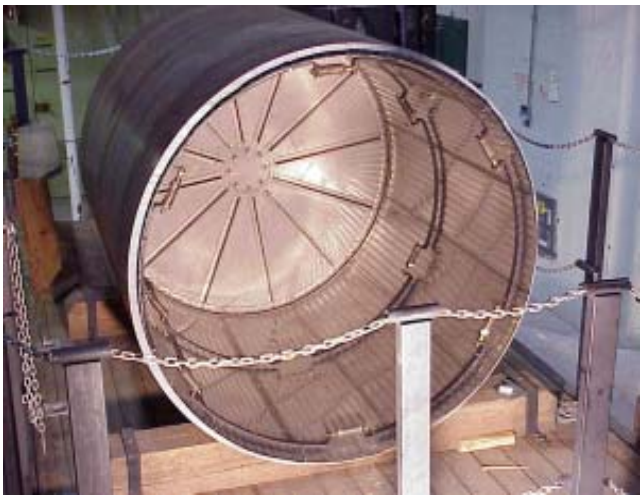
Multiport Dryer Technology

Revolutionary retrofit design can boost production by 20% to 50%



The most costly part of paper manufacture occurs in the drying section where wet paper passes over dozens of large steam-filled cylinder-dryers, e.g. 5 ft diameter, 20 ft long, spinning at 200 rpm. In contrast to conventional dryers, the Multiport cylinder dryer, shown on the left, flows steam through longitudinally oriented passages, or "ports," near the cylinder dryer inner surface. Forcing the steam closer to the cylinder compared to conventional dryers minimizes the condensate layer (by up to 90%), improves heat transfer, increases the dryer shell's surface temperature, and provides a more uniform surface temperature. Also, since the steam flow velocity is very high in the small ports compared to the full cross-sectional flow area in a conventional dryer, the dominant heat transfer mode in the new Multiport dryer design is convection, which is markedly more effective than conduction, the dominant heat transfer mode in conventional dryers. Thus, efficiency is increased by two effects, reduced condensate layer thickness and increased convection heat transfer.

Benefits and Advantages:

- Higher heat transfer rates – 20% to 50%: 20% greater than spoiler bar technology and 50 % relative to conventional dryer technology which means the paper mill using multiport dryer technology can chose from a number of options:

  - o Reduce the number of dryers,
  - o Increase production rate,
  - o Increase the weight of the paper, or
  - o Reduce energy cost, by increased plant energy efficiency through reduced steam pressure and 3.5% steam reduction, at current production rate.

- Existing dryers may be retrofitted for only 20% of the replacement costs for new installation equipment producing 80% capital savings;

- Greater efficiency and quality is produced by the revolutionary design which produces uniform temperature across the drum surface and convection instead of conduction heating higher which increases dryer efficiency and drying uniformity.

Other institutions involved in this project are the University of Illinois, Chicago, and Kadant Johnson in Three Rivers, Michigan. Funding was provided by DOE's Office of Energy Efficiency and Renewable Energy through its Industrial Technologies Program.

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