

Selesmar Radars



When Safety Matters

Selesmar Selux ST 250/340 OSD
Oil Spill Detection Radar Systems
Looking inside the oil slick

Selesmar Selux ST 250/340 OSD



Arctica's Icebreaker M/V Kontio, part of EMSA's Pollution Resonse Network, is equipped with the Consilium Oil Spill Detection System

Oil spill prevention, response and cleanup

In view of the recent oil spill incidents across the world, oil spill prevention, response & cleanup technologies have become extremely important and sought after.

Early detection in the case of accident and emergency response is essential. In order to accelerate the operations and contain the contaminated area at the minimum size, equipment permanently installed on-board are preferred.

Consilium has developed and tested an integrated unique Oil Spill Detection function into Consilium's standard type approved IMO/SOLAS Navigational radar.

As result, ships in force on regular operations can use the primary radar set as a traditional instrument for navigation and the secondary radar display, interfaced to the primary radar, switched over to the advanced function of Oil Spill Detection.

Consilium Selux ST Oil Spill Detection

Three days of extensive testing, during the exercise Oil at Sea (8-10 June 2010), successfully verified the advanced capability of Consilium's Oil Spill Radar to detect oil slicks.

Consilium is the first company able to provide an oil detection application working in parallel on its IMO/SOLAS ARPA Navigational radar.

The excellent capability of the Consilium Oil Spill Detection radar, thanks to an advanced real-time signal processing, is able to highlight the dampening of the reflected microwave radiation on the radar display and overlay it on the Consilium ECDIS.

The Consilium Oil Spill Detection radar operates on the same hardware approved by the Federal Maritime and Hydrographic Agency in Germany (BSH) and compliant with the European Maritime Directive (MED) and United States Coast Guard.

In a combined and integrated navigation and oil spill response and management bridge system, the stress of the officers on duty is drastically reduced by operating on the same user-friendly graphical man-machine interface.

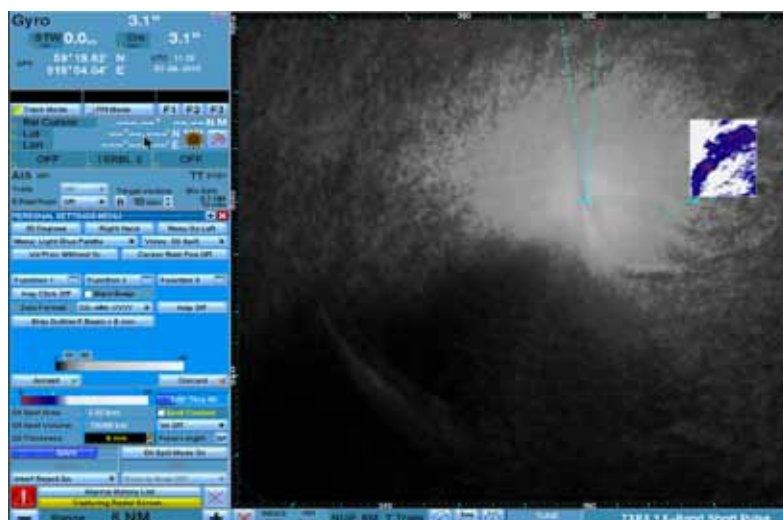
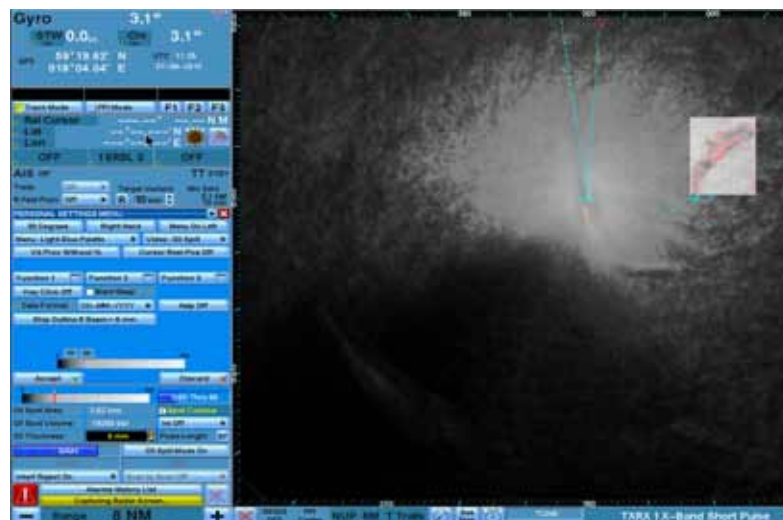
From the shipowners' point of view, the most important benefit is the reduced maintenance costs in terms of installation, service and spare parts.

This is simply and easily achieved due the fact that Consilium is presented by local offices in 19 countries worldwide for both Navigational Bridge equipment and Oil Spill Detection systems.

“95 % of the volume of oil is concentrated in 5% of the slick area”

Main Standard Oil Spill Detection Features

- Ability to present relative signal dumping (oil concentration/thickness) inside the oil slick pattern
- Automatic oil spot contour detection and area calculation
- Assessment of the oil slick position, speed and direction
- Recording of the operating history and instant screen dumps
- Instrumental maximum oil spill detection range up to 12 Nm
- Realtime processed images with selectable integration time between 30 seconds up to 2 minutes
- Information display about wind conditions
- Ability to increase the antenna rotation speed up to 44 revolutions per minute
- Able to operate under all kinds of visibility conditions
- Possibility to integrate external sensors and devices
- Capacity to interface and receive signals from up to 2 radar sensors (up to four optionally) and allows the operator to select the transceiver to be used for Oil Spill Detection
- Capability to operate with Consilium radar Sensors or as slave of existing non Consilium Radar

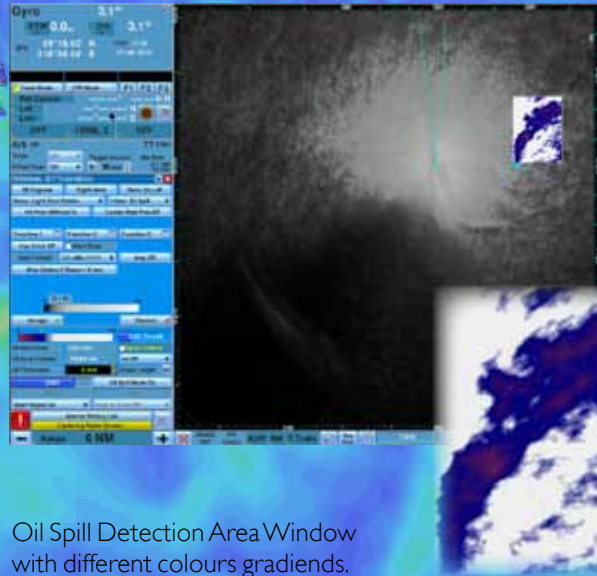


Looking inside the oil slick

The Consilium Oil Spill Detection's main purpose, in order to improve the oil spill response capabilities, is to determinate the maximum concentration of oil inside an oil slick.

With reference to the radar reflectivity scientist literature there is a relation between the reflectivity amplitude and the relative concentration (thickness) of the oil on the sea surface.

The Consilium Oil Spill Detection radar is capable to display, inside the oil spill pattern, the relative oil concentration (thickness) with different colours gradients.



Oil Spill Detection Area Window with different colours gradiends.

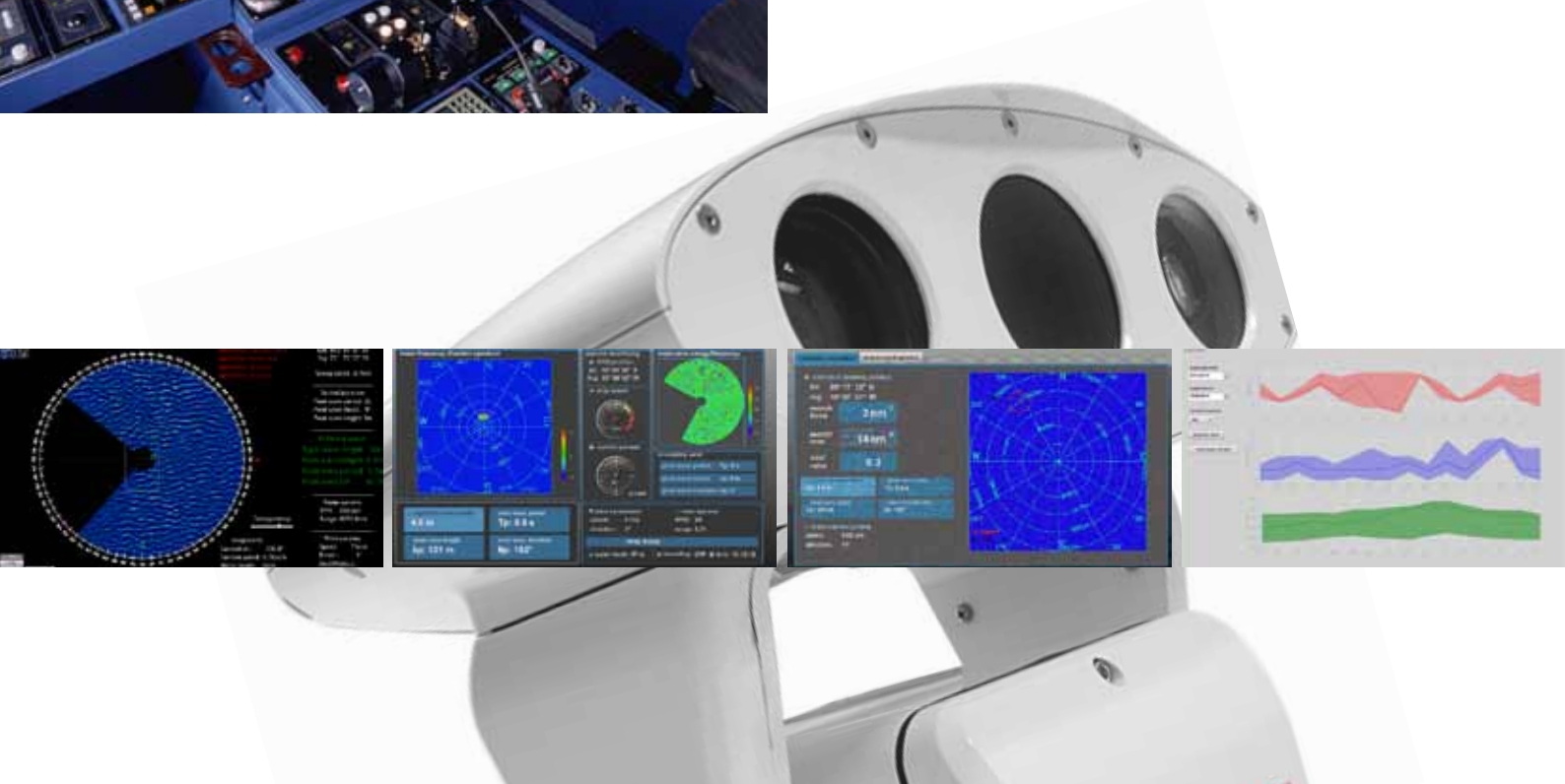


Integrated Navigation and Oil Spill Response & Management Bridge System

A Master/Slave inter-switch board is provided as an integral part of the Selux ST Oil Spill Detection radar system. This means that the oil spill display can easily be interfaced to all on-board radar sensors.

Consilium ECDIS can import weather data files from global meteorological offices and has the functionality to overlay on it selected radar image or oil spill pattern.

Sea State Monitoring, advanced CCTV cameras, meteorological and oceanographic products or services are provided as integral part of the bridge system.



The Selux ST OSD display is produced in three different configurations



Deck configuration

Console mounting configuration

Table top configuration

How it works

In general, the operation of the marine radar is based on the physical phenomenon of backwards “scattering” of microwave radiations. When the microwave radiation waves strike an object, they are reflected in all the directions. The signal is also partially radiated back towards the direction of origin (backscattering), generating an echo on the radar display. The wind causes the regular rise and fall of the water level: the sea waves (waves).

The presentation on the screen of the navigational radar is affected by the presence of the waves. The waves seen by a radar appear as an immeasurable amount of reflective objects that radiate back microwave energy in a completely chaotic and incoherent way over 360 degrees for several miles. The navigational radar has countermeasures to reduce this disturbance caused by waves and makes visible the possible targets.

For the Oil Spill Detection functionality it is vice versa. Echoes from particular waves are required. Ripples, called capillary waves, appear on smooth water when the wind blows due to the friction of air flowing over the sea surface.

The echoes from the sea surface, in terms of microwave radiation, meet the law of the surface reflectivity.

The microwave radiation reflectivity depends on the angle of incidence, the roughness and the dielectric constant properties of the sea surface. The suppression of the capillary waves by oil viscosity reduces the surface roughness.

The different dielectric constant of the oil results in less radar backscatter. The returning signal from an area contaminated by oil is slightly dampened by both of these factors working simultaneously.

The excellent capability of the Consilium Oil Spill Detection radar, thanks to an advanced real-time signal processing, is able to highlight the dampening of the reflected microwave radiation on the radar display.

Vertical Polarization Antennas

When discussing microwave energy propagation and scattering, the polarization of the radiation is an important property.

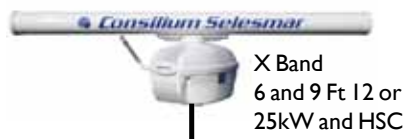
Although imagery in both vertical and horizontal polarizations can be used for slick detection, the vertical imagery is preferred for dedicated oil spill radar sensors. In general, it offers a stronger clutter background than other polarization choices, generating an improved contrast with the oil contaminated areas.

However, in spite of the fact that vertical polarizations are more sensitive than horizontal for slick detection, there are only disadvantages in their use for navigational radars.



Navigation and oil response Bridge Solution

X Band Antenna Group



SELUX ST 340 ARPA
Navigation Radar



Consilium Bridge Network (Lan)

S Band Antenna Group



SELUX ST 340 ARPA
Navigation Radar



Additional two radar sensors
for oil spill (optional)



SELUX ST 340 OSD
Oil Spill Radar



to ECDIS

Interfaced to non Consilium Radar

Existing X Band Radar System



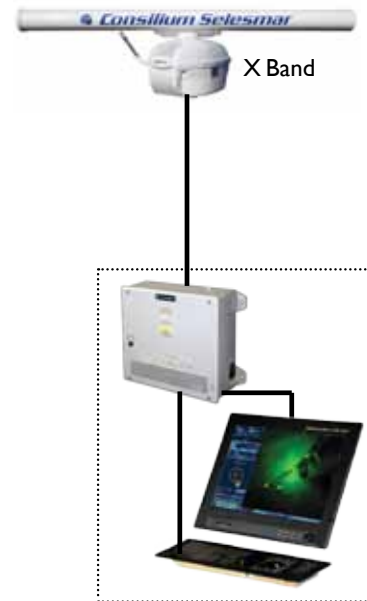
ALPHA RIB
(Radar Interface Board)



SELUX ST 340 OSD
Oil Spill Detection Radar Display

Basic Solution

X Band Antenna Group



SELUX ST 340 OSD
Oil Spill Detection Radar Display

Technical Specifications (Oil Spill Detection operational mode)

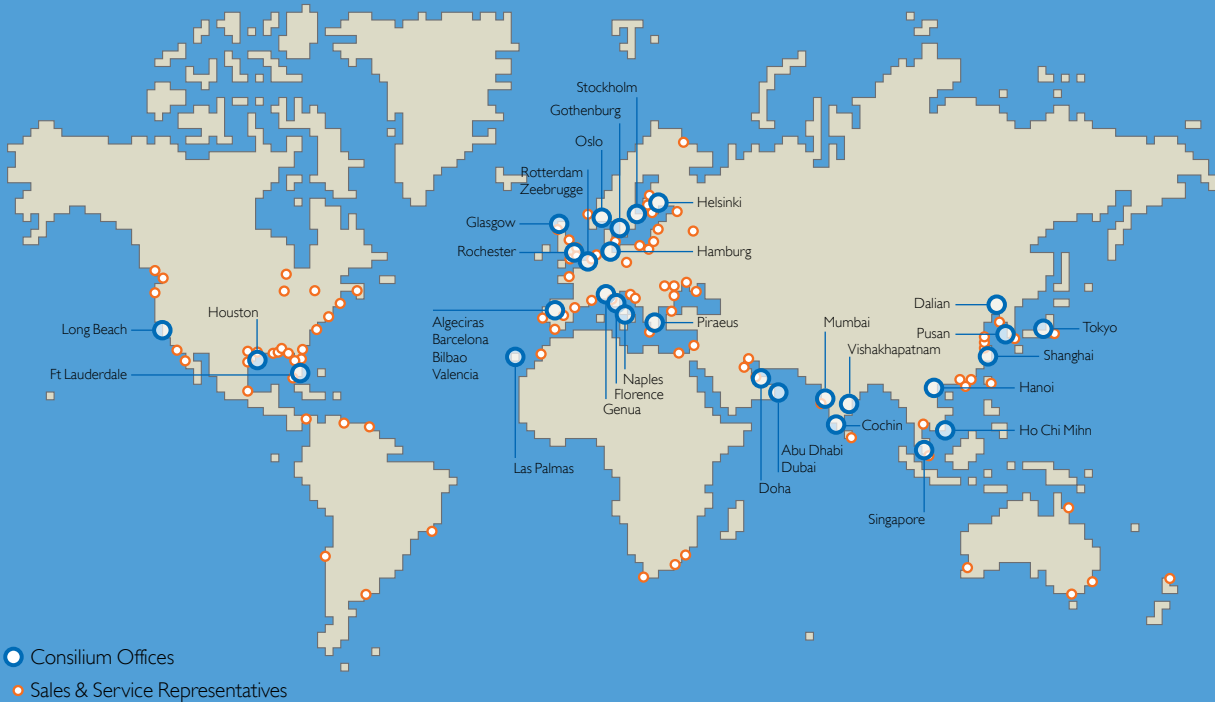
Display		Inputs	
Monitor	19" LCD TFT 23" LCD TFT	Gyro heading	Analog, synchro or stepper Digital Fast NMEA (IEC 61162-2)
Radar picture	>250 mm (12" PPI) >320 mm (16" PPI)	Speed log	Analog: PIT or two axis log Digital: NMEA (IEC 61162-1)
Resolution	1280x1024 1600x1200	EPFS	Serial Interface NMEA (IEC 61162-1)
Presentation Modes	Day/Night modes	Wind	Serial Interface NMEA (IEC 61162-1)
Relative motion (RM)	Head, Course and North Up	AIS	Serial Interface NMEA (IEC 61162-1)
True Motion (TM)	Course and North Up	Output	Serial Interface NMEA 0183 (IEC 61162-1)
Off-centering	Up to 50% of range scales in use		RATTM - RAOSD - RARSD - RAALR - RATLB - RATTD sentences
Range Scales	0.25; 0.5; 0.75; 1.5; 3; 6; 12; 24; 48; 96 nm		Four USB 2.0 port.
Range Resolution	3 m on 0.75 nm range scale	Rules references	
Azimuth resolution	0.1°	Type testing in IMO Resolution A.813 (19), accordance with A.694 (17), MSC 192 (79), MSC 36 (63), IMO Circ. S/N 217 and specified standards:	
Trackball	Polar and Geographical coordinates continuously displayed		IEC 60945 (General Requirements) IEC 62388 (Performance Requirements) IEC 61162-1/2 (NMEA Interface)
Diagnostic	On-line diagnostic programs		
Oil Slick Tracking facilities			
Acquisition	Manual		
Tracking	Manual with automatic dead-reckoning		
Operating History	UTC, Range/Bearing, Speed/Course, Latitude/Longitude, Area, Volume and Thickness. Transferable via USB Memory stick or network.		
AIS facilities			
Presentation	Up to 200 targets chosen as the nearest to own ship		
Safe checking	All 200 targets in sleep or activated stated		
Autoacquisition/			
Guard Zones	Same zones as described for ARPA facilities		
Mapping			
Operator compiled maps up to 120 segments plus symbols and text strings with selectable colours and line styles.			
Map stabilisation	Relative, true (Dead Reckoning) or geographic		
Map storage	By Name, on a built-in non volatile memory. Transferable via USB Memory stick		
Map adjustment	Position and Orientation		
Graphic functions			
Alarms	True or relative time adjustable vectors Target identification number; track-ball marker and true marks. AIS identification number; ship names or call signs. Time adjustable past position plots Own ship shape and activated AIS target shape on lower range scales.		
Data readout			
OSD Target data	Range/Bearing, Speed/Course and Latitude/Longitude.		
AIS Target data	Ship Name, MMSI, Call Sign, Range/bearing, speed/course, CPA/TCPA and Latitude/Longitude, Type, Status, Destination, ETA, ship size, AIS class.		
Own ship data	Heading, Speed/Course water or ground stabilized, wind speed and direction, Geographic position and UTC time.		
Oil Spill area	Automated calculation of the oil spot area in Km ² or m ² .		
Oil Spot volume	Computed calculation of the oil spot volume in barrels.		
System setting	Oil Slick Thickness.		
Alarms	Acoustic and visual warning for: System and external interface sensors (EPFS and AIS) failures.		
		X-Band Radar Up-mast	
		Peak Power (kW)	12 or 25
		Pulse length (nsec)	60 - 250 - 800
		PRF (Hz)	3000-1500-750
		Antenna model	6X 9X 12X
		Gain (dB)	29 31 32.5
		Horizontal beam width at -3 dB (°)	1,3 0,9 0,7
		Vertical beam width at -3 dB (°)	22 22 22
		Weight of Antenna (kg)	40 44 49
		(incl. Pedestal with Transceiver)	
		Nominal Rotation speed (RPM)	22 or 44
		X-Band Radar Down-mast	
		Peak Power (kW)	25
		Antenna model	6X 9X 12X
		Weight of Antenna incl. Pedestal (kg)	38 42 47
		S-Band Radar Up-mast	
		Peak Power (kW)	30
		Pulse length (nsec)	60 - 250 - 800
		PRF (Hz)	3000 - 1500 - 750
		Antenna model	12S
		Gain (dB)	27.5
		Horizontal beam width at -3 dB (°)	2.0
		Vertical beam width at -3 dB (°)	22
		Weight of Antenna (kg)	255
		(incl. Pedestal with Transceiver)	
		Nominal Rotation speed (RPM)	20
		S-Band Radar Down-mast	
		Peak Power (kW)	30
		Weight of Antenna kg	220
		(incl. Pedestal)	
		Sea State Monitoring System (Add-on option):	
		Wavelength, period and direction of the dominant waves	
		Significant wave height.	
		Superficial currents.	
		Space-time reconstruction of wave height.	
		Bathymetry and current maps. (Optional)	
		Wreck search (Optional)	
		Shoal detection and alert (Optional)	
		Environmental Conditions	
		Operating temperature	
		Display Unit	-15° to 55°C (IEC 60945 protected equipment)
		Antenna group	In-door -15° to 55°C

Global Service Network
Consilium Marine & Safety is represented in more than 50 countries and has a presence in the most frequently used ports around the world. Customers are able to obtain spare parts or conduct servicing via the network of subsidiaries and agents. So no matter where they are they are never far from a Consilium expert.

After sales support you can rely on
Consilium prides itself on providing customers with the benefit of a highly trained and resourceful after sales team. Each member of the team is fully experienced so customers have the added assurance of knowing that when they buy from Consilium complete customer satisfaction is an essential part of the deal.

Training on demand
To help customer to get the most out of our equipment Consilium offers educational courses and training seminars from their global network of offices. So should a customer have a special requirement Consilium representatives can help arrange and conduct specific seminars where attendees can discover everything there is to know about a particular product and its functions.

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