New Gear Software

GearTrax 2003 to Model Spiral Bevel Gears

Gear designers using GearTrax software to model gears can expand that software this new year by obtaining its new feature: the ability to model spiral bevel gears.
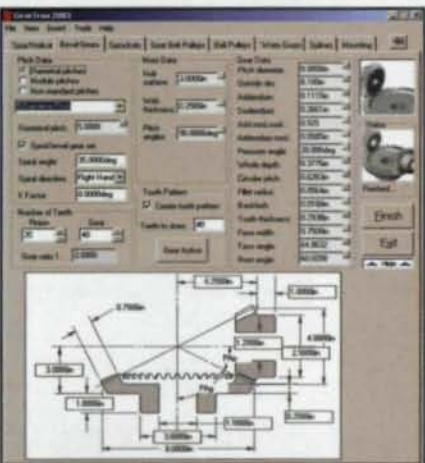
Created by Camnetics Inc., GearTrax is used to model gears in SolidWorks.

Gregory Hottman, Camnetics' founder and president, designs GearTrax to be compatible with that modeling program, made by SolidWorks Corp.

Gear designers can obtain the new feature as part of GearTrax's new 2003

GearTrax 2003 has a new feature that can create 3-D models of spiral bevel gears for assembly drawings.

GearTrax 2003 creates models of spiral bevel gears by operating with SolidWorks. The new GearTrax program creates those models from various gear data.

version. If they bought GearTrax's support plan, then they can download the new version free from Camnetics' website. If not, then they can buy GearTrax 2003 itself.

GearTrax 2003 creates solid models of gears and other drive parts. Hottman recommends his new program for modeling of spiral bevel gears and worm gears and for rapid prototyping of straight bevel gears, involute splines, internal and external spur gears, and internal and external helical gears. He also recommends his software for plastic injection molding, powder-metal compacting and wirecutting/EDM of involute splines and internal and external spur gears.

Hottman explains the modeling of spiral bevel gears would be useful for assembly drawings to check the fit of gear and pinion in a gearbox housing and their fit and function in relation to the gearbox's other parts. The electronic images could also be used in customer presentations.

However, he doesn't recommend his latest version for creating the geometry needed to manufacture a spiral bevel gear by traditional metal-cutting methods.

Hottman expects GearTrax 2003 to be available for $595 in January 2003.

The new feature will create 3-D models of spiral bevel gears from various gear data, including the number of teeth on gear and pinion; the diametral pitch; geometry parameters—like face width and backlash; the hub diameter, which must be given to the program; the pitch diameter, which the program calculates itself; and the spiral angle and direction of the gear's teeth.

These models are created according to Gleason Corp.'s spiral bevel gear standards. Hottman obtained those standards from the 24th edition of *Machinery's Handbook*, published in 1992 by Industrial Press Inc., located in New York, NY.

Like earlier versions, GearTrax 2003 only creates models of gears; it doesn't rate gears, take material data into account or provide power capacities.

GearTrax 2003 will operate as either an add-in or an add-on to SolidWorks. Gear designers can use GearTrax 2003 as an add-in by starting and operating it through SolidWorks. They can use it as an add-on by starting GearTrax 2003 itself and operating SolidWorks through it. Hottman says that GearTrax 2003 runs faster as an add-in.

Besides Camnetics, IronCAD L.L.C. of Atlanta, GA, offers software that can create 3-D models of gears, including spiral bevel gears. Universal Technical Systems Inc. of Rockford, IL, also offers gear modeling software. UTS models are restricted to internal and external spur gears and external helical gears, but they're accurate for creating molds for making plastic or powder-metal gears or dies for making forged gears.

Hottman is timing the addition of GearTrax's new feature with the introduction of SolidWorks 2003. The revised SolidWorks program became available in November.

Hottman explains that his software is tied to SolidWorks software—"The vast

majority of my customers are Solid-Works users." Consequently, each time SolidWorks is updated, Hottman usually has to update GearTrax to be sure they remain compatible.
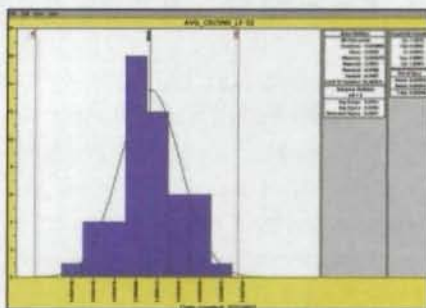
Based in Oregon, WI, Hottman describes his main customers as people who design products that use a fair amount of gears. Those customers include automation/machine designers and gear

manufacturers. His gear manufacturers tend to be smaller companies.

Hottman created the spiral bevel gear feature because it was requested by some of his customers, including a gear manufacturer and a gearbox designer for motorcycle transmissions and all-terrain vehicles.

"I've had people specifically looking for that function," he says.

G.E.A.R.S. Software— SPC for Gear Manufacturers

Nicholson Gear Technology has software to make it faster and easier for a gear manufacturer to statistically track its processes to be sure they're manufacturing gears within design tolerances. Specifically designed for gear data, the software is an interface between the data collected from metrology equipment and a connected SPC program.

The software comes in two versions: a network version available since 1996 for large companies that manufacture gears and a new non-network version for small to intermediate-sized companies.

The network version is called Gear Engineering Analysis Retrieval System—G.E.A.R.S. for short. The non-network version is called G.E.A.R.S. Lite.

G.E.A.R.S. Lite was created because G.E.A.R.S.—starting at $25,000—was too expensive for some potential customers. G.E.A.R.S. Lite, however, starts at $6,700.

"We felt that we weren't reaching the customers," Nicholson says.

Nicholson is the founder and president of Nicholson Gear Technology, based in Medina, OH. He's also product manager for the spiral bevel gear division of SU America Inc., located in Hoffman Estates, IL.

As a network program, G.E.A.R.S. uses a dedicated server for storing data and can operate on multiple personal computers in a network.

As a non-network program, G.E.A.R.S. Lite is meant to be installed on only one personal computer and uses only the computer's hard drive for storing data. Normally, the program operates with the statistical-process-control (SPC) program CHARTrunner, made by PQ Systems of Dayton, OH.
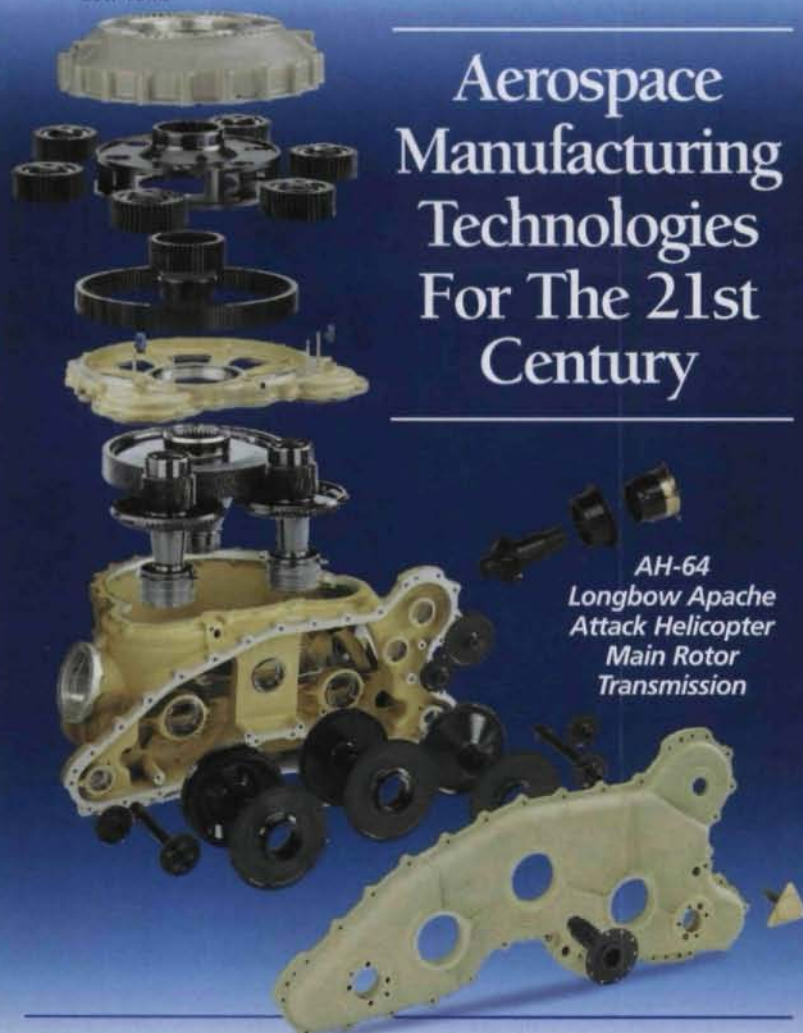
Bought as a package, G.E.A.R.S. Lite includes the gear program itself, CHARTrunner and the installation CD-ROM.

G.E.A.R.S. Lite can also operate with other SPC programs, such as SPC for Excel, made by SQC Development Corp. of Newark, DE.

According to Nicholson, any SPC program on the market can retrieve and analyze gear data, but those programs may be difficult and time-consuming to use. He explains that G.E.A.R.S. and G.E.A.R.S. Lite were designed to be easy to use and that people don't need to know much about statistical process control to use them. Nicholson himself has trained groups of people to use G.E.A.R.S. in half-day classes. He adds that learning to use G.E.A.R.S. Lite is no different from learning to use G.E.A.R.S. "The basic structure itself is identical," he says of his two programs.

G.E.A.R.S. and G.E.A.R.S. Lite collect and query data on all gear characteristics from metrology equipment via a company's Intranet.

Because it lacks a server, G.E.A.R.S. Lite doesn't handle as much data as G.E.A.R.S. or return queries as quickly as G.E.A.R.S. Still, Nicholson says G.E.A.R.S. Lite can be connected to any number of measuring or inspection machines.

G.E.A.R.S. and G.E.A.R.S. Lite import data from metrology equipment as CSV (comma-separated variable) data. The data can be reviewed one gear characteristic at a time and is printed on standard inspection reports. The characteristics include average lead slope, left and right flank; average slope, left and right flank; average involute slope/profile variation; average index variation; and average crown on lead, left and right flank. The data is also transferred to CHARTrunner, so engineers can review the data in either run charts or histograms.

"With G.E.A.R.S. Lite, we keep it as simple as possible," Nicholson says. He adds that the whole basis of the program was to make it easy to use.

As Nicholson explains, people don't have time today to write importing code for SPC programs. They only have time to select their part number, process, date

range, and analysis types, then create their SPC charts.

G.E.A.R.S. Lite can be customized by its buyers as needed. Nicholson describes the program's possible customers as any non-automotive company that manufactures gears. In contrast, he says G.E.A.R.S. is suitable for automotive companies and has been bought by several automotive plants.

Nicholson adds he has already sold his first copy of G.E.A.R.S. Lite to a company, a North American aerospace business. ○