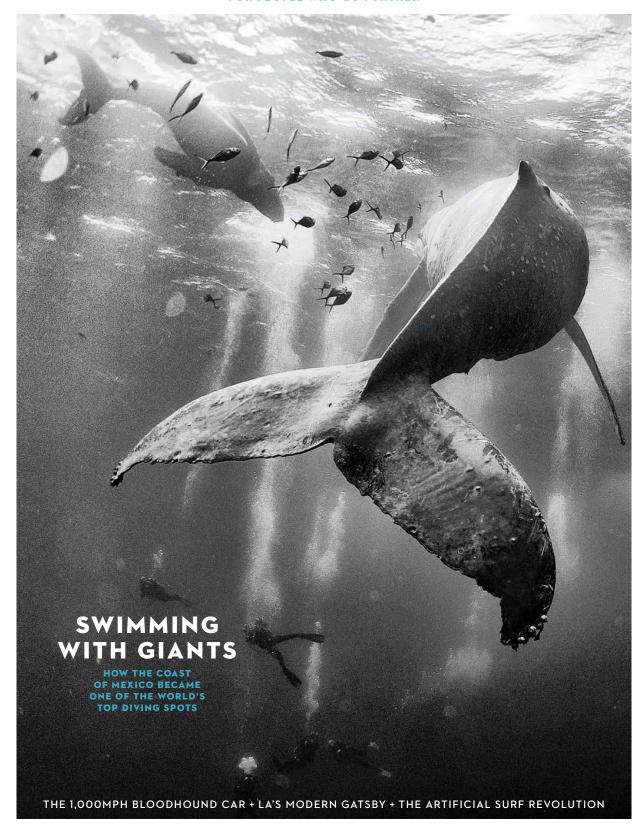
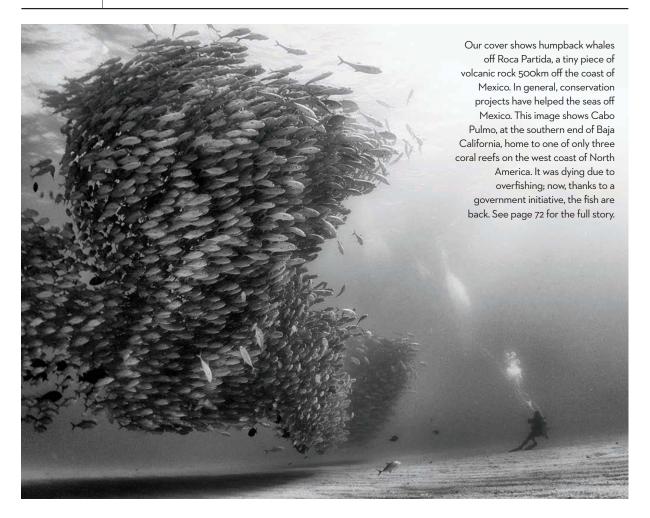
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# 1927



FOR PEOPLE WHO GO FURTHER





## Here's to going further

Californian Tom Lochtefeld talks about his quest to create the perfect man-made wave almost like it's an illness. "It's become an obsession, despite repeated threats to my sanity," he says.

Lochtefeld, who invented the FlowRider static wave, has spent the past two decades trying to realise his ultimate dream: to create economically viable surf parks, with artificial waves that replicate the ocean. "It's taken a lot of thinking and a lot of new technology, but we think we've finally cracked it," he says of his new designs, due to open in Bristol and Rotterdam. See page 86 for the full story.

Using science for thrills is a bit of a theme in this issue. Outside Bristol in the UK, a small group of engineers and a former RAF pilot called Andy Green are putting the finishing touches to the Bloodhound, a land-speed vehicle that will go faster than a bullet. If all goes to plan, they'll hit 1,000mph in the South African desert next year, with Green obliterating his own land-speed record.

"We're not thrill-seekers," insists Green (from page 62). "We're scientific racers, racing against the laws of physics. If you gave that problem to NASA they'd spend years working out how to crack that. We're doing it as a small tight-knit technology outfit. None of that says thrill-seeking to me."

Still, whether it's the globalization of surfing or a car smashing 1,000mph, the results are certainly thrilling. Enjoy the issue, and here's to going further.

TOBY SKINNER





om Lochtefeld's perfect wave isn't Pipeline, Jaws or Cloudbreak. It's powered by computers and air pressure, and its first versions, set to open in Bristol and Rotterdam over the next year or so, won't be near a beach. But Lochtefeld, who has been surfing since the 1960s, insists his firm Wave Loch's technology is "the real thing, it will be like surfing perfect ocean waves, and it could change the sport forever, eventually taking surfing to the Olympics."

Lochtefeld is just one of a new breed of visionaries who see a future where surfers will ride artificial waves in dedicated surf parks, not just in water-park wave pools. Players include Spanish company Wavegarden, Australia's Webber Wave Pools and the Kelly Slater Wave Company, backed by the greatest competitive surfer of all time. The big question is whether their dream can be a viable business.

Artificial waves are, of course, nothing new, and neither is

surfing them. King Ludwig of Bavaria, the famous builder of fantasy castles, used electricity to create ripples in a lake way back in the 19th century. The first "modern" wave pool was built in Budapest in 1927, with the first surfable wave appearing in Tokyo's Summerland amusement park in 1966. Arizona's Hawaiian-themed Big Surf waterpark had a crack in 1969, though the waves, like those at Summerland, were weak and required lightweight boards.

Tom Lochtefeld's first brush with man-made waves came in 1983, at his Raging Waters water park in San Dimas, Southern California. Lochtefeld had grown up surfing the Big Rock break at La Jolla, north of San Diego and, after an early career at KPMG and then in real estate, had co-founded Raging Waters in 1981. It was one of the first modern water parks, with water slides, tubing rivers and all. In 1983, it took delivery of its first wave machine, one of only





### COMPANIES MAKING WAVES



# I SurfLoch

The pioneering Californian Tom Lochtefeld (below) invented the game-changing FlowRider static wave, unveiled in the early 1990s. and since 1997 has been working on dedicated surf pools that he claims will revolutionize surfing. The evidence will come this year with Rotterdam's city center RiF010 surf wave pool, and next year with The Wave, a surf and wellbeing camp near Bristol, England.



a handful in the country. "On the first day after it arrived, I got my surfboard, all excited, thinking I could surf these waves," recalls Lochtefeld. "But it was total crap; you just couldn't. It soon became an obsession, despite repeated threats to my sanity."

Back in the 80s, the technology wasn't there to create a surfable deep ocean wave, so Lochtefeld turned his attention to a "sheet wave" that flowed over a stationary padded surface and could fit in a space smaller than a tennis court. He sold his oceanfront house in La Jolla ("my wife wasn't thrilled") and, needing more funds, in 1987 sold his 25% stake in Raging Waters for \$2m. It took three years of development, much of it spent around a wave tank in the hydraulics lab at UC San Diego, and more than a hundred models, but by 1988 he filed for a patent for "a wave-forming generator", paying more than \$200,000 to patent lawyers. It was 1990 when,

with barely any money left, Lochtefeld sold plans and licensing for his new FlowRider machine to the Schlitterbahn water park in Texas. The FlowRider blasts water up an incline made of soft, trampoline-style mat, creating a simulacrum of a wave that can be ridden on either a bodyboard or a short "flowboard". By 1993, Lochtefeld had sold a FlowBarrel, a larger, curling wave that uses the same technology but with a steeper incline, to a waterpark in Norway.

The FlowRider was an almost instant success, with 90s board sports legends like surfer Kelly Slater and skateboarder Tony Hawk working on board designs and new techniques. Today, there are hundreds of flowboarding machines around the world, including 12 on Royal Caribbean cruise ships. There are WaveHouse surf parks, with tiki bars, hammocks and food around the surf machines, from San Diego to Chile and Singapore. There's even an annual World

### "It will be like paddling out to the real thing but you can potentially catch 20 waves an hour"

Flowboarding Championship, held for the last two years at Abu Dhabi's Yas Waterworld.

Lochtefeld admits that he probably should have left it at that. He'd created a new sport and a stable business that, with FlowRiders selling from \$450,000 to \$2 million each, had allowed him to buy back his old house in La Jolla. "A saner person would have quit, but the dream from the beginning had been to replicate the waves in the ocean. FlowRider was an analogue, not the real thing." In 1997, he patented his first design for a dedicated surfing wave pool, and has been working on it ever since at Wave Loch. "My wife isn't thrilled, again," he notes dryly. "Luckily, she's very supportive of me."

But Lochtefeld isn't the only one chasing this dream. Last summer, Wavegarden, founded in Spain in 2005 by engineer Josema Odriozola and sports economist Karin Frisch, opened the much-hyped Surf Snowdonia in Wales, and are planning another facility in Austin, Texas. Then last December, a viral video was released of Kelly Slater, the greatest competitive surfer of all time, riding a beautiful, perfectly barreling wave in a top-secret location 110 miles inland. "There's a lot of pressure when you've been working on something for 10 years," he says in the video, referring to the Kelly Slater Wave Company, the team behind the prototype  $\,$ wave. After we see him surfing in the beautifully clean barrel and jumping from the lip of the wave, he declares his wave "the best man-made wave ever made." Other companies, such as American Wave Machines and Australia's Webber Wave Pools, have also been working on new surf pool technology, all of them claiming the best waves and technologies.

The problem is, according to Lochtefeld, both the Wavegarden and Kelly Slater waves are doomed to fail. "The way they work is essentially by pulling a huge mechanical plow through the water," he says. "You can create a great wave, but there are two main fundamental problems: One is that you've got this hulking piece of machinery underwater that is liable to break down; the second is that you can only get a wave every two minutes. It means that, as a business, it's just not going to be sustainable."

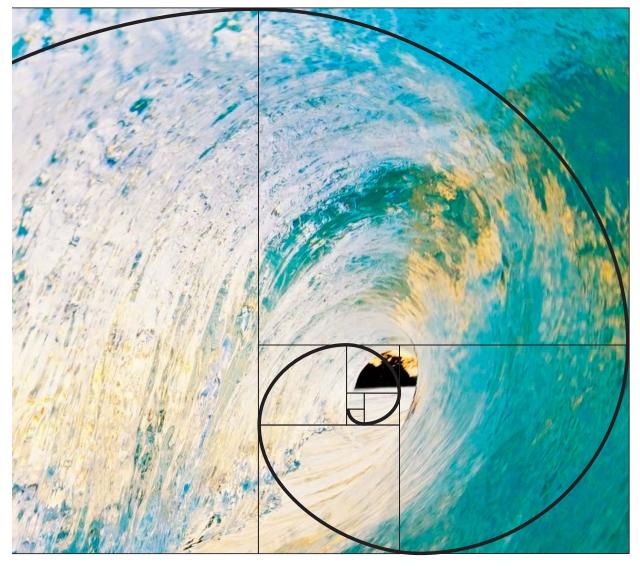
Indeed, Surf Snowdonia, which cost more than \$17m to build, received favorable reviews from surfers when it opened in August 2015, but has been beset by regular



mechanical problems, closing early last summer and being forced to make eight full-time staff redundant.

Lochtefeld's answer, with the SurfLoch SurfPool, is to use air pressure, which means no moving machinery in the water. Instead, the design uses a pneumatic air system to create the wave energy; the shape of the pool floor turns that energy into a large primary wave and then a smaller secondary wave, which dissipates the wave energy without producing backwash. It's due to first be seen in action at Rotterdam's RiFOIO, a publicly funded surf park on a city-centre canal that's being built this summer; and then, early next year, at The Wave, a surf and health park near Bristol, England. Both parks promise three grades of wave on one lake (advanced surfers will paddle out to the largest waves at the back), with waves every 8–10 seconds. "You'll be paddling out like in real waves. It will be the real thing, though you can potentially catch 20 waves an hour rather than a handful."

Lochtefeld admits it's a always a work-in-progress. "It's like a puzzle that you have to keep approaching from 100 different perspectives, almost like a sculptor, whether that means the materials or the computer chips for the air control."





#2 Wavegarden

Founded in 2005 by engineer Josema Odriozola and sports economist Karin Frisch, Spain's Wavegarden is the only company to have already unveiled a current surf-only destination: Wales's Surf Snowdonia, which opened last August. The \$17m project had good early reviews, but has been hit by frequent mechanical problems and subsequent staff layoffs. Still, the company is planning a new wave pool in Austin, Texas, due to open this year.



#### #3 Murphys Waves

The current market leader in artificial waves, the Scottish company specializes in water park wave pools that can double up as surf pools. Since the 1980s, they've overseen more than 200 projects, most notably surf pools at Tenerife's Siam Park and the UAE's Wadi Adventure. According to managing director Jim Stuart, dedicated surf pools are uneconomic and doomed to fail.

Not everyone is convinced, though. Scottish company Murphys Waves is the current market leader in man-made waves, having created 500 regular wave pools and 14 surf pools over 22 years, with all of its surf pools in water parks such as Tenerife's Siam Park or Wadi Adventure in the UAE. They differ from the likes of SurfLoch and Wavegarden in that they don't see surf-only pools as their main business, and also in the technology they use, which essentially allows tonnes of water to pour from a chamber at the end of their pools over man-made reefs to create waves.

According to managing director Jim Stuart, theirs is the most effective technique. "We looked at using air in the 1990s. We thought it sounded wonderful, but we took it to experts at Edinburgh University, who are the best in the world, and they simply said, 'It won't work.' Essentially, once you scale it up, air becomes very unpredictable, and if you get a vacuum it can be quite dangerous."

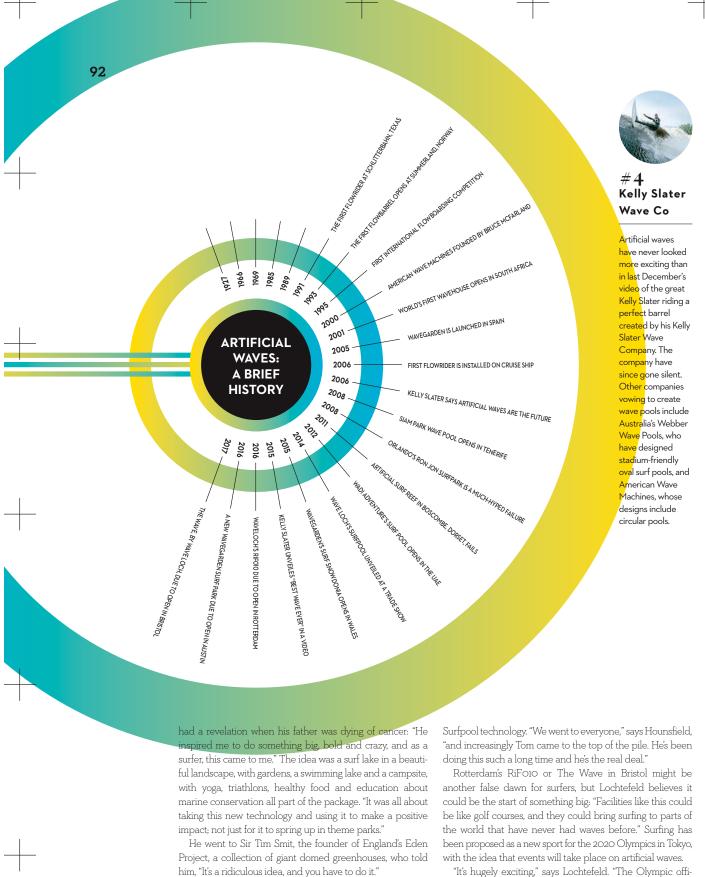
Lochtefeld refutes this. "The technology wasn't there in 1990, but 26 years later, with diligent testing and advances in computer science, it is now possible to create great waves safely and predictably using pneumatics."

Either way, Stuart is unconvinced that a surf-only park can be successful. "Even if the technology's right, the business model of a huge surf-only pool is flawed. You're not going to get enough surfers to have it booked up every hour of every day. And if you're talking about it as part of a wider attraction, Disney's been doing that at Typhoon Lagoon for years."

As a model of failure on both scores, he points to the much-hyped Ron Jon Surfpark in Florida, which promised ground-breaking technology but was a disaster when it opened in 2008, prompting a bitter response from surfers.

The Murphys model, he says, is epitomized by Siam Park in Tenerife, where the pool is a family wave pool by day, and after the main park closes is dialed up for the surfers. "We're in the leisure industry rather than the surf industry," says Stuart. "The people we deal with generally aren't going for a pipe-dream, they want a return on investment."

The dreamers, however, still believe in surf parks, and not just in the idea, but in the business plan. Nick Hounsfield is a co-founder of The Wave in Bristol, which will be built this summer to open next spring. A former osteopath who was concerned at how lifestyle choices affected his patients, he



The project has grown from a dream to a reality, with a

succession of crowd-funding campaigns and grants covering

the projected cost of around \$9.5m. Having originally planned to use Wavegarden's technology, last year, after "months of

sleepless nights," Hounsfield switched to Lochtefeld's

"It's hugely exciting," says Lochtefeld. "The Olympic officials want to see that surfing is a truly global sport; artificial pools could be the push that give millions more people the chance to ride waves and get that indescribable feeling, which is really what all this is about."

Only time will tell.

