



Designing beyond the norm to meet the needs of all people.

Working toward  
universal access  
through research,  
design & education

December 2004

## Dear Friends & Supporters

Yet another year comes to an end and we at Beneficial Designs would like to take this opportunity to reflect on what a full year 2004 has been.

Once again, the Beneficial Designs team, compiled of three offices and several consultants, has had a very exciting year. We are nearing completion on some cutting edge projects while continuing to develop ideas for new ones.

We are completing the last of our seating related Small Business Innovation Research (SBIR) Grants and will be closing our Santa Cruz office during 2005. However, Seanna Kringen, Alida Lindsley, and Kathy Newman will continue to work for us out of their home offices in Santa Cruz. Allen Siekman has started his own consulting business and continues to offer seat cushion testing through his new company, Central Coast Testing.

We would like to share with you a few of the projects we have been working on this past year. Thank you for your continued support and interest in our work. All of us here at BD would like to wish you a joyful holiday season.

## *Management Team*

*Peter Axelson*

*Denise Axelson*

*Mark Richter*

## *Staff*

*Harmony Bennington*

*Bill Blythe*

*Kimberly Lilley*

*Shelly Guzman*

*Seanna Kringen*

*Alida Lindsley*

*Jamie Lummus*

*Andrew Mattson*

*Kathy Newman*

*Carla Shepard*

## *Project Consultants*

*Patti Longmuir*

*Jamie Noon*

*Allen Siekman*

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## UTAP Coordinator Workshops

Kathy, Peter and consultant Patti

This year more trail enthusiasts were trained to lead assessments, using the Universal Trail Assessment Process. The UTAP Coordinator Workshops were held in Nevada, Pennsylvania, and Texas bringing the total number of UTAP Coordinators trained to over 700. Workshop participants included trail professionals, college students, and volunteers. Several UTAP Workshops are being planned for 2005 to be held in Reno, Nevada 6-7 March, Texas, and Florida. Contact [trails@beneficialdesigns.com](mailto:trails@beneficialdesigns.com) for workshop dates and locations.



## TrailWare<sup>2.0</sup>: UTAP Software

NIH/NICHD SBIR Phase II Grant #2 R44 HD36538-02

Kathy, Seanna, Peter and consultants Patti, Joan, John, Jay & Dan

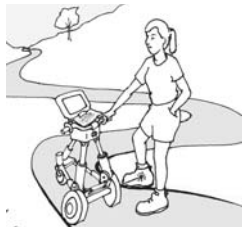
TrailWare<sup>2.0</sup>, the data processing software for the UTAP, was released in the Fall of 2004. Several agencies and organizations participated in beta-software evaluations to assist in creating an effective data analysis tool. TrailWare training courses were held in California, Nevada, and Texas during 2004. TrailWare<sup>2.0</sup> trainings for 2005 are being planned for Florida and Nevada during the Professional Trail Builders Conference on 8 March 2005.

## High Efficiency Trail Assessment Process

USDA SBIR Phase I Grant #2004-00393

Peter, Mark, Kim and consultant Patti

This research and development is for a portable data collection cart that will allow the Universal Trail Assessment Process (UTAP) to be completed by one person. It will also enable more outdoor recreation and trail access routes to be assessed for accessibility.



## Surface Accessibility

NIH SBIR Phase II Grant #2 R44 HD30979-02

Denise & Peter

The Rotational Penetrometer (RP) is now being incorporated into ASTM F1951, the playground testing standard for accessibility. The RP is distributed by Beneficial Designs. This portable tool can measure the firmness and stability of trail surfaces, carpet, and other pedestrian routes. Denise is on the ASTM Committee that develops playground accessibility standards.



## Nevada Recreation Trails

Peter and consultant Patti

The goal of this project is to make Trail Access Information (TAI) widely available for a variety of trails in Northern Nevada. Our first project assessed 11 trails managed by five different agencies. Assessments were conducted by BD's trail assessment staff consisting of Andrea, Bill, Ericka, Jamie, Jason, Kallie, Layne and Patti. Phase II of the project created and disseminated Trail Access Information through on-trail signage, published newsletters and other information formats, and the Trail Explorer website <[www.trailexplorer.org](http://www.trailexplorer.org)>. The collaborating land management agencies are also using the trail information collected to enhance the experience provided on their trails.



**Tahoe Meadows Interpretive Trail  
Lake Tahoe, Nevada**

## Canoe Seating System

NIH/NICHD SBIR Phase II Grant  
#2 R44 HD36944-02A1  
Alida, Allen, Denise, Seanna & Peter

BD is working with Wilderness Inquiry in Minneapolis to evaluate and refine the canoe seat design and conduct evaluations. The seat attaches to the sides of the canoe, replacing the existing bench seat. It provides adjustable pelvic, back, and side supports and has an adjustable seat angle to improve balance and comfort. Physiological evaluations have taken place on a paddling ergometer with 30 subjects. Wilderness Inquiry has been evaluating the seats in the field. Kevin Carr with Chosen Valley Canoe Accessories is assisting us with the refinement of the design for manufacturability.

## Universal Design Guidelines for Fitness Equipment

NIH/NICHD Phase I Grant #1 R43 HD049236-01  
Peter, Kathy, Bill and consultant Patti

The universal design of fitness equipment guidelines (UDFE) project is developing design, construction, and installation guidelines for the universal design of aerobic and strength training equipment. This research will also develop a model step-by-step process for the modification of existing equipment, a system for identifying universally designed products to consumers and data on the cost-benefits of universally designed fitness equipment.



## Adjustable Skeletal Loading Indenter

NIH/NICHD Phase I Grant #1R43 HD043509-01  
Allen, Alida, Peter and consultant Jamie

An adjustable skeleton surrounded by gel to simulate soft tissue, and created to simulate pelvic tilt, rotation, and obliquity. It consists of machined plastic pieces that simulate the human pelvis and femur. The loading indenter is available for testing seat cushions by seating manufacturers and for standards work on seating.

## FlexRim

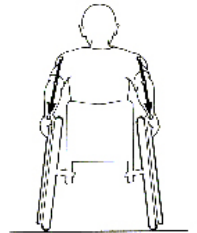
NIH/NICHD Phase II Grant #2 R44 HD36533-02A2  
Mark, Peter and consultant Jamie

The FlexRim is a compliant handrim that replaces the rigid interface between the wheelchair wheel and the handrim. It adds flexibility to reduce the impact forces experienced by users. The Biomobility lab in Nashville, a wheelchair biomechanics lab, has evaluated 25 subjects on our adjustable grade treadmill. Those subjects will soon return to the lab after four months of using the FlexRims in the field for further evaluation.

## OptiFit

NIH/NICHD Phase I Grant #1 R43 HD047071-01A1  
Mark & Peter

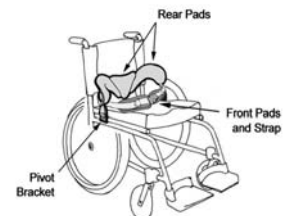
The current state of knowledge in adjusting a wheelchair to fit a specific user is very limited. This project will develop a systematic approach to optimally fit a wheelchair to an individual user such that seated posture and propulsion ergonomics are maximized. A super adjustable wheelchair will be systematically adjusted in the BioMobility lab in Nashville on a treadmill for biomechanical analysis.



## HipGrip

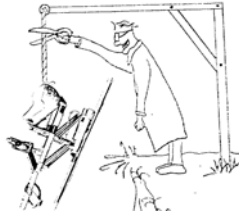
NIH/NICHD Phase II Grant #2R44 HD36156-02A2  
Allen, Denise, Seanna & Peter, and consultants Amy & Jamie

The HipGrip is a dynamic spring-loaded pelvic support device for persons who have difficulty maintaining pelvic positioning. The HipGrip allows the user to lean forward and provides variable resistance to assist the user back into an upright position. Bodypoint Designs has licensed the HipGrip and the product has been launched in Europe and the US.



## **Ski Area Accessibility**

Peter continues to consult for the ski industry, helping to make their facilities and programs more accessible. He is also chair of a RESNA



committee that developed specifications and test methods for adaptive ski equipment. The document is being prepared for final balloting and will soon become a national standard. The committee met in December of this year in conjunction with the annual Ski Spectacular event in Breckenridge, Colorado.

## **Wheelchair Standards**

Peter & Denise

As Chair of the RESNA Technical Standards Board, Peter oversees the work of all RESNA standards committees. Peter still serves as Chair and Denise as Secretariat of the RESNA Standards Board. Annual meetings were held this year in conjunction with the RESNA conference in Orlando. Peter also continues as Convener of the ISO Working Group on Wheelchair Test Methods. ISO meetings took place in Estes Park, Colorado in May and in Valencia, Spain in November.

## **Special Thanks and Acknowledgments**

We would like to thank past employees Allen Siekman and Kallie Goheen, whose work on our projects was invaluable. We also wish to thank consultants Amy Hayes, Mike Passo, Julie Kirschbaum, Joan Lowden, and Dan Michaels who have made significant contributions to our projects this year. We are grateful to our technical consultants Bill Adams, John Endter, Arne Folkedal, Russell Rodriguez, JD Tipton, and Robyn for their assistance with our projects and facilities.

We would also like to thank Wilderness Inquiry for their assistance in the development and evaluation of the canoe seating system.

## **Funding agencies and other acronyms:**

DOT Department of Transportation  
FHWA Federal Highway Administration  
ISO International Organization for Standardization  
NICHD National Institute of Child Health and Human Development

NIH National Institutes of Health  
SBIR Small Business Innovation Research  
USDA United States Department of Agriculture  
RESNA Rehabilitation Engineering and Assistive Technology Society of North America

## **Wheelchair Seating Standards**

Denise & Peter

Denise and Peter continue to participate in the development of ISO standards for wheelchair seating. These standards cover terms and definitions, and testing of postural support devices and seat cushions.

## **Design Consulting**

We continue to provide testing and design services on a consulting basis for the seating and wheeled mobility industry. BD is still assisting Independence Technology, a Johnson & Johnson company, with the design of the seating system of the iBOT Mobility System <[www.indetech.com](http://www.indetech.com)>.

## **Wheelchair Training Guides**

Denise & Peter

The Manual and Powered Wheelchair Training guides provide wheelchair users and therapists with step-by-step instructions for negotiating various



environments. Both books are available through PAX Press, a division of BD.

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## MEET THE BD TEAM

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### MANAGERS

❖ **Peter Axelson**, founder and Director of R&D, leads BD and when he is not traveling to present our work he loves spending time with Denise and Ria Maye. He's also a pilot and avid mono-skier.

❖ **Denise Axelson**, Research Engineer, assists with research, standards development work, technical writing, and grant proposals. She loves being a mom to Ria Maye, playing volleyball, skiing, and cooking.

❖ **Mark Richter**, Research Engineer, is working on the FlexRim, the GripRim, the OptiFit, and HETAP. He completed his doctorate in mechanical engineering at Stanford University early this year.

### STAFF

❖ **Harmony Bennington**, Office Assistant, helps with office tasks. She is a junior in high school and likes skiing, running, and helping others.

❖ **Bill Blythe**, Technical Assistant, is in charge of things that plug in. He likes to cook, play guitar, work with computers, and lead worship at church with his wife Jennifer.

❖ **Shelly Guzman**, Office Assistant, helps with office tasks. She is a senior in high school and enjoys dancing, doing pilates, traveling, and shopping.

❖ **Seanna Kringen**, Research Associate, assists with the research components of our projects. She enjoys swimming and hiking with her husband and three children.

❖ **Kimberly Lilley**, Project Engineer, conducts literature research, assists with subject recruitment, and product testing. She enjoys volleyball, rollerblading and hiking.

❖ **Alida Lindsley**, Product Designer, contributes to the design and fabrication of various prototypes. She plays Ultimate Frisbee, enjoys the outdoors, the arts, and creating.

❖ **Jamie Lummus**, Administrative Assistant, oversees office administrative functions. She enjoys playing softball, coaching cheerleading and her Cairn Terrier.

❖ **Andrew Mattson**, continues to help us on a part-time basis with the canoe seating project and keeping the Santa Cruz office in order. He is in his first year at Cabrillo College studying music and psychology.

❖ **Kathy Newman**, Project Coordinator, organizes UTAP projects and TrailWare development. She is excited about her new marriage and baby due in March 2005!

❖ **Carla Shepard**, Bookkeeper, is in charge of BD finances. She enjoys four-wheeling, playing piano, singing, and camping.

❖ **Kevin Woods**, Project Engineer, works on the FlexRim while doing research for his masters in Biomedical Engineering. He enjoys hiking, ballroom dancing, and restoring his 1890s Victorian home.

### CONSULTANTS

❖ **Patti Longmuir**, Research Scientist, focuses on accessible recreation projects. She enjoys the outdoors, and fixing up her house.

❖ **Jamie Noon**, Seating Designer, contributes to product development. He also works with non-profit organizations to establish clinics in developing countries that provide rehabilitation technology.

❖ **Allen Siekman**, previous Manager of the Santa Cruz Design Center and seating designer, is now a consultant on our seating projects. He continues to perform cushion testing through his new consulting business Central Coast Testing.

MEET THE BD TEAM

Peter



Denise



Mark



Seanna



Bill



Kim



Ria  
Maye

BD's newest edition

Jamie



Happy Holidays  
from the  
BD Team!



Carla

Kathy



Harmony

Shelly



Andrew



Jamie N.



Allen



Patti



Alida