PAPER ROLL TAGGING

- More Efficient Paper Industry of The Future

Are you interested in:

- Reducing costs?
- Serving your customers better?
- Making your processes more efficient?
- Increasing visibility?

If yes, then RFID is your solution.

More Efficient Supply Chain with RFID

Radio Frequency Identification (RFID) solutions are rapidly replacing bar-code technology for identification of different products and assets. In the paper industry, RFID can yield benefits when paper rolls are tagged and automatically identified from the manufacturing phase to the entire supply chain life-cycle.

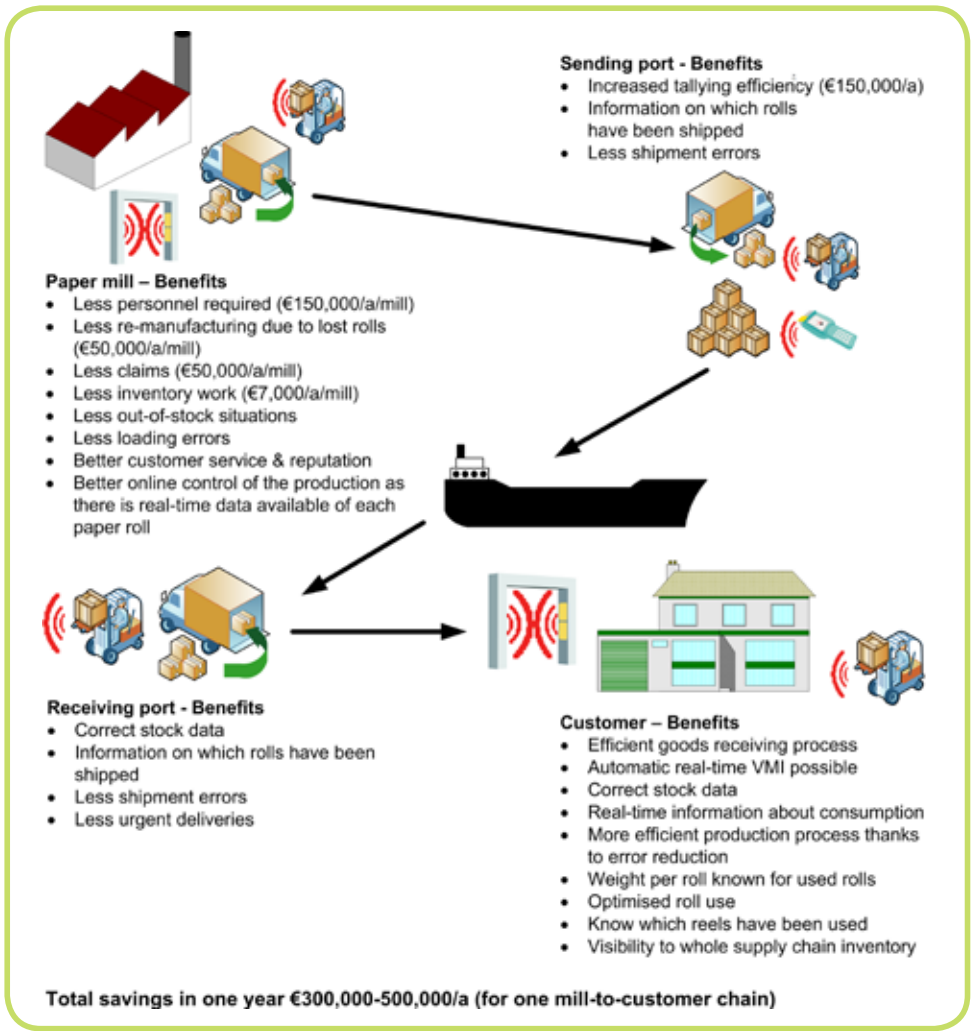
Paper finishing, previously a labour-intensive operation, is becoming increasingly automated. Today the finishing machine control systems already administer all operations and communicate with the mill's other information systems. Although a limited amount of operators are still needed to oversee the flow and functioning of the process, their jobs will decrease in the future as the degree of automation rises.

Paper roll quality assurance and monitoring from the winder to the end customer is common today. But it is still rare for mills or printing houses to fully exploit the potential of current technology to automate and increase the efficiency of this area. Roll identification and monitoring with RFID makes it possible to raise production efficiency and improve utilisation rates and quality for both the paper maker and the paper converter.

Until now the challenge of RFID has been reading tag ID by radio waves through paper. Thanks to the new RFID tags that can be read from a distance of 1-2 meters and from any direction, this is no longer the case.

Convincing benefits along the supply chain

RFID tagged paper rolls can be automatically identified at different stages of the supply chain. For example, in warehouses rolls can be tracked by the clamp truck or gate readers ensuring correct stock data, less out-of-stock situations and lower inventory need. When loading the paper rolls to transportation trucks the clamp truck reader can authenticate that the right roll, i.e. size and quality ordered, is loaded correctly thus reducing costly shipping errors.



Picture 1. Benefits of RFID in the paper industry enable quick ROI (estimated savings)

At the sending port, clamp truck readers can identify the paper rolls moving from truck to port stock and further to ship side. This enables correct stock data, less shipment errors and provides information on which rolls have been shipped. Stamping can be easily done with handheld RFID readers which reduce the need for manual labour in the process. At the receiving port, it is imperative to ensure that no loading errors can occur when shipping and loading to customer. This can be done with an RFID reader equipped clamp truck which reads information on each paper roll prior to loading.

RFID tagging in the paper industry was initiated for the benefits it brings to customers. Traditionally, the paper rolls were marked with a bar code on the surface of the roll, and when the wrapping was removed, it was impossible to identify different rolls. With RFID tags attached to the core, the information stays on the roll enabling customers to identify an already used paper roll in their warehouse and providing information for inventories and orders. This can result in considerable savings, up to 10-20%, at customer end (printing house).

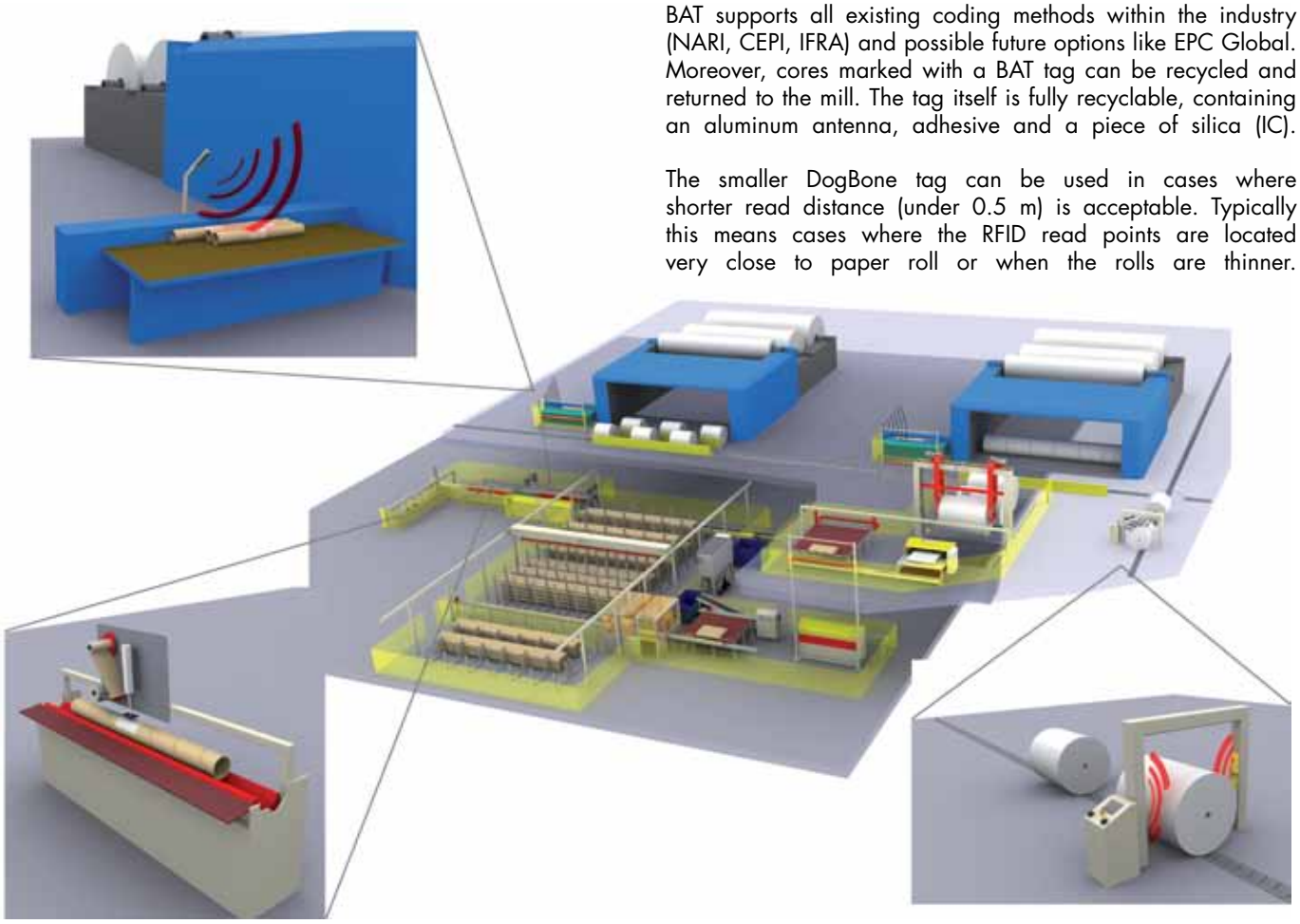
RFID process at the paper mill

During the core cutting stage, RFID tags are automatically attached to the core with an applicator in the cutter. At the same time, the tag is provided with a specific ID number to control the process via the mill system. The RFID tag contains a small microchip to which data can be encoded and later read.

At the roll packing stage, the RFID writer encodes data, usually roll number and weight, about the ready paper roll to the tag's chip. When tagged, the paper rolls can be directed to the right place on conveyor passages with the information supplied by the RFID readers that are installed along the conveyor. New information can be inserted or updated at any reading point giving highest flexibility to guide and control also time consuming disturbances.

Best tags for paper roll tagging

There are two principal passive UHF tag options available for paper roll tagging: the robust UPM Raflatac BAT tag for all paper roll sizes, and the UPM Raflatac DogBone tag for smaller roll sizes.



Picture 2. RFID process at the paper mill

Picture 3. UPM Raflatac Bat tags

BAT is a best performing tag suitable for all printing, package and tissue paper roll tracking applications. Tests show that the tag provides proven reading performance with all roll sizes. BAT is a result of joint development work of Tampere University of Technology* and UPM Raflatac. Development included extensive R&D work and real-life application testing at several paper mills, ports, DCs and printing houses.

The BAT tag's size (197 x 169 mm) and design together enable reading with stationary RFID readers from further distances compared to traditional passive tags. The optimised product design offers 360° reading around the roll and 1-2m reading distance suitable for clamp truck, gate and mobile reading. The BAT tag can handle harsh environmental conditions such as high humidity as well as extreme pressure and temperatures.

BAT supports all existing coding methods within the industry (NARI, CEPI, IFRA) and possible future options like EPC Global. Moreover, cores marked with a BAT tag can be recycled and returned to the mill. The tag itself is fully recyclable, containing an aluminum antenna, adhesive and a piece of silica (IC).

The smaller DogBone tag can be used in cases where shorter read distance (under 0.5 m) is acceptable. Typically this means cases where the RFID read points are located very close to paper roll or when the rolls are thinner.

RFID hardware makes it all happen

In addition to the RFID tag, different types of hardware and suitable software are required to enable automatic identification. The tag contains the data, but additional equipment is needed to encode and read it.

An RFID applicator is the first device needed in the core cutting phase to be able to attach the tags. It is mounted above the conveyor from where it encodes the core number to the tag and automatically applies the tag on core. The applicator is controlled by a core handling PLC that determines when to apply the tag and what data to submit.

Read points can be situated at different stages of the process and supply chain. A read point typically consists of 1 - 8 antennas, a reader device and suitable software for the application. Readers can identify the rolls by reading the data from the tag. Readers can also be used to encode more data to the tag, for example after the winding phase when information about the ready paper roll is transmitted to the tag.

Picture 4. Paper rolls are identified on the conveyor after winding phase

Moreover, readers can be mounted in clamp trucks making tracking in warehouse and loading and shipping stages easy and efficient. The clamp truck reader is rugged in design so that it can handle even the most demanding environments.

Handheld RFID readers are used as backup devices to check roll numbers, recode chips with new numbers or check tag functionalities. Handheld readers can also be utilised at the sending port during the tallying stage to reduce the need for manual labour.

*Source material: TUT Publication 876 /Nummela Jussi"Studies towards Utilizing Passive UHF RFID Technology in Paper Roll Supply Chains

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