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Prosthetic Limb Structure & Fabrication Method

Congenital limb defects or loss of a limb through an accident can severely impede an individual's mobility and ability to carry out day-to-day tasks. Artificial limbs, or prosthetics, are intended to restore a degree of normal function to amputees or individuals with congenital limb defects. Because of variations in sizes and shapes of individuals and their limbs, or limb segments, prosthetics are typically custom manufactured and complex. This leads to higher manufacturing time and production costs. Needs exist for prosthetic devices and fabrication methods that address the limitations of conventional devices and methods.

Prof. Jeffrey La Belle at Arizona State University has developed novel low-cost, easy to assemble prosthetics, methods of fitting, manufacture, and assembly. These prosthetics are fabricated rapidly and then assembled to form the internal frame of a prosthetic device. They are made with inexpensive materials that are lightweight and crush-resistant capable of withstanding substantial axial and torsional loads. The assembled prosthetic may also incorporate functional elements such as actuators, sensors, control mechanisms, energy storage devices, etc. The device can be custom-built for a specific recipient and measured to match intact limbs if present. Further, the design could be adapted for use in underdeveloped areas or in emergency medicine/battlefield/job site locations as customizable splints. Stress studies, with application of a static load of 2000 Newtons, were performed and no parts of the frame experienced a stress exceeding 5.5N/m².

This technology addresses and overcomes many of the limitations of conventional prosthetic devices to provide novel, custom prosthetics that are quick to produce, cost-effective, strong and highly functional.

Potential Applications

- Medical prosthetics
 - Fingers
 - Arm
 - Leg
 - Custom splint
 - Underdeveloped/remote areas
 - Emergency medicine
 - Battlefields
 - Job sites

Benefits and Advantages

- Low cost, lightweight but strong materials
- Easy to manufacture/put together
- Able to be custom-built
- Can incorporate functional elements

For more information about the inventor(s) and their research, please see [Dr. La Belle's laboratory webpage](#)