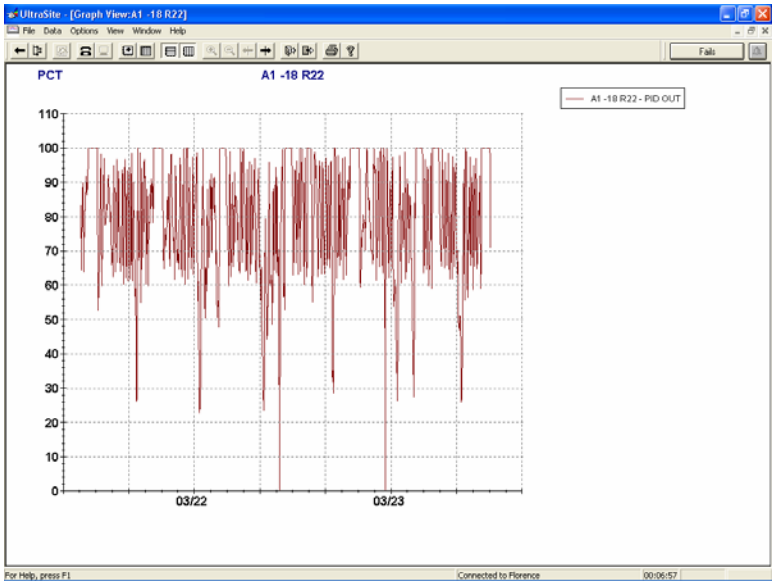
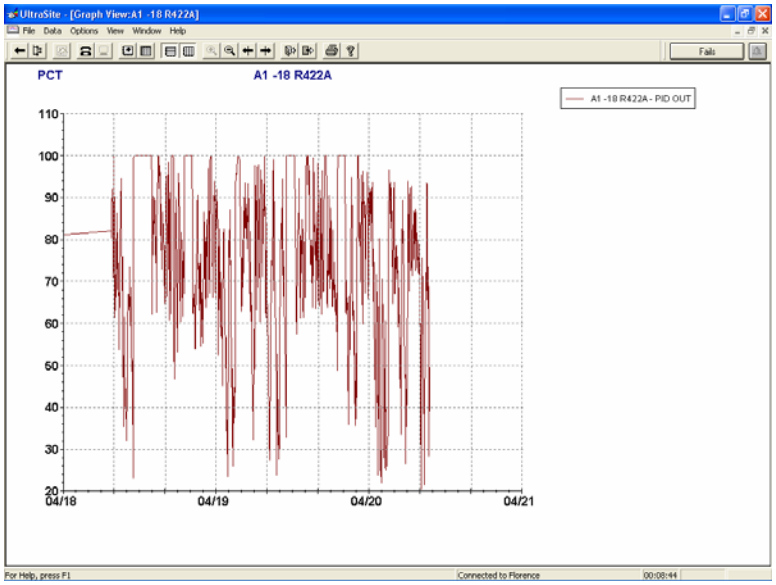
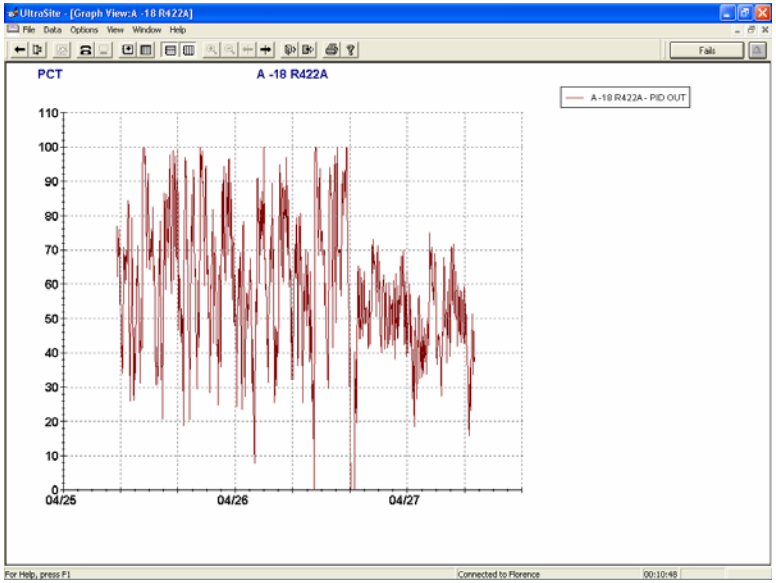
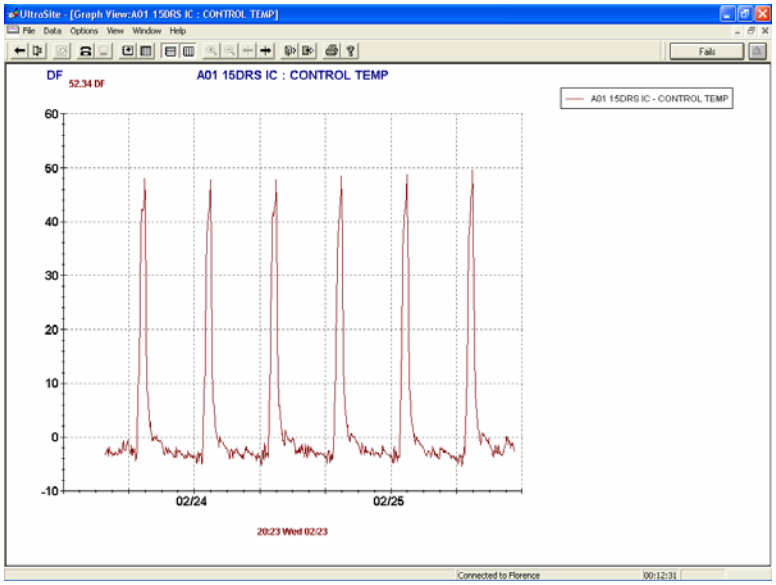


Rack A with R22 – you can see that the rack ran primarily between 70% and 95% of capacity.

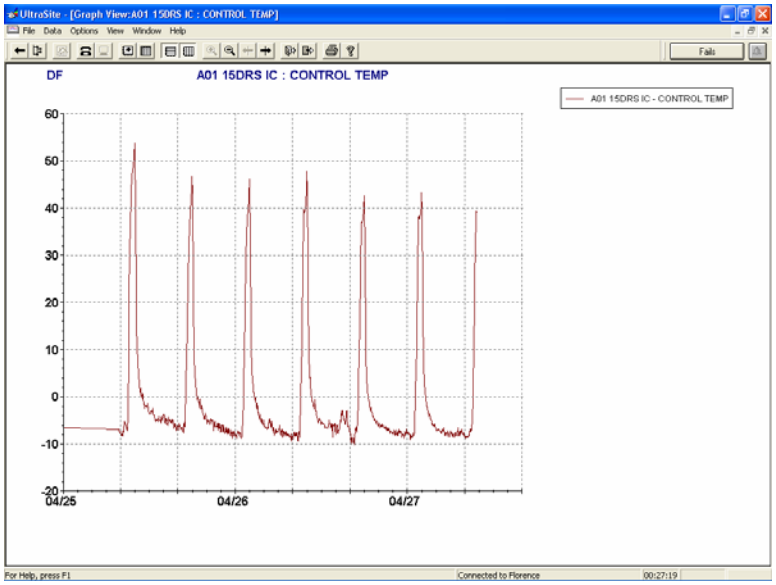


Rack A with R422a – here you can see the rack runs more consistently between 60% and 90%, with more extended periods below 50% of capacity. After fine-tuning the low temp expansion valves, the rack was set up to run the CPC floating suction algorithm on the afternoon of April 26. Note the further improvement in the capacity performance of the rack along with the narrowing of the capacity band requirements.





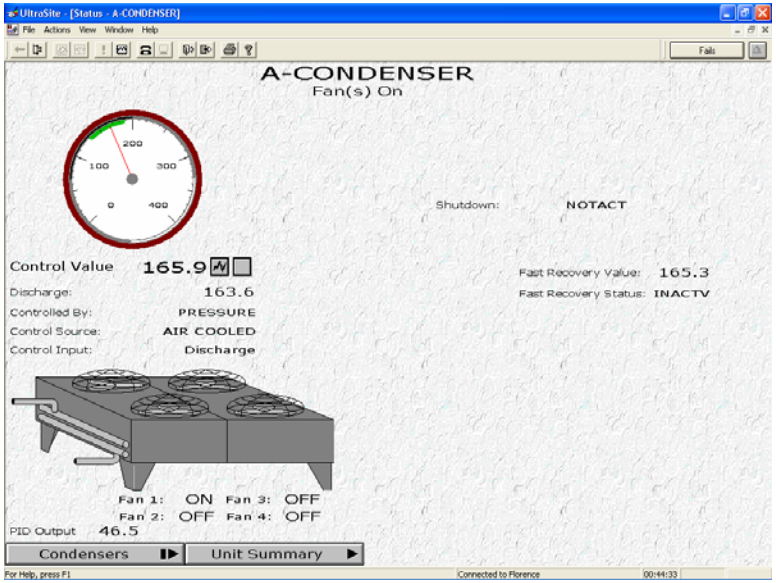
Reach-in Ice Cream typically running –4º to –5ºF with R22.

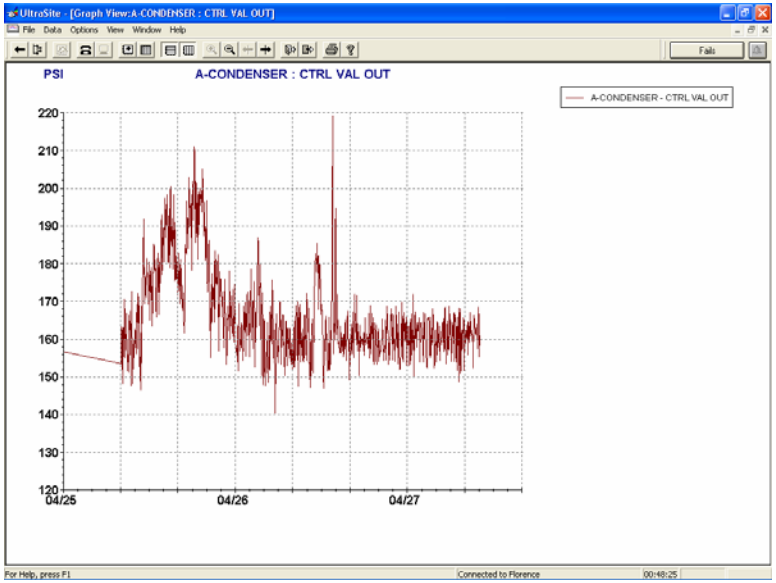


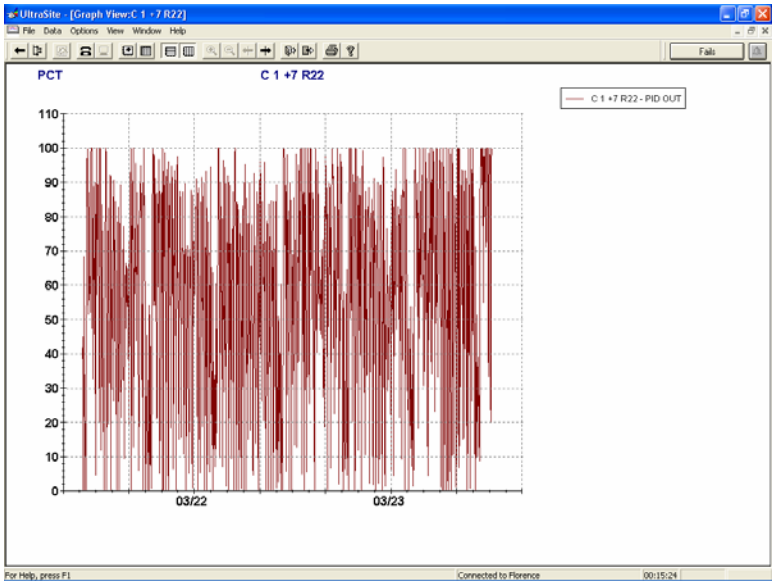
The same Reach-in Ice Cream cases now typically reaching –8º F with R422A.

The refrigeration technicians are investigating whether this case has the proper fan motors and blades in it, as it was originally a reach-in frozen food case that was, at some point in the past, re-merchandised with ice cream. Once the fans motors and blades are upgraded, this case should be able to easily reach –10º to –12ºF.

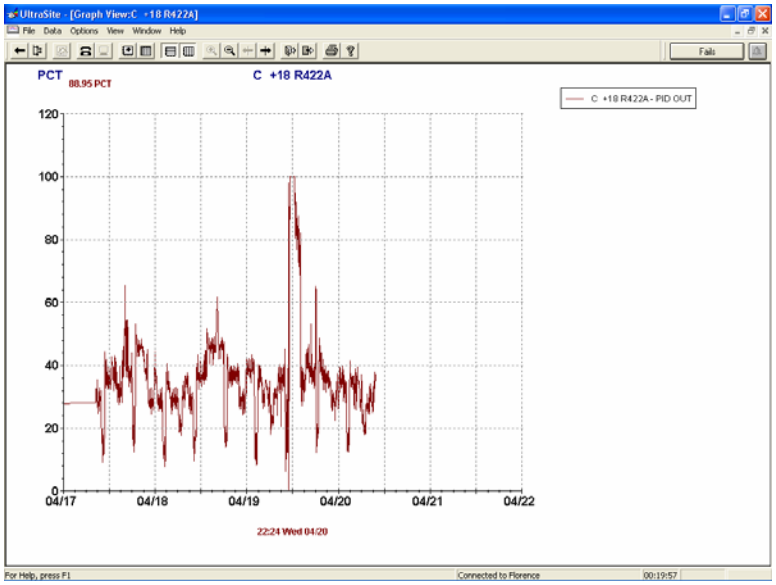
Obviously, comparing the R22 head pressure to the R422a head pressure is not a valid comparison. Just by the nature of the differences between the two refrigerants, the head pressure of R22 will be slightly lower. What I want to demonstrate with these two images is that the pressure range of the R422a condensing is stable and controllable in condensers that were originally designed for R22.





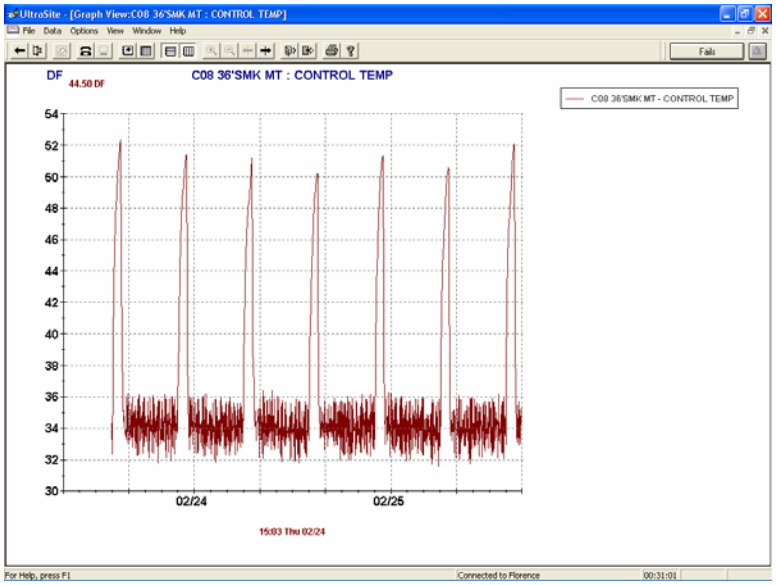


Rack C with R22 - you can see that the capacity was all over the board, but the bulk of the time it ran 50% to 80% range. Part of the big swings seen was because the suction target was just a bit colder than normal and the rack was not using the floating suction algorithm.

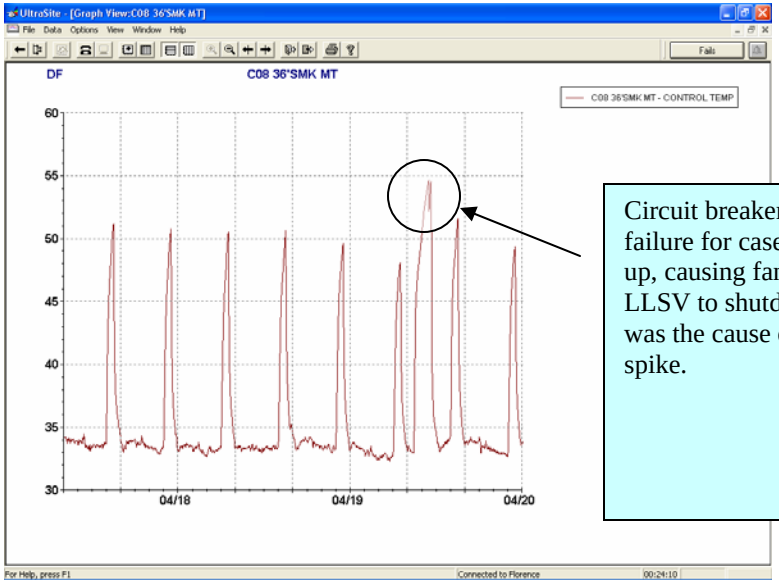


Rack C with R422a – you can see the capacity requirements are much more stable when running the floating suction algorithm, and are consistently below 50%. The blip yesterday was the result of the Smoked Meat case going down (this was the target system for the rack).

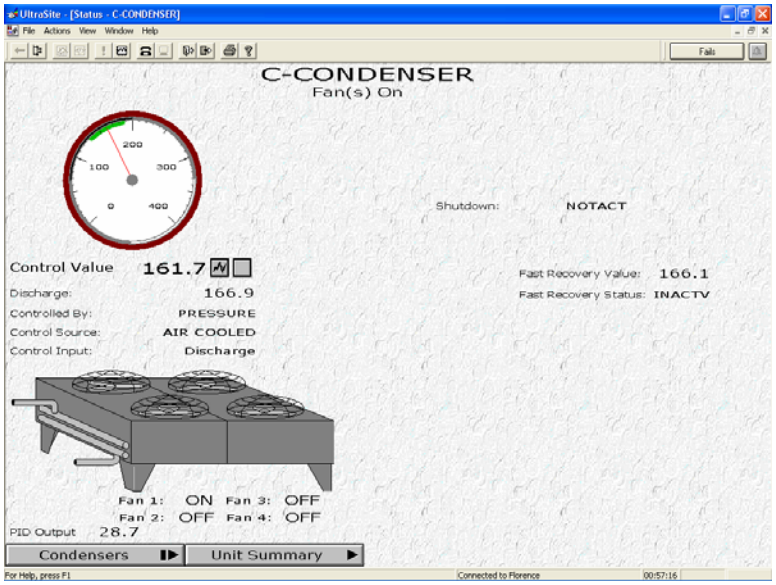
Multideck Smoked Meat Cases with R22, frequently cycling on t-stat control.

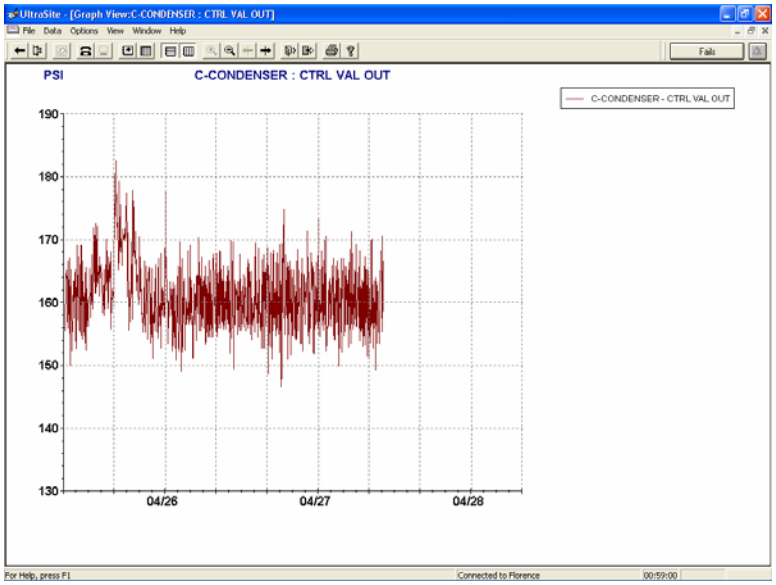


Tighter temperature control as the lead circuit in the floating suction algorithm with R422a.



Circuit breaker failure for case line up, causing fans and LLSV to shutdown, was the cause of this spike.





Obviously, comparing the R22 head pressure to the R422a head pressure is not a valid comparison. Just by the nature of the differences between the two refrigerants, the head pressure of R22 will be slightly lower. What I want to demonstrate with these two images is that the pressure range of the R422a condensing is stable and controllable in condensers that were originally designed for R22.

Initial conclusions:
We have experienced no problems with mineral oil return, migration, or separation in either of these two racks. In fact, we had a significant amount of oil return to the racks from the evaporators after the conversion took place.

Although we don't have a sensor to measure it in the Einstein system, we are achieving better natural sub-cooling from the condensers using R422a than we were while using R22. I believe ICOR's measurements can confirm this.

We are definitely maintaining the case temperatures at least as well as before the conversion, better in some instances, but this could be attributed to the adjustment of the expansion valves. Regarding the expansion valves – on the medium temperature applications, the existing valve bodies required only the replacement of the power elements and the adjustment of the valves. In the low temperature applications, almost all of the valves are oversized with just the replacement of the power element. A lot of time was spent adjusting and fine-tuning the valves. As a result, on future projects of this nature, I believe I would recommend replacing the low temperature valves completely to properly sized R404a valves.

Line sizing and pressure drop do not appear to be an issue, although there was some concern for this in the initial assessment phase of the project.

One of the most satisfying pieces in this project is the improvement in capacity, and the reduction in the number of compressors needed to maintain the suction pressure target and product integrity. This will definitely translate into lower energy costs for compressor operation.