

Dry Fiber Production from Waste Paper

As for which AEROCYCLE has developed a new process, "FRT-AeroMILL", a patent application has been submitted. This energy- and space-saving process ensures careful processing and production of fiber stock from waste paper while, at the same time, improving fiber quality. The fiber stock is for use in the manufacturing of different paper products. This outline presents a new process for fiber stock production, from the defibration of different qualities of waste paper to the manufacturing of a sample paper sheet.

The FRT-AeroMILL Process

Fig. 1 shows cardboard cores as input material in the test run. For internal identification the input material was tagged as follows: cardboard (D-1), core material (H4-1), corrugated cardboard (2 fiber qualities, K2-5 and K2-6).

Fig. 2 shows the input of cardboard (D-1) into the FRT-Aero-Mill. Fig. 3 shows the fiber stock output.

Each of the tagged waste paper qualities (cardboard, cores and corrugated cardboard) underwent the specific defibering process. The different output stock is displayed in direct comparison in Fig. 4.



Fig. 1: Trial run to evaluate the processing of different qualities of waste paper in the technical center



Fig. 2: Feeding cardboard (D-1) as input material



Fig. 3: Output - fiber stock made from cardboard (D-1)



Fig. 4: Output stock in direct comparison



Fig. 5: Fiber stock (D-1); left, after stirring it up; right, after the agitator

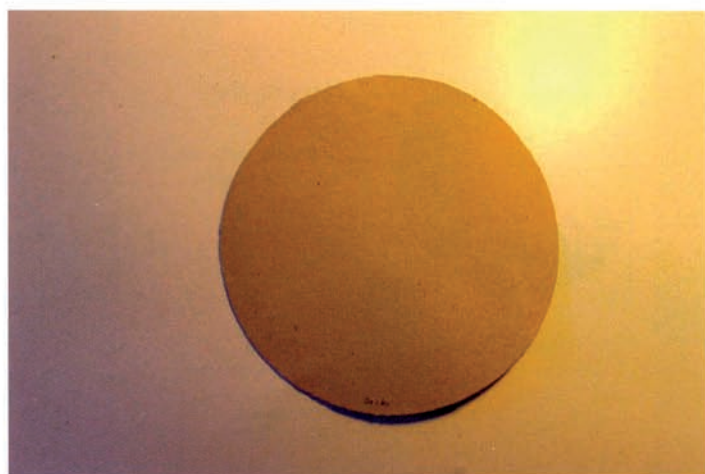


Fig. 6: Sample sheet made from fiber stock (D-1)

The obtained fiber stock was further analyzed. In the laboratory of the Newark Viersen GmbH, samples of paper sheet were manufactured from the fiber stock (D-1) and subsequent paper tests were conducted.

Fig. 5 shows the swelling of the test fiber stock (D-1). Fig. 6 shows the sample sheet from the test material (D-1).

Tab.1 displays the mechanical/physical properties of the sample sheets manufactured from the fiber stock (D-1).

Fiber material used	cardboard (D-1)
Swelling time of the stock	5 hours
Thickness	0.57–0.58 mm
Specific weight	320g/m ²
Roughness	3,000 ml/min
Air permeability	200/220 ml/min
Ash	13.3 %
Bursting pressure	280 kPa
Splitting strength (cohesion)	85 ft-lb/sq.in
Bending stiffness, downweb	51 Taber
Bending stiffness, crossweb	32 Taber
Break length	11.4 km

Tab. 1: Mechanical/physical properties

Summary and Advantages at a Glance

FRT-AeroMILL is a newly developed process for the refreshing of waste paper fibers, to ensure the best possible exposure of the fiber fibrils and to ensure good fiber swelling for the formation of new sheet. Fiber stock from waste paper that was dissolved as usual with a pulper reaches the end of its recycling chain after 6–7 processing cycles; with the FRT-AeroMILL process, the number of processing cycles, according to our research so far, may be at least doubled and even then, the end of the recycling chain is not yet reached.

Other waste paper fiber stock, not treated with the FRT-AeroMILL process, will – without de-inking process – not even closely reach the material purity that FRT-AeroMILL achieves in one step. This is due mainly to the incomplete exposure of the fiber fibrils and insufficient fiber swelling.

Advantages of the FRT-AeroMILL process, when compared with conventional technologies, can be specified for the following stages:

- Careful refining and fibrilization provide the best swelling properties at a high consistency
- The need for a pulper is eliminated – up to 16 times the stock throughput with the same energy input compared to pulper technology procedures
- A savings of at least 50 % in energy and space
- Energy-saving potential: at least € 60–100 per metric ton of waste paper treatment (energy and processing costs).

In the near future a report will appear in the WfP, on the first large-scale application of the FRT-AeroMILL technology at a European cardboard manufacturer.

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