

Testing for water resistance in footwear has always presented problems. When military combat boots become involved, the high standards required call for the most stringent testing, which can be both expensive and time consuming. A new method using a centrifuge machine may prove to be the answer.

Putting the boot in

A prominent defence contractor approached centrifuge maker U.S. Centrifuge, to see if its machines could be used to test for water resistance. The thinking was that if you could stop water getting out, it was also not likely to

get in. A centrifuge is able to create considerable pressure, and as water cannot be compressed, it would find the smallest of leaks through which to escape.

The contractor supplied 16 pairs of boots saying that six of them were known

to leak and wanted to know whether U.S. Centrifuge could identify which ones they were. In the event, eight were found to leak, proving that the centrifuge method was superior to the existing methods used by the contractor and was able to replicate extensive field tests in a matter of minutes.

How does it work?

A boot is loaded toe down into each of 16 chambers that fan out from the central spindle. It is filled with 400cc of water inside the toe and spun for 30 minutes. The centrifugal force produced causes a layer of water to form against the inside of the sole of the boot at a pressure of 2psi; enough to find the smallest leak.

As can be seen in the image, the machine is relatively small. It was designed using Solid Works 3D modelling software to generate 3D computer simulations to assess its practicality. A strong tubular frame supports a vibration-isolated floating base plate for the 36" (90cm) diameter segmented rotating assembly and spindle pack. The control panel features a PLC-based control system, a colour HMI screen to display machine information and VFD motor control so that RPM and respective 'G' force can be adjusted for individual boot styles.

This looks to be an idea that clearly works and could be a useful tool for anyone producing water-resistant footwear, especially golf shoes. 

Details and images courtesy of U.S. Centrifuge.

