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THURSDAY, 31 MAY 2018

Defence Investment Plan launched

Harjit Sajjan, Canada's Minister of National Defence, announced the release of a new Defence Investment Plan on day one of CANSEC. The initiative will include expected characteristics, costs and timings of the broad requirements announced in the government's 2017 Strong, Secure, Engaged strategy.

"When we talk about IDEaS [an innovation programme] on page 77 of the defence policy," said Sajjan, "you can be sure to find it there in the Investment Plan."

The initiative is expected to benefit industry players who will now be able to search online for more than 200 possible contract opportunities by service (for example, Army, Navy, Air Force), capability, investment area or key word. The projected costs listed in the Defence Investment Plan will be in ranges. This will allow for flexibility in the funding process as needs require.

Sajjan also re-committed to boosting Canada's annual defence spending by C$32.7 billion (a more than 70 per cent increase) during the coming decade. He contrasted the Defence Investment Plan with the previous Conservative government's Defence Acquisition Guide, which he characterised as "aspirational and unfunded".

"We have made sure that over the next 20 years our defence policy remains not only fully costed… but fully funded," said Sajjan.

The defence minister also addressed a projected C$2.3 billion shortfall in defence spending. The government had planned C$6.2 billion in capital investments last year, but was able to implement only C$3.9 billion worth.

"About 30 per cent of the funds were unspent because we were able to cut costs through better contracts and unused risk mitigation strategy," said Sajjan. "[This] is a good thing."

The defence minister committed to keeping the unused funds available for when they are needed.

"We have made sure that over the next 20 years our defence policy remains not only fully costed… but fully funded"
HARJIT SAJJAN, CANADA'S MINISTER OF NATIONAL DEFENCE


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DAVID DONALD

Cormorant upgrade gets the green light

Led by OEM Leonardo, Team Cormorant has been given Government of Canada approval to proceed with the Cormorant Mid-Life Update (CMLU) programme. The team includes current Cormorant in-service support provider IMP Aerospace, engine supplier General Electric Canada, training partner CAE and avionics company Rockwell Collins Canada.

Since 2002, the AW101/CH-149 Cormorant has provided the Royal Canadian Air Force with a search and rescue capability (SAR), but the type is due for an upgrade to keep it in service until 2040 and beyond. At the same time, the RCAF is also seeking to expand the fleet to up to 21 aircraft, so that long-range SAR cover can be extended across all of the air force's SAR bases, including CFB Trenton, which lacks a long-range asset.

Having been selected to proceed with the CMLU, Team Cormorant is now in negotiations regarding the details of the programme. For the update element, the RCAF is aiming to raise 14 existing aircraft to the AW101-612 standard, as selected by Norway. This includes a Leonardo Osprey multipanel 360° AESA surveillance radar system, AWAC 200 four-axis digital Automatic Flight Control System, two rescue hoists, searchlight, a cellphone detection system, electro-optical/infrared device, and a fully integrated avionics and mission system with five-screen flight deck.

Yet to be decided is the issue of the additional aircraft, with up to seven required. There are three options on the table, and Leonardo is assisting with the options analysis. One option is to purchase new aircraft outright, while another is to lease new-build aircraft from the manufacturer. The third option is to refurbish some of the fleet of nine aircraft that were bought in 2011 as "assembled spares" from the US following the termination of the VH-71 Kestrel Presidential helicopter programme.

These aircraft are held in storage at Halifax by IMP Aerospace. Leonardo has yet to perform a detailed survey to assess their condition, but they have been well maintained since their arrival in Canada. IMP Aerospace could be the location of an assembly line if new aircraft are procured, although the first machines would be completed at Leonardo's plant in Yeovil, England. A new full-mission simulator from CAE is required under the CMLU project, which would most likely be installed at Comox as part of the SAR centre of excellence so that it can be networked with the fixed-wing search and rescue training systems to permit combined CC-295/CH-149 mission training.

One element not included in the CMLU agreement is in-service support (ISS). IMP Aerospace is the current provider with a contract that runs until 2021. A post-CMLU ISS contract may be made open to bidding.

Leonardo and Team Cormorant are also committed to working with Canada's aerospace and defence industries to develop a robust value proposition programme through industrial and technological benefits (ITBs), delivering high-value benefits to Canada in support of areas of key strategic interest to the country. Leonardo has a demonstrated track record of outstanding ITB performance, delivering 121 per cent of its obligation on the original AW101 Cormorant acquisition contract two years ahead of schedule.

Since then, Leonardo has continued to support Canada's aerospace and defence sector, procuring more than C$1.5 billion in Canadian goods and services for its civil and military helicopter programmes around the world. Underlining an increased commitment to the nation is the opening of a country office in Ottawa this summer.

CANSEC opens with a bang

PETER DIEKMEYER

Christyn Cianfarani, president of the Canadian Association of Defence and Securities Industries (CADSI), officially opened CANSEC 2018 amid growing industry optimism stemming from new government momentum on a variety of procurement programmes. "We are in the early stages of the opportunity of a generation," she told a packed audience at this annual must-attend event. "It will shape the Canadian Armed Forces for years to come and our industry along with it."

CANSEC typically attracts more than 11,000 participants from 40 countries, nearly half of whom are public servants, military, coast guard and policing personnel. This makes it one of the top shows in the world. Canada's ministers of defence, public services and

TAPV gets su

ROBIN HUGHES

The Canadian Army is displaying its Textron Systems Canada 4x4 Tactical Armoured Patrol Vehicle (TAPV) as part of the outdoor static display at CANSEC 2018. The vehicle is equipped with a customised prototype SolarΣShield solar heat load reduction/multispectral signature management skin in Canadian camouflage pattern.

Provided by Rheinmetall Defence, SolarΣShield (pronounced 'solar sigma shield') is a patented two-layered fabric system designed for customised installation on any platform or system operating in harsh climatic conditions, from vehicles, weapon systems, tanks, and reservoirs to control centres, shelters, and electronic systems.

An outer layer (Solar Shield) enables the absorption of solar energy for vehicle heat reduction by natural air convection and artificial shadow; an inner layer (Sigma Shield) enables multi-spectral signature management against thermal, visual, radar and ultraviolet detection. The Army is currently evaluating the system, but has not committed to a procurement.

In the interim, TAPV deliveries continue to the Canadian Army. Textron Systems Canada was awarded a C$603.4 million contract in June 2012 to manufacture and deliver 500 TAPV platforms, with an unfunded option for an additional 100 vehicles. The company has now delivered 448 TAPVs to the Canadian Army, with delivery of the remaining platforms scheduled for completion later this year. Textron will then transition to commence a five-year performance-based support contract (FY2018-23), with an option for a 20-year follow-on contract package.

Textron is expected to declare an operational capability of the TAPV programme with the delivery of the 500th vehicle this year; however, the Army anticipates declaration of a full TAPV operational capability in mid-2020.

TAPV replaces the RG-31 Nyala multi-purpose, mine-resistant, ambush-protected vehicle and the LAV-25 Coyote armoured reconnaissance vehicle, and serves alongside the 4x4 G Wagon – Light Utility Vehicle Wheeled (LUVW) in Canadian Army service. TAPV will eventually be distributed across seven Canadian Army bases, 24 Army units, and a number of primary reserve units. The TAPV capability is intended to eventually equip three Canadian Army divisions (2, 3 and 4) in the Managed Readiness Cycle, along with a reduced capability for 5 Division in the Canadian Maritimes.

Some 80 TAPV platforms were

Cianfarani: "The future is bright"

procurement, and economic development were all expected to attend this year's edition.

Cianfarani cited the Canadian government's defence policy review, which listed an innovative defence industry as a top five domestic priority, as a particularly bullish development. "Whether it's remotely piloted vehicles, Surface Combatants or surveillance and reconnaissance systems, Canadian industry is up for the challenge," said Cianfarani. "Our people have the skills to set our Armed Forces up for success.

"Close to 35 per cent of our jobs are in STEM-related [science, technology, engineering and mathematics] fields, a research and development intensity that is more than four times the national manufacturing average," said Cianfarani. "The future is bright."

Canada's Future Fighter and Canadian Surface Combatant programmes have recently seen new life. Earlier this year the Canadian government announced the names of five players that would be eligible to bid in a "fair and open" competition for a new fighter. The government also expects to make a decision on the winning bid for the $56-60 billion ship programme by the end of 2018.

ited up

deployed earlier this month from Canadian Forces Base Wainwright in Alberta in support of Exercise Maple Resolve 2018. The exercise saw the first full deployment of TAPV as the primary mover for Army reconnaissance units; Major Steve Grubb of the Canadian Department of National Defence (DND) said the DND is currently waiting on feedback from Maple Resolve along with a wider deployment of TAPV before a decision is made on the procurement of the additional 100-platform option. The DND can exercise the option within three years of the delivery of the final, 500th vehicle.

The TAPV is also one of a number of platforms being considered for deployment as part of of the Canadian ground component with the UN Mission to Mali. Major Grubb said any decision on the the international deployment of the platform will also be informed by the feedback from Maple Resolve.

In collaboration with the Army, the DND has selected Kongsberg Protech to equip 364 TAPV platforms with its 40mm Protector Dual Remote Weapon Station (DRWS). Major Grubb said one potential option for TAPV ahead of a decision to acquire additional vehicles could potentially be a procurement of an additional 136 DRWS systems to equip the remaining TAPV platforms.

Top Aces has ASDOT contract in its sights

DAVID DONALD

Having been awarded the long-term Contracted Airborne Training Services (CATS) by the Canadian government, combat airborne training services provider Top Aces is now looking towards a major competition in the UK known as ASDOT (Air Support to Defence Operational Training).

The Canadian company – which rebranded from Discovery Air Defence Services in February – is part of the Red Aces team that is bidding for the contract. As well as Top Aces, the team comprises Leonardo and UK training specialists Inzpire. In March the team was down-selected by the UK Ministry of Defence to compete for the contract.

Red Aces intends to offer training capabilities that far exceed those currently fielded within the UK live training environment. Red Aces will choose these capabilities to meet the evolving operational and technological needs of Defence Operational Training out to 2035 and beyond; this has the potential to provide essential support to future UK Air, Land and Maritime force elements as they train to defend the UK and its interests worldwide.

Following an extended evaluation phase, Top Aces (then still trading as Discovery Air) was awarded the Canadian CATS contract last October. The company was the incumbent Red Air adversary provider to the Royal Canadian Air Force (RCAF), and received an extension contract while the new CATS evaluation was ongoing. The new contract is for 10 years, with a two-year and a 17-month extension option.

To meet its CATS commitments, Top Aces operates a fleet of modernised Alpha Jets and Learjet aircraft to fly fighter adversary and electronic warfare training missions for the RCAF, operating from bases alongside the fighter force. The company also provides similar services to the Luftwaffe in Germany, using A-4 Skyhawks, and has activities in the US. At the end of April the company logged its 70,000th hour of contracted fast-jet operations.

Australia is another country that is evaluating contractorised adversary support. Top Aces sent Alpha Jets to operate as aggressors at the Royal Australian Air Force's F/A-18 Hornet base at Williamtown as part of an extended evaluation that also included Learjet aircraft from Air Affairs Australia operating as EW/combat support platforms.

Team SkyGuardian is proposing a version of the General Atomics Predator B (*left*). The UK RAF is procuring a related system known as Protector, which is certifiable for operations in civilian airspace

UAV players team for impending RPAS bid

PETER DIEKMEYER

UAV providers leveraged attention generated by CANSEC's opening to brief journalists about intentions to bid on Canada's upcoming Remotely Piloted Aircraft Systems (RPAS) project. Team SkyGuardian Canada will include General Atomics Aeronautical Systems, maker of the Predator B/Reaper drones, coupled with CAE Canada, MDA and L3 Wescam. A second team, named Team Artemis, includes IAI and L3 MAS and will offer the Israeli company's Heron.

The RPAS initiative, which used to be known as JUSTAS, received new momentum in late 2017 after it was rebranded by the Canadian government. This, coupled with the Defence Policy Review that specified eight core missions that new UAVs will need to undertake, has convinced suppliers that procurement officials are finally getting serious.

According to Aria Mahdion, a General Atomics strategic development expert, Canada's persistent, long-range ISR and target acquisition capability requirements are broad, so no single company will be able to supply all of them. General Atomics is thus proposing its medium-altitude long-endurance (MALE) MQ-9B SkyGuardian drone – which it describes as the "world's most advanced" – and will leverage Canadian partners to supply local content.

General Atomics officials say that the 5,700kg MQ-9B can provide more than 40 hours of unrefuelled mission endurance and carry wide-area maritime radars, long-range HD video, as well as other sensor payloads. The drones can operate in northern latitudes through a satcom datalink, and transmit real-time sensor data anywhere in Canada.

CAE, which has partnered with General Atomics for years on a variety of international projects, will provide aircrew training and in-service support. MDA would supply ISR and UAV services capabilities. L3 Wescam would supply the MX-25 EO/IR sensor system.

"We know how important it is to build a solid value proposition in Canadian bids," said Mahdion. "So we picked the best partners we could find."

Team SkyGuardian will also look to be adding additional Canadian team mates – particularly small- and medium-sized businesses – as the RPAS project progresses (the level of SME inputs is a major component of Canadian defence procurement selection criteria).

Government officials, who, according to Mahdion, hope to have initial operating capability by 2025, say RPAS is expected to complement RCAF and space-based capabilities through NORAD/FVEY/NATO interoperability.

These include Canada's CP-140 Aurora long-range patrol aircraft, its recently announced fixed-wing search and rescue aircraft, and its existing and future fighters. The platform will provide near-real-time information to tactical, operational and strategic commanders in domestic and deployed operations, and will have precision strike capability. The RPAS programme is currently in the option analysis phase, which is expected to completed by the end of 2018.

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Many missions

Rheinmetall Canada is displaying its new wheeled Multimission Unmanned Ground Vehicle (MMUGV) solution for the first time in Canada at CANSEC 2018.

At the company's Booth 1121 is the surveillance variant Multimission UGV-S, specifically designed for perimeter observation, reconnaissance and scout missions. This features a long-range electro-optical (EO)/infrared (IR) sensor, a laser rangefinder mounted on a 6m telescopic mast, a GPS heading system, and a ROSY rapid obscurant system. For the surveillance-specific variant, the customer can specify any sensor suite/configuration to meet their operational requirements; the EO subsystem solution on display at CANSEC is delivered through Thales Canada in Montreal.

Based on a platform developed by Ontario Drive & Gear (ODG) and software/missile modules developed by Rheinmetall Canada, the MMUGV is an ITAR-free, semi-autonomous, modular platform designed to allow the user/operator to easily install different payloads to accomplish a range of mission types, including: surveillance; force protection/ weaponised; medical rescue; mule (load bearing/logistics); fire suppression; chemical, biological, radiological and nuclear (CBRN) detection; and communication relay.

Rheinmetall Canada vice-president of business development Iain Tremblay confirmed the company has conducted de-risking activities with a remote weapon station (RWS)-equipped MMUGV, but is currently focusing on non-lethal variants for ease of exportability of the platform.

Weighing 750kg and with a maximum payload of 600kg, the baseline MMUGV platform is 2.95m in length, 1.55m in width, and has a ground clearance of 24cm. Powered by an electric motor, the platform has a maximum speed of 40km/h. An amphibious capability enables a maximum payload of 300kg and a maximum speed of 5km/h.

Able to operate autonomously, semi-autonomously or in remote control mode, the MMUGV is compatible with the four principal global navigation satellite system constellations: GPS (US), Galileo (EU), GLONASS (Russian Federation) and China's BeiDou Navigation Satellite System (BDS). Tremblay said all MMUGV platforms are equipped with optional navigation capabilities – INS and digital 3D mapping – to optimise the platform's operational potential in a GPS-denied environment.

Tremblay confirmed that the company has secured an initial contract to supply a number of MMUGV platforms to an undisclosed customer in the Middle East. The first European customer is expected to be the German Army, which will acquire the mule variant "with the ability/option to evolve it into a weaponised platform". This contract is expected in late 2019.

Rheinmetall Canada will also provide a number of systems to the 5th Canadian Division Support Base (5 CDSB) Gagetown, New Brunswick, for system evaluation. Tremblay said the software package on the MMUGV is compatible with the software solution developed for the modular Integrated Soldier System (ISS) currently being delivered to the Canadian Army.

Supersonic diving target

DAVID DONALD

QinetiQ Target Systems (QTS, Booth 414) has unveiled the latest member of its aerial target portfolio. The Rattler is a ground- and air-launched supersonic target that is intended to replicate the threat from high-diving anti-radiation threats, but at a fraction of the cost of the targets that are currently employed in the role.

In recent years there has been a resurgence of the high-diving supersonic anti-ship missile threat, with new weapons being developed by China and Russia. However, the high cost of fully representative targets with similar characteristics – typically more than US$5 million each – means that very few forces can afford to operate them. QTS recognised that this represented a significant market opportunity and, employing design-to-cost principles, developed a target that offers more than adequate capability at less than one-tenth the price of current systems. Around 20 NATO navies have shown considerable interest, including the Royal Canadian Navy.

Suitable for live training and to support operational test and evaluation duties, Rattler can be ground launched without the need for a launch booster, or released from an air vehicle such as the QTS Banshee Jet 80. Development began in July 2017, leading to a first ground launch in March this year, during which a speed of more than Mach 1.85 was achieved. Higher speeds can be attained following an air launch. Rattler is powered by a solid propellant rocket motor and has a range of about 100km (62 miles) when air launched. It can be fitted with active radar augmentation to meet specific weapon system requirements.

Rattler flies to a predetermined path, monitored by a ground control station, which can provide in-flight course adjustments. There is an explosive flight termination system, and another fail-safe termination system in the event that the communications link is lost between the target and the control station.

QTS plans more tests for next year, including air launches. However, the company considers that Rattler has already achieved initial operating capability for ground launches.

IN BRIEF

High-speed screening

Smiths Detection (Booth 1927), one of five operating divisions of Smiths Group, is a global authority on the application, management and manufacture of detection and screening technology for the aviation, ports and borders, urban security and military markets. Its low-maintenance, reliable equipment produces accurate, real-time information about traces of explosives and other suspect materials on people, packages, vehicles and surfaces.

Smiths Detection's technology has been chosen by the Ethiopian Railways Corporation to safeguard people and infrastructure on the new railway link between Ethiopia and the port of Djibouti. A range of scanners will be deployed to prevent threats making their way onto trains at 16 stations on the line.

Leonardo is proposing the M-345 as a follow-on basic trainer to the CT-156 Harvard II currently operated by the NATO Flying Training Centre

Full-spectrum training offered

DAVID DONALD

Leonardo (Booth 1511) is proposing a full-spectrum training system to answer the Royal Canadian Air Force's future needs. With the Future Aircrew Training (FAcT) requirement uppermost in importance due to the impending draft Request for Proposals (RFP), Leonardo is promoting its M-345 jet trainer in particular. A formal RFP for FAcT is expected around the end of next year.

Leonardo suggests that the M-345 can undertake all of the basic training syllabus that is currently performed on the Beechcraft CT-156/T-6 Harvard II, but could also undertake some of the advanced course that is currently assigned to the BAE Systems CT-155 Hawk.

To cater for the later stages of the advanced syllabus Leonardo is proposing its M-346 trainer, which serves in the training role with Israel, Italy, Poland and Singapore. The M-346 is also seen as a strong candidate for Canada's separate Fighter Lead-In Trainer (FLIT) requirement.

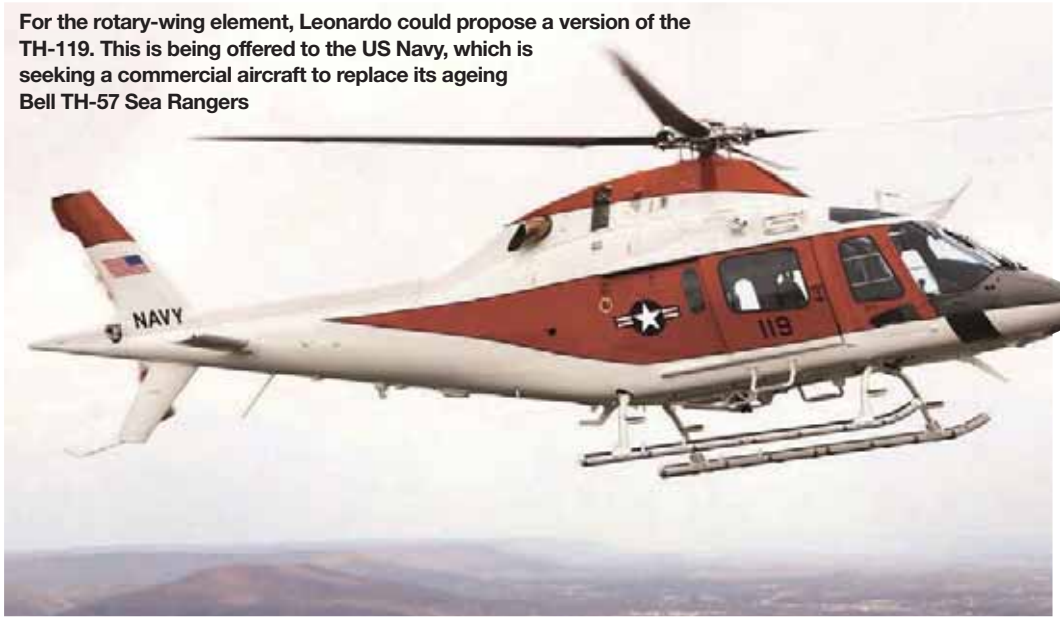
FAcT is currently in a definition phase, with the Canadian government examining capabilities. The draft RFP will give potential bidders a firmer idea of what is required, and could allow industrial teams to form. Through its extensive experience of producing training aircraft, and of managing flying training systems, Leonardo is confident that it can provide the full spectrum of training systems and services required to meet the FAcT specification, working with partners to provide those specialist elements of the overall system that Leonardo does not produce itself. Alternatively, the company could supply assets to another programme lead.

Leonardo developed the M-345 to "restore the energy loss" to the basic trainer arena. High fuel costs in the 1970s forced many air arms to turn to turboprop-powered basic trainers, but they were less representative of the jet-powered advanced trainers and front-line fighters. The company claims that recent advances in materials, reliability and health-monitoring technology have allowed a jet-powered trainer to be operated for around the same cost as the latest high-spec turboprops, but restoring jet performance to the training arena. The M-345 is powered by a Williams FJ44-4M turbofan, a powerplant that is widely used in the business aviation arena and consequently designed with excellent reliability and ease of maintenance in mind.

As a basis for its training system proposal, Leonardo has looked towards the training system being implemented by the Italian air force, which is the launch customer for the M-345. The aircraft is due to enter service with the air force in 2020, and will form the equipment for the 'Frecce Tricolori', Italy's national aerobatic display team.

In the meantime, the M-346 is proving itself in the advanced and fighter lead-in trainer roles. The aircraft features a sophisticated embedded training capability, allowing virtual targets to be generated within the aircraft's cockpit itself and allowing the virtual use of radar and weapons employment. The type has also successfully demonstrated its ability to fly 'Red Air' adversary missions for front-line fighters. The embedded training functionality is being extended into the M-345.

For the rotary-wing element of FAcT, Leonardo has a number of helicopter types available, but is majoring on the TH-119 that has been tailored from the AW119 to meet a US Navy training helicopter requirement. This aircraft is single-engined, and thus cheaper to operate than other types, yet offers the necessary system redundancy to be certified for IFR (instrument flight rules) operations. The company expects that certification in April 2019.



For the rotary-wing element, Leonardo could propose a version of the TH-119. This is being offered to the US Navy, which is seeking a commercial aircraft to replace its ageing Bell TH-57 Sea Rangers

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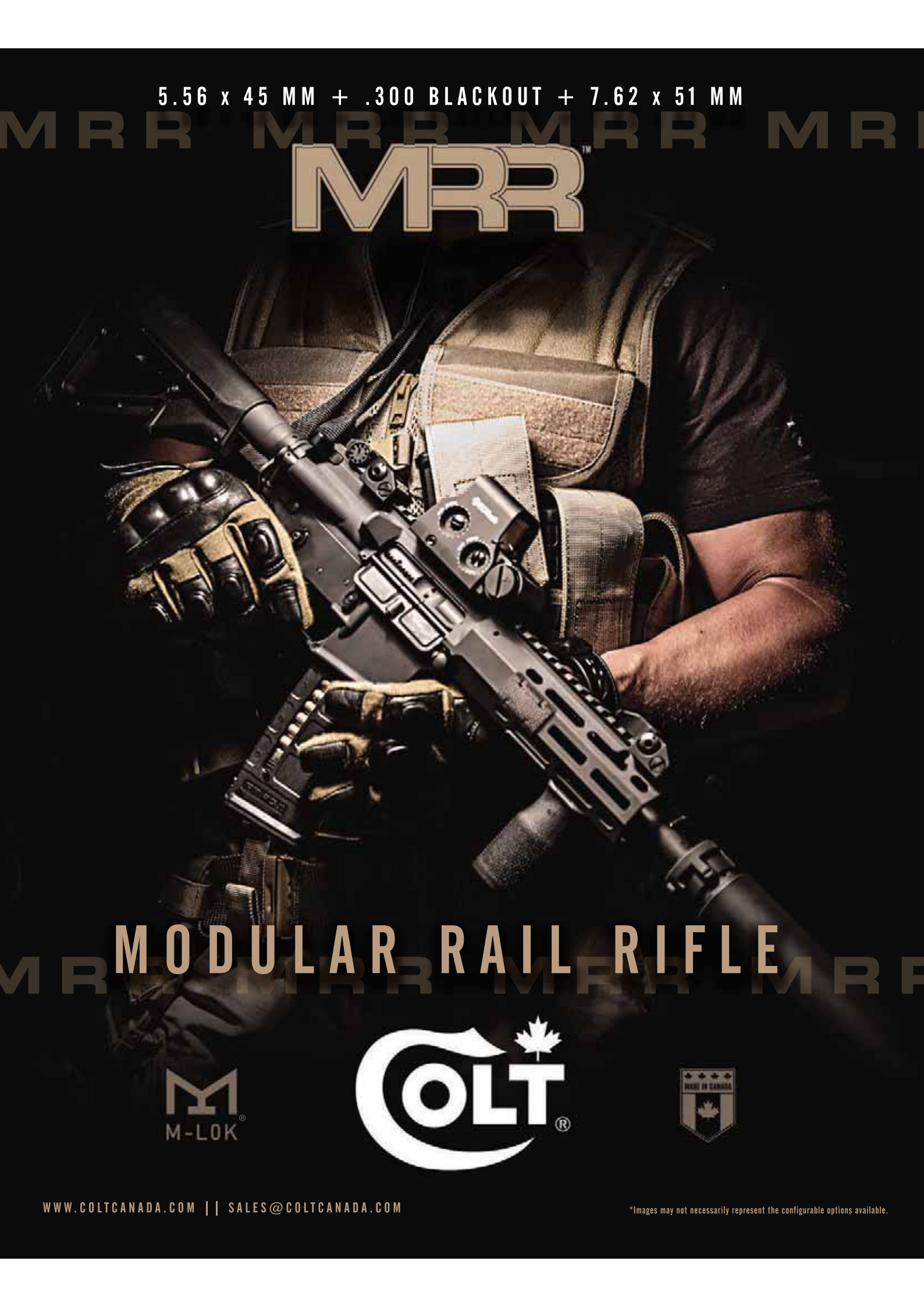

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Training for Canada

DAVID DONALD

With its headquarters in Ottawa, CAE's Defence and Security business has 4,500 employees in Canada, spread between 16 sites across the country. The company is involved to a greater or lesser degree in virtually all of the Royal Canadian Air Force's major programmes, and through its NATO Flying Training Centre (NFTC) provides the majority of the advanced training portion of the pilot training programme.

On 12 May, NFTC celebrated its 20th anniversary, during which time more than 3,300 pilots have graduated with their wings in more than 400,000 flight hours. CAE has owned the school since October 2015, and through this acquisition added live training to the company's portfolio.

Since then, CAE has successfully bid for other live-flying training programmes, and has built up considerable expertise in the development of live-virtual-constructive (LVC) integrated training systems, which are becoming increasingly important as air arms look to outsource their training systems over long-period contracts.

Such contracts can include the provision of instructors, as well as providing maintenance for the training assets. CAE has built up a wealth of knowledge in this area, and now roughly 70 per cent of the company's training business in Canada involves the provision of services, with the remainder comprising the delivery of assets. For customers, the outsourcing of training allows for a predictable budget with much of the acquisition risk removed, and allows the limited number of trained service personnel to be focused on front-line activities. For the provider, the long-term nature of the contracts provides stability, and a reassurance that large asset investments can be undertaken at reduced risk.

As well as NFTC, major RCAF programmes for CAE include the training centres for the CC-130J (Trenton) and CH-147F (Petawawa), which are operated under the Operational Training Systems Provider (OTSP) scheme. Each is a 20-year programme with full in-service support. Within OTSP there is a mandated development element, which also benefits CAE and the customer on a wider basis. Developments

RCAF Cormorant crews currently train in the CAE facility established in the UK to train helicopter crews

A new SAR training centre is being installed at CFB Comox

FWSAR taking shape

Airbus Defence and Space reports that the assembly of the first of the CC-295 aircraft for the Fixed-Wing Search and Rescue requirement is well underway. The Royal Canadian Air Force is receiving 16 of the aircraft, with the initial delivery scheduled for late next year.

Fuselage sections are assembled at Airbus's Pre-Final Assembly Line ('Pre-FAL') at Tablada, a suburb of Seville, Spain. The front, mid and rear sections have been transported to Tablada, where they are being mated to form a complete fuselage sub-assembly. The next process is for the fuselage to be transported to the main Final Assembly Line (FAL) at Seville's main airport, where it will be joined by the wings, engines, tails and other major components. FAL procedures are due to begin in late 2018, with the first CC-295 due to be rolled out of the FAL in the first quarter of next year.

for one programme can be cost-effectively exported from one scheme to another – a common database being a good example.

CAE is currently building the search and rescue (SAR) centre of excellence facility at Comox in British Columbia that will train crews for the Airbus CC-295, which is being procured under the Fixed-Wing Search and Rescue (FWSAR) programme. The centre will allow full-crew training through interlinked flight deck and rear-crew training aids.

As part of an overall C$300 million contract, CAE is in the midst of a three-year set-up phase, with the first crews due to start training in 2020. Initial flight crew requirements will be met in Airbus's flying training centre at Seville, Spain. CAE is the training partner for the C-295 aircraft. Phase II of the contract is a three-year transition period to full operating capability, after which the main 20-year in-service support phase begins.

Meanwhile, CAE provides the full-mission simulator at CFB Trenton for the current CC-130E/H Hercules SAR aircraft. CAE is also part of the Team Cormorant partnership that will upgrade the RCAF's CH-149s. Cormorant flight crews currently train at CAE's facility at RAF Benson in England, but the RCAF is looking to bring Cormorant training back to Canada, adding rear-crew training assets and the ability to network with the FWSAR training apparatus.

Here in Ottawa, CAE is installing a 3000 Series simulator at the Transport Canada airport facility for the Canadian Coast Guard. It will have two cockpit modules to support the service's Bell 429 and Bell 412EPI helicopters. The graphics for this system are highly advanced, simulating the exact views from the flight decks, including slung loads, mirrors and bubble observation windows.

The Chinook training centre at Petawawa includes a door-gunner training aid

Further opportunities include the remotely piloted aircraft system (RPAS) requirement, CAE being the training partner for the General Atomics SkyGuardian. The FFCP future fighter is another major procurement where CAE feels it is well positioned to play a major part. Its LVC training expertise is of particular application to fighter training, and the company has been involved in the operational support of the current CF-188 Hornet fleet for more than three decades.

CAE is also looking to be part of the Canadian Surface Combatant programme, having provided support for the Halifax-class modernisation, as well as developing state-of-the art training systems for the Swedish and United Arab Emirates navies.

The training facility in the UAE is a highly advanced centre that includes simulation-based suites for a variety of ship-based roles, and even includes maritime patrol aircraft operator stations. The centre has been developed to offer training from individual personnel through to collective/joint mission teams.

IN BRIEF

Critical advantage
The Maritime & Land Division of Ultra Electronic Technologies Inc (Booth 601) delivers innovative solutions for maritime and land platforms. The division has considerable expertise in underwater warfare that enables it to deliver leading anti-submarine warfare capabilities.

The division provides sensors, combat management systems, and power solutions for surface, sub-surface and unmanned platforms that provide a critical operational advantage to its customers. It also offers systems for modern military manned and unmanned vehicles, from complete electronic architectures to specialist equipment and components. These improve reliability and performance, while reducing the burden on the operators and maintainers.

Camcopter continues to impress

In a groundbreaking demonstration on 17 April, Schiebel's Camcopter S-100 Unmanned Air System (UAS) and Airbus Helicopters' manned H145 successfully completed a series of Manned UnManned Teaming (MUM-T) flights. Level 5 interoperability was achieved by providing the user onboard the manned aircraft with full command and control over the UAS and its payload, including launch and recovery.

The purpose of the demonstration, which took place as part of a technology partnership between the Austrian Armaments and Defense Technology Agency (ARWT) and Schiebel, was to explore the benefits and challenges of delivering MUM-T flight operations, especially those with highly valuable, mission-enhancing advantages for army aviation. As a true force-multiplier, MUM-T leverages the strengths of both manned and unmanned systems by providing pilots of manned aircraft with the ability to take full advantage of the intelligence, surveillance and reconnaissance (ISR) capabilities of the UAS and thereby improve safety and decision-making in complex, contested missions.

UASs are perfectly suited for providing an aerial overview, operating above manned assets while the manned assets benefit from using local terrain. This approach of enhancing coverage and timeliness of information while keeping pilots and manned assets safe enables commanders to maximise the advantages offered by both platforms.

Camcopter also featured strongly when Overwatch Imaging successfully integrated PT8 Oceanwatch, a revolutionary small target detection payload. PT-8 Oceanwatch delivers an image-based wide area maritime search capability that significantly extends the coverage area and makes the Camcopter S-100 an even more powerful naval patrol solution. Oceanwatch autonomously detects small targets on the ocean surface,

Blackwolf goes on guard

DAVID DONALD

Saint-Jean-sur-Richelieu, Quebec-based armoured truck specialist Cambli (Booth 614) has unveiled the latest member of its public security vehicle family. Having produced the Thunder vehicle, the company identified a need for a smaller armoured truck that could be used for security missions by various agencies. The result is called the Blackwolf.

As with other Cambli products, the Blackwolf is based on an OEM-supplied chassis – in this case, the Ford F-550 4x4. It has a Ford engine, with both diesel and gas options, and a six-speed automatic transmission. Using an OEM-supplied chassis and engine offers the benefits of having a widespread support and spares network.

Cambli is careful that its modifications do not compromise the safety performance of the original vehicle, or invalidate any warranties. Support for the

Cambli-manufactured body is provided by teams that can respond rapidly to calls for assistance.

Cambli specialises in tailoring its products to meet customer specifications, and can cater for requirements ranging from a one-off vehicle to a fleet of several hundred.

Design of the Blackwolf began around 18 months ago, and the vehicle has already sold well. Customers include police forces and security agencies involved with the protection of critical infrastructure, including nuclear power stations.

In its security application, Blackwolf provides typical seating for eight, and there are a similar number of gun-ports: three on each side, one in the rear and one in the roof hatch.

An observation turret can be fitted, and other options include a winch, searchlights and a Golight forward-looking infrared (FLIR) sensor. The vehicle has ballistic protection to level B7, with B6 protection an option. It also has an optional cabin air filtration system.

Design of the vehicle was undertaken in consultation with tactical SWAT teams. As well as the security version, the Blackwolf can be configured for ambulance, command post and armoured personnel carrier duties.

Oceanwatch autonomously detects small targets on the ocean surface

solving the challenge of searching for small objects over vast areas and greatly outperforming conventional cameras that face insurmountably large areas when zoomed in and invisible targets when zoomed out.

Featuring a user-friendly interface, Oceanwatch is an ideal solution for applications such as ISR gathering, search and rescue, and anti-piracy operations.

New shipboard CCMS capability on display

DRS Technologies Canada (Booth 1511) is showing its new Centaurus shipboard Communication Control and Management System (CCMS) at CANSEC this year.

Currently in the final stages of development, the Centaurus CCMS delivers automation of all shipboard communications functions – both internal and external – using network management protocols to enable the operator and maintainer to monitor and configure the entire communications suite.

This includes, for example, V/UHF radio, wideband HF communications, the DRS Wideband Audio Network Data Switch System (WANDSS) and SHINCOM 3100 all-digital secure Voice System.

The system also delivers comprehensive communications plan (COMPLAN) management – enabling the operator to automatically import, verify all configurations in the COMPLAN and assign these to radios. For the maintainer, all communications systems can be managed from a single view.

Martin Munro, vice-president and general manager of DRS Technologies Canada, said a prototype of the CCMS system has been developed and fielded with the Royal Canadian Navy at the land-based Naval Training Development Center in Halifax, Nova Scotia. "This is providing valuable operator feedback," said Munro. "The next step is to deploy a ship-based production system with an RCN Halifax-class frigate," he added. A contract to support this development is expected later this year.

Long-range patrol

DAVID DONALD

With an eye on Canada's forthcoming Canadian Multi-mission Aircraft (CMA) requirement, Saab (Booth 1521) is promoting the Swordfish maritime patrol/ISR platform. The type has been developed not only to perform traditional maritime patrol aircraft (MPA) tasks such as anti-submarine and anti-surface warfare – for which an armed capability is available – but also to perform multimission intelligence, surveillance, reconnaissance (ISR) patrol while engaged on overland duties.

Canada's requirement is for an aircraft to replace its CP-140 Aurora fleet, which has seen extensive service in recent years on Coalition operations. A request for proposal is not expected until early in the next decade, with an entry-into-service date of around 2026, but potential bidders are already looking ahead to the expected requirement.

In February, Canada – along with Poland – joined the 'Cooperation on Multinational Maritime Multi-Mission Aircraft Capabilities' initiative. This was launched in June 2017 by France, Germany, Greece, Italy, Spain and Turkey, which signed a letter of intent concerning the joint acquisition or development of new aircraft to replace ageing maritime anti-submarine and ISR aircraft. At some point this year the participating nations are scheduled to have completed a definition document outlining future MPA capability requirements. This should provide the foundation for developing and fielding follow-on solutions.

Naturally Saab is positioning itself as a potential supplier for both the CMA requirement and the wider NATO programme. The Swordfish has particular resonance in Canada, because it is based on the Bombardier Global 6000 airframe and features a high proportion of world-class Canadian systems, such as the General Dynamics Mission Systems Canada acoustic processor and CAE lightweight magnetic anomaly detector (MAD). Canadian aerospace services company Flying Colours installs the cabin interior.

Saab has already employed the Global 6000 as the basis for three GlobalEye multisensor airborne early warning platforms for the UAE Air Force and Air Defence, the first of which flew in March. The Swordfish shares about 70 per cent commonality with the GlobalEye, both in terms of airframe configuration and in mission systems, significantly reducing the cost of development.

The Global 6000 was selected as the best solution available for the GlobalEye, and Saab is "very happy" with the platform. While it remains the platform of choice for the Swordfish, Bombardier has been developing the Global range further, and in the future the Swordfish could be based on a later model, such as the Global 6500 business jet that was launched by Bombardier earlier this week at the EBACE show in Switzerland.

In operational terms, Saab is quietly confident that the Swordfish can answer the CMA requirement when it is issued. The aircraft has a sophisticated mission management system that fuses data from a variety of onboard and offboard sources. The Swordfish has a Leonardo Seaspray 7500E AESA multimode radar that can be used for overwater and overland missions (including SAR/ground moving target indicator and inverse synthetic aperture radar capability), an electro-optical turret and electronic support measures. An innovative gravity-drop sonobuoy system and MAD are the primary anti-submarine sensor systems. Four underwing pylons can mount torpedoes, anti-ship missiles and other stores.

Using a business jet as a platform provides numerous advantages, including exceptional range/endurance performance, crew comfort and reduced support footprint. Combined with good field performance, the latter factor allows the Swordfish to operate from a much wider range of airfields than are available to a traditional large MPA type. Saab also highlights its long experience of developing aircraft and systems that routinely operate over remote regions in northern climes, and the similarities between missions in Canadian and Swedish waters.

The Saab Swordfish is based on the Bombardier Global 6000 business jet

Swordfish shares around 70 per cent commonality with the GlobalEye AEW platform that has been ordered by the UAE

Ground control for unmanned systems

ROBIN HUGHES

Calgary-based CDL Systems (Booth 1311), a Lockheed Martin company specialising in the development and licensing of vehicle control station software for unmanned systems, is showing the Vehicle Control Station International (VCSi), its latest ground control station product.

Made in Canada, commercially available and not subject to US ITAR export regulations, VCSi is a modular, next-generation VCS system that builds on the 1.5 million-hour transformative legacy of its predecessors with a highly customisable platform for the control of unmanned vehicles in any domain.

VCSi leverages the numerous advances in technology that allow machines to be smarter, nimbler and expeditionary. In line with STANAG 4586 (the NATO standard unmanned control system interface enabling unmanned aerial vehicle (UAV) interoperability), the system provides true 1:N multiple vehicle control and enables effective unmanned traffic management.

VCSi's modular architecture allows the user to purchase only the components required for their system, while a developer-friendly application programming interface and plug-in architecture enable the easy addition or extension of functionality depending on user requirements.

An airspace awareness module brings real-time and immersive information to VCSi to ensure flight safety. This module includes a heads-up 3D view with terrain avoidance information, optionally overlaying video from the vehicle's nose camera; display of real-time ADS-B information on the 3D map; and look-ahead calculations and highlighting on surrounding terrain to ensure the UAV always operates at a safe altitude. A camera control module connects VCSi to a STANAG 4586-compatible electro-optical/infrared sensor and includes video display, tactical marking and camera control; this module also provides enhanced situational awareness through innovative features such as augmented reality combining video feed and the 3D map, as well as real-time 3D mapping.

Currently under development, an unmanned traffic management module integrates airspace data (including weather, obstacles and other information) from national sources into VCSi. Finally, a digital aeronautical information module consolidates international digital aeronautical flight information files, which includes information about airports, airways, airspaces and navigation, into a unified view within VCSi.

Behind the scenes, CDL engineers and scientists are working to advance the state of the art in computer vision as it applies to unmanned systems.

"The future of unmanned vehicles means more localised decision-making by the machine itself," a CDL spokesperson told the *Show Daily*. "This is referred to as computing on the 'edge', i.e. not in the cloud. CDL engineers are working on this future through research in optical simultaneous location and mapping [SLAM] technology."

Optical SLAM is an implementation of computer vision that allows a machine to rapidly map its environment with inexpensive cameras (rather than expensive range-detection devices). Accurate 3D models can be shared among vehicles and users, in a way both can easily understand. Much like humans, machines can perceive range by scanning the environment, while moving, and 'map' their surroundings in real time.

"Advances in computing power make this technology feasible in the near term, and not in science fiction someday," the spokesperson said.

Speeding up RIB design

Zodiac Hurricane Technologies (Booth 727) is a leading innovator, developer and manufacturer of semi-rigid boats. As part of Zodiac Milpro, the company produces boats for military and professional roles, such as special operations, maritime border security, search and rescue, and harbour patrol applications.

Its Canadian development centre focuses on the design and manufacture of custom rigid-hulled inflatable boats – known as RIBs – using a 3D design platform to shorten delivery time and improve the design for manufacture. Zodiac Hurricane selected SolidWorks Professional software for its ease of use, design configuration automation and inclusion of mould design and sheet metal development. Since implementing the software, Zodiac Hurricane has cut development time in half and dramatically boosted throughput without the need for additional resources.

IN BRIEF

Simulation and training

Bluedrop Training & Simulation (Booth 1215) is the largest provider of courseware in Canada and has more than 30 years' experience in training and simulation for large and complex training programmes. Its clients include international air forces, for which Bluedrop has supplied helicopter and aircraft training courses. The company also provided the RCN Halifax Class Modernization Program, while ongoing projects include the Arctic Offshore Patrol Ship Program.

On 16 May, the government of Canada announced a repayable investment of C$7.6 million to support a C$19 million project by Bluedrop to design and develop next-generation aerospace and marine simulation and training products. The project will adapt gaming and mobile technologies to improve the use of artificial intelligence in developing products for air and naval crews.

Inhibit and disrupt

Allen-Vanguard (Booth 800) has extensive experience in the electronic countermeasure (ECM or jammers) sector, with systems that protect the lives of bomb disposal personnel, the armed forces, heads of state and others. To maintain its operational advantage over threats of radio-controlled IEDs and unmanned aerial systems (UAS or drones), Allen-Vanguard provides tailored mission profiles for its customers' operational needs.

To counter the growing threat from drones, it has developed its ANCILE drone protection, which has been developed to deliver RF inhibition to commercial drones. ANCILE transmits optimised inhibition waveforms that disrupt command and control protocols. It ensures a robust and effective no-fly zone that can be applied to convoy protection, operational bases and facilities alike.

Aerial firefighter

GÜNTER ENDRES

The Viking CL-415EAF (Enhanced Aerial Firefighter) conversion programme has been launched by Longview Aviation Asset Management (LAAM) of Calgary, Alberta, in co-operation with Viking Air (Booth 1104) of Victoria, British Columbia. The collaboration between the two sister companies on the CL-415EAF will provide an economic boost throughout Western Canada, derived from job creation, aerospace manufacturing innovation, supply chain development, academic partnerships and global export opportunities.

The CL-415EAF combines the proven performance of the CL-215 airframe with modern upgrades to create the next generation of the world's only purpose-built aerial firefighter and multimission amphibious platform. To initiate the programme, LAAM will be hiring up to 150 technical and support staff members at its Calgary facilities, where 11 specially selected CL-215 aerial firefighting aircraft owned by LAAM will undergo the modification process utilising Viking-supplied conversion kits. Viking has hired 50 employees to date to support development of the conversion kits, and will also be reinstating its very effective 'Viking Academy' paid-training programme.

Eleven CL-215 firefighting aircraft will be modified under the CL-415EAF conversion programme

Both LAAM and Viking are working with local post-secondary institutions to develop innovative technologies and provide training assistance in support of this programme. The Southern Alberta Institute of Technology has been engaged for personnel training in Alberta, and Viking is actively developing partnerships with companies participating in the

The Twin Otter 400 utility aircraft continues to attract customers from all over the world

Flying supercomputer

Last month, Aeryon Labs (Booth 928) launched SkyRanger R80, the newest addition to its family of rotor-wing unmanned aircraft systems (UAS). Designed for the most demanding UAS operators within the defence and security markets, the R80 is said to establish a new benchmark for small UAS performance and reliability.

SkyRanger R80 is a robust, multimission UAS that operates reliably in harsh environments and demanding weather conditions. R80 has a payload capacity of up to 2kg, enabling it to carry heavier optics and multisensor payloads that were previously restricted to larger and more expensive fixed-wing UAS. Operators can attach and deliver nearly any object up to its payload limit, such as radios, ground sensors, life vests and other equipment.

The R80 is a flying supercomputer with an engine for real-time artificial intelligence at the network edge, including object detection and classification. It includes multiple sensors providing flight control inputs, including four dedicated computer vision cameras.

Using Aeryon's new multi-aircraft control software, a single pilot can operate multiple R80s from a single ground control station, on a single network, in co-ordinated semi-autonomous flight plans.

With its simple plug-in tether kit, co-developed with Hoverfly Technologies, the R80 can provide persistent endurance for long-term surveillance applications, then can be easily and quickly reconfigured into free-flight mode.

To meet the unique requirements of the US Department of Defense and its other federal customers, Aeryon Defense USA (a wholly owned subsidiary of Aeryon Labs), will customise the commercially available SkyRanger R80, which will be known as the R80D. Delivery of the R80D began this month.

The new SkyRanger R80 will be available to global defence and security customers later this year.

British Columbia Technology Super Cluster initiative.

The Viking CL-415EAF conversion programme forms part of a staged approach to utilise the advancements made with the LAAM converted aircraft as the basis for the proposed Viking CL-515 new-production amphibious aerial firefighting aircraft. To facilitate the launch of the proposed CL-515 amphibious aircraft manufacturing programme, Viking has applied to the Strategic Innovation Fund (SIF) from the federal department of Innovation, Science and Economic Development for funding support. The SIF funding would be invested between British Columbia and Alberta's aerospace manufacturing, supply chain, academic and skills training sectors, and provide programme benefits to both provinces in Western Canada.

Viking's major programme, the Twin Otter 400 utility aircraft, continues to attract customers from across the world. By the end of 2017, the order book had exceeded 100 aircraft, which, together with some 430 aircraft still in service of the legacy Twin Otter series, make up a sizeable fleet with some 140 operators on every continent. Viking is producing the series 400 at a rate of 18 aircraft a year, and continues to provide support and spare parts for older and new models.

For durability, short take-off and landing capabilities, and versatility, the Twin Otter has no equal. It can be fitted with floats, wheels, skis or with an amphibious hybrid that has both wheels and floats, making it possible to land safely on sand, water and snow, and in harsh climates and extreme environments.

Customers include governments, airlines and companies for a range of uses such as patrols, search and rescue, parachuting, and transportation, including scheduled and charter operations.

Cadets complete ice navigation course

The Canadian Coast Guard (CCG) (Booth 1031) recently completed the first Polar Code pilot course with Virtual Marine's new Ice Management Simulator. The course provided an opportunity to gain real-time feedback from CCG ice captains to ensure the inclusion of necessary skill development for Arctic operations, before using the simulator to train cadets. Last year, the Ice Management Simulator was selected to be included in the Build in Canada Innovation Program.

The simulator uses embedded software to construct and run scenarios on OEM bridge equipment. As a ship and navigation equipment simulator, it is used for the tactical simulation of ice procedures in single-year and multi-year ice. It includes large fields of ice floes, which interact with each other and the moving ship, with ice dynamics affected by impacts with the ship hull, propeller wash and bow thruster wash. Virtual Marine worked with OEM provider Raytheon Anschütz to deliver a training environment that represents an operational bridge in use by the CCG.

The Ice Management Simulator supports the coursing requirements (basic and advanced courses) under the 2017 IMO Polar Code.

Unlimited eye relief at close quarters

Raytheon ELCAN Optical Technologies (Booth 1221) is showcasing two additions to its Specter family of optical weapon sights: the Specter 1X MRDS and Specter 1XL CQS.

Weighing 174g, the 1X MRDS (Mini Red Dot Sight) is a large window reflex (unlimited eye relief) sight, which enables it to be used on a wide range of weapon systems, and increases its effectiveness as a standalone sight, while still being effective in a combination role with a fixed or dual-role weapon sight (for example, the ELCAN Specter OS 4x or 6x fixed magnification sights or Specter DR 1-4x or 1.5-6x dual-role magnification sights).

The Specter 1 XL CQS (Close Quarters Sight) is a wide field-of-view unlimited eye relief close-quarters sight employing LED technology (instead of holographic), which gives a number of competitive advantages on the battlefield: increased battery life, but reduced power and weight, while still meeting mission requirements. The LED creates a more defined, less grainy reticle – important when used in combination with a magnifier; and offers more reticle options.

Dan Pettry, Raytheon ELCAN Optical Technologies product manager for rifle sights, said both systems are fully developed to Technical Readiness Level (TRL) 7 and being qualified to TRL 8.

The Specter 1X MRDS in combination with the Specter OS 6x could be a candidate to replace the Specter M145 3.4x optic sight for the US Army's nascent magnified machine gun optic requirement, although Pettry declined to comment.

Air defence for la

ROBIN HUGHES

Saab Dynamics (Booth 1521) is positioning its RBS 70 NG (New Generation) very short-range air defence (VSHORAD) missile system, which it is showing together with its associated simulator, for a future Canadian Army ground-based air defence (GBAD) requirement.

While the army has been without a VSHORAD GBAD capability for about a decade, Canada's most recent defence policy – Strong, Secure, Engaged – released in June 2017, provides for an approximately 70 per cent increase in defence spending, and includes provision for an army acquisition of "ground-based air defence systems and associated munitions capable of protecting all land-based force elements from enemy airborne weapons".

Currently in the identification phase, the anticipated timeline for this acquisition includes an enter definition phase in 2020/21, implementation phase in 2022 and contract award in 2023. Final deliveries of the selected system are scheduled for 2026.

The RBS 70 NG is a command line-of-sight VSHORAD system with an effective engagement range of 200-9,000m, at altitudes up to 5,000m.

The system builds on the earlier RBS 70 VSHORAD system, but adds a new integrated NG sighting system and the fourth-generation Bolide (9,000m range/5,000m altitude) all-target interceptor.

The core improvement is the new NG lighter-weight sighting system. This features an integrated thermal imager (the earlier RBS 70 variant used a BORC clip-on thermal imager), an auto tracker for improved aiming/guidance, an improved acquisition and engagement system to shorten the engagement sequence, 3D visual cuing, automatic after-action video and improved human-machine

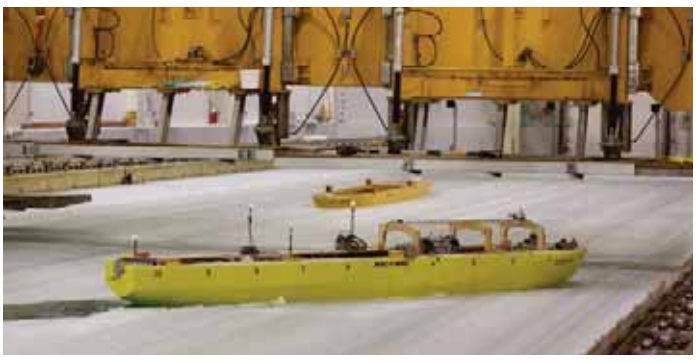
Simulation to aid design of ice-breaker

DAVID DONALD

Ice-breaking vessels are of vital strategic importance to countries such as Canada and the US. However, for the US Coast Guard, it has been many years since a heavy polar ice-breaker has been commissioned, and there has been virtually no development in this niche sector in the US.

To research specifications for new vessels, the US Coast Guard – in partnership with the US Navy and the Canadian Department of National Defence – has turned to the National Research Council of Canada (Booth 1435) to provide detailed research and analysis using its ice tank facilities. The studies are being conducted as part of the Critical Infrastructure Protection and Border Security agreement.

Research got underway in April 2017, with scale models of different ship designs being manoeuvred through various tests, including a ridge penetration test that simulates the vessel smashing into a ridge of ice more than 20m thick. The designs are tested for ice resistance, propulsion and manoeuvrability, and are assessed for their energy efficiency while maintaining ice-breaking capability. The tests are intended to inform the design of ice-breakers for the next three or four decades.



Based in St John's, Newfoundland, the ice tank is operated by the Ocean, Coastal and River Engineering department of the NRC. In operation for more than 50 years, it is more than 90m long and can model a wide range of ice conditions, including pack, ridged, glacial, first-year and multi-year ice. The ship models are typically in 1:30 scale, and are highly detailed, even down to using the same paint as the full-size vessel.

As well as tank tests, the binational initiative will install instrumentation on upcoming Canadian and US ice-breakers to collect real-time data on fuel consumption, gas emissions and other factors, so that this information can also be fed into the design process. The central data bank will be held by Defence Research and Development Canada.

UAV spe

European unmanned vehicle house UMS Skeldar – a joint venture between Switzerland's UMS Aero and Sweden's Saab – is to partner with QinetiQ Target Systems (QTS) to pitch the Skeldar V-200 rotary-wing unmanned air system (UAS) to the Canadian Armed Forces, and to explore export opportunities.

With the Royal Canadian Navy as the programme sponsor, a request for information for a rotary-wing UAS was issued at

nd-based forces

The RBS 70 NG launcher (foreground) and simulator

interface functions for the gunner. The NG sight has been designed to offer a high degree of flexibility and modularity: in addition to the man-portable air defence system configuration, the same NG sight unit can be used in remote-controlled or vehicle applications.

The Mach 2 Bolide interceptor, with its unjammable laser beam riding guidance, is a development of the earlier Mk 2 interceptor, with a new sustainer rocket motor, providing for increased missile speed and manoeuvrability. The missile enables the RBS 70 NG system to engage a complete spectrum from fixed- and rotary-wing threats, along with cruise missiles and unmanned air vehicles.

Bolide's combined shaped-charge and pre-fragmented warhead makes the system also capable of defeating armoured air targets such as attack helicopters and close air support aircraft, as well as armoured ground targets such as medium armoured platforms.

The RBS 70 NG's modular design allows it to reuse all existing generations of RBS 70 missiles up to the Bolide missile.

cialists team up

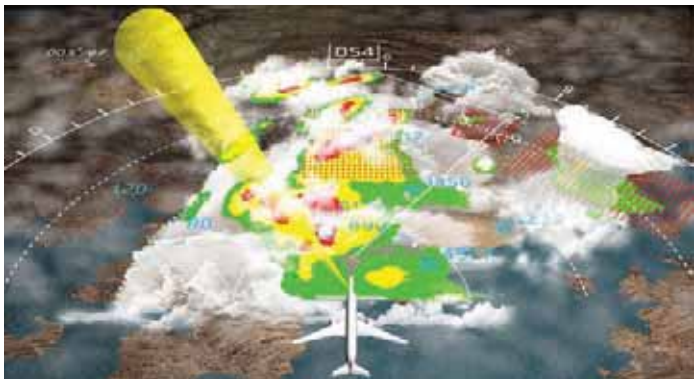
the end of last year, followed by a draft request for proposal. Initial operating capability is scheduled for next year, the principal application being to provide an intelligence, surveillance and reconnaissance capability to the RCN's Halifax-class vessels. Although the navy is the lead service, the winning bid is also expected to serve in a land-based role with the Canadian Army.

Both companies have extensive experience in the development and operation of unmanned aerial vehicles. UMS Skeldar offers a range of UAVs, of which the V-200 has the most experience of operations at sea, including an extended trial with the Spanish navy involved in anti-piracy operations. The V-200 offers a six-hour endurance capability with an electro-optical/infrared sensor payload. QTS and its predecessors have been involved in unmanned operations for decades as both equipment and service providers.

Key features of the V-200 are its impressive time between overhauls and proven heavy fuel engine. The latter allows it to draw on the ship's own fuel reserves and also army vehicle fuel, in turn removing the need for a separate fuel supply for the UAS.

Success in the Canadian programme could lead to an initial five-year contract, and opens up further fields within the Canadian forces, as well as export opportunities.

Typical WXR-2100 MultiScan weather radar display



Simulator displays and weather radar for RCAF

Rockwell Collins (Booth 1103) has been awarded two contracts in support of Royal Canadian Air Force programmes, one to provide weather radars for the C-130H fleet, and another to provide the display for the Full Flight Simulator (FFS) for the Airbus Defence and Space CC-295 Fixed-Wing SAR aircraft.

For the weather radar, Rockwell Collins has been contracted by Cascade Aerospace to provide its WXR-2100 MultiScan radar, along with MFD-255 and MFD-268 multifunction displays. The radar uses advanced automated techniques to analyse hazards, adjust for geographic weather differences, eliminate ground clutter and to present the pilots with a simple and intuitive display of the weather threat. The automation reduces flight deck workload and permits efficient deviations to avoid turbulence. The radar will be of significant application in the search and rescue role, assisting the C-130 crew with the descent into visual flight conditions.

For the CC-295 requirement, Rockwell Collins will supply its Panorama collimated display to CAE, which is building the FFS. The display is tailored for wide field-of-view, cross-cockpit views, and side-by-side training. It offers a display covering 225° in horizontal view and 60° in the vertical plane.

The company has delivered more than 800 Panorama displays to government and commercial companies, and military aircraft types including the Boeing P-8 Poseidon, C-130 and the Boeing CH-47 Chinook.

Smart tactical flashlights

Pelican Products (Booth 821), a manufacturer of advanced portable lighting tools, has expanded its Pelican 7 Series tactical LED flashlights family.

The new lights build on the success of the Pelican 7600 and Pelican 7100 flashlights. Launched in 2016, they are trusted by some of the largest law enforcement agencies, but the introduction of the new models – 7110, 7610, 7620 and 7070R – takes flashlight technology to the next level.

One of the distinct features of the Pelican 7110, 7610 and 7620 tactical flashlights is the ability to reload multiple battery choices, including AA, CR123 and rechargeable, giving officers flexibility and ensuring they always have light when it is needed most.

The 7070R features industry-first Bluetooth wireless technology, allowing the user to personalise the modes (up to five switch sequences with varied light levels and/or flashing modes) through the intuitive app (Android and iOS).

All Pelican 7 Series tactical lights feature a full-time battery level indicator and several operational options, with five selectable programs and four modes: high, strobe, medium and low. With extreme ingress protection, they can withstand harsh weather and extreme conditions.

Operating in GPS-denied environments

Curtiss-Wright's Defense Solutions division (Booth 1903) is to introduce a family of commercial-off-the-shelf (COTS)-based modules and LRU solutions designed for system integrators seeking to rapidly and cost-effectively deploy assured position, navigation and timing (A-PNT) services to ground vehicles operating in GPS-denied environments.

Building on its current PNT solutions, Curtiss-Wright is developing the VPX3-673 A-PNT card, a high-performance single-board computer. The rugged VPX3-673 will speed and ease the integration of complementary PNT sources on ground vehicles. It will deliver state-of-the-art technology services, including a GPS receiver (SAASM GB-GRAM Type II, upgradable to M-Code), chip scale atomic clock (CSAC), and an onboard inertial measurement unit (IMU), to eliminate the need for multiple in-platform boxes or the use of 'bolt-on' technologies to field new navigation warfare capabilities.

Curtiss-Wright also announced an enhanced version of its DBH-672 Digital Beachhead. The new DBH-672A, a fully integrated rugged LRU, adds support for a GPS receiver, CSAC and IMU to the earlier model's built-in Victory infrastructure switch and shared processor unit features.

Curtiss-Wright's A-PNT solutions are designed to provide ground vehicles with access to trusted PNT information, while operating in conditions with limited, impeded or denied GPS. Based on open-architecture, COTS technology, its 3U OpenVPX module and fully integrated rugged LRU A-PNT solutions are said to be cost-effective, simple to configure and rapidly deployable. As well, these A-PNT products are SWaP-optimised for combat and tactical wheeled vehicle platforms. By distributing PNT data simultaneously to multiple platform applications that require GPS data, Curtiss-Wright A-PNT solutions eliminate the need for a ground vehicle to support multiple GPS receivers or antennas.

On a mission above and below

Naval Group (Booth 1426), Europe's leader in naval defence, design and building of submarines and surface ships, and associated systems and infrastructure, is showcasing its full range of products and services, emphasising its commitment to developing a long-term partnership with Canada.

It designs and builds the Barracuda class, the latest generation of blue water attack submarine, developed for the French Navy and dedicated to respond to evolving threats. The French Navy has also ordered 10 FREMM multimission frigates, scheduled for delivery by 2022. The FREMM design was suggested to Canada together with Fincantieri in the context of the Canadian Surface Combatant project.

Australia, within the Sea Future Program, has chosen Naval Group for a co-operation agreement for the building of 12 submarines, based on the Barracuda.

Belh@rra is Naval Group's latest combat and crisis management frigate, empowering modern navies facing the digitisation of warfare. Ensuring naval supremacy, this compact frigate performs all types of operations conducted by large surface vessels with increased precision and capabilities in anti-air, anti-surface, anti-submarine and asymmetric warfare domains.

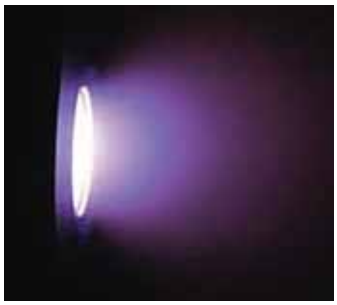
A focus at Naval Group's booth is the i4drones system, which manages, in real time, naval drone operations in all environments — in the air, on the surface and underwater. It can be deployed on surface vessels, submarines and even land-based command centres. With its full interoperability, drone management is significantly facilitated and seamlessly integrated for joint or coalition operations.

Mighty performance in small packages

The Space Flight Laboratory (SFL) of the University of Toronto Institute for Aerospace Studies is Canada's premier microspace organisation. SFL (Booth 1036) builds low-cost microsatellites and nanosatellites that continually push the performance envelope. Missions are typically developed with stringent attitude control and data requirements that are striking relative to the budget available.

SFL arranges launches through its Nanosatellite Launch Service (NLS) and provides customisable separation systems called 'XPODs' for those launches. As part of its complete end-to-end mission capabilities, SFL maintains a mission control centre consisting of multiple ground stations.

At present, SFL operates three satellites from its mission control centre – MOST, CanX-2 and NTS. Each satellite represents



an advance in the field and has broken barriers relative to what small satellites can do. The 53kg MOST satellite was launched in June 2003 and continues to operate well beyond its one-year operational requirement. It is a space astronomy satellite that has made numerous scientific discoveries related to solar-type stars and exoplanets.

CanX-2 is Canada's smallest operational satellite and is the size of a milk carton. It is among the smallest scientific satellites in the world and features three-axis attitude stabilisation.

Nanosatellite Tracking of Ships (NTS) was built in six months and launched with CanX-2 in April 2008 to demonstrate leading-edge ship detection technology from space.

AISSat-1 was launched in July 2010 to monitor maritime traffic in Norwegian territorial waters in real time. SFL built, commissioned and launched the satellite, which is now operated by the Norwegian Defence Research Establishment.

SFL has also been developing next-generation propulsion systems, including a cylindrical hall thruster (*pictured*) and a monopropellant N_2O-based system. These propulsion systems will be used for stationkeeping, constellation management and deorbiting of small satellites. The work is jointly funded by the Canadian Space Agency and the Space Flight Laboratory.

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IN BRIEF

High-density material on demand

Ontario-based Agescan International (Booth 128) is a fast-growing company synonymous with the use of tungsten heavy alloys in defence and aerospace applications where high-density materials are demanded. Tungsten alloys provide a unique combination of density, mechanical strength, machinability, corrosion resistance and economy, providing designers with many new freedoms. Even higher mechanical properties are attainable from tungsten-nickel-cobalt compositions.

They have been routinely used in high-density fragmentation devices and armour-piercing ammunition, from small calibre 5.56mm rounds up to 120mm anti-tank projectiles and beyond. Aerospace use includes counterbalance weights for fixed- and rotary-wing aircraft.

Clear vision

On Booth 121, Metamaterial Technologies Inc (MTI) is showcasing its metamaterial-based technologies. The company is demonstrating its transparent antennas, EMI shielding, de-icing/de-fogging and laser blocking solutions for the aerospace, military, defence, law enforcement and security sectors.

MTI offers large-area laser blocking filters to protect vision, sensors and equipment from laser lights. These filters can be applied to windows on military aircraft, land vehicles and ships' bridges. The company also supplies transparent antennas that can be placed on vehicle windows, buildings and windshields.

To help with de-icing and de-fogging, MTI's NanoWeb provides a transparent and invisible heating layer for goggles, windshields, aircraft, UAVs, ships, vehicles and buildings. It can be placed on any window, providing full visibility while preventing icing and condensation.

Carl-Gustav loses weight

ROBIN HUGHES

With the Canadian Army potentially seeking to upgrade its in-service 84mm Carl-Gustaf recoilless rifle weapon system capability in the near future, Saab Dynamics (Saab Canada Booth 1521) is positioning its latest Carl-Gustaf M4 variant as a prospective solution for this requirement.

The Carl-Gustaf M2 and M3 variants have been in Canadian service since the 1970s, and the army is seeking to modernise its inventory under the '84mm Upgrade' initiative. The upgrade project will introduce new lighter-weight recoilless rifles and a sighting and fire control system that is compatible with the family of existing and future natures of 84mm ammunition, and that will allow for firing under obscuration and low light conditions, while increasing accuracy in all firing conditions.

The initiative has been given impetus by an indication on the part of the US Army's Programme Manager Soldier Weapons of an intent to acquire the 84mm M4 variant in support of the M3E1 Multi-Role Anti-Armor Anti-Personnel Weapon System (MAAWS) programme.

At 6.3kg, the M4 is significantly lighter than the predecessor M3 (10kg), with the length of the overall launcher reduced from 106.5cm to less than 100cm. Driven largely by a universal requirement to reduce the load burden on current ground combat operators, weight savings have been achieved through the development of an improved carbon fibre casing, the introduction of a titanium liner, and substituting the M3's steel Venturi with a reduced-size titanium Venturi recoil damper.

The standard launcher sight is the same telescopic sight with a manual ballistic setting drum featured on the M3, although the M4 design also provides for an interface for an 'intelligent' sight option, the essential discriminator in terms of improved precision and kill probability. The M4 also fires the legacy M3 legacy ammunition.

Therefore, in terms of weight, ammunition requirements, compatibility with interchangeable fire control system, and operational delivery, the M4 fits comfortably with the 84mm Upgrade requirement.

With the options analysis phase already approved and scheduled for implementation by 2021, the government of Canada's given anticipated acquisition timeline for the 84mm Upgrade foresees definition approval by 2023, request for proposal release in 2024, implementation approval by 2025 and contract award/deliveries in the 2026-35 timeframe.

Trained to perfection

During CANSEC 2018, Meggitt Training Systems (Booth 211) is conducting demonstrations of its simulators and trainers, plus displays of live-fire solutions.

The FATS 100MIL virtual small arms training system delivers a significant expansion in training capability, complemented by the FATS 100P when ease of transport is paramount. Other products on show include Meggitt's Armored Fighting Vehicle Trainers, Multi-Function Stationary Infantry Target and the GranTrap bullet trap model.

The FATS 100MIL introduces revolutionary features, such as advanced game engine 3D marksmanship, enhanced diagnostics with intelligent automatic coaching and Virtual Battlespace 3-based collective training. It also allows the assignment of Meggitt's patented wireless BlueFire weapons to each trainee.

The FATS 100P features advanced functionality for instructor and trainee, delivering weapon handling and shot placement analytics, marksmanship automatic coaching tools, video-based judgmental training for escalation and de-escalation, and enhanced graphic capabilities. Portable and light, it comes in two rugged hand-carry cases the size of a large range bag that allow easy transportation, set-up and operation by one person.

The Armored Fighting Vehicle Trainers support individual and collective levels of gunnery and tactical training, allowing soldiers to practise scenarios they would face in combat situations. Tailored training options allow users to maximise resources and optimise combat readiness.


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CityShield steps up

ROBIN HUGHES

As public safety and security challenges grow in complexity, the delivery of and access to timely and accurate information is key to an effective response by public safety and emergency teams.

General Dynamics Missions Systems-Canada is showcasing its answer to this challenge with CityShield – a fully integrated communications solution for effective public safety and security operations that delivers continuous connectivity and enhanced situation awareness to responders when they need it.

With CityShield, public safety and security forces can collect and share tactical information securely on a dedicated network, passing critical data, videos, maps and locations in real time, with each other and with other first-responder agencies as required. With hand-held and vehicle-installed smart devices, first-responders are connected to their supervisors in operations centres by reliable connections and user-friendly displays to protect and secure the public and the responder.

CityShield is built on the General Dynamics Mission Systems-Canada Shield Ecosystem architecture – a secure hybrid public safety system network that combines 4G/LTE technology with satellite and fibre optics networking to seamlessly and securely connect users with voice, data and other security applications.

Key CityShield capabilities include an advanced, high-bandwidth digital IP network; a mobile and fixed video surveillance system designed for large-scale, high-security deployments that demand real-time, high-performance surveillance; an operations and dispatch system, which includes

RGW 90 LRMP shows up at CANSEC

Dynamit Nobel Defence (Booth 728) is showing the latest addition to its series of single-shot 90mm recoilless grenade weapon (RGW 90) systems here: the RGW 90 Long Range Multi-Purpose (LRMP) variant.

RGW 90 LRMP is a lightweight (8.9kg) disposable weapon system furnished with a programmable multi-purpose warhead developed in collaboration with the German Army for its Special Forces (Kommando Spezialkräfte – KSK) requirement.

Integrated with a reusable 2.2kg Dynahawk integrated Fire Control System, the RGW 90 LRMP system can be deployed as an indirect fire (airburst for soft targets/anti-personnel in and behind cover) or direct fire (light armoured vehicles – static and moving; walls and field fortifications) capability out to ranges of 1,200m. As with all weapons in the RGW 90 series, the RGW 90 LRMP can be fired safely from confined spaces.

The system has been in operational service with the KSK since the end of 2017, and has a NATO stock number. Dynamit Nobel Defence has now embarked on an international campaign to familiarise special and light forces with its capabilities, Sebastian Bent, sales and marketing executive with the company, told the *Show Daily*. Bent said that, as part of the campaign, Dynamit Nobel Defence could potentially demonstrate the RGW 90 LRMP capability to the Canadian Special Forces.

computer-aided dispatch, a mobile response application, resource tracking, command and control systems, intelligence, communications and information management systems; an in-vehicle computing system, which enables secure and real-time access to police databases, incident reporting systems, video surveillance, licence-plate recognition, and location tracking systems; web intelligence features, which enable police to search open sites such as forums, social networks and other key sources; citizen safety application, which citizens can download and use to report incidents and attach videos, snapshots, voice information, and location information; a Face First biometric facial recognition system, which enables the use of fixed cameras and video from the 4G/LTE smartphones to identify persons of interest; and a digital telephonic system, which includes IP desk phones and video phone stations to support operations and administration.

At CANSEC, General Dynamics Missions Systems-Canada highlighted the Shield system in conjunction with CyberKar's vehicle-borne Kommander capability – a solution developed specifically for police vehicles (*pictured*). Kommander comprises the best rugged computer, connectivity, software, and console available. The result is a safe, ergonomic and simple to use police car.

In late May, General Dynamics Mission Systems-Canada was selected by the Canadian Commercial Corporation (CCC) to provide a turn-key, integrated public safety solution for the Panama Ministry of Public Security based on the CityShield capability. CCC, a Crown corporation of the Government of Canada, is Canada's international contracting and procurement agency that is fulfilling a Memorandum of Understanding (MoU) signed between the governments of Panama and Canada. The MoU was put in place to facilitate closer relations between the two governments, including collaboration to enhance public safety and security in Panama.

In Panama, CityShield will integrate surveillance cameras, public emergency panic buttons, citizen collaboration tools, GPS location information and other capabilities all fused into the C5 Inter-Agency Emergency and Security Operations Centre. The system will combine these technologies with a computer-assisted dispatch system that will allow the Panamanian police and emergency services to respond faster and more effectively.

Separately, General Dynamics will equip Team Rubicon Canada with EmergencyShield. Launched in 2016, Team Rubicon Canada unites the skills and experiences of military veterans with first-responders to rapidly deploy emergency response teams in Canada and around the world. Once activated, EmergencyShield establishes a persistent, versatile and accessible network that can rapidly share video, voice, data and location information that can also supplement existing radio systems.

"EmergencyShield will be a game-changer for our teams on the ground," said Bryan Riddell, chief executive of Team Rubicon Canada. "Not having to rely on commercial communications systems, which are often unavailable during a crisis or disaster situation, will increase the effectiveness of our teams and improve their ability to provide assistance quickly."

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Stay connected

DAVID DONALD

With its adapted Huey helicopter providing one of the most eye-catching outside displays, Cleeve Technology (Booth 935 and Outside 3020) is at CANSEC to promote its range of electrical connectors and associated products, which are widely used throughout the defence industry.

Part of the Cleeve Group, the company does around 80 per cent of its business in the defence sector, with the Canadian Department of National Defence (DND) its most important customer.

While Cleeve Technology is a major manufacturer and supplier of electrical connectors and cabling, it also has considerable expertise in designing complex electrical systems, fitting out sophisticated components such as aircraft landing gear and military vehicles.

At CANSEC, the company's Vietnam-era Bell Huey helicopter is being used as an ideal meeting room in which potential new clients can become connected with Cleeve. The airframe saw action in Southeast Asia, and later ended up with the National Research Council. It was gifted to Besnovo, another company in the Cleeve Group, as a test item for its laser ablation systems that are employed to strip a range of coatings.

Merger creates strategic advantages

On 3 April 2017, Thyssenkrupp announced it had secured full parent ownership of the Atlas Elektronik Group by acquiring the outstanding 49 per cent of shares held by Airbus Defense & Space.

The 100-plus year old marine systems provider and integrator will become part of a community of more than 158,000 employees working in more than 670 subsidiaries serving commercial and military customers worldwide.

In Canada, Thyssenkrupp employs around 2,300 people, with sales reaching C$1.4 billion in fiscal year 2016/17. To leverage the full potential of this corporate strength, Atlas Elektronik and Thyssenkrupp Marine Systems will restructure and carry out joint operations where synergies can be combined.

Both companies are established in Canada. In 2013, Thyssenkrupp Marine Systems' design of the Berlin-class replenishment ships of the German Navy was selected as the basis for the design of the Canadian Joint Support Ship (JSS) programme and the company is supporting Canada with JSS-related engineering services under a framework contract.

Atlas Elektronik Canada Ltd (Booth 505) was founded in 2012 and is one of the top 75 Canadian defence companies. Rick Gerbrecht, managing director of Atlas Elektronik Canada, will be chief executive of both Atlas Elektronik and Thyssenkrupp Marine Systems Canada following completion of the ongoing integration effort later this year.

Tough rubber tracks for all environments

Soucy Defense Division is highlighting its Composite Rubber Track technology on a Leopard 1 Main Battle Tank trainer at the outdoor display this year (3030).

Rubber tracks were originally designed to address the challenging mobility demands of extreme snow and ice terrains. However, over the past three decades Soucy's rubber tracks have proven to be a key mobility system used by many fleets, not only in extreme cold weather conditions, but also in intense desert heat, on rugged mountains, and in swampy or muddy terrains all around the world.

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