Preliminary Testing

These tests will be used in order to determine whether or not our engineering specs will they satisfy the customer needs.

Tilt Resistance

The customer need is for the new balance training bike to have:

1. Smooth resistance across all displacements
2. Variable resistance for different patients
3. Variable safety lockout at different angles

Method

1. A test group will be used to ride the bike and simulate falling. Their responses will be used to gauge the smoothness of the resistance at all angles of displacement.
2. The variability of resistance will be tested with a force gauge, testing once at a low resistance, once at medium and once at high resistance to determine the full range of variability available.
3. The safety lockouts will be measured for accuracy of actual angle versus angle of lockout. The variability of the lockouts will be tested by inspection.

Pedal Resistance

1. Realistic starting resistance
2. Smooth motion throughout rotation

Method

1. Using a force gauge we can determine the starting force needed to begin pedaling. In collaboration with user testing, the pedal resistance can be tested to determine if it meets the customer needs of a realistic and smooth resistance.

Instruction Page

1. Single page to post next to bike to instruct both patients and therapists in its use.
2. Large simple instructions preferably with pictures

Method:

1. The quality of the instruction sheet will be tested in a Usability Study. Participants will be given the sheet and shown the bike. How the participants use the instructions with the bike will be studied, along with a quantitative analysis of Time-to-Use, will be considered in determining if the instruction sheet is successful.

Tilt Sensor

1. More accurate display
2. Larger display, with speedo also located on display box

Method:

1. Lock the bike into 9 pre-measured tilt angles. -10°, -7.5°, -5°, -2.5°, 0°, 2.5°, 5°, 7.5°, 10°. The accuracy of the tilt sensor will be the difference between the actual tilt angle, the tilt angle measured by the inclinometer, and the tilt angle displayed.
2. The display size will be compared with the current one to show an increase in viewing area. Subjects with poor vision close-up (far-sighted) will be used to determine whether the display is readable by patients with eye problems.

Fall Counter

1. Counts the number of times in a session the patient hits max angle
2. Audio feedback
3. Variable with different lockout angles
4. Reset button to start count over

Method

1. A short experiment will be conducted in which the bike is pushed until it reaches the lockout angles. This will be done 3 times at different speeds of falling for both left and right falls at 5° and 10°.
2. The number of falls counted will be compared to the actual falls, this will help us find out when and why a fall would not trigger the fall counter.
3. Audio feedback and the reset button will be tested by inspection.

Bike Durability

1. Keep frame in very stable condition
2. Cover loose wires for display
3. Stabilize parts in display box

Method

1. The frame durability will be tested pre and post-construction in ANSIS in order to determine how much stress the frame is equipped to take.
2. The loose wires and stable parts will be tested by inspection.