

Cleaner Technology for 21st Century

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ABSTRACT

Because of increased competition among pulp and paper producers, as well as extended use of secondary fibre, highly efficient pulp cleaning equipment become more and more important for achieving superior quality end products.

Limited resources of good easy-treated virgin fibres complicate the picture. In many countries pulp and paper producers are forced to use low quality raw materials like hard-treated annual fibres or mixed waste paper containing various types of contaminants that require special treatments to be removed. In order to meet these trends, a new generation of centrifugal cleaners has been developed that feature a completely new design approach.

This paper presents a new Cleaner developed by GL&V based on decades of experience in this field.

The new equipment represents:

- New thinking in assembly design
- Improved cleaning efficiencies
- Lower energy consumption
- Improved runnability
- Highly flexible systems
- More reliable operation
- Easier maintenance
- Retrofit possibilities.

CLEANPAC 700 satellite cleaner as shown in fig.1.represents the most modern, versatile and efficient cleaner used in the industry today. The inlet head and reject chamber are of a completely new design, which together with the long cone gives an outstanding performance for such a large diameter cleaner. Each cleaner stage is put together in “bank” assemblies as shown in figure 2. The banks consist of standardized “satellites” of 2, 4, 6 or 8 cleaner units (fig 3) and headers. The main headers can either be of a horizontal or vertical type. All satellites have the same connection diameters and can easily be replaced by each other.

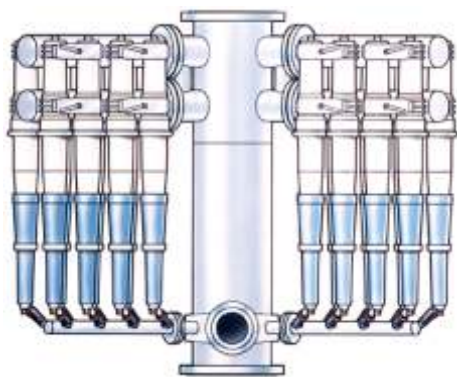


Fig 2



Fig 1

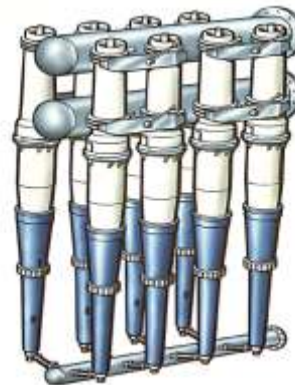


Fig 3

Present Scenario:

A typical mill requires 2-3 cleaner plants depending on furnish used such as virgin chemical pulp, secondary fibre, agricultural residue or market pulp.

The system is extremely flexible and space-saving. Additional capacity is easily achieved by adding satellites or replacing existing satellites with larger ones.

However, these Cleaners operate at a consistency of less than 1%. Therefore, the industry was looking for a Cleaner that can operate at much higher consistency (without compromising on efficiency) in order to bring down power consumption.

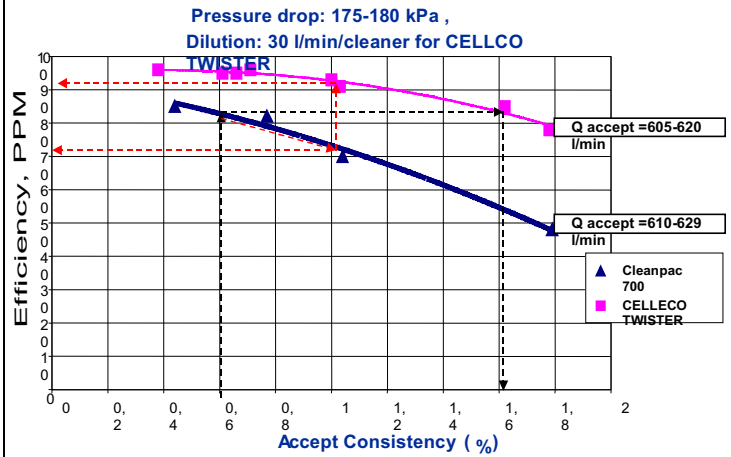
CELLECO TWISTER™

CELLECO TWISTER™ hydrocyclone is the latest development in separation technology. GL&V's innovative thinking over 60 years of hydrocyclone knowledge and advanced computer technology were key elements in the development of this new

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Hydrocyclone Features

Up to 2% feed consistency operation with comparable cleaning performance as in conventional hydrocyclones at 1%
 Superior cleaning performance over the entire operating consistency range
 Up to 50% lower applied energy
 Considerably lower reject rates than conventional hydrocyclones
 Celleco Twin Wall design.



CELLECO TWISTER™ Cone

The CELLECO TWISTER is a radical new concept in hydrocyclone technology. The concept houses three forward cleaners in a single unit and each unit is equipped with the patented two-stage CELLECO TWISTER cone working together with the patented Mid-cone dilution technology.



Mid-cone Dilution Technology

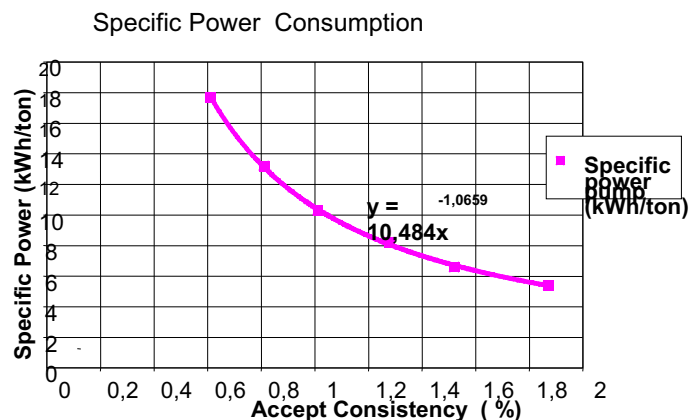
The patented Mid-cone dilution technology re-energizes the stock while providing accurate dilution minimizing fiber-thickening. Mid-cone dilution is located at the base of first stage cone, just before the stock enters the unit's 2nd stage.

This Mid-cone dilution technology enables the CELLECO TWISTER hydrocyclone to have an elongated cone section for higher separation efficiencies without the need to operate the hydrocyclones at an elevated pressure drop.



Reduced Energy Consumption

The CELLECO TWISTER cone and Mid-cone dilution technologies enable the new hydrocyclone to operate at a pressure drop that is equal to our Cleanpac 700 cleaner and the energy reduction is up to 50% compared to conventional cleaners at the same pressure drop. This energy saving operating at an elevated consistency is due to significantly lower hydraulic flow requirements. Under certain conditions, a CELLECO TWISTER hydrocyclone plant can even operate at a lower energy level than a comparable barrier screening plant.



high-performance, high-consistency hydrocyclone. The innovative design and state-of-the-art technology found only in the CELLECO TWISTER hydrocyclone is raising cleaning performance to a new level while utilizing much less energy.

Satellite System

The CELLECO TWISTER hydrocyclone utilizes the extremely flexible Satellite Bank System that was introduced with our Cleanpac 700 hydrocyclone in 1990.

A Well Proven Design

The CELLECO TWISTER hydrocyclone incorporates well-proven

technology from the Cleanpac 700, Cleanpac 270/Tripac 90 families of hydrocyclones that have proven themselves over and over again with over 2000 hydrocyclone plants sold worldwide.

Retrofits

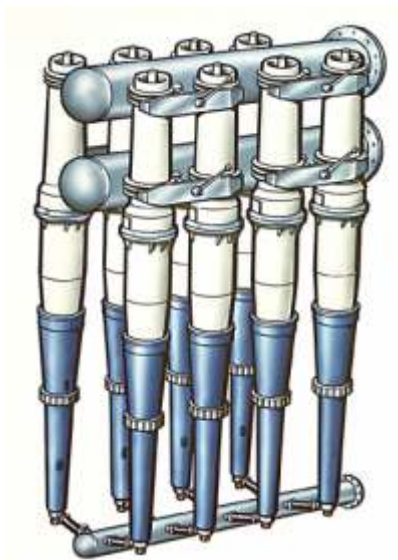
With the CELLECO TWISTER hydrocyclone, it is possible to retrofit existing Cleanpac 700, Cleanpac 270 and Tripac 90 bank installations.

Conclusion

- With these new centrifugal

cleaner concepts, it is possible to utilize a wider and inferior grades of raw materials and still reach the required quality or, on the other hand, improve quality when keeping the same raw material.

- Reliable operation and flexibility, two very important factors in making profitable products, are achieved more easily.
- CLEANPAC 700 with over 3000 installations is established as a universal cleaner suitable for a wide range of applications.
- The development of CELLECO TWISTER has made it possible to achieve the same efficiency and reliability with almost half the energy consumption. This reduces operating costs and overall investments in a mill without reducing demand for the highest possible product quality.



Cleanpac 700



Celleco Twister

CFD Simulation

In designing of the CELLECO TWISTER hydrocyclone, GL&V used Computational Fluid Dynamic (CFD) simulations to optimize the internal design of the hydrocyclone that was also confirmed in actual trials. CFD is what aided GL&V to raise the bar in hydrocyclone performance with the new CELLECO TWISTER.

