Sample Environment News

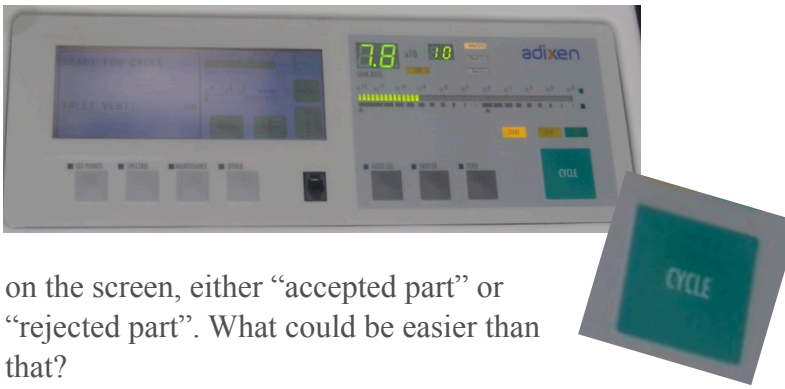
November 14, 2005

Leak-testing Samples without Hassle

Worried about spending all day lining up your sample, and not knowing if anyone will be around to help you leak test before taking data? Well, life just got better.

We are happy to announce that we have a new helium leak detector for checking samples that is available for use by anyone at any time of the day. Previously, we had been forced to require a member of the sample environment team to perform all leak-testing. Otherwise, we were sending the old leak detector off for repair in as little as two weeks after putting it into service. Aside from the considerable repair costs, we were forced to put into service leak detectors that are generally reserved for work on the guides.

We field-tested several models of leak detectors to find one that was easy to use and very tolerant of abuse. We wanted to find a display that was easily understandable, even for a bleary-eyed graduate student in the middle of the night. The Adixen (spinoff from Alcatel) leak detector that we chose has a big green button. Press that and it goes through a one minute leak-testing cycle that ends with a message



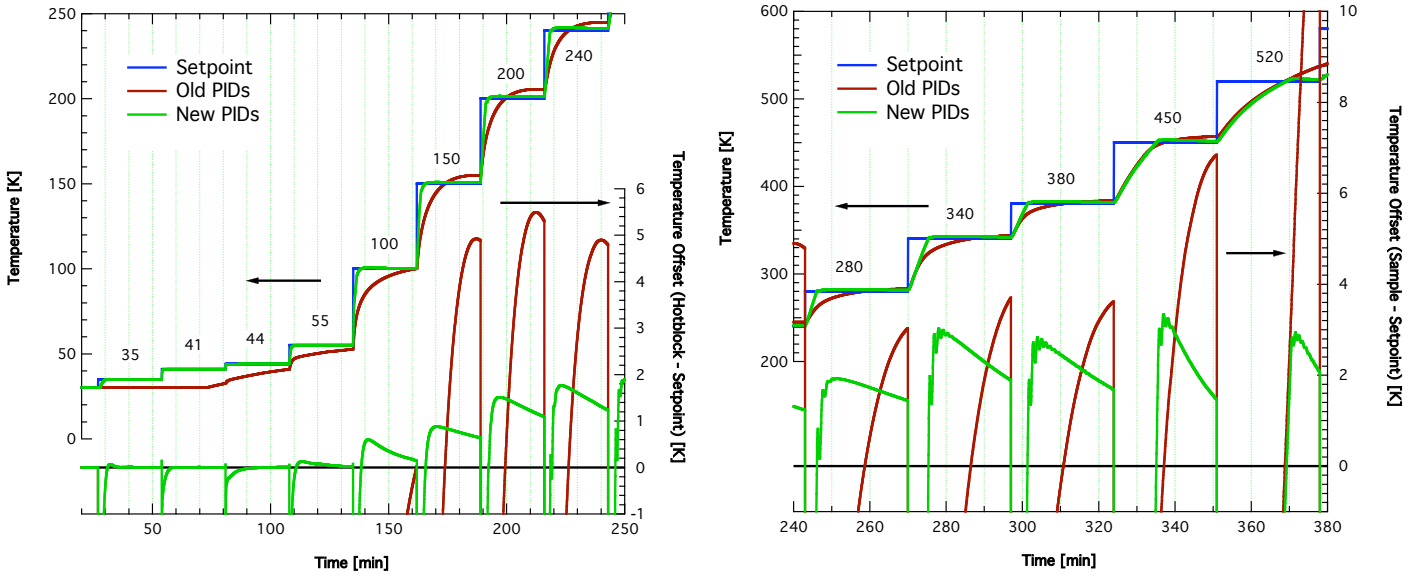
on the screen, either “accepted part” or “rejected part”. What could be easier than that?

Sarah McKenney joins the troops

We have a new face around the building. Sarah McKenney was recently hired to fill a dual role. She will be working with Ross Erwin to bring a helium-3 analyzer from demonstration project to production use. This will be one of the unique features available on the BT-7 triple axis spectrometer. She will be spending the rest of her time helping out with sample environment issues. Although she is learning a bit about everything right now, she will later specialize in the care and feeding of the liquid helium cryostats. Be sure to make her feel welcome.

PID Tuning Update

Started last year with the goal of improving the speed and stability of our closed-cycle refrigerators, this project is starting to reap rewards.



Zone Tuning for High Temperature CCRs

Closed-cycle refrigerators (CCR) form the backbone of our sample environment offerings. They offer a convenient way to access a wide temperature range without having to deal with liquid cryogens (nitrogen and helium). Despite this great utility, tuning these CCRs for optimal performance was excruciatingly tedious and often frustrating. We had to find a better way. Over the past year, we have spent a great deal of time developing an approach for determining the PID tuning parameters for all of our CCRs. The two graphs above showcase the improvement in performance for the high temperature closed-cycle refrigerator CCR-H03. We split the results into a low temperature and a high temperature graph to provide sufficient resolution. The upper curves on each graph correspond to the left hand scale with temperature in Kelvin versus the bottom axis of time in minutes. The actual setpoints are labeled above each interval, and vertical grid lines delineate ten minute intervals for convenience. You can directly compare the performance of the new PIDs to the old as we step through setpoints chosen both to represent reasonable intervals and to exercise each set of parameters in the temperature controller's PID zone table. The right hand scale shows the offset of the sample temperature from the setpoint and corresponds to the lower set of curves in each graph. This is a useful way to determine the quality of the control across widely varying setpoint temperatures. Whenever the green line representing the new PIDs approaches the setpoint quicker than the red line for the old PIDs, we are saving time. Note that at temperatures below 45 K the old PIDs are not controlling well at all. Even at high temperatures where both sets of parameters are limited by heater power, the new PIDs settle more quickly and nicely. After each CCR is tuned, a note is placed on top of the temperature controller indicating its new PID zone table.