

Recovering Fiber And Filler From Mineral Loaded Paper Mill Rejects

Are paper mills wasting raw material?

Ahlstrom claims that its FilRec™-process recovers up to 80-90% of the minerals rejected by traditional cleaner systems

Gary Beckingham, Mukesh Kumar & Pentti Vikio

INTRODUCTION

The rejects of paper mills producing coated or other filler containing grades have a high content of coating flakes and coarse filler particles, which are unusable in their original form on the paper machine. These rejects lead to excess effluent handlings, transportation costs and environmental concerns. Until today there hasn't been any economical technology available to recover the minerals, wasted in the rejects. With the new Ahlstrom FilRec™-process, most of these solids can be returned to the paper furnish while only the unwanted material is rejected from the mill.

PAPER MACHINE REJECTS

A paper machine approach cleaner plant reject consists of water, chemicals, heat, organic matter and minerals. The solids in the cleaner plant reject of a paper machine producing filler containing paper and especially base paper for coating are mainly minerals (Fig. 1).

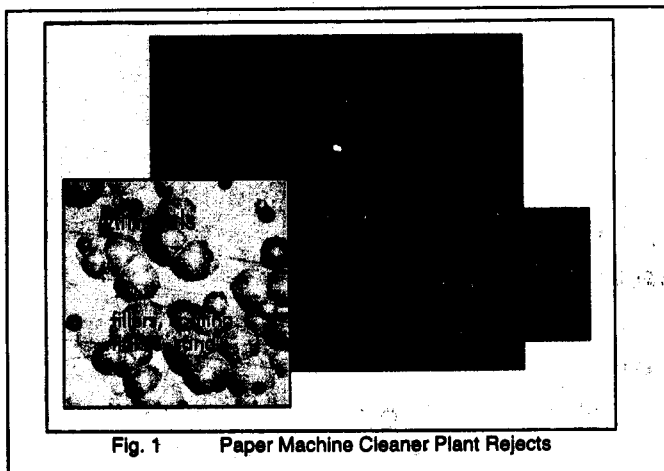


Fig. 1 Paper Machine Cleaner Plant Rejects

The physical properties of the solids in the cleaner plant rejects differ in size, form, specific gravity and stiffness from the material components in the paper.

For a paper machine, which is manufacturing filler containing paper grades, the mineral loss in the cleaner plant rejects is usually 0,5-2% of the paper machine production and/or 2-7% of the filler in the end product. The mineral loss is even higher on paper machines manufacturing base paper for coating and having coated broke in the furnish.

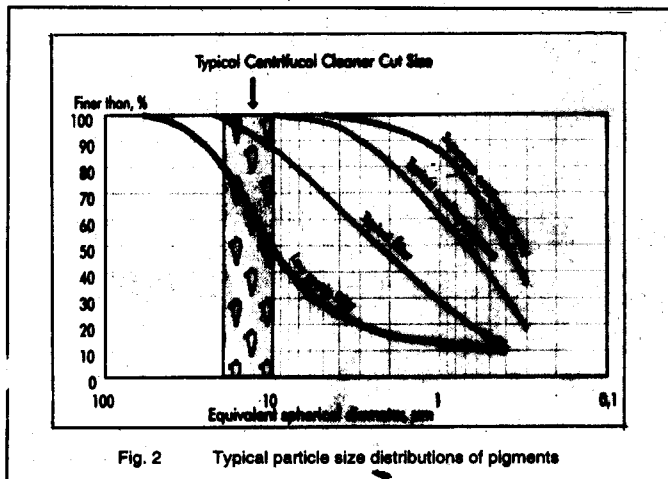
Mineral containing rejects come also from the filler kitchen and coating pigment kitchen and from the flushing circulations of the coating stations.

On paper machines producing filler containing grades, the minerals in the reject contains mostly the coarser fraction of the filler. The particle size distribution of the virgin pigment typically used as filler appears from figure 2. The portion of the particles bigger than 10 micron is less than 15%.

With paper machines producing coated grades the majority of the base paper filler comes from the coated broke. The original particle size distribution of the coating pigment is much finer than that of the filler (Fig.-2).

The minerals rejected from the paper manufacturing process lead to a considerable waste of

Ahlstrom PTE LTD.
9 Scotts Road
10-01/03 Pacific Plaza
SINGAPORE 0922



raw material. In addition, they cause disposal problems. Stricter emission permits set higher requirements on the existing effluent treatment systems. The minerals in these rejects have to be counted as part of the solids load when sizing the effluent treatment system. Because the minerals are inorganic they do not decompose or burn.

By the post treatment of the water, chemicals and useful materials from the cleaner rejects, the physical properties of the recoverable material can be altered and returned to the paper furnish, achieving significant savings.

SIMPLE PROCESS

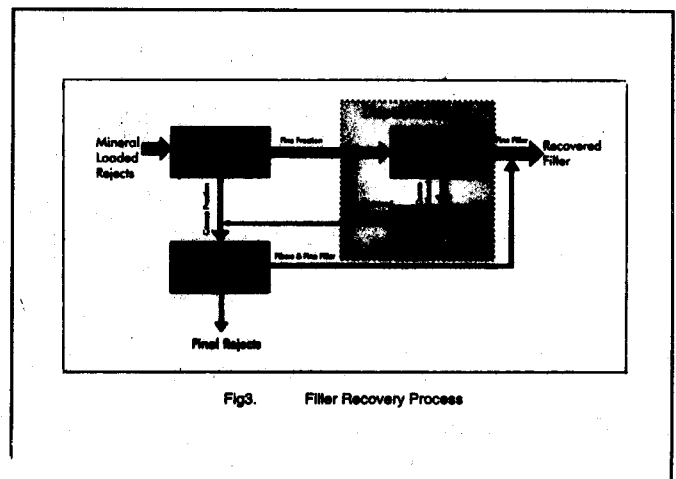
The **FilRec™**-process recovers the raw materials in the paper mill mineral loaded rejects and returns them to the paper furnish (Fig-3). The simplicity of the process makes it easy to implement on any paper machine approach system.

FRACTIONATION

The fractionation stage splits the feed flow into coarse and fine fractions. The coarse fraction consists of fibers, shives, stiff fibers and any coarse solids (dirt) while the fine fraction contains mainly minerals and water.

FILLER RECOVERY

The filler recovery stage classifies the mineral solids according to particle size. Fine filler and majority of the water are returned to the PM process. Coarse minerals are concentrated to a high



20-50% solids content and directed to the mineral dispersion stage.

MINERAL DISPERSION

The coarse minerals are brought under the influence of turbulent shear forces. These forces together with a crushing effect, efficiently break down these coarse particles.

The coarse particles are circulated in the Dispersion Loop until they are small enough to be accepted as fillers. A small outlet flow from the Dispersion Loop prevents accumulation of the undispersable material.

FIBER CLEANING

The coarse fraction from the fractionation stage is classified, along with the outlet flow from the Dispersion Loop, in the fiber cleaning stage. Reusable fibers and fine fillers are returned to the paper machine process. The final rejects, containing mainly coarse organic solids and coarse minerals, can in many cases be incinerated.

RECENT EXPERIENCES

ENSO FINE PAPERS, UPM-KYMMENE, STORA and HANSOL are the latest mills to have installed the Ahlstrom **FilRec™**-process.

At ENSO Fine Papers Oulu Mills, the **FilRec™**-process is installed onto PM #6. The recovered filler is returned to the broke screening feed tank. The operation of the **FilRec™**-process

has been better than expected. The recovery rate has been from 60% to 80%.

At UPM-KYMMENE Kymi Mills the **FilRec™**- process is installed after the cleaner plant on the paper machine approach system. Recovered fiber and filler are returned to the couch pit. The recovery rate is 75-80%. The operation of the **FilRec™**-process has not affected the runability of the paper machine or the paper quality.

At STORA Grycksbo Ab the **FilRec™**-process was started-up on August 1995. The system is installed after the short circulation cleaner plant on the PM #10, which makes copy paper and base paper for coating. The recovery rate has been over 85% and the paper quality is better than before.

SHORT PAYBACK TIME

For high recovery rates the payback time for the **FilRec™**-process investment can be less than a year, when just the value of the recovered raw materials are taken into account.

Additional cost benefits of the **FilRec™**-process are:

- decreased effluent treatment load
- decreased waste transportation
- reduced landfill cost

In some cases these additional benefits can be more significant than just the raw material recovery.

CONCLUSION

Ahlstrom has a continuous R&D program for the entire paper machine approach system including fiber recovery and broke handling.

The **FilRec™**-process as part of the paper machine approach system can minimize the solids loss in the cleaner plant rejects even when the cleaner plant reject rates are increased. In the majority of cases the cleaning result and paper quality will be improved with no adverse effects on runability.