Re-Design of the Automatic CPAP Hose and Mask Washer

Przyjemski, Andrew

CPAP or continuous positive airway pressure is currently the only available treatment for people diagnosed with sleep apnea. An Automatic Washer for a CPAP Hose and Mask was built in 2012. The first project was successful in meeting its goals; however, the washer was difficult to use and eventually failed due to inadequate design. The objectives of this year's project were to improve ergonomics of loading the hose and mask for cleaning, the delivery of fresh water to the wash basin and the wash and drain pumps. The upgrades included adding a drying cycle, solid state controls and the use of specially designed components. The cleaning requirements were reviewed to identify the design inputs required to perform engineering calculations. A design specification was developed based upon the engineering evaluation. A 3D CAD program was used to design the device. Additive manufacturing was used to create the one of a kind parts required to meet the design specifications. The 3D CAD file was converted to a surface tessellation (STL) file. The STL file is the input to the 3D printer used for building the parts. The printer software divides the geometry from the STL file into horizontal slices of varying thicknesses. The printer then adds thin layers of plastic resin in the locations needed to create the three dimensional parts defined in the 3D CAD program. A prototype incorporating the design changes was built and tested. Evaluation of the new prototype showed that all of the engineering goals were met by the new design.

Awards Won: