HMAS CRESWELL

Redeveloping HMAS Creswell at Jervis Bay into a facility fit for the new millennium navy was a complex and time-intensive task. The construction effort for Defence was managed by Hansen Yuncken, and included refurbishment of existing facilities including Heritage structures, an overhaul and upgrade of all services and the construction of new facilities ranging from accommodation barracks and offices through to the extremely high-tech Royal Australian Navy School of Survivability and Ship Safety (RANSSSS). Some aspects of the RANSSSS are entirely new to Australia.

Initial planning for the project began in May 2004, with construction commencing in June 2009 and completed in 2012.

A diverse range of works were undertaken, including improved engineering services and infrastructure (new street lighting, communications infrastructure, upgraded high and low voltage electrical systems, BMS Systems and upgraded security); upgrade to base accommodation; new and upgraded instructional facilities; new physical fitness and training facilities; upgraded officer trainee recreation facilities; waterfront environmental works; teaching facilities; and an upgrade to the armoury.

Work on 'Living in Accommodation' included refurbishment of existing Sailors Accommodation (126 cabins / 34 bathrooms); construction of new Griffiths House (32 Cabins / 16 Bathrooms); refurbishment of existing Collins House Accommodation (78 Cabins / 6 Bathrooms); refurbishment of existing Farncomb House Accommodation (78 Cabins / 6 Bathrooms); refurbishment of existing Dowling House Accommodation (72 Cabins / 9 Bathrooms); As part of the Creswell Heritage precinct, works included Refurbishment of the existing Heritage Cerberus House; and construction of New Geelong House, which has been designed to provide a modernised perspective to the previous Heritage building which was demolished in 1976.

There is also a new Gymnasium including Multipurpose Hall, 25m indoor pool, weights and Cardio rooms and Administration.

As part of the RANSSSS, works consisted of construction of a new SFFU (Standard Fire fighting unit – Gas fires only), and AFFU (Advanced Fire fighting unit – Gas and Diesel Fires) to replicate FFH class ships to encounter temperatures up to 600 degrees celsius, Construction of a new Dynamic Leak Stop Repair Training unit (DLSRTU), Upgrade of the water reticulation, recycling and treatment of the facilities and construction of a new Simulator Control Room, Damage Control Centres and Repair Bases to simulate actual areas of a Navy Vessel.

All Defence projects are constructed to a standard equivalent to Four Star Green Star or higher, and this one was no exception. Water conservation strategies include rainwater harvesting systems on the buildings with the highest forecast water usage; fitting of WELS 4 Compliant (Water Efficiency Labelling and Standards Scheme) taps and showers in all buildings; waterless urinals; and all toilets, both refurbished and new, using recycled water for flushing.

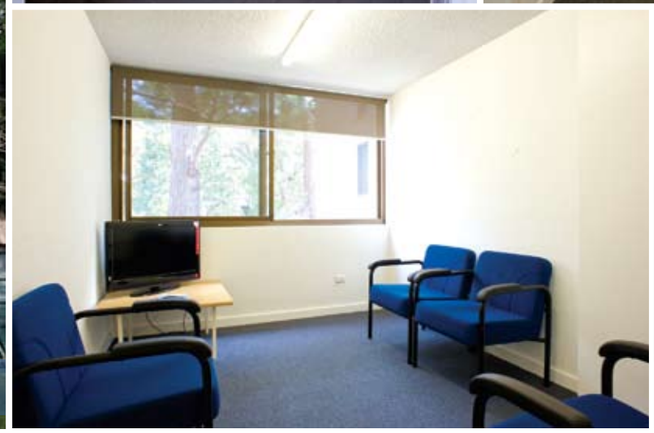
The new training pool has an ultra fine precoat filtration system, which reduces backwash water consumption by approximately 85% when compared with equivalent sand filtration systems and insulated swimming pool blankets have been installed to reduce water loss via evaporation, and reduce heat loss.

All of these strategies will result in a forecast 30% reduction of potable water consumption post-redevelopment based on current population. Other sustainability aspects to the project included extensive use of natural ventilation in new buildings; low VOC materials; removal of lead and asbestos-containing materials and hydrocarbon contaminated soils; use of recycled or certified sustainable timber products; 'closing the loop' by specifying recycled content, particularly in steel and through fly ash replacement; and a construction target of reuse and recycling of 70% of non-hazardous waste, by weight.

The design and construction of the RANSSSS was particularly challenging. Innovative engineering solutions had to be developed which could deliver the highly specific functional capabilities. These include training simulators with a unique level of realism. The DLSRTU (a multi-deck ship simulator, capable of being flooded and oscillated), the fire suppressant foam/water extraction recycling system and the system which integrates the individual simulators into the common command and control network are all unprecedented. There was no standard or existing design to work from, so everything had to be developed from first principles and then refined for constructability as well as end-user needs and functionality.

Specifically, there is no relevant publicly available information. There were no pre-existing RAN design standards or standard operating procedures. Neither the capabilities nor the functional requirements were defined. Concepts did not exist – they were developed from first principles and subjected to iterative evaluation as immature design solutions, risks, constraints and opportunities emerged and evolved.

The end result of the concerted effort of the construction, engineering and subcontractor workforce is a facility which gives the Royal Australian Navy the type of landside accommodation, coordination and training resources they require to be a safer and more effective force at sea.



INTREC'S BRILLIANT NAVAL MANOEUVRES

Intrec Management's work at HMAS Creswell was similar to turning a young civilian into a professional sailor – applying diligence, discipline and skill to deliver a complete transformation.

Intrec specializes in commercial interior fit-outs and refurbishments and at HMAS Creswell, the Company applied an impressive level of attention to detail on an extremely complex, time-pressured project.

Over the course of eighteen months, Intrec oversaw numerous projects in 11 different structures. Works ranged from new accommodation buildings upgraded to run efficiently with solar power and recycled water; to the construction of an Armoury facility for housing and distributing weapons; to the refurbishment of the iconic heritage listed clock tower building.

Before anything new could be constructed, Intrec required the services of a specialist to undertake remediation works and safely remove the asbestos found in most localities on site.

Once completed all of the services at HMAS Creswell where re-engineered to link to a building management system (BMS) monitored off site at HMAS Albatross, Nowra.

"One of the biggest challenges of this job was co-ordinating the delivery of complex service systems and the BMS interface that came with it," said Intrec Construction manager, Stuart King.

The HMAS Creswell was also unique in its affiliation with the Defence Materials Maintenance Organization which required a high level of documentation to allow for ongoing maintenance and monitoring.

"Once something was installed, every asset in the building had to be labeled for entry into the WEB FM System. This system details all data about that item from technical data to life expectancy. "There was a high level of detail required for most items on this project. Also high standards for aspects of the construction", Stuart said.

The risk of bushfire in the Jervis Bay area meant strict specifications on materials and design. Environmental efficiency meant high performance glazing was used, low VOC paints and effective insulation. The procurement and management for this project was complex.

"We were audited under the National Code for Compliance throughout this project, having undergone Defense Security Checks, also having to demonstrate ongoing OH&S compliance under the regulations of the Federal Safety Commission (FSC). This added to the challenges of such a large site and long project duration. Intrec put a lot of effort into developing the safety culture on site, and remained LTI free."

There was a degree of programme pressure from the client, as HMAS Creswell's role as a Naval College means the site has a fixed calendar of events such as the 'Passing Out Parade' for graduates. Intrec needed to ensure there would be sufficient accommodation for the graduating sailors and ongoing activities on the base meant delivery schedules were often inflexible. Leading up to the 'Passing Out Parade', minimal works could be performed on the site.

Intrec had a team of five staff on site throughout, including two Site Managers, Contracts Administrator, Project Director and administration. This team coordinated the efforts of up to fifty separate subcontractors, ensuring the required quality of work was completed on time, and on budget.

"The HMAS Creswell project has provided a significant boost to the local economy. At least 60 percent of our workforce were local subcontractors. Intrec also directly employed several locals as full time staff and there was a lot of business for local suppliers in and around Nowra," Stuart noted.

"Intrec sees great potential for work in the Jervis Bay region and will continue to tender for work in the area" he concluded.

Intrec are also currently completing fitout works for the Department of Regional Australia and over the 2010-1011 holiday season undertook works for the local school and preschool at Jervis Bay.

In Sydney, Intrec has recently completed works at Harper Collins Book Publishers in Elizabeth Street Sydney; EMC2 Business Solutions at St Leonard's, NSW; Estee Lauder in Alexandria, NSW; an office fitout for Oracle in Lyneham, ACT; a branch of the Westpac Bank at Manuka, ACT as well as in Guildford, NSW; the Greyhound Racing Board, Rhodes NSW; and The Benevolent Society of Australia at its Alexandria, NSW offices. The company is also undertaking projects at Sydney University, the University of Technology, Broadway, NSW; Fitness First "Norwest", Chatswood Public School, the Ryde Hospital, Campbelltown Mall and several bank branch fitouts for HSBC and Westpac Banks.

Since commencing business in 1996, Intrec has built solid relationships with clients in the Commercial, Educational, Health, Government, Retail, Hospitality and Community Projects sectors. From offices in Sydney, Brisbane and Canberra, its team delivers superb spaces which functions effectively for clients, backed by accredited Quality Assurance, Environmental Management and Occupational Health and Safety Management Systems. As Members of the Master Builders Association, the Green Building Council of Australia, the Property Council of Australia and the Facility Managers Association, Intrec's commitment is to continue to be at the cutting edge of the building industry, producing project results which have lasting value.

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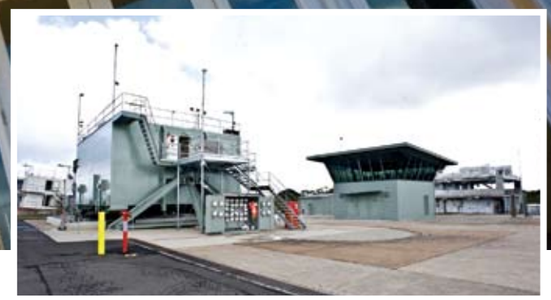

GOING ONLINE KEEPS HMAS CRESWELL ON TRACK

Across Australia, the Defence Department can keep track of every single item at their facilities, right down to the nuts and bolts in the door hardware on the refurbished HMAS Creswell. WebFM provided Hansen Yuncken with a specialised version of their award-winning OMTrak software for the project, which produces the Operations and Maintenance Manuals, and delivers data for Defence's own asset-management system, DEMS.

WebFM's team of IT engineers worked with Defence specialists for seven years to design and perfect this version of OMTrak, which has also been provided for Amberley Airbase, Holsworthy and Singleton Barracks, RAAF Bases Kapooka, Pearce and Tindal and the Hardened and Networked Army project at Edinburgh.

It only took WebFm two days at HMAS Creswell to start the system and train key users, as OMTrak has been designed to be extremely user-friendly. For Hansen Yuncken the advantages OMTrak offers include being able to coordinate data from multiple project tasks, at multiple project delivery points, by numerous subcontractors, all working to individual program timetables, which smoothed information logistics on the project considerably.

The system is highly secure, a bottom line requirement for Defence projects, and so easy to use that even with 430 projects and 6,000 or so users worldwide, the 24 hour WebFM Help Desk rarely receives a call. OMTrak was invented by company Director, Stuart Smith. While working on the Sydney Olympics project for Coopers and Lybrand in 2000, he realised the benefits available from electronic production of construction data collection and O&M data. The company has grown from that initial "aha!" moment into an international network of offices, meeting the needs of projects across health and military, transport and education, retail and mining, commercial, industrial and major residential sectors.

The Rectangular Stadium project used OMTrak, as have Monash University, the University of Sydney and Orange Base Hospital. Stockland and Westfield are regular clients, as is Leightons. Australia's largest infrastructure project, the $5.1 billion Airport Link in Brisbane Queensland, is also using OMTrak to deliver their O&M Manuals, while overseas, projects in Dubai, and New Zealand are adopting WebFM's systems.

WebFM's products are at the leading edge not only of the digital information age, but also of the Green Star construction era.

"Use of OMTrak gives projects the opportunity to acquire four Green Star points – two points for supplying a digital building user guide, and two points for electronic manuals instead of paper. There are also possible innovation points," said WebFM National Development Manager, Brook Baker.

"At HMAS Creswell, the OMTrak system works well, and everything will be handed over on time."

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MAJOR PIPEWORKS WITHOUT MASSIVE EARTHWORKS

Replacing the HMAS Creswell sewer lines without moving serious amounts of earth sounds like mission impossible, but it wasn't for ITS Trenchless. ITS undertook the renewal of the existing 150mm and 225mm / 300mm sewer lines by the trenchless method of pipebursting, reducing the amount of excavations of traditional methods by 90 percent, and minimising the overall impact of works on the site.

The scope of pipeline rehabilitation works included: bypass sewer by setting up sewer plugs and installing bypass pumps; excavation of launch and receipt pits; onsite welding of PE pipe; pipe bursting; rebenching of manholes; restoration; and final CCTV Inspection. This was in effect a total replacement of the sewer network, including new house service lines and junctions.

ITS had a four man pipebursting crew and Senior Project Engineer Barry Moore on site, using innovative techniques involving pipebursting into manholes, as opposed to excavating an exit pit in areas where excavation was going to be difficult or disruptive. As the facility was still in operation and access around the base needed to be maintained, this minimal disturbance approach was particularly suitable for the high security, environmentally sensitive site.

ITS is one of the very few trenchless businesses that can genuinely deliver sewer and water renewals with a choice of lining, pipebursting and open trench methods. The company has built its business on broad inhouse capabilities which can deliver solutions tailored to the needs of clients and their sites, and has a workforce of over 50 skilled operators, labourers, engineers and project supervisors.

The range of world's best practice trenchless technologies for the installation and renovation of pipelines and structures delivered by ITS are suitable for both pressure and non-pressure applications, including potable water pipelines. The specific capabilities include pipe-bursting, slip lining, swagelining, pipeline robotics, point lining and traditional dig and repair works. With offices in Sydney and Brisbane, ITS is providing innovative pipeline rehabilitation solutions to the Water and Wastewater Industry, Local Government and Industrial markets working exclusively on existing culverts, pipelines and pipe related infrastructure.

Other current projects include rehabilitation through sliplining of the East Hills Submain Mars Street Siphon for Sydney Water; sliplining approximately 1.2km of DN1200 and DN900 pipeline of the Bankstown Ashfield Water Pipeline for NetWorks Alliance for Sydney Water; and replacement of sewer and water reticulation pipework for Wingecarribbee Shire Council.

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FIRE, WATER AND AIRCON ON COMMAND

It's not often a project requires someone to start fires, make things leak and cause whole buildings to move about, but the RANSSSS training facility is not exactly your standard project – in fact, there's nothing like it ever been constructed before. Statewide Mechanical Services (SMS) used engineering expertise and ingenuity to deliver on the quite extraordinary specifications.

SMS undertook the design and installation of the fire simulators contained within the Advanced Fire Fighting Unit (AFFU), and the Standard Fire Fighting Unit (SFFU). The AFFU utilises gas and diesel fuel to simulate fires, while the SFFU just uses gas. SMS designed and installed the leak simulators that serve the Dynamic Leak Stop Repair Training Unit (DLSRTU), and the hydraulic power equipment that rotates the building through an arc of 20 degrees.

Also part of their scope of works was the design and installation of the ventilation systems that serve the AFFU, SFFU, and DLSRTU buildings, and the controls system located in the Simulation Control Room (SCR), from which users monitor and control all simulation equipment with the AFFU, SFFU, and the DLSRTU.

In addition, SMS designed and installed energy-efficient air conditioning and ventilation services to diverse other buildings on the base. The major ventilation systems that serve the AFFU and SFFU have been provided with variable speed drives, to ensure they only operate as fast as required, without wasting energy.

A team of 25 SMS staff worked on the project, over a period of 12 months. Delivering results which meet the unusual operational requirements, and do so safely, within tight project deadlines, required a strong focus on project management and precision in executing work.

"The DLSRTU is a unique building, as it rotates on a pivot to simulate the movement of a ship. We believe that it is the first facility, in Australia, that combines leak stop training and a moving environment, to simulate conditions of a navy ship at sea. The rotation of the building is controlled by a specially designed hydraulic power system, which provides the users total control of the buildings position," said Statewide Mechanical Services Project Engineer, Paul Groat.

Statewide Mechanical Services has been operating from Wollongong since 1998, providing design, supply and installation of mechanical services across the Sydney region, Illawarra region, South Coast and regional centres of New South Wales.

With 30 highly skilled staff, SMS can provide excellent results for multiple major projects simultaneously. The company have successfully completed both private and government funded projects including commercial and retail developments, apartment buildings, defence, industrial, heath and aged care projects, and education and training facilities.

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ACOR ENGINEERING GOES BEYOND THE KNOWN

Great engineering provides visionary solutions for unique situations. ACOR Consultants delivered this kind of innovative thinking for the HMAS Creswell project, with an Australian-first for the Royal Australian Navy's School of Survivability and Ship Safety (RANSSSS).

ACOR provided the engineering consultancy services for the Infrastructure Services, civil, hydraulics & fire, aquatic and fuel services elements of the Project, working on the project from Concept Design Stage through to final completion. The RANSSSS required specialist training and simulation facilities which presented significant technical and risk management challenges. The identified risks were successfully designed-out or mitigated via a Navy Safety Case hazard assessment based on AS 4024.

There was also a completely unique engineering design challenge involved in this project. "The RANSSSS required to generate some 30 cubic meters per day (or 8,100 cubic meters per 270 working-day year) of Aqueous Film Forming Foam (AFFF) wastewater as part of their mandatory naval fire fighting training regime. The 'conventional' approach to handle this wastewater stream using evaporation ponds was assessed to be unsupportable from an environmental perspective. The alternative was to contain and dispose of all wastewater off-site, but this approach was also unsupportable from environmental and economic perspectives," explained ACOR Director, Livio Chiarot.

"To overcome these problems, ACOR conceived, piloted, tested and detail designed a customized and purpose designed AFFF recycling and treatment plant that would support the training objectives of the RANSSS in an environmentally responsible, compliant and sensitive manner. The recycling plant allows up to 50 cubic meters per day of alternative formulation AFFF wastewater to be recycled and re-used (effectively in a closed-loop) for fire fighting training activities, whilst always extracting and holding a concentrate-enriched product such that any releases of foam concentrate generated in the event of an overflow to the environment can be avoided, minimized and safely discharged.

"The plant design processes include hydrocyclones, foam enrichment and "knock-down" processes, synergistic bacterial treatment techniques, rapid rate filtration, disinfection and adsorption processes. There are no similar recycling plants for AFFF wastewater in existence to our knowledge elsewhere. The plant capital cost was some $2.0 million, but after allowing for its operation and maintenance costs, it is expected to provide to Defence an annual saving of some $9 million compared to the next best alternative. The completed recycling plant is in its 7th month of operation (as at July 2011)." ACOR also provided consultant services on water and energy efficiencies for the new and refurbished living-in and working accommodation buildings and the new swimming pool. A multidisciplinary ACOR team contributed their expertise, including civil design engineers, traffic engineers, design draftspersons, a fire design team, project director and project management.

With an extremely broad range of engineering and design expertise on staff, ACOR can provide innovative solutions to projects across civil, infrastructure services, aquatic engineering and water treatment. Delivering on ESD objectives is a prime directive for all their projects, including the sustainability of water supplies; reduction or elimination of toxic and harmful substances; selection of materials based on their life-cycle environmental impacts; and maintenance and operational practices that reduce or minimise harmful effects on people and the natural environment.

"ACOR's approach to Ecologically Sustainable Development (ESD) goes beyond meeting ABGR and other performance requirements and benchmarks. ACOR's designs seek to balance fitness-for-purpose, cost-benefit and energy and carbon minimisation to maximise the resulting positive sustainable design benefits throughout the life-cycle of the Project," said Livio Chiarot.

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CREATING AN ACCURATE MAP OF HMAS CRESWELL

Before any work began at HMAS Creswell, Leslie & Thompson undertook topographical mapping of the entire base, using state-of-the-art GPS and robotic survey equipment to efficiently collect ground data. This data was then processed to produce a 3D CAD drawing of the whole base.

As an established, working naval base, the challenge was to set up a control network around existing buildings and vegetation and to provide all the data collected in standard Defence format. The entire process took five staff members working over two and a half years onsite and offsite.

"For a major project like this, an accurate and reliable base plan is essential prerequisite for subsequent design work," said Leslie & Thompson Principal, Stuart Leslie. "We can supply a qualified surveyor with the latest survey equipment to any major project Australia-wide, backed up by data processing in our head office. We are a small, customer-focused firm and our aim is to provide world best practice surveying services for major projects."

Recent major projects Leslie & Thompson have completed include: set out of earthworks and pipeline for Ertech's Olympic Dam mine expansion project, surveying for Multi Role Helicopter Facilities at HMAS Albatross for Richard Crookes and set out construction for multistorey Shoalhaven Entertainment Centre for Edwards Constructions.

Leslie & Thompson are Registered Surveyors, and have been in business for 17 years. Operating under OHS and QA systems, the company delivers safe, efficient and accurate surveying solutions.

leslie&thompson surveyors

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