

TRENDS IN THE DESIGN AND MANUFACTURE OF FOOTWEAR

Sponsored by the Design Committee of the Bioengineering Division

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There are many new challenges facing the footwear industry as they seek to gain a technological advantage to offset the lower cost of production from the Pacific Rim. In fact, the use of technology in footwear is a very recent trend. There are many different approaches to the use of technology in footwear, and this panel seeks to highlight some of the issues involved and to raise the level of discourse in this important field. In addition to the manufacturing challenges within the industry, there are other critical new questions that are being discussed.

Background

The history of footwear precedes recorded history through archeological records. This article does not attempt to document this history, and the reader is encouraged to read Carlson¹, a detailed history of footwear.



The earliest known European shoe, although not the earliest shoe, was found on an intact mummy frozen into the ice in the Alps. This mummy has been come to be known as the *Ice Man*, who lived around 3200BC, and was fairly well-to-do. This shoe, shown at left, surprisingly, was made of multiple pieces of leather and woven quarters. The stitching was very fine, and the interior was lined with grass for insulation. You can read more about the *Ice Man* on the museum's web site at:

<http://www.provincia.bz.it/archaeologiemuseum/gb/index.htm>

Later shoes up through medieval times are made from a single piece of leather, with a center seam. Late in medieval period, a lacing was used

¹ Footwear of the Middle Ages - Counters and Edge Binding, by I. Marc Carlson. Copyright 1996, 1998, 1999.

under the single piece leather shoe which served as a sole. The Romans were the first to use lasts made of iron on which they made shoes, introducing hobnails to hold the soles in place. Heels didn't appear until the late 16th century, and lefts and rights didn't become the standard until the 19th century. What is apparent from this brief history is that progress has been slow in footwear through the ages. A definite trend in recent years, however, is that footwear has benefited from an injection of modern materials and adhesives.

The Panelists

The following panelists include representatives from academic and manufacturing backgrounds. They bring a diverse set of viewpoints and insights.

- **Dr. Greg Dobson** is one of the Founders of *Applied Geometry*, a high technology startup that is dedicated to the creation of smart geometric modeling applications. One application of this technology is in the characterization of feet from 3D scans and the use of expert knowledge to automatically create lasts from which custom shoes can be constructed.
- **Dr. Jordan Cox** is a faculty member at Brigham Young University and a consultant in the field of Reverse Engineering. He has been involved with the creation of a modeling technique to create custom shoe inserts based on a measurement of the pressure field on the sole of the foot.
- **Mr. Howard Shaffer** is the President and CEO of *Otabo*, and has a long history of involvement in the footwear manufacturing industry in the United States and abroad. He was also involved in a project to study the application of new technology to the manufacturing process for footwear to create a flexible manufacturing approach. His company represents a new wave in the use of modern technology into the manufacture of footwear.