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Sealift pick up speed

See jdw.janes.com for "Great carrier conundrum"

Speed at sea is the key for intra-theatre lift

Commercial fast ferry technology is providing the basis for a new genre of high-speed vessels offering military logisticians advantages of speed, economy and access. Scott Gourley and Richard Scott report

Aluminium-hulled high-speed vessels (HSVs) have had a major impact on commercial vehicle and passenger ferry operations over the past decade. Their key selling points include high speeds (up to a typical 'seek shelter' threshold of Sea State 5) and passenger comfort; rapid entry and exit from port (enabled by their manoeuvring capability within harbour); quick offload and reload of cargo and passengers once in port; shallow draught, allowing access to ports with shallow water or tidal restrictions; and reduced operating costs (resulting from fuel economy and increased asset utilisation).

These same attributes have now attracted the attentions of military logisticians. HSV technology is attractive for intra-theatre support because it enables troops and equipment to be moved at significantly lower costs than would be possible with air transport and also more rapidly than would be possible with conventional sealift, thus increasing operational readiness. Proponents argue that this allows commanders to move and control military forces with agility and precise sustainment.

Another key advantage of HSVs is their ability to operate in shallow, restricted and austere ports, due to their low draft, excellent manoeuvrability and onboard loading/unloading ramps and systems. Such ports are inaccessible to conventional sealift shipping or require the use of multiple landing craft, which is slow and cumbersome. They are also often located in areas where there is no suitable infrastructure for airlift.

"A key to military operational success is the ability to rapidly move combat power to a supported theatre, ready for mission execution," says Richard Lowrie, sales and marketing manager for Incat, the Australian fast ferry builder and charter group based in Hobart, Tasmania. "Heavy forces must be more strategically deployable and more agile, with a smaller logistical footprint, and light forces must be more lethal, survivable and tactically mobile.

"HSVs are seen as suitable platforms to help achieve this direction because of their operational flexibility and effectiveness. They have the capability to swarm around a theatre of operations servicing combat operations at various locations, providing the timely on-demand supply and sustainment of resources to general and/or specifically targeted combat areas while keeping opponents on the run."

Incat/Richard Bennett Photography: D585918

USS *Swift* recently deployed as part of Operation 'Unified Assistance' to assist tsunami relief efforts.

It was the Royal Australian Navy's (RAN's) experience with a chartered fast ferry for operations across the Timor Sea in 1999 that provided a catalyst to the burgeoning interest in HSVs. To address a sealift shortfall at the time of the East Timor peacekeeping operation, an 86 m wave-piercing high-speed ro-pax catamaran (hull 045) was rapidly chartered from the Incat group and commissioned into the RAN as HMAS *Jervis Bay*.

Over the next two years, *Jervis Bay* — nicknamed the 'Dili Express' — completed 107 trips between Darwin and Dili. Travelling at 43 kt fully loaded and 48 kt light ship, *Jervis Bay* typically made the Timor Sea crossing in about 11 hours. Through the period of its charter, it covered about 100,000 n miles, carried 20,000 passengers, 430 military vehicles and about 5,600 tonnes of stores.

Incat — through the Bollinger/Incat USA LLC joint venture (an alliance between Bollinger Shipyards Inc of Louisiana, USA and Incat Australia Pty Ltd) — has subsequently secured three US military contracts for the lease of wave-piercing fast catamarans to serve a range of test, evaluation and operational purposes. Incat 050, a 96 m vessel, was commissioned in October 2001 as *Joint Venture* (HSV-X1) to serve as a 'proof of concept' and evaluation platform for trials and demonstrations by the US Navy (USN), Army, US Marine Corps (USMC), Special Operations Command and the Coast Guard. In November 2002, the 98 m Incat 060 was accepted by the US Army's Tank-Automotive and Armaments Command (TACOM) as USAV *Spearhead* (TSV-1X) to participate in a Fiscal Year 2003 (FY03) Advanced Concept Technology Demonstrator (ACTD) activity designed to "provide a mission-essential asset that will support operational movement, repositioning and sustainment of combat forces".

Both vessels participated in Operation 'Iraqi Freedom' during early 2003, conducting missions that included supporting US Naval Special Warfare (NSW) GOPLAT (Gas and Oil Platform) seizures; serving as an

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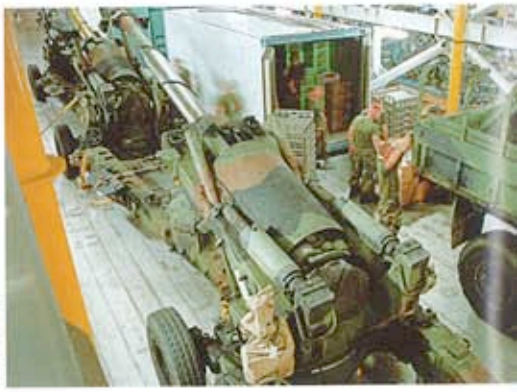
Austal 0585912

***WestPac Express* (left) is under charter to the US Military Sealift Command to support the Third Marine Expeditionary Force in Okinawa.**

Right: US Marine Corps vehicles and equipment on the cargo deck of *WestPac Express*.



Austal 0585910

Third Marine Expeditionary Force in Okinawa under a three-year contract. This follows the completion in February 2002 of a 238-day 'proof of concept' charter period, during which *WestPac Express* transported more than 10,000 marines and 15.4 million pounds of cargo — the equivalent of 217 C-17 airlifts — from Okinawa to Guam, South Korea and mainland Japan.

WestPac Express is a hybrid (roll-on/roll-off passenger ferry/cargo freighter) vessel with a maximum deadweight of 750 tons. Capable of speeds in excess of 40 kt, it has two vehicle/cargo decks with a combined 33,000 ft² of storage. In order to undertake the long transit routes, *WestPac Express* has been fitted with auxiliary fuel tanks providing an additional 240,000 litres of fuel, extending range from 400 n miles to 1,250 n miles (with a 20 per cent reserve). This enables the vessel to undertake the transit from Okinawa to Guam at high speed and at full load in around 36 hours.

In January 2005 *WestPac Express* was deployed from Okiniwa to Thailand to support Tsunami relief efforts. It was subsequently put into use as a shuttle for military personnel and equipment in theatre.

Experience with *WestPac Express* spawned a derivative High Speed Vessel — Multipurpose (HSV-M) high-speed catamaran. Based on the proven 101 m commercial design but optimised and re-engineered to meet military requirements, the HSV-M incorporates a significant increase in structural strength in the bow and tunnel areas, enabling it to operate at higher speeds in more extreme sea conditions than a typical fast ferry.

In terms of configuration, HSV-M features one vehicle deck with stern and side ramps; a main deck level with a helicopter deck and hangar; accommodation and workspaces; and the bridge deck. The vehicle deck offers more than 1,765 m² of useable space and can carry a wide range of military cargo including main battle tanks, armoured personnel carriers, wheeled vehicles and semi-trailers.

Aviation facilities aboard the HSV-M allow for the operation and support of two medium-size multimission helicopters. The flight deck itself is sized and strengthened to take helicopters up to Chinook size.

Permanent berthing is provided for 100 ship's personnel. Seating is provided for 250 troops or other passengers (part of this area can be rapidly reconfigured to provide berthing space for 100 personnel).

Austal, based in Henderson, Western Australia, has subsequently developed further HSV design concepts to cover a range of capacities and capabilities. "While large high-speed vessels have changed the face of transportation for United States forces, nations with other demanding requirements can also derive immeasurable benefits from the use of vessels based on the same proven technology," says the company's Sales and Product Development Manager Glenn Williams. "Recognising that not all countries have a requirement for vessels capable of

Rolls-Royce promotes fast monohull ITLV

Rolls-Royce 0585908

The ITLV is based on the Nordvestconsult-developed P2500 fast monohull hullform.

Rolls-Royce has unveiled proposals for an Intra-Theatre Logistics Vessel (ITLV) designed for the fast transport of military logistics and troops at speeds of up to 50 kt. Based on the P2500 family of commercial high-speed ro-pax ferry designs, which were developed in the late 1990s by Rolls-Royce-owned design house Nordvestconsult, the ITLV is a 120 m shallow-draft monohull optimised for military purpose.

Although not yet built, the P2500 has been designed to Det Norske Vertitas (DNV) high-speed code standards and has been subject to extensive hydrodynamic modelling and tank testing. According to Rolls-Royce, adapting an existing fast ferry design removes the costs associated with a dedicated design and development effort, and offers potential military users a low-risk, near-term solution.

The company also believes that the advanced monohull form offers a number of advantages for the Fast Naval Sea-Lift Vessel over competing multihull designs. These include simplified structural aspects (and hence lower build cost), a lower installed-power requirement, a simplified garage arrangement (reducing turnaround time) and best predicted seakeeping and manoeuvring characteristics.

By combining a wave-piercing bulbous bow with a monohull form, a longer waterline has been achieved with a very low angle of water entrance at the bow. "This has reduced resistance and minimises slamming, while producing better motions in waves," says David Bricknell, Rolls-Royce Marine's vice-president for naval systems.

The main structure is high tensile steel, with only the superstructure constructed from aluminium alloy. According to Bricknell, this maximises strength and combat zone safety while minimising weight and driving down build costs. "The monohull form allows you to build in steel," he says. "Also, steel has higher tolerance to fire and provides higher levels of damage stability compared to multihull designs."

The ITLV propulsion system is based on a combined diesel and gas propulsion arrangement combining a single MT 30 gas turbine and twin Crossley Pielstick diesels driving four waterjet propulsors.

According to Rolls-Royce, the ITLV could transport a payload of 950 tons to a range of around 600 n miles at a 40 kt average speed on a 150-ton fuel load. Alternatively, if range takes precedence, the ITLV could, for example, transport a cargo load of 100 tons at over 40 kt to a range of 4,500 n miles on a 1,000-ton fuel load.

transporting tanks and whole battalions in a single lift, we will custom design and build the vessel to meet the specific requirement — from transporting a small special forces unit and its equipment through to ships able to deploy in excess of 1,000 troops, vehicles and helicopters.

"That process extends well beyond simply reconfiguring a commercial ferry platform with different layouts, equipment and systems. These vessels are engineered from the keel up to ensure they meet the specific rigours and performance requirements of military operations, which are clearly different to those of a standard fast ferry application."

Austal's design portfolio now ranges from a 45 m catamaran with the capacity for 285 troops and six utility vehicles through to a 127 m trimaran capable of up to 38 kt complete with flight deck, helicopter hangar and command-and-control spaces. While catamaran designs dominate the commercial fast ferry market, Austal contends that the trimaran is the future on the grounds that while both hullforms provide low resistance, durability and greater deck space than monohull alternatives, the trimaran offers superior seakeeping in high sea states, particularly in head and bow quartering seas. This is particularly relevant to long open-water transits or operations involving the launch and recovery of vessels or aircraft in exposed conditions.

Austal has developed two versions of its 127 m trimaran: a TSV and a Multi-Role Vessel (MRV). These build on the company's experience gained from user feedback on the performance of Westpac Express and in its role as platform design authority for the General Dynamics Bath Iron Works bid for the USN's LCS programme. They also leverage the same basic hullform as the pioneering 127 m fast ferry *Benchijigua Express*, which was built for Spanish operator Fred Olsen SA for service in the Canary Islands. The world's largest diesel-powered fast ferry — indeed, the largest high-speed multihull ship of any kind in the world — the *Benchijigua Express* will be capable of transporting 1,350 passengers and more than 350 cars, or 450 truck lane metres and 123 cars.

Ordered in June 2003, the ferry will sail at loaded speeds in excess of 40 kt. According to Austal, design studies indicated that the trimaran form would offer a 26 per cent improvement in operability over other hullforms.

Adopting this same hullform, both the TSV and MRV are of aluminium construction and have been designed to incorporate low-risk and commercially proven systems to reduce build costs and design risk. The TSV affords 1,900m² of mission deck area to stow armoured and soft-skinned vehicles and other cargo, and is able to seat up to 970 troops. A helicopter pad is provided aft for vertical replenishment.

The MRV has a crew of 100 and allows seating for 260 troops. It differs from the TSV by way of an aft flight deck with one landing spot and a dedicated hangar for two medium-size helicopters. A foldable stern ramp allows vehicles and cargo to be offloaded at ports.

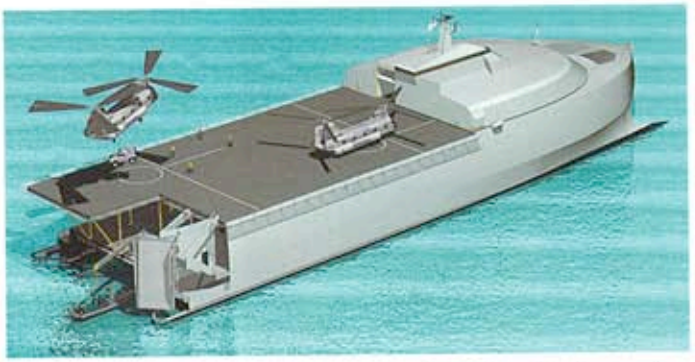
Sharing the same basic hull configuration, both the TSV and MRV offer similar performance: at a maximum sustained speed of 38 kt carrying a 510-ton payload, maximum range is 750 n miles. At a reduced speed of 23 kt and transporting a payload of 355 tons the maximum range is 3,000 n miles.

Joint acquisition plan

Informed by their experience of essentially off-the-shelf HSV technology, the US Army (through TACOM), the USN and the USMC began to develop separate requirements for HSVs. TACOM first briefed industry in March 2003 on its plans to acquire a new class of Objective TSV for the rapid intra-theatre movement of troops, vehicles and other military equipment.

TACOM's summary of requirements stated that the TSV "must be able to self-deploy long distances without cargo and be built to commercial standards, supplemented as needed with military requirements, such as structural requirements beyond the minimum normally required for vehicle fast ferries". It also stipulated build in the USA.

Work to develop and refine the TSV acquisition continued into 2004. However, efforts to assess and harmonise the needs of the US armed services resulted in an August 2004 TSV Memorandum of Intent (MoI). Signed by the vice chiefs of the army and the USN, and the assistant commandant of the USMC, the MoI established the army's intent to transfer the TSV programme to the navy. The merged acquisition effort, now under a Navy Program



Incat: 0585907

Incat has shown this concept design for a high-speed TSV based on a 112 m 'seaframe'.

Austal: 0590344

Austal: 0590343

Two perspectives of Austal's 127 m multirole trimaran design, which is based on the same hullform as the fast ferry *Benchijigua Express*, the world's largest multihull vessel.

Office, has been re-cast as the Joint High Speed Vessel (JHSV).

"The agreed-upon strategy was based on leveraging existing army TSV documentation and ongoing ACTD, and Naval HSC [High-Speed Connector] documentation," explains Capt Patricia Sudol, programme manager for Sealift, Special Mission Ships, Small Boat and Craft in the USN's Program Executive Office for Ships. "Based on the MoI signed in August 2004, a Memorandum of Agreement for signature by the army and navy services' acquisition executives to formalise the programme has also been developed and is currently undergoing final staffing."

According to Capt Sudol, key aspects of transitioning the US Army's TSV programme to the USN under the new name of JHSV include taking advantage of the inherent commonality of the TSV and HSC programmes, creating a more flexible asset for the US Department of Defense and leveraging the USN's core competency in ship acquisition. She adds that the merged JHSV programme has been assigned to a Navy Program Office and that "some army and USMC staff support will participate" as part of that office.

Looking to the future, Capt Sudol added: "The US government plans to evaluate the requirement for the interim capability until US-built ships can be delivered, and [to] pursue the permanent capability solution via an FY08 award of the lead ship."

As a result, TACOM announced the decision to cease the TSV source selection activity on 2 September 2004, a move consistent with the aims of the tri-service MoI. However, TACOM is in the meantime exploring options for the availability of an interim TSV capability, with current plans envisaging the purchase of up to two new or used vessels for delivery in December 2005 and December 2006 (coinciding with the lease expirations for *Joint Venture* and *Spearhead*). ■

RELATED ARTICLES:

- *UK plans Theatre Support Vessel trial,* Jane's Navy International, 28 May 2004.
- *Austal details high-speed sealift trimaran designs,* Jane's Defence Weekly, 2 December 2004.
- *Jane's High-Speed Marine Transportation* (jhmt.janes.com).

Afloat Forward Staging Base for NSW units; providing intra-theatre lift in support of the US Marine Logistic Command; and conducting operational missions in support of a US Special Operations Command joint task force in the Horn of Africa area of operations.

Other FY04 activities included integration of the Enroute Mission Planning and Rehearsal System capability into both the HSV-X1 and TSV-1X, and enhancements to the command, control, communications, computers and intelligence (C4I) capabilities of both vessels.

TSV-1X was also equipped with a new cargo handling system that includes a roller floor system, a 20-ton crane and a T-foil (ride stabiliser). The vessel returned to the US Central Command area of responsibility following these modifications and assessments in support of Operation 'Enduring Freedom'. FY04 also saw the deployment of HSV-X1 to the Pacific, where it participated in technical and operational exercises and demonstrations including 'Cobra Gold' and US Forces Korea's RSOI [Reception, Staging, Onward Movement and Integration]/'Foal Eagle'.

Continuing US Army ACTD activities planned for the rest of the FY05 programme include demonstrating radio-frequency/-infrared/laser warning receiver self-protection capabilities linked to an active deployment system (such as the Multi-spectral Softkill System); investigating the ability to provide an organic integrated system of systems to detect, classify and deter/engage asymmetric threats, using both lethal and non-lethal defences (spotlights, acoustic hailing devices, electro-optic/infrared sensor systems and remotely operated small arms mounts); upgrading the C4I suite of the TSV-1X, using Thin Client Technology; pursuing participation with the Australian Department of Defence in a co-operative development of tactical electronic warfare situational awareness to provide full-dimension protection, precision targeting and combat identification, in conjunction with the US-Australian joint exercise 'Talisman Sabre'; and continuing with military exercises (including RSOI/'Foal Eagle', 'Cobra Gold', 'Talisman Sabre' and 'Bright Star 05') and operational/technical assessment.

Swift delivery

In August 2003 Incat 061 (another 98 m vessel) was delivered to the USN as USS *Swift* (HSV-2X) to serve as an interim replacement for the mine countermeasures support ship USS *Inchon*. *Swift* is being additionally used to explore concepts, capabilities and military utility associated with the advanced hull and propulsion technology, which is integrated with advanced communications in support of the Littoral Combat Ship (LCS) programme. Furthermore, the vessel is being used to conduct a series of limited-objective experiments, exercises, demonstrations and training events for the USMC designed to assess the interoperability potential of HSVs with causeways, watercraft, amphibious ships and other shipping.

HSV-2X has been designed to be capable of maintaining an average speed of 35 kt or

Incat/Richard Bennett Photography 0585916

USAV *Spearhead* (TSV-1X) has been chartered from Bollinger/Incat USA to participate in an Advanced Concept Technology Demonstration.

greater in moderate weather when fully loaded with 550 short tons, consisting of 350 personnel and military equipment; have a minimum operating range of 1,100 n miles fully loaded at 35 kt, and a minimum transit range of 4000 n miles at an average transit speed of 20 kt; and be capable of 24-hour operations at slow speeds (3-10 kt) for small boat and helicopter operations.

In late May 2004 the vessel conducted heavy-weather trials in the North Atlantic. These consisted of multiple dedicated trials during which the craft was monitored by representatives from the Naval Sea Systems Command and the Naval Surface Warfare Center Dahlgren Division to ensure that the structure could satisfactorily endure extreme weather. Subsequent surveys of the vessel's hull and superstructure, undertaken with American Bureau of Shipping engineers, showed some minor damage in the resiliently mounted non-structural superstructure. The hull itself suffered no damage.

At the beginning of 2005, HSV-2X was deployed to support the tsunami disaster-relief efforts in the US Pacific Command area of responsibility. According to the USN: "*Swift* responded on short notice to meet the needs of the humanitarian and disaster-relief efforts [and] will provide a high-speed connectivity capability to the disaster-relief co-ordinator, and much needed fast heavy lift to shallow-water areas impacted by the tsunami."

"*Joint Venture*, *Spearhead* and *Swift* have demonstrated that commercial high-speed vessels, with sensible design modifications, can be used successfully in military operations," says Incat's Lowrie. "Their capability is greatly enhancing intra-theatre deployment, logistics and sustainment support for military units worldwide, providing greater operational flexibility and availability.

"Experimentation has helped determine the impact the craft have on future operational concepts throughout the deployment, employment, sustainment and redeployment cycle. Additionally, exploration into future tactics, techniques, procedures and technologies and the complementary nature of high-speed vessels with amphibious and maritime prepositioning force platforms have been evaluated demonstrating capabilities that will provide greater operational mobility."

Incat, in conjunction with Revolution Design Pty Ltd (the naval architecture and ship design house behind Incat's designs), is continuing to develop new military-optimised HSV designs based on both a 112 m and 120 m catamaran 'seaframe'. As well as an essentially 'conventional' theatre support vessel (TSV), these concept development activities have also scoped an air-capable 'through-deck' design able to act as a forward operating 'lilypad' for rotorcraft and short take-off and vertical landing aircraft.

Austal experience

A rival Australian shipbuilder, Austal Ships, is currently leasing the 101 m high-speed catamaran *WestPac Express* to the US Military Sealift Command in support of the

Incat PR 0585917

***Joint Venture* (HSV-X1) was the first Incat-built HSV to be chartered by the US military. It is seen here participating in a NATO exercise off Norway.**