

## **ISWP Standards Working Group**

### **August 11, 2015 Meeting Recap**

The ISWP Standards Working Group met by conference call on Tuesday, August 11, 2015 from 12:00 p.m. to 1:00 p.m. U.S. Eastern Time. This document provides objectives, action items and a recap.

#### **Objectives**

1. Discuss components of funding proposal for the group
2. Discuss final design and implementation of prototypes for each subgroup

#### **Action Items**

1. Working group members to vote on Doodle poll for in-person meeting availability.
2. Caster subgroup to revise test design and obtain feedback from the group.
3. Prepare agenda for in-person meeting in Pittsburgh.

#### **Discussion**

1. Working Group Funding has been approved on 8/11:

Mark submitted a funding proposal for \$41,000 to cover:

- 18k for in person meeting in Pittsburgh (7 domestic members at 2k each and 3 International members)
  - \$4k for materials and prototyping the design of Rolling Resistance test equipment
  - \$4k for materials and prototyping the design of caster test equipment
  - \$10k for design time of engineering and student internships.
  - 5k for purchase of wheelchairs used in development of the test designs. Every effort will be made to avoid this cost by seeking donations from manufacturers and providers.
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- Mark to lead the monitoring of funds and payments once available to the group.
  - The working group should look for funding opportunities as well for test equipment development that is useful for the industry.
  - Funding will be carried over in case not spent fully.

Here is schedule for second round funding proposal requests. Should be helpful for Standards WG when considering additional tests:

<i>ACTIVITY</i>	<i>ROUND 2 2015</i>
ISWP provides WGs plan, including guidelines, proposal form and funding amount available.	<b>Mon., August 24</b>
WGs submit proposals to ISWP.	<b>Fri., September 25</b>
ISWP forwards proposals to Advisory Board.	<b>Mon., September 28</b>
Board reviews proposals and makes funding decisions. ISWP informs WGs.	<b>Week of October 12</b>

## 2. MIT Cite Project

- The project will commence in 2016 with data collection with instrumented chairs under the direction of Dan Frey from MIT.
- Outcome tools developed by Karen for collecting user and clinician review on wheelchair component failures and performance could be utilized.
- Karen to provide a synopsis of her experience and outcome tools so Jon and Matt can forward to Dan Frey, who is leading the project.

## 3. Rolling resistance:

- The group discussed the first version of the caster test design and suggested revision to make the design simple and easy to prototype.
- Anand to draft the next revision in CAD and submit to group for feedback.
- Discussion:
  - How to include the corrosion component in this test with horizontal approach?
    - Anand suggested employing salt spray testing, drying and humidity testing before fatigue/load testing on current design (ISO standard and automobile industry testing standard).
    - Subjecting a loaded caster to water and dirt together may produce diverse failure modes and it would be harder to segregate the effect of one factor (moisture, surface wear, load, test time) from the other.

- Additionally, the caster will have to be dried during the test since a caster is not continuously exposed to water in real environment.
  - What is difference between DDT and new caster test design?
    - A test protocol with exposure of caster to factorial tests (salt testing, drying, humid environment exposure, UV light) before fatigue testing may produce a result which reflects real environment failure. This is an opinion and needs verification using a standard test protocol.
    - Using different surfaces like patterns on steel, wood or rubber. Casters can travel through a gravel sink that is shaken continuously.
    - Side loading using angled and helical slats is possible.
  - Will slat heights be increased for higher obstacle scenarios?
    - Yes, the design will incorporate ½ inch slats initially and then the slat properties will be varied. Data from CITE's project can assist in slat property design significantly.
  - What part of caster assembly will be attached to the test equipment?
    - This can be done in two ways – 1) for caster assemblies with housing bolted to frame can be connected in same way to our equipment and 2) in most cases, housing is a part of frame; the bearing housing connector (several standard sizes) will accommodate the bearings and caster stems.
  - Can the rotor direction be reversed, so that the bearings will be tested?
    - Yes, need a motor controller for this.
4. Rolling Resistance
- Matt and Norman will lead the development of rolling resistance test.
  - Norman's class students to resume on their earlier work conducted on rolling resistance.
  - Matt will assist activities at LeTourneau from MIT.
5. Corrosion:
- Pitt has purchased new corrosion test protocol standards related to corrosion fatigue, cyclic testing.
  - Discuss corrosion testing when the group meets at Pitt.
  - Need to make a decision on buying the salt spray tester. This is important for caster test as well since corrosion is one of the parameters affecting caster

performance. For example, caster test can include two levels of corrosion (min and max exposure to salt), then fatigue test for a constant load condition and compare caster conditions.

6. Whole chair testing:

- Don would like to develop a flat oval shaped track for whole chair test with obstacles on the flat side.
- JP suggested the group members to develop sketches and assist in activities related to proposing the test to funding agencies.
- May 2016 is the tentative timeframe when this test could be available if funding becomes available.

7. Design Guidelines/Best Practices:

- Probably best to use a collaborative approach for developing the practices.
- Jon feels it provides a nice framework for WG to have best practices; e.g., caution when choosing casters based on failure modes and why there has been an impetus for caster testing.
- This document can explain why ISWP prioritized current tests and approach for future tests.
- Will add to the agenda for the in-person Pittsburgh meeting.

**Subgroups** (for reference)

- Design Guidelines: Mark Sullivan (interim lead), Daniel Martin, Jon Pearlman, Norman Reese, Chris Rushman, Eric Wunderlich
- Casters: Anand Mhatre (lead), Matt McCambridge, Jon Pearlman, Norman Reese, Don Schoendorfer
- Corrosion: Matt McCambridge, Don Schoendorfer
- Rolling Resistance: Matt McCambridge (lead), Jon Pearlman

**Participants**

- ✓ Daniel Martin, Shonaquip
- ✓ Matt McCambridge: DEKA (formerly with Whirlwind)
- ✓ Norman Reese, LeTourneau University
- ✓ Karen Rispin, LeTourneau University



- ✓ Mark Sullivan, Convaid, Ride Designs 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

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