

Whirlwind Wheelchair International - Building Reliable Wheelchairs for Real People, Worldwide

What is Whirlwind?

Whirlwind Wheelchair International is a non-profit social enterprise dedicated to improving the lives of people with disabilities in the developing world. For thirty years we have focused on producing durable, low-cost, and highly functional wheelchairs that are designed and produced in close collaboration with wheelchair riders in the communities where we work. These chairs give riders the reliable and functional mobility they need to reach their full potential. Along the way we've become the leader in super-durable everywhere chairs. We have riders in over 40 countries traveling over every terrain imaginable from muddy village paths to rough pot-holed urban streets. We have continuously improved our products through rider feedback, and we have built a network of manufacturers that allows us to provide our unique wheelchairs anywhere in the world.

How are we organized?

Whirlwind Wheelchair is a nonprofit organization that is based at San Francisco State University. At our San Francisco State office we refine our designs and direct our manufacturing and wheelchair provision operations. Whirlwind's flagship wheelchair is called the RoughRider™. We have developed franchise arrangements with four independently owned factories in different regions of the developing world – Mexico, Vietnam, Turkey, and South Africa. This helps us keep manufacturing and shipping costs low. We supply the factories with the drawings for our wheelchairs, provide the necessary manufacturing tools (jigs and fixtures), and train them in the specific fabrication processes. Once these factories are ready to start production, we send an assessment team to certify the wheelchairs being produced and ensure our quality standards are being met. As we receive orders from non-profits interested in providing large numbers of wheelchairs we send order requests to our quality certified factories. We are able to fill orders from any of our factories for the single \$220 price. Additionally our manufacturers are free to distribute our chairs in their own country without our involvement; however we do charge a small margin to cover quality certification costs.

Why do we focus on wheelchairs?

The World Health Organization estimates that 1 out of every 300 people, or 20 million people, in the developing world needs a wheelchair and does not have one. [WHO Wheelchair Guidelines, 2008] At Whirlwind, we define a "good wheelchair" as safe, durable, locally repairable, and highly useable for the rider. Without durability, breakdowns can interrupt activities like staying in school and getting to work. Riders who often can afford to own only one chair, need an all-purpose chair. An all-purpose wheelchair must be functional for many activities such as crossing over tree roots or broken pavement, reaching down to floor level to care for small children, allowing elbow room to do work tasks, and folding for easy transport in cars and public transportation.

How did Whirlwind get started?

Whirlwind Wheelchair International was born from one broken wheelchair. Ralf Hotchkiss was 18 years old when he rolled out of his rehabilitation hospital and down the street after a severe motorcycle accident. Suddenly his wheelchair broke, just half a block from the hospital. He fixed it himself. Soon, he was busy designing strength into his wheelchair and even building one of the first stair climbing models. In 1980, Ralf traveled to Nicaragua and worked with local wheelchair riders to develop rugged repairable wheelchairs to be built and used there. After Nicaragua, Ralf went to the mountains of Mexico to set up a new shop where wheelchair riders did the manufacturing. Building on our value of local economic development, these shops were the first of over 40 that have been established in Latin America, Africa, and South East Asia. In 1989, Ralf was chosen for a MacArthur Foundation Grant, nicknamed the "Genius Award," for his pioneering global work in rehabilitation engineering.

Today, Whirlwind has grown into a sophisticated socially entrepreneurial non-profit business with a proven capability to produce award-winning wheelchairs and offer them at 20% of the price of comparable U.S. wheelchairs. Under the leadership of Executive Director Marc Krizack, Whirlwind has dramatically increased production capacity with a global network of regional manufacturers. Marc has developed Whirlwind into a mature organization with over \$1.25 million in annual revenues and recognitions like the 2004 Tech Award, the 2009 coverage on PBS Frontline/World, and a \$4.75 million research grant from the U.S. Department of Education's National Institute on Disability and Rehabilitation Research to study how assistive technology is best provided in resource-limited environments around the world. The global

Whirlwind team includes fifteen staff in research, product development, manufacturing, marketing, and distribution roles. Whirlwind's global headquarters is located on the San Francisco State University campus as part of the Institute for Civic and Community Engagement, which is headed by Dr. Gerald Eisman. Whirlwind is an active expression of SFSU's social justice values, putting its ideals into action.

Why design the best wheelchairs possible?

When Ralf first visited Nicaragua in 1980, he saw U.S. style hospital chairs breaking and becoming useless because replacement parts were not available. For riders, a breakdown means that all the benefits of mobility and community participation the chair gives suddenly and indefinitely are taken away. Today, Whirlwind designs are tested to achieve double the international wheelchair standard for durability. And because the grit of village roads will eventually wear out any chair, Whirlwind chairs use only locally available parts like bicycle wheels and the standard bearings used in the ubiquitous Honda motorcycles. All parts are available nearly everywhere at an affordable cost and can be installed with basic tools.

The best way to understand how to develop products for a specific group of people is to live among them. Whirlwind's five designers have lived a combined 15 years or more in the environments where our riders live. Some of these countries include: Nicaragua, Uganda, Namibia, Kenya, the Philippines, and Mexico. This direct experience with the developing world and its unique design requirements are only part of the Whirlwind design secret. As new products are researched and constructed, developing world riders build, test, and send us design feedback as well as their own original ideas which are included in the next model.

From our expertise and leadership in the field, we were invited by the World Health Organization to contribute to and edit its 2008 publication, "Guidelines on the Provision of Manual Wheelchairs in Less Resourced Settings". In 2009, the U.S. Department of Education awarded Whirlwind a 5-year, \$4.75 million research grant to conduct a comprehensive study of how assistive technology (products and services for hearing, vision, and mobility impaired persons) is provided in resource-limited environments around the world. Additionally, the Whirlwind RoughRider™ was a finalist in 2007 at the prestigious competition INDEX: Design To Improve Life, and we are featured in the recent book by Project H Design founder Emily Pilloton, [Design Revolution: 100 Products That Empower People](#).

How does safety fit into Whirlwind's approach?

To avoid harming riders, careful attention must be paid to wheelchair safety concerns. Two of the most common safety problems are tipping forward and secondary injury caused by the rider's use of the wheelchair itself. Tipping forward is the most common cause of injury for riders in the US. Poor roads in developing countries only make the problem worse. Secondary injury from a poorly fitted or broken wheelchair is also a serious concern. New spinal deformities arise from long hours seated in a chair which does not support the contour of the spine. Joint problems can result from poor ergonomics which can leave the rider unable to move independently. Also, new limb distortions often result from ill-fitting chairs. Chairs without the strength to hold their shape in rough conditions drastically increase the frequency of these secondary injuries. Wheelchairs without seat cushions can cause open pressure sores on the skin which are opportunities for life-threatening infections. Recovering from a pressure sore sometimes requires months of bed rest. Without FDA or similar government regulators, riders in the developing world are not protected by standards for medical devices.

This serious safety responsibility has been a core concern for Whirlwind. Our ultra-stable long wheel base design almost eliminates the tipping forward risk, even while rolling off of curbs without ramps. By offering chairs in multiple widths with appropriate cushions our riders are safer from pressure sores and secondary injuries. In 2009, we released a new pressure relief cushion design with fabrication instructions into the public domain so that anyone who needs a cushion can make one.

Like any medical device, even a well-designed wheelchair is only as good as the care with which it is provided to its user. Even a low-tech wheelchair requires that a knowledgeable person ensure that the chair is fitted to the rider's body size and adjusted properly to provide critical postural support. Whirlwind provides a wheelchair service delivery manual, staff, referrals to local partners, multiple widths and back support heights, user's manual, and a clear warning about the seat cushion.

WHIRLWIND FACTS

- First active in 1979
- Established at SFSU in 1989, founded by Ralf Hotchkiss
- Riders in more than 40 countries
- 50,000 wheelchair riders use Whirlwind technology
- More than 25,000 riders use the RoughRider wheelchair design
- In 2009, Whirlwind provided 3,500 RoughRiders in Belize, Bolivia, Colombia, Gaza, Iraq, Jordan, Kenya, Mexico, Nicaragua, South Africa, Turkey, Uganda, and Vietnam, an increase of 500 from 2008 totals.
- The RoughRider costs \$220, 20 percent of the price of comparable U.S. chairs
- Whirlwind has \$1.25 million in annual revenue
- 15-person staff in research, product development, manufacturing, marketing and distribution
- In Vietnam, 88 percent of riders stated that “their lives changed for the better” after receiving Whirlwind’s RoughRider wheelchair, according to a 2008 study
- More than 25 shops and factories in developing countries
- Current quality certified production capacity per month: 500 Vietnam, 100 Mexico, 600 South Africa, 100 Turkey
- Donations to buy chairs for Haiti can be made online at www.wheelchairsforhaiti.org

UNIQUE DESIGN FEATURES

- Extra long wheelbase for stability
- Five different seat widths and three different back heights for 15 different wheelchair configurations
- Rear wheels use bicycle tires for easy replacement or repair
- Steel frame for strength and local reparability
- Front caster wheels that do not sink into sand, soil or loose pavement
- Pressure relief cushions protect riders from pressure sores (design in the public domain)
- Each chair includes a tire repair kit, a pump and an extensive User Manual

AWARDS AND RECOGNITIONS

- 1989 - MacArthur Foundation “Genius Award” given to Ralf Hotchkiss, Whirlwind Founder and Chief Engineer
- 2004 - Tech Award from The Tech Museum of Innovation in San Jose, California
- 2007 - Finalist at the prestigious, international design-competition “INDEX: Design To Improve Life”
- 2008 - Contributed to, and helped edit, World Health Organization's “Guidelines on the Provision of Manual Wheelchairs in Less Resourced Settings”.
- 2009 - Received a five-year \$4.75 million research grant from the U.S. Department of Education to study how assistive technology is best provided in resource-limited environments around the world
- 2009 - Featured in "Design Revolution: 100 Products That Empower People" by Project H Design founder Emily Pilloton.

PHOTOS:



Serafin in Mindanao, Philippines



Thelma Ramos from Chinandega, Nicaragua



Man testing RoughRider built in Zambia



Factory in Johannesburg, South Africa