



## ISWP Standards Working Group

### October 12, 2016 Standards Working Group (SWG) Meeting Recap

The ISWP Standards Working Group met by conference call on Wednesday, October 12, 2016 from 12:00 p.m. to 1:30 p.m. U.S. Eastern Time. This document provides objectives and a recap.

#### Objectives

1. Discuss progress updates from the subgroups and related future work.

#### Discussion

1. Caster Testing
  - a. Testing in progress with slats at zero degree.
    - i. One caster broke at 38,000 cycles.
    - ii. Three casters are running and have completed 350,000 cycles.
  - b. Caster arm design improvement is in progress.
  - c. Caster Failure checklist is being developed at Pitt and will be shared soon for review of checklist items.
  - d. Share caster block design with Norman.
2. Rolling resistance testing:
  - a. The team validated calibration with the two load cells and conducted experiment to determine friction due to bearing carriage of the wheel.
    - i. The group suggested checking for error correction found with the above experiment and determining this effect for pneumatic versus rigid wheels.
    - ii. Matt suggested checking for effect of trueness on resistance.
  - b. Testing plans for wheel and caster testing as listed here:  
<https://drive.google.com/open?id=0B1YvzNMVuia3NUp5QkNaQWxGZ3M>
  - c. The group suggested conducting validation of the RR test with user assessment.
3. Corrosion Testing
  - a. The salt fog has been installed at Pitt and the Pitt team is in process of configuring the salt fog properly before starting to run the machine.



- b. Pictures of the chamber:  
[https://drive.google.com/open?id=0B6\\_UhCTAjSN5YTR0SFMtcm9aYIU](https://drive.google.com/open?id=0B6_UhCTAjSN5YTR0SFMtcm9aYIU)
  - c. The parts to be tested should be evaluated at different time intervals.
  - d. The team had different suggestions for testing:
    - i. Dan suggested looking at field failures of bearings for validating.
    - ii. Matt suggested conducting a cascading test with other tests at Pitt.
    - iii. Parts corrosion versus surface corrosion needs to be analyzed.
    - iv. Anand noted that the protocol for cyclic corrosion is industry specific.
    - v. Mark suggested benchmarking with the bicycle parts testing.
    - vi. JP to connect with cascade designs regarding test protocol for their product range.
4. Whole Chair Testing:
- a. Don presented the development efforts by team Ixion who is working on the whole chair test experimental setup.
  - b. Documents:
    - i. <https://drive.google.com/open?id=0B3o-KpFV8x-8aXpyelBUS3k1ekk>
    - ii. <https://drive.google.com/open?id=0B3o-KpFV8x-8ZkRVMGZyUWx5NEU>
  - c. Suggestions:
    - i. JP concerned with the long footprint and durability of the belt.
    - ii. Matt: Simpler mechanism than the earlier model, WC fragile compared to mining stuff.
    - iii. Dan – the WC should not to rip obstacles out of the belt
    - iv. Pro for this design is that wheelchair movement can be randomized
    - v. Tether system design needs consideration – pull by axle/push
    - vi. JP to send out a paper on validation of dummy falling out of chair to body that looked at the trajectory of fall with sensors.
5. Design Guidelines:
- a. Mark reached out to a few external reviewers about the review.
  - b. Dec 13/14 are the days for meeting for Design Guidelines discussion.  
The group is meeting in California.



## Subgroups (for reference)

- Design Guidelines: Mark Sullivan (lead), Daniel Martin, Jon Pearlman, Norman Reese, Chris Rushman, Eric Wunderlich
- Casters: Anand Mhatre (lead), Matt McCambridge, Jon Pearlman, Norman Reese, Don Schoendorfer, Joseph Ott, Stephanie Lachell
- Corrosion: Matt McCambridge, Don Schoendorfer, Anand Mhatre, Jon Pearlman
- Rolling Resistance: Norman Reese (lead), Matt McCambridge, Jon Pearlman
- Whole Chair Testing: Don Schoendorfer, Matt McCambridge, Josiah Auer, Mark Sullivan, Daniel Martin, Jon Pearlman, Norman Reese, Anand Mhatre, Dave Mahilo, Joseph Ott

## Participants

- ✓ Daniel Martin, Shonaquip
- ✓ Matt McCambridge: DEKA (formerly with Whirlwind)
- ✓ Norman Reese, LeTourneau University  
Caleb Elder, LeTourneau University
- ✓ Mark Sullivan, Convaid and Polus Center (WG Chair)
- ✓ Don Schoendorfer, Free Wheelchair Mission  
Karl-Erik Westman, Handicap International
- ✓ Eric Wunderlich, LDS Church
- ✓ Chris Rushman, Motivation  
Dave Mahilo, Invacare  
Dr. Rory Cooper, University of Pittsburgh
- ✓ Anand Mhatre, University of Pittsburgh
- ✓ Dr. Jonathan Pearlman, University of Pittsburgh
- ✓ Nancy Augustine, University of Pittsburgh  
Ben Gebrosky, University of Pittsburgh  
Josiah Auer, Free Wheelchair Mission
- ✓ Joseph Ott, University of Pittsburgh
- ✓ Stephanie Lachell, University of Pittsburgh  
Kirthika Kandavel, ISWP

Prepared by: Anand Mhatre, University of Pittsburgh