

Paper Testing Procedures
Stora Enso
14 February 2003-02-16

The following is a summary of findings from a visit with Mr. Thorbjorn Linderoot, at the Stora Enso newsprint mill outside Gothenburg, Sweden.

The purpose of the visit was to examine the mills methods for measuring the quality of paper received from over 100 suppliers, and providing a quick and accurate feedback to each supplier. And further understand how the quality translates into determining the price for materials received.

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Background – Stora Enso

One of the larger mills in Europe, the Stora Enso mill has the capacity to produce 800,000 tonnes of newsprint each year.

To achieve this level of production, the mill uses 350,000 tonnes of recovered newspapers per year.

A primary reason for their desire to use secondary fibre is the significant energy savings. When pulping secondary fibre, the mill consumes one-sixth the energy it uses when pulping wood fibre.

The network of suppliers to the mill include 100 depots and 50 different suppliers. The recovered fibres are delivered by train and lorry. Currently all the fibre is received baled, but the mill is moving towards receiving the paper loose or un-baled in the future.

The average distance for sourcing secondary fibre is 480km – compared to wood feedstock which is transported an average of 800km.

The mill sources the majority of its recovered fibre from Sweden – 62%. Denmark provides 26% and Germany 12%.

The paper recovery rate in Sweden is 82% for news and pams, and 90% for all OCC. The primary reason for the high recovery rate is that the producer responsibility laws in Sweden cover newspapers and periodicals. Under the laws of Sweden, newspapers and magazines recovery is the responsibility of the producers, printers and importers. But in fact the mills take over the responsibility from the printers.

Consumers are responsible for putting used news and pams in the receptacles provided by the industry. From that point the responsibility for collection, reprocessing falls on the mills in Sweden.

In Denmark, where 26% of the recovered fibre is sourced, the communities are responsible for collecting the papers.

Samples taken

In 2002 the mill received 11,000 deliveries of recovered news and pams. Of that amount the mill performed quality tests on 12% or 1,300 loads delivered.

This number of samplings is sufficient to provide the quality portfolio required for each supplier of the mill. All suppliers are tested at least once each month. In some cases test may be required from a small supplier because the random sampling system did not identify any of his loads during a given month.

The accuracy of the testing is critical in determining the amount of money each supplier will be paid for the loads delivered.

Testing procedures requires one full time staff person, and one $\frac{3}{4}$ time staff person. The second person is needed primarily because the mill receives paper 24 hours a day seven days a week.

The continuous feed is necessary because the mill has storage capacity for only 4,000 tonnes – the mill consumes 9,000 per week.

The computer identifies eight random times during the day. The first delivery received after that time is identified for sampling. Examples of times that the computer might select: 0.38hr, 7.21hr, 8.04hr, 9.34hr, 11.01hr, 14.01hr, 17.45hr, 20.45hr. The first delivery after these stated times will be tested.

Each day the computer randomly selects the times for the next day's test.

Quality Testing Procedures

Number of samples taken-

Each day 8 loads are randomly selected for testing by the computer. For each load four (4) bales are chosen for testing. The computer identifies the location of the bales in the load that are to be sampled. Two test bales are always taken with one stacked on the other – done for moisture purposes.

Sampling Technique

A drill takes a core sample from near the corner and near the centre of each bale to be tested.

The samples from both core drillings are put in the same plastic bag. The bag is immediately closed and sealed – by a knot.

Sampling size:

Using the drill samples the mill is able to base their testing on 170 grams of fibre. This compares to more traditional methods of sample bales which requires 40kg of fibres.

Assessing the content

The mill staff person weighs each sample taken. The sample is then dried at 100C for 14 hours (however it could well be for 8 – 10 hours, because very little moisture is left after 8 hrs at 100C).

Dry weight is then compared to wet weight to determine moisture content. (12% moisture is acceptable in Sweden).

The dried samples are sorted into four categories:

- a. News fibres
- b. Pam fibres
- c. Other fibres (as good or better) usually office paper
- d. Reactive garbage (usually cartons, OCC)
- e. Disturbing garbage (usually plastics)

Tolerable limits

To produce quality newsprint, it is important for the mill to receive a mix of about 70% news and 30% pams. Fortunately for the Mill, that is the average mix received from Sweden's Waste stream. However, the farther south in Europe one travels, the greater percentage of pams and the lower the percentage of newspapers received.

The tolerance for "reactive garbage" (benign contaminants such as cartons, occ is 0.50%.

The tolerance for "disturbing garbage" (materials that can foul the equipment) is 0.02%

Measuring age of paper

From each test bale, four (4) papers are removed and the date the paper was printed is entered into the test log. The age is recorded in terms of months. (2 months old, 8 months old, etc. etc.)

Completing & recording results

The staff enters into the computer all the data from the tests. The computer has matched each individual random sample with the specific supplier that delivered that load of materials.

All data is entered into the computer. When the staff person completes the entry and pushes the finish) button on the computer – a copy of the test is automatically and immediately sent to the supplier.

This provides each supplier with immediate feedback on the materials being generated that day or the previous day.

Point system used to define quality

Each sample is awarded points based on:

- a. Percentage of Moisture
- b. Percentage of reactive garbage
- c. Percentage of disturbing garbage.

Moisture

The acceptable range of moisture for this mill is between 7% and 17%.

Therefore points for moisture are awarded:

- 7% moisture = 0 points
- 12% moisture = 5 points
- 17% moisture = 10 points

When the percentage of moisture measured in the bale falls somewhere between these benchmark figures, the corresponding points are assigned.

If supplier is consistently above 17% - the maximum level tolerated - they are cut off from delivering any more material. The mill discusses the problem with the supplier. After agreeing on the source of the problem and the solution, the mill allows that supplier to ship one load. As soon as they can deliver five consecutive loads below 17% they can be authorized to supply the mill again.

Garbage – reactive

The range of acceptable disturbing contamination is 0% to 0.05%. The less garbage the better the equipment runs. Hence points are assigned based on the levers of reactive garbage as follows:

- 0% = 0 points
- 0.05% = 2 points
- 2.5% = 10 points

Similar to moisture, for those test bales with percentages that falls in between these benchmarks, corresponding points are assigned.

If a bales contains more than 2.5% reactive garbage, the point doubles for each increment.

Garbage – disturbing

The acceptable level for disturbing garbage is between 0% and 0.1%. Because of the damage these materials can cause during processing, considerable

weight is given to bales containing higher levels of these particular contaminants:

- 0% = 0 points
- 0.02% = 2 points
- 0.1% = 10 points

Similar to the other criteria, for those test bales with percentages that falls in between the benchmarks, corresponding points are assigned.

If a bale contains more than 0.1% of disturbing garbage, points double for each increment

Translating the test into price paid for fibre

The results of the test determine the price the mill will pay each supplier for all the material received that month. The scale for translating quality to price is:

1. Bales testing in the average range received market price,
2. Bales testing better than average received up to 5% Above market value
- 3 Bales testing with higher contamination levels receive up to 10% below market value

Under this testing system an “average” quality bale will receive the following scores:

- Moisture 5
- Garbage (r) 2
- Garbage (d) 2
- TOTAL 9 POINTS

Scoring System

The following scoring system is used by the mill to determine price for materials received from each supplier for that month:

- Less than 10 points = 5% above market value
- 10-15 points = 2% above market value
- 15-19 points = 1% above market value
- 21-25 points = -1% below market value
- etc
- etc
- 40 points or more = -10% below market value

If a supplier stays at 40 points or more for 3 months, they are cut off from supplying the mill. After consultation they can again ship one load. They must ship five loads consistently below 40 to regain status.

Determining quality and feedback to suppliers

It is most important to recognize that this quality testing and feedback system is designed and implemented with the desire to have long term supplier relationships.

As such, the mill does not based the price change on only one sample test, or often times on one months testing from an individual supplier.

Because the long term nature of the relationships the mill uses the last ten samples taken to constitute the average for each supplier. Often time, this ten sample period may run over a period of months; particularly in the case of small quantity suppliers.

Costs of Testing

The mill has determined that the costs to carry out this quality analysis and feedback is about one hour's time per sample.