

3D TRASAR™ Technology for Boilers Helps Improve Tissue Machine Runnability and Operating Efficiency

Mill Overview

Machine Type:	Metso Advantage DCT 200TS
Production (at 18 gsm, 100% efficiency):	207 t/24 hrs
Sheet design:	Single-layer
Paper width on reel:	18 ft (5.5 m)
Max. operating speed (Yankee speed):	6560 ft/min (2000 m/min)
Basis weight range on reel:	14.5-18 gsm
Creeping ratio range:	13-20%
Yankee diameter:	18 ft (5.5 m)

CHALLENGE/OPPORTUNITY

- Improve tissue machine runnability and overall tissue quality
- Reduce frequency of machine downtime caused by soda straw plugging and poor Yankee dryer performance

experienced five unscheduled maintenance outages due to poor tissue quality created by concerns with the performance of the Yankee dryer system. Each unscheduled machine outage was preceded initially by a gradual decrease in blowthrough steam velocity within the Yankee and an increase in differential pressure across the system. Just prior to the tissue machine being taken out of service, both of these operational conditions accelerated in their rate of degradation,

BUSINESS SITUATION

During the first seven months of operation of a greenfield tissue machine, this customer's machine

CUSTOMER IMPACT



ECONOMIC RESULTS

Increased production by 6.9% through reduced Yankee soda straw mechanical cleaning



ASSETS

Annual profit improvement of \$1,560,000 (€1,213,000)

Increased boiler cycles from 16 to 50, saved 14,787 MMBtu/yr (4334 MWh/yr)



ENERGY

\$62,846/yr (€48,847/yr) natural gas cost avoidance

Increased boiler cycles from 16 to 50, saving 5,000 gallons/day (19 m³) of water or 1.75 million gallons/year (6,625 m³) (assuming 350 operating days/year)



WATER

At \$1.10/1000 gallons (0.23 m³), saved \$1925/yr (€1,496/yr)

eROI is our exponential value: the combined outcomes of improved performance, operational efficiency and sustainable impact delivered through our services and programs.

as seen in Figure 1. The longest period between these outages was 42 days and each outage was approximately 60 hours in duration from paper off to paper on.

In each incident, soda straw plugging caused by iron deposits was the cause of the poor Yankee dryer performance. The soda straws remove the condensate from the Yankee dryer. As the soda straws plugged, condensate was building up in the Yankee dryer, affecting heat transfer rates and internal dryer pressure. After each outage, operational changes were made to try and eliminate soda straw plugging - increased venting off the condensate flash tank, increased pH control range in main return condensate sample, new soda straws installed instead of drilling out old ones, installation of multiple sample points around the Yankee dryer, etc. With each operational change made, the time period between unscheduled outages remained unchanged while the actions taken increased the mill's total cost of operations.

PROGRAM DESIGN

NALCO Water was asked to evaluate the problem and to offer recommendations for operational changes to minimize the soda straw plugging and eliminate these unscheduled outages. Because of the speed and nature of the deposit formation it was believed that the plugging occurring in the soda straws was due to excessive corrosion rates present within the Yankee dryer system. Corrosion rates of this magnitude indicated that a combination of elevated carbon dioxide and oxygen levels were likely present in the return condensate system. Field tests that were conducted confirmed this was the case.

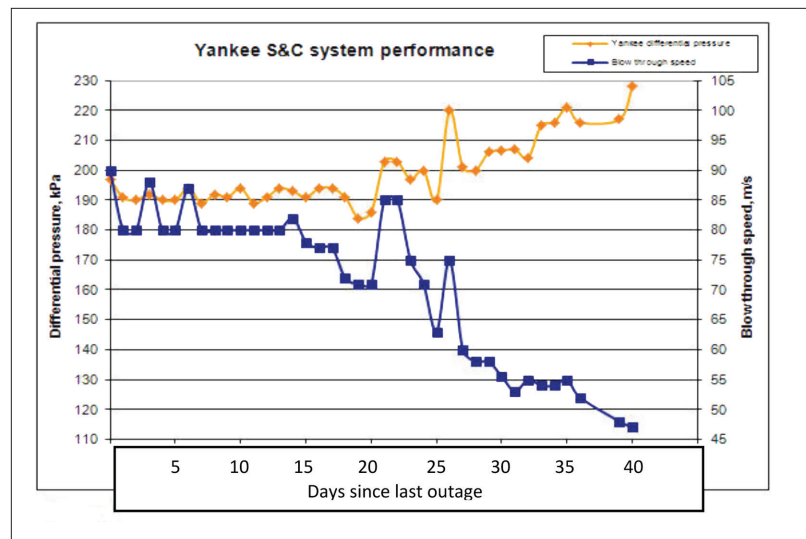


Figure 1 - Yankee S&C System Performance - Plugged Soda Straws

An action plan was developed to address the mechanical removal of oxygen and carbon dioxide within the steam supply system (increased DA venting and RO installation). In addition an enhanced monitoring/control strategy was implemented for the condensate chemical treatment program to improve the protection of the feedwater system and Yankee dryer internals.

3D TRASAR Technology for Boilers was installed in the feedwater system to monitor deaerator mechanical performance and to optimize the feed of oxygen scavenger to treat to the level of oxygen present in the system and to minimize feedwater corrosion. Control parameters and alarms were put in place to monitor corrosion potential based on statistical process control analysis. NALCO Water's System Assurance Center was also utilized to monitor system performance. NALCO Water's System Assurance Center is an extension of the 3D TRASAR technology platform that analyzes alarms and deviation through human interaction, not static computer monitoring.

In addition, the mill incorporated the 3D TRASAR technology monitor/control system in the return condensate line between the Yankee dryer and the condensate flash tank. This 3D TRASAR technology unit monitored Yankee return condensate pH, corrosion potential and conductivity. Based upon these readings, the system controlled the delivery of a satellite feed of a condensate corrosion inhibitor to the steam supply going to the Yankee dryer. This system assured that a proper pH/chemical balance was maintained at all times, minimizing Yankee dryer internal corrosion and the resulting soda straw plugging that can occur from iron deposition. This system is also tied to NALCO Water's System Assurance Center so that immediate analysis and action can be taken in case of system alarm, as seen in Figure 2.

PROGRAM RESULTS

The mechanical, operational and chemical changes made at this facility have now resulted in the tissue machine running continuously between the mill's scheduled six month outages. There has been no sign of soda straw plugging as evidenced by a consistent Yankee dryer differential pressure and blow through velocity, as seen in Figure 3. In addition, chemical feed rates to treat the condensate have been lower and steam venting from the Yankee dryer condensate flash tank has been reduced to 3 percent of total flow as opposed to 20 percent prior to the changes.

Based upon the previous frequency of unscheduled maintenance outages required to address the soda straw plugging concerns, the actions taken allowed the mill to avoid four additional maintenance outages giving them an additional 240 hours of production time on the machine within a six month period.

CONCLUSION

Through a combination of mechanical changes to reduce oxygen and carbon dioxide levels present within the steam, and the implementation of the 3D TRASAR technology monitoring/control system to ensure that appropriate chemical treatment programs were maintained in response to the dynamic boiler and Yankee dryer steam systems, condensate corrosion rates have been significantly reduced and soda straw plugging eliminated. The mill has now been able to increase the machine uptime by over 6.9 percent while also increasing the level of protection for one of its most critical assets, the Yankee dryer, and reducing water and energy consumption

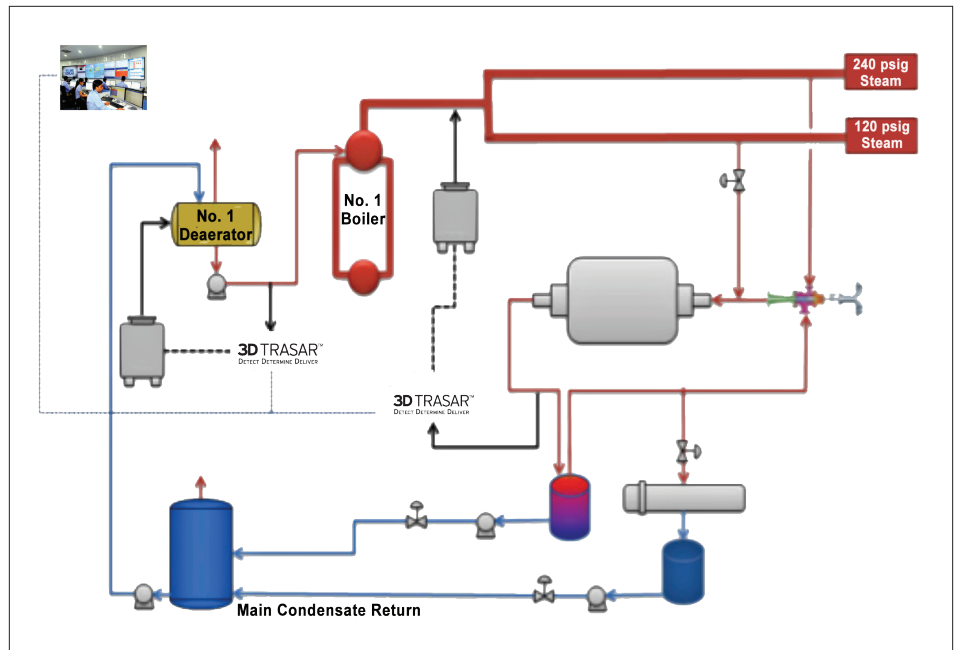


Figure 2 - Layout of 3D TRASAR Technology application points and NALCO Water System Assurance Center

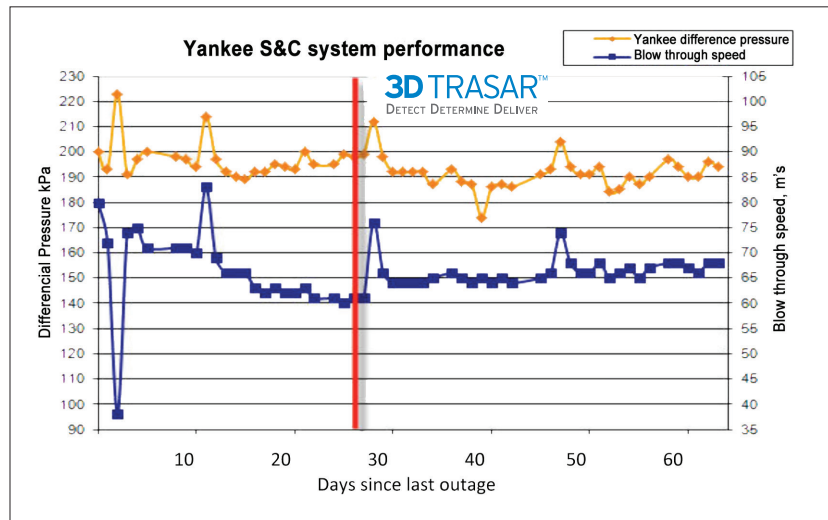


Figure 3 - Yankee S&C System Performance - Clear Soda Straws

NALCO Water, an Ecolab Company

North America: Headquarters – 1601 West Diehl Road • Naperville, Illinois 60563 • USA

NALCO Champion – 7705 Highway 90-A • Sugar Land, Texas 77487 • USA

Europe: Richtistrasse 7 • 8304 Wallisellen • Switzerland

Asia Pacific: 2 International Business Park • #02-20 The Strategy Tower 2 • Singapore 609930

Latin America: Av. das Nações Unidas 17.891 • 6º Andar 04795-100 • São Paulo • SP • Brazil

nalco.ecolab.com

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