

ACE-ING IT



From its new purpose-built Aeromedical Crewing Excellence (ACE) Training Centre at Bankstown Airport, Toll Helicopters is using high fidelity simulation and virtual reality training devices to best prepare its crews and NSW Ambulance paramedics and doctors to save lives across southern NSW and the ACT for the next decade and beyond.

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On January 10, in partnership with NSW Ambulance, Toll Helicopters began its 10-year plus a five-year renewal option contract for the provision of aeromedical helicopter rescue and retrieval services, taking over from incumbent operator CHC Helicopter.

Under the new contract, which is part of the NSW government's \$151.2 million state-wide helicopter retrieval network, the state has been divided into two zones with Toll Helicopters using eight identically-configured and modified Leonardo

AW139 long-nose versions from four bases in Sydney/Bankstown, Wollongong, Orange and Canberra to cover the Southern Zone demarcation on a 10-minute notice to launch by day and 20-minute notice at night.

The service was officially unveiled as Toll Rescue Helicopter by the then NSW Health Minister Jillian Skinner at its Bankstown Airport super base on January 13, with Toll Helicopters initially beginning its contract with two AW139s to service the greater Sydney region with CHC Helicopter continuing to provide coverage in Wollongong, Orange and Canberra until the further rollout of the contract.

"A medical team comprising a NSW

Ambulance doctor and paramedic, or a doctor and nurse, will fly on every mission in one of our fleet of intensive care AW139s helicopters," said Toll Helicopters general manager Mark Delany. "The Sydney base will use three operational helicopters with one each in Orange, Wollongong and Canberra. The balance of two helicopters will be used as operational spares to cover maintenance and training requirements."

Toll Rescue Helicopter was due to begin rescue and retrieval operations out of Wollongong on March 1 from a brand new base at the Illawarra Regional Airport, Albion Park.

Then on April 2, the new helicopter



service will start flying from Canberra, taking over the service currently being provided by the Snowy Hydro-sponsored SouthCare rescue helicopter from its base at Hume, south-east of the city centre.

On May 1, a third operational helicopter will come online at Bankstown allowing for Toll Helicopters to begin transporting sick and injured newborn babies, infants and children for the Newborn and paediatric Emergency Transport Service (NETS). Taking over from CareFlight NSW, which is currently providing the service from a temporary base at Bankstown using a Bell 412EP and a BK117 B2, all of Toll's helicopters have been

configured to carry out NETS missions, giving the service the ability to support multiple neonatal jobs simultaneously.

By utilising its whole fleet, rather than a single dedicated machine for NETS jobs, Toll Helicopters can deliver a NETS crew to a hospital to begin stabilising and preparing a patient for transport. After the drop-off, the helicopter will then be able to return to base or be retasked on another mission with another of its helicopters able to return to the hospital and transport the team and patient to one of the children's hospitals.

Then the final component of the new contract will start on May 14, when Toll Rescue Helicopter

begins operating from a refurbished base at Orange Airport, in central NSW.

The first mission for Toll Rescue Helicopter under the new arrangement came within hours of the contract starting when AW139 VH-TJJ, callsign 'Rescue 207', was tasked to rescue a male bushwalker with a lower leg injury from Hatches Hollows in the Kanangra-Boyd National Park, 130km south-west of Sydney. The crew of Rescue 207 performed a 200ft winch to rescue the 58-year-old male before transferring him to Liverpool Hospital, south-west of Sydney, for further treatment.

In week one of operations

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(January 10-17), Toll was tasked on 27 missions of which 21 were primary response jobs with five of those involving the use of the helicopter's rescue winch.

"While we only had two helicopters operational at that stage, we were very happy with how things have been progressing," said Toll Helicopters' chief pilot Colin Gunn.

"We have just concluded our contract supporting the Australian Federal Police in the Solomon Islands and we are focused squarely on delivering this contract for NSW Ambulance."

Toll Helicopters has 38 operational pilots supporting the contract with four also full-time flight examiners and another four being management pilots. While eight pilots and seven crewmen transitioned over from its Solomon's contract, 10 pilots came across from the incumbent operator with the remaining hired from other EMS operators, the Navy and some well-trained and highly experienced pilots up-skilled for EMS operations.

"We did get a number of people from the incumbent," said Gunn. "One of our strategies for mobilisation from day one was to have 10 friendly faces of pilots and crewmen so when the clinical staff were jumping into the back of the aircraft they were in the company of known quantities."

Training programs for pilots and crewmen were tailor-made for the individuals based on their experience and qualifications. For pilots new to the AW139, Toll Helicopters provided them with a minimum of 86 flying hours comprising around 33 hours on the type rating course and another 53 hours of line training.

"This is well over and above what anyone else would do but that was in our bid and what we put into our contract," said Gunn. "We promised the government the pilots would be as well prepared as possible. This included a number of winch training exercises including transfers from a moving boat. Simulation is wonderful of course, but you have to get out into the real helicopter and learn the true airspace and interact with air traffic control. You can never fully replace actual flying."

Proper preparation prevents poor performance

Like its helicopters, all pilots, aircrew and NSW Ambulance paramedics and doctors have been trained to the same standards through Toll Helicopters'



Winch training from an AW139.

“This is well over and above what anyone else would do.”

COLIN GUNN

ACE Training Centre, a stand-alone facility located behind the operational rescue base at Bankstown.

The ACE training facility is an Australian Skills Quality Authority (ASQA) registered training organisation which attained its full and unrestricted CASR Part 142 approval from CASA in February.

Inside the Leonardo-approved training facility stands a CAE 3000 series AW139 Level D full-flight motion simulator with EASA and CASA approval, a Survival Systems Mets 30 Helicopter Underwater Escape Training (HUET) simulator rigged above a pool that can produce one metre waves and driving winds, and a virtual reality-based Complete Aircrew Training System (CATS) developed by Virtual Simulation Systems based at Port Stephens, NSW. The training centre also includes a wet and dry winch simulator, a 120-seat theatre and space for a second full-motion simulator.

Every three months Toll Helicopters' pilots, aircrew and the clinical teams will spend around three days at the ACE centre practicing normal and abnormal situation training together as a combined crew.

"We wanted to do a better job at training our people for their roles and we wanted to improve operational capability and excellence, standardisation and most importantly,

safety," said Delany.

"To do that we needed to change how we were training our people. Our ACE training program, which I believe is a big reason we won the tender, is really innovative and a step change for the world of how we train for EMS. We designed the program first and then we designed the training centre to support the program."

Toll Helicopters has 10 dedicated instructors at the ACE centre comprising four pilot instructors, one HUET instructor, three crewman trainers plus three instructors who are online with the service. Toll Helicopters' certifications allow for an additional pilot or crewman to be carried on each helicopter over and above the crew of four that is needed for the contract. Thus an ACE instructor can fly on missions to stay contemporary and up-to-date with procedures while undertaking crew training when appropriate to do so.

Delany said Toll has effectively got nine helicopters operating on its contract, citing the Level D simulator as a training aircraft.

"From a logistics perspective it became clear to us we either needed nine helicopters or eight with a simulator because then you get the guaranteed training delivery model and you get all of the exponential benefits of simulator training on a regular basis for your crews. Other [contract] models

that don't have a simulator are doing all of their training on the aircraft. The simulator removes a huge burden off the operational fleet for training and reduces the expense of costly overseas travel for training on a simulator.

"Once you climb out of a simulator your skills are at their peak – you can handle any emergency. But you immediately run into the skills decay from that point until you hop back into a simulator, say again in a year's time. We are trying to minimise or eradicate that by the increased frequency of simulator training. It means you get a skill-set retention."

From day one, Toll Helicopters has integrated its crewmen into their flight simulator program. While it is rare for a crewman to experience any flight simulator training, the general EMS teaming is for a crewman to start out in the front-left seat assisting the pilot with getting the helicopter's systems set up. They can transition into the rear cabin for winching operations or to provide guidance and clearances when flying into tight areas.

"They do spend a fair bit of time in the front assisting the pilot with a lot of their drills, and to have been able to be trained in the front-left seat presents an opportunity for increased training and operational outcomes," said Toll Helicopters' head of training Graham Svenson. "There are very few companies that will actually pay for their crewmen to go overseas to do simulator training. For the crewmen to see realistic emergency training and procedural training with the pilots has been rewarding as opposed to being isolated or separated in their training and not ever having conducted that combined training in a simulator. Under the structure of the programme our crewman will be far better prepared to conduct the full scope of their role."

Hold your breath

Aircrew that have previously used legacy HUET trainers before, such as the stainless steel cage attached to a crane and dunked into the deep end of a local swim centre and rolled upside down, and who have now used the Mets 30 HUET device with all of its add-on sensory features, say it is an experience that is as close to reality as they could want to get.

Resurfacing from a successful egress from the inverted and submerged cabin, dual fans simulate winds up to 145km/h and a single fan positioned above simulates the downwash of



The CAE 3000-based AW139 simulator.



a hovering AW139 tasked to winch you from the water. A large bobbing 'ball' at the end of the pool whips up a one metre wave delivering sea state 3 conditions. Strobe lighting, synchronised to a sound system, replicates a thunderstorm mixed in with audio of the helicopter. It is exhilarating stuff, and that's just observing from beside the pool.

"Participants so far have said our HUET is extra challenging, particularly to pop out the windows with realistic forces of being under water," said Svenson. "It brings home the dangerous nature of the situation they may face and they are trained better which is the ultimate aim."

Three HUET instructors are stationed inside the cabin ready to respond in case of any difficulties. They are backed up by a pair of safety SCUBA divers on guard in the pool

while a crane operator supervising the drills can extract the HUET device from the water in an emergency in around three seconds.

"The round out of a standard HUET course, where you would be dunked and rolled a few times, is to do some life raft draft drills and that would be it," said Svenson. "We add the extra dimension of training where you are winched out of your life raft and up into the helicopter with wind simulating the downwash and the noise and one metre waves. What we are doing is the next step towards the reality and it is really being welcomed in the industry."

Above its contract requirements, Toll Helicopters is offering AW139 type rating and HUET training externally for individuals and can tailor-make a course for a specific company's needs.

Virtual reality rescue

A former Air New Zealand 747-400 pilot, Delany draws parallels with his airline training to the level of training Toll Helicopters' is achieving with its ACE program, particularly around human factors.

"In the airline world you do an enormous amount of human factors training but in the EMS world you can do an online course and you are current for CRM [crew resource management] at the lowest level," said Delany. "That's just not good enough, because we do such complex operations we

↑ Tolls ACE Training Centre at Bankstown.

“**The simulator removes a huge burden off the operational fleet for training.**”

need to do it at a much higher level for our people.”

In partnership with Convergent Safety, three full-time human factors instructors have been employed to support Toll Helicopters’ NSW Ambulance contract which is integrated with its simulation training.

“This excites us more than anything else because it is the human factors that you must work on and keep working on to avoid having those incidents or accidents in perfectly serviceable aircraft,” said Delany.

“The human factors training is really cutting edge and we are confident that we are going to at least meet or exceed what the airlines are currently doing with human factors training. Safety staff, operations managers and engineering managers all do our human factors training as well as they could be the ‘human factor’ that contributes to an incident.”

Using the CATS device, aircrews and medical crews, most coming from different experience backgrounds, contracts and employers, will fly fully integrated missions together in a virtual environment. The air and clinical crews are mixed together from across all four bases when undergoing their training to ensure there is no ‘base grouping’ which, over time, will result in standardised operational skill-sets and procedures across the whole of the operating region.

At a first glance the CATS device is merely a skeletal shell of an AW139 cabin. After putting on a set of VR goggles attached to a headset, you are instantly immersed in an environment where graphics are so crisp and detailed that after a few moments you start believing you are in fact sitting in a real helicopter.

The recent addition of an accurate AW139 cockpit with a domed screen to the front of the CATS device now means pilots too can ‘fly’ the mission for the crew. During a simulated mission, the crew sitting in the cabin see the same synchronised graphics through their VR goggles as what is being projected on to the screen for the pilot and can give guidance to manoeuvre the helicopter for a confined area operation or for a winch rescue.

“The graphics are very high quality and have enough hover references for the pilots to conduct a realistic winch accurately which achieves the training outcomes the crewman needs as well,” said Svenson. “All of a sudden now we can do combined training front



➊ Crewmen train on the CATS device using VR goggles.

and back seat at the same time with emergency malfunctions and all of the other scenarios that we can throw at it. Instructors can load the CATS up with bad weather and emergencies or apply some mission pressure – all human factors that can contribute to a loss of situational awareness.”

Not all the switches in the cockpit are functional – a decal represents a

switch’s placement so either a pilot and crewman can identify the correct position which helps with procedural training and learning check lists.

“We are looking to have CATS certified as a lower level training device able to do limited currency and recurrency for crewmen and the clinical crews as well as the pilots,” said Svenson. “Where possible we won’t use the real aircraft or the Level D simulator to do simple currencies that can be achieved in the lower fidelity and cheaper training device. What the domed cockpit gives us is that extra ability to do the combined training with the pilots and crewman. We have never really had that before other than in the real helicopter.”

Learning from the line

Since starting its contract Toll Rescue Helicopter has flown some challenging sorties, which most of its crews have been exposed to regularly over the past decade. The details of any mission that offers up some new challenges to the crews are entered into an Aeromedical Crew Resourcing Management (ACRM) program as part of the standard debrief after every mission. When other air and medical crews come to do their human factors training, instructors can use these past scenarios in the simulators.

“We are investing in the best [software] we could find in the world for helicopter flight data monitoring systems,” said Delany. “What this will mean is if we have a learning incident or a human factors event we will log that as a quality report to learn from. So if something happens in Wollongong on a Monday, then I want that being instructed in the training centre by the Wednesday so we are completely relevant and contemporary. This is modern contemporary helicopter SAR EMS human factors training which is relevant now – today.”

Delany said a higher frequency of training using high fidelity simulation to support in-aircraft training leads to improved operational capability and a much safer operation.

“Our absolute intention is step change in the industry and we believe we will achieve that through the ACE program,” said Delany. “ACE is a level of fidelity that is not available anywhere else. When we talk HUET, it’s not just rolling upside down in a cage in a pool and tick a box to say you’re current, we are putting people in a program where they build up to Sea State 2 or 3 with wind, with rain,

in darkness with lightning and thunder. We're doing the best for our crews to ensure they get to go home after work to see their families."

Toll Helicopters is also the first external company to be certified as an approved Leonardo training facility.

"We are providing limited training courses using the ACE centre initially but we will be expanding as the need and the business model creates interest," said Svenson. "Initially, we will be running pilot type ratings on the AW139 to start then we will be offering recurrent training programs. We want to expand it out further to meet civil industry needs such as NVIS and EMS-centric training."

Toll Helicopters will also start to roll out courses available to the industry that have been amiss recently such as a multi-crew course (MCC) using the Level D simulator at the CATS.

The long and the short of it

With the seven-tonne long-nose version of the AW139, Toll can carry 600kg more than the legacy short-nose 139s operated by the incumbent. Registered in the VH-TJ_ series – the same as Qantas's old 737-400 fleet – the AW139s boast a new anti-vibration control system for smoother flight.

"The main difference by using the long-nose version is the movement of a couple of hundred kilograms of avionics from the rear of the aircraft up into the nose which centralises the centre of gravity," said Gunn. "With all the medical equipment and four crew in the short nose version, you are flying right on the aft CoG limit for every mission, which means the aircraft is flying and working harder to do the job."

"With the long nose, the serviceability rate of the machine is better due to reduced wear and tear on components and the new electronic anti-vibration system makes it smoother in flight, particularly for the people in the back and the patient when you want to get somewhere fast."

Inside the cabin Total Aerospace Solutions at Albion Park delivered a customised interior medical fitout on all of Toll's machines including the installation of a patient lifting arm for transferring patients into and out of the helicopter. The lifting arm concertinas out from the cabin rear wall and uses an electric winch capable of lifting a patient, stretcher and medical bridge of up to around 400kg.

"We had the helicopters customised

by Leonardo on the production line in Italy to ensure the aeromedical interior would fit into the aircraft with a lot less work and a lot less cost involved," said Toll Helicopters' chief engineer Jeff Bahls.

"There are around 30 customisations that were made to each aircraft. The patient lifting arm is a rather unique feature of our aircraft which allows them to transfer a stretchered patient without having to lift them."

Bahls, charged with overseeing a team of 19 engineers comprising five avionics engineers and the remainder performing structural and mechanical work, says two engineers will be located at each of the four operational bases and will rotate through an eight on, six off roster with a day handover.

"The workload will not be that high at the line bases but it is relentless because they will be running 24 hours per day," said Bahls. "Despite the industry downturn there were a lot of qualified helicopter engineers around who had the correct training, qualifications and experience. EMS is a pretty demanding and dynamic place

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We are fairly self sustained to ensure we minimise any unnecessary down time.

JEFF BAHLS

➤ Toll Rescue Helicopter crews have come from a variety of backgrounds.

that never really gives up so they had to have the right approach to that too."

A large part of the engineering work for Bahls and his team will be making sure the flying hours of the helicopters are managed so at the end of every 12 months they hit their target of 600 annual flying hours. If one machine is running low on hours it will be swapped around between the bases to balance out the fleet.

"Once they do clock up 600 hours, they will pass through the Bankstown base for a couple of weeks to have heavy maintenance carried out before returning back into the field," said Bahls. "We have most of the tooling that you can get for the 139 so we are fairly self-sustained to ensure we minimise any unnecessary down time of any helicopter."

Swipe up

Another new feature of the helicopters designed to make launching on a mission safer and more efficient is the use of a tablet-based electronic flight bags (EFB). For redundancy, three iPads are used on board each helicopter, one each for the pilot and crewman and one that mounts in the centre of the instrument panel in the cockpit.

Inside the operations room, the crewman will use the iPad when the job comes in. As the pilot is listening into the phone call from the Ambulance Control Centre dispatcher and taking notes, the crewman is on Google Earth and entering details into the EFB app. The pilot will then plan the whole mission on the iPad and once the crew gets to the helicopter it is as simple as an 'up-swipe' on the screen, selecting AirDrop and sending the mission plan to the other iPads via Bluetooth.

The aircrew can also send it to the paramedic in the back for them to be tracking the flight which can help build up that overall crew situational awareness.

"We can quite easily walk to the helicopter and be gone in well under the 10 minutes," said Gunn. "But there are a lot of things we have to achieve in 10 minutes. The whole crew needs to fully understand the job, we need to submit a flightplan, check the weather, complete a pre-flight risk management assessment and do a crew brief, which is a new thing for this contract. So we have invested heavily in software that has helped us achieve getting on our way quickly."

Called Gyronimo, a tablet-based app accurately calculates the weight and ➤



balance for each helicopter. Since the helicopters are identically configured, the pilot simply selects the registration or callsign from a drop-down menu, the configuration of the medical and rescue equipment on board, selects the crew names, types in the fuel state and the calculation of the weight and balance is done in a matter of seconds. Every 90 days the crew are weighed to update their profiles in the app to ensure accuracy of the output.

“It will also do the performance calculations,” said Gunn. “CASA is heading down the same path as EASA with having to fly aircraft at specific weights and at specific profiles at surveyed helipads. Until now it has been talked about a lot, but for the first time our contract mandates that we fly in a certain manner with a performance class.

“Going through a 10,000 page flight manual to find the relevant charts that help you to know what power you will have if one of the engines fails, you could spend half an hour in the flight manual prepping before you walk for every sortie. But instead you program the basic information in and out comes every single parameter we want in seconds. The guys are now walking to the aircraft much more informed than they ever have been.”

The future of SouthCare

On April 2, Toll Rescue Helicopter will start flying from the ACT, taking over the CHC-operated SouthCare Rescue Helicopter service.

With an 18-year history and passionate community support behind it, the exact future of Canberra’s and the south-eastern NSW region’s rescue helicopter service remains unclear at the time of writing. In early December, the SouthCare Helicopter Trust announced the appointment of a new Board to oversee the transition to Toll Rescue Helicopter following the resignation of its incumbent board in November.

“The SouthCare Trust is very important to the operation in engaging the local community with the service and will continue to play a significant role in the future,” SouthCare said in an email to *Australian Aviation* in late January. “The exact role the SouthCare Trust will have in the future is currently under negotiation between the key parties and will be considered by the SouthCare Trust Board in the coming weeks.”



➊ Crew training ahead of beginning services on January 10.

“**We can quite easily walk to the helicopter and be gone in well under the 10 minutes.**”

SouthCare’s current naming rights sponsorship agreement with hydro-electricity producer Snowy Hydro will expire on March 31. However, all sponsorships of Toll Rescue Helicopter are currently under negotiation.

A naming rights sponsor has yet to be announced for Toll Helicopters’ Southern Zone operation. And until a sponsorship arrangement is determined, the AW139s have been painted in an interim colour scheme featuring the NSW Ambulance roundel and Toll logo on a white background, compared with the red and white seen on helicopters under the previous contract. The colour scheme is expected to change with the announcement of a naming rights sponsor.

“We have been in discussions with many potential sponsors for a long time and these things take time,” said Delany. “Toll values long-term relationships and this is a 10-year plus contract with NSW and the ACT, so we are looking for a long-term relationship with a sponsor and not a short-term hit. Deals of this nature take a lot of discussion and consideration. We are closer to the end than the beginning, but we’re not ready to announce anything just yet.”

What is clear though is Toll Helicopters’ offering will bring to the

region a more modern helicopter with improved capabilities over the current helicopter type in use.

“Canberra is going to get a world class service,” said Delany. “With NVG-equipped crews, plus the increased weight and speed of the AW139, when compared to a Bell 412 ‘classic’, you just can’t compare it. It will be a significant step forward and these capabilities are going to be available to the people of the ACT when it’s required.”

Getting it done

Taking on the operation of the biggest helicopter aeromedical retrieval and rescue contract in Australian history to date, Toll Helicopters’ journey from contract signing in December 2014 to designing and implementing a contemporary aircrew training program using a high fidelity training centre, bringing eight modified AW139s online and building and upgrading four bases took just over two years.

“We never changed our implementation plan that we had with our tender,” said Delany. “We were on time and on budget with everything we said we were going to do. For us, to do what we did and launch the contract on time is an extraordinary outcome which we are very proud of.”