

Modern Machine Shop: Clock Of Ages.
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Software from Delcam (Windsor, Ontario, Canada) has been used in the creation of a mechanical clock designed to keep precise time for 10,000 years. The monumental clock is a project of the U.S.-based Long Now Foundation, which was founded in 1996 by a group of scientists and thinkers who sought to create a lasting cultural institution that would provide a "slower/better" counterpoint to society's increasingly "faster/cheaper" frame of mind. It is the brainchild of scientist, engineer and foundation board member Danny Hillis, who, in the mid-1980s, pioneered the parallel computing techniques that gave birth to hyper-fast supercomputers.

The clock's binary digital-mechanical timekeeping system self-corrects by "phase-locking" to the noon sun, providing accuracy to within 1 day in 20,000 years. However, the solar day continually varies in length, as a result of the tilt of the earth's axis, the elliptical shape of its orbit around the sun and influences of the moon and other planets. Mr. Hillis designed the clock to adjust to true solar time through the action of a mechanical cam that is a 3D representation of the Equation of Time, a mathematical description of the constant change in the relationship between local noon, sunrise and sunset.

In the final version of the clock, which will be 30 feet tall and sheltered in a white limestone cliff in Nevada, the EOT cam will be about 5 feet tall. Applied Minds (Glendale, California), Mr. Hillis' R & D company, is machining an aluminium version of the model that will be used to make the mold for the replica cams. First, Applied Minds programmer Steward Dickson transformed the mathematical equation into a 3D stereo lithography file.

Then Jerry Sanders, founder of Vizion Technologies, Delcam's West Coast sales partner, used CopyCAD reverse engineering software to convert the STL file into a smooth 3D surface file. To help make the cam's function clear, the display models are engraved with lines representing the winter and summer solstices, as well as numbers to mark the passing centuries. These details were added to the

model with PowerShape, and the complete cam was then machined with PowerMill programs created by Applied Minds NC machinist Brian Roe on a Deckel Maho DMU 80T five-axis machining center. Contact Delcam at (519) 974-8088 or visit www.delcam.com.