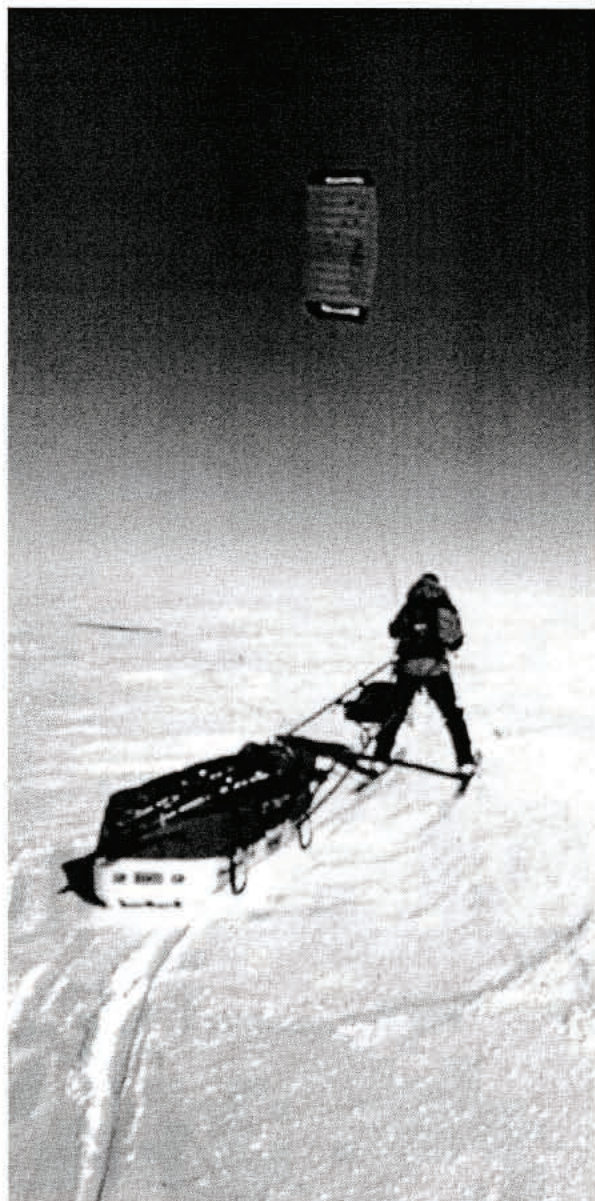


Air Apparent: The Windborne Legacy Continues As Kite 'Engines' Power Exploration, New Sports

By Eden Maxwell



En route to the South Pole: A rare northerly 12 knot wind over the Ross Ice Shelf sends Peter Hillary gliding effortlessly over a slick snow pack on his new route to the South Pole in 1999. Towing a sled weighing 180 kg, the ice trekker heads south toward the Transantarctic Mountains assisted by a 5 sq/m Quadrifoil kite in minus 14° C temperatures and lower. Under these perfect wind and surface conditions, it's possible to cover over 200 kilometers in a single day.

The day has come. Call it critical mass when the prevailing winds finally blow away the ingrained and inaccurate mass media image that kites are simply and solely toys for tots. Generating fierce pulling power, a new generation of revolutionary kite traction "engines" is definitely not child's play. Thrill seekers must master maneuvering the kite as an airborne sail, while simultaneously navigating a moving vehicle.

In recent years, kite traction has been used to power in-line roller blades, skateboards, skis and snowboards (uphill), sleds, ice skates, ice craft, surfboards, wakeboards, sailboards, surf skis, kayaks and canoes. Modern kite traction has also helped reinvent polar travel. Quadrifoil kites from the Action People Corporation have been used to haul men and sleds on self-supported treks across the Arctic Circle (1995) and to the South Pole (1999) in Antarctica.

The largest segments of the kite traction market, however, involve kite buggies and kitesurfing. The basic concept in kite bugging is sitting in a three-wheeled vehicle that's being pulled along by a controllable kite. A kitesurfer is pulled across the water by a kite while standing on a kiteboard—a small surfboard with foot straps. Buggies can reach speeds approaching, and perhaps have already exceeded, 50 mph; experienced kitesurfers routinely rip across the water at 20 knots [23 mph] with spectacular acrobatic jumps 30 feet and higher.

BACKGROUND

Kite power to move a craft is not a new idea. Kites were ostensibly used to haul wheeled vessels across the vast China plains around 4,000 years ago. Several hundred years ago,

Cover image: David Thayer's life-saving kites used to tow a raft, ca. 1890.



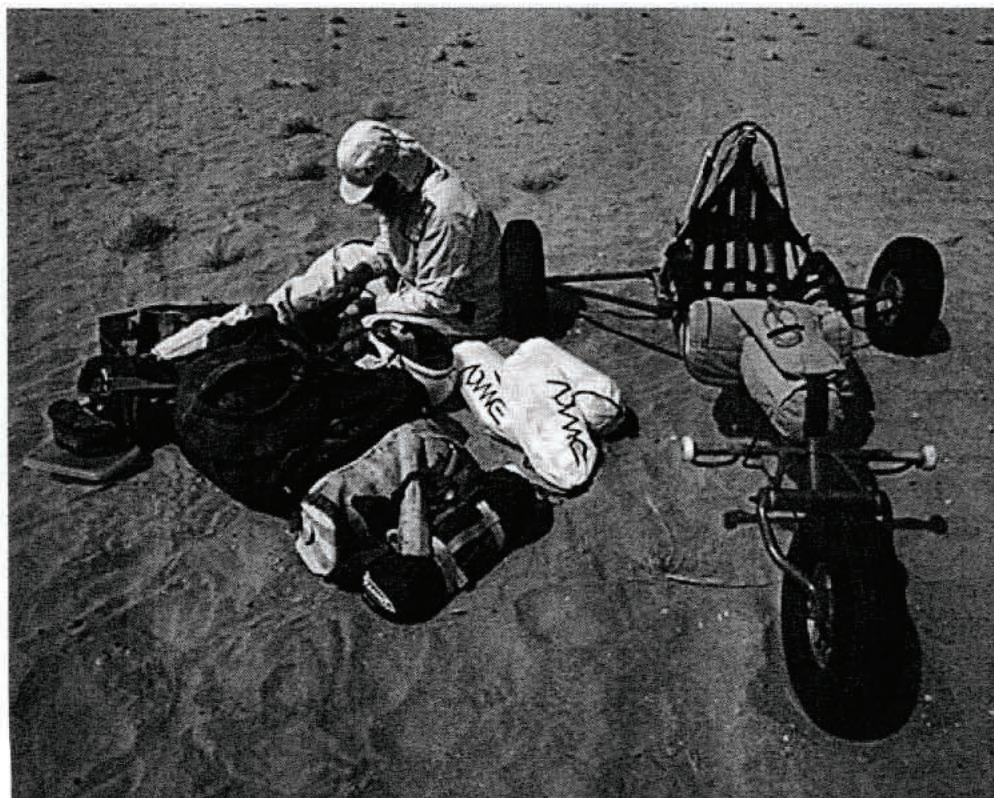
In total control: Wipika Team rider Christopher Tasti with a jibe in the Dominican Republic, April 2000. Tasti is a leading light on the Kiteboard Pro Tour.

Samoans and other island sailors of Polynesia used kites to propel their canoes throughout the vast Pacific. (Although I have it on good authority that using kites in this manner by Polynesian sailors is a fact, I haven't seen the documentation. Grist for one's own mill and, perhaps, another article.) Because he wrote about it (we'll take him at his word), we do know that in the early 1700s, a young Benjamin Franklin, while floating on his back, employed a kite to pull himself across a pond. During the winter Franklin also used kites to pull his inventive and revolutionary self along while ice-skating.

A century later, in 1826, George Pocock of England patented a kite traction system to power a "horseless" carriage or buggy of his own design that carried up to five passengers. The American aviation pioneer Samuel Franklin Cody crossed the English Channel in 1903 from Calais to Dover on a kite-drawn canoe. Over the decades and well into the 1980s, daring souls experimented with kite traction power (stacks of Flexifoil kites were a particular favorite) to propel innovative craft over water, land, ice, and snow. These sporadic and sometimes impressive accomplishments remained, for the most part, eccentric and



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North Africa: Intrepid kite buggy pilot Philippe Poulet of France inspects gear during a wind craft rally across the Sahara in isolated Mauritania. Note that the pilot has brought several kites (stored in white bags) of different sizes to accommodate varying wind conditions.

isolated events. The evolution, however, toward reliable kite traction systems was in motion and inevitable.

Like one of Leonardo da Vinci's flying machines—unrealized during the Renaissance because the materials to build it did not yet exist—kite traction has become an increasingly practical matter during the past 10 years and is still in the exciting stage of development. Innovations in aerodynamics, fabrics, and flying line have spawned an emerging generation of powerful maneuverable traction kite “engines” flown for sport and pleasure. Kite traction, as previously mentioned, had most probably been known since antiquity and certainly among extreme action sport do-it-yourselfers in modern times. It was, however, kite evangelist and innovator Peter Lynn of New Zealand who, in 1990, first established the commercial feasibility of kite traction. When Lynn married off a suitably maneuverable kite design (the Peel) to a hand-made three-wheeled foot-steerable buggy, a new sport was born.

While kite bugging took off and developed a worldwide following in the '90s, it is kitesurfing that is defining today's

estimated \$100 million dollar kite traction market. Depending on what part of the globe you're from, kitesurfing is also called flysurfing, kiteboarding, or kitesailing. Although hard statistics are not yet in, Lynn's best guess is that: “It is expected that kitesurfing, with a growth rate in the 100 percent per annum range, will grow to rival windsurfing, with kite traction in general being dragged along with it. There are probably at least as many people now kitesurfing as those who buggy. Interest in kitesurfing has greatly boosted other fields of kite traction.

“Kites are now far superior to what they were and

getting better all the time. Kitesurfing is taking off in much the same way as windsurfing, snowboarding, and the like have in years gone past. Our business (Peter Lynn Kites) and many others have grown and continue to grow at uncomfortably high rates.”

There are other factors to consider in the wide acceptance of kitesurfing. With both corporate and consumer dollars spilling over from the established yet declining sport of organized windsurfing, the wild and new thrill of kitesurfing had a ready-made crossover market waiting in the wind wings. Kitesurfing gear is also comparatively inexpensive and portable when compared to windsurfing. In addition, the availability of water recreation areas greatly exceeds the long beaches or vast dry lakebeds required for getting the most out of bugging. According to Lynn, “The lure of kitesurfing is, however, big air time with comparatively gentle landings. No other sport even comes close. Windsurfers are now merely seen as obstacles to be jumped.”

Jean-Philippe Bequet, publisher of KiteSurf Magazine, a new, full color and glossy niche publication, explains, "In my opinion, there are no more than 200,000 riders worldwide. The average kitesurfer is between 20 and 35 years old. Kitesurfing is surfing without waves, surfing with speed. Imagine sailing without a screen (the sail of a windsurf rig) in front of your eyes. It's a big sensation of freedom. I think the main attraction for people coming from windsurfing is to be able to jump very high and very long on flat water, and light wind. With windsurfing, you must wait for perfect sailing conditions (wind, waves, etc.). The same goes for surfing. With kitesurfing you can sail in light wind, without any waves, or in strong wind and waves." Kitesurfers can sail in winds ranging from 5 knots up to gusts of 50 knots.

Kitesurfing is probably the most popular in France (where it's known as flysurfing) and Europe in general, including

Belgium, the Netherlands, Spain, Great Britain, and Germany—there's even a kitesurfing group in Croatia. Kitesurfing is getting more play in the USA, especially in the kitesurfing mecca called Hawaii, and is making news in Australia and New Zealand. There's also rising interest in South America.

As with kite buggying, the ingredients for the virgin sport of kitesurfing were also waiting for the right time to lift off. Once kite traction was introduced onto the world scene, a core group of enthusiasts started using kites to replace conventional sails in water sports. To make kitesurfing a popular reality, riders needed an unsinkable power source—a kite engine that could be launched and relaunched directly from the water. These inventors built upon the technological advances made in windsurfing, paragliding, and wakeboarding to come up with what is now kitesurfing. Although claims in kitesurfing circles are made for being the first and the best, it's clear that



Kicking up sand: Buggy pilot Stephan Mausen maneuvering across the desert during the Transat des Sables endurance race.

Traction Kiting

kitesurfing, as with all innovations, was the result of an evolutionary ladder with one person standing on the shoulders of another.

After years of research, a number of water relaunchable kites were introduced. Bruno and Dominique Legaignoux of France unveiled their Wipika kite in the '80s; the Legaignoux brothers would continue to refine their design and would have to wait about 15 years for the world to catch up with their dream. Aerospace engineer Billy Roeseler and son, Cory, sparked international interest and were prime movers in creating the sport with their kite-powered water skiing system (KiteSki) in the '80s and into the '90s. The seed of competition had been sown. Others manufacturers then came onto the scene with relaunchable kites of varying performance and design,

including Raphael Salles (F-One), Michel Montmigny and Benoit Tremblay (Concept Air), Robby Naish and Don Montague (Naish kites), and Peter Lynn (C-Quad and Waterfoil). Kitesurfers who helped pioneer and attract publicity for the sport are, among others, Laird Hamilton, Manu Bertin, Laurent Ness, and Marcus (Flash) Austin.

The buzz of kite traction is the adrenaline rush associated with speed, flying, competition, control over nature, and freeform expression. For some, the pure non-polluting rush is a spiritual high. As with all extreme action-oriented sports, knowing one's abilities and limits is the key factor to safety. Overconfidence and negligence in kitesurfing has lead to bruises, broken bones, stitches, and, according to Jean-Philippe Bequet, at least one fatality. As for the dangers involved, you can say the same for



Harnessing "Air Huskies": The Icetrek Harness System is a multi-functional rig that allows the user freedom to combine three activities: sled hauling, traction kiting and crevasse travel. Kite forces are transferred to four kite lines attached to two handles (one in each hand). A link-line between the handles connects to a kiting bar that spreads the force to the karabiners on the waist belt.

bicycle riding. Kite traction is a male dominated activity, with women making up from 5 to 10 percent of the ranks. But that is changing as the sport becomes more mainstream and equipment gets easier to use.

The majority of kite buggy enthusiasts are in the 25 to 50-year-old plus age range. According to Fran Gramkowski, founder of the Spring Break Buggy Blast (SBBB), "Buggy certainly has a core presence in the USA, but is stronger in Europe where they have better beaches; bugging is especially popular in Germany." Seeing a buggy pilot tear across a dry lakebed under kite power is a surreal, futuristic vision—something out of a Mel Gibson *Road Warrior* film. From time to time, bugging does get press in the mass media, exposing the novel sport to inquiring minds. At the SBBB 2000, held in March on the Ivanpah and Roach Dry Lakes, Primm, Nevada, a television production company from England filmed a segment for the series *Extreme Machines* for Discovery: The Learning Channel.

Active buggy and land yacht pilot, 70-year-old Dave Lord (aka The Ancient One) puts things into perspective: "Kite traction is a relatively safe way to supply the adrenaline rush that many athletes get addicted to. At my age most of the activities that used to supply this rush are too physically demanding." Lord had an accident while bugging that resulted in a bruised rib and 20 or so stitches. "It was a result of ignoring the safety rules," shrugs Lord. "I don't think it's all



Basic sledding mode: The sled poles or straps (traces) are clipped into karabiners attached to both sides of the waist belt. Adjustable shoulder straps also clip into the karabiners, allowing the user to pull from the shoulders and waist. An internal frame prevents the waist belt and shoulder straps from compressing. The kite sail energy is directed to the traces and the sled is towed as well as the user on skis. The continuous flow of energy leaves the user "floating" free of stresses—arms are used only to steer.

that risky. Those whose systems are no longer overdosed with testosterone rarely have a problem."

THE KITE ENGINES

Kite traction engines fall into three main types: inflatable kites, framed single skin kites, and ram-air kites. These designs are the result of assertive R&D and sport aerodynamically sophisticated features, which might not be immediately apparent to the layman.

Experienced kite pilots can use most any traction kite to power up. There are, however, traction kite types that are more suitable in the water, and others on terra firma. Kites used by land buggiers are framed single-skinned or of the ram-air variety. A dedicated water kite, however, must not only provide the

traction of its land-based cousins, it must float and be relaunchable from the water (without sacrificing performance) under the right conditions—usually between 5-10 knots, depending on pilot skill.

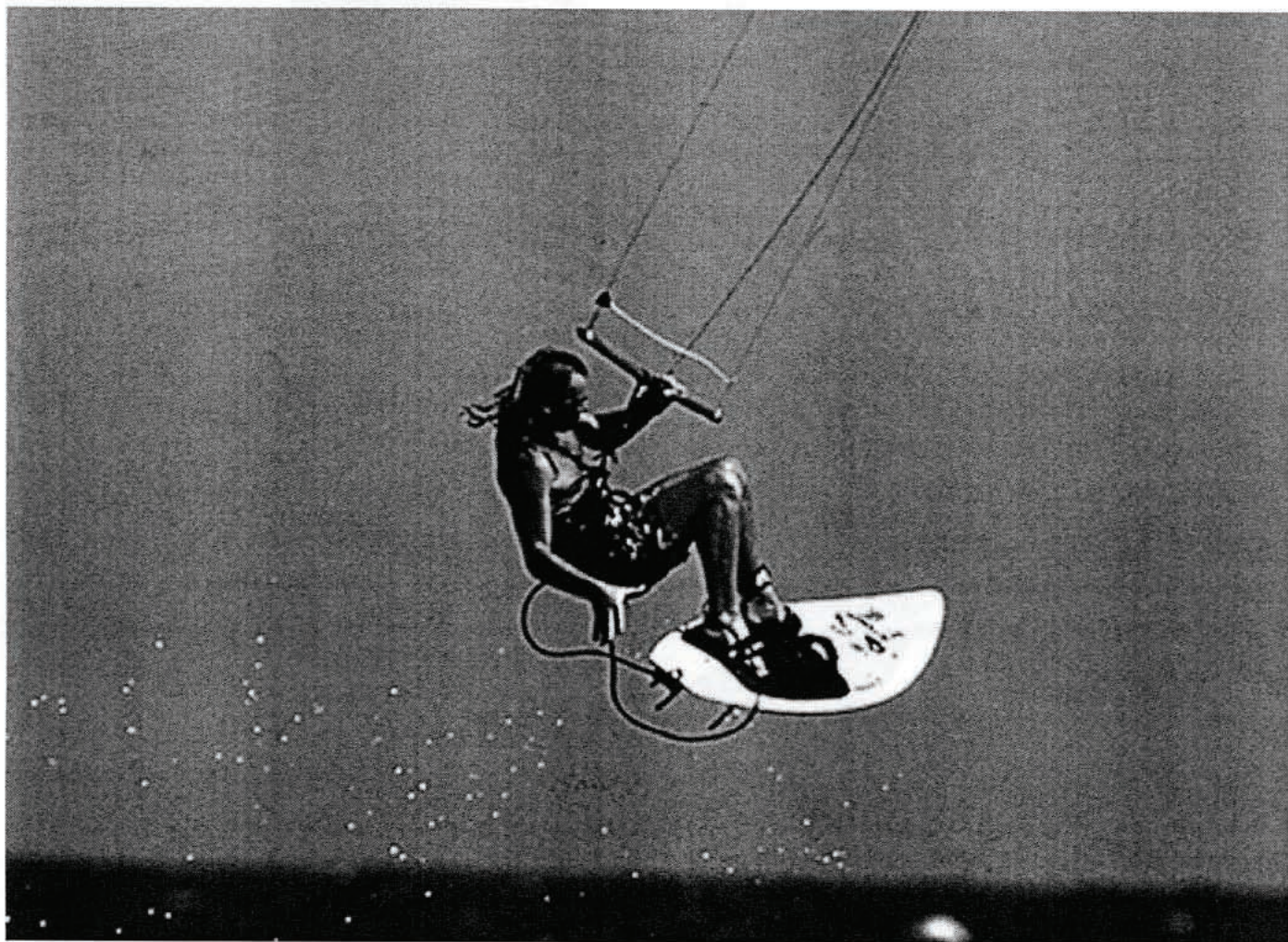
INFLATABLE KITES

Inflatable kites normally have an inflatable leading edge and a number of inflatable battens to give it a permanent “crescent moon” shape. These kites are perhaps the easiest kites to water launch. Although the idea of using inflated structures to support a kite’s frame is not new, Wipika invented inflatable kites especially for kitesurfing and has recently licensed the

technology to Naish and others—allowing both companies to develop and market their own version of the kite.

FRAMED SINGLE SKIN KITES

Framed single skin kites typically have a leading edge made of fiberglass or graphite, one main batten in the center and a number of thin battens along the chord to give the kites a permanent shape. This kite performs like a gust-shedding windsurf sail that is less likely to overpower a pilot in the water. Billy and Cory Roeseler had taken up the aquatic challenge with KiteSki, a kite-powered water skiing system that features an elegant, controlled means of self-launching. Composed of a single skin flexed spar kite, control bar and brake reel, combo



Reaching for air: Wipika rider Mat Pendle with a one-hand jump in the Dominican Republic, April 2000.

skis, or a composite mono-ski funboard designed for kiteskiing, the integrated setup works remarkably well. With favorable “wing loading” characteristics, a ratio concerned with the minimum wind necessary to lift the kite, the dual-line controllable KiteSki is highly maneuverable and relaunchable in the water. Another example of a single skin kite is Peter Lynn’s C-Quad, a low cost, powerful and efficient engine that’s especially popular among buggy pilots. The Nexus from Flexifoil, a soon-to-be-released contender for kitesurfing, is also a single skin design with a pre-inflated leading edge.

RAM-AIR KITES

Soft, sparless ram-air kites have no rigid structure. They have a high aspect ratio profile, meaning the wingspan is substantially greater than the width. Relying solely on the wind for their efficient aerodynamic shape, ram-air kites are dependent upon a finely tuned network of bridle lines to establish the angle of flight, maintain the arc of the airfoil, and connect the kite to the control lines. Offering numerous benefits, ram-air kites have been on the market for a long time and are the workhorse engines of choice for kite buggiers. Ram-air kites are lightweight and capable of tremendous lift; with no spars to break they are nearly indestructible and less likely to harm bystanders; and they can be rolled into a small bundle.

Until recently, ram-air kites were a hassle, if not impossible, to launch on water, and a downed wet inflated kite keeps on pulling. With that said, during the past year, a number of companies, including Action People Corp., Windtools, Concept Air, F-One, and Peter Lynn, have introduced water-relaunchable ram-air kites for kitesurfing. These kites employ various design schemes (air intake and air valve release systems) for keeping portions of the kite inflated with air to maintain its shape and buoyancy for relaunching. Nearing the R&D completion phase for an entirely new design, Lynn has reinvented the ram-air concept with a bridle-less ram-air variety called the Arc—a kite that promises to work extremely well for kitesurfing and doesn’t require the previously necessary and cumbersome car’s cradle of bridle lines.

SAILS OF THE CENTURY

Materials research in the highly competitive worldwide textile industry has made sails lighter and more durable. The latest newcomers vying for the kite traction sail market are imports. In slight winds, when conventional ripstop nylon sail fabric is earthbound, Icarex P31, an ultra light (31 grams/square meter) of finely woven ripstop polyester yarn imported from Japan by Shanti Kite Products, takes off. About 25 percent lighter than comparable ripstop nylon, Icarex is impregnated with a polycarbonate resin similar to that used in fighter jet canopies. Although not as abrasion resistant as ripstop nylon and nearly twice as expensive, Icarex has less stretch and higher resistance to the sun’s damaging ultraviolet light, negligible moisture absorption for better lift in any weather, and has lower porosity for higher speeds. Another fabric introduced from Toray of Japan is Chikara, a high strength, low porosity ripstop nylon that’s doubly coated with carbonated polyurethane, water repellent, strong, reasonably light (40 grams/square meter), and about 50 percent less expensive than first-grade ripstop. Chikara is used as the sail material for Lynn’s new Arc kite.

LINE UP

Stretch and wind resistance are not only factors on the kite sail, but on the bridle and flying line as well. Since parasitic line drag degrades performance, traction kites rely almost exclusively on AlliedSignal’s Spectra Fiber, a low-stretch polyethylene yarn, pound for pound 10 times stronger than steel. Spectra fiber was used in the rigging with the waxed paper-like sailcloth, a high bias four-ply laminate from Cuben Fiber Corporation, of Toshiba—the \$10 million monohull sailboat that set a 1997 world speed record covering 434.2 miles in 24 hours.

Manufacturers have improved upon how Spectra filament yarn is made into kite line. LaserPro Gold, for example, Innovative Textiles’ high end flying line, is fabricated with a PressureLocked proprietary process. This micro-fine braided line is thinner, smoother, and stretches less than other braided Spectra lines. Stretch creates slack in the line, causing less crisp control over the traction kite. A more compact line profile and lower stretch means less drag and near instantaneous control. With a stretch of the imagination, the Active People Corporation’s Quadrifoil traction kites took another approach.

Traction Kiting



Ice buggying: Claude Gravel of Quebec on the custom made buggy kit he designed for use with Peter Lynn's (model year '97 and up) stiffer and faster buggy frames. Gravel's aluminum buggy frame is shown in photo. Adapting snowmobile polyethylene skis and near frictionless carbide runners used for ice racing on oval tracks, Gravel can travel triple the force of wind and has hit speeds in excess of 60 mph. And it's cold. The temperature was minus 22° C when this photo was taken. Note Gravel's modified boots; they have bolts drilled into the soles for braking on the ice. Braking is also accomplished in the same manner as skiing, using lateral sliding going into the wind.

Since line stretch is due mostly to the braid tightening and loosening, the company's new Q-Power Line is a thin sheathed linear core of unwoven Spectra 2000 Fiber that results in almost zero stretch. With the explosive growth of kitesurfing, manufacturers are also making lines expressly for water use. Flexifoil is offering Hydro Line, a floatable highly visible yellow Dyneema (European name for Spectra), low tangle line with colored fleck for use on water and snow. Without the variety of synthetic lines, modern-day traction kiting wouldn't be possible.

What kite "engine" to choose? Some are designed for the recreational flier, others for racing. Since one kite can't perform

optimally for all conditions (wind, terrain, experience, craft), pilots often bring several along—larger for light winds, smaller for higher winds. Land pilots can sail off for about a \$1,000, including the kite and craft; kitesurfers can outfit themselves for about \$2,000. The wind is still free.

The future of kite traction seems secure as it draws more riders into the fold. Perhaps one day we'll see a documentary style film, much like the cult surfer classic *The Endless Summer*, that follows a group of kitesurfers and kite buggiers around the world in search of that perfect natural high.

And don't forget that you can also fly these engines as kites. ♦