

Chase Cromwell  
*Stampede Arm II*

Can 3D Printing be used to manufacture a myoelectric prosthetic arm for under \$350? The design criteria for this version were: 6-7 piece hand, no drilling for assembly, 35+ lbs knuckle strength, 5 hour battery life, arm weighs 5.7% or less of patient weight, and the arm meets all 14 points of evaluated range of motion. The design was updated to extend the range of motion and correct previous errors. The prosthetic was then re-printed and assembled, meeting part count and drilling requirements. Final testing measured and compared the prosthetic with the model arm along with battery runs. Results show that the prosthetic performs under simulated load for 15.5 hours on average before loss of power. The knuckle strength averages at 95lbs before breaking. Comparative tests for weight and size requirements show the prosthetic matches the model arm. Range of motion evaluation showed all functionality is normal except for the wrist's radial and ulnar movement because the arm has no mechanism for that movement. Additionally, the elbow flexion motion was 23° short of the 150° requirement. This version and its properties successfully meet 11 of 12 cumulative design requirements. Future additions could be to allow the arm to receive and interpret data from a brain-based headset or to create a second arm and explore dual mobility processes such as driving or typing. Extended knuckle testing with more trials and varied hinge designs/diameters could provide even more conclusive and informative data on an optimally strong knuckle.