Project Identity

Adjustable Back Angle Controller
Week 5
February 28, 2007
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Work Completed

This week we received the bedframe (Figure 1) from Affordable-beds. We first made sure the frame pieced together correctly and assembled it as shown below. Upon taking measurements we found it to be 76.5” x 38.75” x 7”. Unfortunately, because of the way the cross bar is in the back end, it gets in the way of the scissor jack. So we spent some time in the machine shop on Monday removing the back joints and re-bolting them to the middle of the bed. Now the bed frame has one cross bar at the foot of the bed and a second in the middle to allow for clearance of the jack.

Figure 1: Assembled Bed Frame with Approx. Layout of Scissor Jack
The motor we ordered is below in Figure 2. The output parameters for the gearmotor are 72 in-lbs continuous torque, 285 RPM output speed, 48 VDC, and 8.1 A continuous current. This motor is a huge improvement on our original findings because the speed is nearly 6 times faster. It was modified this week so that it can be connected to the scissor jack. We basically took off the hex nut that came with the manual crank for the jack and attached it to the motor shaft. First the press-fitted key had to be removed from the shaft so that the nut would fit. Once this was removed the nut was placed over the shaft and secured with a screw, lock washer and bolt. This made for a simple solid connection to allow the motor to power the screw jack.

Figure 2. Modified MMP S28-150E-48V GP81-014 DC Gearmotor

I have been brainstorming some new ideas for attaching the scissor jack. It seems as though the turnbuckle idea for allowing rotation of the jack as the bed angle changed may cause some issues with load bearing on the joints and possibly even binding up in operation. To eliminate these issues, I suggested a solid joint at the base of the jack instead of a pivot and some kind of wheel-in-track system to attach to the back of the bed. This way the jack will lift the load vertically, eliminating all angle changes. Since the jack would no longer tilt with the back of the bed, a wheel will be attached to the top of the jack and ride in the track placed on the back of the bed. As the jack rises, the bed back will rise smoothly along the wheel-in-track system. A simple polyurethane fixed castor wheel would be sufficient. Some kind of parallel metal bars can be built around it on the back of the bed to roll straight on track. In Figure 3 below I have diagramed a basic layout of the back bed frame. It will consist of a plywood or
plastic backing with steel support bars. The vertical lines in the middle represent the track that the castor will glide along.

![Figure 3. Idea for Bed Back Frame](image)

**Future Work**

In the coming week we will continue to characterize our parts that came in by attaching the motor to the loaded jack and measuring the current-load characteristics. We will be sure to connect the DC gearmotor, motor speed control, AC to DC power supply, and AC line cord for the power supply to have full operation of the motor. We will continue to finalize the dimensions of the steel cage design that encloses the motor and attaches it to the scissor jack. Future expenses include labor and cost of welding (~$80), a castor wheel for the track (~$25), and plywood to finish framing the bed (~$25).

**Project Review**

At this point all ordered parts have been received and the bed frame has been modified so that we can start connecting our device together. The DC gearmotor has also been modified so that there is a nut attached to the rotating shaft for easy connection to the screw jack. These were our last major purchases for awhile and we are still within budget with $685 remaining. We have currently spent about $1315 of our $2,000 budget.

**Hours Worked**

12 hours