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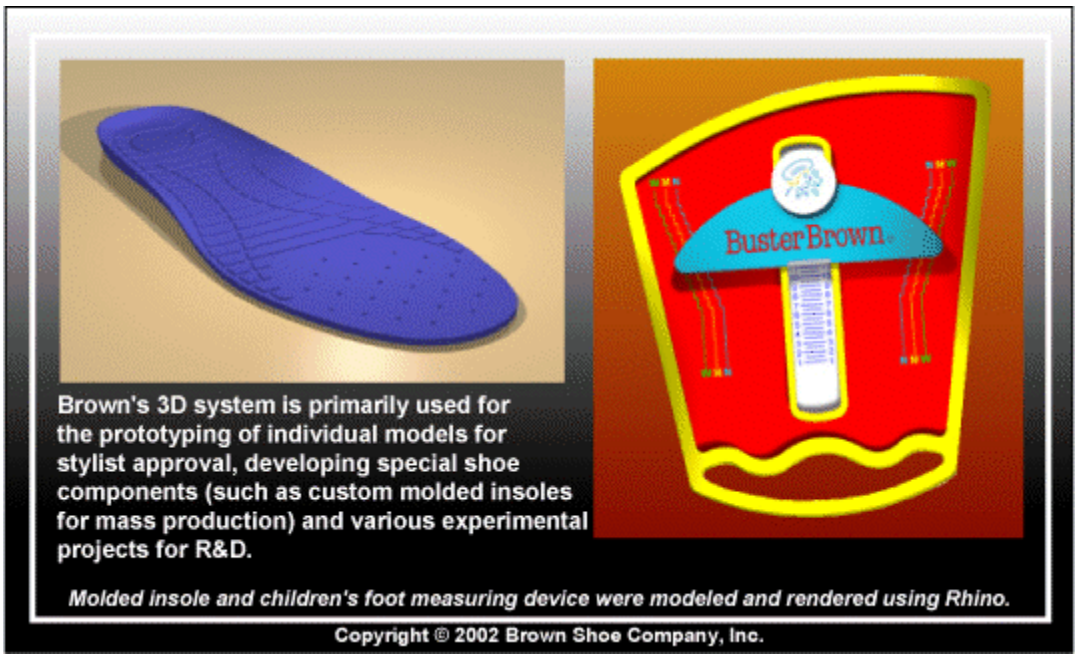
Molds for the shoe industry

More than 120 years ago in 1878, a young man named George Warren Brown believed St. Louis could become a manufacturing center for the shoe industry. He invested his life savings and founded his own little company to manufacture and sell shoes.
That little company is now a major corporation with annual sales of $1.6 billion. Brown Shoe today is the No. 1 retailer of value-priced, brand name shoes for the American family. Plus, we still own and market such well known brands as Buster Brown shoes for kids, and Naturalizer, LifeStride and Connie shoes for women.

Located in St. Louis, Missouri, Brown Shoe Industries is the #1 retailer of value-priced, brand name shoes for the American family.

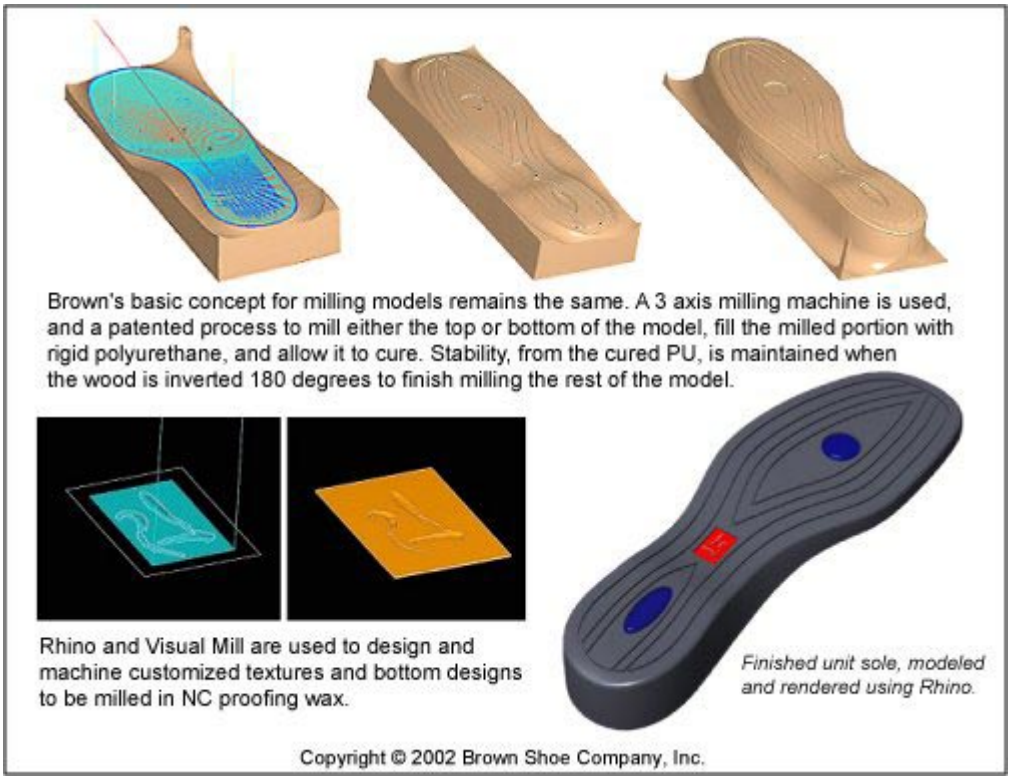
The popularity of unit soles used in women and children's shoe styles had become prominent in the early seventies. This created a new area in Brown's bottom pattern department. Pattern engineers in this new department would make profile, foot and street side paper patterns based on various lasts (a form used to build shoes). These patterns along with a drawing with more detailed instructions would be sent to our model shop to have a wooden model made by hand. The models are often embellished with a vinyl texture covering, and a design on the bottom. After the model was approved, various size patterns would be graded and a run of models would be made. They would then be used to make aluminum molds for production of the finished part. This system proved to be the best solution for our needs because it allows for more versatility with design, input from the shoe stylists, and accuracy.
As the demand for unit soles grew, a more efficient system was needed to help speed production. In 1981 a research team headed by Dan Doerer from R&D was assigned to find a solution. 3D computer modeling and milling was relatively new, but Dan was familiar with the technology and decided on a benchmark test using outside resources. It was at this time that I, Gary Woods, being a pattern engineer, was introduced to this new concept for training. By 1982, our first 3D CAD/CAM system was in place.
In 1997, Brown's 3D system was primarily used for the prototyping of individual models for stylist approval, developing special shoe components (such as custom molded insoles for mass production) and various experimental projects for R&D. The second system, which had been in place since 1988, did an adequate job but was outdated. Since it was UNIX based, it limited interaction with R&D, co-workers, and various outside resources that use Windows. The search for a new PC based 3D CAD/CAM system was initiated.



Although a new system was needed, we had to prove it to be faster and more productive than the system we were currently using. This would require us to do another benchmark test. We evaluated several software packages with meetings and demonstrations. A strong interest in STL rapid prototyping was also considered. However, downloading trial software from the Internet proved to be the best way to evaluate a product's capabilities. After testing what was available, we decided Rhinoceros from McNeel & Associates met all the criteria required for the CAD portion, and much more. Using Rhino enables us to create models with greater detail in a shorter amount of time, and the added benefit of creating realistic renderings, DWG, and Illustrator drawings proves to be invaluable.

Since many of the software packages we evaluated previously offered various CAM solutions, we were familiar with most of them, and their abilities. We focused on VisualMill from Mecsoft Corporation because of its ability to accept, and toolpath native Rhino models, and the evaluation software that we downloaded proved to be very promising, but again, an actual benchmark test would be needed. With the helpful cooperation of VisualMill's support team, we were able to do a complete evaluation, and approve the purchase.

Today Brown's basic concept for milling models remains the same. A 3 axis-milling machine is used, and a patented process to mill either the top or bottom of the model, fill the milled portion with rigid polyurethane, and allow it to cure. Stability, from the cured PU, is maintained when the wood is inverted 180 degrees to finish milling the rest of the model.



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Finished unit sole, modeled and rendered using Rhino.

Using our previous system, a computer model would be broken up into individual surfaces and toolpathed separately. VisualMill speeds this process by allowing us to toolpath an entire portion of a model using various size tools, then process the paths using the customizable post processor. The resulting nc files are transferred to a Zip disk and brought to the model shop for input to our milling machine, along with a drawing which illustrates the positioning used, and renderings of the finished part. The drawings and nc files are then archived for future use if needed.

In addition to milling the wood model, Rhino and VisualMill are used to design and machine customized textures and bottom designs to be milled in NC proofing wax. These finished wax impressions can be used for either a direct pouring of modeling material, or made into an RTV rubber mold for high frequency molding onto a vinyl sheet. These textures and molded designs can be later applied to the wooden model.