

AUTOMATED DATA COLLECTION FOR TOILET FLUSHING MECHANISM

DATA TAKER HANDLES MULTIPLE TEST STATIONS IN PRODUCT DEVELOPMENT LAB



CAS DataLoggers supplied a test system for a manufacturer of pressurized toilet flushing mechanisms to automate the data collection in their product development lab. They had been using a combination of simple digital gauges for water pressure and flow as well as a stopwatch to capture test data for new designs. The standard test procedure required measurement of maximum flow rate, total flow volume, minimum pressure, and fill time at several different water inlet pressures. For each toilet flush test, data was recorded manually on a clipboard and then typed into an MS Excel spreadsheet. Management saw the need for a

solution which would automate the current time-intensive process and improve the accuracy of the measured data. This solution would need to be cost-effective, flexible enough to monitor all the different parameters and capable of real-time data acquisition.

INSTALLATION

CAS recommended a [dataTaker DT80 Intelligent Data Logger/Data Acquisition System](#) was to capture the toilet testing data. The flexibility of the dataTaker's universal analog inputs allowed the use of existing pressure and flow sensors, some of which had voltage outputs and some of which had 4-20mA current outputs. The DT80 offered sub-second sampling with up to 42 analog inputs, which allowed one logger to handle multiple test stations. Built-in scaling was used to convert the raw signal inputs to the correct units. Using the built-in [Ethernet](#) interface allowed the

DT80 to be connected over the network to a PC for real-time monitoring of each toilet flush test cycle.



USAGE

Using the software provided with the logger, a program was created which used the triggering and totalizing features of the data logger to capture the data of interest. A constantly running schedule sampled the flow rate and pressure 10 times/second.

This live data was shown on a dashboard for real-time monitoring. An alarm was created to trigger when the flow went over .02GPM which indicated the start of the toilet flush cycle. This alarm triggered a second schedule which ran while the flush/fill cycle was active. This second schedule performed the logic and calculations to capture the key data:

1. The water flow rate was totalized (integrated) to determine the flow volume.
2. The instantaneous water flow rate was monitored to determine the peak flow rate during the flush cycle.
3. The water pressure at the tank inlet was monitored to determine the minimum pressure during the flush cycle.
4. The pressure at the tank outlet was measured to determine the peak back pressure.
5. The flow rate was used to indicate when the tank had refilled by setting a trigger to fire when the flow rate had dropped below 0.01 GPM.
6. A timer in this schedule recorded the duration from the start of the cycle to when the refill was complete.
7. Finally, at the completion of the flush cycle, a third report schedule was triggered which summarized the data, recorded it in the loggers on-board non-volatile memory and reset the internal calculation variables for the next cycle.

Using the graphing capabilities of the logger software, a line chart was created to display the pressure and flow data during the toilet flush cycle. A dashboard page was also created to display the summary of the results including total flow volume, peak flow rate, minimum inlet pressure and cycle time from each flush cycle.

To automate the data reporting, the DDE capabilities of the software was used to automatically send the summary data to an Excel spreadsheet. A template form was created that received the new data at the end of each flush cycle. An Excel macro monitored these cells, and when new data appeared, the macro simply copied it to a next row in the report and updated the statistics. This eliminated the need to manually enter the data and allowed the customer to quickly process the data gathered from multiple flush tests at different pressures or set-up conditions.

BENEFITS

The manufacturer of toilet flushing mechanisms realized several advantages from installing the dataTaker DT80 in its product development lab, most important of which were the significant time and cost saved by entirely automating the lab's data collection. Suited for applications requiring high-speed, multiple versatile channel inputs and large storage capacity, the DT80 also offered free software which generated the convenient dashboard page providing clear organization of the test results.

For more information on the [dataTaker DT80 Universal Input Data Logger](#), toilet flushing mechanisms or to find the ideal solution for your application-specific needs, contact a CAS DataLogger Application Specialist at **(800) 956-4437** or www.DataLoggerInc.com.