



## ISWP Standards Working Group June 13, 2018 Meeting Recap

The ISWP Standards Working Group met by conference call on Wednesday, June 13, 2018 from 12:00 p.m. to 1:15 p.m. U.S. Eastern Time. This document provides a recap. Link to call recording: <https://iswp.adobeconnect.com/p1n8toe6ylkr/>.

Next call: Wednesday, September 12, 2018, 12:00 p.m. U.S. Eastern Time.

### Discussion

1. **ISWP Status:** Most of the standards work currently is funded through a non-USAID U.S. government grant. There still is some funding through ISWP, which runs through October 31, 2018 and could extend until December 31, 2018, budget permitting. Jon is discussing continued funding with USAID.

ISWP is working with a consultant on a plan for ISWP to become a separate entity outside of the university. The consultant will present its recommendations to the ISWP Advisory Board on June 28, 2018. Recommendations will include potential funding sources, such as establishing a test lab and doing contract testing, and establishing an accreditation for wheelchairs (clinical and technical review) and/or ISWP mark to help standardize product quality. Once the entity is established, the Board would determine projects to be undertaken and revenue streams. Any revenue-generating standards work likely would take shape in 2019 if the Board decided to move forward.

2. **ISO Meeting, May 2018:** Jon Pearlman and Anand Mhatre attended the ISO Technical Committee 173 meeting, plenary and seminar in Nairobi, Kenya, May 5-10, 2018 to present technical standards for testing casters in less-resourced environments. Technical Committee 173 oversees all assistive technology. Subcommittees exist for power and manual wheelchairs, as well as other specific technologies. The Technical Committee meets every 18-24 months; subcommittees meet throughout each year.

ISWP received very good feedback on the caster testing standard, which Anand incorporated and sent to the Standards WG for additional feedback. **Standards WG members** are asked to provide feedback by 6/15. That feedback will be incorporated, and an updated version will be sent to the Technical Committee by 6/22.

Following the presentation, several attendees approached Anand and Jon about doing testing in Kenya. ISWP has engaged the Bureau of Standards in Kenya and may have an opportunity to build a test lab in Nairobi in partnership with APDK; the only test lab currently in the African continent is in South Africa. Jon contacted ISO about potential

funding and will continue to explore other opportunities. The drawings which ISWP is publishing will help to facilitate a lower-cost approach to developing the labs.

During the trip, Jon and Anand visited APDK which produces Whirlwind Roughrider chairs locally.

Jon was nominated to a two-year term as convener of Working Group 1, focused on quality standards for manual wheelchairs. This gives ISWP the opportunity to have input on the agenda and move activities forward.

Upcoming ISO Technical Committee 173 meetings: Fall 2018, London. September 2019, Japan. Jon also would like to host one in conjunction with the International Seating Symposium, Pittsburgh, PA, U.S., March 2019. Jon invites and welcomes ISWP Standards WG members to attend the ISO meetings to represent less-resourced settings.

### 3. ISWP Standards Working Group Activities

- a. **Free Wheelchair Mission (FWM) Test Track:** Free Wheelchair Mission used a medium size Gen 2 wheelchair, which Pitt also tested using the double drum, to compare results. The obstacles on the test track and the double drum were the same. Double drum results fall on lower end of range; test track, on higher end. Bonnie Gonzalez then collected data from 6 independent wheelchair users in Kenya who are students and teenagers weighing about 120 lbs. average. The results of testing are here: [https://drive.google.com/open?id=1LjwQfSrAP2c\\_yUAetgHUz\\_MoCNh0f6nz](https://drive.google.com/open?id=1LjwQfSrAP2c_yUAetgHUz_MoCNh0f6nz). The students traveled on both rough and developed terrain, consistent with many environments in less-resourced settings.

Bonnie saw a lot of stem caster bearing failures on test track and in Kenya and would like to explore further. She did see one instance of wheel bearing failure. Jon said that is ISWP's experience, too and offered to test the same bushings/components on the ISWP caster testing equipment.

Free Wheelchair Mission also tested different caster materials, noticing and measuring the difference with a softer caster. FWM is considering finding softer caster material to withstand less-resourced environments and other requirements.

FWM feels the double drum is a conservative test compared to what is seen in the field. The double drum restrains the wheelchair so it only shows differences in vertical direction, not side to side and doesn't represent actual wheelchair use well. When comparing results, one also needs to consider other factors, such as the way the accelerometer is attached. Accelerometers for chairs on the test track were mounted on the frame close to the front casters. Don wonders if ISWP can increase the double drum slats to replicate accelerations to replicate what is experienced in the field. Anand mentioned that only a limited magnitude of accelerations can be reproduced on testing equipment and hence, he is evaluating the correlation between stress (strain) and

acceleration. FWM plans to share data collected in Kenya with Pitt for additional analysis.

- b. **Caster testing:** Anand is updating the technical standard draft and will forward to the ISO committee and present again at the Fall 2018 Technical Committee meeting in London.

Anand's dissertation regarding caster testing is available online [here](#).

Caster failure data collection on casters from the U.S. is under way through the Rehabilitation Engineering Research Center (RERC) grant.

Pitt staff also is doing some strain gage testing to correlate how much stress is seen in the caster relative to the acceleration in the caster. Anand is experimenting to determine relation between strain and accelerations. Dan mentioned Norm was having similar observations on his accelerometer data. Anand used the same accelerometers; the maximum was 16Gs, and the field data was higher. New accelerometers are 200Gs max; data is showing peaks greater than 40Gs.

- c. **Corrosion testing:** Anand will evaluate the pattern of corrosion on different manufacturers' finishes and test some specimens in the lab to determine the efficiency of various coatings. He will test various wheelchair parts to determine loss of mass and amount of corrosion on different coatings.
  - d. **Rolling resistance testing:** Equipment design at Pitt is complete, and the Pitt staff is making good progress on building the test equipment. The large wheel was built locally and balanced to 200 RPMs. Materials were delivered recently for the top half of the equipment.
4. **Handcycle Review:** ISWP received a hand cycle from Pakistan/Laos NOWPDP for design feedback. Anand received feedback from Dr. Pearlman, Dr. Cooper, Norm Reese, Matt McCambridge, Chris Rushman and Don Schoendorfer. Main issues: Drive train position. Drive train was long, with no adjustability. Idlers, brakes (parking or not, how they are mounted). Gearing/shift levers. Stability since seat is quite high and not the recommended seat; transfers would be high since seat is high. Housing around back wheels may break in less-resourced countries. No adjustability in footrests.

Daniel Martin mentioned that the boom looks chunky and less likely to break. The trailer only seems to have a vertical swivel, which could be a problem if a person experiences bumps. It needs a horizontal swivel, too, to avoid breaking the hinge.

Scott Walter, Mobility Worldwide, invited the group to review the three-wheeled mobility cart his organization has manufactured for the past 25 years. Details are on the [Mobility Worldwide](#) website.

Don Schoendorfer designed a cart with MIT. Free Wheelchair Mission is not planning to distribute the chair since it is not in line with FWM's goals but will provide as an open-source design for anyone who wants to manufacturer it themselves or through the factory FWM uses. Don Schoendorfer mentioned FWM learned a lot in the field trials; staff is changing the design in SolidWorks and will have the drawing package ready in 2-3 months. In meantime, they have some samples they can send if the requester pays for the shipping. Don feels the product is safe and reliable overall; FDA testing hasn't been done but may not be necessary in the country/region the organization is working in.

Chris Rushman described the design that he and Matt McCambridge developed with a partner in Zambia. It is simple to make the production tooling, which was key in the design philosophy and to make the drive as simple as possible. Matt took the design to the Philippines and designed a higher-level product. The seat unit clamps so it can be slid back and forth. Chris may have partners or samples in Pakistan. Also, APDK in Nairobi has distributed about 150,000 trikes similar to the design in review.

5. **ISS 2019:** The [International Seating Symposium](#), hosted by Pitt, will take place March 18-22, 2019 in Pittsburgh (pre-symposium workshops, March 18-19; symposium, March 20-22.). Jon hopes to develop a track on product standards in less-resourced environments. **Jon** will research funding to support SWG members' travel.

### **Participants**

- ✓ Bonnie Gonzalez, Free Wheelchair Mission  
Dave Mahilo
- ✓ Daniel Martin, Shonaquip  
Matt McCambridge  
Mark Sullivan, Convaid  
Norman Reese, LeTourneau University
- ✓ Chris Rushman, Motivation
- ✓ Don Schoendorfer, Free Wheelchair Mission
- ✓ Scott Walters, Mobility Worldwide  
Karl-Erik Westman, Handicap International
- ✓ Eric Wunderlich, LDS Charities  
Ben Gebrosky, University of Pittsburgh  
Mendel Marcus, University of Pittsburgh
- ✓ Anand Mhatre, University of Pittsburgh
- ✓ Joe Ott, University of Pittsburgh
- ✓ Jonathan Pearlman, University of Pittsburgh
- ✓ Nancy Augustine, University of Pittsburgh

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