July 2011

To All Enessco Representatives

Subject: Justification of Enessco : Shutting Down Thermal Dispersion Units in Brown Grades.

One way of justifying the cost of Enessco is to shut of Thermal Dispersion Units (TDU's). Cost to run these units typically are in the range of $8 to $14 US dollars per ton. Most of this cost is in generating steam for the units. Program costs are much, much less.

This has been proven in many mills making brown grades and we are running at many mills with Enessco and no disperser. However it is suggested that a longer-term trial should be looked at as mills have been convinced over the years that a dispersion unit helps Remove Stickies in fact the Dispersion unit only makes them smaller. These micro stickies are still in the system and at some point in time have to come out in the wire, felt, doctor blades, carrying rolls etc.

Essentially a thermal dispersion unit is a large screw press injected with high amounts of steam. In the early section, water is squeezed out then when the stock is dry steam is injected to raise the stock temperature. Stickies, wax and other such contaminants absorb the energy of heat and pressure and basically explode into very small particles. The object is to get them so small that they are not noticeable to the naked eye. TDU's are generally late in the stock prep process after screening and cleaning. Additionally in some mills they are used as thickeners to help control consistency. This equipment is also requires quite a bit of maintenance and is extremely expensive to operate.

Enessco with proper screening and/or cleaning can remove most all of the macro stickies prior to the stock entering into the TDU, thereby eliminating the need of the unit. The idea is to get the same quality stock entering the TDU (with Enessco) as the mill was able to produce out of the TDU without Enessco. Once this has been proven with handsheets and/or lab tests the unit may be turned off. The graph below shows how successful Enessco has been in accomplishing this task.

Figure 1: Enessco results on % contaminants in stock prep equipment. Long Fiber Belt thickener is the stock sample just before the TDU. Long Fiber is the sample after the TDU. Short fiber was not processed through the TDU.

Samples were taken and debris testing was then performed in a laboratory slotted shaker screen (0.006 inch). The procedure calls for adding 10 or 25 bone dry grams of stock (amount dependent upon contaminant loading) to the box shaker screen apparatus. A continuous wash of fresh water is maintained for approximately 10 minutes as the box is mechanically shaken to prevent plugging of the slotted screen. After the wash the remaining material is collected, dried and weighed and percent debris is calculated.
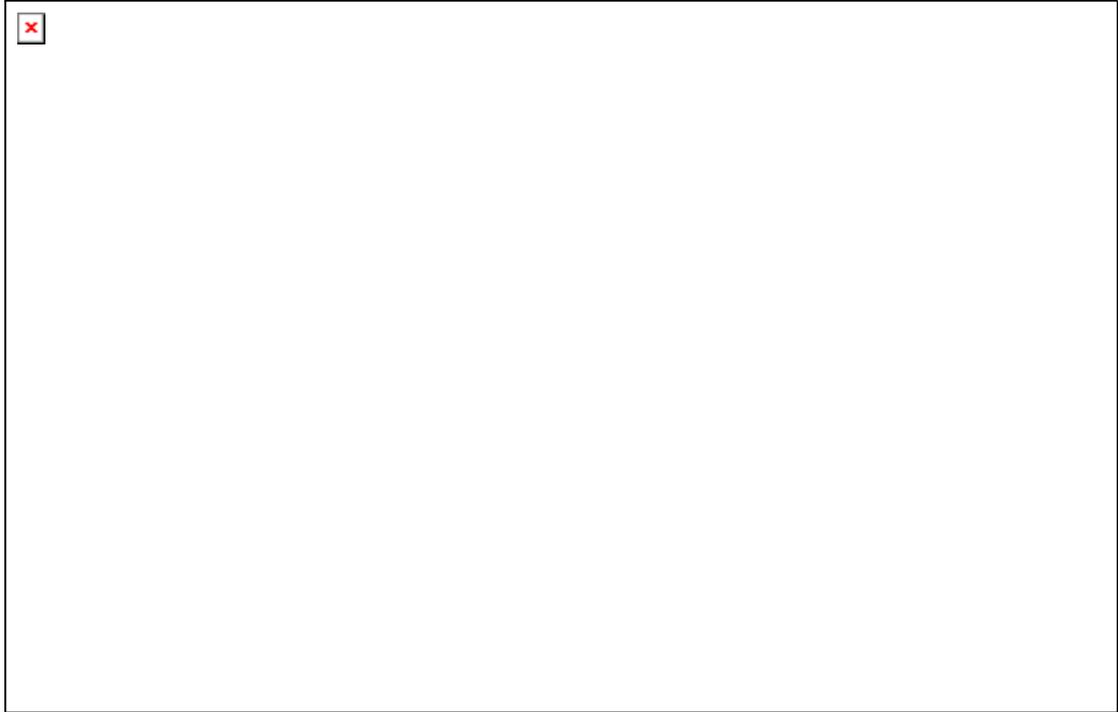
Figure 2: Another Enessco trial to shut off TDU. Analyzed with a Pulmac tester and Image Analysis (dirt counts). Tested stock samples after TDU.

 Figure 3: Enessco trial to shut off TDU. Analyzed with number of dirty sets on final sheet.

The safest way for the mill to shut off the disperser is in incremental steps as listed below. In week 3 the steam is decreased in 25% increments.

Trial Steps	Weekly Goals
Week 1 we will run with Disperser,	Increase amount of rejects in handsheets
Week 2, we will run with Disperser,	Same as above and improvement on PM
Week 3 we will shut disperser off	Maintain above and shut off disperser
Week 4 No Disperser	Maintain above

WEEKLY GOALS ---DEFINITIONS:

Week 1 goal: Increasing amount of stickies in handsheets of the reject streams.

The goal of the first week is to prove the Enessco is increasing the amount of contaminants removed by the reject streams of the stock prep system.

It is logical to say that if "**more contaminants are removed, then the finished stock is cleaner.**

Enessco improves the quality of the stock, one pulper at a time. It takes 4 to 6 days to show improvements in the finished stock. The time depends upon the size of the stock system and process water system. Use handsheets taken from the stock prep system to document the improvements. If it is shown that reject streams have increased in stickies removal then the goal is satisfied.

Week 2 goals: Improvement on Paper Machine.

Once the finished stock in stock prep has improved, the paper machine and the sheet appearance will improve. Deposits on the paper machine will decrease, breaks will decrease and the appearance of the finished paper will be better. Visually inspect the paper machine and the finished sheet to prove this goal. If this is proven the second week goal will be satisfied.

Week 3 goals: Shut off the disperser.

This week the steam to the disperser will be decreased by 25% each day. By the end of the 4th day the disperser will be completely shut off. The proof of success will be that no difference in sheet appearance or paper machine performance will be noted. If this is proven the third week goal will be satisfied.

Week 4 goals : Maintain the improvements.

The final goal of the trial will be to continue the improved quality of the sheet and the improved performance of the paper machine. Paper machine runnability data and finished paper quality will show proof that this goal is achieved. If this is proven the fourth week goal will be satisfied.

Conclusion:

As stated before mills most likely have spent a great deal of money on the installation of a TDU and is reluctant to shut it down. However with the additions of Enessco into the system we are treating the stickies prior to the TDU and therefore if the mills

stock prep system is good no stickies are carried forward to the TDU and thus no need for it. Just reducing the steam can pay for the Enessco product and we have seen at one mill a 4 to 1 payback. As stated about any trial that is done to shut off the disperser should be no less then 4 weeks and recommended 6 to 8 weeks to prove the results and convince the mill.

This report was intended for internal use however we encourage you to share this with any potential customer.