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Voith Paper Sao Paulo develops new process to production maturity

Atmos: fresh wind for tissue paper

For more than 30 years, premium tissue production depended on Through Air Drying (TAD) technology, but not any longer. Thanks to the Voith Atmos process, premium tissue can now be produced with much less energy and fiber outlay.

When at the end of November 2007 dozens of mother rolls of soft white tissue paper were loaded in Talagante tissue mill – belonging to Chile’s big-

gest papermaking concern Compañía Manufacturera de Papeles y Cartones (CMPC) – everyone was delighted. The new tissue machine had com-

pleted its last series of test runs successfully. Now the papermakers had the final proof that high grade premium products for the tissue market could be produced at lower cost, with considerably less consumption of energy resulting in lower cost and less environmental impact. The Atmos process developed by Voith Paper Sao Paulo research engineers lives up to its name – Greek for vapour – by breathing fresh air into the tissue production market. Furthermore, for the first time in almost 30 years, an innovative process has been matured to open up a new epoch in the production of soft lightweight tissue. Tissue papers have quite different characteristics to those of other grades. Paper towels have to be absorbent while at the same time strong enough not to tear when wet. Toilet paper must be soft, and paper handkerchiefs have to be even softer to

protect the sensitive facial skin. These requirements can only be met if the tissue has enough bulk but is still thin, airy and porous. With basis weights of only 10 to 40 g/m², tissue papers are the lightest grades of all. But manufacturing such soft and airy grades is certainly not easy.

Flat pressed sheets instead of airy tissue

Airiness and softness is destroyed above all by papermaking processes that press water out of the paper web. The originally voluminous and airy fiber mixture is compressed thereby – often at 30 bar or more – into a flat sheet of paper that is neither absorbent nor really soft. Although this kind of paper is creped as it comes off the Yankee cylinder to seem more voluminous, its characteristics are not changed at all. To improve tissue pa-

per quality, a process known as Through Air Drying (TAD) was developed about 30 years ago whereby hot dry air at more than 350 °C is blown through the tissue web and structured fabric on a large additional drum in the tissue machine. Since however hot air alone does not make the tissue soft enough, the paper is first sucked on to a structured fabric while still wet. This imparts it with 3-dimensional structure before being dried in hot air. Pressing is largely avoided thereby, so that the paper remains soft and airy. Above all the absorptive capacity of TAD tissue was much higher than ever achieved previously: paper towels made of this tissue were able to absorb fifteen times their own weight in water, twice as much as conventionally produced tissue.

Although TAD technology has been continuously improved since then, energy cost rises above all in recent times have made it too expensive. As a result, tissue mills using TAD machines are faced with shrinking profitability. For this and other reasons, Voith already decided some years ago not to manufacture TAD tissue machines. Instead, the Voith Paper São Paulo development engineers followed another path. Their goal was to produce high quality tissue with much less energy and fiber usage. Together with their Voith Paper Fabrics colleagues, they finally reached this goal with the Atmos process.



Atmos test runs successfully completed. Beaming faces surround the tissue machine in the Talagante mill in Chile.

Talagante paper mill belongs to Chile's biggest papermaking concern: Compañía Manufacturera de Papeles y Cartones (CMPC).



Vacuum instead of hot air

The key element of this system is a vacuum roll over which runs a specially developed fabric named AtmosMax supporting the tissue web. As in the TAD process, this fabric is structured to impart a 3-dimensional structure to the tissue web. But instead of hot air drying, the tissue web runs over the vacuum roll, which sucks out the water at about half atmospheric pressure. The structured fabric and the tissue web are also accompanied over the vacuum roll by two additional fabrics. Underneath runs a dewatering fabric named AtmosFlex that increases the dewatering effect of the vacuum, and on top is an open tensioning fabric named AtmosBelt that additionally presses water out of the web. To reduce the viscosity of the water, hot and humid air from the Yankee hood exhaust is blown over the fabrics, tissue web and vacuum roll. The structured fabric and gentle pressing prevent the paper from being squeezed and losing its bulky character.

Tissue made by the Atmos process

saves more than 20% fibers compared with tissue produced on conventional machines. Nevertheless, its absorption and strength are the same. And since the Atmos process does not need large quantities of extremely hot air, it consumes considerably less energy. Furthermore, capital investment costs are much lower than for TAD machines because no big components (burners, blowers and large piping) are required for providing hot air. TAD tissue machines can only achieve superior quality with exclusively virgin fiber furnish. Atmos tissue machines, however, can also achieve such high quality using mainly recovered paper furnish. As an example, CMPC Talagante uses more than 80% recovered paper furnish.

Conversion in less than eight hours

Atmos machines also have another advantage over TAD machines: the fabrics can be arranged so that they completely bypass the Atmos components. Then the same machine can be used for producing conventional

tissue. This flexibility is very valuable to CMPC, because so far the demand for particularly soft premium tissue in South America is not nearly as high as in North America or Europe. And it only takes less than eight hours to convert the machine.

Not only the Voith engineers are enthusiastic about this new development, but also our customers. In the opinion of Talagante mill manager Arturo Celedon, Atmos is such a revolutionary development in premium tissue production that TAD machines will no longer be a cost-effective option for papermakers in future.

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