

## THE PROOF IS IN THE POPPET

Applying features from a nearly forgotten design, one company resurrected a simple but efficient valve technology that is paying processing dividends.

Invention, like time, waits for no man, or drafting table for that matter. So, 12 years ago when inspiration came, Jeff Kuhman didn't hesitate to unfurl the blueprint on the floor of a bustling Chicago Midway terminal. Kuhman, president of machinery component manufacturer Glycon Corp. (Tecumseh, MI), and consultant Ziggy Kossakowski of Landis Plastics (Alsip, IL) hastily began an impromptu engineering session over the 5-by-5-ft shutoff valve schematic. Following the unconventional meeting, Kuhman returned to Glycon with a design for a new nonreturn valve that was covered not only in notes but also with footprints left by the careless missteps of airport passersby.

### A NEW, OLD DESIGN

The events that led to the airport meeting were set in motion nearly a year earlier. After hearing consistent rumblings from his customers about the relative inefficiency of the ball check and sliding-ring nonreturn valves that dominated the market, Kuhman quizzed molders about what they wanted, and one name kept recurring—the Impco poppet.

Based in New Hampshire, Impco, or Improved Machinery Co., had been a long-time supplier of molding machines and components. Ingersoll-Rand eventually acquired it, but even though the company was no more, a favorable reputa-

tion for the poppet lingered. Molders whom Kuhman consulted still pined for the poppet's efficient operation and simple three-piece design that used a positive-motion device to regulate material flow.

Curiosity piqued, Kuhman investigated the poppet, and upon discovering its patent had expired, he became convinced that it was a technology Glycon should adopt. "[Glycon] looked up the drawings on it," Kuhman says, "and we really liked some of the features in that design. Then we looked into it further with some of the technicians that we respected at various plants."

In a stroke of luck, one such technician, Kossakowski, had actually worked as an assembly supervisor at Impco's Chicago facility. Kossakowski not only remembered the poppet from his days at Impco but also said he had ideas to improve its design. Shortly thereafter he found himself hunched over the blueprints

with Kuhman at Midway, and the rest is history.

Taking some suggestions from Kossakowski and incorporating his own insights, Kuhman presented a new nonreturn valve design to Glycon's engineers, who refined it further and developed a prototype. Tests were performed with encouraging results that led to Glycon's own patent application and its subsequent approval.

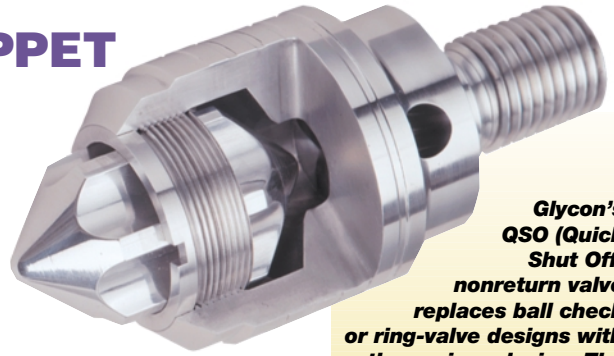
### SET YOUR MATERIAL FREE

From the start, Glycon's goal was to create a nonreturn valve that allowed free material flow and low shear without sacrificing fast, clean shutoffs. The majority of products on the market at the time were of the ring-valve or ball check variety. After examining these designs, Glycon concluded that ring valves provided free material flow but suffered from sluggish shutoff since the ring had to cen-

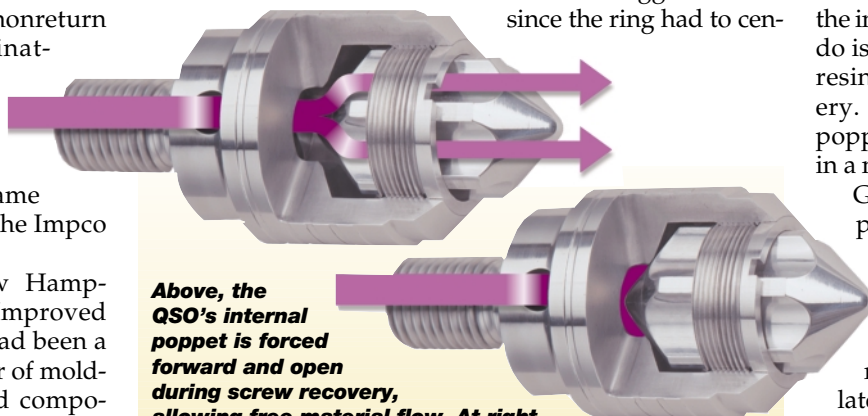
ter itself following injection. Ball check valves, on the other hand, says Kuhman, shut off cleanly but tended to impede material flow, and featured a sometimes-tricky apparatus wherein the ball was forced to situate into a seat.

Glycon's answer was a three-piece nonreturn valve with a poppet. Dubbed the Quick Shut Off or QSO valve, it was roughly based on Impco's original design. Restricting only 20 to 30 percent of the material that comes through, the QSO reportedly offers freer melt flow and cleaner shutoffs. Glycon says that's because it's manufactured with tight tolerances that allow only two positions for the poppet: open or closed. Material flow starts or stops when the internal poppet or torpedo is forced forward by the resin during screw recovery. During injection, the poppet immediately closes in a nonreturn fashion.

Glycon augmented the product with a threaded ring device for the poppet that creates adjustable stroke lengths. Using this, molders can manipulate the stroke depending on the viscosity of the material they're processing. On the market since 1992, the QSO continues to gain



**Glycon's QSO (Quick Shut Off) nonreturn valve replaces ball check or ring-valve designs with a three-piece design. The internal poppet provides clean shutoffs without hindering material flow.**



**Above, the QSO's internal poppet is forced forward and open during screw recovery, allowing free material flow. At right, the poppet settles into a closed, shutoff position for material injection. The threaded ring allows for easy adjustments to the poppet's stroke length, depending upon the material being molded.**

greater acceptance, but some shops, just like Kuhman did nearly 12 years ago, are only now discovering the simple but efficient poppet.

## THE NEW STANDARD

As corporate director of manufacturing and process engineering for Plastech Engineered Products (Dearborn, MI), Rusty Perkins oversees 13 molding plants that supply interior and exterior automotive trim. Producing under the famously thin margins found in his market, Perkins strove for greater process efficiency, but his machines' nonreturn valves were creating unacceptable scrap levels.

## Scrap is down to less than .5 PERCENT.

Working with many engineered resins, including high-crystalline polypropy-

lenes, Plastech was forced to use decompression to draw the screw back 1 inch during recovery. This relieved pressure and helped the screw hold its position during forward motion, but it also introduced air into the melt stream, which caused high levels of splay and left bubbles on component surfaces.

Primarily a problem with its 500-ton presses, Plastech watched as jobs experienced 4 to 5 and even 10 percent scrap rates, costing the company thousands of dollars a day in its larger, more expensive parts.


Searching for a solution, Perkins stumbled upon the QSO during a visit to Glycon. Convinced the QSO would be the answer to his problems, Glycon gave Perkins four of the valves for a 30-day trial run. "I was simply amazed," he exclaims. "We cut our decompression down 70 to 80 percent in most cases."

Now the presses only need to draw the screw back .1 to .2 inch, drastically reducing the amount of air brought into the melt stream as well as the defects that step caused. "If I have .1-inch decompression and expect to hold .25-inch position," Perkins says, "[the QSO] will hold the .25-inch cushion every time. On the [machines] I've retrofitted, I've reduced my visual scrap 90 percent at least. It's been a very good investment."


Perkins says scrap is down to less than .5 percent for visual defects, and the QSO is also reducing scrap after color changes. Before the new valves, the first 10 to 15 shots following color swaps were tossed, but now after only four to five parts, the colors run true.

Perkins was so pleased that he made the QSO Plastech's new corporate standard. Now, every one of the 100 presses he estimates the

company will buy in 2003 will feature QSOs. Asked if Plastech had recouped its initial investment on the nonreturn valve, Perkins' response is emphatic.

"Oh, yeah," he exclaims. "If you're molding large parts selling for \$20 apiece, and you run a couple hundred scrap, you've thrown away a couple thousand dollars."—*Tony Deligio* 

### Contact information

Glycon Corp., Tecumseh, MI  
Jeff Kuhman  
(517) 423-8356  
www.glycon.com  
 IMM Infolink 232

Plastech Engineered  
Products Inc.  
Dearborn, MI  
Rusty Perkins; (313) 791-3001  
www.plastecheng.com