

Alternative wires reduce rejects on recovered paper

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The Dutch paper industry has initiated a project to replace metal wires with plastic wires and paper ropes to reduce the 20,000 tons/year of landfill waste that results from the use of metal wires for baling recovered paper. Metal wires can become entangled in the ragger, can cause accidents due to their springiness, and because of their content often can't be reused or recycled. According to Jori Ringman, director of CEPI Recycling, replacement of metal wires would benefit the whole recovered paper chain and be a huge step toward a sustainable future.

In 2005, The Netherlands produced 3.4 million tons of paper and board using more than 2.4 million tons of re-

cycled paper. Total production of food contact packaging is 2 million tons per year which, according to European law, must be baled.

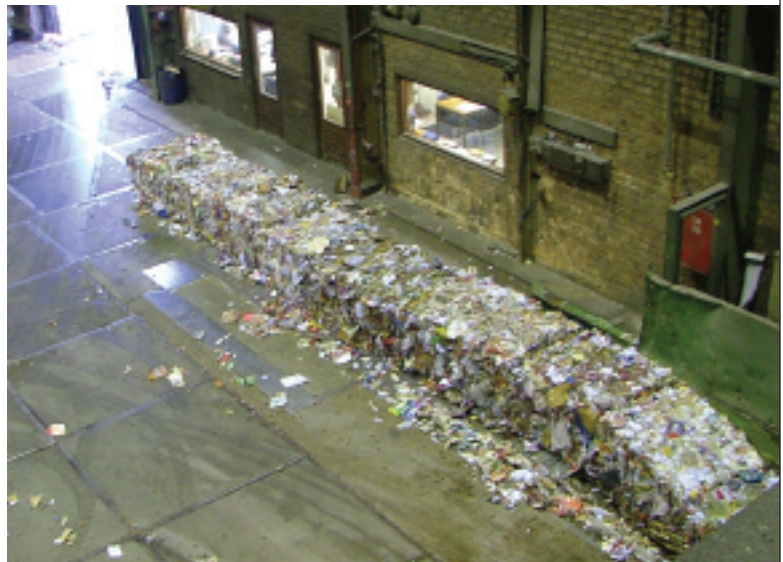
Within all European Union countries, the recycling rate of recovered paper in 2005 reached the level of 55.4%, which means more than 46 million tons of raw material was used. With the growing amount of material collected, the amount of low quality fraction is also growing. While there are several projects under way to reduce the impact of non-recyclable and non-paper fractions in recovered paper, certain legislations for food packaging still make it impossible to reduce some parts of non-paper fraction, such as metal wires.

After researching the supply chain and its specific demands for wires, about 30 types of alternative wires were examined for suitability—including jute,

paper and plastic ropes or wires. Unnatural, unrefined fibers were quickly rejected, since recovered paper mills can't separate those fibers from others. It soon became clear that paper and plastic had the best chance for success.

First, lab-scale testing took place at the Centre Technique de Papier in Grenoble, France. Later, full-scale industrial trials were conducted on the stock prep line of Smurfit Kappa Roermond Papier BV. Results showed that PET (polyethylene) wire was best for the normal (600+ kg) bales; PP (polypropylene) wire was best for medium-size bales; and paper wires were most suitable for the hand-pressed and small pressed bales.

PET also has the advantage of giving a lower cost of operation because of better productivity. During testing, PET wires could handle more compressed bales, and they didn't get stuck in the



Recovered paper baled with alternate wires.



Polypropylene ropes and clew after eight hours of trial.

knotter. Because of the higher strength of PET wires, the press can operate with fewer wires. The wires didn't break after the bale left the press, which suggests that there is less need for double wrapping, which happens occasionally with steel wires.

No empirical testing is available for PP ropes, although bales with PP rope were tested at Smurfit Kappa Roermond Papier. These bales were not very dense, which made stacking difficult. Considering the material properties of PP and PET, it is known that PP has a lower strength and higher

stretch. To get a good bale density, it is expected that for PP ropes, more wires per bale are necessary.

There is also an economic incentive to replace metal wires, due to the price of steel (Table 1). Costs for a typical paper mill were calculated assuming standard bales of 600 kg of 1 x 1.1 x 0.6m in dimension. Clearly visible is the advantage of using plastic instead of steel wires, mostly due to the lower density of the plastic wires. Additional savings can be realized when the wires are not landfilled but processed to secondary fuel (savings of 75 €/ton of reject in The Netherlands).

It was concluded that for the paper industry, PET wires and PP ropes were more suitable than wire because they are cheaper and lighter, did not break in the pulper or cause extra wear on the machinery, and left no trace in the stock prep system. In the case of PP ropes, some small 10-30 cm particles were found in the rejects from the sorting drum, but there was no trace of wires within the accepts fraction that is used for paper production.

The rejects from the pulper can be mixed with other materials and used for production of secondary fuels or can be easily processed, dried and shredded, since no extra separation is necessary because there are no metal wires to have to deal with.

Further plans for the project include full-scale trials on a drum pulper and with an automated deragger. 🙌

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Table 1.

Average costs of wires

Costs of wires for a paper mill (incl purchase)

Steel	0.40	€/ ton RP
PET	0.09	€/ ton RP
PP	0.08	€/ ton RP

Costs of rejects for a paper mill (from pure wires)

Steel	0.21	€/ ton RP
PET	0.05	€/ ton RP
PP	0.04	€/ ton RP

Corrected for plastic as secondary fuel

Steel	0.21	€/ ton RP
PET	0.01	€/ ton RP
PP	0.01	€/ ton RP