the XCOR offices, past nearly everything, stands the Virgin Galactic hangar, fenced off and unwelcoming to visitors, particularly in these solemn months after the crash. Still, there is a center to the port, and that’s the entry to the airfield itself, and next door is the Voyager Restaurant, a great greasy spoon, named after the Rutan brothers’ famous craft. Inside it’s all military buzz cuts and pocket protectors, jumpsuits, and glasses. The flyers here don’t mingle much with the engineers. Their lives and careers are so different, but both are focused on problems above and beyond terra firma. Watching them, waiting for my burger to arrive, I was reminded of something Tom Shelley had told me, something he hadn’t given much thought to before getting involved in this whole space business: that the vast majority of people working to send humans into space, spending their entire careers and lifetimes worrying about it, would never

VIRGIN GALACTIC

The plan was for SpaceShipTwo to launch off WhiteKnight. Or, rather, WhiteKnightTwo, a gigantic carrier airplane with two fuselages, which would fly 18 kilometers high before the craft it carried blasted off on its own, up another 82 kilometers. That was the plan, before SpaceShipTwo crashed. Few answers have emerged from Virgin since the disappointment in October last year. Plenty of tickets have been sold, hundreds of people have signed up for a trip. But the timeline continues to be pushed back. Virgin is without question the most recognized brand in the game of commercial space for tourists. But despite its serious credentials, it is increasingly looking like the biggest long shot of all.

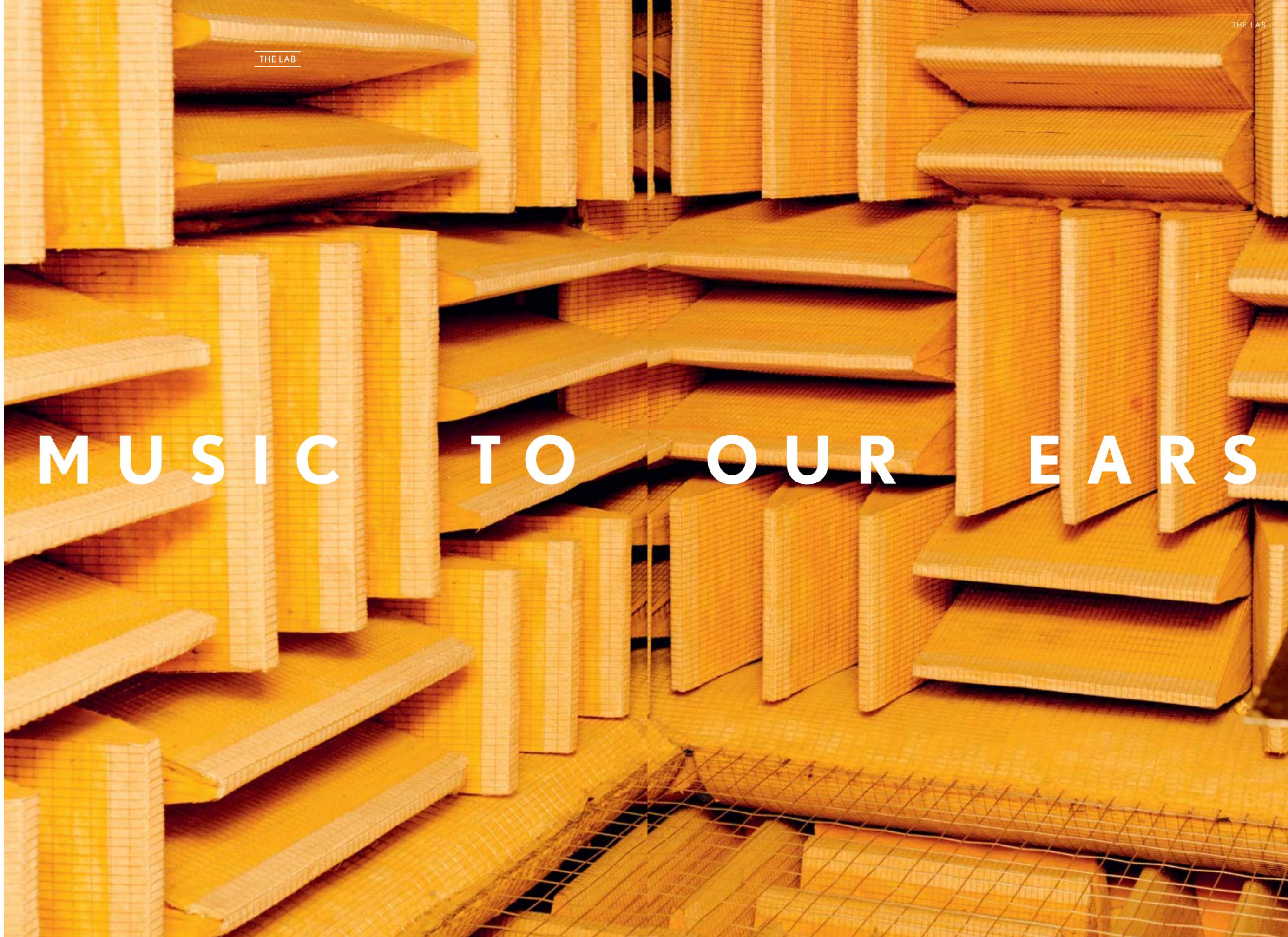
experience space themselves. That’s an incredible thing: that people would be so moved by the idea of a place, they’d give their lives to it, without any chance of getting there. This is what Shelley is hoping to provide: the chance.

Outside the Voyager, out on the airfield, there’s a loud thrum. An experimental craft is taking off. It’s skinny and light and seats only one passenger. A silence falls in the dining room. Everyone stares at it, the flyboys in jumpsuits and the engineers wearing pocket protectors, watching it accelerate and take to the sky and disappear in the ether.

The man in the booth next to mine murmurs to his neighbor, “Beautiful, but where’s it headed?”

His neighbor replies, “I dunno. Somewhere far, far away, I’m guessing.” ☹

MUSIC TO OUR EARS



To create a good sound system, especially in a car, the folks at Mark Levinson risk madness.
It's because they must confront absolute silence

Text by Brandon R. Reynolds
Photography by Ryan Lowry

Engineers put speakers through a lot of tests on the way to your ears, and one of them is an anechoic chamber, a room insulated against sound bouncing off walls (*anechoic* means “without echo”). In the total absence of sound, you start to hear things that have always been there: the sound of your heart, the quickening of the blood in your veins, the eerily mechanical clicking of your many valves opening and closing. After a while, you get disoriented. You may even start hearing things that have *never* been there: astronauts put into anechoic chambers report hallucinations caused by the brain's inability to deal with pure silence. Where astronauts dare to tread, that's where good speakers are born.

This is the sort of extremely niche, extremely technical work Harman International does in facilities all over the world – in Michigan, Connecticut, Japan, Germany, and elsewhere. You know Harman, whether you're aware you know it or not. The audio equipment company comprises almost two dozen brands, including Harman/Kardon (maker of your adorable portable Bluetooth speaker), JBL (home audio and 80 percent of the big sound systems for stadiums, theaters, and arenas), Revel (your huge speaker towers in the den), and Mark Levinson. This last brand has been making high-end audio since the 1970s, and in 2000 it partnered with Lexus to design luxury sound systems for its cars.

Hidden among the cubicles and laboratories of the cavernous Harman acoustic design facility in Northridge, California, just outside Los Angeles, there are living rooms. They're all different. This one has some tasteful crown molding; that one has low-pile carpet; this other one has French doors and low leather couches. These living rooms are where engineers test their sound systems in realistic settings, trying out different speakers and amps and positions to try to transform that living room into, say, New York's iconic 30th Street Studio on the first day of July in 1959, where the Dave Brubeck Quartet recorded the jazz classic “Take Five.”



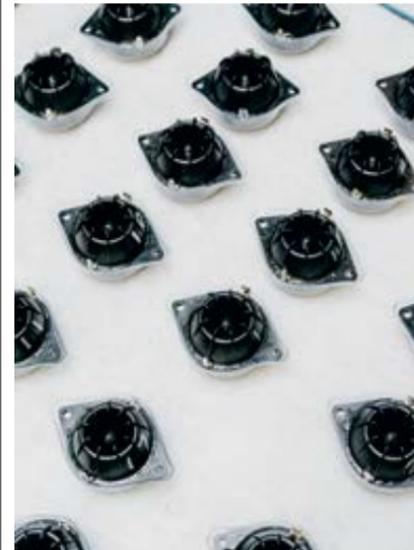
Left: An antique passive crossover cart, once used by loudspeaker engineers to design crossover networks (which split audio into two strands), stands in a corridor at Harman's Northridge facility

In those living rooms, Mark Levinson systems are often used for that transformation. Todd Eichenbaum, director of engineering luxury audio at Harman, says that Mark Levinson components “have always been known for their uncanny ability to reproduce a large, realistic, three-dimensional soundstage, with individual instruments located with holographic precision.” Speakers, particularly those high-end towers that dominate a room, give the impression of throwing sound at you, delivering it to you. But talk to the people who design these systems and their goal seems to be more about delivering *you* to the sound. It gets spooky. They talk about transcending the space, about creating, as Eichenbaum says, a kind of sonic hologram: here are the drums to your right; there is the guitar in front of you, maybe a marimba off to the side (tastes vary). With a good sound system, you also hear the space itself: Is the recording in a concert hall or a small studio? Are the ceilings there high, vaulted, nonexistent? Is that a western wood-pewee singing outside?

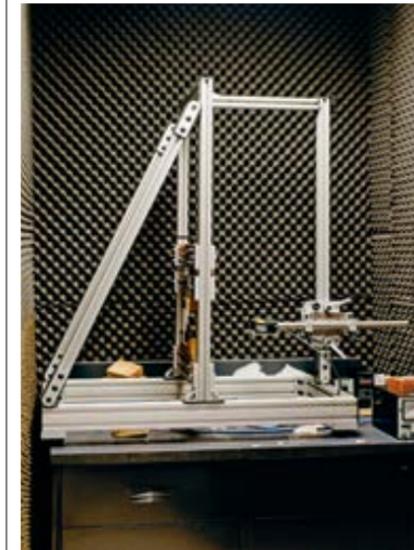
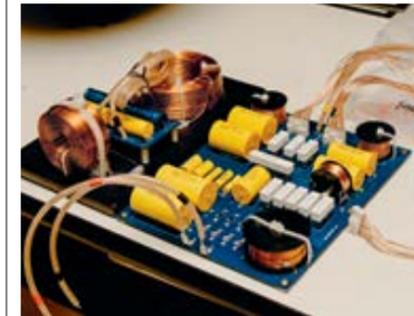
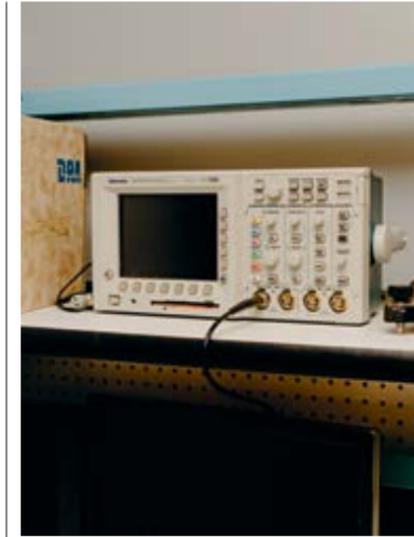
All of which has been great for the history of the living room, but it's much tougher to recreate 30th Street Studio in a car.

“The car is an extremely challenging environment,” says Chris Ludwig, chief engineer of acoustic systems at Harman, as diplomatically as possible. The space is small, there are a lot of reflective surfaces, and it's hard to get the listener in “the sweet spot” between speakers. Ludwig

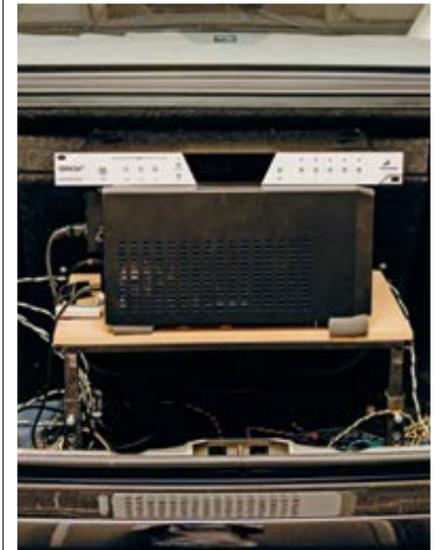
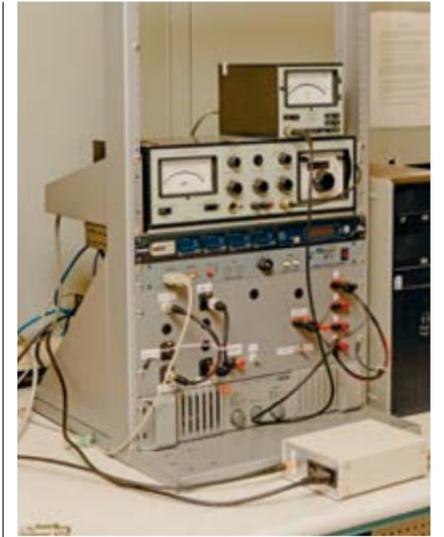
MARK LEVINSON SYSTEMS “HAVE ALWAYS BEEN KNOWN FOR THEIR UNCANNY ABILITY TO REPRODUCE A LARGE, REALISTIC, THREE-DIMENSIONAL SOUNDSTAGE”



Top: Two Harman employees analyze sound quality test results. Middle: Woofer speakers on a workbench ready to be tested. Bottom: Twenty five millimeter-high energy tweeter speakers are lined up in rows



Top: An oscilloscope, used to measure the frequency of an electrical signal. Middle: A loudspeaker crossover system laid bare. Bottom: In a lab, a scanning laser is used to measure distortion in loudspeakers



Top: Testing equipment on a Harman workbench. Middle: An Orion 32 channel Digital / Analog converter in a Lexus LS, used to manipulate sound in the vehicle's cabin. Bottom: The anechoic chamber



works at the Harman facility in Novi, Michigan, where he and his engineering team spend as many as four years designing the Mark Levinson sound systems for each new series of Lexus. “A car is fundamentally acoustically flawed in terms of its interior design,” Ludwig says, “but through our technology and speaker design, we’re able to overcome a lot of those inefficiencies.” The team buys a current model and takes it apart, trying out new configurations of components and re-engineering the structure of the car itself, trying to build a soundstage with a Mark Levinson system inside the car such that even obscure songbirds will emerge from the music. “Mark Levinson car audio systems, quite simply, strive to reproduce every aspect of the listening experience in the car that our systems do in the home environment,” says Eichenbaum.

The pairing of Lexus and Mark Levinson made sense brand-wise. In the early 1980s, car buyers began to demand higher-quality sound systems, rather than the (as one Harman engineer called it) “unbearable” factory audio or only slightly better aftermarket equipment at the time. And Lexus buyers, says Kevin Rivera, senior marketing manager for Lexus, wanted something unavailable elsewhere. Lexus found a kindred brand in Mark Levinson’s top-tier, highly regarded audio. (The pair quickly identified a set of four shared virtues: audio purity, craftsmanship, emotional connection, and innovation.) Rivera says that between Mark Levinson’s focus on a pure sound experience and Lexus’ well-engineered, quiet cabins, “it was the perfect environment for a high-end audio system.”

Starting with the 2001 LS 430, the Mark Levinson sound systems have evolved, from the 2002 SC 430 convertible’s sound system that equalizes depending on whether the top is up or down, to eco-friendly technology that cuts down on power consumption, to, in 2015, the Lexus RC becoming the first vehicle in the United States with Clari-Fi, a kind of artificial intelligence that automatically restores quality lost during digital compression. It takes from 30 to 40 people – designers, engineers, specialists in a variety of fields – to develop each new audio system. They’re trying to get as close as possible to listening in a living room – and then, of course, transcending that, so you’re listening somewhere else entirely.

“Music is a huge part of most people’s lives,” Ludwig says, so it makes sense that car companies would invest in the sound experience as much as the handling, the drivetrain, the climate control. Having good sound becomes essential for enjoying the ride. “It’s one of those things that in terms of your sensory experience is very attainable,” he says.

The technology to accomplish this has improved considerably as a result of the digital revolution. “We really see things that we could never

Opposite: Inside the anechoic chamber, which offers Harman employees complete silence in which to test the quality of sound systems

THE REALLY GOOD AUDIO SYSTEMS, LIKE THE ONES THAT HARMAN’S TEAMS ARE MAKING WITH MARK LEVINSON, CREATE EXCITING, SATISFYING, SOOTHING SPACES OUT OF SOUND

see before,” says Ludwig, “new ways of analyzing acoustics that we couldn’t do 30 years ago.” Engineers can analyze data more rapidly and at a finer level, and make adjustments more quickly, than ever before. “We can find ways to solve problems that we didn’t even know were problems before.”

Ludwig became a jazz drummer at a young age; that, and an interest in math and science, informed his decision to become an engineer. He wanted to “merge the artistic and scientific,” which is where all this really ends up: a lot of state-of-the-art technology in service of conducting an artistic experience as faithfully as possible to the listener. And so, at the far end of the science, past the data analysis and terrifying silences, is the human ear, that most subjective and necessary piece of testing equipment. To that end, Harman employs “trained listeners” from within the company and beyond. “Only the most discriminating and consistent listeners are selected for product evaluations,” says Sean Olive, director of acoustic research at Harman’s Northridge facility. “For untrained listeners, we use people from a wide variety of cultural backgrounds, age groups, and listening experiences.”

Whatever it is that makes for a better listening experience, it appears to be universal. “So far we’ve found that untrained listeners like the same products as trained listeners,” says Olive. The really good audio systems, like the ones that Harman’s teams are doing with Mark Levinson, create exciting, satisfying, soothing spaces out of sound. The best of it comes up out of nothing, art out of revelatory silence. ◌



Finished Mark Levinson audio systems seamlessly integrated into Lexus interiors

AT WORK WITH TAKEAKI KATO

As the engineering lead on the development of numerous Lexus models, the chief engineer Takeaki Kato is a busy man. We spend a surprisingly calm 30 minutes with him

Every Lexus model is the result of thousands of man-hours involving people around the world. But there is always one person who oversees the process from day one, who is involved in every step of creation, every facet of a model's development: the chief engineer. It is the chief engineer who ultimately decides how a car will look, how it will drive, even what sort of consumers will drive it.

Like all new vehicles, the Lexus NX began as an idea, but once Takeaki Kato was named its chief engineer, the model quickly took shape. Thanks to his dedication, and the collaboration of his team, it became the popular crossover SUV you see today.

"The process of creating a vehicle starts long before the first example rolls off the assembly line," Kato said recently. "In the NX's case, we started planning in June 2009, a full five years before the vehicle went on sale." Kato, 52, was talking in the main engineering building at Lexus' vast operational headquarters. "We not only needed to decide how the vehicle would look," he continued. "We also had to sort out things like what sort of engine and suspension it would have."

Kato's inspiration springs from a variety of disparate sources, only some of which seem obviously connected with the industry in which he works. He is the holder of a national competition racing license, for example, and competes year-round in local endurance races, an activity that provides him with hands-on experience of the performance potential of cars, and their durability when driven at their limits. But he also takes inspiration from unlikely places – like television dramas. "A television show consists of a writer, script, director, producer, and the cast, among other things," he says. "All the elements and processes that go into creating a drama are basically the same for making just about anything, including automobiles."

Once the chief engineer establishes the basic components of the vehicle, teams are formed. In the NX's case, the team consisted of about 30 different departments and thousands of people. Different departments deal with different facets of the car-making and car-selling process: design, engineering, public relations, assembly, marketing. Kato's job is to provide direction to these various factions, which means he's rarely at his desk during developmental stages. When he isn't traveling – test-driving, overseeing clinics, communicating with dealers and distributors from all over the world – he's bouncing around various offices throughout Japan, meeting with heads of the departments. It's a role that makes Kato, a master multitasker, one of the busiest men in the company.



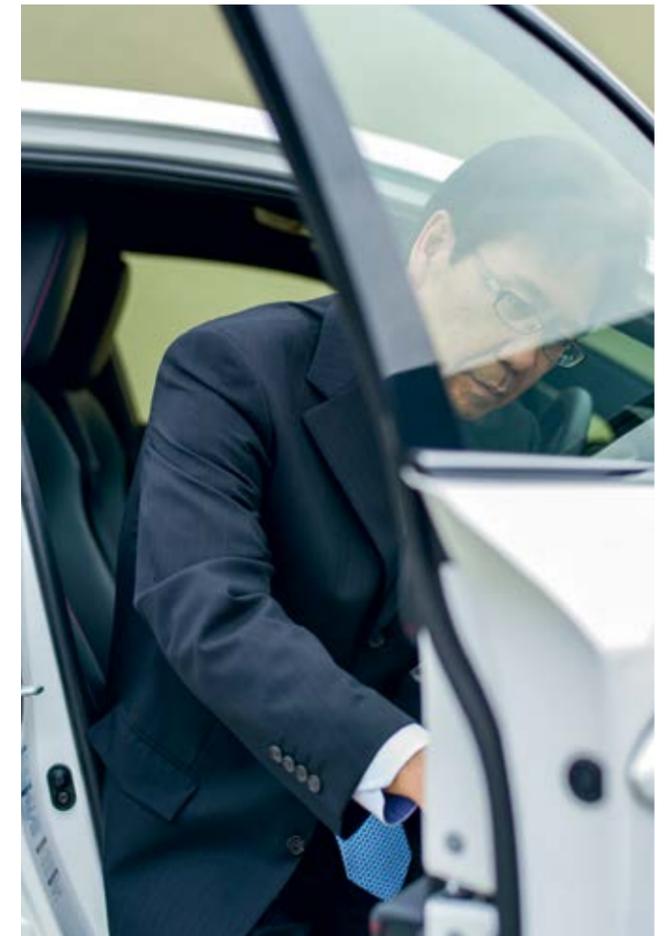
Chief engineer Takeaki Kato inspects a Lexus NX, the popular SUV he helped design and engineer

"Many aspects of the vehicle are developed concurrently," he explained, "so I'm constantly going from one meeting to another to make sure the vehicle is being developed in the correct way. For example, while I was overseeing the new turbo engine's development, I would visit the design studio on a regular basis and offer my input on the NX's styling. At other times, I would spend hours at the test track to make sure the vehicle's driving dynamics were where they needed to be."

Our time together was running out, but Kato was careful to explain that the duties of the chief engineer don't end with the delivery of the first vehicle. "We're constantly testing, looking for improvement, and it's also my responsibility to answer questions from the media," he said. "It's an ongoing process." And with that he glanced at his watch, politely excused himself, and headed off to another meeting.



"THE PROCESS OF CREATING A VEHICLE STARTS LONG BEFORE THE FIRST EXAMPLE ROLLS OFF THE ASSEMBLY LINE. IN THE NX'S CASE, WE STARTED PLANNING IN JUNE 2009, A FULL FIVE YEARS BEFORE THE VEHICLE WENT ON SALE"



To produce the NX, Kato worked with a team that consisted of about 30 different departments, from design and engineering to public relations and marketing

