

CoriolisMaster FCB400

Black liquor monitoring in pulp & paper industry



Measurement made easy

CoriolisMaster FCB400

Introduction

Chemical wood pulping involves the extraction of cellulose from wood by dissolving the lignin that binds the cellulose fibers together.

The 4 processes principally used in chemical pulping are kraft, sulfite, neutral sulfite semi chemical (NSSC), and soda. The kraft process alone accounts for over 70 percent of the chemical pulp produced.

The kraft pulping process involves the digesting of wood chips at elevated temperature and pressure in 'white liquor', which is a water solution of sodium sulfide and sodium hydroxide. The white liquor chemically dissolves the lignin that binds the cellulose fibers together. Once the cooking is complete, the digester contents are washed in pulp washers & Pulp is separated from the spent liquor known as 'weak black liquor'.

Additional Information

Additional documentation on CoriolisMaster FCB400 is available for download free of charge at www.abb.com/flow.

Alternatively simply scan this code:

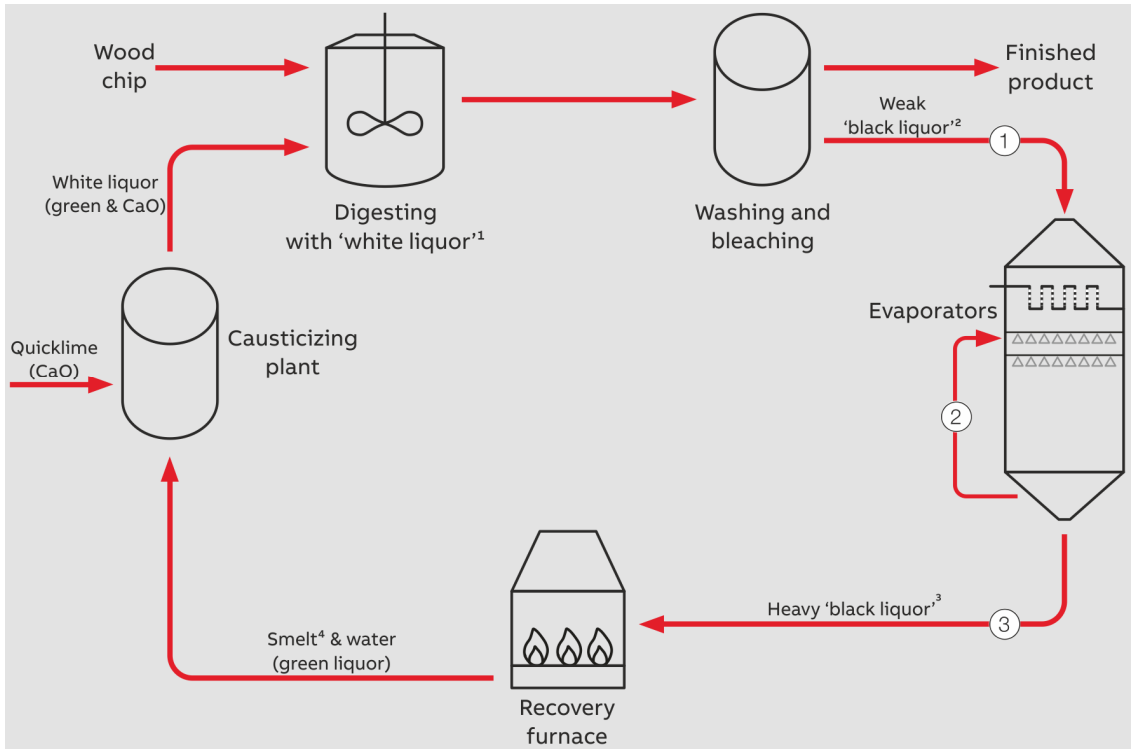




Kraft chemical pulping process cycle

01 Pulping process

02 CoriolisMaster FCB400



- 1 White liquor chemically dissolves the lignin that binds the cellulose fibers together
- 2 'Weak black liquor' – cooking liquor & pulp with wash water (about 55 % solids)
- 3 'Heavy black liquor' – now concentrated to 65 % solids
- 4 'Smelt' – inorganic chemicals present in the black liquor collect as a molten 'smelt' at the bottom of the recovery furnace

① Measuring point 1 – 'Weak black liquor'

③ Measuring point 2 – 'Heavy black liquor'

② Measuring point 2 – Concentration process

01



02

Measurement points

03 CoriolisMaster FCB400

Measurement point 1

This produced black liquor is quite toxic to aquatic life & if discharged untreated results in very high BOD & COD values for effluent.

In Kraft process as a thumb rule, 10 T of weak black liquor is produced for one ton of pulp. The weak black liquor, generally carries 10 to 15 % of solids.

Central Pollution control board, in order to prevent the direct discharge of this harmful byproduct, is making the flow monitoring of weak black liquor mandatory immediately after the pulp washers. Also to avoid any kind of mischief, the Coriolis flow meter with concentration measurement has been proposed to ensure that flow readings are for black liquor only.

Measurement point 2

This produced weak black liquor has good potential of being used as fuel, & recovering the process chemicals for their reuse.

This can achieve twin objectives:

1. Increasing the competitiveness of pulp mills by reuse of process chemical & water.
2. Ensuring zero discharge of harmful black liquor by using it as fuel for recovery boiler in CRP.

For using the black liquor as fuel, it has to be concentrated so as to remove water content & making the solid content at least 50 % before it is fired. This is necessary to increase the fuel efficiency by increasing the calorific value & also for efficient burning thereby reducing the pollution due to emission.

Weak black liquor is passed thru multistage evaporators to concentrate the liquor. This results in strong black liquor. Measurement of concentration at this stage is important to know about efficiency of evaporators. Coriolis mass flow meter with concentration measure is the recommended technology for this measurement.

Measurement point 3

Before firing this strong black liquor is further concentrated in a direct contact evaporator. Here it is ensured that before firing the concentration level reaches at least 65%.

Monitoring of concentration & flow is very important for efficient combustion so as to ensure economy as well as reduced emission pollution. Coriolis mass flow meter provides the best solution for this measurement.

However this heavy black liquor can pose some challenges for corrosion of SS316 steel, thereby making it necessary to use Hastelloy® C tubes, Coriolis meters.



03

The solution

04 CoriolisMaster FCB400



04

The CoriolisMaster FCB450 provide complete solution for black liquor cycle measurement in pulp & paper industry.

The CoriolisMaster FCB450 provides multivariable measurement of process stream:

- Mass flow with onboard totalizer.
- Density measurement.
- Temperature measurement
- Concentration measurement with help of concentration curves.

The CoriolisMaster FCB450 is equipped with most advanced features to ensure highest level of performance in harshest of conditions.

- On site meter verification
- SensorApplicationMemory to ensure easy maintenance at site
- Modular I/O's to suit every need & application
- Intuitive graphical display
- Advance diagnostics for preventive maintenance.
- High accuracy up to 0.1 % of flow rate

Notes

Notes

ABB Limited
Measurement & Analytics
Howard Road, St. Neots
Cambridgeshire, PE19 8EU
UK
Tel: +44 (0)870 600 6122
Fax: +44 (0)1480 213 339
Email: enquiries.mp.uk@gb.abb.com

ABB Inc.
Measurement & Analytics
125 E. County Line Road
Warminster, PA 18974
USA
Tel: +1 215 674 6000
Fax: +1 215 674 7183

ABB Automation Products GmbH
Measurement & Analytics
Schillerstr. 72
32425 Minden
Germany
Tel: +49 571 830-0
Fax: +49 571 830-1806

abb.com/flow

We reserve the right to make technical changes or modify the contents of this document without prior notice. With regard to purchase orders, the agreed particulars shall prevail. ABB does not accept any responsibility whatsoever for potential errors or possible lack of information in this document.

We reserve all rights in this document and in the subject matter and illustrations contained therein. Any reproduction, disclosure to third parties or utilization of its contents – in whole or in parts – is forbidden without prior written consent of ABB.