CASE STUDY

How Rotomation customized a solution for a builder of custom packaging machinery utilizing an innovative special gripper-rotator to fill unique bottles with caustic cleaning material.

Established in 1967, Rotomation is a leading manufacturer of high-speed, heavy-duty pneumatic and low-pressure hydraulic rotary actuators, offering a wide range of shaft motions.

PREPARED BY ROTOMATION INC

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INTRODUCTION

A builder of custom packaging machinery faced a difficult task: designing a machine capable of filling and capping bottles of a leading toilet bowl cleaner. These bottles, with their uniquely shaped necks, coupled with the highly caustic cleaning material, presented significant challenges. Seeking a tailored solution, the company turned to Rotomation, known for their expertise in engineering custom pneumatic rotary actuator solutions.

BACKGROUND

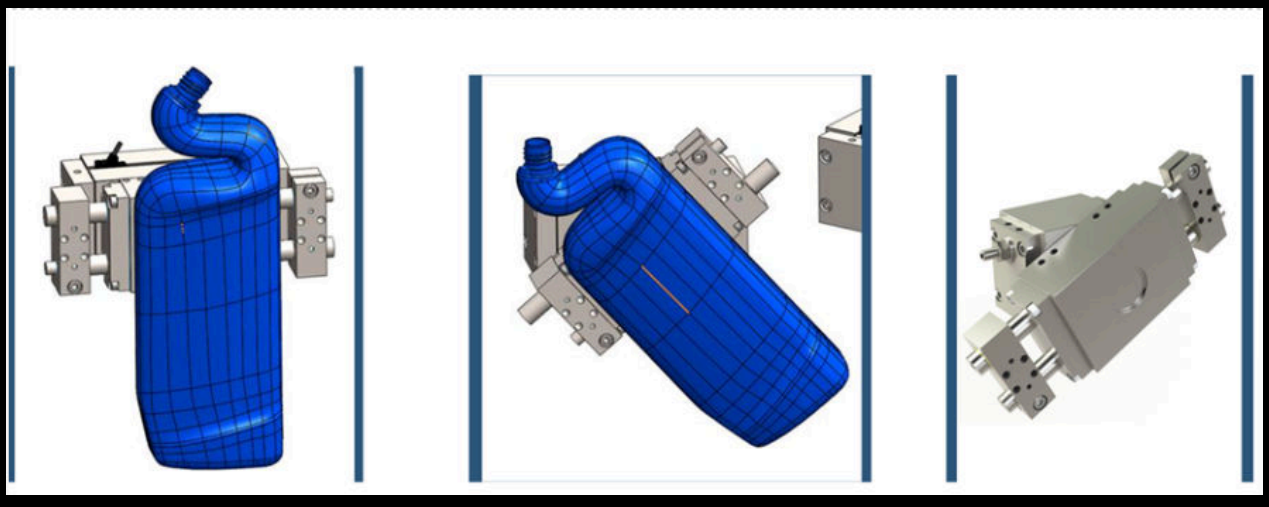
The machine builder is an expert in crafting high-speed, dependable equipment for sorting, filling, and labeling of a wide variety of containers. They focus on rotary machine designs for efficient, multi-step processing, prioritizing hygienic design and robust materials. They offer a line of standard machines which boast adaptability for rapid product switches, though some demand custom modifications for unique items. In other cases, they develop a machine from the ground up.

In this case, the unique challenges posed by the bottle's distinct shape and its caustic contents required innovative adaption; reorienting the bottle by 45 degrees to align the nozzle upwards, enabling standard filling and capping in an unconventional scenario.

CHALLENGES

Unique Bottle Shape: The bottles featured an irregular neck design, rendering traditional filling and capping hardware impractical. The irregular shape required a solution capable of accommodating it while maintaining efficiency.

Handling Caustic Material: The corrosive nature of the cleaning material posed a threat to standard machinery components. The solution needed to withstand the harsh environment without compromising performance or longevity.



SOLUTIONS

Rotomation engineered a specialized combination gripper-rotator, specifically designed to address the unique challenges posed by the bottle shape and caustic material.

KEY FEATURES

1. Parallel Gripper Design:
Recognizing the constraints imposed by the bottle's geometry, flow requirements, and limited space, Rotomation opted for a parallel gripper design. This configuration ensured optimal handling while maximizing efficiency.

2. Innovative Motion Mechanism:
Most parallel grippers utilize a mechanism that cannot be sealed from the environment, making them unsuitable for this application. Leveraging their expertise, Rotomation adapted its standard rack-and-pinion concept to facilitate parallel motion. By employing round shafts, effective sealing was achieved, crucial for withstanding the corrosive environment.

3. Compact Rotary Actuator:
To address the gripper's high moment of inertia and meet the desired production rate, Rotomation developed a custom dual rack rotary actuator. The design includes a simple but effective rotary seal between it and the gripper. This compact yet robust actuator provided the necessary strength and precision for continuous high-speed operation.

4. Material Selection:
Research showed that the exposed surfaces of the gripper-rotator had to be machined of 316 stainless steel to avoid being destroyed by the corrosive media. The selection of seal material was not as straightforward, but fluorocarbon (FKM) was generally advised. When one seal proved to be problematic, other more exotic materials were tried. Ultimately, the seal geometry was optimized, resulting in improved performance with standard FKM material.

COLLABORATIVE EFFORTS

The collaboration between Rotomation and the packaging machinery builder was instrumental in the project's success. Close coordination ensured seamless integration of Rotomation's specialized gripper-rotator with the custom-designed components provided by the machinery builder.

OUTCOME

The innovative solution developed by Rotomation addresssed the challenges posed by the unique bottle shape and caustic cleaning material. The custom gripper-rotator combination enabled efficient filling and capping operations, ensuring high throughput and reliability.

CONCLUSION

Rotomation's commitment to engineering excellence and customization capabilities proved pivotal in delivering a solution tailored to the customer's specific needs. With a rich history dating back to 1976, Rotomation continues to be a trusted partner for companies seeking innovative automation solutions. For businesses facing unique challenges in their automation processes, Rotomation stands ready to provide expert guidance and support.