Testing For Simplicity—
Lessening Consumer Burdens

Tokheim Corporation Uses Rational's SQA Suite
to Test The Columbus POS System

I t's safe to say that buying gas isn't the highlight of most peoples' week. It's just some-

thing you need to do. Making this process quick and easy is the goal of every major

retail fuel provider in the nation.

Tokheim Corporation, a global leader in the design, manufacturing and servicing of electronic and mechanical petroleum dispensing marketing systems, has pioneered revolutionary work using automated testing to ensure that the cash register systems in gas stations control and track fuel sales quickly and accurately.

Specifically, Tokheim manufactures fuel dispensers (gas pumps) and point-of-sale (POS) systems that enable customers to purchase gas and various goods at the cash register quickly and easily. To ensure that these systems perform to their customers' satisfaction, Tokheim spent a lot of time and resources on software testing. Initially, they started testing the application in a manual fashion, but soon realized that to remain competitive they needed to exploit the benefits of automated software testing.

As you can imagine, this posed some interesting problems:

How can you "automatically" test a software application that relies on physical input from real people?

How can you collect test data for someone beginning or completing a fuel sale?

How can you tell how much fuel is dispensed when that amount is determined by how long someone squeezes the nozzle?

How can you gather enough instances of these activities, in a controlled environment, to create a valid test sample?

The answer lies in the process of simulation.

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Tokheim Develops A Dispenser Simulator To Test The Fuel Controller In The POS System

Tokheim was interested in pursuing the application of automated testing within their product development cycle, so they used a dispenser developed by their Software Verification Group to test the fuel controller in their POS systems. This simulator can be configured to resemble up to 32 separate fueling points, 16 of which have outdoor payment terminals (OPTs), credit card readers that allow customers to pay for gas at the pump. Each fueling point in turn can be configured to emulate a particular type of production gas pump. The simulator can be operated either through a keyboard, or in response to commands received via Dynamic Data Exchange (DDE) or Network DDE. The simulator can perform all the functions of a production fuel dispenser including starting or ending a fuel sale, selecting a product, selecting cash or credit pricing, "dispensing" fuel, swiping cards at the OPT, and activating the OPT's buttons.

Tokheim Combines Automated And Manual Testing

To bring its testing initiative from a manual to automated process, Tokheim turned to Rational Software Corporation. Tokheim wanted to do automated testing of its newest development project, the Columbus Point of Sale system. This system was designed to run either as a single POS terminal, with both the server and client software on the same PC, or as a server with up to three POS client terminals. The Columbus POS system can control up to 32 fueling points (16 dispensers, with a fueling point on each side) that can be OPT-enabled to facilitate the use of debit or credit cards.

Tokheim used Rational Software Corporation's SQA Manager to track defects and change requests throughout the development process, assigning software engineers to work on resolutions for each defect or necessary program alteration concurrently, as they were identified. SQA Manager regularly sent automated reports to the product manager that listed the changes that were currently being re-engineered into the program, according to the priority and severity of each. This enabled the product manager to determine the status of the application at any given time in the development cycle.

According to Tremain, the company had one primary goal in the testing of their new POS system — to determine if Columbus could handle a large volume of fuel sales transactions from many fuel points correctly while maintaining accurate tracking of fuel sale dollar amounts and volume totals.

> "We made thorough use of both SQA Manager and SQA Robot," said David Tremain, Engineer and POS Test Team Leader at Tokheim. "In fact without them, testing the Columbus POS system would not have been possible."
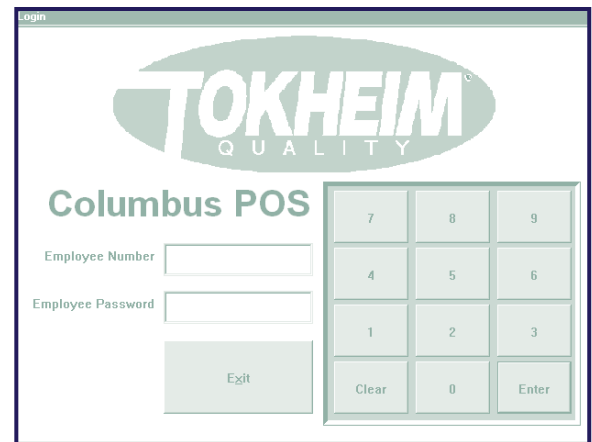
With SQA Suite, Tokheim Makes The Move To Fully Automated Testing

To test the interaction between the dispensers and the console of their newly developed Columbus POS system, Tokheim used SQA Robot to act as a cashier would in a typical fuel purchasing situation. Robot was set up to communicate between the POS system and the dispenser simulator in the middle of the sales sequence. Robot would send a message to the simulator to start a fuel sale by "raising a handle" and requesting approval from the Columbus POS system. Robot would then direct the POS system to approve the sale. At this point the simulator would dispense fuel until Robot sent a message to the pump instructing it to "lower the handle" and complete the fuel dispensing process. The POS would then collect and record the required "dollars," finalizing the sale.

"Each of the 16 fueling points that were used to test the POS system had three handles. The test script initially simulated lifting the first handle at each fueling point, approving each fueling point for the sale, allowing the sale to run and lowering the handle, completing the sale," said Tremain. "The automated test script then repeated these actions for the second and third handles on each of the 16 fueling points and continued repeating the entire process until the required sales, fuel volume or time had been realized."

Testing ran for 14 hours and 45 minutes on a single terminal using 16 fueling points with seven different fuel products. In the tests, 7,689 fuel transactions dispensed 423,872 gallons of gasoline for sales totaling $458,051, according to both the Columbus POS and the simulator. From these results, Tokheim determined that the Columbus POS system was able to handle high volumes of fuel sales while maintaining 100% accurate money and volume totals. A side result observed during the testing was the sustained throughput of a transaction every 6.9 seconds while 16 fueling points were active.

Rational's SQA Suite Facilitates An Industry First For Tokheim

"We believe the testing procedures developed with Rational's SQA Suite represent a first in the petroleum dispensing/tracking industry" said Tremain. "Automated software testing of Tokheim's products has enabled us to position the company as the most customer-centric POS system provider in the industry."

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Q U A L I T Y

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