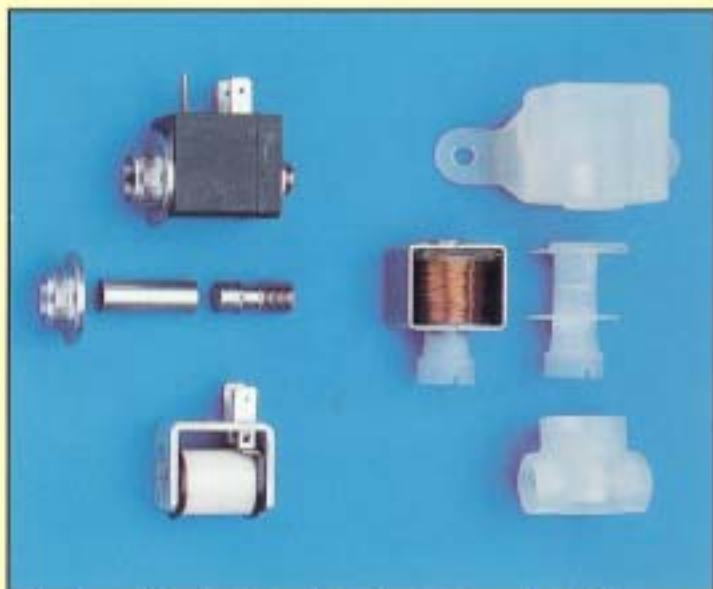


## CONCURRENT PRODUCT DEVELOPMENT

## CAD AND STEREOLITHOGRAPHY SPEED SOLENOID DESIGN

When Peter Paul Electronics faced the need to quickly redesign a humidifier solenoid valve, Senior Design Engineer Thomas J. Pellegatto naturally turned his Cad-Key-based system loose on the physical parameters of the new valve. But that wasn't enough. The design required lower-cost manufacturing technology as well as dimensional and mechanical design changes.

Existing valves from the company feature an all-steel sleeve, consisting of a flange nut, tube, and end stop, all of which are staked together for welding. A weld bead secures the end stop to the tube at the top edge and joins the tube and



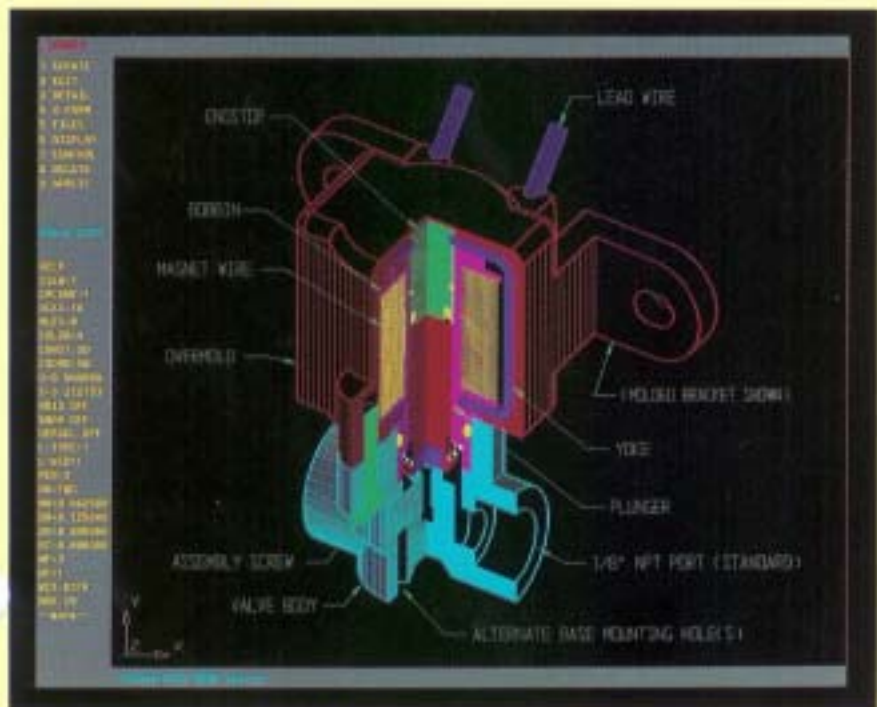
*Redesign and simplification of the solenoid valve coil and sleeve assembly (left) is easily compared with the coil-on-bobbin assembly. The extended and molded one-piece bobbin eliminates the use of two machined parts, two welds, and one quality operation while providing an improved magnetic circuit, reduced weight, and lower cost.*

threaded portion of the flange nut at the bottom. Alignment of these components becomes critical, because the sleeve sits inside the coil, which is the heart of the solenoid valve. In addition, a plunger that causes air or fluid to flow in the valve rises inside the sleeve.

According to Pellegatto, the simplest method for reducing cost and complexity of the critical sleeve assembly was to use the coil's bobbin to replace the sleeve and house the plunger. Working directly with engineers at Du Pont, designers selected a thermoplastic named Rynite to eliminate misalignment and the need for welding the new assembly. The CAD system fed

Peter Paul's internal model shop with the data to develop bobbin prototypes from the thermoplastic. In addition, designers decided to mold the formerly metallic mounting bracket as part of the plastic housing.

Once designs were finalized, Pellegatto sent the CAD file to a local stereolithography shop, which built demonstration models using a 3D Systems unit. Two copies each of three molded components—the bobbin, valve body, and overmolded housing—were produced for about \$3,000. Finally, after sample parts were approved by the customer, hard tooling was developed using revised CAD files. This venture into "desk-top manufacturing" saved enormous amounts of design cycle time, according to Pellegatto. Peter Paul Electronics Co., Inc., 480 John Downey Dr., New Britain, CT 06050-1180.



*The three components created in plastic include the overmolded valve housing with integral bracket (red), the bobbin on which the coil is wound (purple), and the valve body with which the solenoid valve is connected (blue).*