

Fingerprints for freight items

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Air freight being loaded. Researchers at the Fraunhofer IFF are working with other partners on a digital fingerprint for security-sensitive air freight in the project ESecLog. This is intended to make tampering with shipments easily detectable in the future. Credit: Fraunhofer Fraunhofer IFF/Anna Mahler

Security is a top priority in air freight logistics but screening procedures can be very time consuming and costly. Fraunhofer researchers intend to boost efficiency with a new approach to digital logistics, without

sacrificing the security of air freight operations.

Thousands of freight items are shipped by plane every day, around seventy percent of them in airliners. Stringent controls are supposed to prevent hazardous substances such as explosives from being smuggled on board. Screening procedures, such as x-ray scanning of freight, are time consuming and costly and have to be repeated in the event of suspicious circumstances. Easily verifiable features that verify that a freight item is "secure" have been lacking until now.

Researchers at the Fraunhofer Institute for Factory Operation and Automation IFF in Magdeburg are working with development partners and users such as Panalpina and Lufthansa Cargo in the joint project ESecLog to resolve the dilemma between security and efficiency: Using simple screening procedures, they aggregate features such as 3D contours or RFID identifiers into one central shipment profile for every freight item. "The trick is that we document and aggregate these features into one complete digital image. Thus, every freight item has one digital fingerprint. This delivers accurate information of freight's security status throughout the entire transport chain across operations and at any time," explains Olaf Poenicke, project manager at the Fraunhofer IFF.

Safety Wire Prevents Subsequent Tampering

The partners are working, for instance, on a marker that can be used to verify whether a freight item has already been x-rayed – something that has not been traceable. The researchers are additionally developing an RFID seal in order to detect subsequent tampering with a shipment. To do so, they affix a transponder on a package's seal with an ultrafine safety wire. If it is opened, the wire breaks. The shipment continues to be identifiable but the screener is additionally notified that the wire has been damaged. "This technology makes it possible to even inspect entire pallets. If one of the freight items has a broken wire, the shipment

concerned can be identified precisely by its ID," according to Poenicke. A pallet's contour can additionally be captured by means of a 3D scan. The pallet's contour changes if a package is subsequently placed on it.

All of this information is aggregated into a kind of shipping record. Screeners can view this documentation in the central fingerprint information system as a timeline on a tablet. If necessary, they can retrieve additional information on individual stations and view all of the x-ray scans once again. This system will drastically reduce the work required for reinspections. Until now, every freight item has to be individually reinspected or even opened whenever there is suspicion of tampering. Poenicke explains what might happen in the worst case: "Deliveries are often made overland. When the cargo is already considered to be secure, the truck is sealed before shipment. If someone at the airport determines that the seal has been broken, then the entire contents have to be reinspected." ESecLog systems would make it possible in such a case to check quickly whether individual packages have been tampered with.

It will be a while, though, until the system is put to use: Now that the consortium has designed the individual systems, the technologies are in the development stage and should be operational by the end of the year. A test environment is supposed to be built in the coming year to optimize the interaction of the systems. The researchers from the Fraunhofer IFF will be presenting this project at the International Supply Chain Conference in Berlin from October 22 to 24. ESecLog is being funded by the Federal Ministry of Education and Research (BMBF).

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