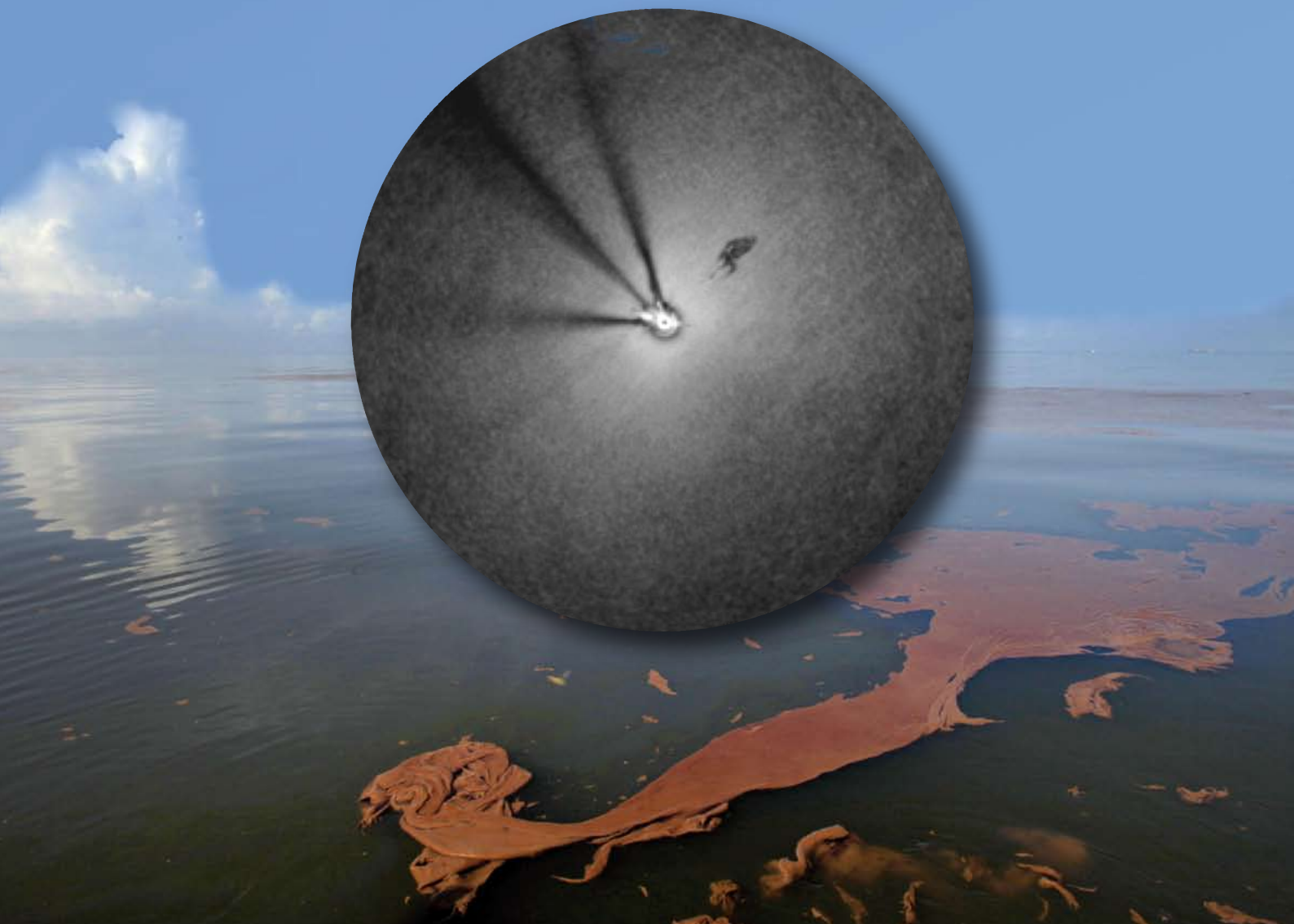
OIL SPILL DETECTION SYSTEM

Using a high resolution X-band radar, the Oil Spill software can detect and monitor oil spills on the sea surface. Using a combination of fast up date rates, great horizontal resolution and low detection limits, the system detection is both technologically at the forefront and an established tool in oil spill recovery operations.

APPLICATIONS

- □ Water pollution at sea and rivers
- □ Can be integrated into VTS/VTMIS
- □ IR camera optional aid
- □ Limited budget, long life programs requiring no need for satellite comms
- □ Detection of pollution of sea waters surrounding off-shore oil platforms



WHY OIL SPILL DETECTION?

- Oil water pollution is one of the most damaging environmental concerns of today as the number of gallons of large oil spills is 37 million gallons per year.
- On land, oil spills are usually localized and thus their impact can be eliminated relatively easily. In contrast, marine oil spills may result in oil pollution over large areas and present serious environmental hazards.
- The primary source of accidental oil input into seas is associated with oil transportation by tankers and pipelines (about 70%), whereas the contribution of offshore drilling and production activities is minimal (less than 1%).
- Some tankers washing their tanks with sea water. In this way, millions of tons of oil are discharged annually into the oceans.
- The oil floats on water, forming a layer that insulates the water from the air, preventing the exchange of gases. The depletion of oxygen caused kills many marine organisms.
- Eutrophication: the release of phosphate in the waters of seas and lakes increases the algae. When they die, bacterial decomposers consume oxygen dissolved in the water causing the death by asphyxiation of other organisms. The excessive presence of these organisms significantly affects the balance of aquatic ecosystems: it increases the consumption of dissolved oxygen in the water decreases the availability for other life forms like fish.



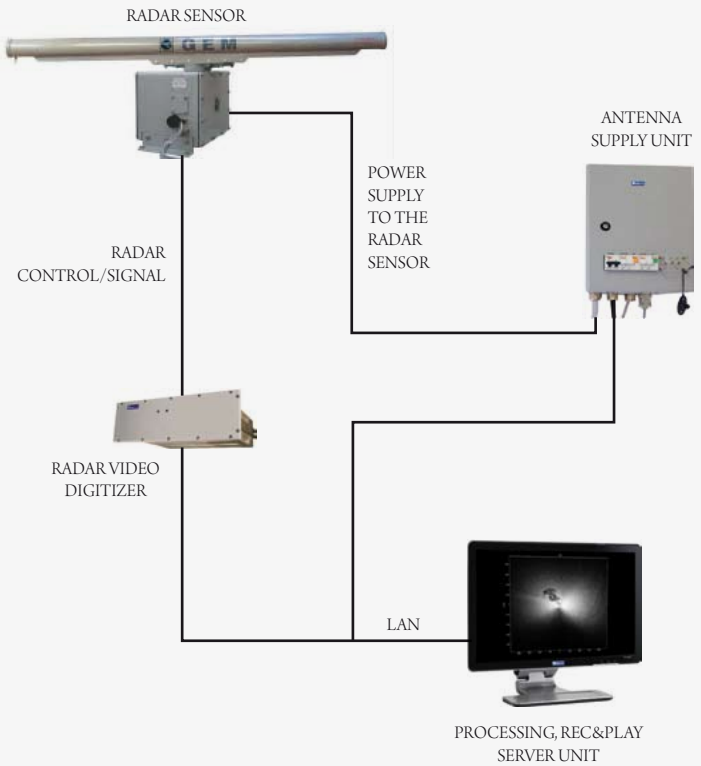
SYSTEM COMPOSITION

1. X-band radar sensor including:
   - 9' or 12' VV-slotted-waveguide antenna
   - 25 kW radar scanner with motor unit
2. Antenna supply unit for selection of several rotation rates of the antenna unit.
3. Radar raw video digitizer unit.
4. Processing server allowing also presentation and record of the oil spill digitized echoes. Includes:
   - Min. 15"LCD flat screen
   - Keyboard
   - Mouse.

The system adopts LAN architecture for fast connection to the external world.

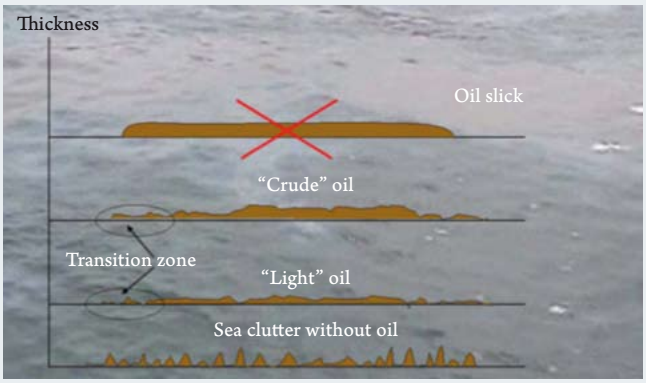
The human interface is very friendly, all main tasks can be operated through the mouse.

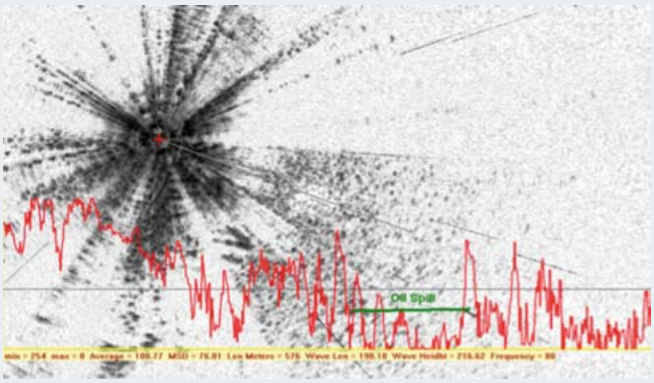
SYSTEM BASIC ARCHITECTURE



SYSTEM PRINCIPLE

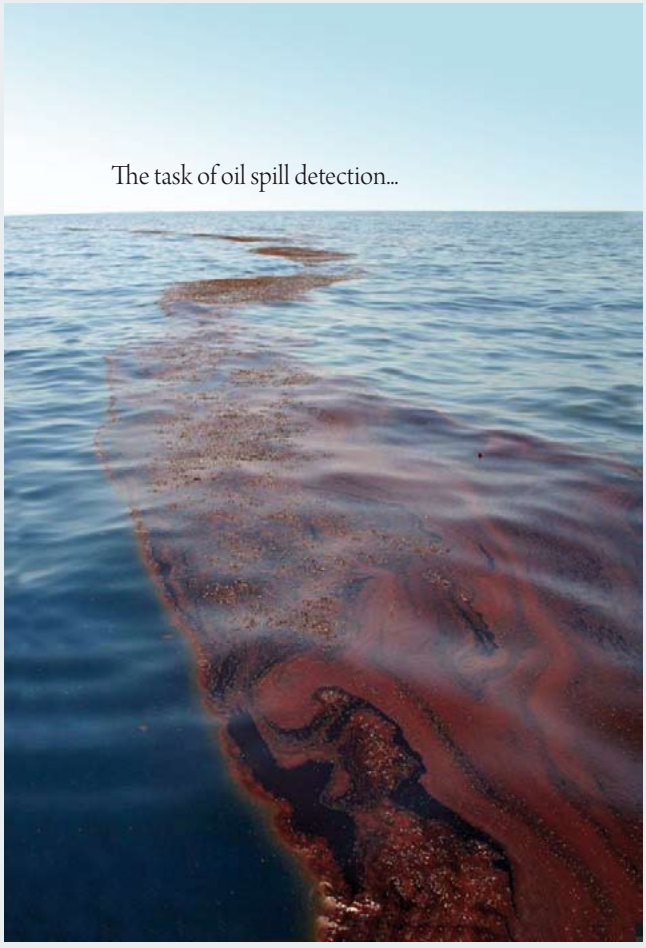
Oil on water is not like a solid, steady object with sharp edges as indicated as the upper slick. Oil slicks have very thin edges and "breathe" with wind and waves. Because of this the shape of an oil slick is not stable. The thickness of oil depends on many parameters like oil grade, air temperature, water temperature, strength of wind etc. The transition zones indicated in the picture above is one of the main challenges
for the Oil Spill Detection System.
These are also the reason why there is a boundary zone defining the extension of the slick and not a pencil beam definition of the edge.





The presence of an oil slick can be detected as a "quiet" sea surface where the reflection from sea clutter is less compared to the surrounding areas. This means that a polluted area will appear in the image as a zone with less sea clutter than its surroundings.

The task of the Oil Spill Detection system is to process the detected image, segment the white spots and present the spots on the PPI scope.



"Thanks to its prominent skillness and experience of radar detection and specific processing techniques, GEM elettronica proposes its compact and advanced solution to foster prevention of sea pollution, either as stand-alone system, or integrated in shore-base systems giving precise description of the surface status and health."

Technical Specification

X-BAND OIL SPILL DETECTION SYSTEM

ARRAY MODEL	9 feet	12 feet
Type	Slotted waveguide	
Frequency band	9410 ± 60 MHz	
Polarization	Vertical	Vertical
Horizontal beamwidth to –3dB	0.85°± 0.1°	0.65°± 0,1°
Vertical beamwidth to –3dB	25°±10%	22°±10%
Gain	31 dBi ± 0.5 dB	32.5 dBi ± 0.5 dB

ENVIRONMENTAL PERFORMANCES

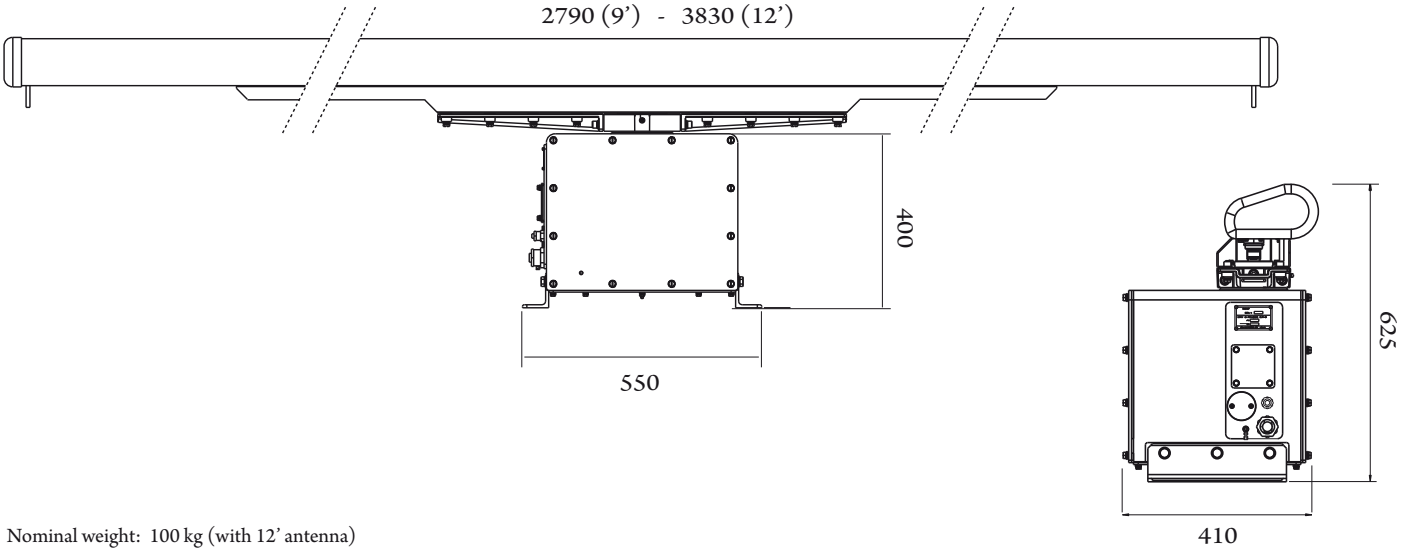
Operating temperature range:	From -25°C to + 70°C
Relative humidity:	Up to 95% at + 40%
Vibrations	In accordance with IEC-945
Vibrations/shocks	1 g from 0 to 50 Hz

TRANSCEIVER UNIT PERFORMANCE

Peak power (nominal):	25 kW
Radiation frequency:	9410 ± 30 MHz.
Pulse Width:	50 ns 80 ns 300 ns 800 ns 1200 ns (± 20nsec; for PW > 300nsec ± 10% tolerance)
Pulse Repetition Frequency:	3200 Hz 2000 Hz 1000 Hz 750 Hz 500 Hz (with ± 5% tolerance – stagger function included)
Receiver type:	logarithmic, fully solid state
Dynamic range:	> 100 dB
Intermediate Frequency (I.F.):	60 MHz ± 2 MHz
I.F. bandwidth:	20 MHz with short pulse (50-80 ns) 8 MHz with medium pulse (300 ns) 4 MHz with long and extralong pulses (800-1200 ns) (with ± 10% tolerance)
Noise figure:	< 4 dB
Interface:	100 MB Ethernet LAN
BITE:	integrated built-in module for replaceable modules testing
Power supply:	115 / 220 Vac, 50 Hz, one phase through ASU-43000 unit

ROTATION UNIT PERFORMANCE

Rotation speed	22 or 40 ± 2 rpm
Tolerable relative wind speed	100 knots (at 22 rpm)
Encoder	4096 pulses



Nominal weight: 100 kg (with 12' antenna)

SURVEILLANCE & SECURITY | GUIDANCE, NAVIGATION & POSITIONING | MILITARY & DEFENCE | MARINE ELECTRONICS

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