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See Immediate Improvement in High Consistency Refining with Refiner Plate Process Modeling from J&L

J&L developed Refiner Plate Process Modeling (RPM) to increase the success rate of plate trials and shorten the lead-time to an optimal refiner plate pattern. Besides saving time and money during the trial process, the mill receives superior refining results due to the advanced technology of RPM.

Typical cycle time for a trial can take several months and consume many resources. Current know-how of converting the mill requirements into plate geometry parameters is based upon the limited experience of individuals.

Facts:

1. Obvious: High consistency (HICO) mills want to optimize their refining process.
2. Observable: Optimizing the refining process is dependent on the refiner plates used.
3. Unfortunate: The trial process for HICO refiner plates can be time consuming and costly.
4. Remarkable: Fact #3 is now a myth due to J&L's Refiner Plate Process Modeling.
5. Vital: With RPM, mills will see improvement immediately while saving time and money during the trial process.

RPM uses computer simulation to design optimal HICO plate patterns. The computer simulation was developed using statistical tools such as Design of Experiments by modeling actual mill experiment data. Multiple trials and scores of pulp tests were run. By utilizing the SmartPlates control system, also developed by J&L, process and temperature data was able to be collected. The captured data was used to develop empirical models that define relationships between dependent and independent variables. These empirical equations make up the RPM program. RPM uses multiple variable optimization techniques to find the optimal plate pattern. This ensures that we utilize all the available energy to the development of the fiber and therefore reduce the energy requirement for a given Tensile or fiber length target. This improves the efficiency of the refining.

Case Study: The Value of RPM

Mill A is a TMP plant with Twin-50 refiners. Each line processes 250 ADMT/D of pulp.

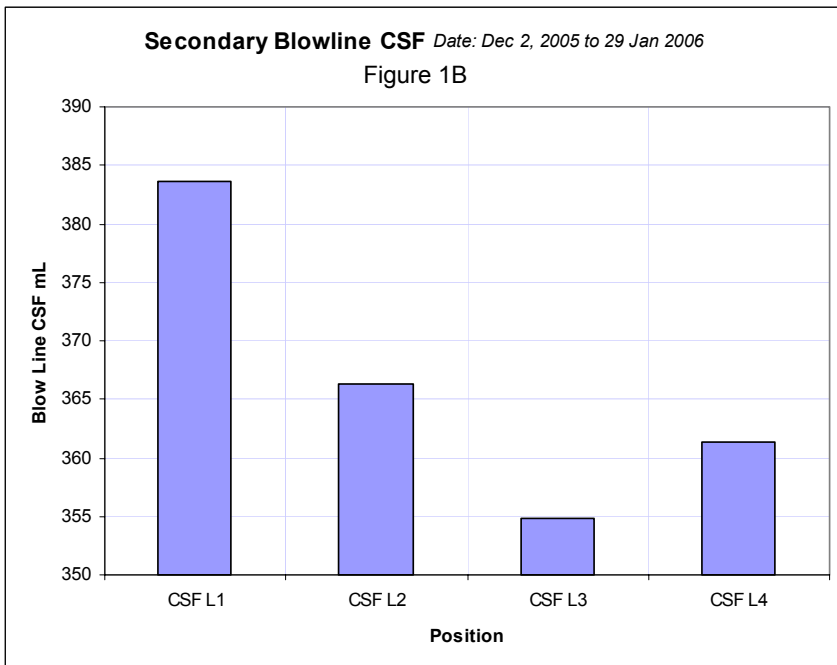
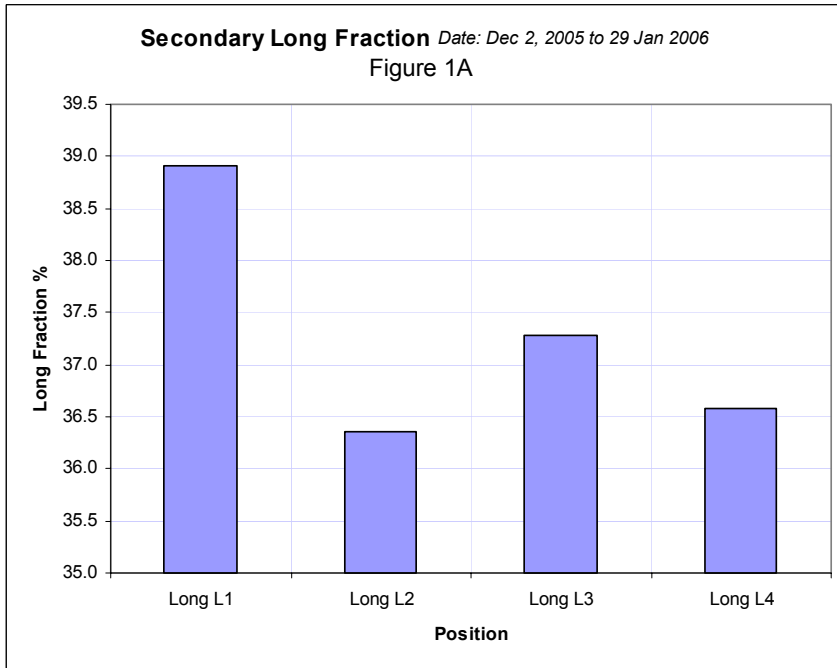
The trial objectives for the primary refiner at Mill A were:

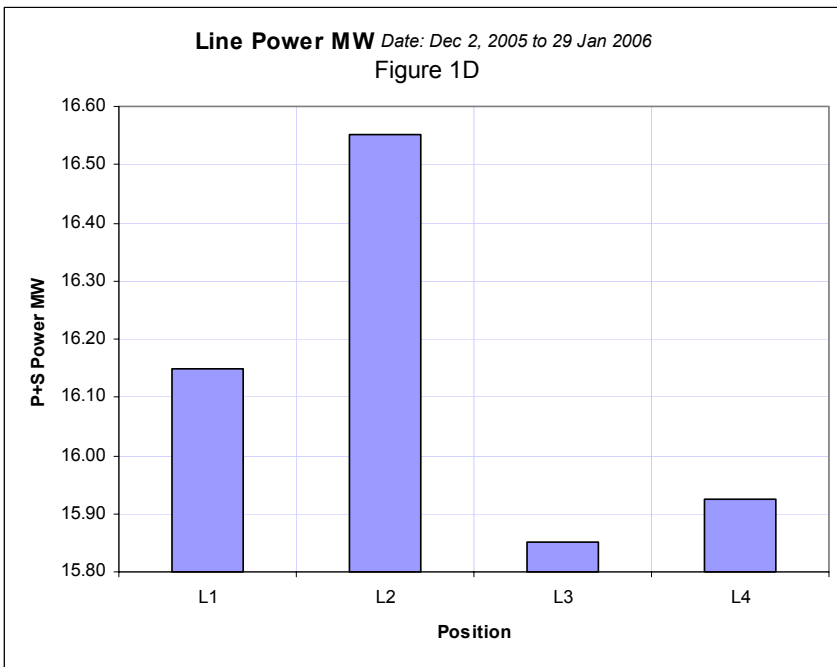
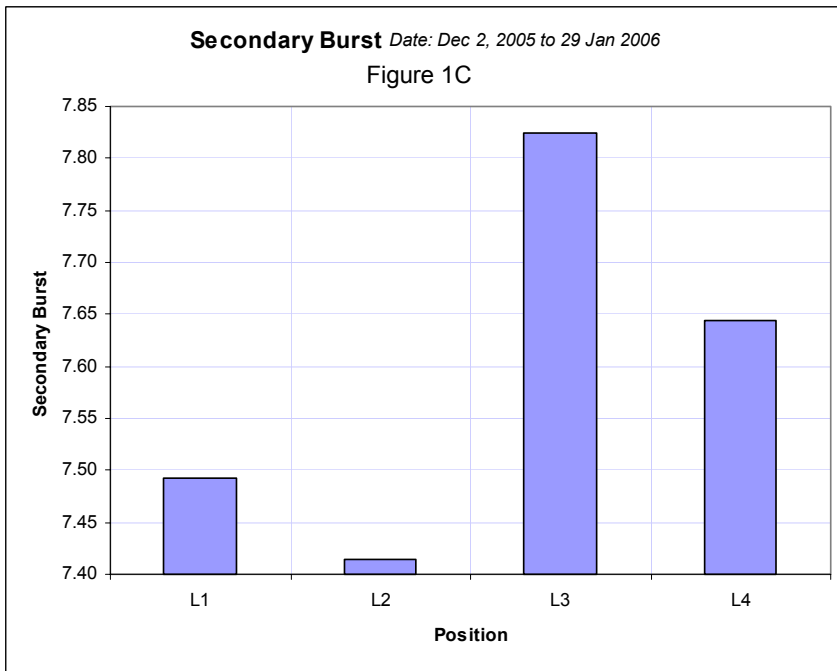
1. Reduce refiner vibrations to less than 2.5 mm/s.
2. Improve burst strength and/or reduce energy consumption.

The RPM process was used to analyze the plates that were causing high vibrations in the primary refiner and to determine which plates would best meet the mill's objectives.

When the RPM trial plates were installed in P3 refiner, there was an immediate improvement in refiner vibrations compared to the previous standard plates. Vibrations were maintained at well under 2.5 mm/s so the mill continued to run the plates.

The following graphs show the results with the RPM trial plates running in line 3 primary refiner. Figure 1A shows that the long fiber fraction for line 1 is highest, however this is not surprising when looking at Figure 1B which shows that line 1 freeness is also highest. On the other hand, the trial plates in line 3 produced *high* long fiber fraction at the *lowest* freeness of all four lines. This indicates that the freeness is being reduced by developing the fibers rather than by cutting them. Figure 1C shows that line 3 has the highest burst strength, which is further proof that the freeness reduction is a result of more fiber development and less fiber cutting. Energy consumption is shown in Figure 1D: line 3 has used the least amount of energy.





In addition to meeting the mill's objectives, the trial plate life was 50% longer than standard plate life. This is likely due to the lower vibrations and reduced clashing of the plates throughout the life.

To summarize the RPM trial results for Mill A:

1. Refiner vibrations maintained at less than 2.5 mm/s.
2. Burst strength and long fiber fraction improved for a given freeness.
3. Energy consumption reduced for a given freeness.

The RPM process provided a tremendous benefit for the mill: it allowed them to install the optimum set of plates right away so they could achieve their objectives immediately. This is a much shorter duration than the typical trial process of trying a set, making minor changes, trying another set, and so on, until the optimum pattern is reached. Often by that time the mill's objectives have changed and it's time for a different set of trials.

To learn more about how RPM can benefit you, call your J&L representative today.

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