

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

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What is Whirlwind?

Whirlwind Wheelchair International is a nonprofit social enterprise dedicated to improving the lives of people with disabilities in the developing world. For over 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 in Berkeley, California, where we refine our designs and direct our manufacturing and wheelchair provision operations. Whirlwind's flagship wheelchair is called the RoughRider™. We contract the manufacturing of our wheelchairs to several independently owned factories in different regions of the world – Mexico, Vietnam, Georgia, Indonesia, China 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 that 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.

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. Whirlwind's work began at the end of 1979, when Hotchkiss, with support from Ed Roberts, Director of the California State Department of Rehabilitation, traveled with a group of California disability rights activists to Nicaragua. Their plan was to meet newly disabled Nicaraguans and offer assistance in wheelchair repair, health issues, social integration and other issues resulting from the recent period of war. In Nicaragua, Hotchkiss worked with local wheelchair riders to develop rugged repairable wheelchairs to be built and used there.

After Nicaragua, Hotchkiss 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 50 that have been established in Latin America, Africa, and South East Asia. In 1989, Hotchkiss 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 nonprofit social enterprise that sells award-winning wheelchairs and offers them in developing countries at 20% of the price of comparable U.S. wheelchairs.

Why design the best wheelchairs possible?

When Ralf Hotchkiss 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 wheelchair 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.

Whirlwind's ongoing direct experience working in developing countries and incorporating their unique design requirements are 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." 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 that does not support the contour of the spine. Joint problems can result from poor ergonomics that 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 that 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 and with appropriate cushions, Whirlwind makes our riders safer from pressure sores and secondary injuries. In 2009, as part of over 25 years of open-source work with pressure relief cushions, we released the design for a new pressure relief cushion into the public domain. Creation of inexpensive pressure relief cushions that are capable of preventing sores in the toughest cases, wheelchair riders with limited sensation, still remains a difficult challenge. Whirlwind hopes to speed progress by sharing technology with all others working toward solutions.

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.

Unique Design Features of the RoughRider™

- 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 wet sand, soil or loose pavement
- Pressure relief cushions protect many 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