Measurement of Stickies (Macro, Micro and Potential Secondary Stickies)

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INTRODUCTION

Contaminants from synthetic polymers such as plastics, coatings, adhesives and waxes remain one of the biggest challenges for papermakers using recovered fibre. These contaminants are called “stickies” because they stick to paper machine felts and wires leading to operating problems, reduced productivity and defects such as holes and dark spots in the paper. Through a survey conducted by the CSIR, the South African paper recycling industry identified several shortcomings of existing methods for measurement of stickies, and has expressed the need for quick and simple methods that could be easily implemented in a mill environment. The consequence of "inadequate methods" has been poor process monitoring and the inability to fore-see stickies-related problems before they occurred. This resulted in a rather reactive approach to dealing with these problems. As with all testing procedures, the criteria for any measurement must include a high degree of precision and repeatability. However, in a mill environment, operator time and ease of implementation must also be considered, and more often than not, a compromise is required. In response to this need, the CSIR developed quick and simple methods for routine measurement of all types of stickies (macro, micro, and potential secondary stickies – see Figure 1 for stickies classification). The applicability of the methods was demonstrated during stickies audits carried out at a newsprint and packaging mill. In addition, the new methods were compared to existing methods.

STICKIES CLASSIFICATION

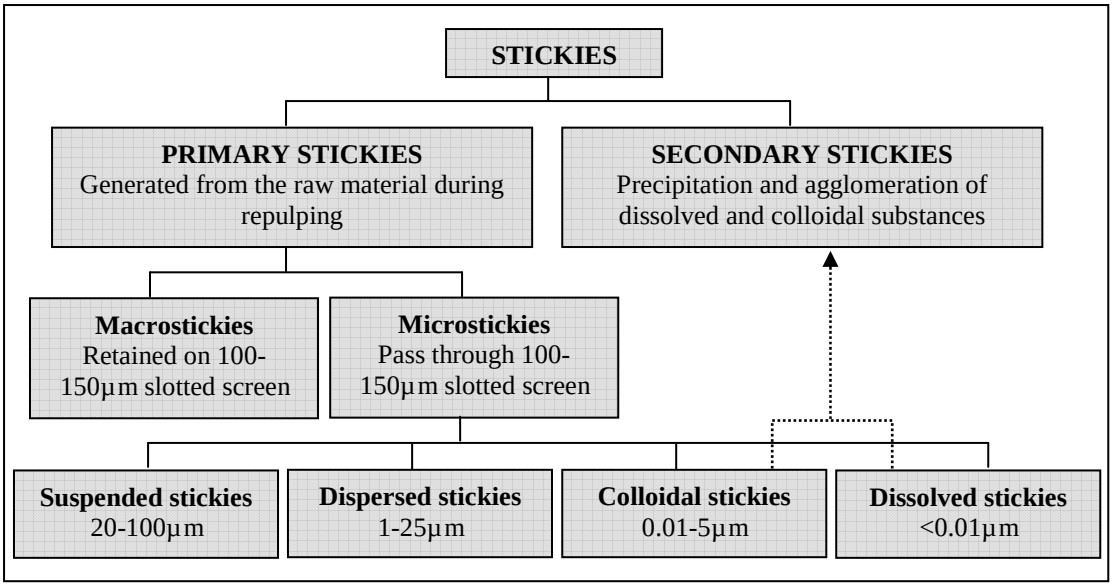

Figure 1. Classification of stickies based on size (Doshi et al., 2003).

METHODOLOGY

Macrostickies Measurement

Methods described by Houtman & Tan (2002) and Aquan-Yuen *et al.* (1999) were modified and used to measure macrostickies. The modified method was verified using the TAPPI standard method T277.

Microstickies Measurement

Methods described by Allen (1997) for pitch particles and by Huo *et al.* (2001) for model microstickies were modified and used to measure microstickies. The modified method was verified by turbidity readings of the process waters.

Potential Secondary Stickies Measurement

Dissolved and colloidal stickies were precipitated after pH shock and measured using the method described for microstickies. The method was verified using the turbidity method described by Sarja *et al.* (2004) for measuring potential secondary stickies.

Sampling

Pulp samples were obtained at several points in a newsprint mill recycling old newspapers (ONP) and sorted books and magazines (SBM), and a packaging mill recycling old corrugated cardboard (OCC). Samples were collected over a four week period and average results were reported. Where applicable, samples were taken at the Repulper (RP); Dump Chest (DC); Primary Coarse Screen Feed (PCSF); Primary Coarse Screen Accept (PCSA); Secondary Coarse Screen Feed (SCSF); Secondary Coarse Screen Accept (SCSA); Intermediate Chest (IC); Long Fibre stream After Fractionation (LFAF); Primary Fine Screen Accept (PFSA); Secondary Fine Screen Accept (SFSA); Long Fibre Storage Tank (LFST); Out of Flotation (OF); Accepts after Centri-Cleaners (ACC); Before Wire Press (BWP); After Wire Press (AWP); Medium Consistency (MC) Pump; and Storage Tower (ST).

RESULTS AND DISCUSSION

The actual cause of stickies problems is often unknown. Is it due to macrostickies? Agglomeration of microstickies? Precipitation and agglomeration of dissolved and colloidal stickies (secondary stickies)? It is important that this information is known, as the stickies size classification influences the strategies for removing each size class, and also influences the approach taken for minimising their impacts on papermaking.

Mills use screening systems to remove macrostickies – but what are the efficiencies of the screens? Are the efficiencies measured in the first place? How can they be optimised? Does screening need to be re-configured?

Very few mills, if any, measure microstickies on a routine basis. After screening and removal of macrostickies, is agglomeration of microstickies into macrostickies occurring? What is the baseline concentration of microstickies in process waters? At what concentration level does microstickies become a problem? What triggers agglomeration of microstickies or precipitation of secondary stickies? What is the current approach of dealing with microstickies – Talc? Dispersants? Polymers? Enzymes? Are their dosages at optimal levels? Are they added at the right places in the process? Are the process conditions conducive for optimal functioning of the additives?

The CSIR has developed and tested methods for routine measurement of macro, micro, and potential secondary stickies in a mill environment. The developed methods compared favourably with existing methods during trials carried out at a packaging mill and a newsprint mill (Figure 2A-F). Through regular monitoring of stickies, it is anticipated that these methods will help answer some of the questions raised above. In addition, the CSIR has the expertise to carry out complete mill audits from the furnish to the reel in order to understand the nature and the extent of stickies-related problems to assist mills in developing robust and proactive strategies for removal and control of stickies in their paper recycling operations.

ACKNOWLEDGEMENTS

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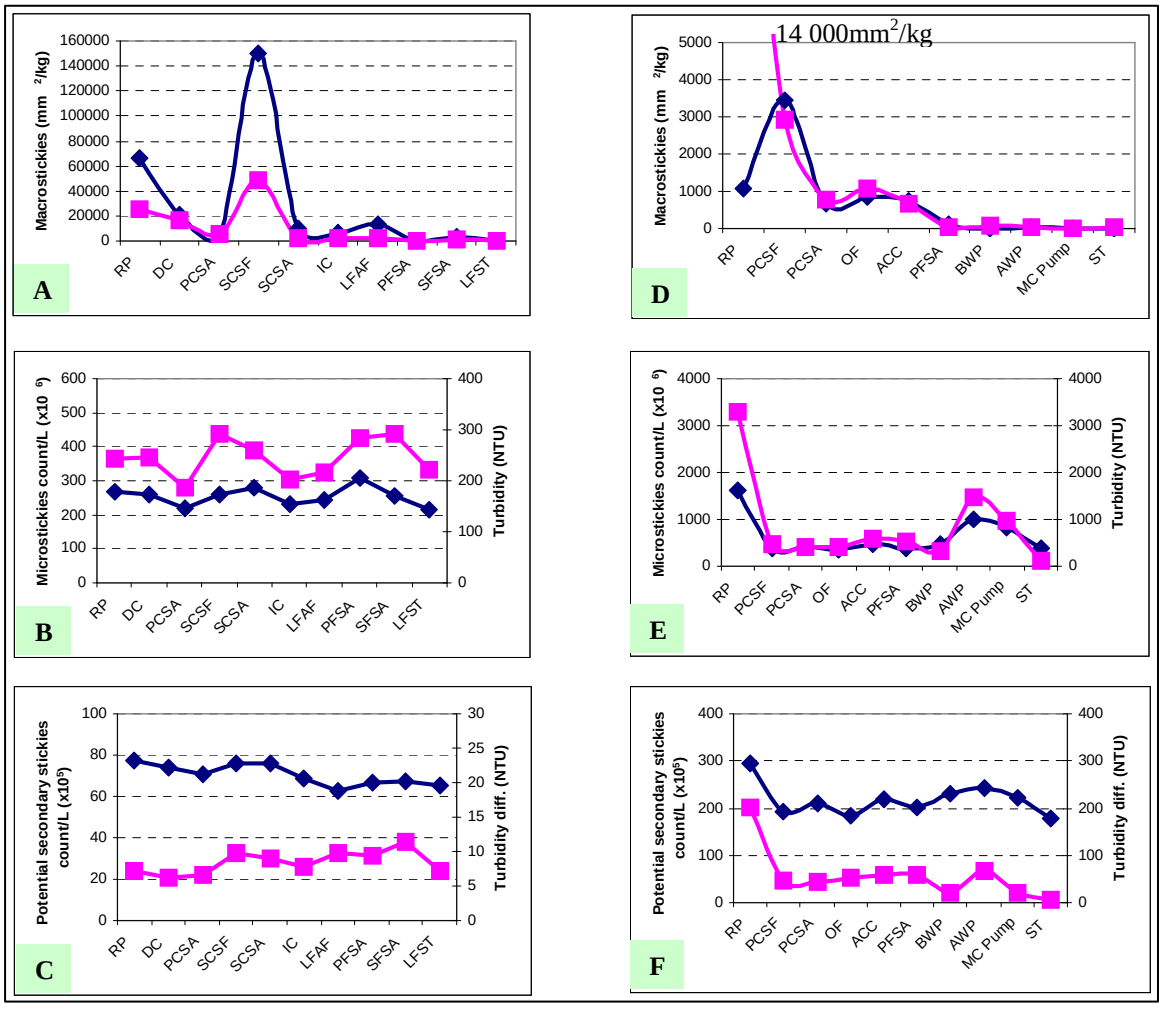

Figure 2. Macro, micro, and potential secondary stickies measurement at various points in a Packaging (A-C) and Newsprint (D-F) mill. Comparison between CSIR (♦) and other (■) methods.