

# Davis

## NEWSLETTER

March 1998, Issue 8

### F-100 FRIGATE

In early 1997, DAVIS started to work with Bazan shipyard in Ferrol, Spain to manage the IR signature of their new multipurpose frigate, the F-100.

The contract was broken into three phases:

- Phase I:  
IR Signature Study : 1997
- Phase II:  
Detailed Design : 1998
- Phase III:  
Manufacture and Supply:1999 - 2003

The first Phase was completed late in 1997, and the second Phase was initiated early in 1998.

The design goal was to manage the IR signature so that the ship would

demonstrate the best IR signature that can be reasonably achieved with today's technology.

The F-100 power plant is a CODOG arrangement, comprising two GE LM2500's and two diesels, all of which will be fitted with IRSS systems, to reduce the temperature of the exhaust gas and metal.

In addition, the F-100 will be fitted with a unique system for managing the ship's IR signature under difficult solar heating conditions.

During the course of our work with Bazan, they have gained an in-depth appreciation for IR signature management and this experience is now being applied to other new ship programs in which they are involved.



The New Spanish F-100 Frigate

### Focus

The company has continued to experience growth and new opportunities. We have been very busy during the past six months with projects in Spain (wave generator and the F-100 frigate) and the U.S. (ASG systems).

We have been actively marketing our helicopter IR suppressor technology and we have been pleased with a very positive response. In addition, a new product - aircraft potable water tanks - has provided a good application for our fabrication skills.

Our core business, stealth systems for naval warships, continues to generate more opportunities worldwide.

It has become apparent the IR signature and magnetic management is now considered to be essential in the design of warships, and our experience and technology is in increasing demand.

This demand in turn provides a very positive outlook for the company as it translates into firm orders.

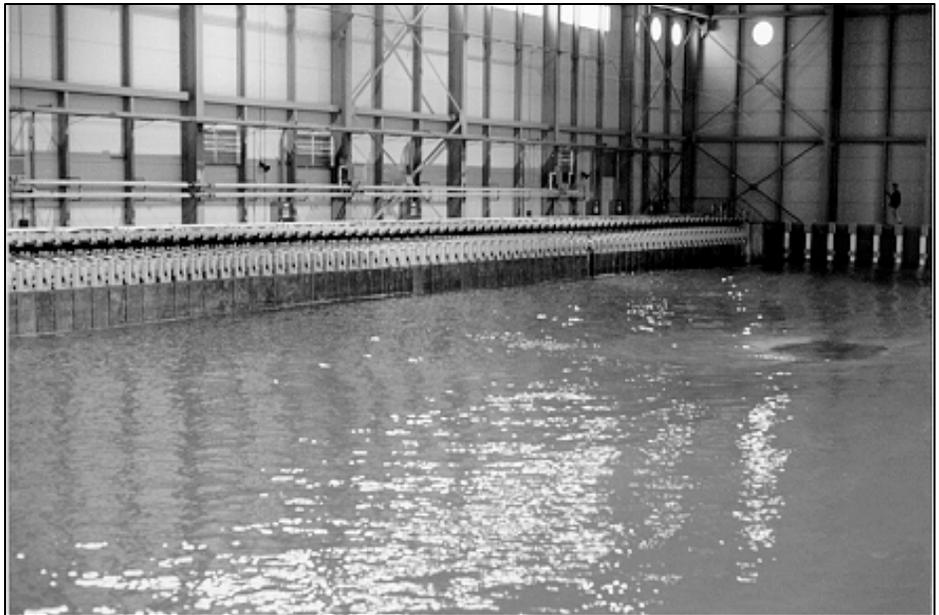
Rolly Davis, P.Eng.  
President

## BRIEF UPDATES

- In October 1997, Rolly Davis made a presentation to Portuguese Naval Officers at an EW Seminar in Lisbon. The presentation included descriptions of both our IR and EM stealth technologies.
- In August 1997, DAVIS was awarded a contract for the design and supply of a flume wave generator by Centro de Estudios y Experimentacion de Obras Publicas (CEPYC) for the lab in Madrid. In 1993, DAVIS supplied a 72 segment wave machine for the same laboratory.
- In January 1998, DAVIS signed a contract with the Naval Research Laboratory (USN) in Washington for enhancements to the IR code SHIPIR/NTCS. This advanced IR simulation code for naval warships is being used by eight NATO countries as a standard for ship IR signatures. These enhancements will be made available to SHIPIR users through software support agreements.
- In January 1998, Rolly Davis presented the two papers listed below at the American Society of Naval Engineers SC-21 Symposium in Biloxi, Mississippi.

“IR Suppression of Modern Naval Ships”, J.Thompson, D. Vaitekunas, A.M. Birk.

“A Survey of New Electromagnetic Stealth Technologies”, I. Jeffrey, B. Brooking.
- DAVIS has been able to restructure the pricing schedule for NTCS/SHIPIR due to increased demand and maturity of the code. For more details, please write to NTCS Product Manager.



New KRISO Ocean Engineering Facility

## KRISO SEGMENTED WAVE GENERATOR COMMISSIONED

The Korea Research Institute for Ships and Ocean Engineering (KRISO), a division of the Korea Institute of Machinery and Metals (KIMM) is located in Taejeon, about 200 km south of Seoul.

In 1991, DAVIS was awarded the contract for this 88 segment machine, which was planned as a joint venture with Korean industry. Some difficulties with local manufacturing and budgetary constraints caused this project to take longer than expected, but it was successfully commissioned in January 1998.

The Ocean Engineering Basin is very impressive (56 m x 30 m x 0.4 to 4.5 m depth), and includes current generation and wind generation, as well as irregular and regular wave making. As with other

DAVIS systems, the wave generator is operated by a sophisticated direct digital control system and the wave generation and analysis software GEDAP.

As shown, the basin currently has 88 wave segments operating on one side, but it is anticipated that it will be expanded to comprise 112 segments on the long wall and 64 segments on the adjacent wall. The segments can be raised and lowered 2.2 m with the tank water depth.

Ian Jeffrey of DAVIS and Dan Pelletier of the Canadian Hydraulics Center worked together to commission the machine and provide training in its operation. DAVIS now has more than 500 segments in total operating successfully around the world.

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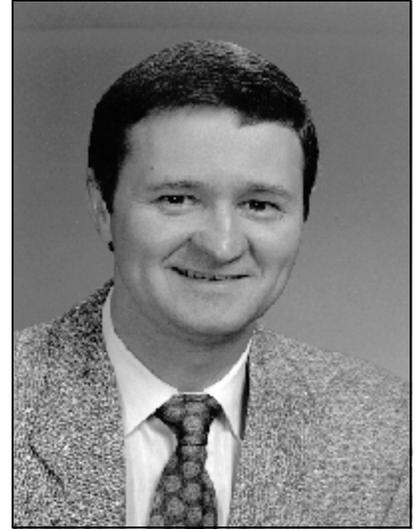
## EMPLOYEE PROFILE ANDRÉ LACROIX, MECHANICAL TECHNICIAN

André joined DAVIS in 1982 as a Junior Mechanical Technician, his background at that time included being a Heavy Equipment operator, an automotive body man and painter, and a service station attendant. André is currently the longest serving technician in the Manufacturing group.

André possesses a positive attitude and has excellent work habits. His versatility has led to his being involved in most of our manufacturing projects, his desire to travel and his product knowledge

have also made him the primary candidate for field installations of our wave machines, where he has represented us well. In addition, André has been an active member of the DAVIS Health and Safety Committee. He has been instrumental in eliminating lost time injuries.

André is an accomplished light aircraft builder and pilot. His many outside interests have included firearm sales and repairs, hot rod building, and he is an avid player in the stock market.



André Lacroix

## A NEW PRODUCT LINE - AIRCRAFT POTABLE WATER TANKS

In August 1997, DAVIS decided to apply our advanced engineering capability and quality fabrication facility to the aerospace industry. This was prompted by an opportunity to manufacture

stainless steel potable water tanks for the Bombardier RJ-700.

The RJ-700 is Bombardier's next regional jet which will have a capacity of 70 passengers. Their

success with the original 50 passenger RJ gives every indication that this new jet will also be very popular. Bombardier's marketing forecast is 400 RJ-700s over the next ten to twelve years.

After several months of working with the engineering staff at Bombardier and B.F. Goodrich, who have responsibility for the entire potable water system, DAVIS was awarded a contract for approximately 100 tanks for the first year's buy.

Since our fabrication facility is so well suited to this type of product, DAVIS is now discussing similar requirements with several aircraft manufacturers and their suppliers.

We are confident that this will prove to be a stable and long term growth area for the company.



Bombardier Regional Jet

## SIGNATURE MANAGER REDUCES IR THREAT

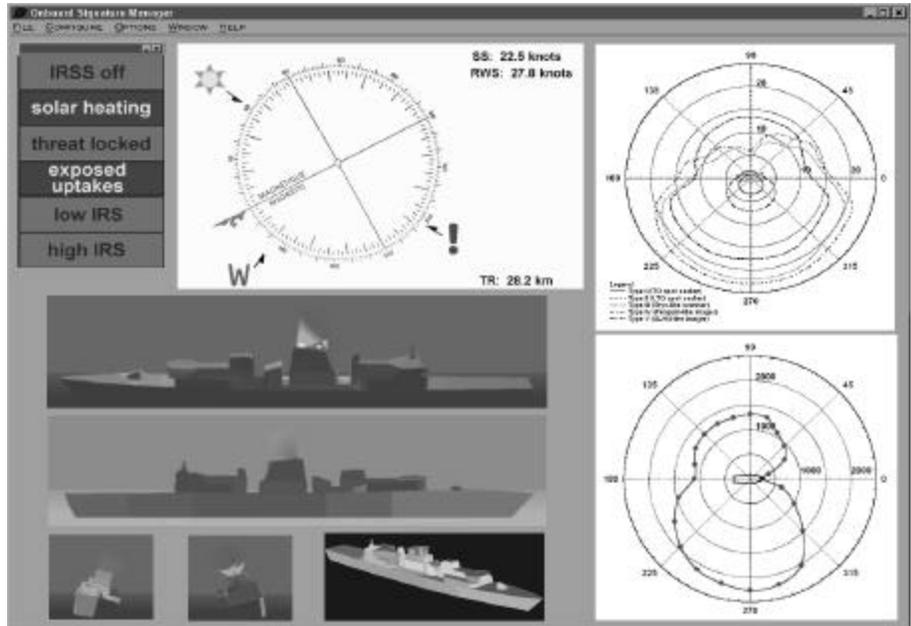
W.R. Davis Engineering Limited has been developing the capability to characterize the IR signature of a warship for a number of years. It has done so using a number of software tools, the most sophisticated of which is the Naval Threat Countermeasures Simulator/SHIPIR Code (NTCS/SHIPIR).

NTCS/SHIPIR models a warship and its IR signature and the environment surrounding the ship. The comprehensive software package also provides ship susceptibility to IR-guided anti-ship missiles, IR decoy countermeasures analysis, and IR suppression evaluation/benefits analysis. The IR code has been supplied to the Royal Australian Navy, the Republic of Singapore Navy, the Indian Navy and navies of eight NATO countries.

The main objectives of the Onboard Signature Manager (OSM) program were to take advantage of the development of the NTCS code to help operational personnel to characterize the IR signature of a vessel in real time, using a combination of physical measurements (including temperatures at various locations on the ship), and modules of the NTCS software.

Using OSM, it is possible to determine the ship's IR signature relative to background temperatures, using actual measured surface temperatures and sky/sea radiometric data.

At any given time, using OSM it is possible for the operator to see how the ship appears in its background - in both 3 - 5  $\mu\text{m}$  and the 8 - 12  $\mu\text{m}$  wavebands - from a total of five view angles (top, port, starboard, bow, stern). These views show important details such as the effects



Typical OSM Display

of ship roll on the signature shown to a sea-skimming IR-guided threat.

At the heart of the OSM is a structured set of data files, generated using NTCS/SHIPIR, that contain all the important geometric and radiometric data for a given vessel. The database is merged with measured ship surface temperatures, sky and sea radiances, sun/moon position, ship heading, roll, and a number of other factors such as the prevailing atmospheric conditions. The combined information is presented to the operator in summary form.

The hardware required for OSM comprises a number of shipboard instruments such as surface mounted thermocouples, and devices for measuring wind speed, sea temperature, ship heading, speed and roll angle; a data acquisition system for scanning these

instruments; and a control computer for storing and analyzing this data.

The software has been developed to run on a standard PC (Pentium 100) platform. OSM is coded using C++ and Visual Basic programming languages, and will run in the Windows NT or Windows 95 environment.

It is anticipated that the ability to monitor the ship's real time IR signature using OSM will prove invaluable to the ship's operators. With the future of IR signature management being based on variable signature control, OSM will become necessary as a feedback mechanism.

DAVIS expects that the first shipboard system will be trialed in 1999.

For further information please contact:

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