Papermakers today face several challenges when producing deinked pulp-based paper. In Europe, most of the deinking plants were built in the 1980s and 90s and they have been running on their upper-limits for many years. The raw material ash content has been rising and operating costs have been on the upturn too. Although some existing buildings set challenges for deinking line rebuilds, solutions are available.

Stora Enso’s Maxau mill in Southwest Germany was one such mill, and decided to rebuild its deinking line’s flotation system with Metso’s new linear cell technology. The focus was on optimizing the complete flotation process.

Delivery comprised a new pre-flotation primary cell “Street 3” parallel to the existing old cells and a new secondary stage cell (common for all pre-flotation primary cells) designed for 158 t/d capacity. The space was limited to 11 meters x 7.5 meters, where the cells were built while production was running. The rebuilt pulp line manufactures deinked pulp for SC (supercalendered) paper. The rebuild targets were to improve selectivity and lower fiber losses, improve brightness, and thus gain savings in bleaching chemicals, as well as improve ash removal in flotation.

MEETING REQUIREMENTS

Quality, operational and maintenance related issues have been highlighted by papermakers when the development needs for flotation have been discussed. Based on papermakers’ feedback, the space required by the flotation unit should be minimized, even though line sizes are increasing, in order to yield savings in civil work costs.

Investment costs per produced ton of pulp should be minimized. In practice, this means minimization of cell volume, leading to the minimum amount of construction material. The product family should range from small to the largest lines ever, while still maintaining easy operation. There is an obvious need for advanced control of ash removal, yield and quality. Maintenance should be minimized and access to possible maintenance areas should be easy. Advanced automation loops for better process control are expected.

The OptiCell flotation system combines all the key elements of a flotation process: effective ink removal, cost efficiency, reliability, user friendliness, and easy maintainability. It features both proven technology and the latest technical innovations — at the same time. This flotation cell is highly efficient when it comes to costs and operation. It can be easily scaled to various production levels without compromising...
performance. In short, OptiCell flotation cost-efficiently enhances the performance of the deinking line and ensures a reliable flotation process.

HEART OF THE PROCESS
The heart of the flotation process is the injector. In the OptiCell system, this has been designed with special care, utilizing the experiences of earlier flotation technologies and modern computational fluid dynamics calculations and new image analysis methods. The combination of these approaches results in a unique injector that represents the latest technology.

With innovative jet nozzles, up-flow feed, an efficient diffuser, a self-aspiring aeration injector and, most importantly, optimal bubble size distribution, this injector certainly differs from traditional injectors. The elliptical shape is optimal for internal pulp circulation, improving ink removal efficiency. Its flatness, in turn, intensifies the rise of air bubbles within the volume available.

All the above-mentioned was verified in a pilot flotation cell with mill scale dimensions that were built in Metso’s technology center. With its Plexiglas walls, the cell operation could be fine-tuned to perfection.

Metso prepared the first OptiCell flotation system start-up with extra care together with Maxau mill project team. Test runs were made with mill furnish and injector parameters identical to the mill design.

The new OptiCell flotation system started up on September 15, 2008, followed by takeover on September 19. Brightness and production rate targets were achieved and maintained right from the beginning.

“In the first phase, we started the secondary cell. A few days later the new primary cell was included into the process, said Markku Karvonen, project service engineer at Metso.

“A couple of weeks later, we modified the existing cells in a way that meant that they could be run stable with a lower flow,” Karvonen added.

Earlier, the mill used two flotation lines, each consisting of seven consecutive inter-connected cells with a total length of 15 meters — the OptiCell measuring only 7 meters.

“The start-up went as planned and at the original schedule. The line was stabilized right from the start, and DIP quality was well accepted in the paper machine,” Karvonen said.

According to Metso, the brightness from the complete flotation system has increased by two units. A brightness gain of 13 units from thick stock to accept was achieved with the OptiCell process.

Reject ash content also improved and fiber losses decreased. As a result of the flotation performance and correspondingly, brightness improvement, peroxide consumption has decreased significantly in bleaching.

In addition to the aforementioned benefits, stickies content was reduced substantially. “The stickies content has been the lowest ever measured at the deinking line 1,” noted members of the Maxau Mill’s project team.

As the new cells have “healed” the system this has also helped to tune existing cells for better performance and offered possibilities for further energy savings.

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