

# KING<sup>of</sup>GS

## Custom Design

**A**t a time when many OEM suppliers are trimming their product lines and offering standard designs to contain costs, a distinguished group of vendors are giving their engineering customers exactly what they want. These suppliers will customize their products, design prototypes, provide extra application help, and accelerate deliveries. Rely on these companies to meet your special needs...

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*Tol-O-Matic Inc.*

# Custom projects take on a new look

*Custom products seldom resemble anything a company manufactures as standard, yet under the surface, they include everything a company is capable of doing*

**T**hink of custom design as starting with a blank page, much as those original designers needed to do for the first computer, the first automobile, or even the first wagon wheel.

Incorporating as much intuition as logic, custom design has always been part science, part inspiration, and part inborn proclivity. The break from standard to custom products is often difficult for a company because of the unusual mixture of talents necessary to pull it off well. For a company to produce custom designs it has to first attract the talent necessary to proceed forward with a project while not having a map. In all practical purposes, such talent is hard to come by. Because custom designs often take on a look and feel not associated with a company's standard products, such designs, and the designers responsible for them, are, by nature, awe inspiring.

Therefore, the ability to tackle custom work requires that a company have a strong design engineering department, a group of people who are willing to think, as they say, out-of-the-box.

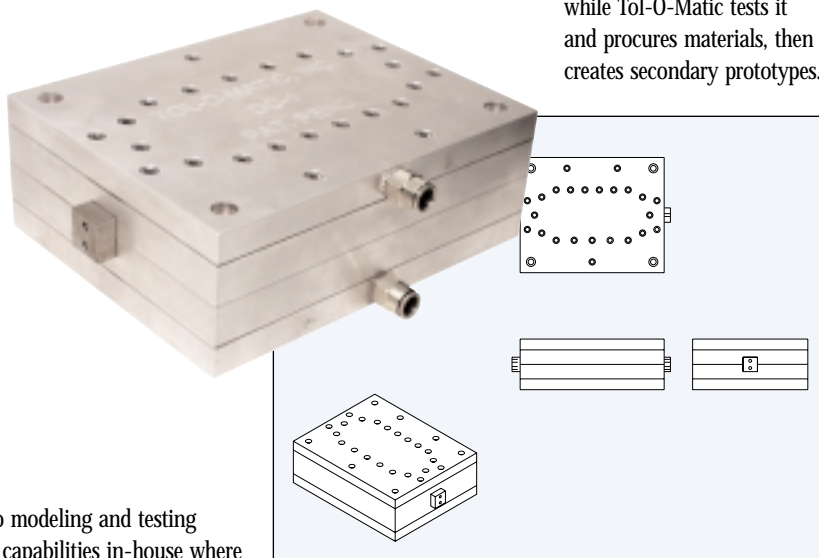
Tol-O-Matic employs a staff of highly trained, educated, and degreed mechanical, electrical, and application design engineers. These talented employees continually create efficient, leading-edge solutions for a variety of customers in a wide array of industries.

A company also needs access to modeling and testing capabilities. Tol-O-Matic has these capabilities in-house where models can be easily altered and controlled to fit the needs of the final design. In fact, the skilled artisans in the company's model shop can create a design prototype quickly and efficiently while controlling the complete process so that the

final product conforms to the highest quality standards. Companies who can handle custom design also provide manufacturing services, which means that they are keenly aware of the costs associated with tooling and assembly.

Overall, Tol-O-Matic prides itself in providing actuators, whether from their standard line, from a modification to a standard product, or through blank-page, out-of-the-box custom designs, which meet every specification its customer's project requires.

The process for custom work is familiar to Tol-O-Matic customers. The process starts with meeting several design engineers for preliminary evaluation and concept analysis. It then follows through to the design and prototype of an initial product. The customer evaluates the prototype while Tol-O-Matic tests it and procures materials, then creates secondary prototypes.



Tol-O-Matic engineers designed this dual diaphragm cylinder for a material handling company that needed an actuator for a flying cut-off operation.

Further evaluations follow if needed, and then the approved component is produced. But it is not through the process so much as through example that truly exploits the company's capabilities in design and production of electro-mechanical, fluid, and power transmission technology.

#### MATERIAL HANDLING—IN A BIG WAY

A material handling company needed an actuator for a flying cut-off operation. How fast the nip roll could move down, make the cut, and get back up out of the way without interrupting the material flow was limiting the line speed of the process.

The requirements for the actuation system were to

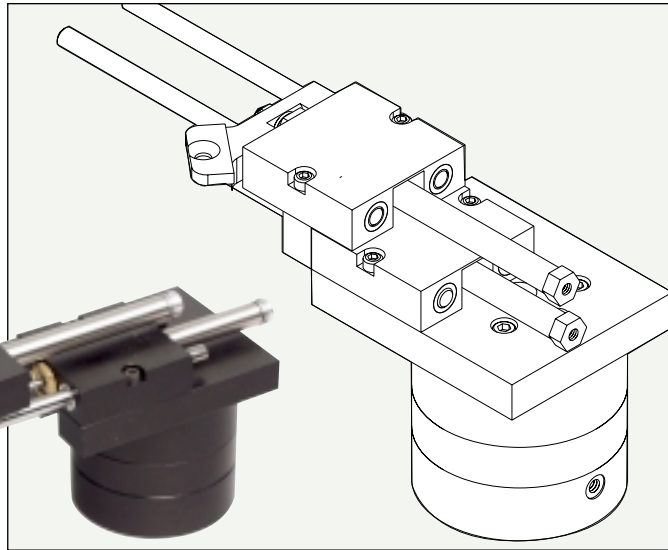
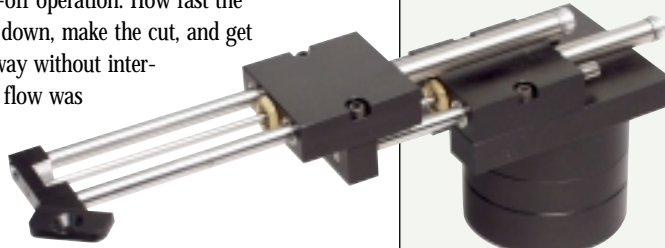
decrease the cut time by one-half to one-third of any currently available system. What this meant in terms of performance specifications was that the actuation system was required to cycle down and back up a distance of 0.020 inch in less than 10 msec. To top off the challenge, the move had to be made with a 100-lb cutter, while providing a 750-lb down force.

Considering the load requirements of this application, Tol-O-Matic engineers knew that an electric solution was unlikely. This application would require the speed and thrust of pneumatics. However, this would be a stretch even for air. The solution would require the cylinder to be nearly free of friction and would require the cylinder to waste no air and time filling non-thrust producing cylinder head volume.

Tol-O-Matic's solution was a patent-pending dual diaphragm cylinder. The cylinder is frictionless due to its floating piston design. At no point do the piston or piston seals make contact with the cylinder housing eliminating all stick-slip. Wasted volume is limited to the volume required to port the chambers. Almost no air volume is required to pressurize the cylinder head itself. In addition, the fiber reinforce diaphragm design resulted in a rugged cylinder with millions of leak-free actuations.

#### LIFT AND TELESCOPE CYLINDER FOR AUTOMATED POLISHING PROCESS

During an automated polishing process, the customer needed to remove particulate from a horizontal wheel on an interval based solely on the quality of the material surface finish. What the customer needed to do was to lift and extend, and lower and retract a wiper blade. The design's requirements included a lift adjustable between 0.050 and 0.125 inch, capable of lifting 15 lbs, and applying an



adjustable down force of 1 to 5 lbs. The extension required was 5 inches, however,

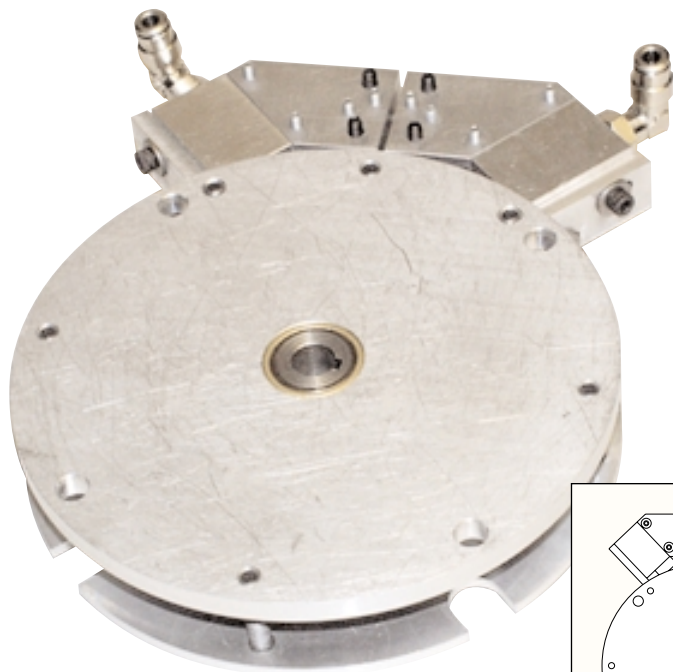
the retracted footprint could be no more than 5 inches.

Once again, the custom design was different than any standard product the company produced. The final design consisted of a diaphragm lift cylinder with miniature, precision H-block cylinders. The lift cylinder itself was a 0.5-inch bore with an adjustable spring return to provide the adjustable force return. It was guided by three, 0.25-inch ground shafts using precision bearings. The extension used two low-profile H-block cylinders with  $\frac{5}{16}$ -inch bore cylinders and precision bearings and shafting.

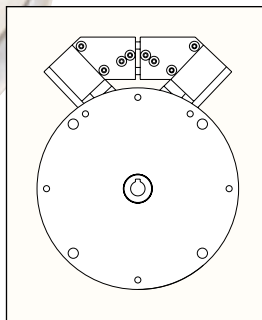
#### MOTION CONTROLLER WITH A CUSTOM USER INTERFACE

Medical devices must go through repeated testing prior to their use. Because they involve the health and safety of a human being, they are often approached with a greater sense of concern. For a particular medical device company, a custom user interface was required to aid in the analysis of insertion and removal of tubing into veins and arteries.

This software had to be easy to understand because of the lack of technical background of the operator. Therefore, the customer requirements involved the creation of a simple Windows-based user interface that could be used to guide the operator through the input of specific information. Further, data collection software needed to receive information from a force transducer and encoder, which relayed actual event data back to the operator. After the completion of the operation,



A peristaltic rotary actuator was the answer for a company that required 24 in-lbs of torque in a package that was less than 1 inch high and less than 5 inches in diameter.



the software had to output a test report that included insertion force versus position.

#### PERISTALTIC ROTARY ACTUATOR

For the company that required 24 in-lbs of torque in a package of less than 1 inch in height and a diameter of less than 5 inches, a peristaltic rotary actuator was the answer. The actuator was being used in an environment that required it to be leak free. Mounting requirements were also unique in that the actuator was required to accept a mounting shaft. Both initial tooling costs as well as product costs were extremely sensitive in this application.

Conventional rotary vane, rack and pinion, and electric motors could not meet the requirements of this application. Therefore, Tol-O-Matic chose to use the basic concept of many fluid pumping devices used today—the peristaltic pump. The peristaltic pump uses an electric motor to pump fluid. Why not use air power to turn a shaft? The peristaltic concept met the cost, torque, and packaging objectives. The challenge was in the tubing. Traditional tubing proved to be unsatisfactory. Several iterations of tubing composition were required in order to find the proper solution for a peristaltic rotary actuator.

#### WIDE RANGE OF CAPABILITIES

Tol-O-Matic is proud to acknowledge the fact that custom design and manufacturing has always been a key component in their business strategy. The company has been involved with the creation of literally hundreds of special proprietary products for a wide variety of industries from aerospace and automotive to medical and pharmaceutical. In-house resources available to the customer include every aspect concerned with the entire process of producing and manufacturing a custom product, including design, prototype, test, and manufacture.

The company's capabilities extend from simple refinements like creating new mounting brackets or trapped holes to redesigning an existing product, to custom work, where Tol-O-Matic's Custom Design Solutions Team will create a completely new product to fit customer specific needs.

Custom design can only be as good as each individual involved and the expertise of the customer as well. Tol-O-Matic, therefore, is also known for having the most

advanced, comprehensive, state-of-the-art training facility of its kind in the industry. To date, hundreds of the company's distributorship salespeople and their customers have attended classes, which cover all Tol-O-Matic products and specials. This training is also open to prospective customers as well, and is worth taking advantage of.

#### FOR MORE INFORMATION

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