



Ideas to Reality™

2016 Annual Report



# *Ideas to Reality*<sup>™</sup>

It is not just a tagline. It is something that ENSCO is committed to, in all we do.

- We are committed to our customers and their missions, and to developing technology to make the world a safer place.
- We promote a culture that encourages an entrepreneurial spirit and child-like enthusiasm for learning, growing and problem-solving.
- We employ creative individuals who possess the knowledge, innovation and determination to continue down a path—sometimes fraught with challenges—until a solution can be found.

Our 2016 Annual Report highlights our commitment to putting these words into action every day.





# To Our Customers, Employees and Shareholders

Fiscal year 2016 (FY16) was an important year that saw ENSCO revitalizing its technology roots, strengthening its technology offerings, and expanding into new markets. Our Rail Technology business continued its double-digit growth, but the National Security and Avionics areas experienced some program cancellations and delayed awards, as well as recruitment and retention challenges. As a result, our overall revenue decreased slightly (3.8 percent) from fiscal year 2015 (FY15). At the same time, we were able to increase slightly our profit margin and have won a number of projects that position us well for the next year. In fact, we finished FY16 with a funded backlog of \$103 million, which represents a significant 46.3 percent increase compared with the funded backlog at the end of FY15!

In addition to our continued support to the Federal Railroad Administration (FRA), we won several significant Rail Technology contracts this year, among them were awards with Amtrak, Canadian National Railway, Brazil's Rumo ALL, the Port Authority Trans-Hudson, and Metro-North Commuter Railroad. These latest wins use an array of new technologies developed through ENSCO's internal research and development program and customer-sponsored research in the areas of next-generation measurement platforms, autonomous and machine vision track inspection, and advanced data management platforms. We opened an office in Perth, Australia, to support our expansion into that market.

Capitalizing on our expertise in Avionics, we continued our 28-year history with BAE Systems with a new three-year contract to provide engineering services. We also won new contracts with Lockheed Martin-Owego to provide engineering support for the C-130 program, and with Triumph Thermal Systems and Curtiss-Wright.

In the area of National Security, we won several key contracts this year, including Phase 2 of SenseNet, a program to develop a commercially viable biological threat sensor system, and an exciting program with our longtime customer, the Air Force Technical Applications Center, focusing on seismic data collection and analysis, which has strong long-term growth potential.

In the Aerospace business area, we won a contract from Space Florida to operate the Shuttle Landing Facility in support of both commercial launches and Unmanned Aircraft System (UAS) operations, an exciting new growth area. In addition, we initiated two new contracts with customers in the commercial launch market for range safety and systems engineering support.

## Looking Ahead

Based on these wins and increased backlog, ENSCO is well positioned for growth next year. We have a number of Corporate initiatives in place to help us achieve this. We hired a Chief Strategy and Technology Officer (CSTO) to help advance our technologies and technical capabilities, and ensure better



**Boris Nejikovskiy**  
President

alignment of our technologies with the strategic needs of our customers. We have also established a Technology Council to help the CSTO identify and grow strategic technology areas, and a leadership training program aimed at nurturing the next generation of company leaders.

We are pursuing a number of new strategic opportunities in each of our markets.

In our Avionics business, we will focus on expanding into the DOD and government marketplaces. (This is a joint effort between our Avionics and National Security business units.) We will also offer more comprehensive technology solutions based on our integrated test expertise, turnkey display development capabilities, and the IData® Tool Suite.

In Rail Technology, we are pursuing a new area of signaling and train control inspection and are hoping to leverage our rail expertise to gain work with a new governmental agency, the Federal Transit Administration.

In our National Security business area, we are leveraging our Chemical, Biological, Radiological, Nuclear, and Explosives (CBRNe) monitoring technology and expertise to enter new markets. We are also pursuing a number of exciting and very advanced technology projects within the Positioning, Navigation and Timing (PNT), cyber and electronic warfare fields.

And finally in the Aerospace area, we are expecting award decisions on a number of key strategic contracts, including the Air Force Range Network System Engineering and Integration (RN SE&I) program, Advanced Weather Interactive Processing System (AWIPS) re-compete, and a commercial weather contract supporting Delta Air Lines.

## Ideas to Reality™

We introduced a new tagline this year: "Ideas to Reality," which reflects what ENSCO has been and what we aspire to be. A more detailed version of this tagline is expressed in our Company vision statement: To create and apply advanced, emerging technologies to make the impossible, possible.

As you look through the pages of this year's annual report, I hope you are awed by the examples of ENSCO employees working on amazing projects that implement this vision. From its inception, ENSCO has been dedicated to finding a way to develop and use technology to tackle the world's challenges. We foster a culture of creative collaboration—between employees, across business units, and with customers—to solve these problems in creative and unique ways.

We thank you—our customers, employees and shareholders—for your support in helping us make ideas a reality.

A handwritten signature in black ink that reads "BORIS NEJIKOVSKIY". The signature is fluid and cursive, with a long, sweeping underline that extends to the right.

**Boris Nejikovskiy**  
President

# National Security



# National Security Overview

*Since its inception, ENSCO has supported efforts to keep the nation and its assets safe and secure through the application of advanced technology, research, services and products.*

## Advanced Sensors and Systems

For more than 45 years, ENSCO has developed innovative geophysical MASINT (Measurement and Signature Intelligence) sensor technologies and advanced signal processing solutions to meet national security and intelligence community missions. As a leader in the development and application of Ground Penetrating Radar (GPR) for subsurface exploration, ENSCO has advanced GPR technology to small and ruggedly deployable platforms that have been used in real-world applications. ENSCO has applied advanced signal processing of seismic, acoustic and electromagnetic data for passive detection and monitoring of threats invisible to other types of assets.

## Scientific Modeling and Environmental Fate

ENSCO scientists are trusted experts in the fields of environmental fate and biosystems modeling. We apply our understanding of the modern Chemical, Biological, Radiological, Nuclear, and Explosive (CBRNe) mission to provide unique and timely solutions to the U.S. government and federal entities.

## Positioning, Navigation and Timing

The dramatic expansion of GPS has simplified the movement of people and assets around the world. Yet even the most sophisticated satellite navigation equipment cannot operate in every environment. GPS service degrades quickly when the signal is denied, impaired, or otherwise unavailable. ENSCO

scientists and engineers have developed reliable custom solutions that combine the most advanced technologies to augment traditional GPS, addressing a wide range of tracking, locating and navigation challenges.

## Electronic Warfare and Cyber Technologies

ENSCO leads the way in providing specialized cybersecurity solutions to the defense and intelligence communities, and federal civilian agencies. Our innovative offerings include full-spectrum cyber operations and security, threat research and assessment, cyber sensor development, and cyber hardening of critical infrastructure.

## CBRNe Warning and Protection Systems

In pursuit of the national goal of preparedness and the protection of life, health, property, and commerce, ENSCO provides scientific and engineering models that predict the behavior of CBRNe materials in the environment, compute the needed physical properties for hazardous materials, optimize the performance of CBRNe detection equipment, provide facility physical security integration, and conduct vulnerability assessments.

## Critical Infrastructure and Protection

Whether the threat is from a natural disaster, criminal activity, or terrorism, ENSCO's consulting services assist our customers in developing comprehensive strategies for protecting their most valuable resources: personnel, facilities, infrastructure, and information. From developing tailored plans and policies, building training programs, and conducting assessment and risk analysis to evaluating the effectiveness of protection systems, ENSCO provides sound, cost-effective solutions, optimized to protect key infrastructure and minimize impact on operations.

## *From Idea to Reality:*

# Positioning, Navigation and Timing (PNT)

Today, everybody uses GPS, a satellite-enabled PNT technology that revolutionized our lives. Many U.S. defense and national security applications rely on accurate positioning, navigation and timing. However, GPS does not work everywhere and can be relatively easily denied by a technically adept adversary. ENSCO scientists had the idea to develop a radio frequency (RF) ranging PNT device to augment or replace the satellite-based GPS capabilities currently in use for warfighter tracking applications. Because the technology does not depend on GPS, it can track and locate warfighters when a GPS signal is denied, impaired, or otherwise unavailable. The origin of this revolutionary technology dates back to 2008, when ENSCO patented RF measuring techniques to estimate distance, velocity and time offset wirelessly among a network of radios. Three years later, ENSCO demonstrated a prototype to the customer. Impressed



with the capabilities, the customer funded development of two subsequent efforts to customize the technology. Recent advancements include wireless time synchronization between moving platforms demonstrated to sub-nanosecond precision, along with precise range and velocity measurement. This is a key enabling technology for many PNT applications that need wireless time synchronization beyond GPS. Today, the ENSCO RF measuring solution is actively used for PNT applications in conjunction with other warfighter navigation technology. ENSCO's follow-on efforts will focus on continuing to meet the technical and programmatic goals of our customer's PNT efforts, and getting the technology into the hands of our warfighters in the field. In addition, making this idea a reality holds promise for many commercial applications that ENSCO scientists and engineers are exploring.



# Rail Technology





# Rail Technology

For nearly 50 years, the name ENSCO has been synonymous with technology and services that improve railway safety, quality and efficiency.

## Track Inspection Technologies

An international leader in track inspection, ENSCO has pioneered the use of advanced sensing technology, signal processing, data analytics, and autonomous operations to create a broad portfolio of track condition monitoring products. These products, along with ENSCO's knowledge and hands-on approach to consulting and service, provide customers with the best possible tools to ensure track safety, increase maintenance productivity and efficiency, and reduce operating cost.

## Track Data Management

The data gathered from inspections is only as good as the actionable information it provides. ENSCO offers decision makers fully integrated data management and analysis software packages to visualize track inspection data, trend track conditions, and manage maintenance tasks. Our Data Management Suite uses common architecture, data structures, and asset databases to enable an integrated view of track condition in the past, present and future. By harnessing the power of the Internet, ENSCO offers web-based applications that are seamlessly integrated into one user interface.

## Train Control Safety

Positive Train Control (PTC)—a safety initiative mandated by Congress—consists of highly advanced technologies designed to make rail transportation safer by controlling train movements to prevent collisions. Always on the forefront of applying technologies to the latest advances in safety, ENSCO supports PTC, and other train control and signaling systems through our technology and consulting services. ENSCO's in-house train control professionals combined with our engineering staff provide train control consulting services, as well as comprehensive inspection systems

for train control system condition monitoring.

## Rail Safety and Security

ENSCO leverages decades of experience and the latest in technological advances to offer comprehensive rail safety, and security systems and services. We take pride in developing workable solutions that balance the need to keep passengers and railroad personnel safe and secure with the desire to continue daily operations without an interruption in service.

Our vulnerability assessments mitigate vulnerabilities while ensuring uninterrupted operations, identifying potential threats to the safety and security of railway infrastructure. Our derailment prevention consulting services include investigating and assessing factors that can contribute to a derailment and recommending mitigation to prevent accidents.

The first passenger evacuation simulator of its kind in the United States, ENSCO's Rail Car Emergency Evacuation Simulator is an innovative tool to train first responders and emergency personnel how to respond to passenger rail emergencies in the event of a derailment.

## Vehicle Track Evaluation

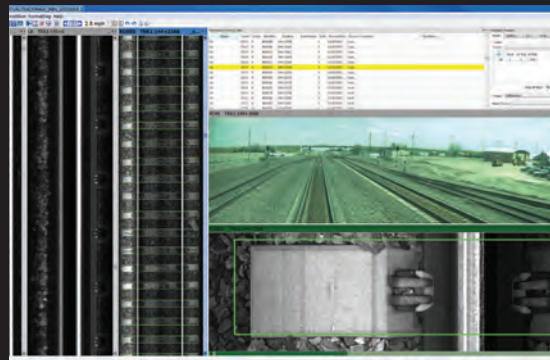
ENSCO is a recognized leader in the rail industry and parlays more than four decades of experience into comprehensive, knowledge-based vehicle/track interaction consulting services. Our instrumentation, field testing, and modeling and simulation analysis experts provide support and consultation specific to the needs of vehicle operators, suppliers and derailment investigators. We offer practical solutions for qualifying vehicles for higher speed operation, addressing a vehicle's behavior, or qualifying rail vehicles through acceptance testing.



## From Idea to Reality:

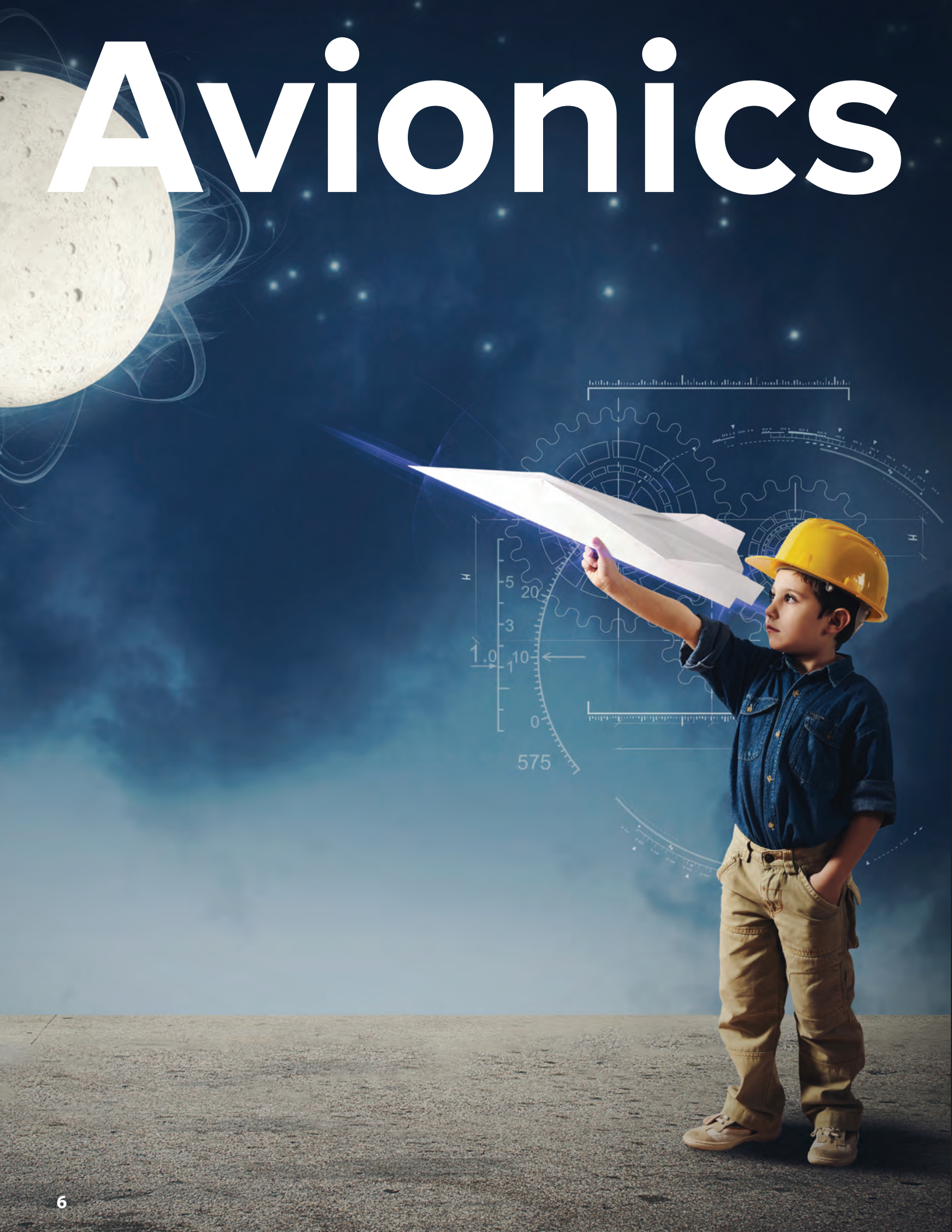
# Virtual Track Walk

Detailed visual inspection of railroad tracks is traditionally performed by inspectors on foot or on slow moving hi-rail vehicles—It is costly, time-intensive, and potentially dangerous. In 2006, to overcome those limitations, ENSCO came up with an idea to develop new machine vision technology to perform high speed, automated visual inspections. This new approach introduced the use of high-resolution imaging technology coupled with machine vision algorithms. The first machine vision technology platform was developed jointly by ENSCO and the Federal Railroad Administration to detect the presence of rail joints and automatically assess their condition. Since then, ENSCO has introduced an array of high speed track imaging and detection products for the right of way, ties and fasteners, rail surface, overhead wire, third rail, and thermal imaging of track infrastructure. As multi-function inspection vehicles



were increasingly equipped with the technology, a new challenge emerged: Managing the terabytes of collected data and finding an efficient process for reviewing that information to create actionable maintenance reports. To solve this problem, ENSCO conceived and developed another idea: In 2015, we developed a Virtual Track Walk office review system, which allows a track inspector to virtually walk the track with all possible perspectives of the infrastructure, providing insight into asset presence and condition, maintenance conditions, and asset locations. Making this idea a reality, ENSCO machine vision technology is currently installed on inspection vehicles around the world. The next major release of Virtual Track Walk will feature synchronization with track measurement data to provide a complete, augmented view of the track condition from an office environment.

# Avionics





# Avionics

*For three decades, ENSCO has been a prominent avionics development partner, enabling the advancement of sophisticated airborne systems.*

We have a reputation for success in providing safety- and mission-critical engineering and COTS Human Machine Interface (HMI) development toolkits to the aerospace industry, for manned and unmanned systems, with a specific focus on DO-178C, DO-254, DO-278A, and military standards. ENSCO delivers solutions by leveraging its unique portfolio of engineering expertise and HMI designer tools, enabling avionics system providers and integrators to reduce cost, meet challenging schedules, and access industry expertise across the entire system life cycle.

## Engineering and Certification Services

ENSCO provides safety-critical software solutions to avionics systems development programs. Support is provided at any stage of the software development life cycle from requirements through design, code, integration, verification, and certification. Extensive DO-178C experience covers a wide array of platforms with specific domain expertise in embedded systems (engine/flight controls), power systems, and avionics displays. ENSCO provides full or partial turnkey complex electronic hardware development solutions required to support DO-254 requirements through Level A design assurance levels. As DO-254 requirements continue to move to the forefront of the avionics industry, we guide clients through the myriad changing DO-254 requirements and offer cost-effective direction.

## IData® Tool Suite

The IData® Tool Suite is a data driven solution for the creation of safety- and mission-critical embedded display applications. IData provides a robust and flexible development framework to easily design, develop, prototype, and deploy rich graphics for

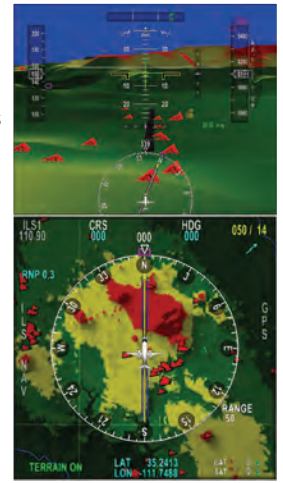
any target display application. Designers benefit from 2-D and 3-D digital moving maps (IDataMap) and 3-D views (IData3D). Accompanying certification artifacts ease the certification effort for mission- and DO-178 safety-critical embedded display applications.

## IGL® Software Graphics Renderer

IGL® is a highly flexible safety-critical OpenGL® software graphics renderer that offers all the benefits of a software driven OpenGL graphics engine. Efficient and with a small footprint, IGL gives application developers a wide range of implementation options for providing safety-critical real-time graphics on many different systems without the need for a dedicated GPU. IGL enables designers to overcome challenges faced in today's display development environment due to its small size, lighter weight, lower power, and radiation tolerance.

## SVS Core 2.0

ENSCO's SVS Core is a software application baseline used by ENSCO Avionics to develop tailored uncertified synthetic vision applications for external customers who specifically seek military applications for underwater missions, such as search and rescue, or anti-submarine warfare. The core was developed over several years by ENSCO and includes advanced algorithms for the underwater environment and associated sonobuoy sensors. By leveraging the core for external development projects, ENSCO can deliver a solution to a customer more quickly and more affordably than would generally be achievable through internal customer development.



## From Idea to Reality: Synthetic Vision for IData®

In the last decade, through advancements in communication networks, sensors, navigation systems, and graphical interfaces, the potential of using synthetic vision (SV) to aid flight and other missions in poor visibility has come to fruition. Synthetic vision is now being applied to various environments, including cockpits for manned aircraft, command and control systems for UAS, and mission computers for acoustic operators conducting search and rescue or anti-submarine warfare missions. Several years ago, ENSCO developed an SV solution for use on the Lockheed Martin P-3 aircraft. This was fielded in 2014, and knowledge gained from this program combined with customer input laid the foundation for developing market requirements to bring the display graphics for SV to the IData® Tool Suite.

As of today, there is no commercially available tool suite for avionics display designers to develop certifiable synthetic vision applications, which are intended to improve situational awareness



and reduce the chance of accidents or incidents. In 2011, ENSCO acquired the IData® product, a software development toolkit for creating and deploying embedded software display devices. It is a single integrated display design solution with a unique approach that allows customers to go through the development process only once for multiple displays. Already differentiated by its design approach, the IData Tool Suite is also the only embedded display tool suite available with an integrated map plug-in: IDataMap. This allows display designers to easily add digital moving maps to their displays. To secure our differentiated IDataMap and deliver valuable new functionality to the market, the IData development team is adding new functionality for certifiable SV application elements, including 3-D terrain, and object overlays. This development effort—IDataMap 2.0—will be available as part of the IData Tool Suite in early 2017. Transforming this idea into reality will result in IData being the only tool suite for the avionics sector that provides an integrated mapping tool for developing certifiable SV applications.

# Aerospace





# Aerospace

*For more than 30 years, ENSCO has been a pioneer in delivering cost-effective safety and security solutions to contribute to the mission success of launch ranges and the space industry.*

## Launch Safety and Range Engineering

ENSCO engineers support critical range safety systems around the world. We architect, build, test, and participate in range operations and specialize in launch range modernization efforts. We combine electrical engineering, computer science, mechanical engineering, physical science, and mathematics to develop comprehensive systems engineering solutions and recommended range architecture to optimize our customers' operations.

## Simulation, Test and Recording System

ENSCO's Simulation, Test and Recording System (STARS) is an advanced range instrumentation, payload and missile simulator used to evaluate range safety- and mission-critical systems for the U.S. aerospace launch ranges, enabling end users to build custom simulations for any aerospace or aviation application.

## Unmanned Aircraft Systems

ENSCO provides operational consulting to Unmanned Aircraft System (UAS) users, including systems engineering, infrastructure, and operational policies and procedures. Our knowledge of UAS operational and performance capabilities along with our FAA regulatory experience offers a unique capability to assess the risk and develop the requirements for safe operations of UAS platforms in the National Air Space (NAS).

## Simulation

The models and simulations developed by ENSCO reduce the risk associated with range instrumentation modernization programs. Using these tools to create test data and simulate sensor input, we conduct performance testing early in the development cycle, resulting in lower cost and lower risk solutions.

## *From Idea to Reality:*

# Unmanned Aircraft Systems (UAS)

UAS and commercial space launches are significantly changing the aerospace industry. Our customer, Space Florida, sought to position itself as a leader in both of these fields by providing range infrastructure for commercial space launches and UAS testing.

They assumed responsibility for the Shuttle Landing Facility (SLF) at Kennedy Space Center and turned to ENSCO for help in integrating the potentially disparate requirements into a common UAS and commercial launch range. This combination of UAS testing and commercial space initiatives has never been tried before.

Our decades of experience in range architecture development with systems engineering support uniquely position us to transform the idea into a reality.

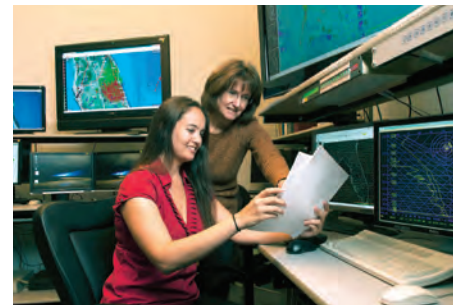


## Independent Verification and Validation

ENSCO Independent Verification and Validation (IV&V) is tailored for specific program requirements and time frames. Our experience includes aircraft engine and missile programs, as well as weapons and space platforms. ENSCO works closely with customers to deliver a high-quality verification effort, including managing a large verification team, controlling cost, and staffing with professionals to meet our customers' schedules.

## Meteorology and Weather Forecasting

ENSCO is a recognized expert in many areas of weather forecasting and integration. We develop real-time and analytical weather systems that ingest meteorological sensor data and use advanced analytical models and



techniques to display the data to end users in the aviation, launch and utility communities. We maintain multiple global weather data sources along with multiple National Weather Service NOAAPORT terminals strategically located throughout the United States. Our redundant data rich environment allows us to provide up-to-the-minute, high-resolution weather models and observations.

Our MetWise® meteorology product line is designed to deliver comprehensive meteorological data clearly and efficiently to decision makers so they can make critical decisions with ease and confidence. The MetWise family of products and services can be used to visualize all types of meteorological information and enable users to create and distribute the most effective decision assistance tools.

Today, ENSCO has made Space Florida's goals closer to reality by providing the development of operating guidelines and procedures for safe operation of UAS platforms that comply with FAA and NASA regulations. Included in this effort is consideration for

horizontal takeoff and landing for space launches that will share the airspace. ENSCO is also contracted to market the facility and attract UAS and commercial launch providers to operate at the SLF. This is an exciting opportunity and the venue is the first to integrate UAS and space operations at the same location.

In a similar manner, ENSCO is seeking ways to exploit the efficiency of UAS to the rail industry, where ENSCO has a reputation for success in new technology for rail safety and efficiency.

## Mission

*ENSCO cultivates the ideas of our employees and customers, delivering leading edge research, development, products and services in the rail, aerospace and national security market.*

*We foster top science and engineering talent, creating an environment where employees can tackle our customer's problems in creative and unique ways.*

## Vision

*To create and apply advanced, emerging technologies to make the impossible, possible.*

# Ideas to Reality™



# Executive Staff



**Boris Nejikovskiy**  
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Treasurer



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ENSCO Avionics  
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**Theodore G. Freeman**  
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**Scott Goldstein, Ph.D.**  
Chief Strategy and  
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**Joanne McDonald**  
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**Karen Sivek**  
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