

Davis

NEWSLETTER

March 2001, Issue 10

COOLED EXHAUST DEVELOPED FOR AGUSTA-BELL AB139 MEDIUM HELICOPTER

In January 2000, Davis Engineering was awarded a contract to develop a Cooled Exhaust System (CES) for the AB139 helicopter by Agusta (Italy). The AB139 is a new helicopter, targeted at both civil and military markets, and is currently under development as a joint venture between Agusta (Italy) and Bell Helicopter Textron (USA).

DAVIS was asked to apply our specialized knowledge of engine exhaust cooling to the two P&WC PT6C-67C gas turbines that power the aircraft. The aim was to lower the internal compartment temperatures, while not incurring performance penalties, or requiring excessive use of insulation.

The CES entrains air by ejector action through a number of gaps in order to lower the metal temperature of the exhaust and drive compartment

cooling air flow. The system is passive and does not require cooling fans or moving parts.

The CES was developed at DAVIS, making extensive use of both commercial and proprietary CFD codes and full-scale models, tested at temperature, on our Hot Gas Wind Tunnel (HGWT) test facility. Heat transfer predictions were made using the ShipIR/NTCS program. The helicopter fairings surrounding the exhaust, and compartments through which it passed, were all mocked-up in full-scale for an accurate measurement of air flow and compartment temperatures.

These CES prototypes will be used for both ground and flight testing in Italy, and for a structural qualification test program undertaken in parallel in Canada. The structural qualification will

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Bell/Agusta AB139's first flight from Agusta's Cascina Costa facility on February 3

Focus

As noted in our last Newsletter, our growth is in the international marketplace, and to serve that market more effectively, we have incorporated DAVIS Engineering International Inc., which will focus on international marketing and R and D (see article, page 3).

Although we have had a presence in Australia, South Korea and Italy, these countries are new markets for our stealth equipment, and last year we were successful in signing contracts for our ASG system in Australia, and our IR suppressors in Korea and Italy.

Our contract with Agusta (Italy) also marked the first time our technology has been used for non-defence purposes on a helicopter; in essence a dual-use application (see adjacent article).

The application of our IR suppressor technology to helicopters now has a solid basis for expanding our sales in this field. By mid-2001, we will have suppressors operational on approximately 200 military helicopters, providing very effective passive self-protection.

In the coming year, we expect to continue to expand into the international marketplace in both naval and air environments.

Rolly Davis, P.Eng.
President

IR SUPPRESSION FOR THE KOREAN KDX II DESTROYER

DAVIS Engineering International Inc. has recently been awarded contracts by both Daewoo Shipbuilding and Marine Engineering (DSME) and Hyundai Heavy Industries (HHI) to supply Infrared Signature Suppression equipment for the new Korean

Destroyer (KDX II). All engine exhausts (propulsion and electric power generating) will be suppressed.

The lead and third ship are being built by DSME at its shipyard in Keoje-City and the second of class

is being built by HHI at its shipyard in Ulsan. Delivery of the first shipset of hardware is expected to be made in September of this year.

Previous to the hardware contracts, DAVIS was also awarded a contract by DSME to provide Engineering Support for both infrared and radar signatures during the detailed design of the KDX II.

The modeling and analysis work performed under this contract will ensure that the signature targets will be realized during the detailed design and construction phases of the ship program. The RCS related work was subcontracted to IABG (Germany).

DSME has adopted a very rigorous approach to the design and construction of the KDX II. Detailed IR and RCS models of the ship will continually be upgraded and analyzed based on the progression of both the detailed design and manufacture of the ship. This process will ensure that the final ship configuration will meet the established signature specifications.



Artist's Sketch of the KDX-II Frigate

Cooled Exhaust for Agusta-Bell AB139

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include environmental vibration and shock tests, and endurance cycling on the HGWT. The prototypes are all manufactured at the DAVIS facility in Ottawa using a combination of stainless steel and titanium components. The first of these prototypes was

delivered to Agusta in November, 2000.

In addition to the standard version of the CES, which is intended for commercial helicopters, DAVIS has also designed a military variant. An IR suppressor

replaces the end section of the CES. This suppressor is designed to be retrofitted onto the CES, and reduces the IR signature significantly from all view angles.

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Davis



André Lavergne

EMPLOYEE PROFILE ANDRÉ LAVERGNE, WELDING SUPERVISOR

André joined DAVIS in 1983 as a Welder Fitter. As the company grew, so did André's expertise in the welding field, he advanced to Welding Supervisor and has held that position for ten of his eighteen years with DAVIS.

André's versatility and mechanical knowledge has also allowed him to supervise many DAVIS manufacturing projects over the years.

In his spare time André will often be found fishing, and we have heard many stories about the ones that got away.

André enjoys the outdoors and if not out in the wilds he will be found lounging about his pool at his home in Rockland with his wife Joanne and their children Tanya and Cedric.

Cooled Exhaust for Agusta-Bell AB139

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"This is the beginning of what we expect to be a significant involvement of Canadian industry in the production of this new and exciting helicopter. Not only do we

believe the AB139 will be a major player in the medium lift market segment over the next two decades, but we also believe that this agreement will enhance Davis

Engineering's ability to gain access to other rotary-wing opportunities," said Paul Costanzo, President of Bell Helicopter Textron's Commercial Helicopter Division, located in Mirabel, Quebec.

DAVIS OPENS INTERNATIONAL OFFICE

During our first 25 years of operation, the company has evolved from a diversified consultancy, serving a primarily Canadian market, to a specialized defence contractor servicing the international market. Today we have representatives, clients and installations in more than twenty-five countries.

For several reasons, we have decided to concentrate our marketing, research and product development activities in

DAVIS Engineering International Inc.
Contact: C.E. Davis, President

Tel: (246) 428-3828
Fax: (246) 420-9233
Email: info@davis-eng-intl.com

which has been located in Barbados. Barbados, the most easterly of the Caribbean islands, is located on the south eastern edge of the Caribbean Sea. It has the third oldest Parliament in the Commonwealth, and became a Sovereign nation in 1966.

DAVIS International will conduct its own research and product development, and application engineering relative to contracts with international customers. DAVIS

International will contract with DAVIS Canada for manufactured product, or with other subcontractors when there is a commercial advantage.

Due to the power of the internet and inter-office communication, we are able to maintain real-time links between our offices, and the effect of this initiative on our customers will be largely unnoticed.

As always, all members of the DAVIS group will continue to be available to answer questions as required, and the DAVIS group will continue to stand behind all our products.

Australian FFG Upgrade Project

In June 1999, the defense contractor ADI Limited of Australia signed a contract to upgrade the Royal Australian Navy's six guided missile frigates (FFGs). That contract provides for the significant upgrading of the frigates' combat system to increase their operational effectiveness against regional threats and to ensure their supportability.

ADI's upgrade includes upgrading the MK92 Mod 2 fire control system, the command and control system, the provision of an onboard training system, and the installation of a vertical launching system MK41.

Also included in the upgrade is the enhancing of the mine counter-measure capability by the reduction of the underwater Electromagnetic (EM) signature. Davis Engineering is a subcontractor to ADI on this program, supplying our Active Shaft Grounding System. Manufacture of six shipsets began in the summer of 2000 and delivery will take place in the fall of 2001. Our contract also includes documentation and operation and maintenance training. Training will take place at DAVIS in the spring of 2001.



RAN FFG Frigate will be fitted with the DAVIS ASG system

The Active Shaft Grounding system has well known benefits. It reduces the underwater Extra Low Frequency Electromagnetic (ELFE) signature minimizing the susceptibility to naval mines and surveillance equipment. As well, it reduces the corrosion of shaft bearings and seals due to shaft current, by providing an

alternate, low impedance path from shaft to hull.

The ASG system has been specified by the USN for all new surface ships and submarines, and has been adopted by the navies of five countries. There are currently a total of over one hundred ASG systems operational.

LINUX VERSION OF SHIP/NTCS

In the previous Newsletter (Issue 9), DAVIS announced the release of a PC-version of ShipIR/NTCS for Windows NT. Although the PC (NT) version has achieved success with its desktop convenience and price advantage (along side other NT applications), it still lags behind the SGI (UNIX)

version of ShipIR/NTCS in terms of speed and accuracy.

With the release by Metro Link (www.metrolink.com) of a fully SGI-compliant version of OpenGL for Linux Intel/x86, development efforts are already underway to produce a Linux version of ShipIR/NTCS. It is

hoped that current speed and accuracy limitations of the Windows NT platform can be overcome by porting to the Linux version of OSF/Motif and OpenGL. This would make the PC Linux version fully-compatible with that of the SGI. We will keep you informed of our progress via the DAVIS website (www.davis-eng.com).

BRIEF UPDATES

- The second shipset of IR suppressors for the Spanish F-100 frigate was delivered to Bazan, Ferrol in December, 2000.
- David Vaitekunas had a very busy year, giving the ShipIR/NTCS training course to the following groups during 2000:
 - Centre Technique des Systèmes Navales (CTSN) in Toulon, France;
 - Agency for Defense Development (ADD) of South Korea in Munich, Germany;
 - Naval Research Laboratory (NRL) of the USN in Washington, D.C.;
 - Chung Shan Institute of Science and Technology (CSIST) in Taiwan;
 - DCN (Ministere de la Defense) in Lorient, France;
 - Royal Netherlands Navy (RNLN) in the Hague, Holland; and
 - Norwegian Defence Research Establishment (NDRE) in Oslo, Norway.
- DAVIS designed and supplied a hailgun to the Engine Laboratory of the National Research Council in October, 2000. The hailgun will enhance NRC's capability to test gas turbine engines at their Ottawa Facility.



Jim Thompson of DAVIS attended the Seminar and Exhibition on Aerospace Weapons System 2000 (SEAWS) in Seoul, Korea to demonstrate our helicopter IR suppressor technology. Shown above, from left to right are: unidentified, Mr. Y.T. Cheon (former Minister of National Defence), Jim Thompson, Mr. Kim (Sungshin) and Mr. Jeon (Sungshin). Sungshin Mechatronics Co., Ltd. represents DAVIS in Seoul.

- David Vaitekunas presented a paper at the Fourth Joint International Military Sensing Symposia (MSS) in Paris, France, entitled "IR Vulnerability of Modern Warships Using ShipIR/NTCS" on September 22, 2000.
- Rolly Davis presented a paper entitled "Lowering Warship Signatures (IR and EMF)" at

the Pursuit of Stealth Conference in London, England, on February 22, 2000.

- In December, 2000 DAVIS signed a contract with the Royal Norwegian Air Force to supply IR suppressors for their AB412 helicopters that will be operational in Kosovo, as part of Norway's peacekeeping force.

SHIPIR/NTCS UPDATE

The naval ship infrared target, threat and countermeasure simulator (ShipIR/NTCS) continues to grow as a world standard in predicting the infrared signature of maritime targets and backgrounds.

With the addition of 3 new NATO licenses (Norway, Poland, Turkey) and 5 new commercial licenses, there are now a total of 34 NTCS users worldwide.

Recent upgrades to the thermal model in NTCS (v2.8) have involved the further refinement and spectral segregation of thermal radiation into both solar and thermal wave-band regions, and has since been shown to have a marked improvement over previous versions (see side graph).

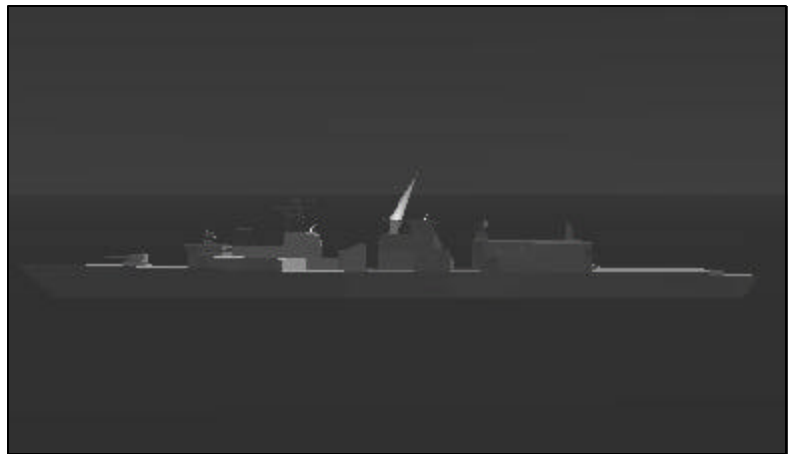
These and other model enhancements will be put to the test during an upcoming NATO-sponsored Ship Infrared Model Validation Experiment (SIMVEX), to be held later this year in Canada.

The objective of this new measurement will be to compare and validate the radiometric measurements of different participating NATO countries, and to generate a high-quality (unclassified) radiometric database for subsequent collaborative efforts to validate the ShipIR model.

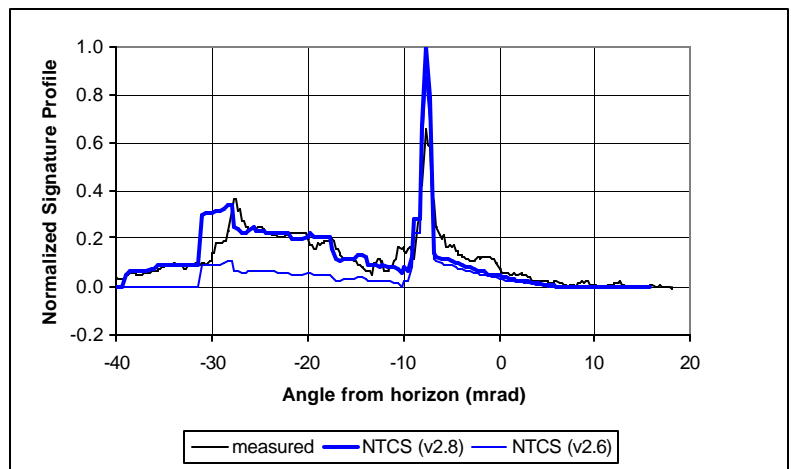
These and other ShipIR projects will be discussed at the next NATO TG.16 ShipIR Workshop, to be held at the German Research Institute for Optronics and Pattern Recognition in Ettlingen, Germany on March 21, 2001.



Trial Measurement



Trial Prediction



Trial Comparison (v2.6 versus v2.8)

For further information please contact:

W.R. Davis Engineering Limited, 1260 Old Innes Road, Ottawa, Ontario, Canada, K1B 3V3
Tel: (613) 748-5500, Fax: (613) 748-3972, E-mail: marketing@davis-eng.com, Website: www.davis-eng.com