

A new PARADIGM is needed

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Paper industry management has ignored the great significance of bringing its chemistry focus to a molecular scale. In doing so it is missing the opportunity to magnify chemistry effectiveness by one to two orders of magnitude.

Our studies have shown that the conventional papermaking process is flawed; chemistry efficiency is less than 10%, and energy efficiency only about 50%. These, combined with other inefficiencies, virtually double the effective cost of a new machine.

Furthermore, process cleanliness is unacceptable. It is ridiculous in the 21st century to have to periodically shut down a machine for a “boil out.” A modern machine should be designed and operated to run antiseptically clean forever, barring only mechanical breakdowns and regular clothing replacement.

Failure to understand the significant intermeshing of chemistry and engineering has led to inefficient processes:

- Use of common white water systems and multiple head boxes on a single machine that creates a level of non-homogeneity and leads to runnability issues, breaks and poor quality.

- A major machinery supplier is unable to guarantee performance on a newsprint machine with a reduced white water system

- Cationic demand technology in global use to control the wet end is not reproducible, manifesting the low correlation coefficient of 0.17 with zeta potential. Even if it were repeatable, a residual charge is undesirable; we need neutrality.

Creating stock homogeneity on a molecular scale would flatten the field. Nanotechnology re-

quires invoking delicately balanced physical and chemical forces to accomplish particulate dispersion down to a molecular size, and then scaling for maximum efficiency on a large, expensive machine. The ultimate in synchronization of chemistry and engineering is essential.

The technical issues are easy to understand. The philosophical problem is that the industry fails to designate a single individual or group with appropriate competence to integrate and manage the disciplines of both engineering and chemistry in a given mill or within a group of mills. Paper company management has decimated the ranks of competent technical personnel at both the mill and corporate level.

Giving this responsibility to chemical supplier personnel won't work. A dedicated chemical supplier technical representative is primarily motivated by profit; all else is secondary. This is clearly not the best way to align the disparate disciplines of engineering and chemistry. It is simply foolhardy to assume that such a task could be accomplished by technologists serving multiple masters. We shall continue to endure gross inefficiencies until the chemistry and physics of papermaking are unified and fully integrated.

Papermaking nanotechnology is new and evolving. Let us bring our engineers, chemists and information technology people together to collaborate in the development and implementation so that, forever after, papermaking will represent the best efforts of many disciplines—truly a new paradigm. **361**

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