# WHIRLW ND Wheelchair





www.whirlwindwheelchair.org



# To Our Friends and Supporters

We're coming to the close of another year of rapid growth fueled by a hard-working group of dedicated people who have taken Whirlwind to new heights. Whirlwind's cutting-edge designs are benefitting more and more people around the world. And, the future looks brighter than ever.

In 2012, we sold over 15,000 RoughRider® wheelchairs—more than double the number we sold in 2011. Wheelchair sales accounted for 84% of our total revenue. Growth has been heady, but also difficult to manage as we've had to institute new and more robust systems for tracking orders, sales, shipping logistics, and more. We've been developing and implementing a quality assurance system at the PT Dharma factory in Indonesia and compiling detailed specifications for the 2010 RoughRider so that other manufacturers can upgrade to the improved model. It may be a cliché that the devil is in the details, but clichés are clichés because they're often true. In 2012, we've learned a few things the hard way, but the end results are impressive.

We've made a significant design breakthrough in the development of an ergonomic, front-wheel drive, hand-driven tricycle optimized for income generation. We are happily ahead of schedule to have the trike in production by Fall 2013. Learn more about this exciting project on page 3.

In January, we began a 30-month USAID-funded project to establish seven Wheelchair Provision and Assembly Centers (WPACs) in seven locations around the world. The WPACs are intended to be local social enterprises that are self-sustaining and will develop the market for wheelchairs. These WPACs can become the core infrastructure for ensuring appropriate provision and on-going services in line with World Health Organization Guidelines. Selecting qualified WPAC partners has been challenging. Disability community organizations in developing countries do not typically have significant streams of earned income and have not yet operated in a traditional business environment. We will announce the WPAC pilot sites shortly. You can see a great animated video that explains the WPAC concept at www.whirlwindwheelchair.org/wpac/

In June, after months of trying to get it just right, we opened U.S. sales of the RoughRider as a new means of generating income to support our work in the developing world. Our Oakland, California distribution center provides part-time employment for three people who fulfill national and international orders. Check out the article on pages 4–5 about riders in the U.S. who are embracing the RoughRider.

Whirlwind's increased wheelchair sales and your ongoing support have allowed us to increase our staff to 11 full-time employees this year. But despite this growth, we still need your support. The opportunity to expand our social enterprise to provide good wheelchairs in the developing world inevitably brings with it increased complexity and costs. We will succeed with your support. As you help Whirlwind, you help change the world.

Sincerely,

Marc Krizack, Executive Director

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#### Handcycle Tricycle Development and Testing

Many types of hand-powered tricycles are used by people with disabilities around the world, from lightweight sports handcycles for racing and recreation to rolling stores to cargo trikes loaded with merchandise. Whirlwind is applying our experience with wheelchair propulsion, ergonomics, and manufacturing to the development of a cargo handcycle that can be efficiently produced at large scale, compactly shipped around the world, and be affordably and easily maintained in the smallest workshops. We are developing this product with financial support from USAID and in collaboration with our network of wheelchair builders, riders, service providers, and colleges and universities throughout the world.

San Francisco State University and Santa Clara University student interns have contributed to our project research by talking with tricycle riders and builders to gain a better understanding of how people are using handcycle tricycles both for personal mobility and as platforms for mobile businesses.

"The trikes are great because they provide mobility to entire families, in some cases."

Ayuba Gufwan, the founder of Wheelchairs for Nigeria, visited Whirlwind this fall to talk about his experiences building and riding handcycle tricycles in Nigeria. He observed, "There is so much poverty, and the trikes help people to get around and provide for their families. There is a whole range of activities that the trikes can solve."

Whirlwind began this project by exploring how different, well-proven designs from around the globe perform when transported to new environments. Working with Whirlwind, Donna Cohn and Bob Cann at the Creativity Center at Hampshire College in Amherst, Massachusetts built a prototype

rear-wheel-drive tricycle, similar to the style that is popular throughout India. In August, Whirlwind founder Ralf Hotchkiss and Professor Cohn took this tricycle to Nicaragua to test the prototype with six trike riders in Chinandega, home of long-time Whirlwind collaborator Thelma Ramos.

Having explored many options, Whirlwind's tech team is now moving forward with a simple and versatile design appropriate to multiple environments. The first handcycle that Whirlwind will put into production will be a hand-cranked, front-wheel-drive trike, similar to those proven throughout East Africa, but with the added ability to push directly on the rear wheels, like on a wheelchair. The bicycle-style, hand-crank propulsion method is comfortable for efficient longer distance travel at higher speeds, while the rear-wheel pushrims give the rider increased maneuverability in tight spaces and on rough or steep terrain where it may be too difficult to use the hand crank.

Whirlwind has designed the handcycle trike to be a platform adaptable to the needs of the riders and communities where the trike will be used. Whirlwind will offer standard options for configuring trikes for hauling cargo, selling goods, or just getting around. We will collaborate with wheelchair builders around the world to develop custom add-ons and design improvements. We will also use the Internet to share a library of open-source, tricycle-related products and accessories available worldwide.



Tricycle builders and ridermerchants Juan Carlos Valle and Chalio Rosario Lopez test trikes on rough terrain in Chinandega, Nicaragua with Professor Donna Cohn.



PHOTO BY RALF HOTCHKISS

# The U.S. Welcomes Whirlwind's RoughRider

heelchair riders in the USA are purchasing RoughRiders®, and the benefits for wheelchair users—both in the U.S. and the developing world—are exceeding even our high expectations.

We are honored that wheelchair riders in the USA, who have access to an enormous variety of excellent mobility technology options, are choosing to purchase and use our chairs. Whirlwind has always referred to the partnership we have with riders and factories in the developing world as a collaborative "technology



Aaron Wieler, Whirlwind Product Designer, helps unload the first shipment of RoughRiders to the U.S.

exchange." And, we have often spoken of the potential for technology developed in less resourced environments to "trickle up" to wealthier countries. This trickle-up is happening now on a growing scale, and the results are exciting.

In return, our U.S. customers are helping wheelchair riders abroad. For every wheelchair

sold in the U.S., Whirlwind donates the same model wheelchair to a person in need in a developing country via our Buy-One-Give-One (BOGO) program. To learn more about this unique program, visit www.whirlwindwheelchair.org/roughrider/

U.S. riders also contribute to ongoing efforts to improve the wheelchair simply by acting as empowered consumers, and communicating loudly and clearly what they need from their chairs. By sticking up for their own needs, U.S. riders bring attention to needs they have in common with people in less resourced settings, whether U.S. riders use their chairs on weekends for recreation in the wilderness, or as a daily-use chair to conquer challenging urban wilds with semi-accessible buildings, uneven terrain, and public transit.

We are thrilled and more than a little awestruck by the great potential power of this global coalition of RoughRider users. We look forward to a future in which people with disabilities are increasingly empowered to shape the course of international wheelchair design.

#### "I feel so much freedom, I love it!"

Envious of riders in developing countries who already had a RoughRider®, Brian Tsai checked Whirlwind's Website every week for a year, eagerly awaiting FDA approval and U.S. sales to begin. In June, Brian became the first wheelchair user in the U.S. to buy a RoughRider. On his daily commute to work in San Francisco's Presidio, he has traded the sidewalk for a more direct, grassy route. When Brian is not busy painting Eastern Orthodox icons, and when the sun breaks through the fog, he likes to skip the long MUNI Metro ride for a detour down to Fisherman's Wharf and the Embarcadero alongside the runners and bikers. His RoughRider has made getting around town a lot easier.

"Sometimes there are just obstacles—a car blocking the curb-cut, or there are people crowding the sidewalk and you just can't get around them. With the RoughRider, it doesn't matter because I can just go from the sidewalk to the street even if there is no curb-cut....

The RoughRider is so tough it's not going to break and I don't feel like I'm going to fall out of it.... I feel so much freedom, I love it! And I love the idea that my purchase allows Whirlwind to give a RoughRider to someone in another country." You can watch a video of Brian at www.whirlwindwheelchair.org/video/

Brian can
go over curbs
and navigate
numerous urban
obstacles in his
RoughRider,
giving him a
sense of freedom
he had not
exprienced in
his previous
wheelchair.





Crystal can now tend to her beloved animals, including her six horses, thanks to her new RoughRider.

# Hard Work, an Indomitable Spirit, and a RoughRider

Getting back to doing what you used to do can be one of the hardest hurdles for someone with a traumatic spinal cord injury. But Crystal Costa's hard work, indomitable spirit, and her new Whirlwind RoughRider® are doing wonders. Crystal, an equestrian, was thrown from her horse while training for the upcoming Tevis 100 mile endurance race near her home in Cool, California. Although still partially paralyzed from the waist down, Crystal has worked hard to regain movement in her legs and is determined to continue doing what she loves to do. Her RoughRider makes much of that possible.

"The RoughRider is very easy to manage in the gravel and dirt, and going uphill and downhill, too."

Before her accident, Crystal would wake up early to feed her seven dogs, feed and groom her six horses, and then head off to the veterinary hospital that she managed. Crystal's RoughRider not only allows her to navigate in and around her house. She can again go outside to feed her dogs

and walk her horses. She was also able to attend a three-day tack sale and BBQ recently that she otherwise would have missed.

### Back on Target and Rolling in Big Sky Country

An avid hunter, Dennis Hein, 56, enjoyed getting outdoors in Billings, Montana. For several years, he shared his enthusiasm for hunting by teaching a Hunter Education class in one of the local middle schools. But, a couple of years ago, nerve damage affected Dennis's ability to walk, causing him to need a wheelchair and to cut back on his time spent outdoors on trails and at the shooting range.

Last year, Dennis couldn't teach the Hunter Education class because he couldn't make it up the school's access ramp in his old wheelchair, nor could he get his old wheelchair's front wheels over the threshold. At the shooting range, he couldn't sit in his wheelchair while shooting for fear of tipping over. Even when seated on a bench, he worried about losing his balance from his rifle's recoil.

This year, things have changed. Shooting while seated in his RoughRider®, Dennis is more confident, knowing that his chair is stable and won't tip over sideways. And, he's once again teaching his Hunter Education class and going to the shooting range. "The chair just makes getting around a whole lot easier. I can get around in tight spaces easier and get over the rough spots much easier. I even attempted to go up a mountain bike path that I would not have attempted in my old

chair." Dennis is also



Dennis, back in the classroom, where he teaches a Hunter Education class in a middle school in Billings, Montana.

thrilled that he can once again enjoy watching his grand-daughters play softball and volleyball.

#### Whirlwind Shifts into High Gear with International Quality Standards

With the 2010 RoughRider® on track to reach more than 20,000 riders next year, the process for ensuring that each chair is of the highest quality becomes an even greater challenge. Unlike Whirlwind's first 25 years, it is no longer cost-competitive for one person to hand-make every RoughRider from start to finish. Now, as we expand into mass production, Whirlwind and our partners must streamline the production process to create experts in the manufacture of specific wheelchair parts and collaborate to make a great product. Whirlwind's development of complex quality control systems is emblematic of our transition from a traditional nonprofit to a social enterprise capable of delivering unique, top quality products to tens of thousands of riders in need all over the world.



Kaleen Canevari, Whirlwind Quality Systems Engineer

In June, Whirlwind hired Kaleen Canevari as our Quality Systems Engineer to facilitate this transition. Kaleen has a B.S. in Mechanical Engineering from Kettering University and comes to Whirlwind with four years' experience in the automotive and medical device industries. She serves as the liaison between Whirlwind's tech team and overseas manufacturing facilities, ensuring that design specifications, change processes, and production methods yield the highest quality product possible. To achieve this, Kaleen and the Whirlwind tech team have developed formal processes for controlling quality, managing design changes, and effectively tracking customer complaints to continually improve the RoughRider. International standards guide Whirlwind and our producer-partners to create and implement QC systems effective in managing high-volume, industrial manufacturing applications around the world.

#### **WPACs: Back to the Local Level**



With a grant from the U.S. Agency for International Development (USAID), we are one step closer to fulfilling our mission

of enabling every person who needs a high-quality wheelchair to obtain one. By June 2014, we will have set up seven Wheelchair Provision and Assembly Centers (WPACs) around the world. WPACs will use a sustainable business model, selling the RoughRider® and other models, including a tricycle currently under design (see page 3). Nonprofits, government agencies, and religious groups will become WPAC customers. WPACs will be trained in the World Health Organization wheelchair provision guidelines to ensure that wheelchair riders are properly fitted.

In our early days, Whirlwind worked extensively on the local level, but in recent years we have focused on developing high-quality mass production. WPACs will give our staff the opportunity to work once again on the local level, engaging with local disability communities to promote full access and participation in society.

We are currently reviewing applications for the first WPACs and hope to announce the pilot sites shortly. Laura Harrington, who joined us in August as Whirlwind's Project Administrator, brings nearly 10 years of valuable experience to this undertaking, having managed USAID projects in Africa, Asia, and Eastern Europe. To see the video about the WPAC project, go to www.whirlwindwheelchair.org/wpac/



Laura Harrington, Whirlwind Projects Administrator

# **Nuts & Bolts**

#### Whirlwind to Host 2013 ISO Meetings

Whirlwind will be the official host for the 2013 International Standards Organization (ISO) TC 173/ SC 1/Working Group meetings. The meetings will be held on the San Francisco State University campus during the first week of June next year. The meetings will bring together international experts in wheelchair standards in the areas of test methods, transport, electro-technical, and seating. The Paul K. Longmore Institute on Disability at SF State will serve as co-host.

#### Krizack Named Co-chair of RESNA Special Interest Group

Whirlwind Executive Director Marc Krizack has been named co-chair of the RESNA International Special Interest Group (ISIG) for 2012–2014. RESNA is the Rehabilitation Engineering and Assistive Technology Society of North America, the leading professional organization dedicated to promoting the health and well-being of people with disabilities through increasing access to technology solutions. Krizack's co-chair is Maria Luisa Toro of the University of Pittsburgh. Krizack and Toro hope to reinvigorate the ISIG to provide improved opportunities for U.S. and Canadian rehab professionals. The new ISIG leadership is also sponsoring a RESNA international student design competition for assistive technology solutions appropriate to resource-limited environments.

# Remembering Dwight & Vivian Johnson



Dwight with Vivian—his wife, co-designer, and constant traveling companion—developing Whirlwind technology in Phnom Penh, Cambodia in 1994.



Dwight happily combined high and low technology in his creative process and the resulting innovations—right up to his passing.

Whirlwind has, at long last, said goodbye to the second of a pair that has been at the heart of our way of working for the past 23 years. Dwight Johnson passed away this July; his wife Vivian six years earlier. They joined the work of Whirlwind in 1989, at the beginning of our time at San Francisco State University. It was clear from the start that they brought a spark that was truly unique.

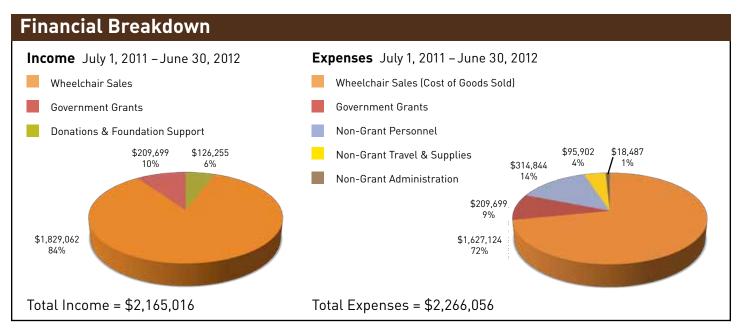
Both had retired early, Dwight from engineering at IBM and Vivian from medical device technology. Both entered the study of Rehabilitation Engineering Technology at SFSU. Motivated by their Presbyterian faith, and always working as a team, they taught us the process that was necessary to bring the Whirlwind wheelchair to the level of design of which we are so proud today.

Dwight and Vivian shared an attention to detail and a devotion to perfection that have set the standard for the best of Whirlwind's work. Many stories come to mind of how well they did what they did.

- Vivian building and training without pause in a Palestinian workshop where women as workers had never before been allowed.
- Dwight concentrating for three very long days during a Kenyan training to make sure the dimensions of our new Whirlwind folding frame were, without question, optimal.

We are honored to build upon the work that Dwight and Vivian began. The reams of detailed notes that Dwight left make it clear that this work will go on and on. We could easily fill a book with Dwight's technical contributions, many of them clever and interesting on their own merits. Hidden in his notes, of course, are bits of his humor. And we all need that.

Dwight and Vivian cared very, very well for each other, in so many ways. This, most of all, we will never forget.



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