

Exoskeleton Operation Manual

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August 09, 2017

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1 INTRODUCTION

The number of the patients with the need of practical rehabilitation is increasing by the day. With the increase of the patients with physical development issue, the conventional recovery has been not able to fulfill the necessities, since it is high treatment cost, requests for word related specialists, and predominantly depends on rehabilitation treatment. Therefore, Adjustable Human-Exoskeleton Mounting Interface for Assisted Gait Rehabilitation is introduced, in attempt to mitigate the aforementioned problems and cater to the needs of the society

2 Operations

- a) This design is used in static exercises and not for the movable, in such a way that the weight of the same does not affect the left extremity.
- b) The footplate installed to ankle area by lower frame which is made from aluminum 6061.
- c) There are different sized of the footplates which are 11.5, 11, 10 and 9.5.
- d) There is a bearing between the frame and footplate to make movements free and there is bending to avoid hurts of ankle.
- e) The plastic sheet has different sizes and molded by hot water to make it curve shape, so it will be easily attached to user's legs.
- f) The holes of the frame are used to adjust the plastic sheet place.
- g) Every other day, the bearing should be adjusted and tied to avoid changing degree of angle.
- h) In both of the plastic sheet areas, there are two Velcro belts which are located outside, so for the lower plastic area, the belts adjust the shin area, and for the upper area, the belts adjust thigh areas.
- i) The width of both frames is 0.765 inches because they will attach to the motor easily.
- j) The screws had flashed to avoid any hurts for the users.

3 General Maintenance

Maintenance

- a) It is important to keep the exoskeleton device clean.
- b) The thickness and weaving pattern of the plastic sheet must be selected to take the load of people in the age-group 13-75 ages.
- c) To utilize the exoskeleton, users must be a sure size (between 5 feet 2 inches and 6 feet 3 inches, and under 220 pounds) and needs to have the vital bone thickness to stand and walk.
- d) Intermittent upkeep includes the supervision of working conditions, the supply, or substitution of ointments for the bearings, and consistent occasional investigation.

Precaution

- a) Exoskeleton should be properly maintained to ensure safekeeping of the device.

- b) Should be used in such a way that it must not go out of order due to wrong handling.
- c) One should have clear ideas on how to handle this device competently to avert severe dislocation of joints

4 Assembly

The purpose of this group project is to develop an exoskeleton that will be assist the people with disability to move with ease.

Assembling

- a) The exoskeleton proposed for this design will have joints at the knee and the ankle area. The frame of the structure will have two joints in the knee for the motor and ankle for the bearings.
- b) The joint at the ankle will be a simple joint with a single degree of freedom. The joint at the knee area will have additional stiffness to take care of load.
- c) This joint in turn will have two joints to support the shin-knee movement and the thigh-knee movement. A small frame is connected at the knee area with joints at both ends which is the motor.
- d) The joint will be made of screws for the ankle, the motor will be attached to the knee's joint and the design will ensure that no parts are projected outside.
- e) The foot plates will be inserted to the shoes and it will have insoles above the plates to avoid slipping of the foot to outside area.
- f) The back portion of the thigh and the shin area will have protection to adjust the body shape during the movement.
- g) These metallic surfaces will be connected to the framework through riveted arrangement.
- h) The front portion of the knee area is covered with a motor to shield the knee during its bending. The knee will tend to move forward during bending and has to be restricted.
- i) A motor is bent and fixed near the knee area to restrict it during the movement.
- j) Adjustable arrestors are provided at the thigh area to fix the exoskeleton and adjust it as per the thigh dimension.

APPENDIX

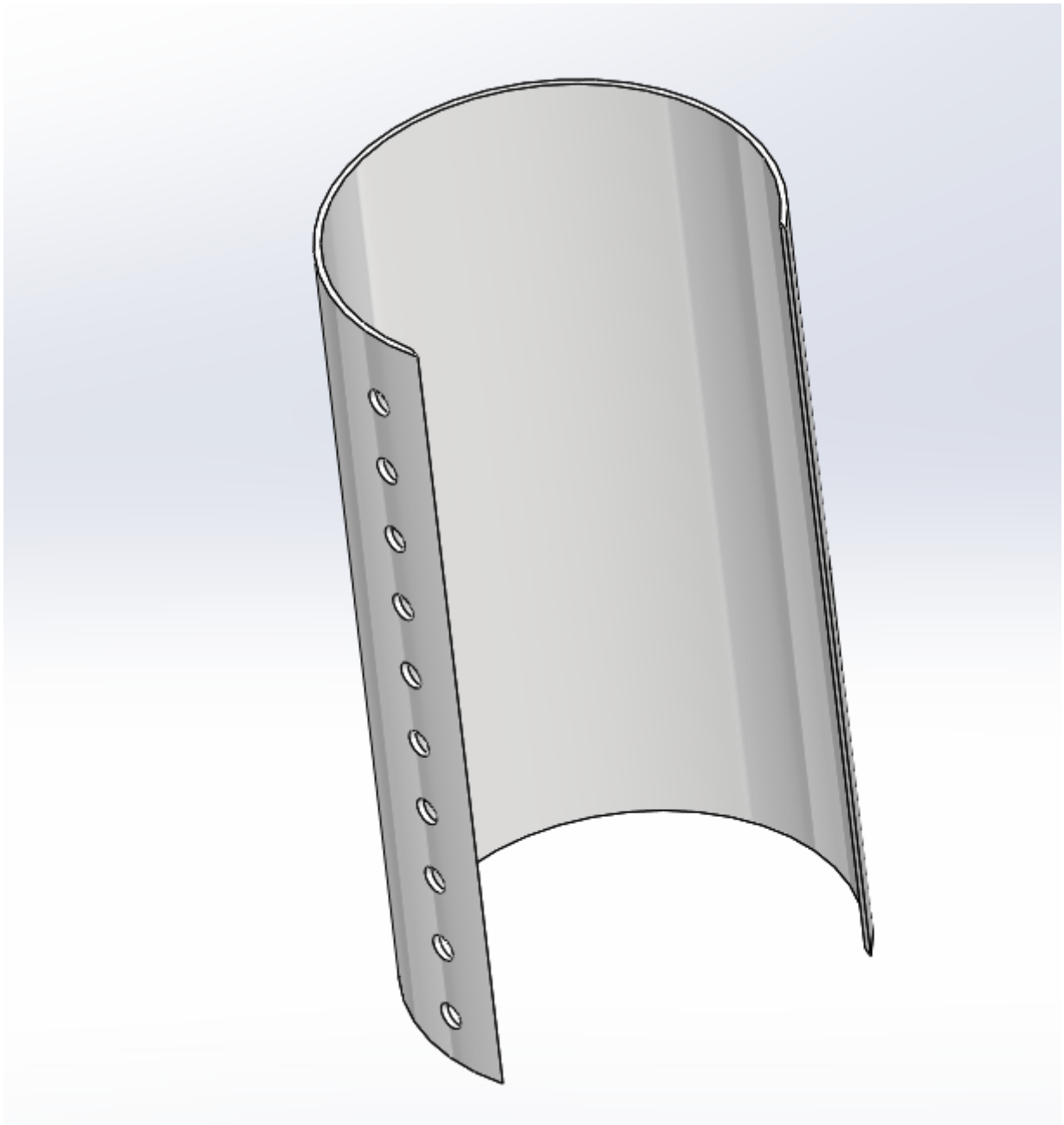


Figure 1 Plastic Sheet with Holes



Figure 2 Footplate with Velcro Belts



Figure 3 Bending and Bearing of Ankle Area



Figure 4 Inserting Footplate inside a Shoe

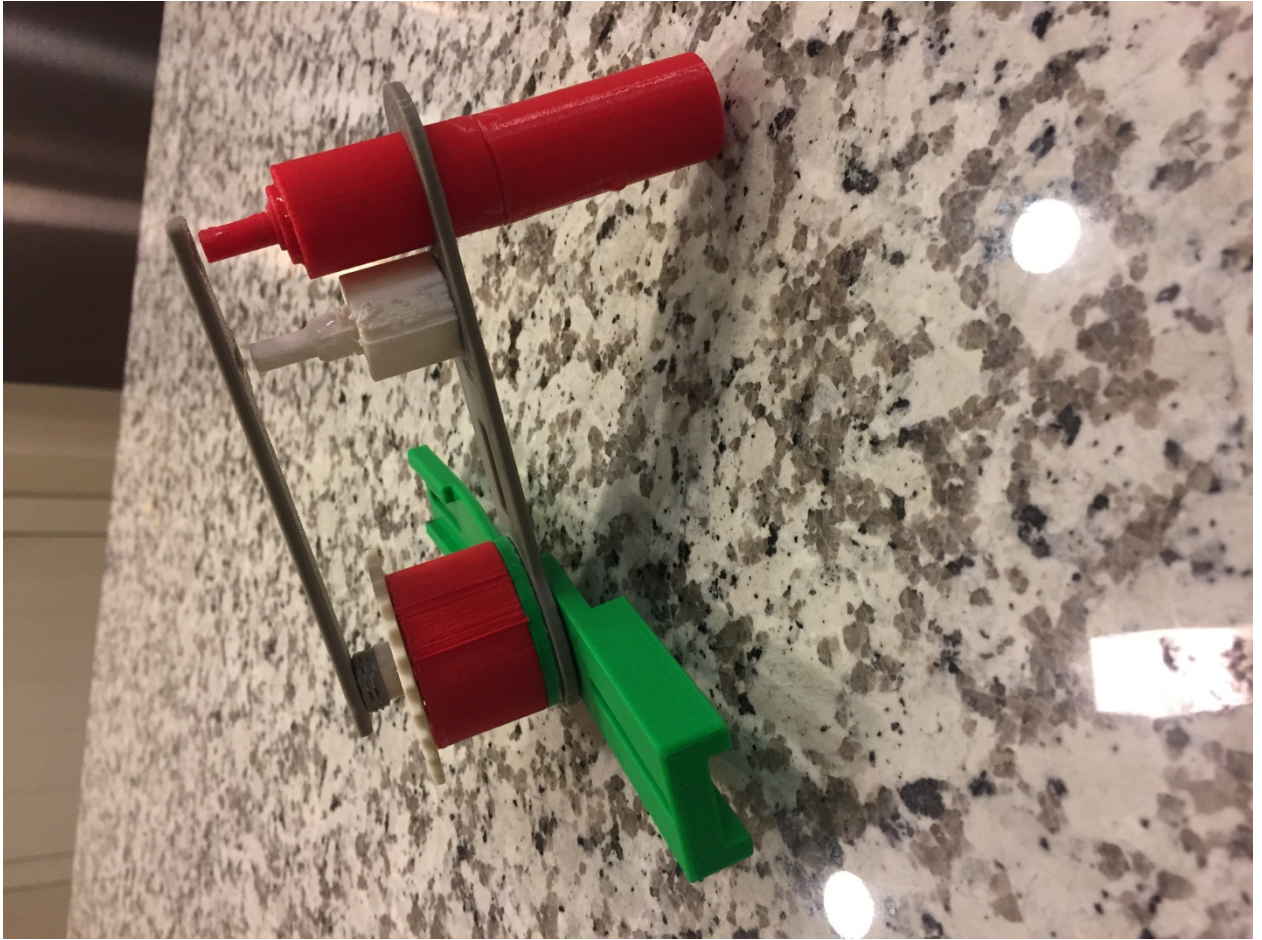


Figure 5 Prototype of the Motor



Figure 6 Attaching the Frames to the Motor



Figure 7 Attaching Frames to the Motor (2)



Figure 8 Flashed Screws



Figure 9 Final Leg Exoskeleton Assistive Device