

To: Dr. Trevas

From: Chrishell Mercado

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Re: Individual Analysis

For this Individual Analysis, our group needed to capture the motions from a foot pedal to rotate a flywheel. Our group has decided on a design that will use a linear motion to capture the oscillating motion of the foot pedals. Before finalizing the linear motion, our group started

with a crankshaft design. One of our group members then pointed out that there are simpler motions we could use and so we started looking into a rail system like a garage door. We found a linear slide guide by Joomen CNC with a model number of SBR25. This component is from amazon and it comes with two rails and four bearing blocks. The bearing blocks are carriages that move on top of the rails while minimizing friction due to ball bearings installed within them. These bearing blocks has a specification dependent on the type of railing system we decide to get. For the one that we found, the railing will be 700mm in length. We chose this length so that it will be long enough for a full motion of the foot pedal can occur. The bearings will be attached to the springs so

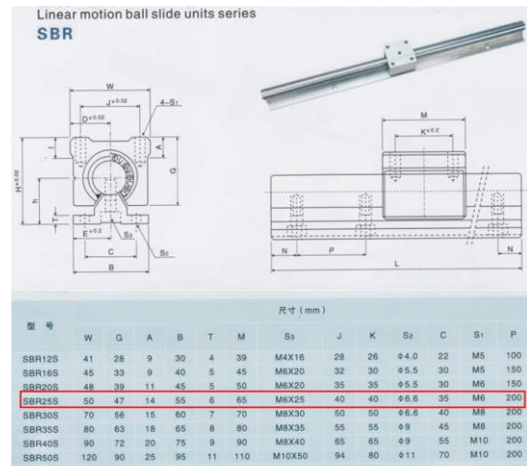
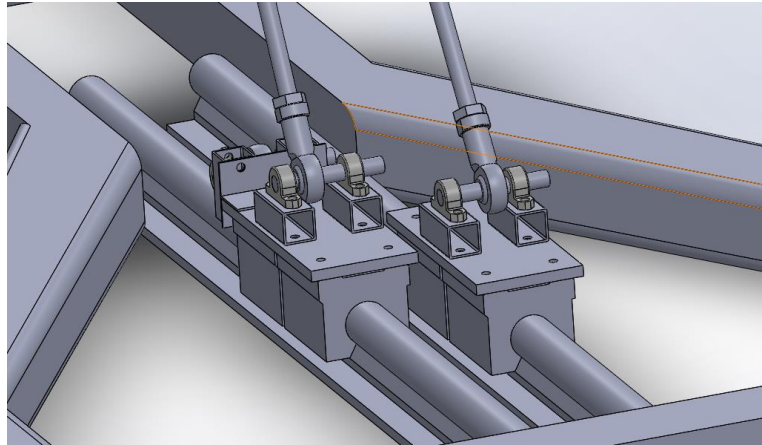


Figure 1: Linear motion selection chart

that when we push down on the foot pedal, the force from the foot will move the bearings forward to the furthest point it can go and will stop when it hits a barrier. Since we are only concern with the rail moving in the x-direction, we can ignore the forces in the y direction. According to the summation of forces on the bearing blocks, when trying to move the block forward, the x directional force from the foot must be greater than the x directional force of the springs. As the bearing blocks move further from rest, the potential energy from the springs will increase. When the rail is going back to the rest position, the x forces from the foot pedal will become zero since there is no one pushing on the pedals. The potential energy from the springs will then make the bearing blocks move to its natural resting position. There were many potential railing systems that we looked at but Joomen CNC was the least expensive, costing \$200. At the top of the bearing blocks, there are four mounting holes. We are going to be using these holes to mount a steel plate so that two blocks will be moving at the same time. We first wanted to machine shop custom

designed parts. We then realized that we could redesign some components to where we didn't have to machine any parts. As seen in Figure 2 our new design will just obtain the parts from a website called McMaster. In conclusion, having a linear motion is a simpler design than the crankshaft that will still be able to capture the motion of the foot pedals. We hope to obtain the parts that we need by the end of next week so we could start measuring and cutting the exact dimensions we need.



*Figure 2: Mount Design*