

International Tug & Salvage

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■ Euroyard focus ■ Fire-fighting ■ Engine room

Avoiding the partial load dilemma

As reported in the March/April edition of *IT&S*, Foss Maritime Company, based in Seattle, USA, has taken delivery of *America* and *Pacific Star*, two Robert Allan designed AZ 30/80 tugs leased from Signet Maritime Corporation of Houston. Recently, both owners and operators have praised the operation of the main switchboards designed and built by Industrial Power Systems, (IPS), of Jacksonville, Florida.

"The Martinac Shipbuilding Corporation set out to resolve a notorious problem encountered in the design of the electric plant on tug boats. The solution came in a power management system designed and built into the main switchboard by Industrial Power Systems," said Gary Farrell, the yard's chief electrical designer.

Many large escort and ship-assist tugs employ an electric hawser winch that can be greater than half the ship's total load. Because these winches are deployed infrequently, often for as little as 15 minutes a day, and the vessels work 24/7, a typical diesel generator set sized for the full load will operate most of the time at partial load. This negatively impacts the reliability and cost-efficient operation of diesel engines.

As Farrell explains: "Operating a generator set in an under-loaded condition like this causes the diesel engines to slobber and carbon-up. The result is excessive down time and maintenance costs."

To resolve the partial-load dilemma, the shipyard and owner determined that 99kW was the correct size based on load analysis and the operating scenario for the winch.

Two 99kW generator sets – one lead, one standby – would each be capable of carrying the normal 24-hour, 70kW ship service load at an acceptable 70 per cent load factor, and have sufficient power in reserve to operate



the 56kW electric hawser winch at 50 per cent load.

To solve the problem of making full power available for the winch on-demand and maintain full ship service operations without interruption, Martinac asked Industrial Power Systems to design a power management system that would provide complete control functionality for the full range of operating scenarios. There were additional design considerations: due to manning levels on this type of vessel, the control system had to be fully automatic and available engine room space dictated that a specific, compact envelope had to be met.

Bill Young, president/CEO and chief technology officer of Industrial Power Systems said: "Our first priority is to find out what the customer needs and wants and then offer the highest quality product at a competitive price and deliver it on time."

The IPS main switchboards are designed for protection and control of two 480V, 99kW

generators and one 100-amp shore power connection. Full automatic control of generator starting, stopping, paralleling, synchronising, load sharing, load shedding and bus connection, based on load demand, is built into the system.

The IPS switchgear includes several modes of operation: automatic, load shed, manual and shore power transitions. In automatic mode, power is limited to the winch when one generator is on-line and providing ship service power. When ship's load reaches 90 per cent of a single generator's capacity for a predetermined time, a second generator is automatically started and connected to the bus allowing the winch to operate on full power. When the ship's load falls below 60 per cent of a single generator's capacity, the lag generator is taken off line and put into cool down. If the lead generator shuts down for any reason the lag generator automatically starts and connects to the bus.

Load shedding is initiated by an excessive drop in generator frequency, usually occurring when a second generator is not available to share the load. Feeder breakers assigned to pre-selected non-vital loads will trip automatically, in sequence, to prevent an overloaded generator from tripping off-line.

The ABS-certified switchboards include all engine and generator controls and instrumentation, and accommodate two integrated 480V busses and a 208Y/120V bus, all contained within the prescribed 1,760mm x 1,830mm x 560mm envelope.

Joe Martinac, president of Martinac Shipbuilding, called the IPS electrical controls: "A nicely engineered system, it works like a charm. And we got great support from IPS."