



WHITE PAPER

PRODUCT SECURITY TECHNOLOGIES

THE ROLE OF BRAND PROTECTION IN
PACKAGING AND LABELS



Introduction

Whether you're the seller or the buyer, chances are you have encountered counterfeit products. In fact, it's commonly reported that over 80 percent of all global consumers have unknowingly bought a falsified product at some point.

There is an ever-growing epidemic of product counterfeiting in a multitude of industries. This poses a very serious problem in areas such as food and beverage, medicines, health and beauty, apparel and a host of other consumer products. The effects of this product compromise extend to financial losses to brand owners, and more importantly, add risks to consumer health and safety. These falsified products are often produced without regard to the correct ingredients, quality control, and government oversight in place to help ensure consumer safety and confidence.

Some brand owners built dedicated infrastructure and resources to combat product fraud decades ago. Many of those early adopters have seen a vast improvement in the detection and reduction of counterfeit goods in their supply chain. Indus-

tries where goods are critical to human health have been most active in the struggle, while other industries have been slower to move to brand protection solutions. Many are still plagued with the counterfeit problem as distribution continues to go global and visibility of the supply chain becomes blurred. Implementing anti-counterfeiting solutions to detect and deter product fraud is easier than once perceived. To disrupt such criminal activity, the following steps are necessary:

1. Understand the size of the problem
2. Understand the risks associated with high-value branded products
3. Understand the implications to the organization
4. Understand brand protection technologies and their role against illicit trade

In some of the more impacted markets, such as the pharmaceutical industry, counterfeiting is estimated at over \$200 billion per year according to the World Health Organization. In fact, estimates are that over 30 percent of all drugs sold in developing countries are fakes, putting millions of lives

\$1.0-\$1.7 Trillion USD	Total latest estimated value of global trade in fake goods ¹
15%	FY 2017 seizures in apparel/accessories, the largest category seized within all merchandise ²
\$323 Billion USD	Amount of estimated losses due to global online counterfeiting in 2017 ³
\$30.3 Billion USD	Total losses by luxury brands due to online counterfeiting ⁴
\$2.3 Trillion USD	INTA and ICC report indicates counterfeiting could reach by 2022 ⁵
70%-80%	Estimate of percent of counterfeiting products seized originating in China ⁶
\$153.9 Billion USD	Value of the secure packaging market by 2020 ⁷
34,143	U.S. Customs and Border Protection seized worth \$1.2 billion USD ⁸
Over 5.0 Million	Estimate of global jobs lost due to counterfeit goods by 2022 ⁹



at risk daily. However, whether you sell medical devices, cosmetics, tennis shoes, fashion watches or baby formula, there are nefarious parties aiming to profit from faking the valuable brand goods and designs you have legitimately built over the years. For instance, not only can counterfeit drugs lead to dangerous health side effects and even death, but publicly known product compromise can also quickly erode consumer confidence and the value of the brand and business overnight.

For the affected brand owners who are late to deploy counterfeit protection in their supply chains, it is likely that soon the costs of addressing a counterfeiting incident will rise and create chaos, financial harm, and devastating consequences for many stakeholders in the organization. Often brand owners are caught unaware and don't have processes and protocols in place to deal with these issues that weaken and disrupt their business. Moreover, the different departments and stakeholders within an

organization will typically not be well-coordinated to combat the counterfeiters due to the lack of detectability to find and measure the extent of the problem. In the end, the event becomes a recovery process that could take months or even years to fully address.

There is good news, however; your company, or your client (if you are a printer or packaging converter) can start the process of planning and implementing product security solutions right away. With the advances of today's authentication technologies, there are a host of experienced brand protection solution providers with global reach and resources targeting the first line of defense – packages and labels. Many of these companies offer a myriad of solutions that are quickly deployable. Learn how future incidents can be dealt with faster, your customers will be safer, and the financial impact of an adverse product event can be far more controllable and mitigated.

The Role of Brand Protection in Security Packaging and Labeling

In terms of brand protection security applications -- overt, covert, semi-covert or forensic-- each represents a different level of security. This is due to the level of difficulty to identify and duplicate the feature, and the complexity of specific detection devices used in authentication. An overt application can be identified by sight. A covert feature uses micro or nano-tagants and can be detected by using a specialized reader or collection method. Semi-covert is a visible or semi-visible marking which can be seen by the naked eye upon manipulation or specialized inspection, but otherwise

may go unnoticed until the feature is revealed. An example would include a color-shifting ink, as found on many banknotes today. A forensic feature is only detectable with laboratory equipment.

The most utilized type of brand security application is the on-package or on-label approach. Covert solutions contain some form of taggant in a security ink that is only detectable through a proprietary hand-held reader. Products utilizing taggants are often supplied with this feature in the form of standard press-ready inks (including over-print varnish-





es and coatings) suitable for direct application or as concentrates suitable for blending into plastic for injection molding, extrusion followed by thermoforming or blown molding. Additionally, packaging or labels can be printed with these security inks or coatings without having to materially adjust or modify any existing printing equipment or existing processes.

Proprietary readers are specifically tuned to look for unique optical or other physical elements of a taggant. These detection devices can be tuned to detect multiple special characteristics before internal algorithms make a “yes/no” determination.

The most sophisticated optical taggants are usually from infrared (IR) based fluorescent materials/ molecules and are detectable by handheld readers. Fluorescence is the emission of light by matter after

it is hit or irradiated with light of a different wavelength. In most cases, the emitted light (such as a laser) is a longer wavelength than the source light (this is called “down-converting” fluorescence). Fluorescent inks used for security purposes “glow” in the IR ranges and are not visible to the naked eye. This effect is totally reversible and ends once the excitation light source is turned off.

IR fluorescent taggants are the most widely used of the taggant types due to their high level of security. Standard Type A UV taggants (seen with black light sources) are now generally regarded as lower-level security, and single-color applied UV marks can be readily located. Such inks are easily sourced on the open market. However, utilizing highly complex UV marks in multiple colors can be an alternative approach to making UV technology much more secure.

Taggants are encoded chemical materials that can be added into inks, coating, films, plastics or other package elements. Similar to a fingerprint, this covert feature is virtually impossible to duplicate.

Two types of taggants

1. Optically readable - can be read by a proprietary device
2. Forensic - requires laboratory analysis



Continuous Inkjet Covert Ink



Today's Product Security Technologies - What You Should Know

Traditionally, anti-counterfeiting security solutions can be categorized into five different platforms:

1. Overt security - features you can see without devices

- Holograms
- Color-shifting inks
- Simple codes
- Watermarks (in paper)

2. Covert security - features you can see only with proprietary devices

- Advanced infrared (IR) taggants
- Ultraviolet (UV) inks
- Complex codes
- Laser-activating inks
- Hidden image technology
- Invisible taggants embedded in substrates

3. Semi-covert - features you might not notice until they are pointed out

- Pantographs
- Micro text
- Metameric inks
- Scrambled indicia
- Special-effect inks
- Coin-reactive inks
- Thermochromic inks

4. Forensic - features only detectable with laboratory equipment

- Molecular taggants
- DNA-type inks for forensic examination
- Nanoparticle coatings
- Spectrographic signature analysis

5. Digital - a host of solutions, which can include the above, relating to numeric values or digital symbology that enable users to look up related product

authentication data either via the internet or through a proprietary localized database.

As decades of experience in the areas of security documents, currency, and product anti-counterfeiting efforts have shown, there is no single “silver bullet” technology that can be applied across the board for all products. Usually a multilayered approach (as used in currency) is the most effective long-term. Of the five categories of anti-counterfeiting solutions listed, the prevalent technology implemented and most often recommended is “on-package” or “on-label” solutions consisting of specialized inks or substrate markers.

Conversely, direct product chemical or physical testing is the least routinely utilized method but is often the last step to forensically determine authenticity if no other method is deployed. It is important to keep all five categories in mind when selecting an anti-counterfeiting solution. Your decision should be based on the understanding of the overall risks and objectives of said product such as appropriate applications, solution cost and overall public safety factor. In some cases, a simple color-shifting ink and hidden IR code might be best for one product line, while a tamper-evident seal with an invisible IR ink might be better for another. In many cases, the decision might rest on the packaging type and access to distribution or retail settings for inspection.

Advanced digital printing and manufacturing technology, now available to everyone, drives the ease of entry for counterfeiters into any given market. With the right expertise; this same advancing technology can also provide countermeasures to combat problems.

Let's explore some of the leading anti-counterfeiting solutions available in the global market today.



Security Features that Protect Your Products

DIGITAL SOLUTIONS

These technologies encompass applying a unique code, number, symbol, etc. and recording those codes or numbers in a database. During production, it is also possible to record variable product information regarding unique attributes such as manufacturing date/time, expiration dates, lot numbers, pictures, and a host of other origin information. Later, as the product travels through the supply chain, the unique number or symbol can be collected in the database. This information is available to the user via the internet or a localized database.

In a track and trace system, the information flow can be bi-directional, meaning that the collection of the symbology and the unique call to the database can be recorded and appended to the product record. Information is captured along the product's supply chain journey to show authentication collection including the location, time, date, and user information about the inspections occurring in the field.

There is a range of complexities to these digital systems. Some can be a simple yes/no result on authentication. Others can show the complete variable information including detailed accounting of product movement in the supply chain all the way to retail purchase and ultimate deactivation of the product's unique ID number.

Unless the number or symbol can't be copied and reproduced, it is possible to simply copy the package bar code or number, thereby enabling the counterfeit product to be authenticated as genuine. This is especially true if the 'read rates' of product information are only a fraction of the products actually produced. Unless 100 percent of the products are continually scanned and accounted for, it is possible for copied labels or packaging to enter the system and be validated. To prevent this, it is necessary to have covert or inimitable numbers or symbols that

specialty-programmed collection devices or applications can identify as unique.

Another digital tool available is Radio Frequency Identification (RFID), which is usually a small antenna and receiver system where a unique product-level ID is hidden or embedded in a small chip or printed label. In some cases, the chip residing on the product can have its own power source (active) or can be energized through the collection device (passive). The ability of these "electronic labels" to communicate with a centralized database system has all the features of and per-

Three print and packaging security level features that can determine product authenticity:

Primary (Overt) - Visual, tactile anti-counterfeiting security feature that can be quickly checked by the consumer, investigator, retail personnel and law enforcement.

Secondary (Covert) - Hidden anti-counterfeiting feature that can be checked/examined using a reader device (proprietary, UV lamps, laser penlights, etc.).

Tertiary (Forensic) - High-end complex anti-counterfeiting feature that requires lab analysis to determine its authenticity and provides great value in litigation situations.



forms very similarly to bar codes and other track and trace systems as described earlier. However, RFID can be expensive on a per-product basis and has limitations on many applications, including potential interference of the signal via ambient conditions.

It should be noted that track and trace systems are not able to counter materials that move covertly or surreptitiously around legitimate supply chains, such as when counterfeit samples are distributed through e-commerce.

FORENSIC FEATURES FOR DIRECT PRODUCT TESTING

Forensic analysis is direct product testing that is conducted in a laboratory environment. This process determines the product's authenticity by analyzing unique elements of physical product construction or ingredients. Brand owners have been using this anti-counterfeiting solution as a key approach in generating needed evidence for legal proceedings.

This method of authentication provides hard evidence that a product is fake or genuine, but doesn't have the capability of tracing the product back to its origin. This can be done by adding a unique hidden tracing element to the product. Using a unique and non-reproducible marker or identifier on the product is far more powerful when chemical and physical analysis methods are used. This type of analysis can take more time and money, and may require the destruction of the product in the process.

ON-PACKAGE OR ON-LABEL PRODUCT SECURITY

The most widely used product security technology is the use of security inks and other marking systems on packaging and labels. This can be implemented through covert features, overt fea-



Overt Holographic Feature



Covert Machine-Readable Marker



tures or a combination of both. Overt and covert security features can be supplied as inks, coatings and taggants. They can be applied to almost any substrate, including plastics, glass, labels, foils, masterbatch, etc. These features are compatible with most printing methods, including digital and conventional printing. Covert solutions offer a high level of security and are often viewed as a second line of defense. Overt features, on the other hand, are clearly visible to the naked eye and do not require a special reader, and are therefore seen as significantly less secure.

Benefits of an On-Package Approach

1. Lower cost
2. Seamless integration into existing processes
3. Instant yes/no determinations for in-field investigators
4. Ease of implementation
5. Features are easily scalable and layered

The Right Security Technology for Your Packaging and Labels

More companies are utilizing in-house experts to handle brand protection, IP and anti-counterfeiting issues. These designated personnel and departments evaluate the issues and level of risk exposure associated with their high-value branded products. After determining the level of risk, they can select the appropriate anti-counterfeiting technology to deploy. The following questions can determine the risk level of high-value products:

- Is this a life-saving product?
- Is this product considered high value?
- Is this product's supply chain complex?
- Is this product likely to be counterfeited?

Brand protection technologies can be applied directly to paper labels, on packaging and increasingly into plastic parts (e.g., bottle caps, etc.). Costs are low on a per-item basis ranging from a few pennies and down to a fraction of a penny depending on unit volume. High-end security solutions are often sold based on a unit level or, as referred to in the printing industry, on a "per-click" basis.

As the rate and extent of the problem of global counterfeiting grows, it is increasingly important for manufacturers to take steps to protect their products by taking measures to prevent and deter counterfeiting. This paper is a commitment to understanding the options and technologies available.

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About Authentix

As the authority in authentication solutions, Authentix helps customers thrive in supply and distribution chain complexity. We provide advanced authentication solutions for governments, central banks and commercial companies, ensuring local economies grow, banknote security remains intact and commercial products have robust market opportunities. Our partnership approach and proven sector expertise inspire proactive innovation, helping customers mitigate risks to promote revenue growth and gain competitive advantage.



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