Crisis Quality Brand Management
Product Surety, Security, Protection & Safety
Electronics: A Global Challenge in Reliability and Authentication

Peter Gabriele
ARmark™ Authentication Technologies, LLC
Microtag/Taggant/®mark/

How big?
Microtag/Taggant/®mark/
Millionaire’s Microtag

- Consider all the information in this coin:
  - Brand (U.S. Currency)
  - Time
  - Language & Communication
  - Association and Trademark
  - Culture & Economic Value
  - Religion, Politics & Government
  - Style
  - Heritage
  - Location
  - Virtue
  - Exchange Value
  - Supply chain information integration
The Facts

• Counterfeiting costs U.S. businesses $200 billion to $250 billion annually.

• One of every 10 tech products sold is counterfeit, leading to an estimate of a direct loss over $100 billion a year. A $2 fake part leads to losses of $20 if detected at the manufacturing board level. It costs $200 if detected in the market.

• Since 1982, the global trade in illegitimate goods has increased from $5.5 billion to approximately $600 billion annually in 2004 and $1.3 trillion in 2006.

• Approximately 5% - 7% of world trade is in counterfeit goods.

• 5.2 million counterfeit foodstuffs, drinks, and alcohol seized by the EU

• 8% -10% of globally Rx Medicines are Counterfeit ($72B) PDMA

  (Indian Pharmaceutical Market is $8.5 Billion 20% + API potential)

• U.S. companies suffered $9 billion in trade losses due to international copyright piracy.

• Since 1980, 80% of terrorist activity has been directed at private industry.

• 25% of companies have experienced a disaster in the last 5 years.
The Economic Consequences

• Economic and social impact on consumers
• **Direct financial loss**
• **Danger to human safety**
• Diminished or destroyed brand image
• Warranty and service claims
• **Liabilities**
• Lost tax revenue to government
• Downward price pressure
• Loss of confidence in identity documents and financial instruments
Supply Chain Challenges in a Thieves World

Mass-serialization

Authentication

Intellectual Property Management

Anti-Counterfeiting

Brand Authentication

Brand Reliability

Gray market

ARmark™ Authentication Technologies, LLC.
The Basic Supply Chain Unit (Vertical)

- External Suppliers
- External Vendors
- Internal OEM
- External Logistics Providers

ARmark™ Authentication Technologies, LLC.
The Basic Supply Chain Unit (Horizontal)
Mass Serialization
Track and Trace
What’s Authentication?
Brand/Supply Chain Vulnerabilities

- Manufacturers-Logistics Providers-Retailers
  - Driving Forces
    - Globalization
    - Competitive landscape
    - M & A
    - Regulatory requirements
    - Customer expectation
      - Product failure rate
      - Product variety
    - Energy cost
    - Port Congestion
    - Disasters
    - Terrorism
Brand Management is Brand Authentication
Brand Authentication is Brand Management
Brand Management is Brand Authentication
Brand Authentication is Brand Management
Brand Management is Brand Authentication
Brand Authentication is Brand Management
Brand Management

• It’s about controlling product image and avoiding compromise
  • Diversion of products (Gray Market)
  • Counterfeiting
  • Organized retail theft
  • Warranty and return fraud
  • Illegal factory over-runs
  • Re-labeling, re-dating
  • Parts harvesting, re-manufacturing
  • Terrorism
  • *Ignorance and neglect*
Brand Management Will

- Let you know the product is *indisputably* yours!
- Assure product reliability
- Be a Deterrent
- Reduce liability and sustain profitability
- Share holder assurance and confidence
- Guarantees quality, ethics, and moral obligation to customer Sarbanes-Oxley
- Inspire consumer confidence
- Challenge your competition
Defining Authentication in a Crisis

• Elements of Crisis Mitigation
  • Private Industry
    • To indisputably eliminate your product and company from liability i.e. manage brand security
    • Support investigative strategy
  • Government & Regulatory
    • To have the ability to quickly trace back to the origin of electronic items in a crisis
    • Provide critical product identity for search and seizure or intervention mitigation
When Do You Authenticate?

• When your product has a reservation price value
• When there is emotional value to your product
• When the liability of a single issue can crush your immediate earnings
Clues to a Brand/Supply Chain Problem

- Drop in raw-material orders
  - “Where’d all the packaging go?”

- Increased orders for proprietary components
  - Export/import ratios: “It’s going where?”

- Increased gray market activity
  - “This shouldn’t be here! Or there!”

- Increase in service returns
  - “Got back more than we made.”

- Large volume of discounted products available
  - “Wow, that’s a great deal!”
Common Layers of Security Technologies

<table>
<thead>
<tr>
<th>TECHNOLOGY</th>
<th>THREAT ADDRESSED</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overt</td>
<td>Counterfeiting</td>
</tr>
<tr>
<td>Holograms, OVD’s, intaglio ink, copy prevention</td>
<td></td>
</tr>
<tr>
<td>Covert</td>
<td>Counterfeiting</td>
</tr>
<tr>
<td>UV/IR, taggants, microtext, packaging design features</td>
<td></td>
</tr>
<tr>
<td>Coding (Track &amp; Trace)</td>
<td>Diversion, Gray Market</td>
</tr>
<tr>
<td>Encrypted Bar Codes &amp; RFID</td>
<td></td>
</tr>
<tr>
<td>Forensic (Court admissible, evidentiary)</td>
<td>Counterfeiting, Diversion, Gray Market</td>
</tr>
<tr>
<td>Synthetic DNA, elements, nano-particles</td>
<td></td>
</tr>
</tbody>
</table>
Covert Markers a.k.a. Covert Micro Tags (CMT)

- High definition micro disc-like structures in the diameter size range of 90 to 150µ by 10 to 20µ thick.

- Information centric indicia including for example:
  - Alpha-numeric text,
  - Hieratic,
  - Geometric symbol
  - Composition

- The only authentication technology that is composed of food grade materials that allows in situ use
  - Its edible!

ARmark™ Authentication Technologies, LLC.
Selected Examples
Example of EDS Map for Elemental Authentication

Titanium is present where a green dot appears on the map.
ARmark Internal Authentication

Optical Picture

® symbol is made up of BaSO$_4$ white (invisible in TiO$_2$ white sea)

EDS Map
(black dots represent Ti)
Design as a Code: Multivariate Information

- **Color**
  - Color and spectral selection
  - Photophysical and Photochemical response

- **Text**
  - Novel alpha-numeric identifiers
  - Coding & Encryption

- **Composition**
  - Physiochemical content
  - Chemotrophic technology

ARmark™ Authentication Technologies, LLC.
Thermal & UV Masks

Taiyo FOC-800 USA UV

ARmark™ Authentication Technologies, LLC.
Multiple Sizes
Salt and Pepper
klöckner pentaplast

100x magnification
KP logo Taggant
75micron diameter x 25micron thick
Lot# 070607-1 & 3
Custom Security Label Adhesives

ARmark™ Authentication Technologies, LLC.
Surface Mount Device Components

- Plastics
- Laminates
- Ceramics
- Solder
- Inks
- Conformal Coatings
Cable Wrap

NIST Product Authentication
Information Management Workshop
February 17-18, 2009

ARmark™ Authentication Technologies, LLC.
Laminates and Packaging

Markers master batched in pellets
Extruded into film
Markers in the film

SHIRLEY TEST
1234567890

ABCDFGHJKLMNPQRSTUVWXYZ

ARMark™ Authentication Technologies, LLC.
Packaging Applications
Energy Dispersive Lacing Images
Application & Handling

- Air/Airless Spray
- Dip
- Curtain
- Electrostatic
- Mill & Mix
- Screen
- Flexo
- Cast

- Aerosol
- Flood
- Knife over roll
- Gravure
- Molded
- Extruded
- Laminated
INTEROPERABILITY

Main Entry: interopera
dility
Pronunciation: "in-t&r-"ä-p(&-)r-&'-bi-l&-tE
Function: noun
: ability of a system (as a weapons system) to work with or use the parts or equipment of another system
- interoperale  /"ä-p(&-)r-&-b&l/ adjective
• Laptop/Cellular Capable
• Database integrated
• Portable Field Readable
• Frequency or Wavelength Specific Detection
  • UV-VIS-NIR options
• Magnification 140 -300X
• Custom optics
  • 1.3 Mega-pixel CMOS imaging sensor
• Custom matched materials of construction and reader detection
Summarize

• Questions:
  • Business Questions
    • William Stratton
    • ARmark Authentication Technologies LLC
      • 159 Industrial Dr., Glen Rock PA 17327
      • 717-227-3254
      • bstratton@arglobal.com

• Technical Questions
  • Peter Gabriele
    • pgabriele@rmark.org
    • 717-227-5922