

# The Wizard

## Pulp and Paper Industry

## Applications 1

### Recovery Cycle, Black & Green Liquor

The sulfate or kraft process recovery cycle represents a large application area for gamma density gauges. In this process, weak black liquor (spent chemicals and dissolved lignins) from the washed pulp is concentrated in multiple-effect evaporators, then burned in the recovery furnace. The burned liquor drops to the bottom of the furnace as molten smelt which in turn flows into a dissolving tank to become green liquor. Lime (calcium oxide) is added to the green liquor causing a mild reaction that produces white liquor. The cycle is completed as the white liquor is clarified and returned to the digester to be combined with wood chips.

### Weak Black Liquor

A gamma density gauge can monitor weak black liquor concentration of both the input and output of multiple-effect evaporators. It is important that the gauge measuring concentration between the evaporators and the concentrators be located around a line section free of liquor flashing.

The input to the evaporators is in a 10 to 20% range, while the output is held at a fairly constant 50%. The concentrator increases solids to 65%, the approximate concentration required by the recovery furnace to proper liquor combustion.

### Strong Black Liquor

Although the process shows a concentrator between the multiple-effect evaporators and the recovery furnace, some systems employ a cascade of contact evaporator. These evaporators have revolving drums

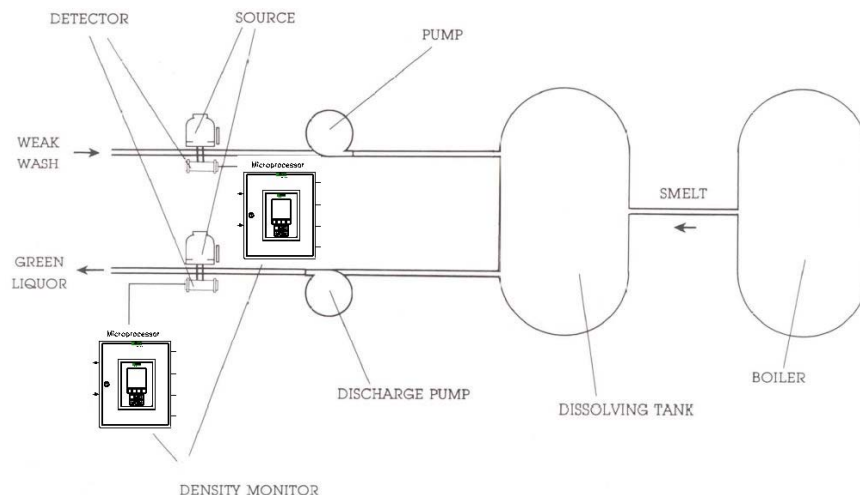
or discs that bring the black liquor in direct contact with the flue gas from the recover furnace. The churning liquor picks up an appreciable amount of entrapped gas, adversely affecting the operation of a gamma density gauge. Severe gas entrapment may require a refractometer for liquor density. However, most new systems use a concentrator that does not introduce air into the black liquor. In these cases, the gamma density gauge has been successfully applied to strong black liquor measurement in the 50 to 70% range.

### Green Liquor

Green liquor is monitored after the discharge pump for density before causticizing. To do this, a Ronan Density System is mounted around a small section of reduced diameter glass or Teflon-lined process pipe. This lining and the increased flow from the smaller pipe will prevent any material build-up, which would affect the gauge's output. The gauge can be mounted on either a horizontal or vertical pipe with upward flow.

In a dual-line system where the weak wash is alternated with green liquor, two density systems would be used. Control schemes take advantage of the continuous measurement of both weak wash and green liquor densities to keep control and balance of the dissolving tank and recausticizing operations.

Ronan's Density Systems are non-contact, rugged, and clamp to the outside of the pipe. It is maintenance-free and wear-resistant.



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