

Anti-counterfeiting Technologies for Packaging

Adding Taggants, Hidden Image Technology, Numeric Codes, and Color-Changing Pigments Provides Valuable Protection against Counterfeiting



Introduction

Counterfeiting has become a worldwide epidemic, and the dangers it poses are vast.

Counterfeiting threatens public health through the production of inferior medicines, foods, and beverages, causes taxes to increase by sidestepping official channels, increases public spending by boosting law enforcement to counter the illicit trade, and raises the price of legitimate products as companies seek to recoup their losses.

The problem of counterfeit products cuts across industries and can be found in a wide range of diverse product types. Some of the key industries most vulnerable to counterfeiting include automotive parts, alcohol, computer hardware, mobile phones, packaged foods, personal goods, pharmaceuticals, and tobacco products.

Counterfeiting even affects simple things like sunglasses, shoes, tools, safety goggles, electrical plugs, and tea bags. Pirated and counterfeit goods are increasingly being sold online, where the use of legitimate websites to deliver infringing goods has made it that much harder for law enforcement officials to detect.

How big of a problem is counterfeiting?

According to the World Health Organization, the global trade in counterfeit pharmaceutical drugs is estimated to be worth over \$32 billion. *USA Today* reported in February 2012 that in developing countries, approximately 30 percent of medications sold are fake. Not only can counterfeit drugs lead to dangerous health side effects, including death, they erode consumer confidence in a brand.

U.K.'s *The Telegraph* reported in November 2013 that wine industry experts estimate that up to 20 percent of all wine bottles sold worldwide are counterfeits. *The Irish Times* reported that 929 liters of counterfeit alcohol were seized by authorities in Ireland in 2013. That was an increase from 232 fake alcohol bottles confiscated a year earlier. *RIA Novosti* reported one man was arrested for smuggling 800 bottles of counterfeit vodka into

working for you.

Russia in 2013. The deaths caused by counterfeit alcohol were 12,000 in Russia alone in 2010. Sixty thousand bottles and labels of fake champagne were seized in Italy in February 2014.

Channel NewsAsia reported in February 2014 that over 1,200 tons of counterfeit and substandard foods and nearly 430,000 liters of counterfeit beverages were seized across 33 countries. These included everything from oil, vinegar, biscuits, and chocolate bars to fake spices, condiments and substandard dairy products. In fact, \$17.2 million worth of counterfeit foods and drinks were seized in Colombia.

Counterfeit cigarettes have also been regularly seized. In Ireland, 37.7 million fake cigarettes were seized in 2013. They pose even higher risks than legitimate cigarettes, as they contain much higher levels of nicotine and other dangerous chemicals, such as arsenic, benzene, cadmium, and formaldehyde.

Exact numbers are hard to quantify, but based on these various reports, it is clear that the counterfeiting problem is vast and growing.

There are no “silver bullets” for dealing with counterfeiting, but there are strategies, options and techniques commonly used across industries to address brand protection issues.

Sun Chemical is a global ink manufacturer with an integrated brand protection business. Its expertise in packaging, printing, and security, and its diverse brand protection product portfolio and presence around the world make it a good fit to help resolve counterfeiting issues on packaging for any multinational brand.

Protecting ROI: Fighting Back against Counterfeiters

With profits, corporate liability, and brand reputations at stake, more and more companies are fighting back to protect themselves. For example, in the past six years, more than 25 pharmaceutical companies have reportedly become members of the Pharmaceutical Security Institute (PSI), an organization made up of corporate security officers, law enforcement and customs officials who work to stop this illicit activity.

Increasingly, brands have expanded their budgets for confronting both counterfeiting and diversion issues. In addition, companies are being more proactive in applying anti-counterfeiting technologies to their products, particularly to their packaging.

As decades of experience in the area of security documents and currency have shown, it is an established maxim that no single technology works best for all products and situations, and multiple approaches and technologies are needed—that is, a layered approach is what works best.

An excellent example of a layered approach can be found in a person’s wallet in the form of paper currency, which is basically the visible outer wrapper (or packaging) for the intangible monetary value represented by the denomination of the currency

note in question. Very often a currency note will have from six to 10 overt security features with many more hidden or covert features.

This many security features is arguably extreme. Each brand protection situation needs to be assessed individually and on its own merits. And the number and type of product anti-counterfeiting technologies deployed should be based on the given situation and the goals of the brand owner.

Anti-counterfeiting Technologies

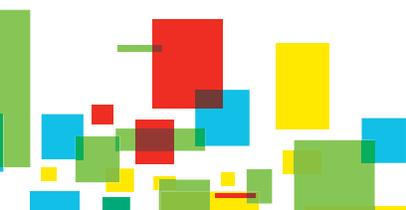
In terms of a layered approach, security solutions can be categorized into three basic types:

- on-package–based solutions
- serialization (or track and trace)—including bar coding and RFID
- direct product testing

Of these options, the most prevalent technology implemented and recommended is on-package–based solutions. Direct product testing is the least used anti-counterfeiting method.

Serialization refers to the process of identifying and tracking at the unit level using a number specific to each unit. The number may be printed as an alphanumeric code or a data matrix.

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Track and trace is another method that processes data, often in real time, as an item moves through the supply chain. It requires expensive readers, scanners, databases, and personnel. Tracing is frequently used to find an item in case a recall is needed or to identify a product's history in the event of a counterfeiting incident.

Direct product testing refers to the use of laboratory or field analytical techniques to determine product authenticity by chemical and/or physical analysis methods. Common analysis methods can include, but are certainly not limited to, near-infrared (NIR), Raman spectroscopy, colorimetry tests, UV-visible spectroscopy, and various chromatography methods.

The most cost-effective and effective security solution is an on-package approach. There are many benefits in using an on-package security approach, including ease of implementation, the ability to be integrated into existing processes, a rapid yes/no determination for in-field users or customs officials, and its low cost.



Figure 1 Sun Chemical's V400 reader and Verigard™ security system offer a lock-and-key approach to securing and authenticating brand packaging and documents of value.

For an on-package-based solution, the suboptions can include a combination of overt and covert technologies. Sun Chemical has a range of both overt and covert security features that can be supplied as printing inks or be incorporated covertly into the packaging. Covert solutions offer increased security compared to overt solutions and are viewed as the second line of defense.

Overt features are clearly visible and do not require detection. They can include holograms, inks that change color with view angle, metachromic inks that change color based on the light source, and thermochromic inks that change color based on temperature.

First-level covert solutions include fluorescent inks, which are invisible in daylight but exhibit distinct fluorescent shades on exposure to UV light. Colored fluorescent inks are visible in normal light but have a strong fluorescence under UV light.

High-level covert solutions will contain some form of taggant that is only visible or detectable through more sophisticated hand-held readers, which range from laser pens to dedicated readers with controlled distribution. Through the incorporation of these forensic markers, suspicious packaging can receive laboratory analysis, which not only plays a very important role in identifying a fake, but can also serve as evidence in courtroom situations.

In addition to its Verigard System, Sun Chemical can also provide Hidden Image Technology. Sun Chemical has entered into a partnership with Document Security Systems, Inc. (DSS) to cross market and sell one another's anti-counterfeiting products.

The strategic partnership allows Sun Chemical to market and sell DSS' suite of anti-counterfeiting technologies that include smartphone authentication, hidden images and copy protection.

DSS will also market and sell Sun Chemical's wide range of anti-counterfeiting solutions, including multiple covert taggant-reader systems, special effect inks and smart sensor technology.

DSS' brand protection solutions include a portfolio of products which help businesses and governments protect against fraud and counterfeiting. The company's innovative anti-counterfeiting solution, AuthentiGuard™, enables consumers or supply chain personnel to validate product authenticity with a smartphone.

Highly flexible brand protection security solutions are made possible through technologies that are incorporated into the ink. Packaging printers are able to use these inks without having to adjust or replace any press equipment or process lines, as the products are supplied as standard inks suitable for all single-trip applications, which makes security a realistic option for all brand owners.

Sun Chemical's security products and the technology they provide have been used in passports, tax stamps, postal stamps, and product labels, and embedded into plastic parts and many other product areas. Sun Chemical products have also been successfully protecting pharmaceuticals for a number of years.

Evaluating At-Risk Products and Taking Action

Increasingly, companies are employing in-house experts or teams of experts to handle anti-counterfeiting efforts. These experts evaluate the risk exposure of a firm's individual brands and overall product portfolio.

For example, security teams at a pharmaceutical firm might ask some of the following questions about a new medicine:

- How will the product be priced?
- If it's a high-value product could it become a target for counterfeiting?
- Has this type/class of product been counterfeited before? If so, this might mean there is an established supply channel that can be utilized by counterfeiters.
- If a product is not yet marketed, where will the product first be introduced? (Europe, USA, or Asia.)

Products that are identified by experts/security teams as "high potential risk" are usually those that are expensive or high volume, or that have some type of inherent vulnerability. Based on this type of situation assessment, the appropriate anti-counterfeiting technology and strategy can be selected and deployed.

AuthentiGuard is a TM of Document Security Systems, Inc. (DSS)

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Conclusion

All of Sun Chemical's brand protection technologies can be applied directly to paper, plastic, metal, or foil by either printing or incorporation directly into a product at relatively low cost, and require only a small-sized reader in most cases. The technology is proprietary and is currently implemented globally. All of Sun Chemical's materials are manufactured on-site in secure facilities.

Additionally, all of Sun Chemical's solutions are designed to have little or no impact on existing manufacturing processes to allow rapid and seamless integration into any customer supply chain.

Sun Chemical's Brand Authentication Products	
Product Name	Description
Invisible Security Ink Taggant/Reader Systems	Read with hand-held (or smaller) security readers (Verigard TM)
Hidden Readable Codes	Invisible codes covertly read with viewing reader
Hidden Image Technology	Covertly embeds hidden imagery and/or alphanumeric characters into existing printed artwork (done by your existing printer and read via iPhone app or reticulated lens)
Specialty "Effects" Inks	Color shifting, metachromic, thermochromic
Upconverting Taggants and Readers	Portfolio of emission colors and wavelengths
Taggant Sensor Systems	Safeguarding that cartridges and replacement parts for your product are authentic

To watch a video about Sun Chemical's full range of brand protection solutions for packaging or to learn more, call 708-236-3798 or visit www.sunchemical.com/anticounterfeiting.