

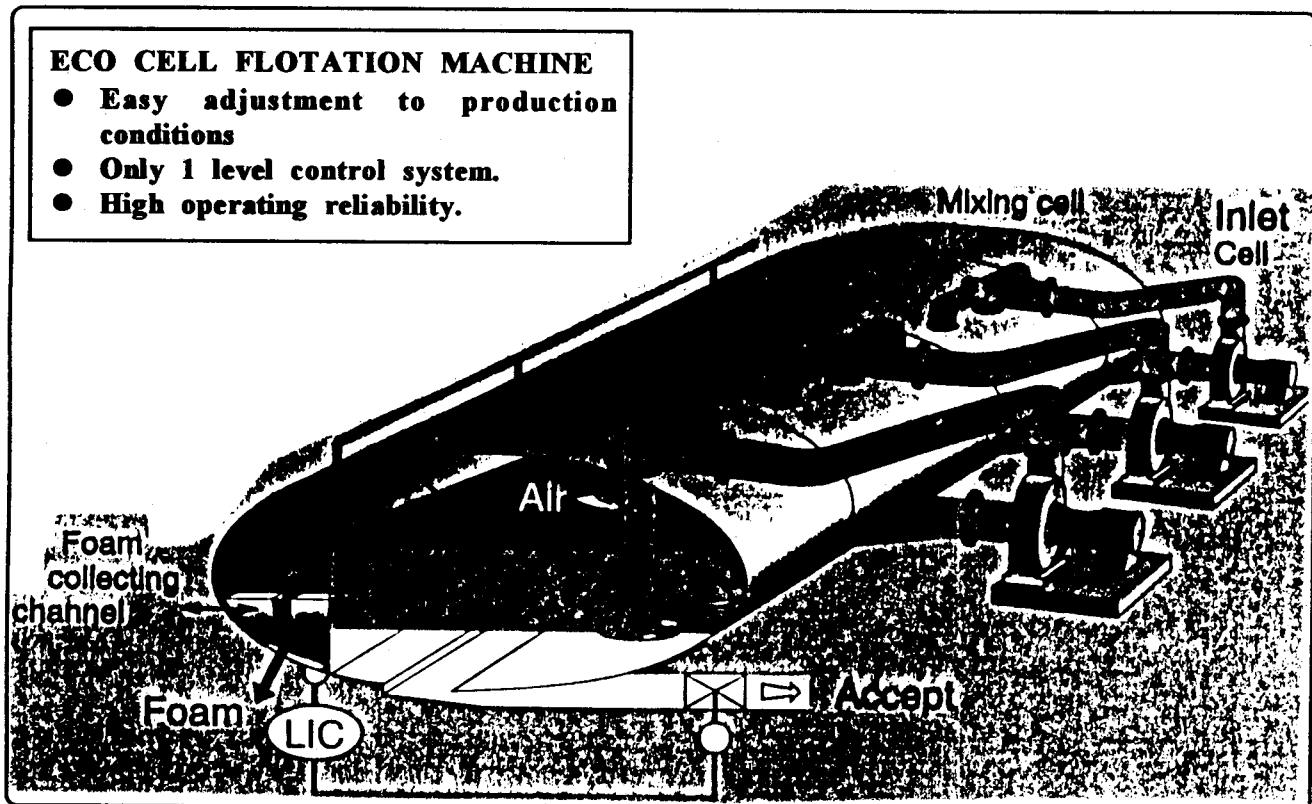
Ecocell : A New Development In Flotation Deinking

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INTRODUCTION

It has always been an endeavour in paper industry to improve the quality of pulp with latest technological solutions offered by equipment manufacturers. This trend is more visible in pulp made from recovered fibres where the idea is to obtain best possible result out of low cost, low quality waste paper.

Fig. - 1



In the field of flotation deinking, lot of research and effort has been put in to offer innovative methods to remove printing ink effectively. The ECO Cell is a new development in this direction by our collaborator M/s. Voith Sulzer, Germany. It combines the design features of the E-Cell and CF Cell developed by erstwhile Voith and Sulzer Escher Wyss respectively.

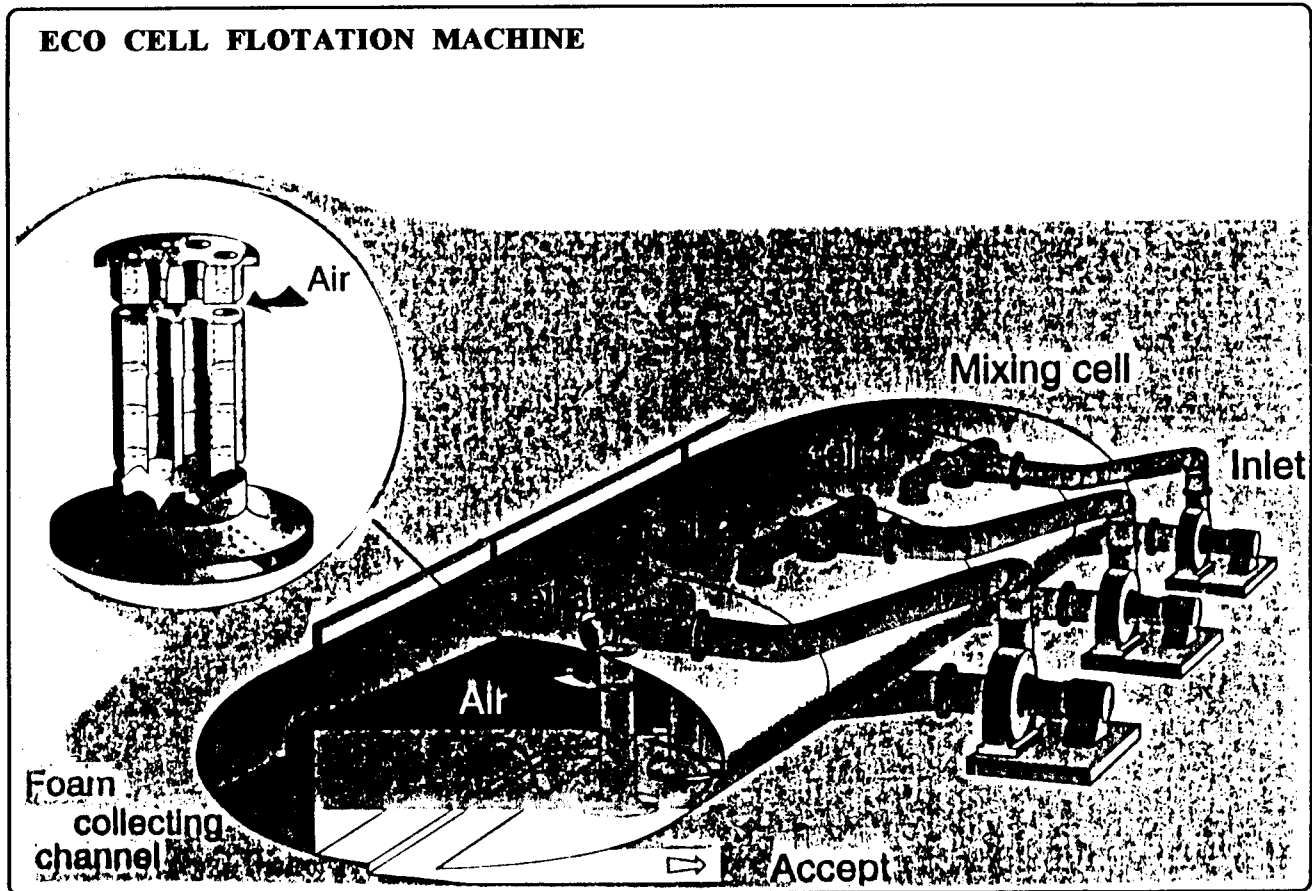
FLOTATION PROCESS

Three important steps are necessary to carry out an effective flotation process :-

- Effective aeration of the stock and generation of bubbles with wide size range.
- Good distribution of air bubbles in the stock for removal of printing ink and other

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Fig. - 2



hydrophobic contaminants.

- Separation of ink-laden bubbles from suspension.

The above three steps are carried out by the aeration element (also called the injector or diffusor) and the flotation cell tank.

While the aeration element injects air and allows through mixing of air bubbles into the stock, the tank provides sufficient space to remove ink-laden bubbles from the suspension.

ECO CELL FLOTATION CELL (Fig. 1 & 2)

The ECO Cell Flotation machine comprises of mixing cell followed by 3 to 6 primary flotation cell in series. The mixing cell receives the inlet (grey) stock, primary return flow and secondary flotation accepts.

Each flotation cell has circulation pump for

forward transmission of stock from one cell to another. Counter current flow through partition walls provides additional residence time in the cell and hence higher removal of contaminanats. A common rejects channel is provided for primary foam.

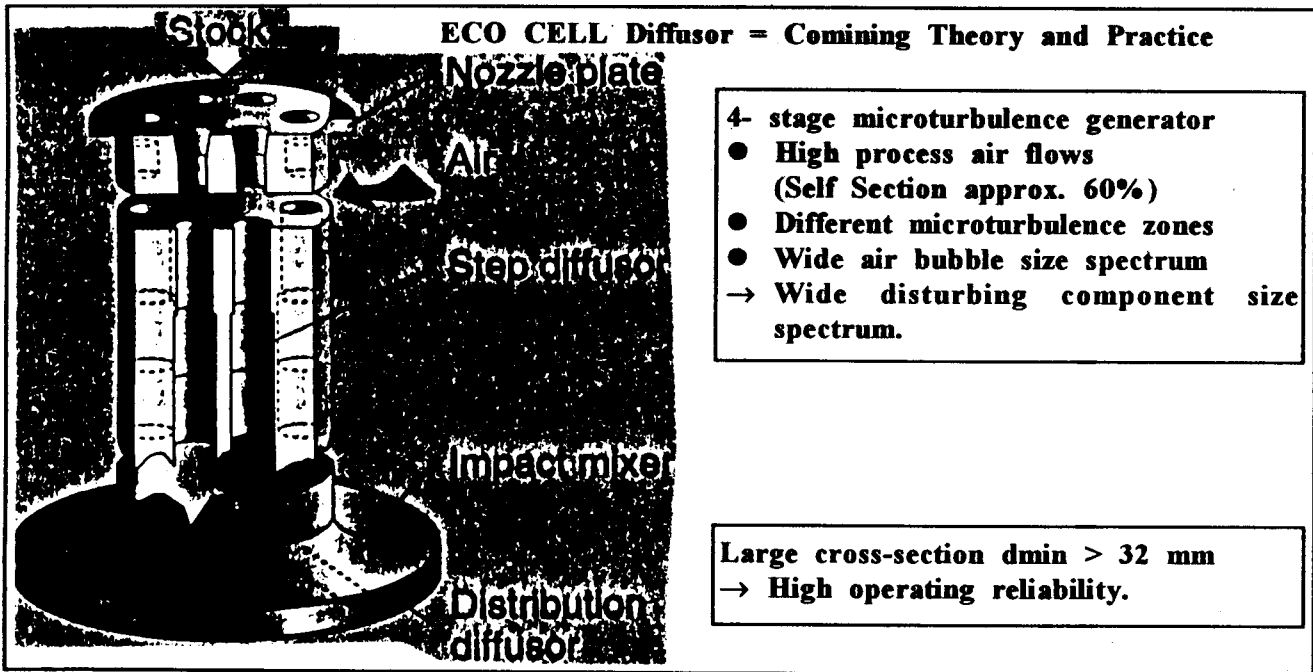
ECO CELL AERATION ELEMENT (Fig. 3)

The ECO Cell aeration element consists of a nozzle plate with opening of air suction, a step diffusor block, an impact mixer and a distribution diffusor.

In the nozzle plate, stock is subjected to high acceleration, which in turn, leads to self-suction of air (upto 60% by volume referred to stock flow rate) into the stock.

The step diffusor block has four "steps" with increasing diameter of orifice. This provides different levels of micro-turbulence zones thereby generating a wise range of air bubble sizes. As explained earlier, this step is essential for flotation of wide range of contaminant particle sizes (about 5-500 μm). The

Fig. - 3



orifice or nozzle diameter is optimised so that it provides efficient forced mixing of air and stock and at the same time prevent blockage of nozzle by suspension.

Energy consumption is relatively low (stock circulation pumps operate at 0.9 bar) because the step diffuser principle has high pressure recovery rate.

The aeration injectors are positioned inside the elliptical cell tank in such a manner that the rising ink-laden bubbles travel through a short distance. The low stock velocities at the end of distribution diffusor virtually eliminates any possibility of bubble collapse. Thus the bubbles remain buoyant till they rise to the top and become part of the reject foam. the foam carpet at the top also moves uniformly over the reject

Fig. - 4

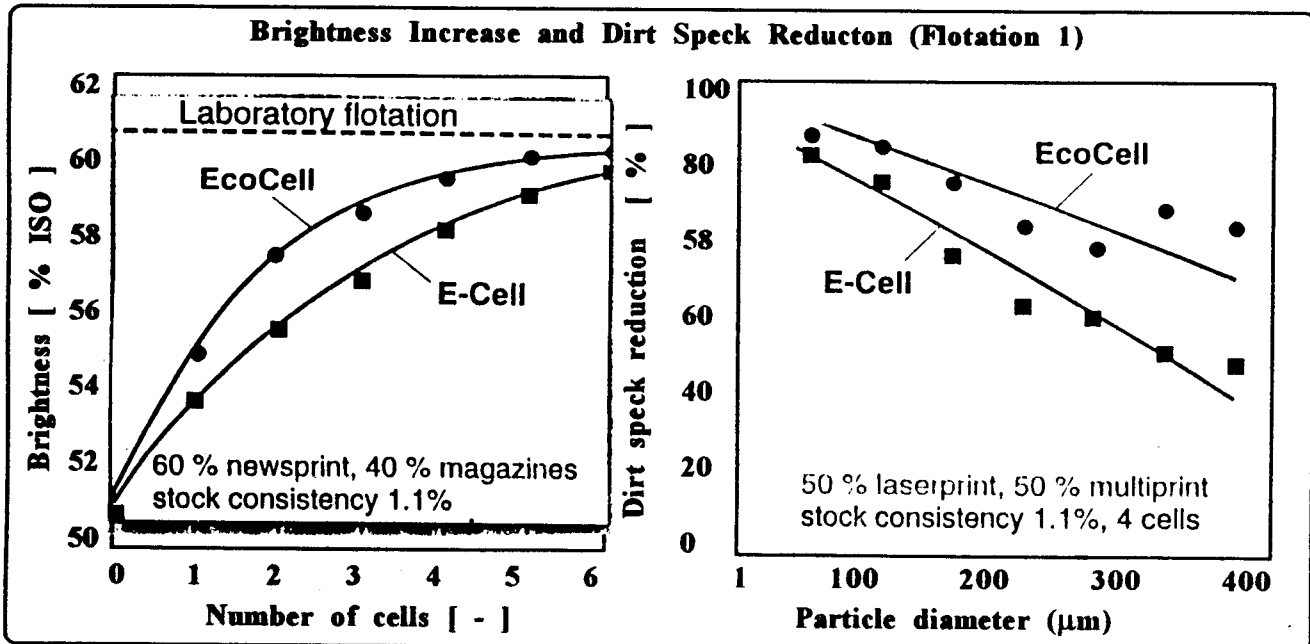
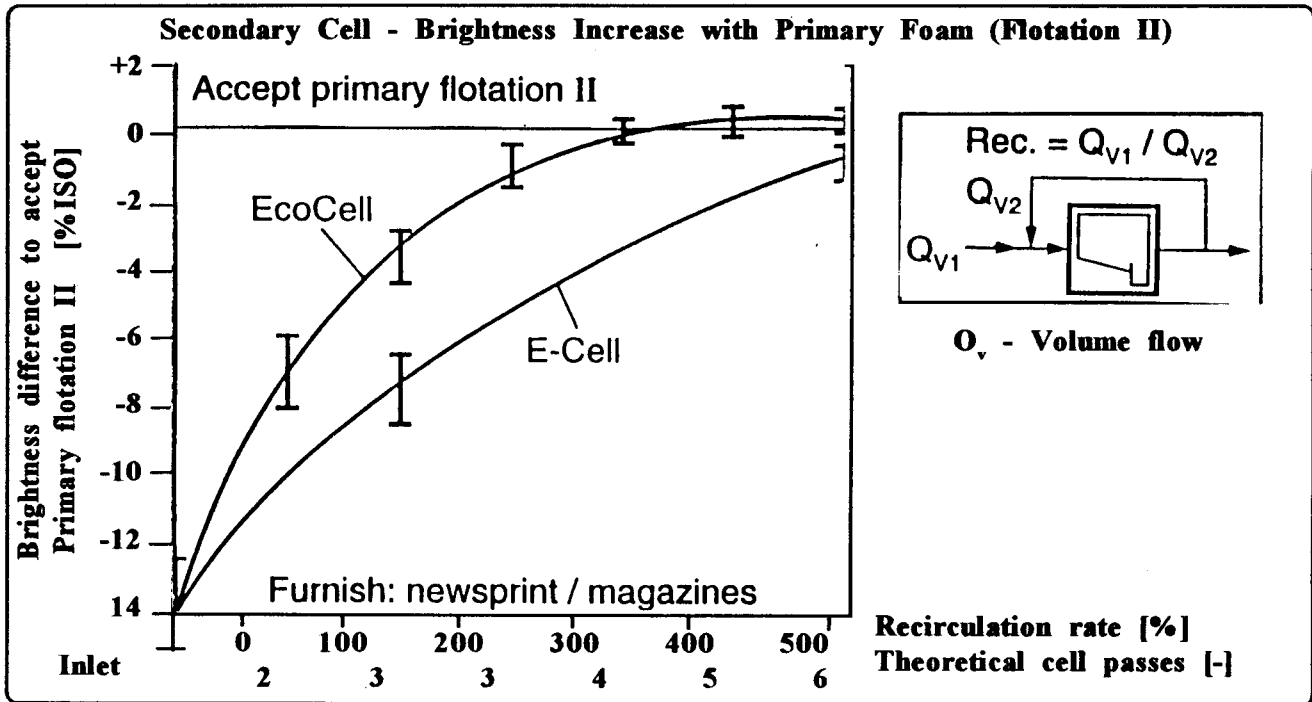


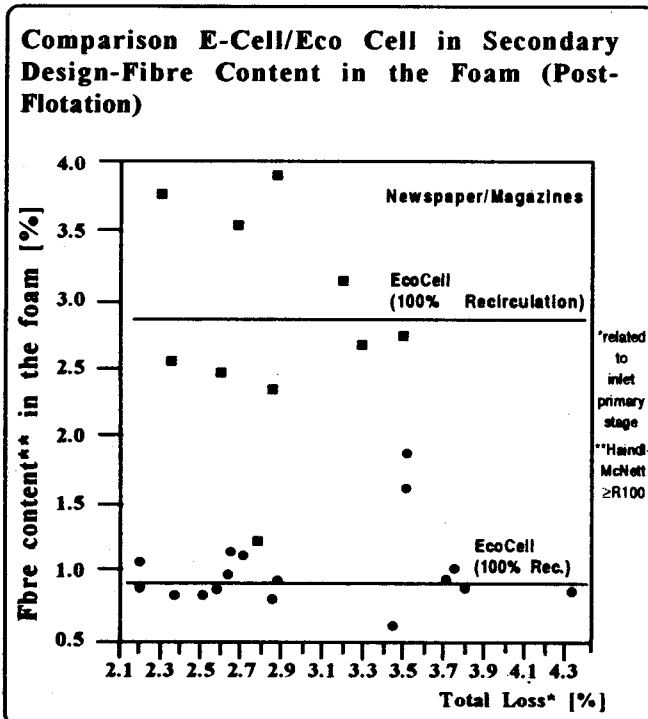
Fig. - 5



weir into the foam collection trough.

For constant throughput stock circulation pumps, recirculation between the cells provide "compensation

Fig. - 6



flow" to the accepts flow from each cell. Since the cells are interconnected to each other, only one level

controller (LIC) is required. This LIC is provided for foam volume control. in other words, the level of suspension in each cell is regulated by the amount of foam flowing into the foam collection trough.

RESULTS : BRIGHTNESS AND CLEANLI-NESS OF PRIMARY CELL (Fig. 4)

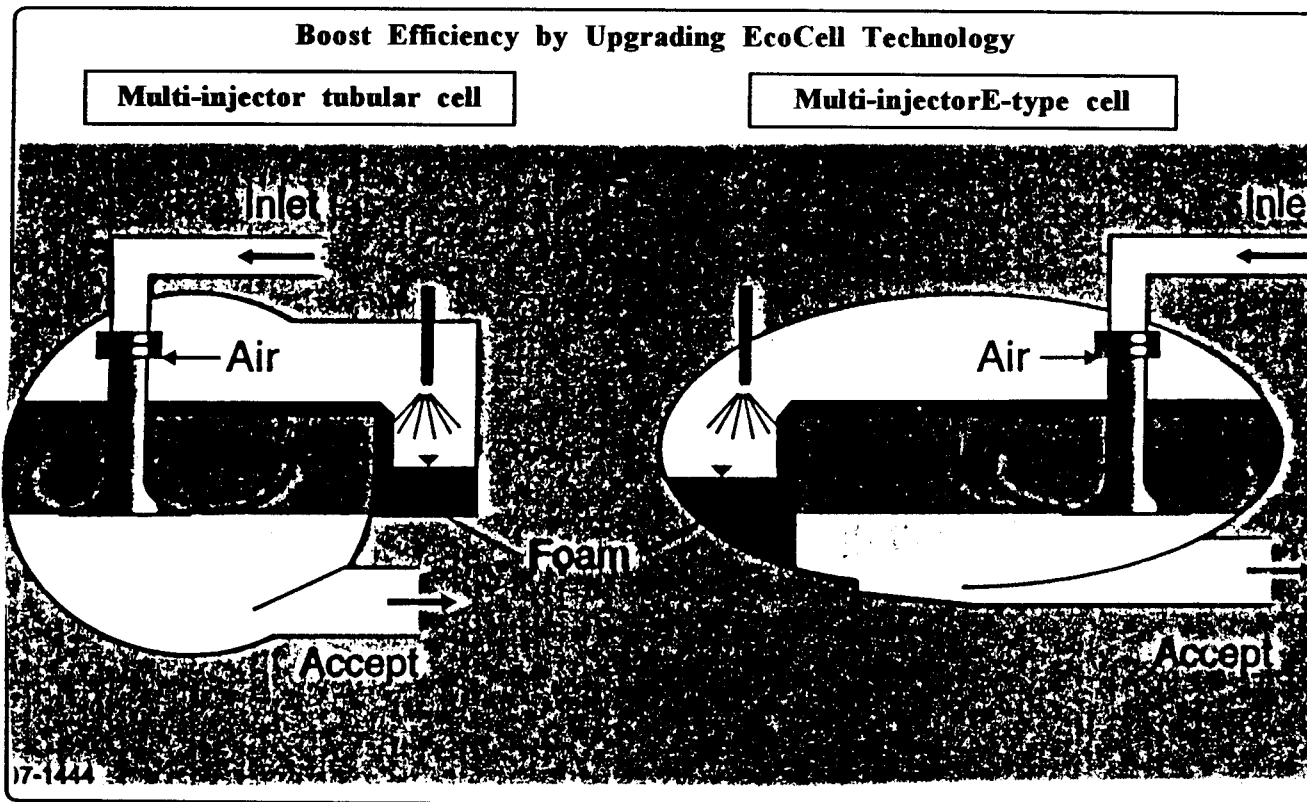
The new ECO Cell Step Diffusor has improved brightness development and optical cleanliness results.

When compared with former E-type cell, for a mixture of 60% ONP and 40% magazines, the graph shows that same brightness level can be achieved with fewer number of ECO Cells than that of E-Cells. For a mixture of laser and multi-print office waste, ECO Cell gives higher contaminant removal efficiency for larger particle sizes than E-Cell.

EFFICIENCY OF SECONDARY CELL (Fig. 5 & 6)

Similar to primary cell, the ECO Cell is more effective than E-Cell in terms of brightness gain. Moreover, the fibre losses in ECO Cell Secondary Cell is much lower (approx. 66% lower) than that of E-Cell.

Fig. - 7



RETROFIT FACILITY (Fig. 7)

ECO Cell injector has an important advantage that is can be utilised for upgrading the earlier versions of Flotation Cells viz. The E-Cell and Tubular Injector cell. This is a cost-effective method to boost up the efficiency of the old machines.

Depending on plant and operating condition, 20% production increase or an equivalent brightness gain at same production level can be achieved.

CONCLUSION

Flotation deinking provides a multi-faceted role

in stock preparation system. It improves brightness and optical cleanliness of the pulp.

The ECO Cell is a simple and reliable machine based on years of research and know-how of our collaborator M/s. Voith Sulzer, Germany.

ECO Cell injector is also a cost-effective measure to upgrade the earlier versions of Flotation Cells. A compromise between brightness gain and production can be met with retrofit ECO Cell injectors.