

MAJOR PROJECTS

PRECISION NAV-AID FOR DIEGO GARCIA

3.5 MILLION CANDELA PEL-6 LIGHT 2001

VEGA'S TECHNICAL CHALLENGE

- Remote coral atoll in the Indian Ocean
- Dredged access channel 228 metres wide
- Safe anchorage inside for naval vessels
- Vessels up to 41 metres beam would transit daily
- Underwater channel invisible from above surface
- Significant drop off in sea floor just outside the reef
- Unpredictable ocean currents strike vessels side-on
- Entrance buoys would drift and were not accurate enough
- A direction-indicating sector light was desirable
- Only place for a nav-aid was 7.3NM beyond entrance
- Any light had to be visible at 10NM by day
- No commercial power was available at the site
- Site access awkward by both land and sea

VEGA'S SOLUTION

- Use existing PEL-6 Sector Light as starting point
- Design and manufacture a new "projection" section
- Beam would be just 1.6° wide, 3 separate colours
- Central white sector 0.2° wide = 47 metres at entrance
- Solar power system, with on-demand remote control
- Remote monitoring incorporated in remote control
- Lightweight stainless steel for high torsional stiffness
- Designed for 20-year life (with annual servicing)

PEL-6 Sector Light Condenser System

The standard PEL-6 condenser system has been in service for almost 20 years. This uses a 250 Watt halogen lamp with flat filament configuration to provide maximum pickup angle with the smallest diameter of optic.

New 600 mm diameter Projection Optic

Prior to this project the narrowest beam for a PEL-6 light was



3.5° subtense, giving a range of almost 6 Nm by day. Reducing this subtense to 1.6° allowed the intensity to increase 4.8 times to 3,500,000 candela in the white sector. But this required an optic 600mm diameter. To reduce projector length a double-folded optical system was deployed, with two Mangin mirrors.

Stainless Steel Tower

To achieve the required resolution the tower was required to be torsionally stiff, with less than 0.01° deflection allowable at the top. The tower was designed using marine-grade Avesta stainless steel to achieve the high stiffness and long life in the marine environment without painting or other maintenance. No security fencing was required because site access is controlled.

Solar Power Supply

There was no option but to use solar power. With only 1 transit per day a significant saving was made by using a radio controlled switch with a 2-hour timeout. The solar power system

was installed entirely on the top platform to minimise voltage losses in cables and susceptibility to lightning that would be a problem with long vertical cable runs.

Remote Monitoring and Control

Since a radio link was to be in place, for a small additional cost a complete remote monitoring system could be supplied. This monitors parameters such as the state of battery charge, and number of lamps remaining in the lampchanger. An emergency over-ride switch is provided on the tower in the event of complete radio failure.



SPECIFICATIONS

Signal Light

Light Type	PEL-6-1.6D with 24Vdc halogen lamp
Power Consumption	250 Watts at 24Vdc when operating, 130mA idle
Peak Intensity	3,500,000 candela in white sector
Day Range	Up to 10 Nm depending on viewing conditions
Night Intensity/Range	Reduced to 1% of day intensity, more than 22Nm
Individual Sectors	Left to Right: Red 0.7°, White 0.2°, Green 0.7°
Beam width at entrance	380 metres total (at entrance to channel)
Width of white sector	47 metres at entrance to channel (range 7.33NM)
Dimensions	650mm diameter x 750mm long
Weight	300kg
Boundary Resolution	1 minute of arc = 4.6 metres at 7.33NM
Construction	Materials Marine grade aluminium, optical-quality glass
Finish	Anodised, epoxy primer, 2-pot marine polyurethane

Tower

Material	Avesta stainless steel, all welded construction
Light Centre Height	10.3 metres from base of tower
Maximum Height	13.75 metres to top of lightning conductor
Wind Rating	Rated to 120 knots wind velocity without damage
Torsional Deflection	Less than 0.01° at design wind velocity
Access	Secure door, internal ladder
Finish	Unpainted
Design Life	In excess of 20 years in marine environment

Solar Power Supply

Solar Panel Type	6 x Siemens SP 75 panels
Solar Array Peak Output	225W at 24Vdc
Battery Type	8 x Sonnenschein A412/120
Battery Capacity	480 Amp-hrs at nominal 24Vdc
Solar Regulator	Morningstar Pro-Star 30

Remote Monitoring

Monitoring system	VegaTEL, VHF radio communication
Interfaces fitted	VC-30 PEL (sector light), VC-30 P (solar panels)
Power Consumption	72mA continuous (all monitoring equipment)
Antenna	Directional, Yagi type

Lightning Protection

Active Air Terminal	Erico Dynasphere Mk 3 Gold
Down-Conductor	Erico E1, 50 sq mm, tri-axial

