

RAindrops

Robert Allan Ltd. Information & News Issue 3

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ROBERT ALLAN LTD.
NAVAL ARCHITECTS AND MARINE ENGINEERS



“Innovation is one of the strong points in our design practice.”



“Every project has been exciting and challenging.”

More than Tugs

by Dr. Oscar Lisagor, P.Eng.
Vice President, Naval Architecture

New trends in shipping and offshore industries require workboat designs that provide operators with highly effective and safe vessels. Maximum attention must be also paid to develop environmentally friendly and clean vessels. Robert Allan Ltd. is at the forefront of current technologies in all aspects of modern naval architecture.

Innovation is one of the strong points in our design practice. Our highly experienced team of Naval Architects and Marine Engineers creates atmosphere for the development of unique vessels with excellent performance. Our innovative designs of tugboats includes well recognized **RAstar** Class, **Z-Tech** Class, **AZ** Class, **AVT** Class Tugs and others.

Robert Allan Ltd.'s distinguished record of innovative designs includes not only tugs. We have provided consulting and design services to the offshore industry for many years. Offshore specific

projects include supply and anchor handling vessels; salvage and rescue vessels, FPSO conversions, scientific, seismic and geological survey vessels. We also have extensive experience in working with all levels of government in designing fireboats, ferries etc.

Most of these projects present a unique set of application and operational conditions. The specific nature of these requirements encourages innovative design decisions and non traditional solutions. Experience with offshore operations as well as intimate knowledge of the latest scientific and technical achievements is our base for innovation that leads to development of effective and safe vessels.

The latest developments in Arctic shipping make our ice class design experience very useful and current. In the past few years we have developed a variety of projects for vessels and tugs with icebreaking capabilities. These range from vessel for shallow ice covered seas to deep water with heavy multiyear ice. This direction is very challenging and interesting.

Middle East Workboats

by Xuhui (Bill) Hu, P.Eng.
Senior Naval Architect

The Middle East has been one of the most active areas of the world workboat industry for years, and continues even during the globe current economical crisis. The motivation of owners and shipbuilders in this area to adapt to new technology has lead to many of our new designs being introduced there: Lamnalco took delivery of one of the first **RAmparts 3200** and **Z-Tech** tugs; IRSHAD's operational requirements for escort tugs initiated the very first **RAstar** high-performance terminal support/escort tug design, which has been since widely accepted by major tugboat owners internationally.

Vessels designed by Robert Allan Ltd. and operated in the Middle East not only represent local workboat industry features; from crew boats,

offshore supply vessels, fire fighting vessels to tugboats (azimuth stern drive, tractor and VSP), but also demonstrate the position in a globalized economy by the local builders, such as Dubai Drydocks, Grandweld, Zamil, etc.

The Middle East Workboat Show is one of the major workboat shows worldwide. Exhibitors, speakers and delegates travel from across the globe to attend. I had the pleasure of presenting a technical paper in 2008, examining the evolution of our **RAmparts 3200** class tugs. This design has proven to be very popular worldwide with nearly 100 in service. By attending the show I made contacts with clients that have proven to be very helpful.

Every project has been exciting and challenging. We have enjoyed the process of design, construction and delivery of each vessel. We certainly look forward to working with our valuable clients in this area in the coming years.



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On the cover

Recent delivery for Rimorchiatori Riuniti Porto di Genova Srl, the **RAmparts 2500** Class *Norvegia*. Photo copyright Imagen Naval 3kmi S.L.

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The RAMparts 3200 Class Khasifa operating in Abu Dhabi

Featured Deliveries

Alaryam

IRSHAD, a joint venture between ADNOC and Lamnalco, have just taken delivery of their latest high-performance terminal support/escort tug from Astilleros Balenciaga SA, of Zumaia, Spain. The *Alaryam* (seen below) is the one of the latest deliveries of our widely acclaimed *RAstar* Class true escort tug designs, but in actual fact is also the first tug of the *RAstar* series ever designed. The design was the subject of an extensive series of model testing to prove the concept.

This *RAstar 3600* Class vessel was designed to perform a wide range of tasks, including ship-handling, LNG and Oil tanker escort, fire-fighting and oil spill response/recovery duties. The *RAstar* class hull form ensures the highest standards of both escort towing capability and superior sea-keeping in the heavy sea conditions encountered in these operations.

The *Alaryam* is classed for unrestricted duty and accordingly was built to Lloyd's Register of Shipping Class: 100 A1 Escort Tug, Fire-Fighting Ship 1 (2,400 m³/hour), Occasional Oil Recovery Duties LMC, UMS, EP, MCM, and in full compliance with SOLAS and International Loadline regulations.

Propulsion comprises a pair of Wärtsilä 8L26 diesel engines, each rated 2600 kW at 1000 rpm, and each driving a Wärtsilä model CS275 controllable pitch Z-drive unit. With this propulsion

system, the vessel performance satisfied all expectations, with a recorded Bollard Pull of 84 tonnes and a free-running speed of 14.7 knots.

The *Alaryam* is very well-equipped for its various towing and escort duties: the fore deck is fitted for typical ship-handling and escort work, with a Karmoy double-drum hawser winch, Karmoy tow-pins and Karmoy anchor windlasses. The winch features a towline render/recover system for escort operations and has capacity for 200 and 150 metres of 76 mm diameter high strength towline.

The aft deck is fitted with a 100 tonne SWL towing bitt and Mampaey towing hook. Also fitted are a 10 tonne capstan, and a hydraulic knuckle-boom deck crane of 15 tonne-metre capacity.

The *Alaryam* is outfitted to the highest standards for an operating crew of up to twelve (12) persons. Facilities on board include spacious crew rooms for the full complement in two (2) single cabins, each with individual en-suite toilet and shower facilities, and five (5) spacious double cabins. Public spaces include a generous combined lounge/mess area and a fully equipped and modern galley.

In common with the majority of Robert Allan Ltd. designed tugs, a great deal of attention was paid throughout the design process to mitigate the propagation of noise and vibration. This includes the essential resilient mounting of the main engines, isolation of all exhaust system components, and the extensive use of visco-elastic floating floor systems throughout.

Norvegia

Astilleros Armon SA has successfully delivered the tug *Norvegia* (seen on cover) to her owners, Rimorchiatori Riuniti of Genoa Italy. This vessel is the first of two to be built at Armon's Burela yard in Northern Spain. The *RAmparts 2500* ASD type tug is designed for maximum efficiency in performing ship-handling duties; with minimized manning and maximized power, the *Norvegia* will prove to be extremely economical in her duties. The *Norvegia* is constructed with double chine hull form, in steel with scantlings in excess of the minimums of any Classification Society.

The particulars of the new tug are as follows:

- Length Overall - 24.40 metres
- Breadth, Moulded - 11.25 metres
- Depth, Moulded - 5.10 metres
- Draft, Navigation - 4.90 metres

The capacities of the vessel are as follows:

- Fuel Oil - 83,000 litres
- Potable water - 9,380 litres

Norvegia achieved a free running speed (ahead) of 12.0 knots, and 10.5 knots astern. The rated Bollard Pull is 70 tonnes. Propulsion power is provided by two Caterpillar 3516C diesel engines, rated for 1920 kW at 1600 rpm, driving Rolls Royce US 205 FP thrusters with 2.4m props.

Yong Gang Tuo 29

One of the latest *RAmparts* class vessels *Yong Gang Tuo 29* (seen below) was recently delivered by Zhenjiang Shipyard to its new owner, the Ningbo Port Corp. This vessel exemplifies the versatility of the *RAmparts* design; originally conceived from

the *RAmparts 3200* design, the owner's requirement for increased bollard pull led to a stretched version of the design to a *RAmparts 3300*. Due to the foresight of the naval architects, it was relatively easy to add parallel mid-body with minimal changes to the rest of the boat. In its new configuration the vessel can now generate over 80 tonnes of BP. Other upgrades include; increased comfort levels for the crew due to reduced noise and vibration and an updated fender arrangement. All of this while keeping the tonnage under 500GT.

Recent Deliveries

The *Seaways 20* has been launched by Keppel Singmarine and is to be delivered shortly.

The fireboat *Guan Xiao Er Hao* was launched from Wang Tak Shipbuilding and Engineering on June 30th and is currently undergoing trials with delivery to follow soon.

Dolega, Esti and *Farfan* a little bit of catching up to do on the Panama Tugs being built by Cheoy Lee in China. These are boats 8, 9 and 10 of the series of 13. *Farfan* left Hong Kong on August 20th.

Ocean Perfect, RAmparts 3200CL built by Cheoy Lee departed Hong Kong at the end of June bound for India. This is the second vessel of this design (specialised for Cheoy Lee) and the Owners. Hmmmm... did they name it perfect after receiving the first one?

Seaspan Eagle left the shipyard (Sanmar) in Turkey mid-June and is now in operation in Vancouver, Canada.



RAstar 3600 Class Alaryam testing fi-fi equipment in Abu Dhabi, UAE



The customized RAmparts 3300 Class Yong Gang Zhong Tuo 29

Cheoy Lee turns Gold!

What began almost ten years ago as a bright idea backed by bold ambition has blossomed into a modern day success story. Robert Allan Ltd.'s **Z-Tech** design was born of a partnership between PSA in Singapore and Cheoy Lee Shipyards in Hong Kong. The result is an award winning tug that has earned accolades for the industry world-wide.

Recently Cheoy Lee delivered **Z-Tech** #50 - **Dolega** (seen on back cover) to ACP in Panama. Robert Allan Ltd. congratulates Cheoy Lee on such a momentous occasion and looks forward to a continued successful partnership.

Middle East Designs

by Jim Hyslop
Manager, Project Development

Robert Allan Ltd. has a long history of design project in the Middle East. In the past 10 years there have been dozens of our designs built at yards such as; Dubai Drydocks, Grandweld and Zamil Offshore. Our vessels are in use or in-build for numerous operators; Lamnalco, IRSHAD,

ESNAAD, SMIT, Saudi Aramco, Svitzer, Kuwait Fire Services Directorate, Atlantic Marine Group, Seaways International, Abu Dhabi Port Corporation and Saudi Ports Authority.

Crew boats (such as the **Rally 2500** Class **Khulood** seen below) which deliver personnel and supplies quickly and safely to rigs and offshore facilities were among the first Robert Allan Ltd. designs. But this soon expanded into the realm of the high performance offshore tug, primarily the **RAstar** class, that work in tanker operations in the exposed parts of the Gulf. Indeed, the original **RAstar** class tug, which now has sisters across the globe, was spawned by the requirements of a Gulf operator - IRSHAD. Port operations have been largely handled by our **Z-Tech** and **RAmparts** class designs. Similarly, one of the very first of the award winning **Z-Tech** design was delivered to Lamnalco for their port operations. The region is at the forefront of the design trends, and it is encouraging to work with clients who are highly knowledgeable in the field.

Robert Allan Ltd.'s presence at the Middle East Workboat show solidifies our position in the region and ensures our client of the utmost professional attention. We look forward to strengthening our relationships with existing clients, and forging new ones at the show.



Canadian Coast Guard Medium-endurance Multi-tasked Vessel Earl Grey



Rally 2500 crewboat Khulood operating in Abu Dhabi, UAE



A Robert Allan Ltd. - Ausenco Sandwell Joint Venture

Robert Allan Ltd., and Canada's leading arctic and offshore engineering firm, Ausenco Sandwell, have announced they have formed a joint venture—Canada's Arctic SAGE Team—to bid for the design of the Canadian Coast Guard's new flagship icebreaker.

“Canada's Arctic SAGE Team brings together the most experienced, skilled and talented team in the world on ice breaker technology,” says Robert Allan Ltd.'s Executive Chairman, Robert Allan. “It includes the top people in Canada who were responsible for designing highly innovative icebreakers for the Beaufort Sea oil boom, those who designed the **Polar 8 Icebreaker**, and who are now internationally recognized authori-

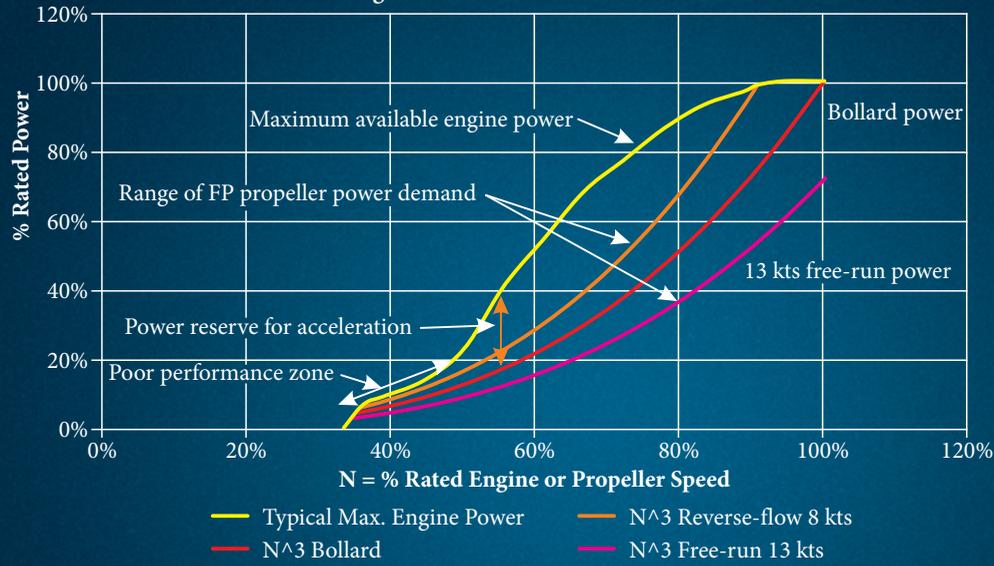
ties working on the leading edge of international icebreaker design.”

To create Canada's Arctic SAGE Team, Robert Allan Ltd. has partnered with Ausenco Sandwell, also based in Vancouver. Key subcontractors within the team include AKAC Inc., R.P. Browne & Associates, Ben Johannson, Colin Revill, DC Maritime Technologies, and D.F. Dickins and Associates, all internationally acknowledged experts in icebreaker technology. The Glostén Associates of Seattle bring extensive recent experience on the Science Mission aspects of the icebreaker. A corps of highly experienced Canadian Ice Masters—men who have worked throughout the Canadian Arctic in a wide range of icebreaking ships—bring a practical operational perspective to the design group.

Allan says this team intimately knows the Canadian Arctic and the ice conditions there, conditions he says are harsher and totally different from any other region in the world.

“This team is simply the very best in the business,” concludes Allan. “It is gratifying to see this international expertise is available in Canada today to design the flagship of the Canadian Fleet.”

Typical Fixed Pitch N³ Propeller Power Demand and Engine Maximum Available Power Curves



Propeller Selection Considerations

by F.L. (Fuzz) Alexander, P.Eng.
Senior Project Engineer

Ship handling tugs include harbour/terminal tugs, escort tugs or multi-purpose tugs that provide a wide variety of ship assist duties. Robert Allan Ltd. designed tugs are commonplace in major ports around the world. The effective forces delivered to the ship being assisted are provided by the thrust from the tug's azimuthing stern drive (ASD) thrusters. The ASD propellers can be either fixed pitch (FPP) or controllable pitch (CPP). Both have important performance characteristics that should be evaluated for specific applications. A primary consideration is that propeller power demand must be coordinated with the available engine power over the engine's operating speed range.

Fixed pitch propellers (FPPs) require variable input speed to vary thrust. The propeller power/rpm curve (prop curve) is pitched for rated engine power and rpm at bollard condition so that maximum available engine power is available for maximum bollard thrust. ASD propellers can also operate in reverse-flow conditions that require higher propeller power input than occurs at bollard conditions. The engine must be capable of meeting these higher short-term loads without stalling, and additionally must provide sufficient reserve power to deliver reasonable rpm acceleration for thrust changes. Evaluation

of the maximum deliverable engine power versus maximum propeller power demand must be done over the entire operating range. Special emphasis must be given to the low speed range of the engine, typically from idle (or clutch-in speed) to about 75% rated rpm. FPPs may require installation of a higher rated engine pitched for lower power (e.g. bollard pitch at 85% ± of rated engine power) to obtain adequate vessel performance if the available engine power is marginal at lower rpm.

Controllable pitch propellers (CPPs) can operate in both forward and reverse pitch, and zero pitch, at any input speed up to rated speed. This effectively allows the propeller to be re-rated to suit the propeller movement relative to the water, and the combination of pitch and rpm can be selected to suit any available engine power. CPPs allow for bollard operation at full rated power/rpm, and also allow the propeller to be re-pitched to absorb full rated engine power at rated rpm in the free-running condition. CPPs are more costly than FPPs, and require additional maintenance of the pitch adjustment mechanism. The larger hub may also have a small negative effect on overall propulsion efficiency. CPPs do have the advantage of individual blade replacement in the event of major blade damage.

There are additional factors that should also be evaluated in selection of FPP or CPP thrusters for ship handling tugs. Robert Allan Ltd. welcomes Owner discussion and input and will provide appropriate technical guidance to suit specific applications.

High Speed Hull Design Using CFD

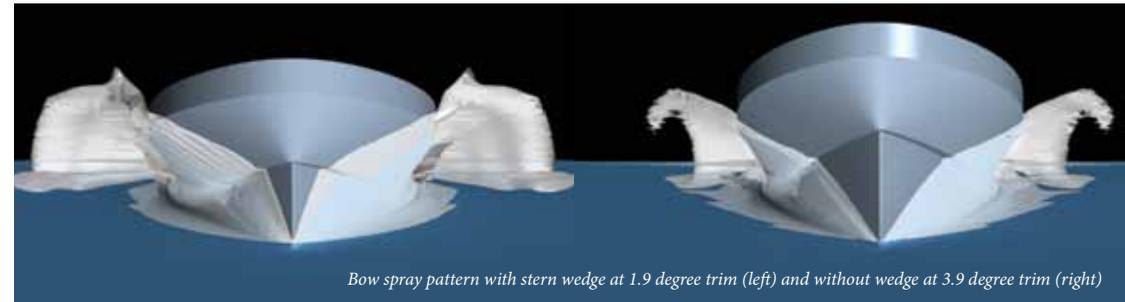
by Bart Stockdill, M.A.Sc., P.Eng.
Mechanical Engineer

The recently launched Marine One Replacement Fireboat for the Massachusetts Port Authority demonstrates the ability of CFD (Computational Fluid Dynamics) to predict the performance of a high speed, semi-displacement hull. Design budgets for this type of vessel are rarely able to accommodate model testing and there is limited data available for performance estimates. CFD is relatively quick and cost effective design tool for assessing performance parameters such as

of the prediction was well proven on trials where the measured running trim angle was 4.0 degrees as compared to the 3.9 degree CFD prediction.

During the design process, the hull shape was changed by increasing fullness of the lower bow in order to add displacement forward and accommodate an unanticipated change in longitudinal centre of gravity (LCG). CFD simulations showed that the bow modifications yielded an increase in trim of 0.3 degrees and a further 2% reduction in hull resistance.

The figures at the bottom of the page further demonstrate the accuracy of the CFD simulations. Both figures show the stern wake at 24 knots as predicted by CFD and as photographed during trials. The position of the camera is approximately

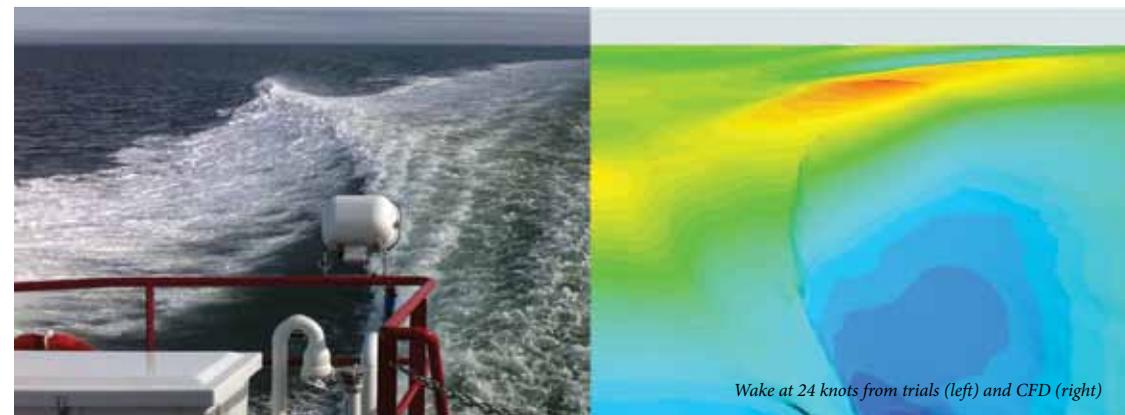


Bow spray pattern with stern wedge at 1.9 degree trim (left) and without wedge at 3.9 degree trim (right)

Dynamic trim can significantly affect the hull resistance and the spray patterns. Spray over the foredeck and wheelhouse windows can be particularly troublesome at low (bow down) trim angles. To analyse the trim effects, simulations were run at 24 knots with and without stern wedges. The running trim prediction was 1.9 degrees with the wedge and 3.9 degrees without. CFD predicted a 2% drop in hull resistance without the wedge and a considerable reduction in the spray over the foredeck and wheelhouse windows. The accuracy

of the prediction was well proven on trials where the measured running trim angle was 4.0 degrees as compared to the 3.9 degree CFD prediction. The colour contours in the CFD plot indicate the water surface elevation; red indicates high elevation, blue indicates low elevation. While CFD does not show the white foam in the wake, it does clearly match the wake elevations and wave patterns very closely.

By using CFD, vessel performance, particularly running trim, was accurately predicted at the design stage, greatly reducing the risk of surprises during vessel trials and the risk of expensive modifications.



Wake at 24 knots from trials (left) and CFD (right)

2011 Robert Allan Memorial Scholarship

The Trustees of the Robert Allan Memorial Scholarship are pleased to announce the award of the 2011 scholarship to Ms. Erika Brown, a student of Naval Architecture at Memorial University of Newfoundland.

Erika was nominated for the scholarship based on her excellent academic record, coupled with practical experience in the industry. Erika has a strong commitment to the pursuit of a career in Naval Architecture. This scholarship, created by an endowment from the late Robert F. Allan, noted Vancouver Naval Architect, is awarded annually to a deserving Canadian student in Naval Architecture.



Ms. Erika Brown

Quality Assurance

by Dave Christopher, IEng IMarEng, MIMarEST, MNI
Senior Marine Engineer / Chief Engineer



What does this mean ?

Robert Allan Ltd. maintains a Quality Management System, to the satisfaction of Lloyd's Register Quality Assurance. LRQA on behalf of an accreditation service, provide a monitoring service to

ensure that the Robert Allan Ltd. QMS is functioning correctly, and adhering to an internationally recognized standard. This standard is ISO 9001.

The United Kingdom Accreditation Service is a body based in the UK, and internationally recognized as a leader in evaluating and assessing, against worldwide standards.

To our Clients, this provides a measure, as to the level of competence, and dedication that Robert Allan Ltd. staff have in ensuring that our work is "right first time, every time". A major component of fulfilling customer satisfaction and meeting client objectives is feedback, and it is encouraged from all our clients to liaise with the Robert Allan Ltd. Management Team, or the QA Representative with any concerns that they might have, please address any correspondence to qa@ral.ca. As our Quality Policy clearly reminds us every day... "Robert Allan Ltd. will continually strive to meet or exceed our Clients' requirements and expectations..."

Our Virtual Shipyard

by Derek Noon
Manager, Marine Engineering

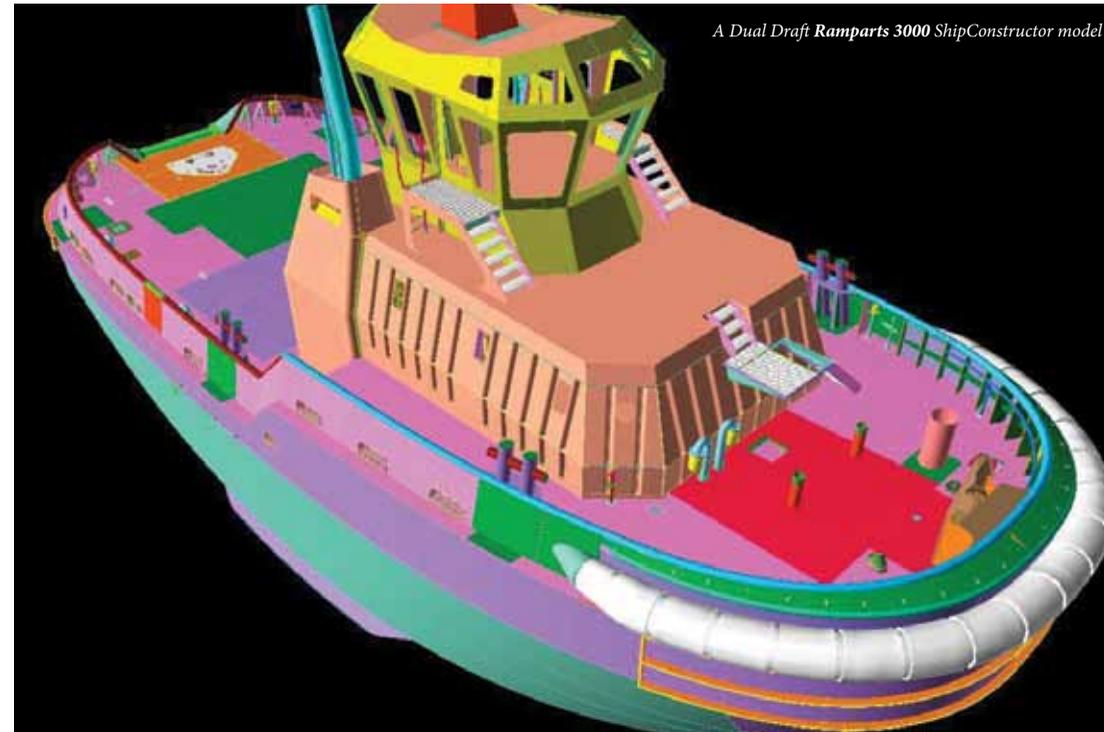
None of the shipyard banging, grinding and cursing here, perhaps the odd thump on the keyboard and occasional muttering! We build ships in a virtual environment, carefully modelling all components: the steel parts, fitting machinery and connecting with piping and valves. From the model we extract the individual component parts and co-ordinate with the shipyard's block production. This is nothing new in the industry but the service we provide enables the designer to follow the process through to construction providing continuity through to the end product. Our in house shipbuilders provide critical design feedback to improve all the details that make a sensible and successful design.

Our start in CAD/CAM occurred in the early 90's where using AutoCAD 2D drawings (yes, 2D!) we developed aluminum parts for the 12 metre Port of Vancouver fireboats. We've come a long way since with the use of ShipConstructor software and developing our in-house virtual shipyard with a dedicated team of modellers. In the years since our first modelling effort, we have provided steel parts for a variety of our tug and fireboat designs which have been built in a number of shipyards worldwide.

An Indian Alliance

Robert Allan Ltd. and Microdata Marine group of Mumbai, India have entered an agreement whereby Microdata Marine group will act as agents for Robert Allan Ltd.'s design and consulting services in India. The MicroData Marine Group offers turn key solutions to the Marine Industry, encompassing Ship Builders/Shipyards, Design Houses and Marine Equipment Vendors.

The company is steered by a team of experts, Naval Architects, Mechanical Engineers and Design Engineers whose collective experience in the service of the Maritime Industry is 300 years. MicroData Marine Group has a dedicated facility located in the financial capital of India, Mumbai. We at Robert Allan Ltd. are excited about this new opportunity to enter into this market and we are looking forward to a long and prosperous relationship with Microdata Marine group.



A Dual Draft Ramparts 3000 ShipConstructor model



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