

# Technology Brief

## RFID Solutions For a New Economy

Realizing that manufacturers across the industry spectrum struggle to find ROI in RFID, especially in a time of economic decline, a packaging manufacturer and an RFID integrator set out to make the technology more affordable and reliable. This joint development effort resulted in the HIDE-Pack™ concept, a truly innovative approach to integrated RFID-enabled packaging.

### OUR MISSION

HIDE-Pack's primary focus is to provide universal RFID implementation solutions for packaging manufacturers who wish to generate new business and better retain existing customers by expanding their product portfolio with RFID-enabled cases.



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## An Innovative and Sustainable Approach to RFID-Enabled Packaging

### RFID MADE SIMPLE FOR CONSUMER PACKAGED GOODS MANUFACTURERS

For consumer packaged goods (CPG) and other manufacturers struggling to find ROI in RFID projects, finding a reliable and cost-effective method of implementing RFID technology in a wide variety of packaged goods is essential. In comes the HIDE-Pack™ concept, a truly innovative approach to integrated RFID-enabled packaging. HIDE-Pack is a patent-pending technology developed by HIDE-Pack, a division of Krupack Packaging, a large producer of corrugated cartons from recycled fibres.

HIDE-Pack is an innovative and sustainable approach to RFID-enabled packaging. It consists in embedding an RFID inlay within the structure of a package, so that the inlay is not visible from the inside or the outside of the package. Effectively, the RFID inlay becomes an integral part of the packaging medium. The HIDE-Pack process results in significant capital and labor savings for all users of packaging, from consumer goods to perishable commodities.

By purchasing packaging with HIDE-Pack embedded RFID tags, a CPG manufacturer

can lower its investment in capital costs, RFID consumables, equipment maintenance and repair, as well as the often substantial extra labor cost required to implement RFID in manufacturing operations.

This is illustrated in Figure 1, which schematically compares the RFID implementation approaches associated with a conventional "slap and ship" solution and the HIDE-Pack concept.

Using HIDE-Pack can benefit CPG manufacturers with their RFID programs on several levels. HIDE-Pack helps reduce up-front implementation costs in several areas, by notably reducing or eliminating the need for RFID printers and applicators. This saves capital costs for the RFID equipment, and there is a considerably smaller footprint with the RF interrogators in a HIDE-Pack environment when compared to print/verify or print/apply/verify implementations.



## Sustainability the HIDE-Pack Way

### FIBRE CONTENT REDUCTION

Because HIDE-Pack integrates the RFID inlay to the structure of the package, it represents the simplest form RFID can take. This is in opposition to RFID smart labels, which require paper and energy during the converting process.

For a large US retailer alone, replacing smart labels with HIDE-Pack-enabled intelligent boxes would help reduce greenhouse gas emissions by 10,000 tons every year! HIDE-Pack clearly is the RFID-enabling technology which will leave the smallest environmental footprint.

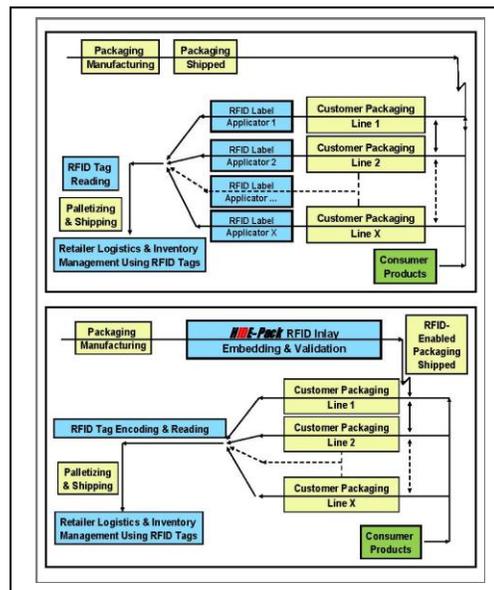
### RECYCLABILITY

The biggest concern about the recyclability of RFID inlays is their ability to be removed from a stream of repulped containers. Through extensive testing in recycled pulp and paper mills, HIDE-Pack has shown its intelligent boxes with on-board RFID inlays to be 100% repulable, and to have no impact on the ensuing pulp quality.

Conventional contaminant removal equipment used in recycled paper mills – screens and hydrocyclones for instance –are effective at removing all RFID inlay components from a given pulp stream.



What HIDE-Pack users think of the technology  
“It’s simple, cost-effective and reliable. Simply one of the greatest innovations to take place in the corrugated industry over the past decade.”



**Figure 1: Comparison between a Traditional RFID Implementation Approach and the HIDE-Pack Solution**

Moreover, HIDE-Pack drastically reduces the total cost of application of RFID. Consumables in the form of traditional RFID-enabled labels are avoided, and substantial savings are achieved by avoiding operational costs of printer-based systems. These cost areas include spare parts inventory, maintenance and repair labor and increased line stoppages for equipment failures and label maintenance.

From a sustainability standpoint, HIDE-Pack clearly generates benefits. By eliminating the

need for labels, not only is HIDE-Pack more cost-effective both for consumables – an inlay is after all RFID in its simplest form – and capital equipment, but it also reduces the fibre content on the packaging medium.

HIDE-Pack-enabled corrugated cases have also been shown to be repulable and recyclable. A trial performed in a 100% recycled linerboard mill, whose products are approved by Health Canada, showed that conventional contaminant removal equipment is effective at isolating the stream of inlay components from the recycled fibre.

### BENEFITS FOR PACKAGING MANUFACTURERS

From the box plant point of view, trials have shown that the integration of the HIDE-Pack technology to a box-making line does not affect its productivity or product quality.

The HIDE-Pack system was designed to be non-invasive to current package manufacturing processes. Trials run over a range of speeds of 6,000-18,000 units/hour showed no effect on productivity. On-line rejection of unreadable inlays prior to their application limits rejects at the post-application verification station to less than 0.1%, and ensures 100% functional intelligent box shipments to the end users.



The HIDE-Pack process has also been proven to have no effect on the product quality and integrity. In trials of the HIDE-Pack system using numerous inlay sizes, no loss of top-to-bottom compression strength in packaging structures was observed statistically, as indicated in Figure 2.



**Figure 3: HIDE-Compliant RFID-Enabled Corrugated Cases Being Produced on a Flexo-Folder-Gluer at 900 fpm**

Further advantages provided by the HIDE-Pack concept include robustness to various conditions typically known to degrade the performance of identification technologies, and more specifically RFID infrastructures, namely:

- Exposure to moisture
- Electrostatic discharges
- Physical damage incurred during case filling, transit, and handling with automated equipment.

Results from trials held in an independent, US-based RFID testing facility showed that the performance of HIDE-Pack-enabled corrugated cases did not degrade between their shipping from the box plant to their reception in a distribution centre. A sample

## EYE ON IT Current RFID Implementation Approaches

Today, companies implementing RFID across their supply chain typically use one of two approaches:

- (1) Slap-and-Ship

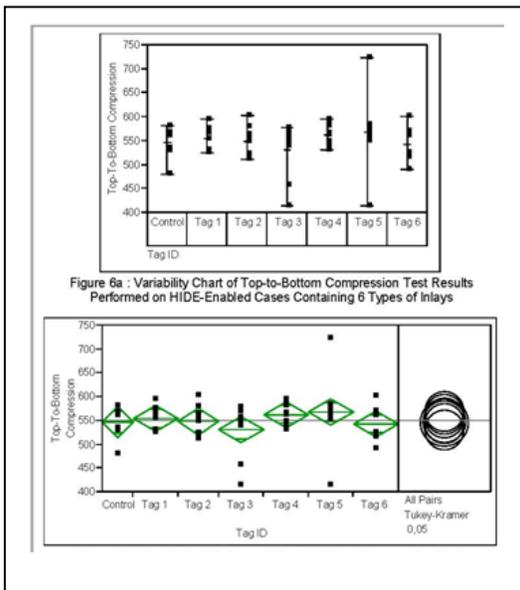
This approach implies manually applying RFID smart labels to the surface of cases. It is labor-intensive and incurs high consumables costs.

- (2) Print-and-Apply

A slightly more automated version of slap-and-ship, this approach replaces manual labor with RFID smart label printer-applicators, which are installed on packing lines. It is thus more capital intensive, and incurs the same high consumables costs as slap-and-ship.

## WHY HIDE-PACK MAKES SENSE

HIDE-Pack eliminates both the need for additional labor and equipment to RFID-enable packing operations. With packaging that has on-board RFID technology, RFID implementation has never been so easy and affordable.



**Figure 2: Variability Charts of Top-to-Bottom Compression Tests Results Performed on HIDE-Enabled Cases**

The HIDE-Pack technology fits easily to a wide variety of package-making equipment, ranging from corrugated cases to folding carton. Figure 3 shows a flexo-folder-gluer producing HIDE-compliant corrugated cases.

## An Innovative and Sustainable Approach to RFID-Enabled Packaging

For more information on the HIDE-Pack technology, our RFID inlay portfolio, our integration and training capabilities or to book a visit to our demonstration centre, please contact us at:

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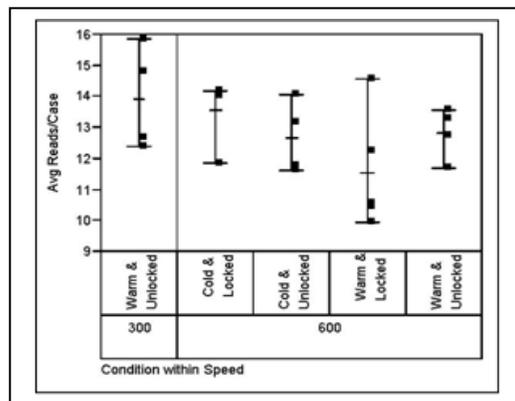
within this box shipment was intentionally subjected to extreme and adverse environmental factors to prove the concept's robustness. Boxes submerged in water for 24 hours and subsequently frozen displayed 100% readability while in a state beyond use in the supply chain. This gave another clear indication of the added value of HIDE-Pack.

### THE SCIENCE BEHIND HIDE-PACK

The core of the HIDE-Pack concept is the embedding of the RFID inlay within the structure of the packaging medium. The use of the packaging structure and of its constituents as a means of protection for the inlay is what makes HIDE-Pack so unique among today's RFID global product offering.

By positioning the inlay within the manufacturer's joint, two layers of the packaging medium plus the packaging adhesive encapsulate the inlay.

Further investigation and testing determined that the adhesive had no effect on the read rates of the embedded inlays. Tests have shown that HIDE-enabled cases display read rates as high as those associated with cases having inlays on the external surface. These results are illustrated in Figure 4.



**Figure 4: Read Rates Obtained with HIDE-Enabled and Control Cases at 2 Conveyor Speeds**

### CONCLUSION

HIDE-Pack offers a complete range of services and products to help organizations implement RFID in an affordable and sustainable way. With our unique knowledge of the packaging industry and of the challenges it faces with RFID integration, we provide our customers with a unique product tailored to their needs, as well as with advice on packaging design, adhesive selection, RFID inlay selection and inlay placement. The development of the patent-pending HIDE-Pack process has proven that:

- RFID inlays can be embedded within the structure of a packaging medium during its manufacturing without negatively affecting the productivity of the line.
- The integrity of a packaging medium, as measured by its top-to-bottom compression strength, remains unchanged, whether an RFID inlay is present within its structure or not.
- Inlays embedded within the joint of a corrugated case can be encoded, locked and read successfully and reliably over a wide range of line speeds.
- The layer(s) of packaging adhesive(s) encapsulating the HIDE-compliant inlay is successful at preserving its performance under environmental conditions that would otherwise have been detrimental to it, such as condensation from cold storage and immersion in water.
- HIDE-compliant packaging media are sustainable in that they contain less fibre and are 100% repulpable.
- HIDE-Pack is the most cost-effective way to RFID-enable the CPG supply chain.