

ExamFolder System Integration Architecture

The ExamFolder™ information processing, display and archival system is the heart of a Nondestructive Examination System (NES). It fuses the information together from various data sources and sensors then structures the data for an analyst. Data structuring allows the analyst to manipulate the data to provide the maximum effectiveness in assessing cargo at seaports, airports and border crossings. ExamFolder™ program features: integrity of sensor data, evidential integrity, expert system friendly & hierarchical security levels. The ExamFolder™ based inspection platform provides for the integration of virtually any existing sensor and will accept new sensors which conform to its open architecture conventions without change to the base platform.

Introduction

The Nondestructive Examination System (NES) integrates various sensors into a high production operating platform that is geared to the needs of the transportation industry and national security. The ExamFolder™ program software and network is the heart of NES. The software allows us to integrate effectively various sensors, external intelligence and commercial information and state-of-the-art analysis tools. Sensors may consist of radiographic imaging, chemical sampling and analysis, weight measurement, radiation measurement, license plate readers, microwave tags readers, fingerprint readers, infrared devices, acoustical measurement devices, temperature/pressure measurement devices and real-time video capture systems.

State-of-the-art analysis includes object/graphic audit tools, digital voice recording, voice mail, and voice recognition systems for hands-free and rapid database entry and report creation.

The ExamFolder™ software is a contemporary, multi-media system which can integrate graphics, text, sound, digital voice, image data and video from multiple sensors, computer systems and information sources and presents the data to the analyst. The analyst can manipulate this data to provide the maximum effectiveness in assessing containers and their cargoes. Following completion of the analysis, the ExamFolder™ program will archive the fully examined cargo in-

formation along with the original sensor specific data.

The ExamFolder™ Configuration Approach

Each NES System is configured to meet the specific needs of the enforcement and transportation community that it serves. The configuration issues are complex since NES Systems may be applied to airport, seaport and land border crossing environments. The objects to be examined range from air cargo ULDs, ocean containers, conventional cargo trucks, neobulk cargo trucks, railcars, bulk material transports to conventional passenger vehicles.

The configuration objective is to achieve a responsible balance between the concerns and requirements of the regulatory and enforcement agencies and the needs of the transportation community. Regulatory and enforcement agencies will normally have the final word; however, most are commercially sensitive to today's economic warfare issues.

To achieve this configuration balance, a thorough systems engineering and operational analysis is performed. Alternate facility layouts, employing different material handling techniques, are examined. Simulation of the NES System is utilized to establish the through-put objectives of each site and provide the baseline information necessary to configure the ExamFolder™ program and generate the associated computer hardware requirements.

The final ExamFolder™ program configuration will optimally integrate the initial suite of sensor technologies while providing the flexibility to integrate other future sensor technologies as they become operationally viable.

The ExamFolder™ program has the following features:

- **High Through-Put Production Control System** - The NES Terminal Control System is an object-oriented system which uses a state-of-the art relational database and allows the use of tools necessary for high through-put transportation planning and control of the nondestructive examination process. The system includes industrial engineering reports to help optimize each unique NES system.

- **Evidentiary Integrity** - The ExamFolder™ program maintains the integrity of original sensor data and assures that the chain of evidence as collected is unbroken and traceable. The ExamFolder™ program results may be archived to Write Once Read Many (WORM) optical disks to preserve the evidence in a format that minimizes the potential of data destruction by magnetic fields or data tampering by malefactors.

- **Dynamic Routing** - The ExamFolder™ program allows dynamic routing of examination data to different NES Analysts to support various levels of diligence in primary, secondary and tertiary screening activities or even hold some ExamFolder™ programs out of the current work queue pending availability of a specialist. Additionally, NES Analyst workstations at various locations can be placed on-line/off-line for maintenance purposes, all without affecting the through-put capability of the total NES system.

- **Supports Hierarchical Security Levels** - The ExamFolder™ program can complement established Customs, Intelligence & National Security computer systems through the use of multiple password and user access privileged sensors and controls. Information compartmentalization and control objectives and requirements can be met.

- **Integrity of Sensor Data** - Each sensor transfers the data it collects to the ExamFolder™ program in the original sensor output format. Any postprocessing of the data is a separate operation and results in additional unique files. Original sensor data is recorded

intact for future post-processing, auditing, training and quality assurance purposes.

- **Expert System Friendly** - The ExamFolder™ program architecture has been developed to accept alert flags and analysis from expert systems which perform profiling. Additionally, the ExamFolder™ program is capable of passing both original sensor and post-processed data to various expert system shells. These expert systems then pass their results back to the ExamFolder™ program. The ExamFolder™ software will provide a unique icon for each expert system result. It is possible to have multiple knowledge based systems running simultaneously on networked computers to provide NES Analysts with expert advice and assistance.

- **Supports Training Systems & Security Audits** - The structure of the ExamFolder™ architecture simplifies retrieval of archived records and enhances the ability to create focused training sessions that are crucial to continued operational effectiveness. The ability to replay an Analyst's session is an important feature not only for training purposes but also for internal security reasons. Another feature is its online multi-media training and help capability.

- **Easy to Operate** - The ExamFolder™ program is a user friendly interface utilizing the Sun Workstation's Open Windows format. The information about a container, truck or passenger vehicle is collected and represented as various icons in different labeled windows. The information icons are labeled and easily opened by clicking with the workstation's mouse.

- **Future NES Enhancements** - The open architecture design of the NES allows for the incorporation of advanced sensors as they become technologically mature, reliable and economically practical for long-term system operation. In addition, other data sources can be fed into the database available to the NES, depending on government requirements and system application. Some possible enhancements include:

- (1) **Nuclear-Based Contraband Detection Systems** Nuclear-based contraband detection systems use neutrons to produce gamma ray emissions which are used to detect nitrogen-rich material which are typically present in contraband of interest.

(2) Physical and Chemical Sampling and Analysis

Physical and chemical sampling and analysis will be used to take air or particulate samples from target vehicles on or around suspect cargo. Systems targeting specific spectrums and substances are available and more advanced. They have better detection probabilities and lower false alarm rates than systems which are designed to detect wide range of substances.

(3) Intelligence Data

Intelligence data from various local, national or international agencies can be input to the NES database to alert the NES analyst to watch for possible drug, terrorist or other subversive threats. The inclusion of intelligence data in the NES database will require the activation of enhanced the ExamFolder™ program data security capabilities and additional physical site security. The use of encryption and decryption devices to allow the receipt and transmittal of sensitive information will also be required. The respective intelligence agency always retains control on the judicious release of its information.

Conclusion

The key to effective security, examination and inspection, with optimal through-put is to integrate the data from various sensors with cargo, vehicle and driver information, as well as information obtained from law enforcement and intelligence agencies. At the control and analysis facility, trained NES analysts can use the data to make informed decisions. The ExamFolder™ program is a contemporary open-architecture information processing system capable of receiving, processing and displaying data from diverse sensors and sources. It is the key to integrating this data and other information and using it efficiently to provide an effective examination capability.

The NES ExamFolder™ program's configuration approach and operation feedback systems work to balance the critical needs of the transportation and enforcement communities.