

ALPHASTAR CORPORATION

GENOA SHM - Digital Twin Zero Maintenance

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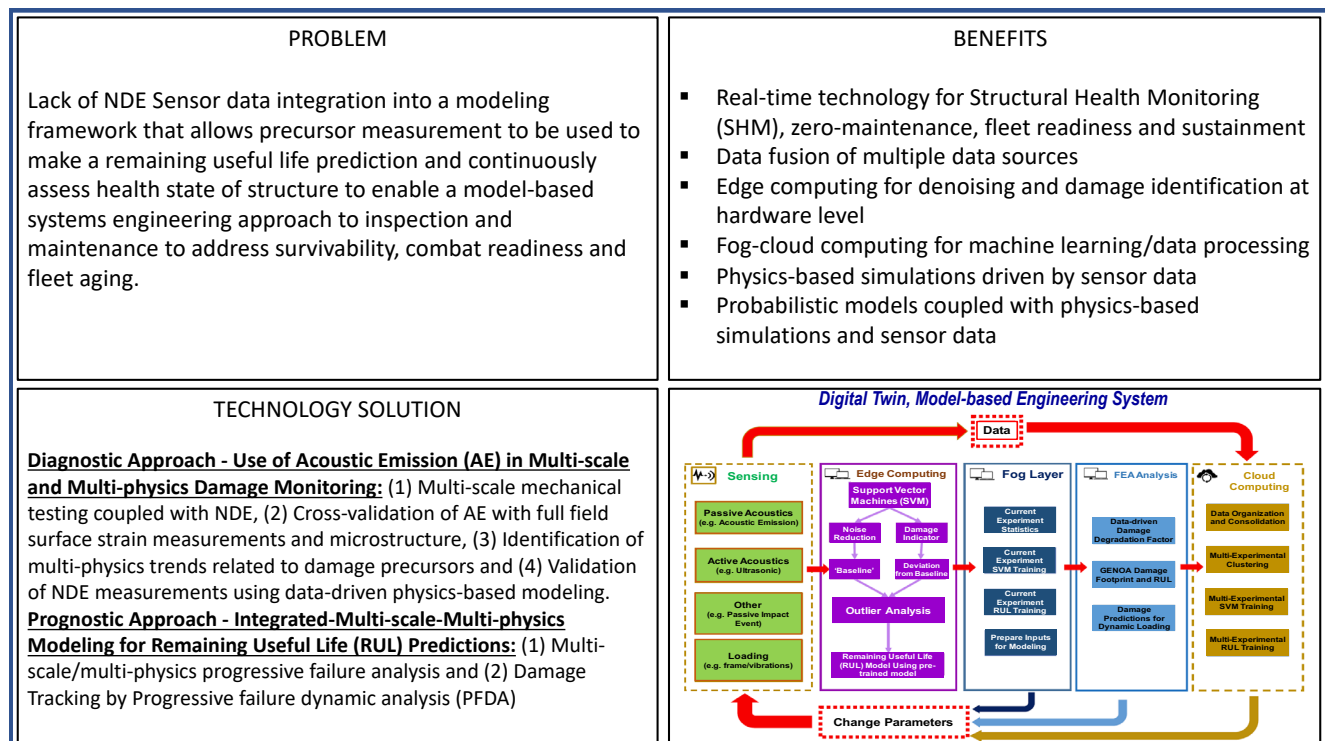
GENOA SHM Digital Twin zero maintenance technology continuously assesses the health of a structure to enable a model-based systems engineering approach for inspection and maintenance relative to survivability, combat readiness and aging. The approach includes customizable Digital Twin sensing and computing architecture for real-time analysis, feedback, readiness, estimation of remaining useful life and cost savings.

Current technology readiness level (TRL) is 5 and the strategy going forward is to establish proof of technology/system adequacy in a laboratory/field test environment using subcomponents/components. Technology captures precursors using multi-physics non-destructive evaluation by integrated modeling framework to automatically update computer models with sensor data and compute remaining useful life.

The strategy includes (1) laboratory qualification and validation with real part; (2) protected evaluation with maintenance/depot support; (3) real world field

test bed for real-time feedback and active environment conditioning; (4) pursue, in-parallel, next-level miniaturization and ruggedization of hardware as well next level security of software and data transmissions; (5) deliver product as a retro-fit package for existing platforms; (6) work with end user/business partner (Boeing, General Atomics, etc.) to integrate technology into new systems; (7) work with leading commercial software vendors to bundle technology and make available to industrial sectors such as energy, infrastructure, automotive, etc.

Headquartered in Long Beach, CA, AlphaSTAR Corporation is a leading engineering services and software developer that provides innovative physics-based simulation technologies for structural health monitoring, metal, polymer and ceramic additive manufacturing, material modeling and analysis of advanced composite structures in the aerospace, automotive, defense, and energy industries worldwide.



ANALATOM INCORPORATED

In Situ Corrosion Rate and Environmental Condition Monitoring Supporting Structural Health Assessment

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Located in Silicon Valley, Analatom Incorporated designs, develops, and manufactures hardware and software solutions to meet Structural Health Monitoring/Condition-Based Monitoring (SHM/CBM) demands. Analatom technology is fielded in several key commercial and military arenas, such as Aerospace (fixed wing and rotary wing), Petrochemical (pipelines), and Civil Engineering (bridges and buildings) customers in U.S. and international markets. An Air Force example illustrates the cost, maintenance efficiency, safety, and mission readiness benefits of monitoring corrosion with onboard sensing. With the help of the sensors, the maintenance team at Patrick AFB, Florida, has the ability to calculate where and when corrosion is likely to start, enabling the base's corrosion prevention to be taken to a higher level. Sensors are proving to be a tool that allows measuring not just effectiveness, but also maintenance shortcomings. For maritime

applications, Analatom technology improves vessel system sustainment by monitoring concealed corrosion in inaccessible areas where visual inspections are labor intensive. The monitoring system, based on Micro Linear Polarization Resistance (μ LPR) corrosion rate sensors, provides the capability of operating in remote areas without any interaction or support with advanced detection and prognostic capabilities. Data is downloaded and evaluated during vessel inspections to assist maintenance and design personnel identify the state of the vessel to improve depot-level maintenance. The Analatom system not only does measure corrosivity of the environment, allowing calculation of estimates of structural corrosion; but the thin sensors when installed beneath protective coatings give direct measurements of actual corrosion rates occurring, as well as indicating coating degradation.

PROBLEM

- Annual corrosion related costs for DoD facilities, infrastructure, and equipment are \$20 billion.
- Aerospace examples: Approximately 25% (\$5 billion) occurs at depot-level maintenance for Air Force aircraft and missiles. Navy and Marine Corps aviation annual corrosion cost is \$2.6 billion; 26.1% of total maintenance costs (FY 2008-2009).
- For maritime applications, existing/emerging corrosion sensing, logging, and monitoring technologies are not applied as a comprehensive, strategic, integrated solution for corrosion management, maintenance, and mitigation.

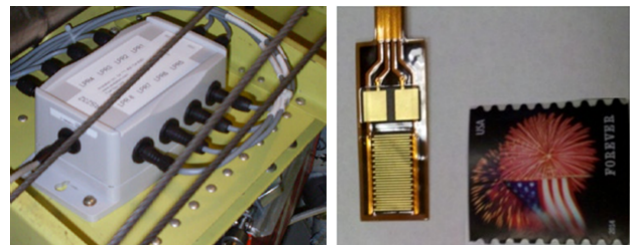
BENEFITS

- **Heightened military capability** by ensuring maintenance is condition-based, resulting in shortened procedures & reduced depot times.
- **Accelerated military development** when domain experts/engineers can identify areas frequently maintained to improve structural & material designs.
- **Reduced costs and increased ROI** by identifying failure modalities in critical components. CBM+ compatible condition monitoring reduces life cycle costs associated with unnecessary maintenance, particularly for inaccessible critical components.

TECHNOLOGY SOLUTION

- Analatom monitoring/assessment system incorporates in situ corrosion rate and environmental conditions micro-sensors providing continuous data for advanced modeling assessment and prediction of protective coating & CPC condition.
- Assessing/predicting coating degradation and corrosion onset through advanced sensor data management, analytics software, and hybrid coating condition/corrosion modeling establishes the framework for sustainment groups' real-time corrosion assessment of in-service platforms to substantially enhance CBM+ programs.

Corrosion Monitoring System Typical Installation and Corrosion Rate Sensor with Postage Stamp



CIMTEC AUTOMATION

Collaborative Robot Application

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Since first establishing our business in 1987, CIMTEC has become one of the industry's largest, most progressive, responsive and trusted providers of automation solutions. Our work ranges from fully vetting and supplying automation products to designing and implementing complete, state-of-the-art automation systems. Headquartered in Charlotte, North Carolina, CIMTEC has offices in strategic locations throughout North Carolina, South Carolina and Virginia.

CIMTEC specializes in Collaborative Robotics. But what is a collaborative robot? A collaborative robot places control of the automation task into the

hands of operators. They are: Easy to set up, easy to program, easy to re-deploy, and safe to work side-by-side with humans. The Harvard Business Review (HBR) calls them "smarter, smaller, safer robots." In an HBR interview, the head of innovation management technical planning at BMW said of the 20 adaptive robots at its plant in Spartanburg, South Carolina that: 1) Robots have become safer and this makes people happier with them. 2) Robots speed-up thankless tasks. 3) Robots greatly reduce idle time. 4) Workers want to work with the new robots. "...huge gains will come when the new machines are paired with high performers..."

PROBLEM

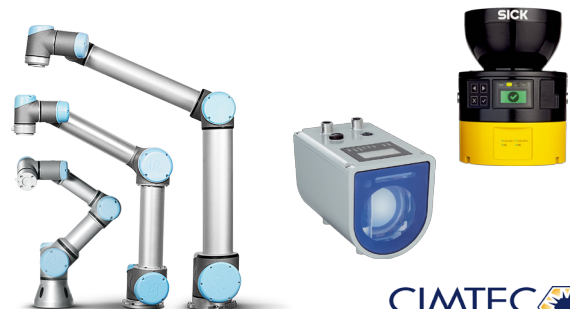
- 1.) Many repetitive tasks are dull, dirty, and dangerous. For those whose job is to complete repetitive tasks, there is constant threat of injury, boredom and human error. Hiring and retaining skilled employees for repetitive tasks, no matter how critical, is difficult.
- 2.) Precise object distance measurement and human detection around dangerous equipment presents a SAFETY risk.

BENEFITS

- 1.) Safety, Repeatability, Precision, easily deployed
- 2.) Precision, Ease of use, Rugged, Safety

TECHNOLOGY SOLUTION

- 1.) Collaborative Robots... a new approach with force limiting technology to minimize danger and simplify the programming and deployment.
- 2.) Industrial Lasers... Application specific lasers used for safety monitoring to prevent human injury as well as precise object location.



CIMTEC
AUTOMATION ENGINEERING SOLUTIONS


GE INSPECTION ROBOTICS

Ultra Mobile Industrial Inspection Robots

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As a leader in the robotic inspection field, GE Inspection Robotics is built on engineering, innovation, and technology. Established in 2006, the GE Inspection Robotics develops autonomous inspection robots for power plants, chemical/ petrochemical facilities, and the maritime industry. Thanks to the latest robotic and measurement technology, many service and maintenance tasks can be carried out by inspection robots. These devices are extremely robust and reliable, operating

autonomously and to the highest degree of precision even in adverse environments. GE Inspection Robotics provides operators and inspection companies of large-scale technical facilities with tailor-made systems enabling them to improve inspections by minimizing outages and maintenance times and enhancing environmental and workplace safety.

<p style="text-align: center;">PROBLEM</p> <p>Traditional tank inspection is performed by putting an inspector in the tank (Confined Space Entry). This presents significant challenges and safety issues for the asset owner.</p>	<p style="text-align: center;">BENEFITS</p> <p>Use of robots can reduce or eliminate Confined Space Entries (CSE), which in turn can</p> <ul style="list-style-type: none"> ▪ Reduce costs and time during turnarounds / outages ▪ Increase asset uptime / availability ▪ Produce consistent, repeatable inspections ▪ Reduce / eliminate risk of CSE
<p style="text-align: center;">TECHNOLOGY SOLUTION</p> <p>Utilize highly mobile inspection robots to perform these internal tank inspections. Equipped with magnetic wheels for extreme maneuverability, these robots can carry a wide array of testing technologies, including high resolution visual cameras, UT, EC, and other sensors.</p>	<p style="text-align: center;">BIKE Platform – Ultra Mobile Inspection Robot</p> 


HYTORC

Batter, Hydraulic and Pneumatic Torque Tooling

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HYTORC makes industrial bolting safer and simpler. With 50 years of experience focused entirely on developing the highest quality industrial bolting systems, HYTORC is the most trusted name in the industry. From steel mills and mining equipment to refineries, power plants, and wind turbines; we have developed solutions for every bolting application imaginable. For custom projects, our highly experienced engineering team is at your service to design the most efficient solution for your job with simple operation and economical pricing in mind. We are consistently improving upon existing products, and developing new tools, based on feedback from the people that use our tools every day. Our latest product line features patented industry-firsts like hands-free operation to keep tool operators at

a safe distance from the application, on board documentation systems to provide job accountability and assurance, and industry-leading bolt load accuracy to reduce nut loosening and joint failure. With authorized repair facilities located all over the world, fast and professional service is always available. All our products are covered by our worldwide one-year no-questions-asked warranty, which includes free parts and labor. Our latest bolting systems are guaranteed to stop leaks on pressurized vessels and eliminate unwanted nut loosening. Our mission is to make our customers' jobs as safe and hassle-free as possible. Contact HYTORC today to find out how we can optimize your bolting.

PROBLEM	BENEFITS
<ul style="list-style-type: none"> Productivity issues Quality / Re-work costs Ergonomic tooling problems Reliability concerns High cycle times Inaccurate impact tooling Injury to workers 	<ul style="list-style-type: none"> Tooling can be configured for multiple applications based upon reaction fixtures Less trigger time exposure to the operator Improved productivity and quality Data collection Global support via service centers or drop shipping Tooling accepted within Navy community
TECHNOLOGY SOLUTION	
<ul style="list-style-type: none"> Hytorc washers and nuts vs. super nuts, conventional nuts Data collection for torquing bolts vs. second operation inspection Exact torque value set on tooling Ability to remove reaction points all together On-site calibration ability via Hytorc van NSN numbers for some products Kitting available Torque and angle, torque check and snug modes available on battery tooling 	 <p>www.hytorc.com</p>

ID INTEGRATION INC.

Locate & Track Assets On-Demand with RFID Location Tracking

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Transform production efficiency with improved workflow, fewer errors, and less downtime. Save time and money searching for critical tools and equipment. Breeze through audits and keep tabs on inventory. It's all possible with today's RFID Smart Manufacturing technology. Now is the time for manufacturers and companies to begin pilot and proof-of-concept projects for RFID asset and work order tracking projects. This is where the emerging technology is heading and if manufacturers want to be competitive and relevant in the future, they need to begin using these technologies. We have the answers for RFID applications for any industry: from government and aerospace to industrial manufacturing, to healthcare (hospitals & medical clinics) and pharmaceutical, to construction and landscaping, to chemical and farming, to car lot and dockside, and more.

With our unlimited RFID technology, you now have unlimited ways to utilize this technology: Reduce operator time spent searching for orders, tools, parts & more, gain valuable insight throughout the work order process to identify bottlenecks & updated ETAs, increase accuracy of data by eliminating manual entry errors, and analytics to alert stakeholders to issues of concern and improve efficiency. At ID Integration, we bring to the table more than 20 years of experience navigating compliance standards in the defense and aerospace industries. "One-size-fits-all" solutions don't work. We create tailor-made solutions to fit your needs, whether you're facing an audit, or you need to automate your entire work order process, our systems integration experts have you covered.

PROBLEM

Downtime searching for critical tools and equipment is costly in terms of expense, potential fines, lost tooling, and failed audits. Decreased efficiency, workflow bottlenecks, and user error also negatively impact the overall production and accuracy.

Some applications may also require capability to bridge the gap between different RFID technologies (active, GPS, IoT, hybrid, & traditional) without dealing with disparate data.

BENEFITS

- RFID Location Tracking technology enables manufacturers and companies to reduce time spent searching for orders, tools, parts, & more.
- Provides insight to the work order process identifying bottlenecks and ETAs.
- Increases data accuracy by eliminating manual data entry errors.
- Provides analytics that alert stakeholders to issues and means to increase overall efficiency.

TECHNOLOGY SOLUTION

- V-Tag™ Active RFID: V-Tag GPS™ RFID tags "talk" with each other to create an ad hoc, decentralized network.
- V-Tag GPS™ RFID: Rugged RFID tags designed to withstand the rigors of wide temperature and humidity fluctuations found in outdoor environments. They're equipped with beepers that sound off at 75 decibels to pinpoint exact locations of assets.
- Active, IoT, & Hybrid RFID: Track assets with smart manufacturing capabilities. Combination solutions maximize processes & data collection capabilities.
- Traditional RFID: Some applications include a combination of traditional RFID with modern technology.



PYROTEK

Marine Acoustic and Thermal Solutions

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Pyrotek products are designed for extreme marine conditions. Aesthetic and environmental factors have been allowed for in the product construction, offering products that meet or exceed the requirements of safety of life at sea (SOLAS) and the International Maritime Organization (IMO) regulations. Many of these solutions will also protect your asset from structural duress, metal fatigue and ensure longevity and structural soundness for years to come. Selecting the right solutions will substantially reduce noise levels on commercial, cruiseliner, luxury, defense and military vessels, improving boating pleasure and safety.


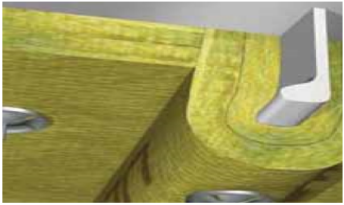
DECIDAMP SP150

Decidamp SP150 is a fast drying, water-based vibration damping compound. The exceptional vibration damping properties are complemented by ease of use, low volatile organic compounds (VOCs) and

low combustibility. It can be easily applied by spray gun, brush, roller or trowel. Once dry the cured film is UV, water and abrasion resistant.

ULTIMATE – U Sea Protect

ULTIMATE combines peak performance in fire protection and thermal insulation with an extremely lightweight, flexible product. It provides additional acoustic insulation while being faster and more efficient to install than traditional methods. It is marine certified for use on steel, aluminum and composite/glass constructions.

PROBLEM	BENEFITS
<ul style="list-style-type: none"> • Heavy, difficult to install Structural Fire Protection (SFP) • Heavy and labor intense insulation materials • Structural vibration • Airborne Noise <ul style="list-style-type: none"> • Transfer of noise and vibration • Personnel safety and fatigue • Structural fatigue • Condensation • Solution Compliance 	<ul style="list-style-type: none"> • Light weight fire protection and thermal insulations • Reduce noise and vibration • Improve safety and personnel environment conditions • Eliminate condensation • Design for economy and performance
TECHNOLOGY SOLUTION	
<ul style="list-style-type: none"> • U-Sea-Protect Structural Fire Protection and Thermal solutions • Spray on damping coatings, Damping tiles, custom designed damping and acoustic products • Design solutions combining acoustic and thermal systems • Labor saving application of materials • Light weight - high performance materials 	<div>   </div> <p>(Left) DECIDAMP SP150 (Above) ULTIMATE – U Sea Protect</p>

SIEMENS GOVERNMENT TECHNOLOGIES

Lifecycle Management for Depot Maintenance

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Teamcenter® digital lifecycle management, enables global enterprises to engage every facet of requirements development to retirement of systems and platforms. Integrated idea capture and data management, real-time conferencing, conflict resolution, supplier and program management tools are combined with an industry-leading open design and development solution in a single, shared source of system and platform knowledge. The NX™ suite enables a holistic approach to system and platform development that stresses collaborative knowledge capture and re-use in a managed environment ensuring quality as well as performance. Mentor Graphics provides electronic design automation software and hardware solutions to design, analyze, and test

electro-mechanical systems, electronic hardware, and embedded systems software worldwide. Tecnomatix® combines knowledge management with process improvement in a virtual environment that lets you optimize the quality, process, facilities, resource and simulation aspects of your logistics and production operations. Simcenter™ uniquely combines system simulation, 3D CAE and test to help predict performance across all critical attributes earlier and throughout the entire product lifecycle. By combining physics-based simulations with insights gained from data analytics, Simcenter helps optimize design and deliver innovations faster and with greater confidence.

PROBLEM

- Per GAO audit, Naval Shipyard facility conditions are contributing to lost operational days when ships could be at sea.
- Pearl Harbor Naval Shipyard was established in 1908 with majority of its current facilities being constructed during WWII and the Cold War
- Most facilities have exceeded their 67 year life expectancy and are costly to maintain.
- Current facilities are sub-optimally configured/positioned to support current repair mission of Naval Shipyards and are driving inefficiencies and excess travel

TECHNOLOGY SOLUTION

Employing simulation software to create a baseline digital model to simulate the “As-Is” condition of facilities, equipment, personnel, and maintenance and sustainment work processes. “As-Is” model is referred to as a digital twin.

Once created, the user can then make and test changes to the digital twin to optimize the shipyard maintenance and sustainment processes by digitally changing infrastructure, equipment lines and/or processes to test and challenge scenarios in a closed environment, creating the optimal shipyard plant layout and configuration.

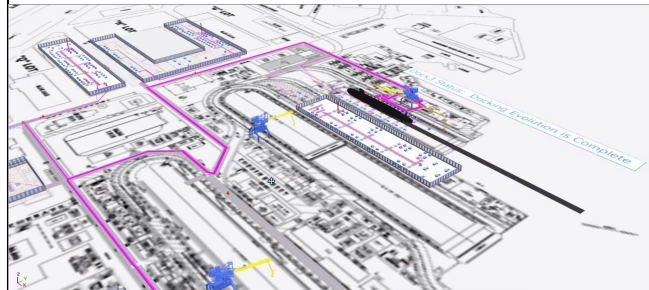
BENEFITS

- Optimize equipment and processes to increase efficiencies
- Determine, prioritize and validate which capital investments are needed and will have the greatest ROI
- Provide assurance that investments will yield results sought.
- Maximize workforce allocation
- Reduce costs and waste

Impact on Warfighter:

- Increased operational days at sea
- Improved ship readiness

Optimization run: Shops 56/57 moved to DD3. Distance travelled during availability decreased from 9M ft to 4.5M ft.



SWAGELOK NORTHWEST (US)

Orbital Welding, Fluid System Components, Services and Training

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Swagelok Northwest (US) is your exclusive local sales and service center for the Pacific Northwest. Our end-to-end quality system and knowledgeable team of associates have helped serve communities and transform countless fluid systems. With unpar-

alleled quality, performance, and safety, Swagelok Northwest (US) is the provider you can trust. We're your source for first-rate fluid system products, solutions, and training.

No Quad Chart Provided

THERMO FISHER SCIENTIFIC

Viewpoint™ Remote Monitoring Radiation Detection System

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The ViewPoint system provides real-time personnel and environment monitoring during normal and outage operations. The ViewPoint system has the capability to integrate radiation and environmental, and general purpose detectors from Thermo Fisher Scientific's portfolio and other vendors. The

ViewPoint system provides users the ability to centrally process and analyze instrument/detector data. A major benefit is the sturdy design which is robust, secure and scalable.

PROBLEM

Remote readings of radiation detectors is an essential ALARA tool in many high dose and dose rate fields. However, technology limitations, system complexity, and price (\$\$) often prohibit the leveraging of this effective ALARA solution.

BENEFITS

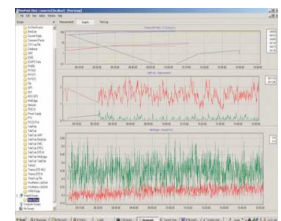
- **Comprehensive coverage**-Integrates Thermo Fisher Scientific and third party personnel dosimetry and area monitors.
- **Simplify data management**-Centralization of instrument data providing an efficient, optimized operational management by integrating personnel, environmental, and process monitoring.
- **Enhanced data analysis**-User-friendly, highly customizable and configurable instrument data management with logging, reporting and sophisticated real-time trending.

Technology Solution

The system provides simple to deploy, and cost-effective radiation monitors that are capable of communicating with PC's and SMART mobile device. The technology uses legacy radiation detectors commonly used in the Navy with communications technology also deployed in the shipyards.



VP SAT Remote Monitoring Station



Viewpoint™ S/w