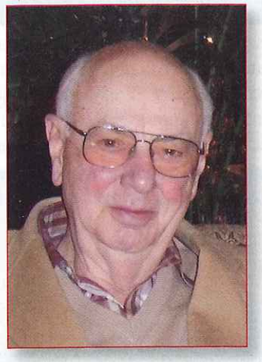
Geared For Precision

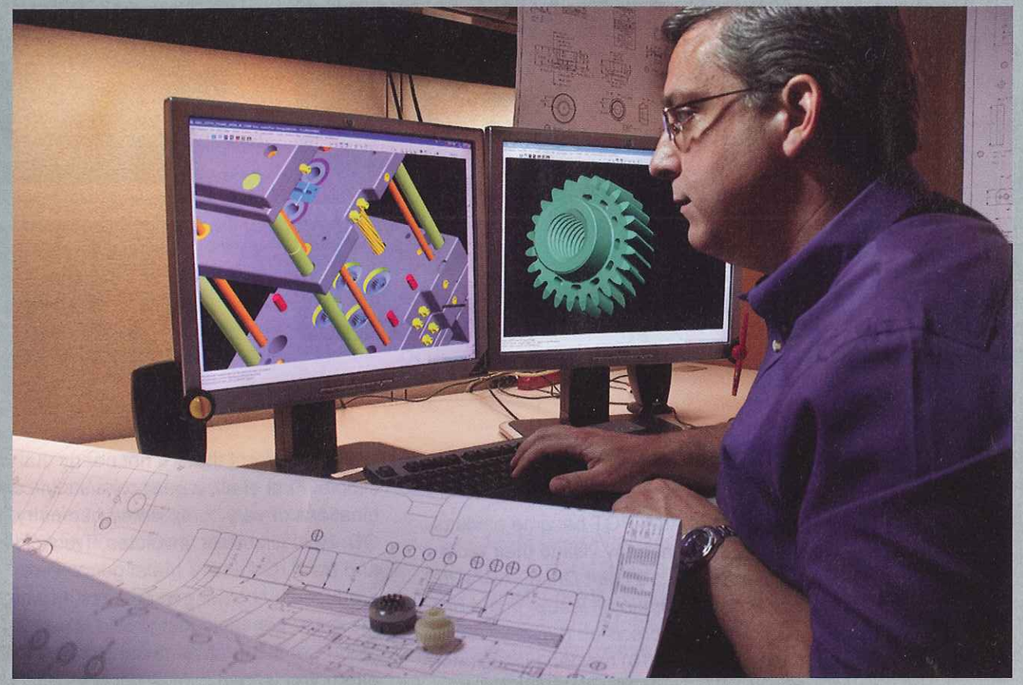
ABA-PGT



Sam Pierson, President & CEO of ABA-PGT

Based upon our previous three Top Shop features, a reader might think that having dozens of EDM's is the key to being selected for this feature. While having a large number of machines is certainly an outward sign of success, the achievement of excellence is what sets our Top Shops apart from the pack.

For our Winter Issue, EDM Today returns from the desert Southwest to the frigid Northeast to visit one of the nation's finest mold shops, ABA/PGT located in Manchester, Connecticut.



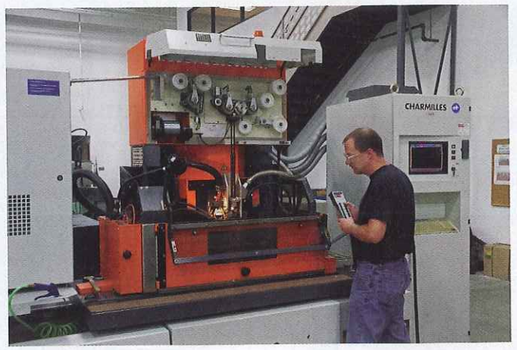
Sophisticated CAD systems are utilized for gear and mold design.

History:

ABA Tool & Die was founded in 1944 by Helmar Anderson, Edwin Bertsche, and Clarence Anderson to design and build high precision components for the aircraft industry. In those early years, the partners manufactured their tools working evenings at the Howell Cheney Technical School which allowed them to use the school's equipment. In 1950, they built their own facility in Manchester, Connecticut. Soon after, they decided to focus the company's activities on the design and manufacture of high precision plastic injection molds. In 1952, Sam Pierson joined ABA as a mold designer and by 1957 became its Executive Vice President. During the fifties and sixties, ABA earned a reputation for engineering excellence and uncompromising quality. During that time frame, ABA decided to narrow their focus even further to concentrate on the production of highly accurate molds for gears, a specialty field where few mold makers dared to tread. In 1969, at the urging of its mold customers, Sam founded Plastics Gearing Technology (PGT) as a molding affiliate of ABA Tool & Die. In 1988, ABA and PGT merged, and Sam Pierson became President and CEO of ABA-PGT. In 1995, ABA-PGT opened up a satellite "lights out" 15,000 square foot production facility in Vernon, CT containing 12 automated molding machines that runs high production parts 24/7. In 2002, ABA-PGT built their current state-of-the-art 68,000 square foot facility which administrative offices, engineering, tool room, and production facilities. The combined output of both facilities exceeds 147,000,000 molded parts per year.

These 8 tooth spur gears are about the size of a grain of salt.

High precision fine tooth gear cavity insert



Cavity inserts are often finish skimmed with .002" wire.

The Present:

The focus of ABA-PGT became obvious even as I planned my visit to their facility: the address is "10 Gear Drive". ABA-PGT has become a national leader in the production of high precision (typically AGMA Quality Number 10) molded plastic gears of all types. Their 98 employees offer a complete range of in-house capabilities from complete plastic gear transmission design, prototyping, mold design, mold making, and molding serving automotive, consumer, medical, military "blue chip" OEM's and manufacturers worldwide. ABA-PGT has earned ISO 9001:2000 and ISO 13485:2003 (medical) certifications. While 75% of their production is injection molded gears, they readily entertain any high precision molding projects that fit within their capabilities.

An Accurate Mold *The Heart of Successful Molded Gears*

So, some might ask, "What's so difficult about making a gear cavity? Just layout the gear in the computer and apply the shrinkage in the machine!"

Well, it turns out that it's not nearly that simple. First of all, a gear consists of combinations of very complicated geometry: OD, Root Diameter, Involutes, Trochoids, and Radii. Originally, metal gears were produced by hobbing, a process by which the entire complex gear profile is generated from the relative motions of hob (with geometry defined by straight lines and radii) applied against a rotating gear blank. In fact, for many years all of the electrodes that were used to EDM gear cavities were made that way. However, when it is required to produce millions of plastic gears to AGMA #10 tolerances, the concept of applying a standard shrinkage number to all the gear dimensions completely breaks down. It turns out that different zones of a gear profile shrink at different rates, and even some gear teeth shrink differently than other teeth on the same gear. ABA-PGT has developed highly sophisticated algorithms to calculate the shrinkage on each portion of the gear tooth. This means that some gear cavities can often no longer be cut with a hobbed electrode. Most gear cavities today are Wire EDM'd with very sophisticated programs to incorporate the various shrinkages in the various gear form geometry elements. Even then, the molded gear may not fully cooperate with the calculations, requiring extensive inspection and further distortion of the cavity profile to produce an acceptable tooth form on the molded product.

Helical gear electrodes must be generated on a gear hobber for perfect form. Just leaning the wire is not good enough!

Overhead view of EDM Department

Helical gear cavities are still burned utilizing C-Axis in Sinker EDM.

Producing Class 101 mold tooling with guaranteed interchangeability and a one million shot service commitment takes more than an accurate gear cavity. Quality is tightly controlled from the beginning with highly engineered tool designs. In house heat treating facilities assure maximum component stability and life. Tool and mold makers sweat tenths at every step of mold production. Wire EDM cavities are often finished skimmed with .004" or smaller wires to assure the best cavity finish and form definition. Sinker burned cavities are not orbited to remove any possibility of tooth form distortion. Frames and cavity components are jig ground for true alignment and minimum clearance fits. Even wire skimmed ejector holes are hand lapped to hold a maximum .0001" clearance after tool run-in. And…… everything is inspected multiple times.

ABA-PGT combines craftsmanship with a continuing investment in state-of-the-art technology:

- Pro Engineer CAD
- Mastercam CAM
- Turn/Mill Turning Centers
- 5 Axis Hard Milling
- CNC Sinkers
- Twin Wire WEDM
- High Speed Small Hole EDM
- CNC Jig Grinding

In addition ABA-PGT utilizes state-of-the-art measuring equipment:

- M&M Gear Analyzer CMM
- Rolling gear testers with certified master gears
- OGP Avant ZIP400 Optical CMM
- OGP SmartScope ZIP250 Optical CMM

An Employee Owned Company

In 1989, employees became owners, as ABA-PGT became an ESOP (Employee Stock Ownership Program) company. So everyone at ABA-PGT has a vested interest in the success of the company.

The Last Word

"Over the decades our knowledge, tools, and processes have changed, but our culture remains the same – Do it right each step of the way" - Roger Anderson, Vice President

Acknowledgement

I would like to express my appreciation to Terry Holmes, VP Sales and Marketing; Thomas Peck, Director of Operations; Frank Ruck, Manufacturing Manager; Dan Perkins, EDM Department Manager; and Nancy Russo, Director of Employee Relations for their gracious hospitality during my visit.