Review of Design Decisions

**Bone Mount Axle (BMA)**

Functions: The bone mount axle must attach to Praxim’s adjustable bone mount and allow the rotating base to freely rotate around it.

Design Goals:

* Have the bearings for the rotating base spaced as far apart as possible to minimize play in the joint

**Rotating Base (RB)**

Functions: Provide a base to mount all of the device components to.

Design Goals:

* Design to be as easy to manufacture as possible

Design Features:

Link axles are designed to be threaded in to the RB in order to avoid a press fit into the RB

The attachment points for the links are perpendicular to each other and angled 45 degrees away from the BMA to minimize interference with the soft tissue around the knee.

Recommended Improvements

Casting this part would allow for a more complicated geometry, which, in turn, could reduce the total amount of material required to accomplish its required functions; therefore, reducing the weight of the part.

**Primary and Secondary Links**

Functions: The primary and secondary links constrain the upper connection (Link 3) to move in a strictly linear motion wrt the RB. The primary links also need to be facilitate the physical constraint preventing motion past a defined linear distance between the RB and link 3.

Design Goals:

* Minimize the size and weight of the links
* Have the contact surface of primary link 1 (PL1) shaped so that the function for the physical constraint position is as simple as possible
* Minimize the size of the joints between the two primary links and the two secondary links.

Design Features:

Link Size

Equal length primary links were chosen to simplify the physical constrain function. A link length of 70mm was chosen because it yields a large enough machining envelope and is also large enough to avoid any collisions between the primary link encoder and the and the physical constraint motor.

Link Profile

All of the links, except PL1, have a peanut shape in order to reduce the weight of the links. PL1 has the peanut profile on the top half of the link; however, the bottom half of the link is a straight edge in order to provide an edge for the physical constraint to act on.

Recommended Improvements

An area for improvement lies in the joint design. The joints have been designed to be a small as possible while still providing minimal play, a possible improvement to the design would be to simplify the machining process for the links as much as possible. Simplifying the joint design could lead to a much easier and faster assembly of the device.