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Case ID:M19-073L
Published: 9/6/2019

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Improved Lower Limb Socket

Use of current designs of lower limb prosthetic sockets result in many user issues ranging from pain and discomfort to tissue degeneration, thereby leading to lower levels of patient compliance. Common socket designs, including pin-lock and suction-based designs, utilize a solid outer shell that provides high levels of force distribution over the residual limb, however they allow little airflow, heat dissipation, moisture wicking or volume adjustment. While there have been some efforts to overcome these issues, they are either complex, bulky and expensive, or have reduced contact with the residual limb causing pain and tissue damage.

Researchers at Arizona State University have developed a novel passively cooled prosthetic socket that is able to produce the same force distribution of suction-style prosthetic sockets but with improved cooling capabilities. This cost-effective socket also allows volume adjustment by the end user and provides for maximum level of comfort for Class I and II amputees. Maximized air flow results in a socket that is passively cooled, stream-lined and a universal fit with high force distribution for decreased pain and tissue damage.

This unique and ingenious design produces a device with the benefits of a cooled socket but the mechanics of a traditional shell suction socket all at a reasonable price point.

Potential Applications

- Transtibial prosthetic socket
  - Class I and Class II amputees

Benefits and Advantages

- Improved heat dissipation and volume adjustment for fewer follow up fittings
- Cost-effective (projected retail price: $2700)
  - Fewer custom components and tooling

- Improved force distribution when compared to a state-of-the-art adjustable socket
    - Less deviation in force applied around the residual limb
    - Almost 4.5x the active constrictive area
    - Does not sacrifice air flow

For more information about this opportunity, please see

Smith et al - BMES Symposium - 2019