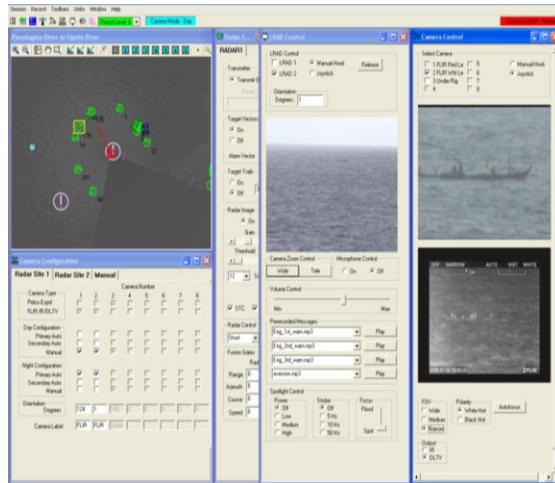
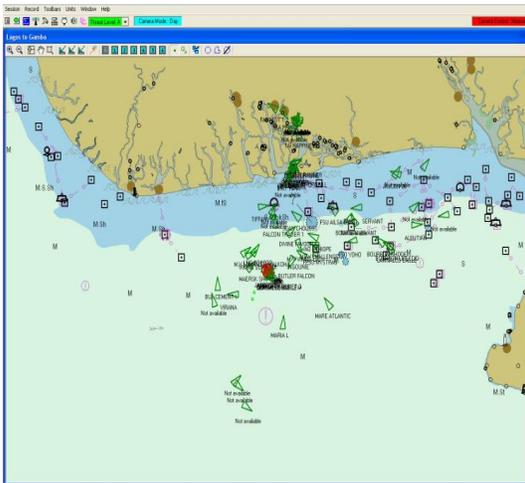




HarborGuard-Pro® EWDSS

Early Warning Detection, Surveillance, and Security System for Offshore Platforms



Klein Marine Systems, Inc.
11 Klein Drive, Salem, NH, USA 03079
Web: www.kleinmarinesystems.com

This technical data and software is considered as Technology Software Publicly Available (TSPA) as defined in Export Administration Regulations (EAR) Part 734.7-11.7

Introduction

Klein Marine Systems' HarborGuard-Pro Early Warning Detection and Surveillance System (EWDSS) is an advanced maritime surveillance and detection system designed to protect vital offshore assets such as:

- Fixed drilling and production platforms
- Semi-submersible or re-locatable platforms
- Construction platforms, barges and vessels
- FPSO's and SPM facilities

The modular design of HarborGuard-Pro hardware and software components provides a flexible solution which can be scaled and customized to fit any offshore security application. The system provides multiple layers of surveillance and protection against waterborne threats and intruders. The layered approach shown in Figure 1 provides the following:

- 360° Detection of Small, High Speed Watercraft via Small Target Detection Radar
- 360° Thermal and/or Visual Camera Coverage
- Tracking of all AIS-equipped Vessels
- Automatic Alert on Zone Intrusion
- Automatic Camera Cue- to-Track and Track-Following
- Automatic Threat Classification
- Automated Warning Message via Acoustic Hailer
- High Powered Search light with strobe feature for Visual Attention and Night Operation



Figure 1 - Surveillance and Protection Layers

Company Overview

Klein Marine Systems, Inc. of Salem, NH is a wholly owned subsidiary of Mitcham Industries, Inc. a Texas company listed on NASDAQ (MIND). Klein Marine Systems, Inc. has over 45 years of experience in the development and manufacturing of high performance side scan sonar systems and introduced the first commercial-off-the-shelf (COTS) side scan sonar systems into mine counter measures (MCM) operations. Klein Marine Systems, Inc. has leveraged its hardware and software skillsets in the development of the COTS-based HarborGuard-Pro Waterside Security and Surveillance System. Klein Marine Systems, Inc. occupies a design and manufacturing facility of approximately 30,000 square feet located in Salem, NH, approximately 30 miles Northwest of Boston, Massachusetts. The facility contains all the necessary equipment and infrastructure to support the design and manufacture of both COTS side scan sonar systems and integrated waterside security systems.

System Overview

The HarborGuard-Pro system is an open-architecture, IP-based sensor network system which fuses data from a wide range of sensors within an intuitive graphical user interface.

The core of the HarborGuard-Pro EWDSS is the real-time Situational Awareness workstation console. The HarborGuard-Pro console is a self-contained system with a compact footprint which has been designed specifically for shipboard/platform control room installations. The console is loaded with the HarborGuard-Pro graphic user interface to display realtime data from the radar, AIS and camera feeds. The target positions are compared with configurable warning and alarm zones to trigger automatic positioning of the cameras to facilitate threat analysis and support target challenges through the integrated acoustic hailing device.

A powerful and key feature of HarborGuard-Pro is the ability to define rule sets to define how a target can be automatically classified to set off response actions such as:

- Track the target via integrated camera
- Activate Acoustic and/or Visual deterrence systems
- Alert operator with visual and/or audible alarm based on target threat level
- Automatically record threatening targets

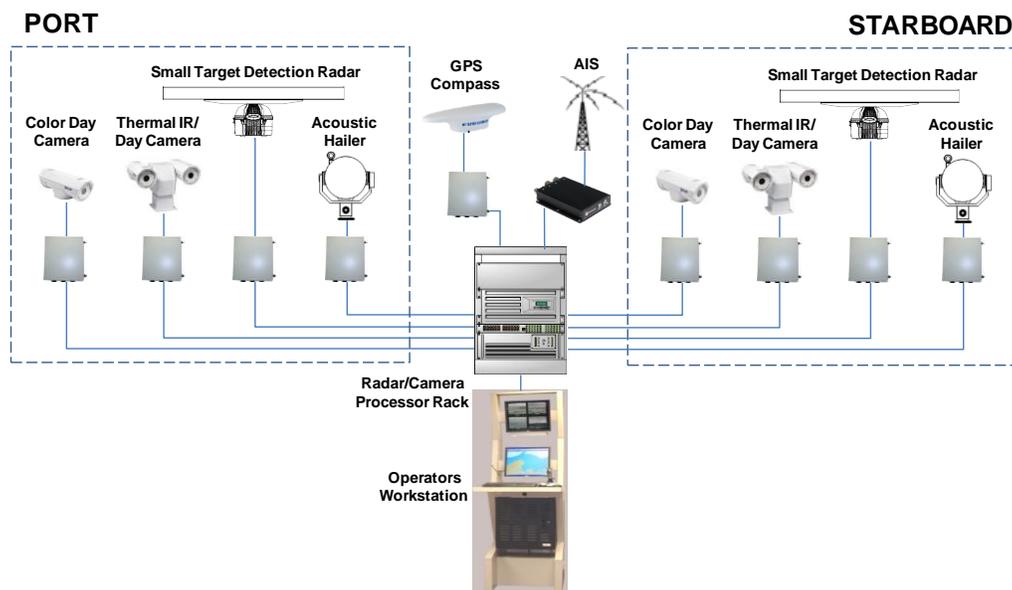
The target classification rule sets can include parameters such as:

- Vessel speed exceeds speed limit
- Vessel track changes abruptly
- Vessel is enters/about-to-enter security zone
- Vessel does not alter course when directed to do so

The system integrates the following sensor feeds:

- Light Weight Series 2000 Small Target Detection Radar
- Automatic Identification System (AIS) receiver or transceiver system
- Integrated Thermal IR and/or visible light pan/tilt camera which can automatically lock-on and track targets.
- Acoustic Deterrent System

The system's open protocol also allows for integration with 3rd party command/control, video management, and physical security information management systems. This also allows for integration with 3rd party sensors which may already be resident at the site.



Technical Description

The HarborGuard-Pro system as illustrated in the figure below represents a basic system which can support any number of waterside security applications. The complete system may be comprised of one or more of the following major components in any combination:

Command Center Workstation

- HarborGuard-Pro Software
- Operators Console

Remote Radar

- Series 2000 Small Target Detection Radar
- RadarPro™ Advanced Radar Processor
- High resolution plot extractor and image processor
- Target Tracker (1000 Track Capacity)
- Low profile, 1U rack mount local maintenance display

AIS

- AIS Receiver
- VHF Antenna

Camera

- EO/IR Camera
- Pan/Tilt/Zoom Mechanism

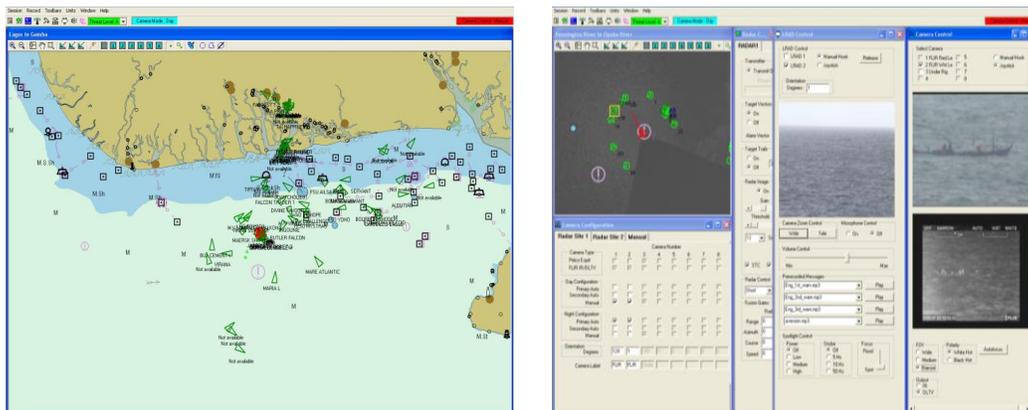
Acoustic Hailer

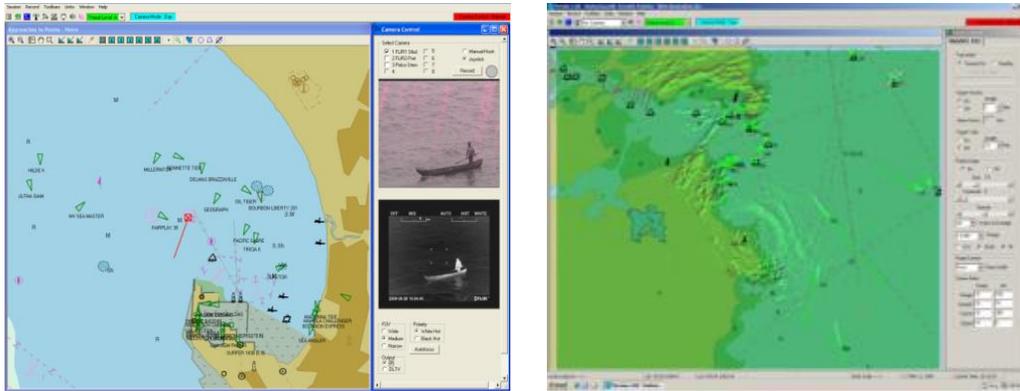
- Acoustic Hailer System
- Pan/Tilt Mechanism
- Integrated Camera (Optional)
- Integrated Spotlight (Optional)

HarborGuard-Pro Workstation

The HarborGuard-Pro workstation hosts Klein Marine Systems, Inc.'s HarborGuard-Pro application software. The workstation is a PC based platform using Windows operating system. The baseline HarborGuard-Pro system includes a detailed digital nautical chart as the geographic background display. Optionally, a high-resolution overhead satellite image of the area of interest is available as the background geographic image. Logically arranged and easy to use menu lists and icons provide the operator access to all operational features. Graphical control panels provide the operator access to control functions for radars, cameras and AIS.

Each HarborGuard-Pro workstation connects to remote radar site sensors via the IP network. Real-time radar target data from all connected radars are processed for display on the HarborGuard-Pro map display. Each radar transmits track reports (all targets being tracked) once every antenna scan (80 RPM), so the refresh rate of display of radar targets on all connected HarborGuard-Pro displays is every 750 milliseconds, providing unmatched, real-time presentation of data. In addition, AIS transponder reports from all AIS equipped vessels within the coverage area are processed and displayed on the HarborGuard-Pro map.





Radar target symbols include a displayed vector, which provides the operator with a quick visual assessment of the location, direction of movement and speed of all targets. With mouse double-click action the operator can roll over any individual radar target to open up the detailed information window which displays the numeric values of range and bearing (from the radar sensor), Lat/Long, speed and course, as well as hostility level. This radar information window also includes text fields where the operator can annotate the target data that is then saved with the radar track log data.

Radar target symbols are color-coded based on the HarborGuard-Pro Hostility Level criteria. Initially, a yellow “Unknown Target” symbol indicates newly detected radar targets. The hostility level definitions are as follows:

- Yellow (Unknown) - Initial detection state
- Green (Neutral) - User defined classification rule
- Red (Hostile) - Security perimeter violation as defined by user
- Blue (Friendly) - Known security assets or cleared vessels

AIS targets are presented on the HarborGuard-Pro display using the international standard AIS track symbol (triangle). The AIS symbol also includes the identity tag, which will show the vessel’s name. The operator, using mouse roll-over and double-click, can query the AIS symbol to open the AIS information window which will show all vessel data including; MMSI, Name, vessel type, speed, course, heading, nationality, navigation status, destination, ETA and many other parameters.

The HarborGuard-Pro track management processing analyzes and compares all radar and AIS targets to determine those targets that correlate as one track. This assures that the same vessel reported separately by a radar and the AIS receiver are fused on the HarborGuard-Pro display as one target track symbol, identified as a fused Radar/AIS track. In addition, where multiple remote radar sites have coverage overlaps, target reports from multiple radars are compared, and where the fuse gate parameters match, a single track symbol is presented on the HarborGuard-Pro screen. The fuse gate parameters measure several track features including position, course and speed.

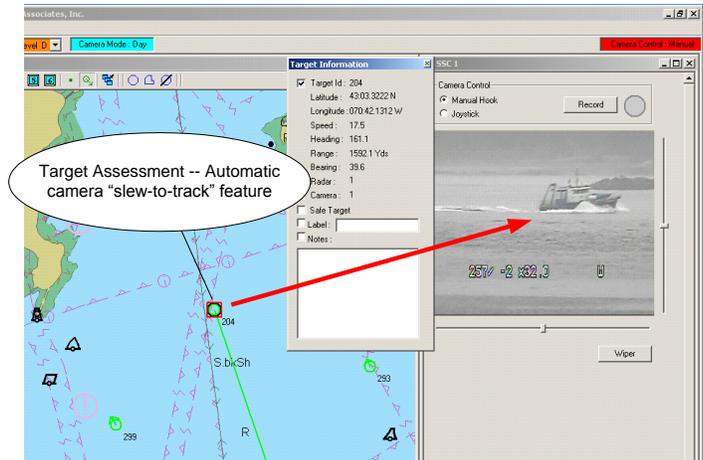
Detection Performance

An effective, radar-based waterside security system must have the capability to automatically detect and track all surface targets of interest. While monitoring of conventional marine traffic is a common capability of most systems, the ability to quickly detect and track potential threat targets, while maintaining low false alarm rates, requires specialized technologies. Threat targets of particular concern would include small fast craft, slow powered or unpowered craft, even surface swimmers or waterborne improvised explosive devices (WBIED). Characterized by their low radar cross section these targets are difficult to detect without appropriate technologies and measures.

The HarborGuard-Pro system with its Series 2000 Small Target Detection Radar employs unique small target detection radar processing features that analyze every detection; weighing a number of variables including target size/shape, motion, and persistence, all in real-time. Targets that meet this multi-level detection criterion are promoted to tracks with a very low probability of false alarm occurrence. These tracks are presented on the HarborGuard-Pro geographic operator display.

Target Assessment and Classification

HarborGuard-Pro solution can include a dedicated Thermal IR or Visual Light camera located at each remote radar site. The cameras are connected to HarborGuard-Pro through an Ethernet (TCP/IP) connection such that the operator can “point and click” on an acquired target track and lock the camera onto the target by sending commands to the pan-tilt-zoom mechanism. The camera viewing window will “pop-up” automatically and HarborGuard-Pro will automatically slew the camera pan/tilt to keep the target in the field of view. It is not necessary for the operator to follow the target with a joystick.



A powerful and important function of the HarborGuard-Pro system is the ability to create geographic zones that can be associated with configurable rules. The user can create and save an unlimited number of zone polygons using simple onscreen drawing tools or by entering a list of polygon point latitude and longitude values.

Each zone created in the HarborGuard-Pro system can be associated with one or more rules. The rule defines a specific behavior that is monitored, and an action is defined based on the rule being satisfied. Examples of the types of rules that can be defined:

- Target Entry** Target crosses the zone perimeter boundary
- Target Exit** Target leaves a zone
- Target Approach** Target is within a predicted time-to-go before entering a zone
- Target Speed** Target's speed exceeds the pre-set value
- Target Course** Target deviates from a pre-set channel course

The following properties and actions can be assigned to any of the above example rules:

- Assign datetime parameters to alerts i.e. weekend only, time-of-day, calendar date, etc...
- Associate this rule with MARSEC Level
- Associate the rule with target hostility level i.e. friendly (known) target or hostile (unknown) target

Actions that can be triggered for each alert:

- Sound audible alert
- pop-up configurable text instructions
- automatically assign the nearest camera to the violating target

Datalogging and Recording

The HarborGuard-Pro system provides automatic recording of critical system data for 30 days or more. The recorded data includes:

- Track Log** CSV track logfile of track data records 15 minute intervals of: Datetime, Radar ID, Track ID, Camera ID, Position, Course, Speed, threat level, and user notes.
- Event Log** CSV diagnostics logfile of target alerts, system alarms, user actions and error messages.
- Recording/Playback** All radar tracks are recorded in a proprietary format to support the HarborGuard-Pro visual radar play-back operation. Any previous event can be played back on the

HarborGuard-Pro map display. This provides a useful visual play-back of prior situations for post event analysis or for training purposes.

XML Support

The HarborGuard-Pro system provides an XML data port where external systems can subscribe to HarborGuard-Pro track and event data in real-time. This XML server feature provides a means to integrate to other external security applications.

Built-in Test and Diagnostics

The HarborGuard-Pro system incorporates a number of automatic and manual test features for fault detection, troubleshooting and health monitoring. The HarborGuard-Pro Operator Workstation computers and the RadarPro Advanced Radar Processor computers include a remote access capability using the Famatech RAdmin remote desktop access products. With proper firewall permissions, credentialed external users can access each computer desktop with full privileges. The RAdmin features test or voice-chat session features that provide real-time communications between local operators and the Klein Marine Systems, Inc. remote help desk. With the RAdmin feature, the remote technician can also download log and error files for offline analysis. The RadarPro Advanced Radar Processor also includes a radar health monitoring utility that runs in the background. This utility continually monitors radar power levels, receiver performance, power supply voltages, internal temperatures and communication link quality. Out of tolerance readings are logged and a fault warning is activated which can be queried remotely by the operator or by the Klein Marine Systems, Inc. remote help desk.

System Components

Following is a list of sensors which are currently supported within HarborGuard-Pro.

HarborGuard-Pro Workstation

The Operator workstation comprises the HarborGuard-Pro PC, with two (2) high resolution 23-inch color LCD monitors, keyboard/mouse with, Joystick, Speaker and microphone. The HarborGuard-Pro communicates with the Radar, LRAD, Thermal IR and visible Cameras over a dedicated TCP/IP local area network. The HarborGuard-Pro network is connected to the platform's LAN (and Internet access point) via a router which will allow secure, remote (and local) access to the HarborGuard-Pro (and other system PC) desktop. This feature will allow for remote troubleshooting and observation of system activity. The HarborGuard-Pro workstation PC will receive GPS position and heading information from the platform's GPS and gyrocompass using NMEA0183 serial data connections. The HarborGuard-Pro can control and display the video from all the system cameras (Thermal IR and visible, and LRAD aiming cameras). The HarborGuard-Pro PC components are standard rack-mount (2U) computers which can be installed in a customer supplied console workstation.



Series 2000 Small Target Detection Radar

The Klein Marine Systems, Inc. Series 2000 Small Target Detection Radar provides high levels of detection performance in the harsh marine environment and is specifically designed for reliable detection and tracking of small surface vessels in all-weather conditions. The radar sensor is an X-Band, pulsed modulated maritime surveillance radar specifically adapted for maritime perimeter security applications. With short pulse operation, high gain antenna and rapid scene scanning, the Series 2000 can resolve and discriminate small targets within narrow, complex, congested waterways. The SRT25 radar sensor used within the S2000 RADAR is designed and tested to meet strict out-of-band and spurious emissions requirements to assure the system would not interfere with near-by radar and radio systems. The SRT25 includes a programmable transmit sector blanking feature that can be configured at each radar site to limit the radar active transmissions to the over-water areas of interest and coverage.



RadarPro™ Advanced Radar Processor

Klein Marine Systems' RadarPro™ Advanced Radar Processor provides superior radar detection and tracking. RadarPro™ is a high performance, PC based radar plot extractor and target tracker system. The system is available in configurable packages meeting a variety of surveillance radar applications. The RadarPro™ Advanced Radar Processor provides target track and image data as well as radar transceiver status and control via a TCP/IP Ethernet LAN to HarborGuard-Pro clients. The RadarPro™ Advanced Radar Processor features:

- High Res Analog-to-Digital video converter (12-bit)
- Pulse Processor matched to beam pattern to suppress interference
- Scan Average Processor dramatically reduces clutter and enhances detection
- Ordered Statistic CFAR
- Track up to 1000 targets (both slow and fast)

Medium Range Thermal IR Camera System

Klein Marine Systems has integrated HarborGuard-PRO with the FLIR model Ranger® MS-UC DefendIR dual thermal/day pan/tilt system. The Ranger MS-UC DefendIR is an uncooled thermal system which is an industry leading mid-range

thermal imager for seeing in complete darkness and through a multitude of environmental conditions including smoke, rain, snow, dust and dense fog. The Ranger MS-UC DefendIR is the first of its kind, un-cooled imager to offer continuous optical zoom. Based on forward looking infrared (FLIR) technology developed for the US military, the Ranger MS-UC DefendIR uses the innovative VisionSense™ technology. This technology offers user-controlled, customized real time mixing and merging of the two visual sources - a visible light (CCD) camera and an infrared camera. VisionSense generates the ability to penetrate glare and see through windows, glass or water. The Ranger MS-UC DefendIR is ideally suited for day and night perimeter security and maritime surveillance applications.



Visual Light Camera

The ExSite® Pan/Tilt Series from Pelco combines a camera receiver, lens, pan/tilt mechanism, and enclosure into a single easy to install Ex rated system. The Integrated Optics Package contains an autofocus camera and lens module with configurable features. The camera is a high resolution day/night camera with a removable infrared cut filter and a 36X zoom lens (36X optical, 12X digital). The electropolished 316L stainless steel construction is ideal for marine environments and the system has an absolute operating temperature range of -76° to 140°F (-60° to 60°C) and includes a built-in de-icing element.



AIS Receiver

The Automatic Identification System (AIS) Receiver is a vessel traffic-monitoring tool which provides shore side facilities with a means for monitoring vessel movements through VHF Data Link (VDL) to shipboard AIS Transponders. The AIS Receiver provides tracking of Class A and Class B AIS transponder equipped vessels within VHF range of the antenna site. The AIS Receiver will be interface to the HarborGuard-Pro operator workstation and provide AIS track reports that will be displayed graphically (target symbol) on the Electronic Chart display and textually on the target list. It will also support transmission of RADAR target tracks in standard AIS messaging format.



Acoustic Hailing Device

The LRAD long range acoustic device consists of an emitter head, pan/tilt device for precision audio targeting, and integrate spotlight integrated with the HarborGuard-Pro monitoring and control software. The concept behind the LRAD is that it emits a high intensity, focused sound that can be clearly heard at 300-500 yards and that grows in intensity to an uncomfortable level as the receiver nears the device. It is intended to convey an unambiguous warning and deterrent to anyone attempting to approach the platform. The unit weighs about 100kg with the pan/tilt mechanism which can be controlled through an arc of up to 360 degrees (non-continuous) in the horizontal plane and +45 to -90 degrees in the vertical axis. It has a nominal beam width of +/- 15 degrees and power consumption of approximately 1200 Watts. A single RJ-45 connection manages the control, visual and audio performance of the system.



Services and Support

Management and Engineering

Klein Marine Systems employs a full service engineering, manufacturing, and service organization. A Project Manager is assigned to each project with assigned key personnel who will follow the project from project definition through final commissioning. Each maritime security and surveillance project is managed using a structured phased approach, which would include:

- Project definition
- Project planning
- Execution
- Implementation
- Life cycle support

Site Survey

A critical part of the Detailed System Design is a site survey. During the site survey Klein Marine Systems Engineers will meet with customer and local support personnel and will survey the physical sites. Actions to be completed on the site survey:

- Review the security/surveillance requirements and develop concept of operations
- Identify optimum locations for the WSS sensors and operator workstation
- Collect data for the design of the necessary infrastructure to support the installation and operation
- Identify/confirm the appropriate equipment complement to meet the requirements
- Identify local regulations, permits, etc
- Identify local support contractors (if necessary)

Detailed System Design

Most applications will have unique requirements which must be considered in the overall system makeup and design. Klein Marine Systems recognizes the importance of the system design in the implementation of a successful Waterside Security and Surveillance System and therefore offers its services for the development of a Detailed System Design. Upon completion of the site survey, Klein Marine Systems will develop and prepare the Detailed System Design. The delivery of the Detailed System Design will be 2-4 weeks after completion of site visits and will include:

- Detailed System Design report
- Final System Configuration and updated price proposal
- Installation plan with equipment list, cable list, mounting arrangement and interconnection plan
- WSS production and delivery schedule

Installation Support

Installation is not included in this proposal. Unless otherwise stated in the Scope of Supply, cables, mounting structures, and other installation materials are not included. Upon completion of a Site Survey an installation proposal detailing Time & Material requirements and cost can be provide.

Training

Klein Marine Systems can supply Onsite Operator and Maintenance training courses. The onsite Operator Training Course shall consist of both classroom and live operation instruction at the customer's system location. The course shall comprise four (4) days of instruction for Operator and Supervisory personnel. The onsite Maintainer Training Course shall consist of classroom instruction and hands-on exercises at the customer's system location. The course shall comprise three (3) days of instruction for technical maintenance personnel and will emphasize scheduled maintenance plans and actions.

Contact Information:

Please contact the following for more information regarding the HarborGuard-Pro system:

Klein Marine Systems, Inc.
11 Klein Drive
Salem, NH 03079 USA
Tel: +1 603.893.6131
Fax: +1 603.893.8807
Email: Klein.Mail@KleinMarineSystems.com
Web: www.kleinmarinesystems.com