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## Sculpted shapes in wood for musical instruments

Nestled in the towering cedars and maples of the Eastern Fraser Valley, near the city of Chilliwack in British Columbia, Canada, is the home of Heiden Stringed Instruments. Luthier Michael Heiden makes finely crafted mandolins and guitars for customers all around the world. Having legends like Mark O'Connor and Guy Clark play his guitars exclusively has allowed Heiden to enjoy a huge reputation among musicians.

He has earned this reputation the old fashioned way, by working for it. As a master craftsman with over 25 years of experience, Michael applies painstaking attention to detail both in the crafting of the instrument as well as producing the best-fit instrument to the playing style and needs of the musician.

"Tools are a big part of my life" says Michael. Over the years he has carefully made and selected tools to help him in his quest for building the perfect instrument. Starting out with nothing but hand tools, today he has added CAD/CAM/CNC as an integral process in designing and manufacturing of his instruments.



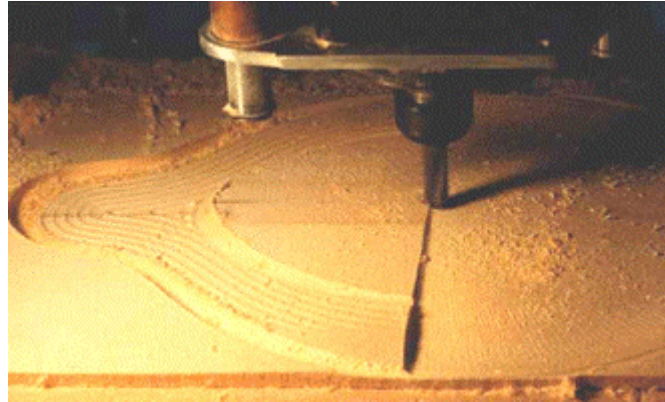
Michael Heiden is the owner of Hieden Instruments, maker of fine custom Guitars and Mandolins.

Having had little experience in CAD/CAM/CNC, Michael (in getting started), set about researching the field for the best combination of tools that would fit his needs. He settled on **Rhino** from [Robert McNeel & Associates](#) as his CAD system. "I hired an artist trained in AutoCAD and Rhino to do the complex rendering of the curves and cross sections necessary for the top and back plates. He has given me a basic training, enough to do the drawings of all the other parts; instrument molds,

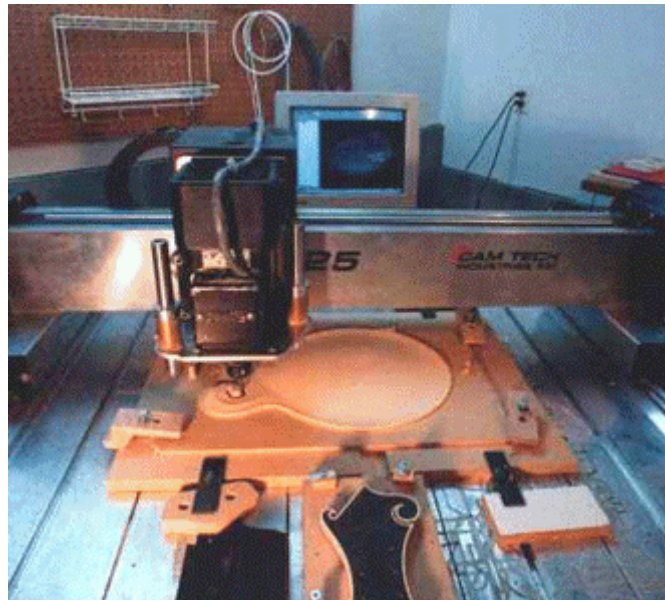
bending forms, inlays etc. Rhino is a very versatile and powerful 3D rendering program and allows me to draw quickly and then import directly into the manufacturing program. After demoing and looking at numerous manufacturing software I chose **VisualMill** from [MecSoft Corporation](#) because of its versatile, intuitive, graphic format. It has such a variety of tooling options and the on-screen simulation allows me to see and test every cut before I send it to the router, saving valuable time and materials. The people at MecSoft are very helpful and committed to making the program work for my particular needs."



An elegant tear-drop mandolin with its arresting scrolls and striking pegheads are hallmarks of Heiden's Instruments.



The back of the mandolin being machined on a CNC using VisualMill's radial cut method.



Michael Heiden's VisualMill and CNC router setup.

Michael uses a CNC from CamTech Corporation, with a 25-x25 inch gantry that allows him to machine the relatively large body shapes of his guitars and mandolins easily. Because of the acoustic nature of the mandolins the tops and backs made on the CNC are not routed to a 'finished' state but are 'roughed' to within .020 on each surface, inside and out. Then they are fine tuned with small finger planes and scrapers to get the 'handmade' touch and tuned aspect necessary in a very responsive instrument.

Michael summarizes his experience in using **VisualMill** as: "VisualMill is a very easy to learn, user friendly program with many incredible features for milling and machining. Because I am working in wood I use the horizontal roughing feature to do just that. I then use the Parallel contouring to

establish the final shapes still in a coarse roughing mode. Finally, the radial machining feature takes it to the final shape leaving the plate with very fine router marks in the center where the least amount of hand tuning takes place and coarser at the edges where all the tuning or thicknessing takes place. Other parts such as the Abalone and Mother of Pearl shell inlays are cut with a high-speed air turbine following the intricate designs flawlessly. This is where the on-screen simulation of VisualMill is so wonderful. I can be sure of the exact cutting sequence and precision before any valuable material is used."

Looking into the future Michael feels that there is a "renaissance of luthiery" currently in progress and is happy to be a part of it. He loves his work with the passion of masters of past ages and looks forwards to new challenges and knowledge. With his skill, creativity and with a little help from the tools he has so carefully chosen he will be more than up to these challenges.