Analyzing the Effects of Fluid-Integrated Outsoles on Foot Swelling

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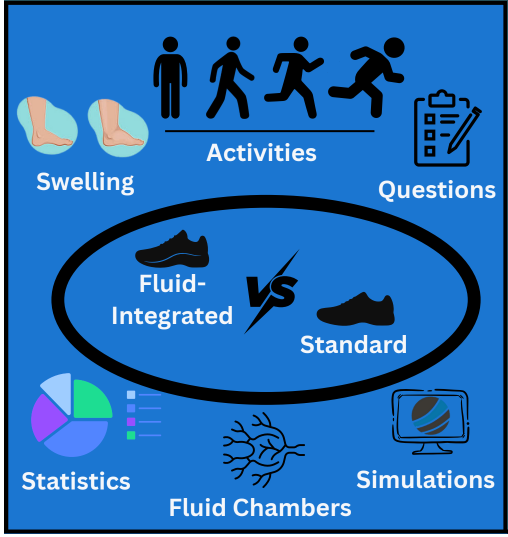
Abstract + Engineering Goal



Engineering Goal: Design a shoe with integrated fluid channels to reduce foot swelling

Integrating fluids into shoe outsoles alters the user's plantar pressure distribution.

Data Analysis

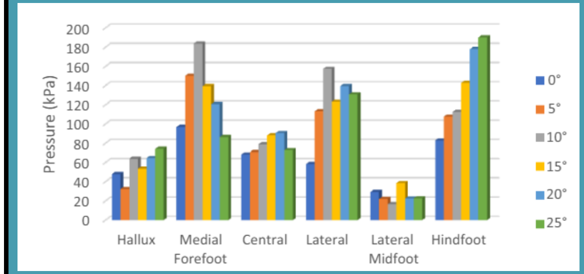


Figure 1: A graph showing the different regions of the foot and how their pressure is affected by different inclines for a person standing still

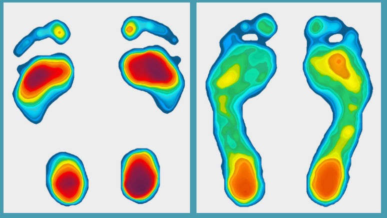


Figure 2: Aetrex Albert Foot Scan of a Participant's Fee, highlighting high pressure areas in warmer colors.

Methodology

Develop Fluid Chambers → Simulate Foot Strikes → Optimize Chamber Locations → Test Different Fluids → Develop Prototypes → Competitor Analysis → Organize Results → Draw Conclusions

Interpretation and Conclusions

According to the bar chart and foot pressure scans, the highest pressure areas, when standing still, are at the forefoot and hindfoot of the sole. In each figure, pressure is unevenly distributed across the plantar surface, which is further shown on inclines, as shown in Figure 1. Given the force-reducing properties of fluids, which help reduce pressure through longer contact time and spreading out the pressure, this data strongly supports the potential of incorporating fluid-filled chambers into shoe outsoles.