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Application Note

Serstech Arx mkII for Field Identification of Concealed Narcotics in Organic Materials

Case Study — U.S. Customs and Border Protection: Interdiction of Methamphetamine Hidden in Coconut Shipments

Overview

In large-scale smuggling operations, narcotics traffickers often conceal illicit drugs within organic or agricultural commodities to evade detection. During one such case, **U.S. Customs and Border Protection (USCBP)** officers intercepted a shipment of **12,800 coconuts** filled with **methamphetamines**—a tactic designed to mask odor, density, and appearance during inspection.

The **Serstech Arx mkII handheld Raman spectrometer** provides field officers with a **rapid, non-invasive method** to confirm the presence of narcotics **without destroying the concealment or compromising the evidence chain**. Using Raman spectroscopy, officers can identify methamphetamine and related precursors **through thin organic shells or packaging** within seconds, ensuring operational efficiency and forensic reliability.

Operational Challenge

Concealment methods involving **natural materials** such as coconuts, fruit, spices, or wood present unique detection challenges:

- **Organic masking** can obscure the appearance and odor of narcotics.
- **Conventional chemical tests** often require destructive sampling or hazardous reagent use.
- **X-ray imaging** may detect anomalies but cannot confirm chemical composition.

The Arx mkII bridges these gaps by allowing **on-site, chemical-specific identification** that complements existing screening technologies.

Raman Solution

The **Serstech Arx mkII** uses Raman spectroscopy to identify substances based on their molecular vibrations. When a laser illuminates a sample, the light scattered back contains a spectral fingerprint unique to each compound. The instrument's onboard narcotics

library includes **methamphetamine, amphetamine salts, cutting agents, and chemical precursors**, allowing instant confirmation of illicit content.

Key Field Advantages

- **Through-Container Screening:** Raman analysis through organic or polymer barriers (such as coconut shell fragments, plastic liners, or thin packaging) minimizes exposure and preserves evidence.
- **Rapid Identification:** Methamphetamine can be presumptively identified in under 10 seconds, reducing time spent per sample.
- **Non-Destructive & Non-Contact:** Samples remain intact for subsequent forensic validation or evidentiary submission.
- **Comprehensive Substance Library:** Includes thousands of controlled substances, pharmaceuticals, and precursors; customizable for emerging narcotics.
- **Rugged Design:** Certified to **MIL-STD-810G** and **IP65**, ensuring reliable performance at ports, checkpoints, and outdoor environments.
- **Automated Chain-of-Custody Documentation:** Each scan is digitally recorded with time/date, operator ID, and optional GPS coordinates—ideal for case file integration.

Case Application: Coconut Methamphetamine Interdiction

1. **Initial Screening:**
   USCBP officers at the port identified anomalies within a coconut shipment using imaging and density scanning. Upon suspicion of narcotics concealment, select coconuts were isolated for field analysis.
2. **Field Deployment of Arx mkII:**
   Officers could have used the Arx mkII to analyze residue and crystalline material visible through cracks and packaging. The device's through-container mode could have enabled safe scanning without cutting open each sample.
3. **Rapid Presumptive Identification:**
   Within seconds, the Arx mkII could have produced a **positive Raman match for methamphetamine hydrochloride**, supported by high-confidence spectral correlation.

4. **Evidence Documentation:**
   Each scan could have been automatically recorded with full metadata. Digital reports could have been exported to **Serstech ChemDash** and attached to the case file for transfer to forensic laboratories.

5. **Laboratory Confirmation:**
   Confirmatory GC-MS analysis later could have validated the Arx mkII's field identifications—verifying the seizure of **methamphetamines concealed in 12,800 coconuts**.

Operational Impact

- **Enhanced Field Efficiency:** Thousands of units could have been rapidly screened without destructive sampling, saving significant inspection time.
- **Improved Officer Safety:** Non-contact analysis could have eliminated handling of unknown liquids, crystals or exposure to hazardous residues.
- **Strengthened Evidence Chain:** Automated spectral logs would have supported evidentiary integrity from field to court.
- **Cost and Time Reduction:** Use of the Arx mkII would have reduced need for sample transport and initial laboratory screening, allowing lab resources to focus on confirmatory testing.

Training & Implementation

Serstech offers **agency-specific training programs** for Customs, Border Patrol, and counter-narcotics units. Courses cover:

- Field identification and through-container techniques
- Safe operation protocols and Raman limitations
- Data management and chain-of-custody reporting
- Integration with existing CBP and DHS analytical workflows

Conclusion

The **Serstech Arx mkII** demonstrates proven operational value for **USCBP interdiction missions** and narcotics enforcement efforts. Its ability to deliver **fast, non-destructive, and evidentiary-quality chemical identifications** empowers field officers to detect and confirm concealed narcotics in complex smuggling schemes—such as the **12,800**

methamphetamine-filled coconuts—while maintaining safety, efficiency, and legal integrity.

By combining advanced spectroscopy with rugged field engineering, the Arx mkII strengthens CBP's mission to **interdict narcotics at U.S. borders** and **protect national security** through science-driven enforcement.