



## Putting an end to sludge accumulation with ITT Flygt submersible agitators

### THE PROBLEM

Agitators are normally used in activated treatment processes to save energy by increasing the efficiency, reliability and flexibility of the process.

The effluent treatment flow sheet of the Beaupré Mill is conventional, with the discharge from the primary clarifier mixing with return sludge from the secondary clarifier in a small anoxic zone, before overflowing into the aeration basin. The 60 m diameter and 5.6 m deep aeration basin is divided into two equal cells by a concrete centre wall. Cell #1 originally contained 17 floating aerators, and Cell #2 contained eight identical units.

Shortly after start-up of the treatment process, operating personnel noticed a deficiency in their solids balance calculations. After testing with a light intensity meter they determined that there was a sludge accumulation in the bottom of the aeration basin.

### THE SOLUTION

An order was placed with the aerator supplier for two floating 30 kW agitators to solve the settling problem. These agitators are virtually identical in design to the

Abitibi Consolidated is one of the largest pulp and paper companies in Canada with nine mills operating around the country, producing a total of 2 500 000 tons of paper annually. In September 1995, four of their mills in the province of Quebec were required to upgrade their effluent treatment systems in order to meet new provincial regulations. One of these, Beaupré Mill, chose to install ITT Flygt submersible agitators to solve the problem of sludge accumulation in the aeration basin.



*The mounting system of the SR 4680 submersible agitator allowed for installation without having to empty the basin.*

aerators, although with reverse rotation so that the thrust is downward.

As a stopgap measure to maintain a degree mixing in the cells until the vertical agitators arrived, two submersible 30 kW agitators were rented from ITT Flygt's Quebec City Branch.

Originally, one agitator was

placed in each cell. When the two vertical agitators did arrive, they were installed in Cell #1 while both ITT Flygt agitators were installed in Cell #2. This provided a direct full-scale field comparison of both mixing processes with identical sludge conditions, in identical cells, using identical kW units.

## ITT Flygt

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Various modes of operation were tried, including alternating the operation of the aerators and the agitators. However, the mill observed that sludge settling still appeared to be continuing in Cell #1. Readings taken in Cell #1 after the vertical agitators had been installed and operated in conjunction with the aerators, still showed 1.4 m of sludge build-up along the centre wall. Additional modifications that were attempted included draft tube extensions for seven aerators, but without success. Similar readings taken in Cell #2 with ITT Flygt agitators showed no measurable sludge accumulation.

The final recommendations, from ITT Flygt, were to use three 30 kW submersible agitators per cell to allow for energy losses in negotiating the deep corners and the volume occupied by the floating aerators.

On the basis of the success at the Beaupré mill, Abitibi Consolidated has now installed ITT



Surface movement in the aeration basin, Cell #2, approximately five minutes after the aerators were turned off.

Flygt submersible agitators in two other mills.

### THE BENEFITS

Comparison of the two types of mixing show a high velocity and no settling immediately below the vertical agitators, but with sludge accumulation in the low-velocity corners. As the velocity reverses, the energy is dissipated very quickly as shear action along the basin bottom.

On the other hand, the bulk flow mixing of ITT Flygt submersible agitators maintains a more even velocity distribution throughout the entire basin volume, with minimal low-velocity zones.

ITT Flygt's submersible agitators, by virtue of the flexible mounting arrangement, allow a more efficient utilization of agitator energy. This principle can be used in effluent treatment or in other mill processes to reduce power requirement of any mixing application.

### Technical specifications

Application	Aerated basin
Tank size	D = 60 meter H = 5.6 meter
Sludge	Activated sludge
Temperature	30-37 °C
Agitator type	SR 4680 with jet ring
Power	30 kW
Installation	Portable concrete bases with a mast
Weight	470 kg



SR 4680 agitator with jet ring.



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