In Fall 2000, Procter & Gamble donated its Clay-Filled Tissue (CFT) Technology to IPST. The donation includes complete ownership of 6 issued U.S. patents, rights to some 60 foreign patents (some pending), and access to P&G expertise and trade secrets related to CFT Technology. With further development, it is estimated that Clay-Filled Tissue Technology could result in annual cost savings of over $100 million to the paper industry (see Table 1). “We are very pleased that Procter & Gamble has recognized IPST as uniquely qualified to further develop and commercialize these technologies,” said IPST President Jim Ferris.

The proprietary process conservatively replaces 10% of fiber in tissue with relatively inexpensive kaolin, a common natural clay. Traditional tissue-making processes and products remain unchanged with CFT Technology. Lab testing indicates the same product performance and attributes as the control. The technology “reduced to practice” without consumer-noticeable difference during a one-month supermarket trial. CFT is safe and environmentally friendly.

**Project Description**

With CFT Technology, clay particles are bound to the paper fibers (see Figure 1). The kaolin clay retention process involves formation of a kaolin-polymer complex (see Figure 2). Anionic polyacrylamide is added directly to the dual-charged kaolin slurry, creating a negatively charged complex. This complex is then mixed with the fiber slurry. Addition of cationic starch results in precipitation of the complex onto the fibers (see Figure 3).

Cationic promoter addition is also possible for charge control at the headbox. First-pass retention is 90% at 8.5% filler level. Total kaolin retention is 98% using an open water system.

<table>
<thead>
<tr>
<th>Fiber cost ($/t)</th>
<th>300</th>
<th>400</th>
<th>500</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fiber savings ($/t) 10% not used</td>
<td>30</td>
<td>40</td>
<td>50</td>
</tr>
<tr>
<td>Kaolin cost ($/t) 10% used @ $90/t</td>
<td>(9)</td>
<td>(9)</td>
<td>(9)</td>
</tr>
<tr>
<td>*Chemical cost ($/t)</td>
<td>(16)</td>
<td>(16)</td>
<td>(16)</td>
</tr>
<tr>
<td>Raw material savings ($/t)</td>
<td>5</td>
<td>15</td>
<td>25</td>
</tr>
</tbody>
</table>

* polyacrylamide, cationic starch, and cationic promoter

Table 1. Raw material cost savings that result from Clay-Filled Tissue Technology. The basis is 10% filler.
Benefits

Clay-Filled Tissue Technology conservatively reduces the amount of fiber needed by about 10% (see Table 1). As a result, CFT Technology reduces fiber used in nonrecyclable paper products. The speed of tissue production remains essentially unchanged compared with production of unfilled sheets. Neither softness nor strength is negatively affected. There are no negative effects on drainage rate. Improved first-pass retention results in improved machine cleanliness. A higher drying rate was achieved. The technology may be practiced on machines employing layering or making single or multiple-ply grades. There are no FDA issues and no toxicity issues.

Applications

CFT Technology is now available to tissue manufacturers via licensing from IPST. Technical support and temporary trial systems are available from IPST and chemical suppliers.

Capital requirements are modest for commercial installations.

For additional information, please contact:

David White
david.white@ipst.edu
Institute of Paper Science and Technology
500 10th St., NW
Atlanta, GA 30318-5794
Phone: 404 894-5700
Fax: 404 894-IPST

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