



TJ SUMMARIES

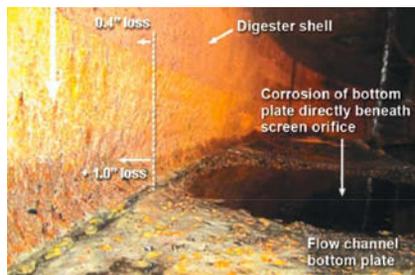
THE PAPERS SUMMARIZED HERE ARE from the August 2014 issue, featuring special Engineering content, and the September 2014 issue, featuring special Recycling content, of *TAPPI Journal*, an online publication of relevant and timely peer-reviewed research delivered via email and free to all TAPPI members. To receive *TAPPI Journal*, join TAPPI at www.tappi.org.

AUGUST

CORROSION

Digester thinning: Erosion-corrosion of internal flow channel headers

Greg A. Busby and Peter W. Hart



▲ **CORROSION** – Hart Busby. Digester’s lower extraction flow channel shows severe erosion-corrosion of shell near the bottom plate, as well as bottom plate wash-out.

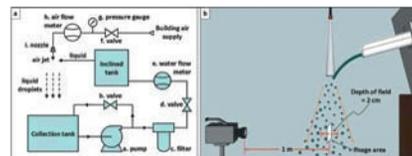
A softwood continuous digester experienced severe erosion-corrosion of the shell wall inside the internal flow channel headers of the extraction and modified continuous cooking (MCC) zones. The worst damage was located where high velocity liquor exits the screen orifices and enters the collection headers. With erosion-corrosion rates as high as 200 m/year, the damage has effectively reduced the wall thickness almost by half

in the worst areas. Also affected were the horizontal backing rings that form the bottom of the flow channels. An API-579/ASME FFS-1 Part 5, Level 2 analysis was performed to allow the mill to continue operating the digester until the next scheduled outage.

RECOVERY BOILER

A laboratory study of recovery boiler smelt shattering

Anton Taranenko, Markus Bussmann, and Honghi Tran



▲ **RECOVERY BOILER.** Schematic (a) and illustration (b) of laboratory-scale smelt shattering apparatus.

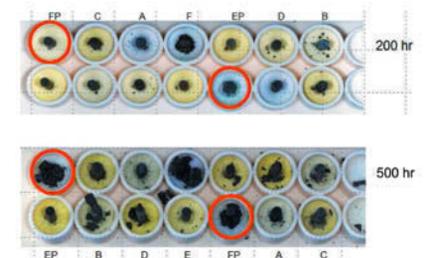
A scaled-down experimental apparatus was built to examine smelt shattering during typical recovery boiler operations. Water-glycerine solutions and air were used in place of smelt and steam. A high-speed camera and image processing software were used to record and quantify liquid shattering in terms of droplet number and size distributions, as a

function of air velocity, air nozzle position, liquid flow rate, and liquid viscosity. The results showed that increasing shatter jet velocity reduced average droplet size, increasing the liquid flow rate increased droplet size, and placing the shatter jet nozzle closer to the liquid stream decreased droplet size.

CORROSION

Could biomass-fueled boilers be operated at higher steam temperatures? Part 1: Laboratory evaluation of candidate superheater alloys

Douglas L. Singbeil, Laurie Frederick, James R. Keiser, and W.B.A. (Sandy) Sharp



▲ **CORROSION Part 1** – Singbeil. Alloy coupons at the conclusion of tests in recovery boiler salts at 625°C.

A laboratory-based program was designed to evaluate candidate alloys for superheaters operating at temperatures substantially higher than currently used in practice for biomass and chemical recovery boilers. However, the data is also applicable to superheaters operating in very corrosive conditions at lower temperatures. Alloys are ranked according to their performance in simulated environments.

This research provides information on the corrosion resistance of alloys that could potentially be used to make superheaters in very advanced biomass and kraft recovery boilers with superheater steam temperatures much greater than 500°C.

RECOVERY BOILER

A novel method for determining the internal recycled dust load in kraft recovery boilers

Matheus Antunes Guimarães, Honghi Tran and Marcelo Cardoso

A new method has been developed to quickly and accurately determine the amount of internal recycled dust in recovery boilers. The method is based on the difference between the total organic carbon content of

the virgin black liquor and that of the as-fired black liquor. Tests using the method were performed on recovery boilers at three of Fibria's mills in Brazil. The results show that while the specific virgin black liquor solids produced at these mills were about the same, the internal recycled dust load varied widely, from as low as 4 wt% of as-fired black liquor solids fired in the boiler at one mill, to as high as 15 wt% at another mill. Instead of total organic carbon values, heating values may also be used but the result is not as accurate.

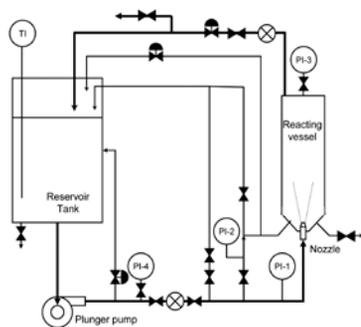
SEPTEMBER

DEINKING

Pilot-scale development of cavitation-jet deinking

Shisei Goto, Hiromichi Tsuji, Isao Onodera, Keigo Watanabe and Katsumasa Ono

Describes a new deinking method for paper recycling using a fluid-jet cavitation technique. An in-house, laboratory-scale device revealed that cavitation-jet treatment without deinking chemicals decreases ink and dirt content in deinked pulp. As the next step, a pilot-scale deinking device 10 times larger than the laboratory device was designed. The specifications of the pilot device were determined by experiments using the laboratory



▲ **DEINKING.** Schematic diagram of laboratory CV-jet device (PI=pressure gauge, TI=temperature sensor).

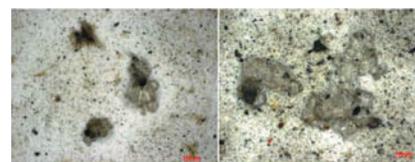
device. The pilot device was installed in a deinked pulp mill and the effects of multijet nozzles within a reacting vessel, depending on consistencies of the deinked pulp, were investigated. The operation stability of the device was also examined.

MICROSTICKIES

Quantifying microstickies via a new agglomeration technique

Yuxia Ben, Michelle Ricard, and Gilles Dorris

Researchers tested agglomerating microstickies in a pulp sample by long cold storage or by exposure to reduced pressure conditions, followed by a classification step to isolate them from the pulp as macrostickies.



▲ **MICROSTICKIES.** Photomicrographs of agglomerated stickies in whole pulp after boiling treatment.

The research showed that microstickies in mill samples could be effectively agglomerated into macrostickies by boiling whole pulp suspension.

DEINKING

Effect of poorly deinkable paper on deinked pulp quality

Georg Hirsch, Dennis Voss, Hans-Joachim Putz and Samuel Schabel

Laboratory tests were performed to assess the influence of various digital prints and packaging paper products on the quality of deinked pulp. Boards and digital prints were dosed to a certain percentage in basic mixtures of offset printed newspapers and offset and rotogravure printed magazines. After pulping, the fiber suspensions were treated in a single step flotation process and the deinked pulp was characterized by optical properties. Effects on optical properties of deinked pulp are presented. 560

OTHER RESEARCH APPEARING IN TAPPI JOURNAL'S AUGUST 2014 ISSUE:

CORROSION

Could biomass-fueled boilers be operated at higher steam temperatures? Part 2: Field tests of candidate superheater alloys

James R. Keiser, W.B.A. (Sandy) Sharp and Douglas L. Singbeil

CORROSION

Could biomass-fueled boilers be operated at higher steam temperatures? Part 3: Initial analysis of costs and benefits

W.B.A. (Sandy) Sharp, W.J. (Jim) Frederick, James R. Keiser and Douglas L. Singbeil

PULPING

Combustion properties of reduced-lignin black liquors

Niklas Vähä-Savo, Nikolai Demartini, Rufus Ziesig, Per Tomani, Hans Theliander, Erkki Välimäki and Mikko Hupa

OTHER RESEARCH APPEARING IN TAPPI JOURNAL'S SEPTEMBER 2014 ISSUE:

DEINKING

Cavitation jet deinking: A new technology for deinking of recovered paper

Shisei Goto, Hiromichi Tsuji, Isao Onodera, Keigo Watanabe and Katsumasa Ono

DEINKING

DIP quality influenced by process water quality

Dennis Voss, Hans-Joachim Putz and Samuel Schabel