



Exhaust Systems and Plume Coolers for the Leviathan Platform

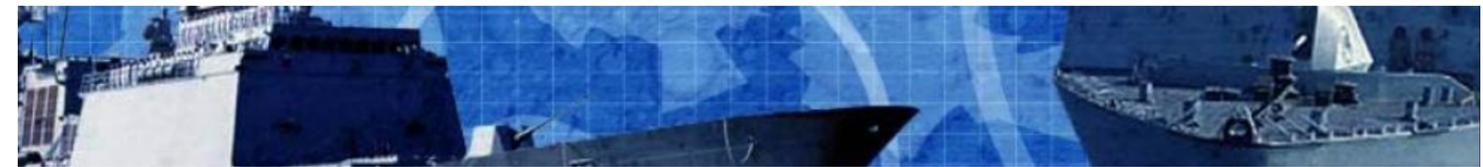
Davis has successfully designed and supplied the hot-case exhaust systems and plume coolers, complete with support structure, to Noble Energy for the 3x Solar Taurus 70 gas turbine main power generators on the Leviathan offshore energy platform.



Exhausts and Plume Coolers for Solar Taurus 70 main power generators on Leviathan

Brief Updates

- Davis and Sungshin Enstec (SSE), our South Korean partner for naval and aircraft exhaust systems, have completed delivery of the IRSS systems for the diesel engines, and both the uptake and IRSS on the MT30 gas turbine engine, for ships 3 and 4 of the ROKN FFX-II frigate. We have also recently delivered the IRSS devices for ships 5 through 8 of the ROKN PKX-B ship.
- Davis has been selected by Fincantieri for the design and supply of the IRSS for the Qatar Doha class corvette. A total of 4 ships will be built.
- We have been awarded the contract by CSBC Corporation to design and supply the IRSS devices for the new ROCN (Taiwan) LPD ship. Four ships are planned.
- We completed the design and manufacture of the plume cooling systems for the gas turbine and diesel engines on the new Italian Navy LHD ship.
- Davis has been awarded a contract by Navantia to supply IRSS devices for the Avante 2200 Corvette. A total of 5 ships will be built.
- Davis recently completed the delivery of the LM2500 plume cooling system for ninth ship of the USCG Deepwater National Security Cutter (NSC) program.
- We have recently been awarded a contract by Naval Group to design and supply the infrared suppression systems for the new French frigate, the FTI class.



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Davis

Davis Delivers Engine Auxiliary Systems for First Royal Navy Type 26 Frigate

The RN Type 26 frigate has been steadily progressing through its detailed design and construction phase. The CODLOG propulsion system uses one RR MT30 gas turbine engine and four MTU Type 20V diesel engines. Davis is the supplier for the complete engine auxiliary systems for all the engines.

Deliveries for the first ship set of the downtakes, uptakes, and IRSS began in October of this year and continue through to February 2020.

BAE Systems (Glasgow) has been marketing the ship class under the Global Combat Ship (GCS) brand, and both the Royal Australian Navy and the Royal Canadian Navy have now selected the frigate for their Hunter and Canadian Surface Combatant (CSC) programs respectively.

In total, 32 ships of the class are planned for construction (8 for the RN, 9 for the RAN, and 15 for the RCN).



Indian Navy P17A Frigate



UK Royal Navy Type 26 Global Combat Ship

GE Selects Davis for Indian Navy P17A LM2500 Intakes and Exhausts

The Indian Navy is building seven new ships of the P17A frigate class.

The main propulsion engines for the ships are two GE LM2500 gas turbines.

GE has contracted Davis to perform the design and supply of the complete intake and exhaust systems for the engines.

Since engine performance is sensitive to the design of the intake and exhaust systems, the Indian Navy was motivated to have a single supplier, GE, take responsibility for the entire system. Davis has been a reliable supplier to GE for over 20 year, and as an experienced designer of intake and exhausts systems, we could be relied upon to supply a system which would ensure that GE meets its performance requirements.

The delivery of all seven ship sets is scheduled to be complete by the end of 2021.

Davis

ShipIR/NTCS Update

IR Countermeasure Tactics Investigation by Missile Engagement Simulation

The Naval Threat Countermeasure Simulator (NTCS) has recently incorporated new features and refinements to allow users to evaluate IR soft-kill countermeasure effectiveness.

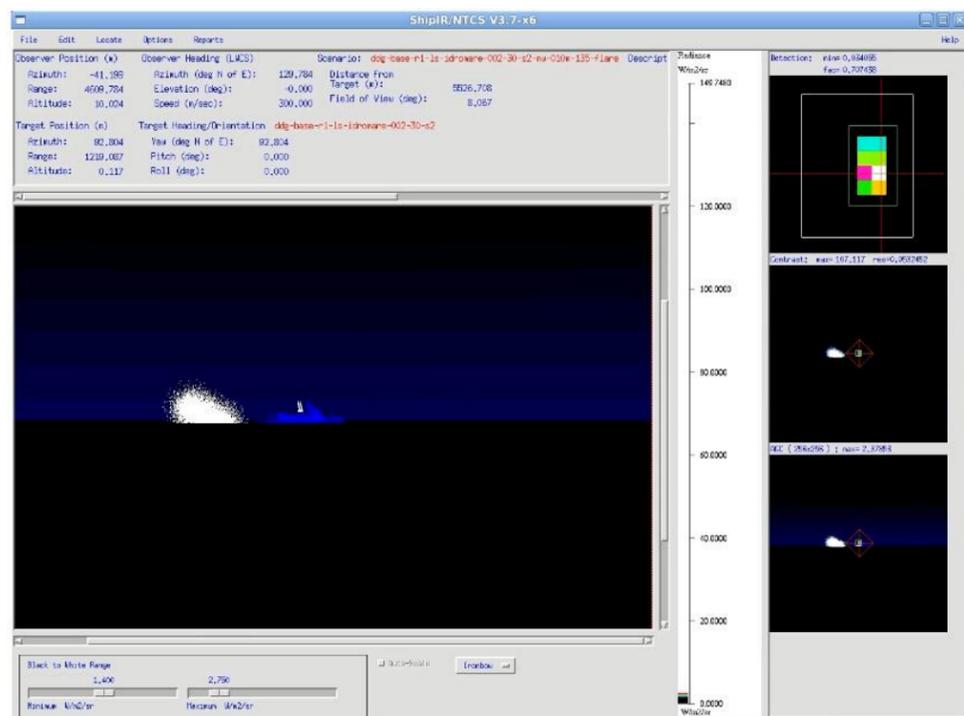
- Refinement of the flare model to accurately represent IR emission, spatial, and temporal characteristics;
- Improvement to the seeker algorithm for robust tracking and flare rejection through an Automatic Track Gate (ATG);
- Ability to schedule the flare launch sequence in accordance with the system specified on the ship; and
- Improved scripting functions to efficiently run multiple engagement trials and so achieve a statistical measure of countermeasure effectiveness.

NTCS has a unique capability to combine a sophisticated and realistic IR engagement simulation with a high fidelity model of the ship signature. It is the only tool in use today in the world which combines these capabilities.

We are currently participating in two NATO System Concepts and Integration (SCI) task groups: *EO and IR Countermeasures against Anti-ship Missiles (SCI-224)*; and *Expanded Countermeasure Methods against IR Anti-ship Threats in Varied Parameter and Scenario Engagements using All-digital Tools Sets (SCI-310)*.

We hope through our participation in these groups to share knowledge on defensive tactics and to compare the effectiveness of different tactics on a common IR simulation platform (i.e. enable apples-to-apples comparisons).

NTCS allows users to evaluate tactics using the built-in Davis IR seeker or to program their own seeker through an easy-to-use software plug-in.



Status of tracking algorithm displaying current inner and outer track gates

Line-by-line contrast with state of lock (in red diamond)

IR scene at resolution of the seeker

Power Plant Exhaust Dispersion Device for Reducing Plume Buoyancy Near Airports

Large gas-fired power generating plants (~300+ MW capacity) produce a hot exhaust plume which due to its buoyancy creates an uplift of air far above the plant.

Although the upward speed of the exhaust plume decreases with height, it can still be high even at 1 km above the plant. If the plant is located close to an airport, this creates a safety hazard for aircraft taking off and landing.

Regulations have been created which limit the upward speed of buoyant plumes in proximity to an airport.

To help provide more flexibility in locating power plants, Davis has developed a plume dispersion device which significantly lowers the plume buoyancy and so the upward velocity of air at 500-1000m above the plant.

The device is installed at the top of the exhaust stack and asserts a small backpressure on the gas turbine engine.

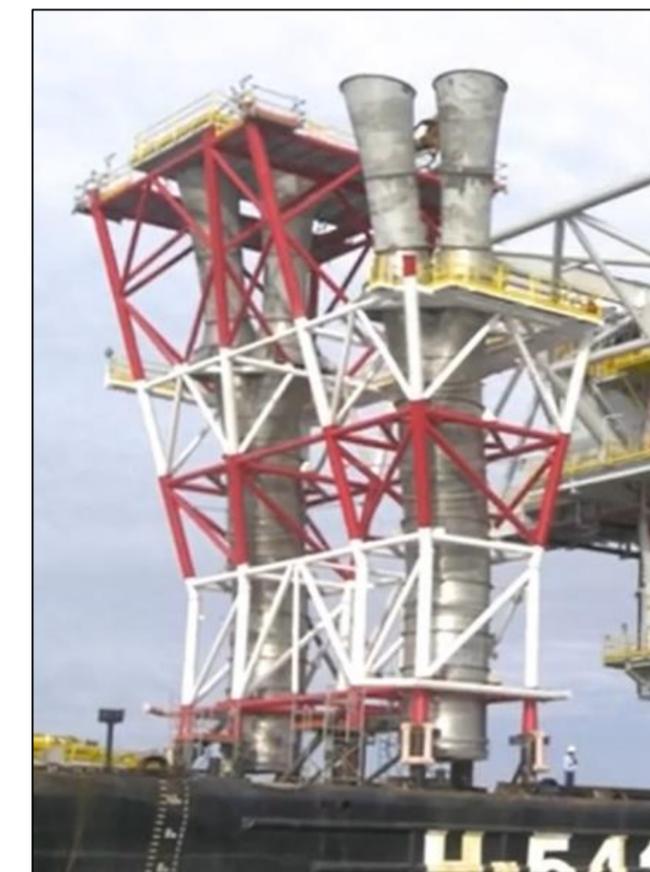
Davis Supplies Exhaust System and Plume Coolers for Peregrino II

Davis has completed the design and manufacture of the custom exhaust systems for the two GE LM2500+G4 engines on the Equinor Peregrino II program.

WoodGroup had contracted Davis in 2016 to perform the exhaust plume dispersion analysis for the engines in order to determine whether any harmful effects would be observed at the helideck or the crane systems. Using the Davis proprietary empirical plume trajectory prediction tool (PLUMTRAJ) we were able to quickly determine the height, location, and cooling characteristics of plume coolers that could mitigate any problems.

We were then contracted by Kiewit, the construction company for the project, to design and build the two 40m custom cold-case exhaust systems complete with the support structure and plume coolers.

Delivery of the systems occurred in late 2018 and their installation on the rig in Corpus Christi has recently been successfully completed.



Top Section of Peregrino II Exhaust System Captured during Sail-away