Using Drainac™ Drain Time in a DCS

Introduction

Your Drainac has been designed to measure the drainage time of your furnish with a high degree of repeatability. This drain time measurement is the native measurement of the Drainac analyzer. Many mills, however, prefer to express the freeness measurement in more familiar units such as CSF. While the Drainac has the ability to output freeness in CSF, many mills are electing to convert Drain Time (DT) to CSF within their DCS systems.

There are several advantages to the papermaker in using his DCS to host the DT/CSF calibration. First, the typical DCS has powerful historian and statistical analysis tools which make capturing and analyzing large amounts of data very convenient, allowing process analysts maximum flexibility in developing and manipulating DT/CSF relationships. Secondly, hosting the calibration in the DCS gives the operator more control over the interpretation of the instrument's output. Finally, the function of the Drainac will not change as different furnish recipes are used. The operation of the instrument always stays the same whereas the operator can shift or adjust calibrations in the DCS as the need arises.

Setting the Drainac to output Drain Time

Drain Time output can be selected via the Freeness parameter within the CONFIG menu of the Drainac. Choose SECONDS as the units of freeness and the system will be set to output Drain Time. Normally, the FREENESS ZERO and SPAN settings are set to the same values as the CYCLE TIME ZERO and SPAN settings. This produces a one-to-one relationship between the Cycle Time input measurement of the Drainac and the Drain Time Freeness analog output (Figure 1). An alternative output window can be selected if, desired, by specifying different Drain Time Zero and Span values.

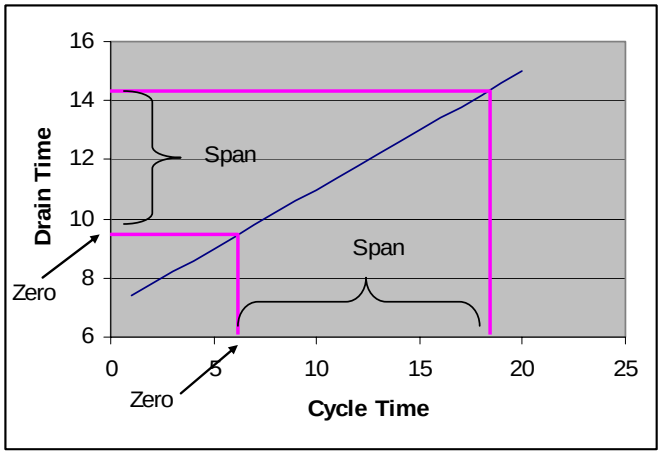

Figure 1 - Cycle & Drain Time Windows

The analog output of the Drainac will then reflect the Drain Time Zero & Span values, ie

4ma = DT ZERO and 20ma = DT ZERO+SPAN.

Developing the Drain Time- CSF Relationship

Once the operational parameters of the Drainac are set, it will be necessary to collect both process and Drainac data in order to build the calibration to be programmed into the DCS. Periodically collect furnish samples and perform manual lab evaluations of freeness. Record the Drainac response time when collecting the sample. Repeat this procedure to build a collection of data points.

Try to collect samples with a large range of freeness variation. Ideally, collect samples with a minimum of 200 CSF variation. Avoid collecting samples during startups as stock characteristics are likely not to have stabilized. A good time to collect samples is during a machine break as these are times when the furnish is close to nominal conditions and the operators can be persuaded to increase or decrease refiner loads to give wider ranges in freeness.

Once you have collected a number of data points – the more the better – you can analyze the data to build a calibration. Use your DCS statistical analysis packages or a program like Excel to plot the data (Figure 2).

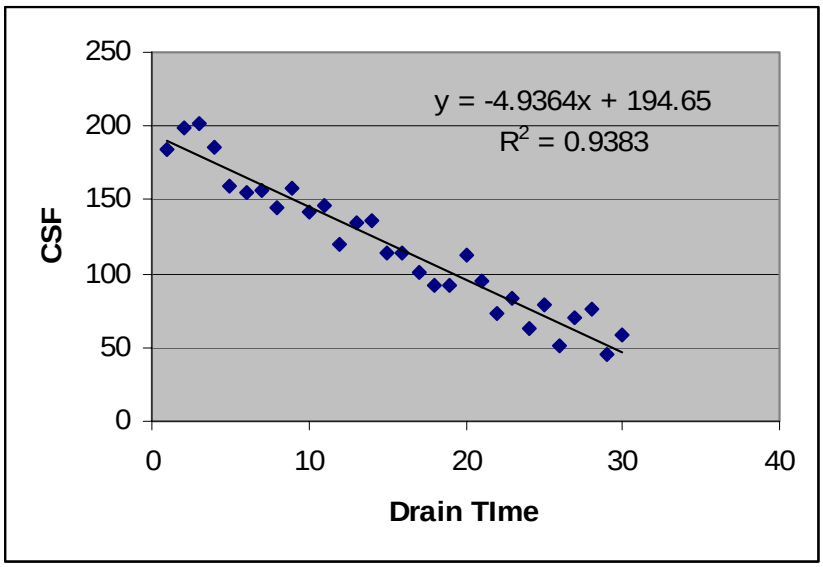

Figure 2: Drain Time and Lab Evaluations of Freeness

Use the regression utilities in your DCS to derive an equation for a best fit trend line of the data. The example in Figure 2 used Excel's linear modeling for the regression and developed the equation

CSF = -4.9364* DT + 194.65

This is the equation that you would program into your DCS to interpret Drain Time.

Final note: Linear approximations should suffice for most applications, but your data may best be modeled using alternative regressions, such as logarithmic or exponential models. Try to model the data as best as you can but keep in mind that simpler is often better. A linear approximation will often yield excellent results and not require the amount of work to resolve more complicated regressions.