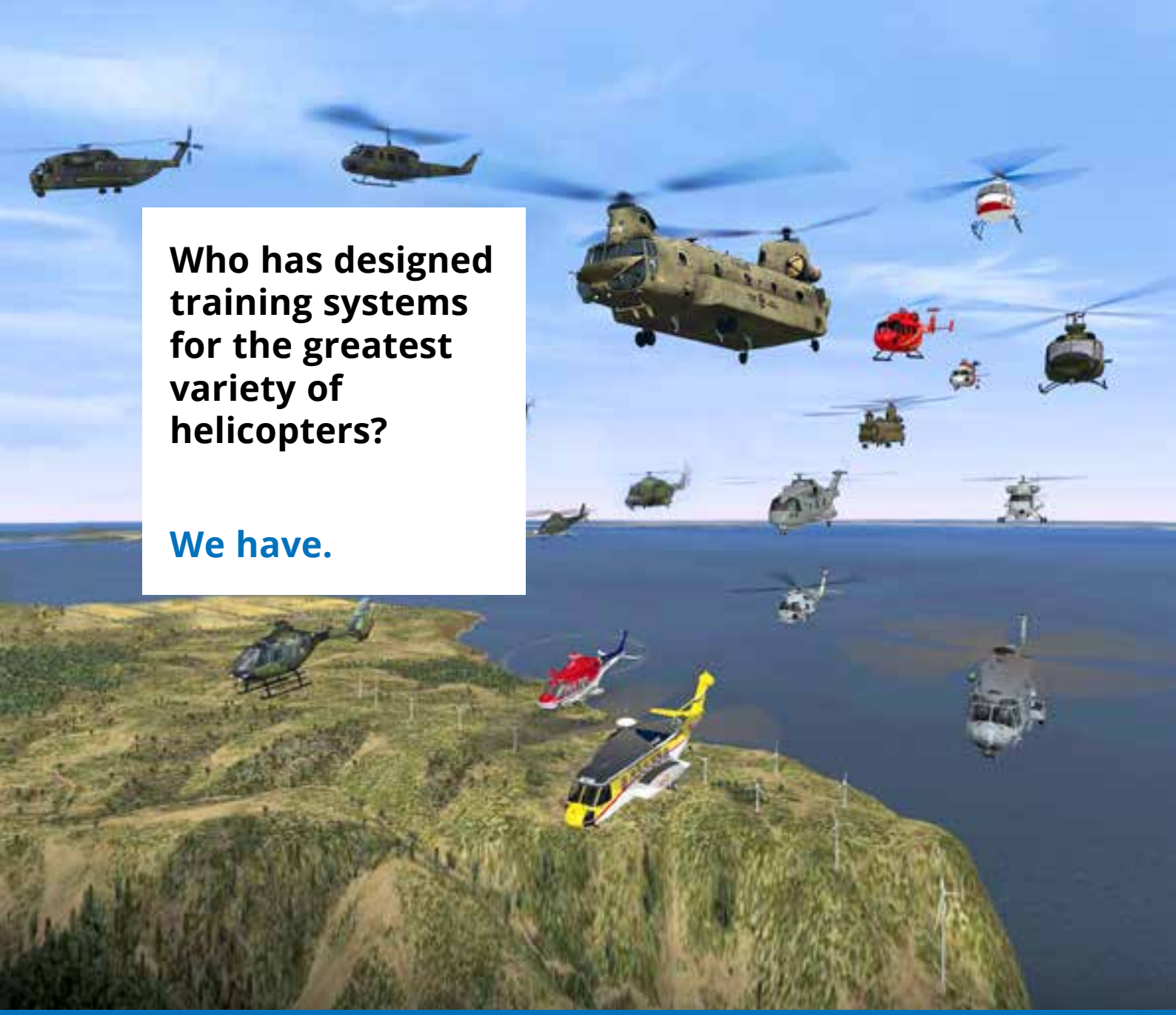
Helicopter Aircrew Training Solutions

Your worldwide
training partner
of choice

CAE



Who has designed training systems for the greatest variety of helicopters?

We have.

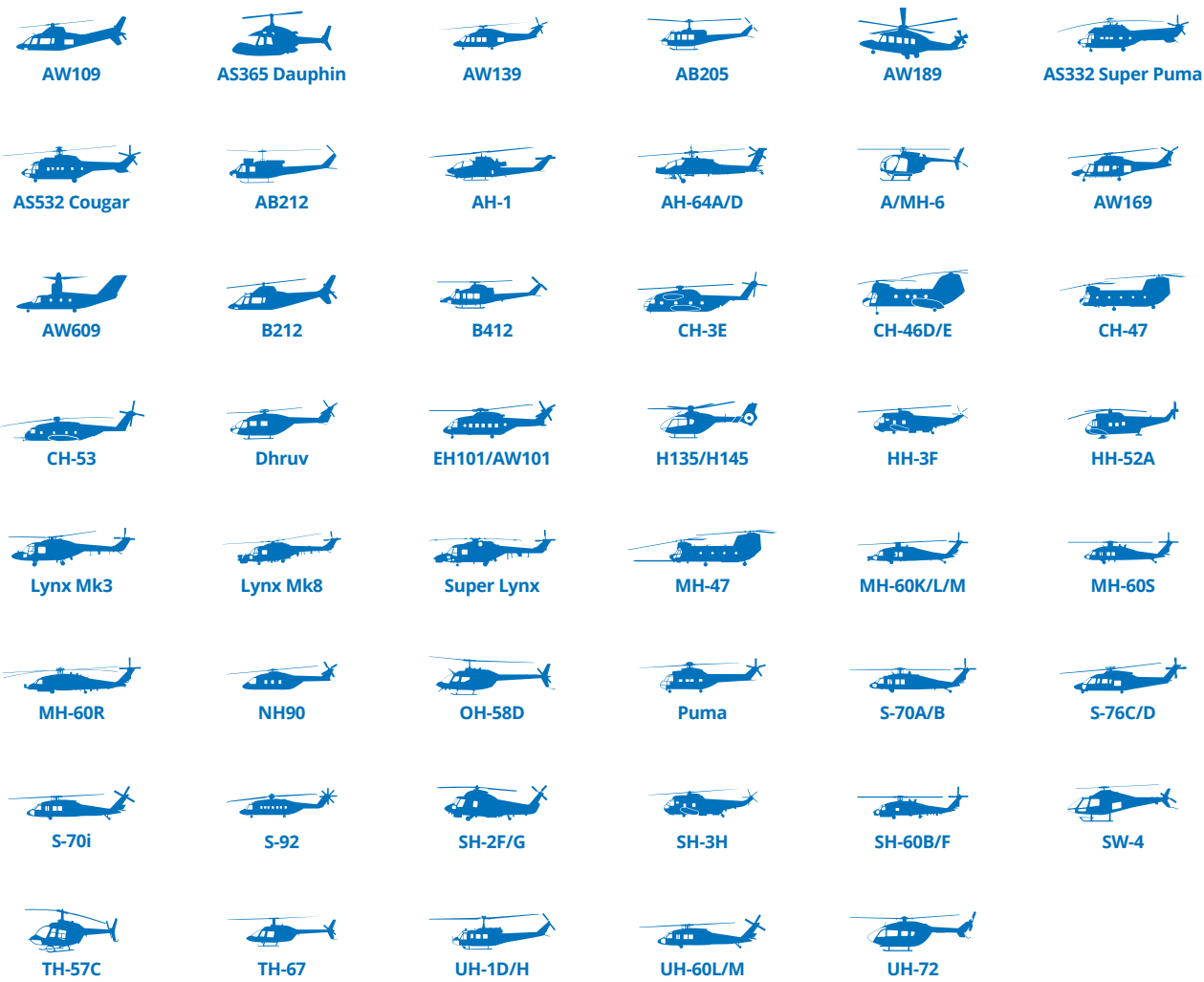
CAE has simulated helicopters from virtually all the major manufacturers, including Airbus Helicopters, Bell, Boeing, Hindustan Aeronautics Limited (HAL), Kaman, Leonardo Helicopters, MD Helicopters, NHIndustries, and Lockheed Martin/Sikorsky.

Helicopter Aircrew Training Partner of Choice

Helicopter pilots today are operating highly specialized, complex helicopters for an array of missions, including attack, tactical support, troop transport, search and rescue, reconnaissance, anti-submarine warfare and more.

The changing nature of warfare over challenging terrain and in demanding environments, combined with humanitarian support requirements, has made the flexibility of helicopters even more important for military forces. Simulating rotary wing aircraft and designing a training program to meet training objectives is a major challenge. Helicopters maintain some unique characteristics in areas such as aerodynamics and vibration that make high-fidelity simulation a difficult task. The varied operational uses of the helicopter combined with specialized technical challenges place unique demands on helicopter training and simulation.

CAE is the ideal partner for all training and mission rehearsal needs of today's helicopter aircrews. From entry-level training devices to the networking of advanced multi-mission helicopter simulators operating in an interactive threat environment, CAE has earned a reputation as the leader in delivering helicopter aircrew training. We provide innovative simulation products and comprehensive training services to help prepare helicopter aircrews for their demanding missions. In fact, no other company has designed training systems for a greater variety of rotary wing platforms.



Technology Leadership

CAE is focused on designing and developing the most advanced simulation-based training systems.

Our focus on training, simulation, and mission rehearsal, as well as the skill and imagination of our people, has helped us pioneer many of the innovations related to helicopter simulation over the past several decades. Our technology leadership is evidenced in the following areas.

Blade Element Rotor Model

CAE's Blade Element Rotor Model (BERM) is the basis for modeling the blade aerodynamic characteristics of all helicopters. The BERM models the complex airflow around the rotating airfoils and accurately simulates the blade hinge and hub articulation, as well as all of the power-drive linkages. In addition, the accurate simulation of blade malfunctions is a fundamental and integral part of the BERM.

Vibration Platform

When accurately stimulated, vibrations combine with visual and sound system cues to ensure that the aircrew develops proper control strategies while experiencing representative workloads. Vibrations in helicopters, in addition to creating a harsh operating environment, provide the aircrew with rotor dynamic feedback critical to their ability to control the aircraft. CAE's high performance 3-DOF (degree-of-freedom) vibration platform, installed under the cockpit, subjects the entire cockpit to vibration cues that are validated with actual helicopter recorded data. In addition, on our fixed-based devices our revolutionary dynamic seat for vibration and motion cueing delivers maximum realism of the training experience.

Visual Systems

CAE offers extreme field-of-view display systems and powerful image generators to create a realistic and immersive out-the-window virtual environment critical for helicopter training. The CAE Medallion-6000XR is the latest member of CAE's powerful Medallion image generator family and was developed with full support for the Open Geospatial Consortium Common Database (OGC CDB). The CAE Medallion-6000XR delivers exceptional image quality and scene density particularly important for low-level helicopter simulation-based training.

Who is the leading provider of high-fidelity helicopter training systems and services?

We are.

Open Geospatial Consortium Common Database (OGC CDB)

The Common Database (CDB), a CAE-led development, is designed to significantly reduce the timeline it takes to get a fully correlated database in operation within a range of training and mission rehearsal systems. Correlation of multiple databases in varying formats has been one of the major obstacles facing military forces wanting to practice and rehearse missions in simulation. The CDB architecture effectively removes this obstacle by allowing all users, or "clients," of the data required to access the information from a common database source and do so in real-time. These clients include not only the out-the-window visual scene in a simulator, but also other systems in the simulator requiring data, such as sensors, computer-generated forces, and communications systems. Since the completion of the original contracts under which the CDB was developed, the CDB specification has been maintained and updated by an industry-led board. In September 2016, the Open Geospatial Consortium (OGC®) an independent, international consensus-based standards development organization, formally approved the CDB as a standard and it is now referred to as the OGC CDB. The adoption of the CDB as an OGC standard brings together the geospatial intelligence and modelling and simulation industries to establish greater interoperability in the use of geospatial data.

CAE's Helicopter Simulation Technologies

- Blade element rotor model
- Virtual cockpit models
- Air turbulence around ships
- Wind models over mountain peak
- 3D oceans
- Radar and weather models
- Motion, vibration and ground handling
- Visual and display systems

Ground Handling

Ground handling simulation has proven to be one of the most challenging aspects of flight simulation. To achieve simulation fidelity in crosswind takeoff, landing on sloping terrain, or taxiing on different surfaces, the interaction of the helicopter's tires and landing gear with the ground must be accurately simulated. CAE has developed advanced ground handling models that faithfully simulate the helicopter's on-ground directional stability and control characteristics.

Roll-On/Roll-Off Cockpits

CAE pioneered the development of a full-mission helicopter simulator with a revolutionary roll-on/roll-off cockpit design, which enables cockpits representing various helicopter types to be used in a "mothership". The mothership simulator platform will include a common motion system (six degree-of-freedom), vibration platform, and visual display system. Different helicopter cockpits can then be "rolled on and rolled off" the mothership to provide ultimate flexibility and cost-effectiveness. When a cockpit is not being used in the full-mission simulator, CAE has also developed a docking station so the cockpit can serve as a fixed-based flight training device.

CAE3000MR SERIES

Military Helicopter Flight and Mission Simulator

The CAE 3000MR (Mission Reality) Series helicopter simulator was designed to meet the requirements for simulating military helicopters.

CAE offers a 10-foot dome display capable of a 210 by 75-degree field-of-view and a 12-foot dome display capable of an extreme 220 by 88-degree field-of-view, as well as the ability to utilize roll-on/roll-off cockpits to support mixed fleets. An enhanced tactical environment combined with weapons and sensor simulations will deliver the realistic mission training required for military needs.

The CAE 3000MR Series helicopter flight and mission simulator provides an immersive and realistic training experience for helicopter aircrews. The CAE 3000MR Series was developed with extensive input from CAE's helicopter advisory board with a specific emphasis on providing helicopter-specific mission training.

This CAE simulation product was also designed to meet or exceed current and emerging regulatory requirements for simulation-based helicopter training.

CAE 3000MR Series Features

- Extreme field-of-view visual display
- Industry-leading CAE Medallion-6000XR image generator for enhanced realism
- High-fidelity vibration and motion cues
- NVG/FLIR capabilities
- Weapons and sensor simulation

CAE700MR SERIES

Military Helicopter Flight Training Device

The CAE 700MR Series is CAE's next-generation flight training device (FTD) that offers an immersive, realistic and cost-effective experience for military helicopter-specific flight and mission training.

The CAE 700MR Series is based on the CAE 3000MR Series, a proven full-mission simulator platform. The CAE 700MR is a fixed-base FTD focused on the highest priority design attributes for military helicopter training, such as the synthetic environment, visual system immersion (field-of-view resolution, database content), cockpit layout and avionics simulation fidelity. The CAE 700MR fixed-based FTD is also ideal for traditional helicopter pilot training, including familiarization and procedures training as well as visual flight rules (VFR) and instrument flight rules (IFR) training. The CAE 700MR Series offers a revolutionary dynamic seat for vibration and motion cueing, thus maximizing the realism of the training experience on a fixed-based device.

CAE 700MR Series Features

- Unprecedented visual realism
- Distributed Mission Operations
- Advanced computer-generated forces
- Spacious design
- Innovative vibration cues with dynamic seat

Training Systems Integrator

CAE is a training systems integrator in the development of world-class helicopter training and mission rehearsal solutions. We provide innovative simulation products and comprehensive training services to help prepare helicopter aircrews for their demanding missions.

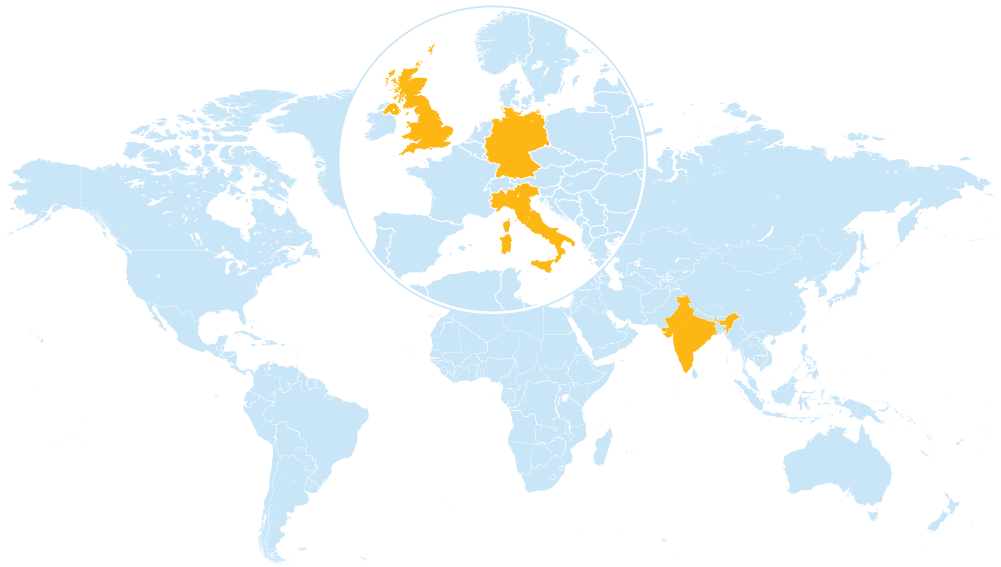
CAE's Global Turnkey Helicopter Training Facilities

CAE's training systems integration (TSI) approach addresses the full-spectrum of the training continuum, from academic and simulation-based training to a full live-virtual-constructive (LVC) environment for training and mission rehearsal. Our TSI approach is all based on exhaustive training needs analysis to ensure greater efficiency and lower costs while meeting training and readiness requirements.

With our worldwide network of industry partners, CAE delivers turnkey training solutions that include complete training programs, courseware, computer-based and classroom-based training, part-task and team training systems, training centres, facility management and operation, in-service support, and an integrated learning management system with brief and debrief features. As a TSI provider, CAE has all the requisite skills and experience to provide immersive mission and operational training, including training systems that can be networked for distributed mission operations and training. Some of CAE's helicopter training facilities worldwide include the following.

Medium Support Helicopter Aircrew Training Facility (MSHATF)

Our Medium Support Helicopter Aircrew Training Facility (MSHATF) in the UK is a perfect TSI example. The MSHATF delivers the total spectrum of synthetic aircrew training required by the Royal Air Force (RAF) Support Helicopter Force for the CH-47 Chinook, AW101 Merlin, and Puma platforms. In addition, Royal Navy aircrews as well as aircrew from other nations such as the Netherlands and Canada train at the MSHATF.



United Kingdom

Medium Support Helicopter Aircrew Training Facility

CH-47 Chinook, AW101 Merlin, and Puma

Germany

Helicopter Flight Training Services GmbH (joint venture of CAE, Thales, Rheinmetall, and Airbus Helicopters

NH90

Italy

Rotorsim (joint venture of CAE and Leonardo Helicopters

AW109, AW139, AW169, AW189, AW609, NH90

India

Helicopter Academy to Train by Simulation of Flying (joint venture of CAE and Hindustan Aeronautics Limited)

Dhruv, Bell 412, Airbus Helicopters Dauphin

Helicopter Program Highlights

Program Highlights

CAE is responsible for the design and development of some of the most sophisticated and capable helicopter training systems in the world. Following are brief descriptions of some recent and current helicopter programs at CAE.

Qatar Emiri Air Force (QEAF) NH90 Helicopter Training Solution

Under subcontract to Leonardo Helicopters, CAE will provide the Qatar Emiri Air Force (QEAF) with a comprehensive NH90 helicopter training solution. The QEAF is acquiring a fleet of both NH90 tactical transport helicopters (TTH) and NH90 NATO frigate helicopters (NFH). CAE will provide the QEAF with an NH90 training solution that will include a training centre facility, a suite of simulators and training devices, and training support services. The CAE designed and built centre will house a CAE 3000MR Series NH90 TTH full-mission simulator (FMS); a CAE 3000MR Series NH90 NFH FMS; a NH90 NFH rear-crew trainer for training tactical coordinators (TACCO) and sensor operators, and capable of networking with the FMSs to provide full-crew mission training; a CAE Simfinity NH90 integrated procedures trainers for the TTH and NFH configurations; a NH90 winch and door gunner trainer and NH90 virtual maintenance training system (VMT) classroom. The centre will open in 2021 at which time CAE will commence providing training support services, including classroom and simulator instructors. CAE will also design and develop a Tactical Control Centre to be used for managing networked mission training exercises.

Lockheed Martin/UK Military Flying Training System

Under subcontract to Lockheed Martin, CAE is providing Airbus Helicopters H135/H145 synthetic training equipment in support of the United Kingdom's Military Flying Training System (UKMFTS) program. CAE is providing a total of seven CAE 700MR FTDs and one command and tactics trainer (CTT). All the training devices will be delivered by the end of 2018 to Royal Air Force (RAF) Base Shawbury and used to support ab initio helicopter pilot training for the Royal Air Force, British Army and Royal Navy.

Polish Air Force SW-4 Full-Flight Simulator (FFS)

The Polish Air Force is using a CAE 3000MR Series SW-4 FFS at the 41st Air Base School in Deblin, Polandto train air force cadets.

The SW-4 helicopter, developed in Poland by PZL-Swidnik, a Leonardo Helicopter company, is a multi-role light utility helicopter used by the Polish Air Force for advanced pilot training and other utility missions. The CAE 3000MR Series SW-4 helicopter simulator includes the CAE True six degree-of-freedom (DOF) electric motion system and high-performance vibration platform to replicate vibration cues critical to helicopter pilots; the high-fidelity CAE Medallion-6000 visual system; state-of-the-art computer-generated forces tactical environment; and a direct projection 210 degree by 80-degree extreme field-of-view dome display system.

The SW-4 simulator also features the Open Geospatial Consortium Common Database (OGC CDB) architecture, an international standard for the creation of synthetic environment databases. This common software and standardization, which has also been deployed on the C295 and M-346 training systems that CAE developed for the Polish Air Force, further enhances interoperability across the Polish Armed Forces.

UAE Joint Aviation Command 407MRH and UH-60M Program

CAE is providing the UAE Joint Aviation Command (JAC) with a suite of helicopter simulators and training devices for the NorthStar Aviation 407 Multi-Role Helicopter (407MRH) as well as the Lockheed Martin/Sikorsky UH-60M Armed Black Hawk (ABH).

For the NorthStar Aviation 407MRH, CAE is designing and manufacturing a high-fidelity, fixed-based Level-7 equivalent flight training device (FTD). In addition, CAE is providing a suite of desktop trainers and brief/debrief systems.

CAE is designing and manufacturing a UH-60M/ABH full-mission simulator for the UAE Joint Aviation Command. The UH-60M/ABH full-mission simulator representing the armed variant of the Black Hawk helicopter features a six-degree-of-freedom motion system, vibration platform, and extreme field-of-view display system.

The simulators and training devices for both the 407MRH and UH-60M include the CAE Medallion-6000 image generator and Open Geospatial Consortium Common Database (OGC CDB) architecture, which will further enhance networked, interoperable mission training across platforms.

U.S. Navy MH-60S and MH-60R

Since 2004, CAE USA has been the prime contractor responsible for the design and manufacture of MH-60 Seahawk tactical operational flight trainers (TOFTs) for the U.S. Navy, as well as foreign military sale customers. For both the MH-60R Romeo and MH-60S Sierra, CAE has developed the operational flight trainer for pilot training and the weapon tactics trainer for training rear-crew sensor operators.

In 2016, CAE was selected for the MH-60 Technology Refresh and Procurement of Simulators (TRPS) program by the U.S. Navy. As part of the "Tech Refresh" program CAE is performing major updates and upgrades to the U.S. Navy's suite of MH-60S Sierra and MH-60R Romeo training systems, including tactical operational flight trainers and weapons tactics trainers located at Naval Air Station (NAS) Jacksonville, Naval Station (NS) Mayport, NAS North Island, and NS Norfolk.

International Helicopter Training Centre

CAE was the prime contractor responsible for the development of the German Army's Night-Time Low-Level Flight Training Facility (NTF), which is Europe's largest helicopter training facility. CAE designed and manufactured 12 full flight simulators (two UH-1D, two CH-53, and eight EC-135) that are used for basic flight training as well as training in low level day, night, or instrument flight conditions.

The project features our revolutionary roll-on/roll-off convertible full mission simulator design, where a common motion base can receive a variety of cockpit modules of different helicopters. All of the simulators can be networked to participate in the same flying exercise or tactical operation. CAE currently provides comprehensive training support services on-site at the International Helicopter Training Centre in Buckeburg.

United Kingdom Ministry of Defence's Merlin Life Sustainment Programme

As part of the Merlin Life Sustainment Programme (MLSP), Leonardo Helicopters is the prime contractor responsible for the conversion of 25 AW101 Merlin helicopters for maritime operations to support the Royal Navy.

Under subcontract to Leonardo Helicopters, CAE is designing and manufacturing a suite of AW101 Merlin synthetic training equipment to train pilots and rear crew.

The training suite, which will be delivered to RNAS Yeovilton, includes two CAE 700MR Series AW101 Merlin Mk.4/4a fixed-base flight training devices (FTDs), one rear-crew trainer (RCT), and one flight navigation procedures trainer (FNPT). The RCT, which can operate in standalone mode or be coupled with a flight training device, will use augmented reality delivering an enhanced and immersive training experience for the rear crew.

Royal New Zealand Air Force (RNZAF) CAE 700MR Series NH90 FTD

CAE is under contract from the New Zealand Defence Force (NZDF) to provide the Royal New Zealand Air Force (RNZAF) with a CAE 700MR Series NH90 flight training device (FTD). CAE will deliver the CAE 700MR Series NH90 FTD to RNZAF Base Ohakea in 2020 where, upon delivery of the simulator, CAE will also provide long-term maintenance and support services.

CAE's 700MR Series FTD is specifically designed for military helicopter flight and mission training, delivering an immersive and realistic training environment in a fixed-based platform that includes a dynamic seat for vibration and motion cueing. The RNZAF NH90 simulator will feature the CAE Medallion-6000XR image generator and an extreme field-of-view visual display system (240 degrees horizontal by 88 degrees vertical) which will enable the RNZAF to safely practice and rehearse high-risk maneuvers such as ship deck and confined area landings.

About CAE Defence & Security

CAE's Defence & Security business unit focuses on helping prepare our customers to develop and maintain the highest levels of mission readiness. We are a world-class training systems integrator offering a comprehensive portfolio of training centres, training services and simulation products across the air, land, naval and public safety market segments. We serve our global defence and security customers through regional operations in Canada; the United States/Latin America; Europe/Africa; and Asia-Pacific/Middle East, all of which leverage the full breadth of CAE's capabilities, technologies and solutions.

For more information visit our website
cae.com

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