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Liquid Flow Interface Detection Test Report August 2002

Sample Identity: The sample material is identified as-
Chemical tank flow with three distinct phases.

Purpose:

This report demonstrates the Canty Interface Detection system's ability to identify when three visually distinct products are being removed from a settling tank. Prior to installation of the Canty System, no in line control system was utilized to determine when in the vessel draining process the primary product obtained was complete and the secondary and tertiary byproducts were entering the drain stream. This report details the data obtained from a typical vessel draining process and presents the advantages the system gives the customer.

Setup:

The Canty Interface Detection System was installed in the drainage line of a high volume settling tank. The Canty system is vision based and self-contained including illumination components. In this system the camera is oriented perpendicular to the direction of flow and the light is oriented parallel to the flow. Video signal is fed from the camera to the Canty Vector where our software performs the appropriate analysis. As the tank was drained, the vision system obtained images of the flowing liquid and processed them using the Vector Computer. Vector contains several imaging tools and techniques in the software that allow a full analysis of the images. The images presented here show the flowing liquid as captured by the camera.

Calibration:

A simple 0 to 100 scale was imposed on the intensity measurements where a reading of zero is completely dark and a reading of 100 is saturated brightness.

Results and Discussion:

The CantyVision Vector system allows visual verification of laboratory results. Single snapshots of a measurement process can be taken using the Vector in the test mode. This helps the operator to ensure that the process will collect appropriate data during run time.

Figure 1 shows a typical test image for the primary product drained from the settling tank. This image has an overall average light intensity reading of 45.7 and distinct patterns are seen in the flow. Figure 2 presents the test image of the first byproduct. Although no distinct particulates or flow patterns are seen, this byproduct scatters light significantly and causes the image brightness to increase to 81.0. Figure 3 shows a test image when byproduct 2 is present. This byproduct is a sludge that blocks almost all light from reaching the vision sensor and gives an intensity reading of 8.4.

Figure 4 shows the intensity plot vs. time for the run time data on a typical tank draining procedure. The first two hours of good product flow are not shown as the readings are similar to those obtained in the late period good product readings and the scans were stopped after the vision system readings became very low indicating that the second byproduct was present in high concentration. The Plot shows distinct points where the light intensity changes significantly. The product flow was sampled immediately following the light intensity changes recorded by the vision system. The flow contained significant amounts of byproduct 1 after the intensity climbed above 50 and significant amounts of byproduct 2 after the intensity dipped below 40.

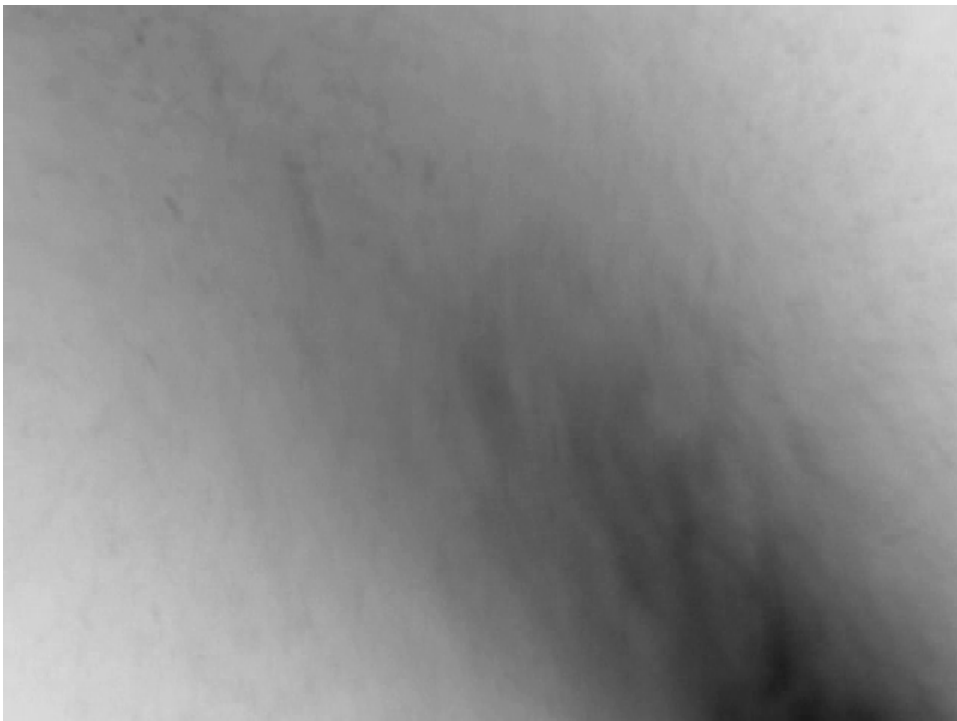


Figure 1: Test Image during Good Product Flow.

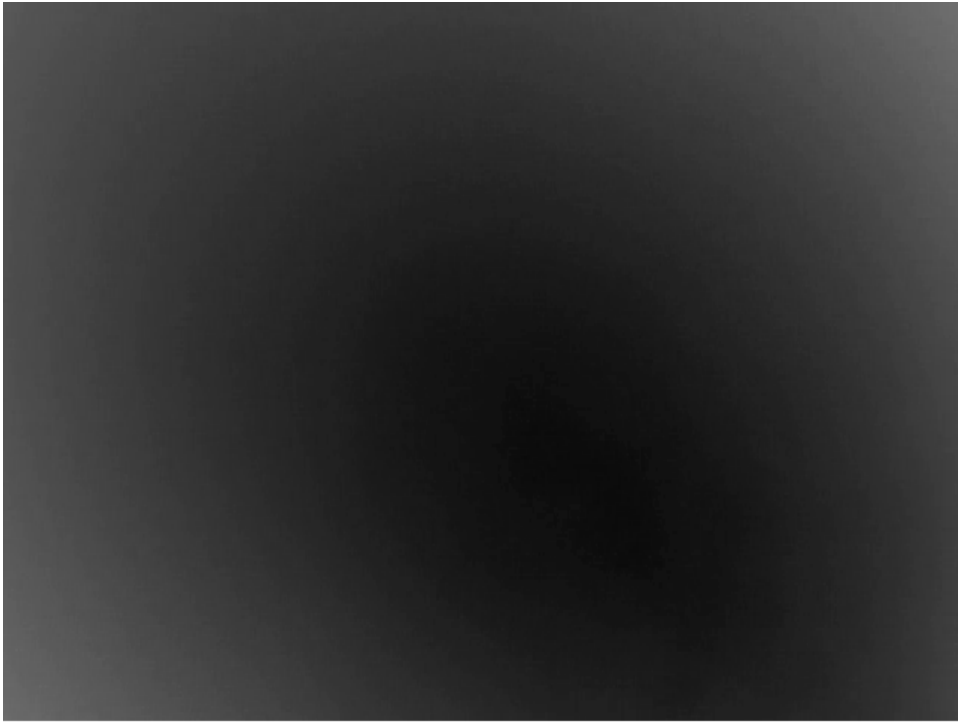


Figure 2: Test Image during Byproduct 1 Flow.

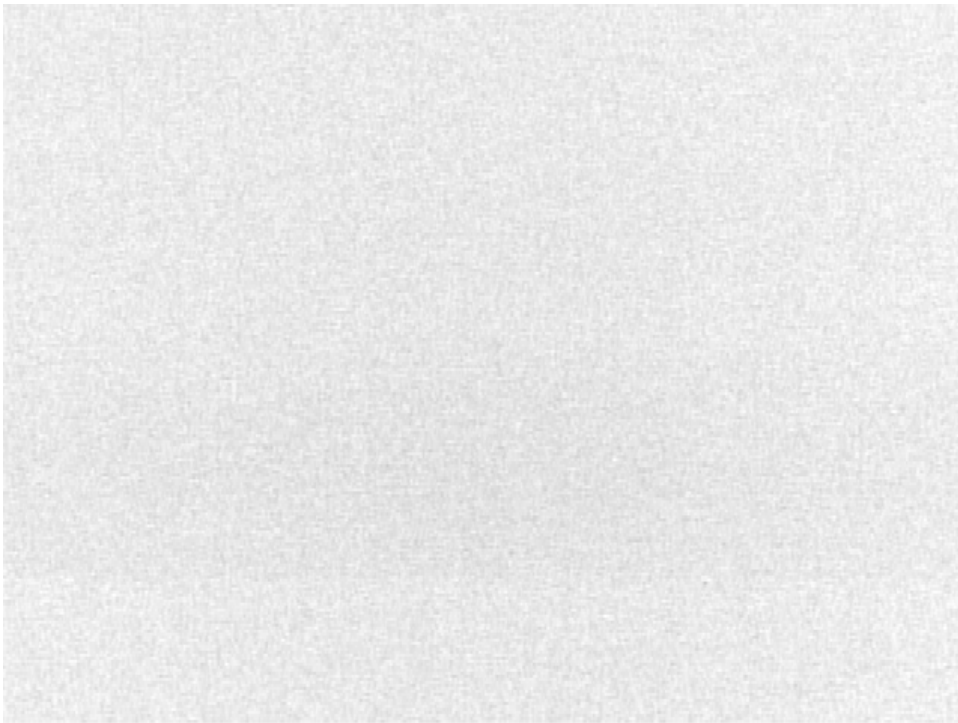


Figure 3: Test Image during Byproduct 2 Flow.

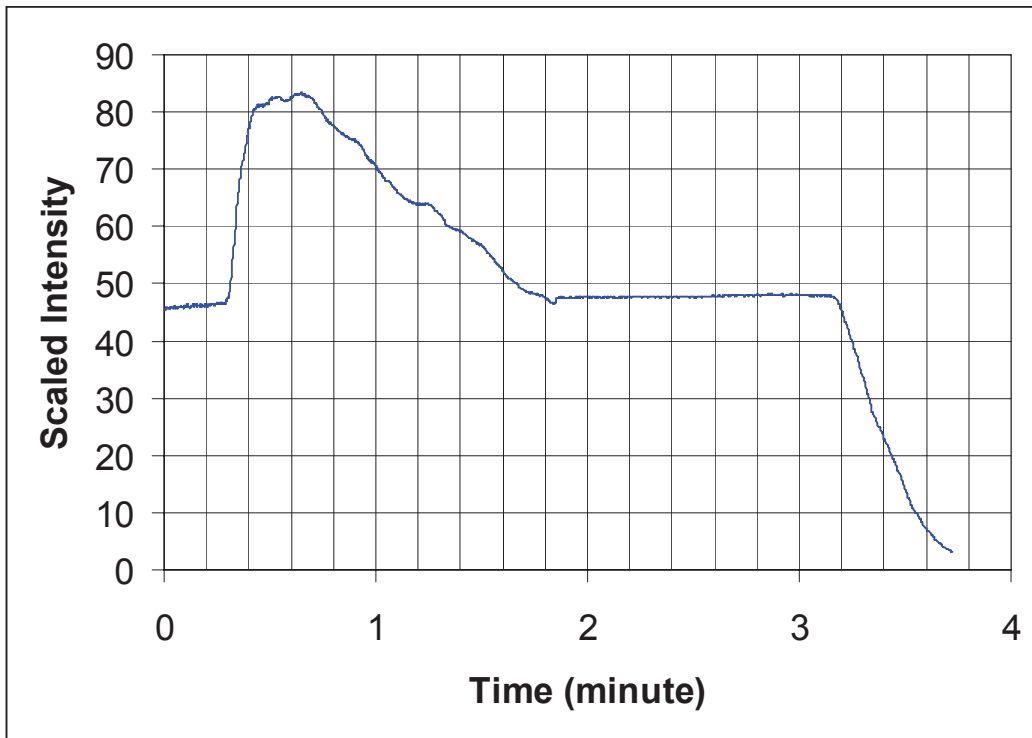


Figure 4: Intensity vs. time plot showing the entire transition period

Conclusions:

The Canty Vision System provides consistent measurements of the visual characteristics of the product flow. It provides a reliable indicator of changes in the characteristics of the fluid flowing out of the tank that can be used to determine when the flow from the tank contains significant amounts of either byproduct. While this report only presents the transition period that occurs over a 5-minute time span, the true time to empty the tank is approximately 2.5 hours and for most of this time good product is draining. The value of this good product can be reduced significantly by contamination from either byproduct and the desire to recover a maximum amount of this good product is obvious. However, with no indication of when the byproduct concentrations are actually increasing, the user has no reliable way to maximize his efficiency by ensuring that all good product is recovered and little to no byproduct contamination occurs. The vision system provides this capability and is usable as an in-stream analyzer providing measurement results in a matter of seconds on a continual basis.

Further Information:

For further information on Canty Vision Systems, please contact us at the address on this report or feel free to email us at sales@jmcanty.com.