IMPLEMENTING RAPID PROTOTYPING WITH CURRENT TECHNOLOGY TO ENHANCE OVERALL FUNCTION FOR BLIND BILATERAL PATIENT

Matthew Mikosz

Hanger Clinic

ABSTRACT

This presentation will discuss the design and fitting process for a blind, bilateral partial hand/ trans-radial amputee who also underwent a face and jaw transplant after an attack by a chimpanzee and the rationale behind choosing the specific design that was implemented. After a thorough evaluation with the patient by the physician, upper limb specialist and Occupational Therapist it was determined that the patient could benefit from being fit with some of the latest myoelectric technology with some modifications to maximize her function. The technology that was chosen for her on the left trans-radial side was a myoelectric prosthesis with I-Limb Quantum, electric wrist rotator and custom silicone socket interface. The right partial hand was a custom made implement holder that was designed in CAD and 3D printed. The purpose of this presentation is to highlight the benefits of rapid prototyping and how implementing with current technology can enhance the functional outcomes for the user. Utilizing the I-Limb Quantum with electric wrist rotation had proven to have many benefits that improved her activities of daily living but also presented some challenges. The wrist rotator presented the most challenges as being blind she was unable to determine where the hand was in space. This challenge was anticipated and led to the design of a wrist rotation limiting device that was placed in between the hand and prosthesis to limit the motion of the wrist rotator. The range of motion determined to be required for functional activities was around 90 degrees. This allowed her to always know where the hand positioning was based on an audible beep from the wrist rotator when the limits were achieved. The right partial hand device was designed specifically for her to better assist her with feeding herself, writing and grooming. Several designs were developed over the week and incorporated into her therapy sessions. At the end of the week the optimal design was printed and implemented into her prosthesis. This fitting has shown that currently available technology alone can have great benefits for the user but when limitations or challenges arise some modifications or additions can compound the benefits and overall success for the user.