Recycled fibers use in paper production has increased continuously over the years. However, secondary fiber ‘contaminants’ found in furnish such as mixed office waste (MOW), old corrugated containers (OCC), and old newsprint (ONP) are becoming a major issue for recycled mills throughout the world. Such contaminants are characterized by stickiness and lipophilicity, and hence termed as “stickies”.

Stickies which get combined with other organic and inorganic substances to grow bigger are also known as 'deposits'. These tacky materials coming from recycled fiber sources, end up either as spots on the paper or, more often, as deposits in felts and other transfer surfaces-in the press section and the dry end of a paper machine.

The cost of these impurities to the paper industry has been quantified by various sources. For example, in the last few years the cost to the US Paper and Paperboard industry in terms of downtime due to stickies was estimated to have been well over $500 million.

**ORIGIN OF STICKIES**

In simple terms ‘Stickies’ are the contaminants from waste paper which are released during the repulping process.

Sources of stickies may include adhesives, hot melts, coating binders, ink residues, de-inking chemicals, rosin, wet strength resins, as well as wood resins which are introduced into the papermaking system if some mechanical wood pulps are also used as furnish. Usually stickies are understood to involve all adhesive materials coming from the waste paper pulp.

One of the main culprit in many cases is the polyvinylacetate (PVA) and other binders present in “pressure-sensitive” labels that are common in mail envelopes.

**WHY ARE THEY A PROBLEM FOR THE PAPERMAKER**

Stickies are a problem because they have a great negative influence on the runnability of a paper machine and the quality of final product.

In practice, the contaminants remaining in the pulp furnish can build up within the paper machine headbox, forming wire, press section, and dryer section, causing operational barriers and lead to poor product quality. Control of sticky contaminants efficiently is therefore crucial for such mills.

**TYPES OF STICKIES**

Stickies are broadly classified as ‘macro stickies’ and ‘micro stickies’. ‘Micro-stickies’ are also described as ‘potential stickies’. Macro stickies are those which can be retained as a screening residue and are easier to remove from the deinked pulp in the deinking process by filtration.

**Micro stickies** are those that pass through a slotted plate screen of 0.10 - 0.15 mm. They can be finely dispersed (100 µm - 100 nm), colloidal (100 - 10 nm) or molecular dissolved (<10 nm). They remain in the system, often fill felts, plug wires, cause paper defects, and increase machine downtime.

**NATURE OF STICKIES**

Microscopic examination shows that macro-stickies are in the range of 0.10-1.0 mm. Hence more than 75% stickies generated during repulping can be removed from the system, e.g. about 45% are removed by coarse screening and low-consistency cleaning, and 31% in the fine screening, respectively.

Through classification and analysis (by centrifugation and filtration) of contaminants in the process water from a recycled newprint mill, it is found that Dissolved and Colloidal Solids (DCS) are the predominant contaminant (about 90%, w/w).

Stickies are found to have the following characteristics:

- they have a great ability to bunch together into globs and strings having little affinity for fiber surfaces.
- they tend to contain polymeric materials.
- they are deformable and can "extrude" themselves through the slots of fine screens, even if those slots appear to be too small.
- they often have thermoplastic properties with low glass transition temperatures.

**FACTORS AFFECTING INCREASED STICKY FORMATION**

Stickies are formed through agglomeration of the DCS (Dissolved and Colloidal solids) in the system. Any factor which can increase the stickiness and probability of aggregation, leads to increased deposits.

Chemical-physical alterations like pH, temperature and charge changes might cause colloidal destabilization and the consequent agglomeration of micro stickies. Higher the circuit closure, more will be the build-up of micro-stickies. Slime and foam in the system are also contributing factors.

Usually it is impractical to eliminate pH changes in a system, but it can pay to follow a strategy of keeping the changes gradual through the process.

A study of Papermachine deposits at The University of Helsinki established the following:

- Hydrophobic-hydrophilic interactions play a major role in agglomeration and deposit formation.
- The nature of deposits formed vary at different interfaces; within tanks, on machine equipment etc as the conditions will vary.
- Microbiological EPS (Extracellular Polymeric Substance) “slime” material, interacts with organic and inorganic material to form sticky deposits.

According to a Pricewaterhouse Coopers report, the Indian print media industry is growing rapidly. Newspaper publishing which is growing at a CAGR of 6.5% (2010-2014) is surpassed by Magazine publishing growing at 11.55%. This is due to the continuous launch of a host of niche magazines who generally command a higher advertising premium.
Deposit control systems have to be designed taking a holistic view of the paper making process. (Important to look into the wet-end chemistry)

A well designed program including a multi functional deposit control agent clearly improves total efficiency.

**STICKY REMOVAL IS A 'STICKY' PROBLEM**

Research on the flocculating possibilities of stickies was carried out through use of coagulants and flocculants. These have proved to be effective for DCS removal.

However due to the many differences in particle size distribution, Zeta potential, cationic demand, conductivity, turbidity and COD owing to the differing origin and physical – chemical properties of these DCS, the removal efficiency and the adaptability of flocculants have varied widely.

**SOLVING THE PROBLEM**

Traditional approaches for chemically controlling micro stickies include:

- fixation of stickies to fiber
- dispersing of stickies (using solvent and surfactant blends)
- polymeric stabilization
- use of enzymes (mostly esterases)
- combinations of each of these programs

Efforts to control 'stickies' also lead to a corresponding reduction of deposits, hence most chemical companies term such packages as “Sticky and Deposit Control programmes”.

**Fixing the sticky with the fibre** : This approach entails the use of coagulants based on Polyamines or PolyDADMACS. These ‘trash catchers’ are highly cationic low molecular weight substances which effectively coagulate the contaminants by charge neutralization. The neutralized contaminants leave the system with the paper being produced.

Using a scavenger: A scavenger such as an ‘activated bentonite’ works on the principle of ‘adsorption’. The high surface area of an ex-foliated bentonite effectively removes even fully dissolved contaminants like paper colourants, pigments and other substances which are not affected by a charge balance.

Cationically modified talc is specially effective as a pitch controller when added at the pulping stage.

**Dispersing the stickies** : Stickies which have grown in size can be dispersed by suitable surfactants. Such surfactants can be used for periodic ‘boil-out’ programmes to keep the system ‘deposit-free’.

**Use of polymeric passivators** : The approach here is to use a polymeric "barrier chemical." A dilute solution of the chemical is sprayed onto the forming fabric, a press fabric, or possibly another transfer surface in the press section to make the surface more ‘hydrophillic’. The ‘stickies’ composed of elastomeric materials are ‘hydrophobic’ and are effectively ‘repelled’ from the surface of felts, wires and other machine parts.

**Modifying the surface** : Another approach is to modify the surface of the ‘hydrophobic sticky particle’ with a cationic polymer to make it more hydrophilic so that it attaches to the fibre and passes out as ‘paper’.

**Using enzymes** : Chemically, stickies are found to be composed of esters. The class of enzymes found to be most effective for tackling them are ‘esterases’. They cleave the ester bond of the ‘macrostickies’ making them smaller in size and reduce their tackiness.

**CONCLUSION**

Waste paper recycling in papermaking is expected to scale greater heights.

Can there be a way to avoid stickies? A good possibility seems to be the effective sorting of waste paper. Can sorting be mechanized? Work at N.C. State University, sponsored by the Department of Energy, is helping to make that possibility a reality. Results to date have demonstrated the feasibility of separating various kinds of paper based on spectral analyses.

However the main source of ‘stickies’ continue to be in the elastomers used in the highlighted ‘labels’ of magazines. It would be interesting to see if someone can develop robots to cut out these labels from magazines, before sending to the pulper!

---

**QUOTABLE QUOTE**

There are some people crazy enough to think that they can change the world – and they do it. - Blog on Steve Jobs

---

**SCRABBLE**

What does **F S C** stand for?  (Hint : Certification body)

First correct answer will win a Parker Vector Roller Pen (Maximum two prizes for one person in a year).

Post / Fax / Email your answers to EDITOR-W&F SNIPPETS by 20th November, 2011.

Answer: CERTIFICATION BODY

---

**WINNER**

OCT’11

Mr. Kaushal K Prasad, Manager (Paper), HPC Ltd, Kolkata

Answer: S S B  :  SHUTER SUPPORT BINDER

---

**?QUIZ**

Choose the right option:

A soft paper coating binder when compared to a hard binder will have the

a) Same Tg value b) Higher Tg value c) Lower Tg value

Post / Fax / Email your answers to EDITOR-W&F SNIPPETS by 20th November, 2011.

Answer: c)

---

**WINNER**

OCT’11

Mr. A. Bhaskar Rao, AGM (Paper), Emami Paper Mills Limited, Balgopalpur, Post: Kasulpur, Dist: Balasore-756020

---

**Prizes**

1. Best/first correct answer received will win one-year subscription to IPPTA Journal (Maximum one prize for one person in a year).

2. Best of the 12 monthly winners in a year, will win one-year subscription to Paper 360° Magazine, USA.

---

**Executive to Friend**

Executive to Friend - I have to undertake a flight to the US next week and you know I am always scared of these long journeys by air.

Friend: (speaking philosophically) : Don’t worry. Its all written in our ‘Fate’.

If your ‘time has come’ you can even fall down from a bicycle and die.

Executive: Yes. But in this case I’m always worried whether the pilot’s ‘time has come’.

---

**Published by >>**

Wires & Fabriks (S.A) Ltd,
JAIPUR-302012, India.

Phone: 0141-2341722 Fax: +91-141-2340078
Email: snippets @ wirefabrik.com

Only For Private Circulation

Website: http : // www.wirefabrik.com

The contents & opinions expressed in this publication are of the writer/editor. The Company has not verified & may not subscribe to the same.