

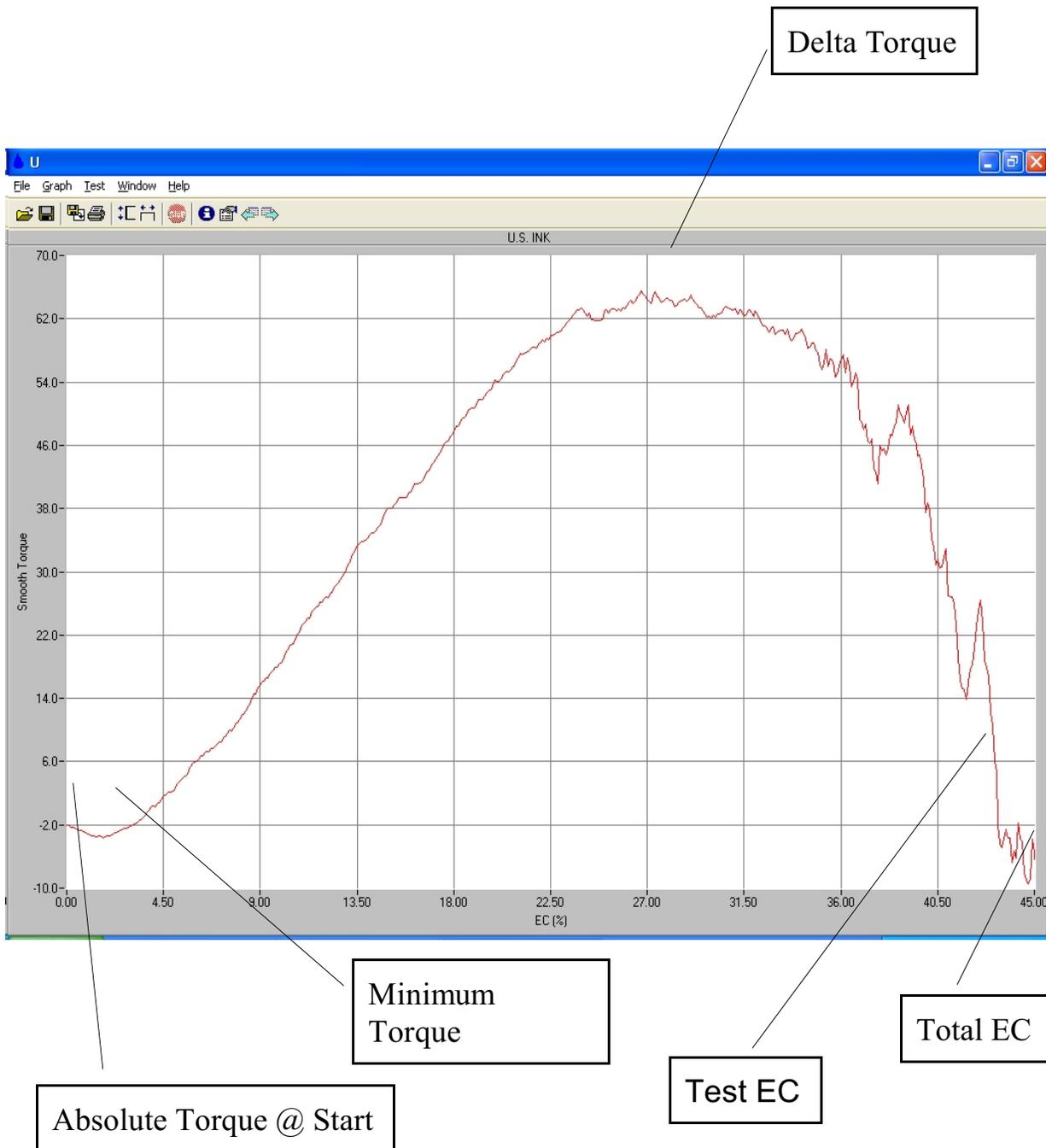
Kershaw Instrumentation LLC

517 Auburn Ave. Swedesboro, New Jersey 08085, Phone 856-467-5482, Fax 856-467-2341

www.kershawinst.com

Water Pickup System, Model WPS Technical Briefs and Notes

The follow pages include some common "Question and Answers " and technical comments regarding this instrument.



The above printout shows a graphic display of a typical Water Pickup Test. An information box is provided below the graph (not shown in this illustration) which provides the following information.

Absolute Torque @ start: This value represents the torque generated by the ink at the end of the premix. This value is reset to zero when the fountain solution is introduced. The torque is expressed as a Delta value after it is reset to zero.

Minimum Torque: This is the lowest torque recorded during the test. This value usually occurs early in the test as shown above. This depression in the curve represents the ink's resistance to the fountain solution.

Delta Torque: This value represents the peak of the curve. The value is calculated by subtracting the lowest torque value from the highest torque value observed during the test.

Test EC: This is the amount of fountain solution added during the test until the torque dropped below zero. Any fount added after the torque reached zero is not recorded here. The information box provides this value in percent of fount added and also in running time expressed in minutes.

Total EC: This is the total amount of fountain solution added during the test. The information box provides this value in percent of fount added and also in running time expressed in minutes.

EC Data @ Delta: This value shows where the peak of the curve or highest torque value occurred during the test. It is expressed in percent of fount added and also in running time expressed in minutes.

Some comments regarding the WPS-101c

1. What is the difference between test time and total time?

The test time indicates the amount of time from when the pump is started until the torque goes below zero. The total time indicates the entire time that the pump is running.

Please note that same applies to the test EC and the total EC. The EC value is the amount of water added in percent.

2. Torque

The torque value is the amount of energy required to spin the propellor in the ink mixture

3. Smooth torque

During a test the data is captured at a rate of 3 data points each second and stored this way in raw form. I.e. each minute of testing the system stores approx. 180 data points.

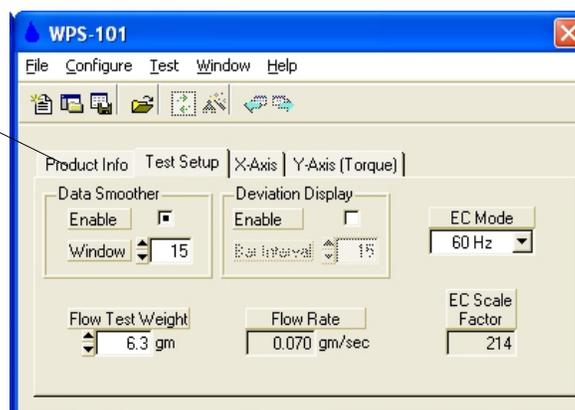
On the “Test Setup” tab in the main menu the operator can enable the “data smoother”. This feature allows you to improve the appearance of the curve. If you check the “enable” box you have turned on the smoothing feature and must now select a smoother value between 2 and 25. Where 2 is the least amount of smoothing and 25 is the maximum. The smoothing works as described in the following example:

Smooth data Example:

The operator enables the smoother and assigns a value of 10 in the “Window”. The system will now take data points 1 - 10, average them and display this average value as the first point on the curve. Next the system will now take data points 2 - 11, average them and display this average value as the 2nd point on the curve. Next the system will now take data points 3 - 12, average them and display this average value as the 3rd point on the curve, and so forth..... One can see how the larger numbers will generate a smoother curve.

If the operator displays the data with no smoothing a rather rough curve appears as shown in figure 1. If the operator chooses to smooth the data, a better curve appears as in figure 2.

Data smoother



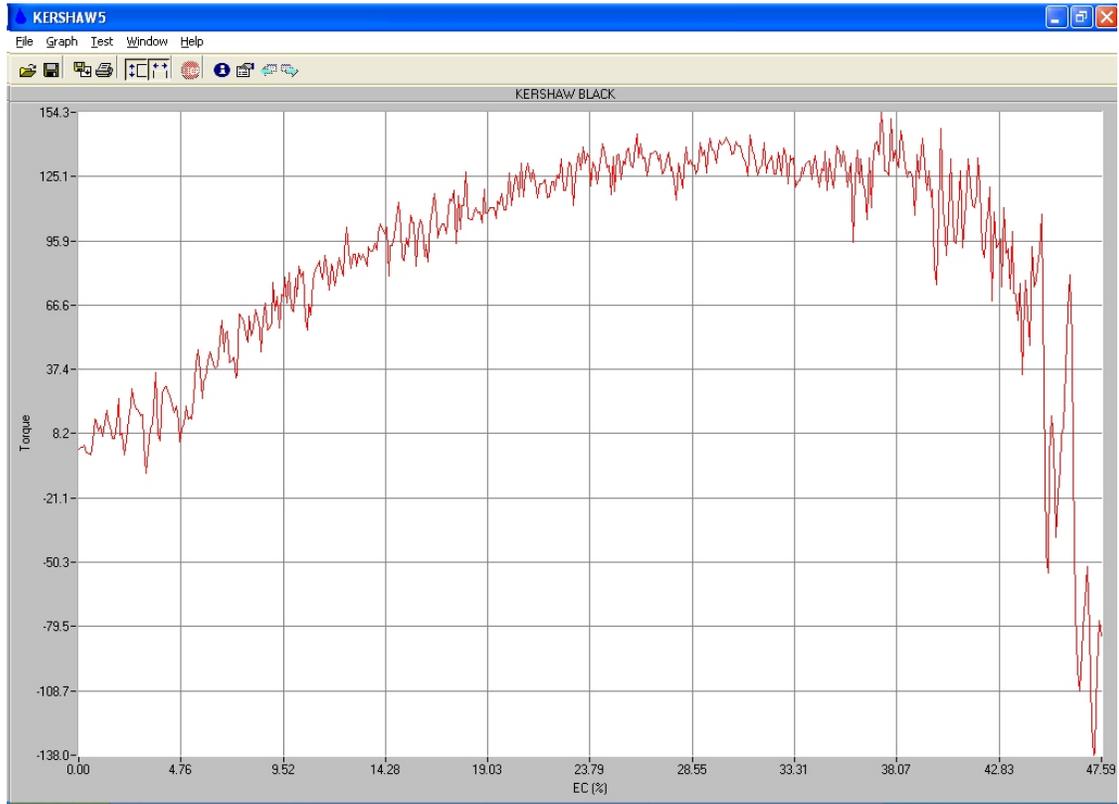


Figure 1, no smoothing, raw data display

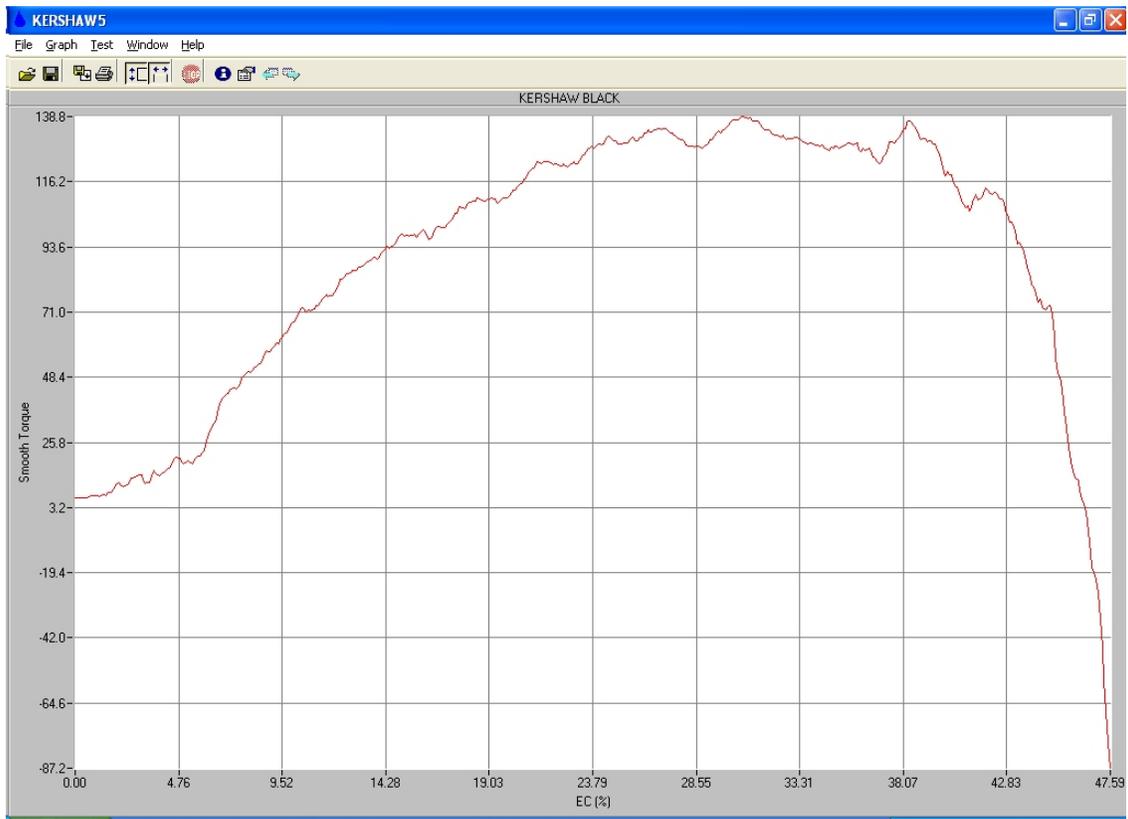


Figure 2, smoother enabled, Window = 15

4. Torque deviation

The torque deviation can be selected by checking the “deviation display enable” as shown below. This will generate deviation bars on the curve. This bars show how much deviation from the curve is present in the data that you cannot see because of the data smoothing. I would suggest that if this is confusing simply turn it off. An example of this is shown in Figure 3.

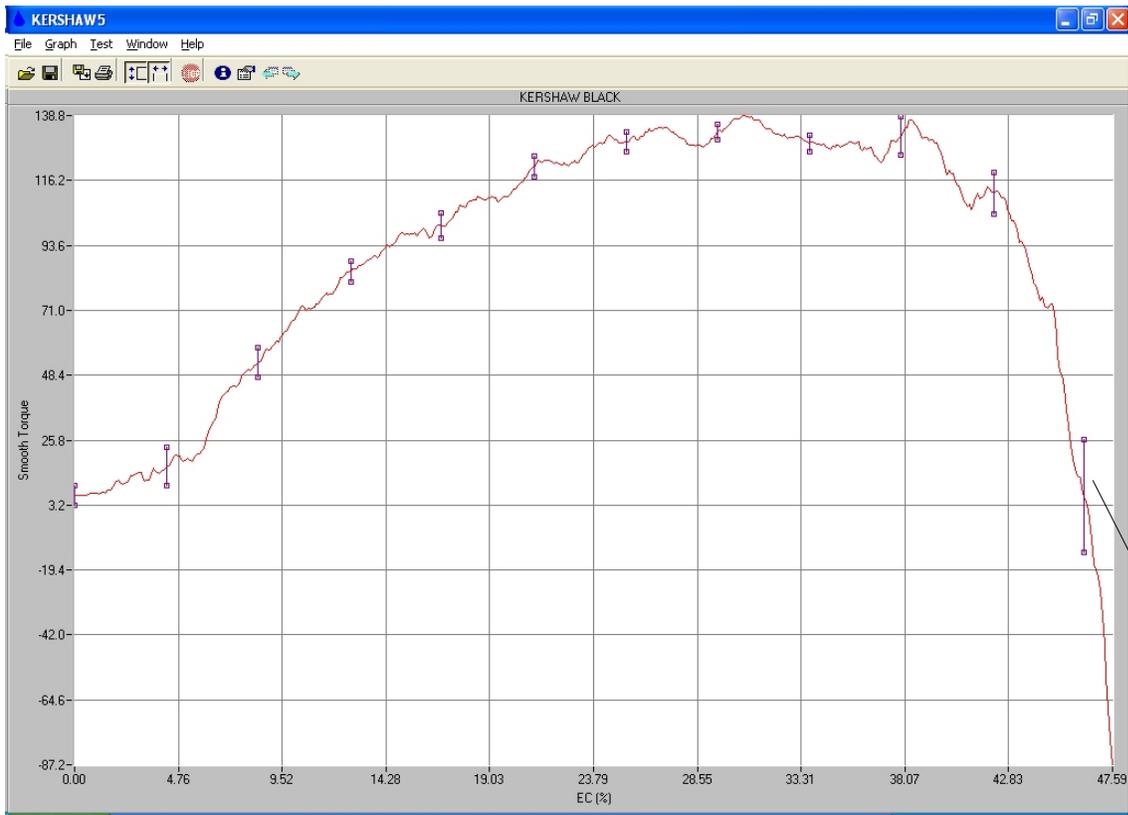
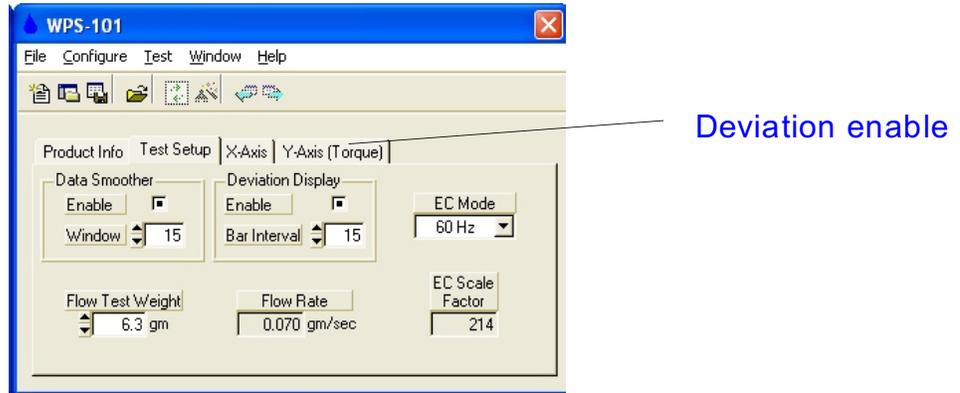


Figure 3, Deviation enabled

Deviation bars

5. Result txt file ? Starting torque?

I do not understand this question. Can you send me an example??

6. EC scale factor calculation.

The EC display has an internal clock which is generated by the line power frequency. The frequency is 60HZ here in the USA. The calculation is done using the following factors:

Calibration test time = 90 seconds

Line power = 60 Hz

Sample size =25 grams

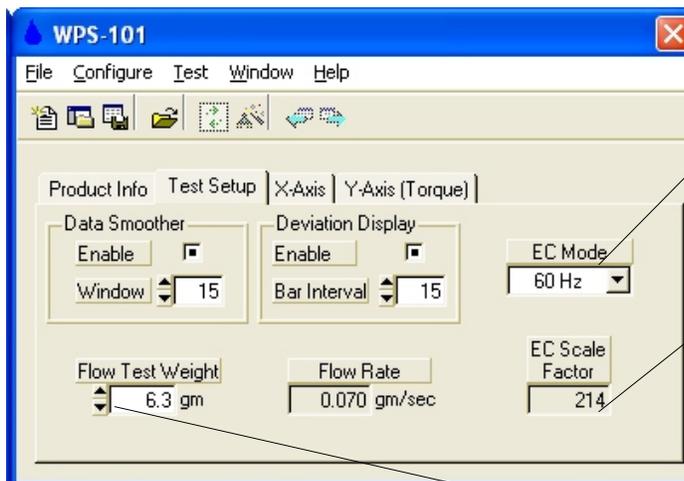
The equation is as follows:

$$(90 \text{ seconds})(60\text{Hz}/1 \text{ second})(25 \text{ gram}/100\%) = 90 \times 60 / 4 = 1350$$

Please note that if your line power is 50 Hz the equation is as follows:

$$90 \times 50 / 4 = 1125$$

Also note that the software will do these calculations for as shown below.



Line frequency

Calculated EC Scale factor

Measured test weight

7. MRU Depth

Most recently used sub menus located within the application window and graph window file menus.

8. 1 minute test time

The system is designed to stop the test once the torque drops below zero for more than 5 seconds. A one minute minimum test time has been built in to allow the ink to emulsify. Some inks require a longer period of time to start to emulsify. This is often the case when running UV Inks (see appendix D Resistant inks).

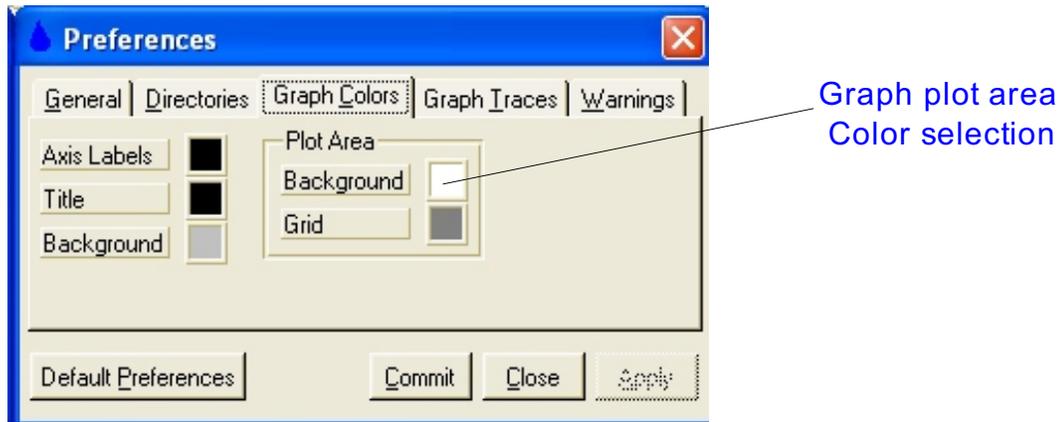
The operator can extend this minimum time by installing a jumper as described in appendix B. Simply use a short piece of electrical wire 18 - 26 gauge and connect it to the PLC as shown in figures B1 and B2 in the manual.

9. Interface Test Panel.

An interface Test Panel has been provided in the software to check the operation of the system. Click "Configure", "Interface", "Test". To access this control panel test feature.

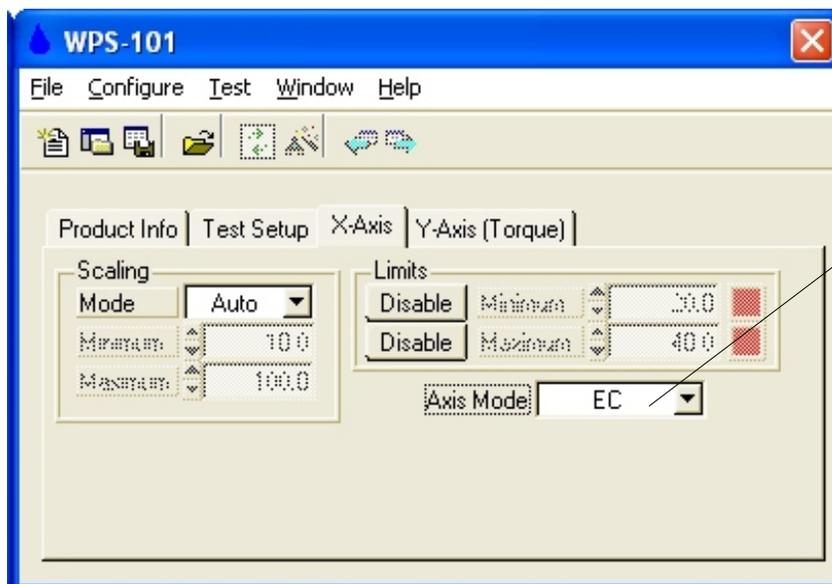
10. Graph background color.

The background color of the graph should be white as shown in examples 1 - 3 above. You can change the background color by "configure", "Preferences", "Graph Colors". Then select plot area color as shown below.



11. Time scale or EC scale

The horizontal scale on the graph can be scaled either as time in minutes or as EC in percent of water added as shown in the examples above. This selection is made on the X-Axis tab as shown below:



Horizontal Scale selection

Operating Modes added to the WPS-101c software, 1/1/2009

Introduction:

The software for the WPS-101c has been modified to add four different operating modes. These software modifications have eliminated the need to add jumpers to extend the test wait time. The test wait time can now be extended from the project menu as shown below. The operating modes are selected from the “test Setup” tab as shown below.

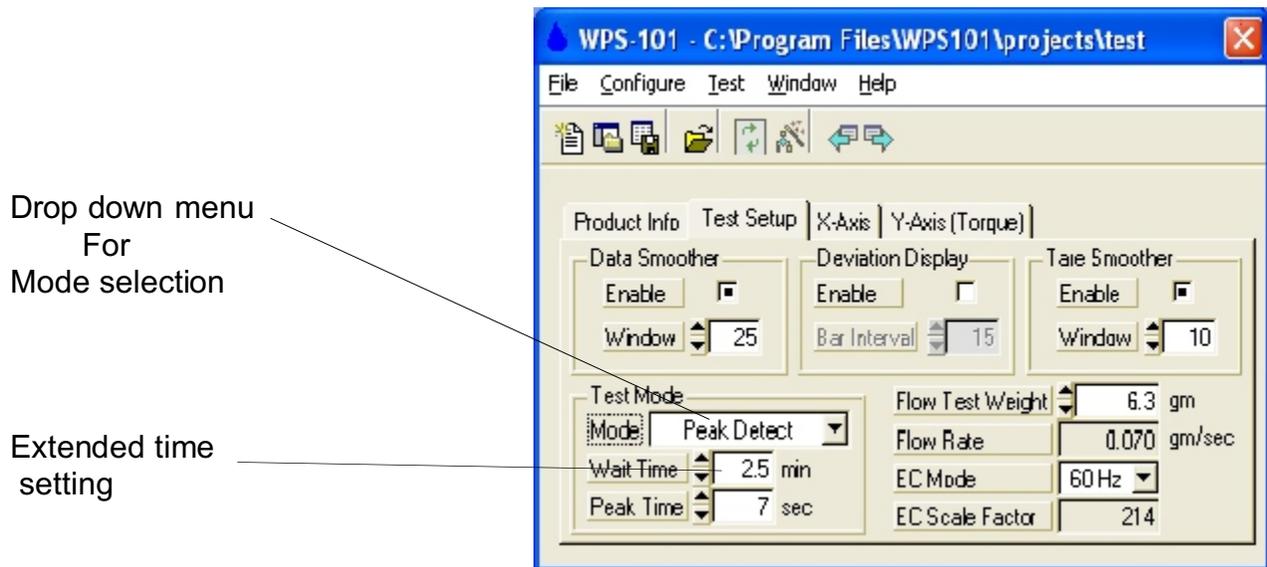


Figure 1

Normal Mode:

The “Normal Mode” will delay the shut off of the test for 1 minute after the pump begins adding water. This fixed minute time delay allows the ink to accept the water for 1 minute before checking the torque of the propeller. After 1 minute the system now waits for the delta torque to fall below zero for 5 seconds then ends the test. This mode is identical to the original operating system of the WPS - 101c.

The “normal mode” can be selected from the Test Mode drop down menu as shown in figure 1. When the normal mode is selected the Wait time and Peak Time boxes will be grayed out, hence are not operational in this mode.

Extended Auto mode:

The “Extended Auto Mode” will delay the shut off of the test for an operator selected time period after the pump begins adding water. This extended delay allows the ink to accept the water for a period before checking the torque of the propeller. After the extended time elapses the system now waits for the delta torque to fall below zero for 5 seconds then ends the test. This mode is identical to the original operating system of the WPS - 101c when the jumpers were installed.

The “Extended Auto mode” can be selected from the Test Mode drop down menu as shown in figure 1. When the Extended Auto mode is selected the Wait time will be active. This box allows the operator to enter the desired extended time. The box will

accept any time value between 1.0 and 10.0 minutes in 0.1 increments. The Peak Time box will be grayed out, hence is not operational in this mode.

In figure 2 below, is an example of a test run in the extended auto mode using an extended time of 3.0 minutes. Please note that the test waited 3.0 minutes, then shut off after the delta torque dropped below 0 for 5 seconds.



Figure 2

Extended time = 3.0 minutes, the test runs at least to this point

The test shut off when the torque crossed zero

Extended Manual mode:

The "Extended Manual Mode" will delay the shut off of the test for an operator selected time after the pumps begins adding water. Unlike the Extended Auto mode, this Manual mode simply ends the test after the the extended time elapses. This mode does not monitor the delta torque to shut off the test. This mode is used when the operator wants to run a test for a finite period of time regardless of the torque data. Keep in mind that the EC numbers will be identical when multiple tests are run in this mode.

The "Extended Manual mode" can be selected from the Test Mode drop down menu as shown in figure 1. When the Extended Manual mode is selected the Wait time will be active. This box allows the operator to enter the desired extended time. The box will accept any time value between 1.0 and 10.0 minutes in 0.1 increments. The Peak Time box will be grayed out, hence is not operational in this mode.

In figure 3 below, is an example of a test run in the extended manual mode using an extended time of 2.5 minutes. Please note that the test waited 2.5 minutes, then shut off.

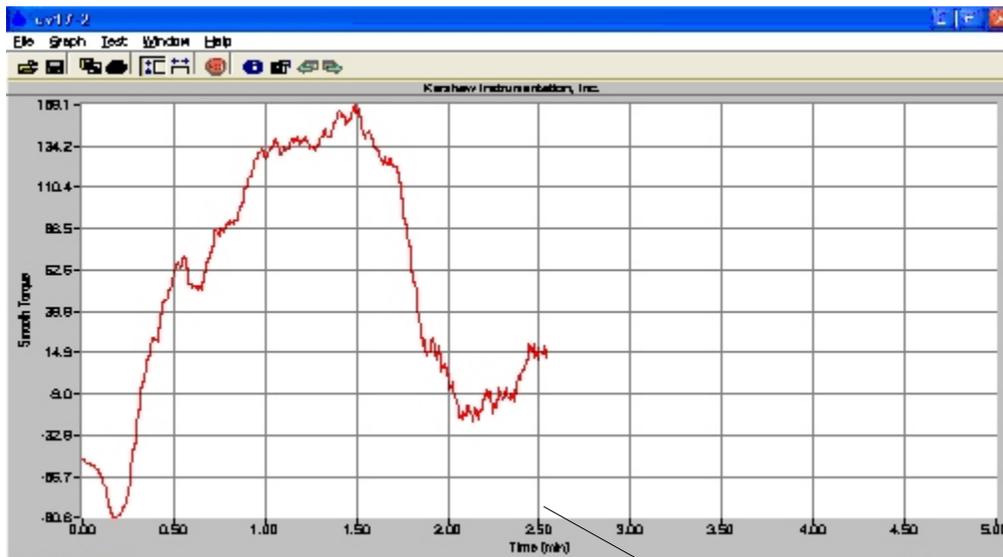


Figure 3

Extended time = 2.5 minutes, hence the test shut off here

Peak Detect mode:

This peak detect mode allows the ink to accept the water for an operator selected time period. After the extended time elapses the system watches for the delta torque to reach a peak. Once the delta torques falls below this peak for a time greater then the “Peak Time”, then the test ends automatically.

The “Peak Detect mode” can be selected from the Test Mode drop down menu as shown in figure 1. When the Peak Detect mode is selected the Wait time will be active. This box allows the operator to enter the desired extended time. The box will accept any time value between 1.0 and 10.0 minutes in 0.1 increments. The Peak Time box will also be active. This peak time allows the operator to select how long the system will wait after the peak has been reached before ending the test. The peak time box will accept any time value between 1.0 and 30.0 seconds in 0.1 second increments.

In figure 4 below, is an example of a test run in the Peak detect mode using an extended time of 1.0 minute and a peak time of 7 seconds. Please note that the test waited 1.0 minute, then shut off after the delta torque dropped below its peak for 7 seconds.

Peak occurs here

Test shuts off 7 seconds after peak



Figure 4

Waiting time is 1 minute

The system waits 1 minute before it looks for the peak

A Typical Test Method:

In order for the operator to determine the correct test mode, they must first run a “sample test” using the extended mode manual set to 5 minutes. We have chosen 5 minutes to insure that more than enough water has been added to emulsify the ink sample. Keep in mind that the operator can stop the test at any time if desired by simply turning the test switch to off on the front of the instrument. Upon completion of this 5 minute test, the operator can now look at the graphic results to determine which mode is best suited for this application.

If the torque curve generates a steady rise followed by a steady decline in which the torque falls below the zero axis then you may select either the normal or the extended auto modes. These modes will shut off the test automatically.

Some inks have little resistance as the water is added. This is indicated by little or no drop in torque at the beginning of the test phase when the water is added. In this case the normal mode which has a fixed waiting time of 1 minute will work well. If the ink has a greater resistance the torque may indicate a large drop at the beginning of the test and may require several minutes to recover. If this is the case the operator needs to use the extended auto mode and enter a waiting time long enough to accommodate the resistance of this ink sample.

If the torque rises but does not show a significant drop after the peak, the operator will want to select the Peak detect or the extended manual modes. These modes will terminate the test without the torque falling below zero. This selection is simply a matter of the operator's preference. In most cases the "EC @ Delta" will be the same in either mode.

Keep in mind that the "EC@Delta" value indicates the amount of water present when the maximum torque is reached. This "EC@Delta" value is recorded on the print out in both EC% and Time.

WPS Examples of “Good inks” verse “Bad Inks”

Introduction:

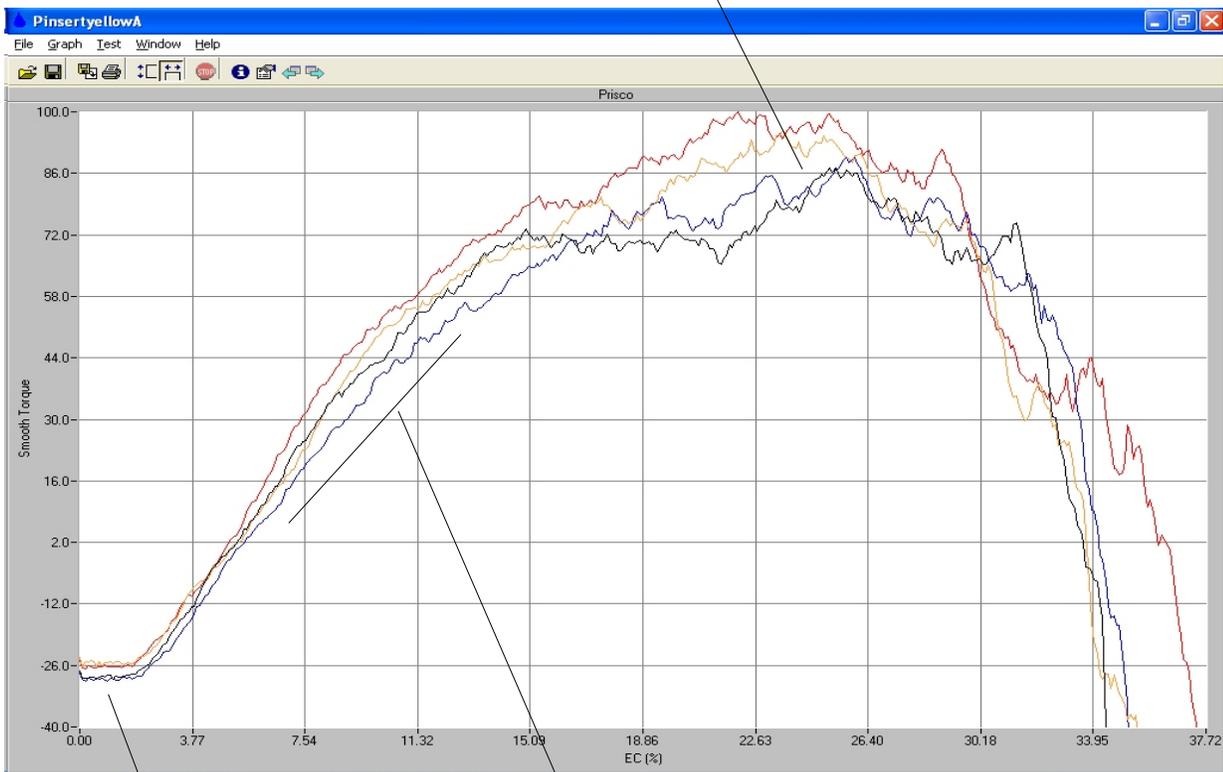
The objective of the WPS is to predict the ink - fount interaction on a printing press. By running a “Set” of inks with a particular fountain solution on the WPS we can often predict how these inks will perform on the press.

The following examples show a set of 4 process color inks run with 2 different fountain solutions.

Example #1: Good Inks

The first example (good) indicates that all four inks will yield good results and all of the inks will emulsify consistently.

All Curves “Peak” about the same,
hence they have similar rheology

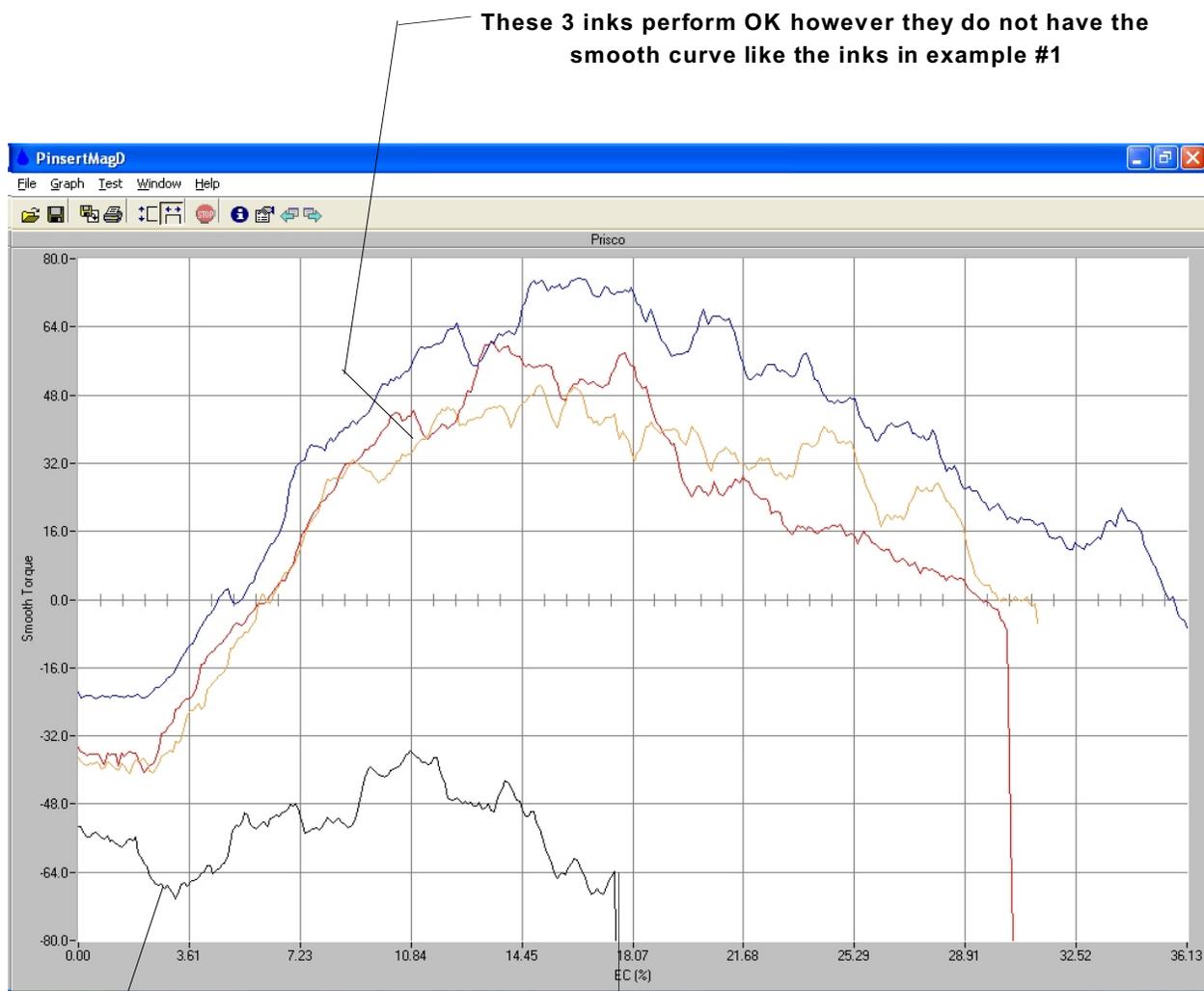


Smooth raising torque indicates good emulsification

Small “dip” indicates there is very little resistance between the ink and the fount

Example #2: Bad Inks

The second example (bad) indicates that the black ink does not emulsify well with this fountain solution.



Short test, poor results

Large "dip" indicates much resistance between the black ink and the fount