


# A simulating business



The use of simulators as a training tool for pilots and other aircrew is becoming more and more widespread in both civil and military aviation.

**BILL READ** looks at recent developments in two leading simulator and training companies, Thales Training & Simulation and CAE.

**T**he use of flight simulators has become a key element in both military and pilot training programmes. The application of more and more sophisticated technology has enabled manufacturers not only to create simulators that are more realistic but which can be used not just for flight training plus many other scenarios experienced by aircrew. Simulator providers are also becoming more involved in the provision of training services, as the experiences of two leading manufacturers demonstrate.

Well known as a defence contractor, Thales also has a substantial presence in the simulation and training market. Comprising three main business areas, Thales' defence activities make up 57% of its revenue, followed by IT services with 25% and aerospace taking up the remaining 18%.

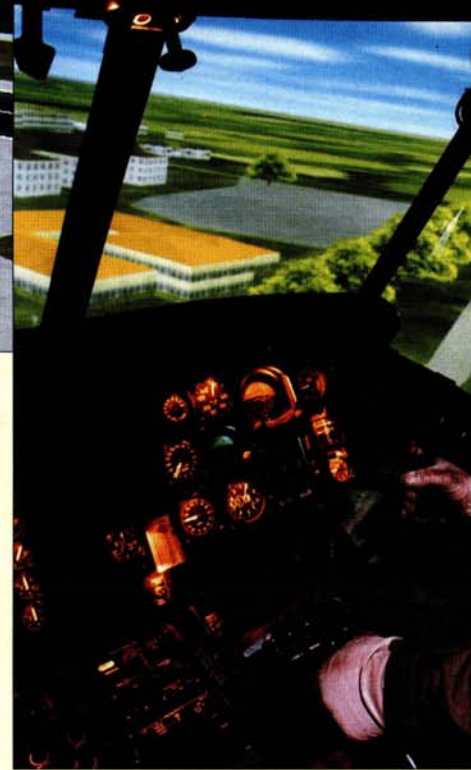
Thales' aerospace sector covers air traffic management, avionics and training and simulation. In 2001 the latter business accounted for Euro 325m out of the company's total turnover of Euro 10.3bn. Thales Training & Simulation (TT&S) employs a total of 2,010 workers, 1,100 of

whom work at Crawley in UK. A further 700 are employed at Cergy in France with 150 at Sydney, Australia, and 60 at Tulsa in the USA. The company's main market is in Europe (with 60%) followed by North America (15%) and the rest of the world (25%).

## You name it, we simulate it

A total of 800 simulators made by TT&S and its predecessors is currently in operation in over 60 countries. Of these, civil and military sims each account for around half of the business. Support and training activities, together with helicopter and land systems each take up a quarter of the total while simulators for fighters account for 10% and transport aircraft for 40%.

On the civil aviation side, TT&S has supplied over 370 full flight simulators to more than 100 airlines plus aircraft manufacturer and independent training centres. These not only include full flight simulators, but also a wide range of other training devices including fixed base simulators, maintenance training simulators, flight training devices, cockpit systems trainers, enhanced situational awareness trainers,



enhanced crew resource management, flight management system trainers and part task trainers, as well as Internet and computer-based training. Nearly all makes of past and present aircraft from Airbus and Boeing have been catered for together with examples from McDonnell Douglas ATR, Dornier, Fokker, Ilyushin, TriStar, BAC/BAe, Concorde, Caravelle and Beechcraft. "We are currently looking for new contracts to supply trainers for the new Airbus A380 as well as Bombardier CRJ and Dassault Falcon bizjets," states Jeremy Standen from TT&S' aircraft systems business.



Turning to defence training, TT&S has 160 military simulators in service with over 30 armed forces. As with the civil aviation business, a wide variety of aircraft are covered. Fighter sims include the Harrier, Sea Harrier, Tornado, Hawk, Jaguar, Alpha Jet, Mirage, Super Etendard, Tucano, F-16, F-111 and Eurofighter. Numerous military transport sims are also provided, such as the KC-10, KC-135, C-5, C-130, P-3C Orion, Nimrod, Atlantique and Transall. Rotary wing aircraft are also well represented with

simulators for the Super Puma, Cougar, Agusta A129, Dauphin, Panther, Lynx, Blackhawk, Gazelle, Sea King, Ecureuil, Fennec and Tigre.

TT&S also produces a range of non-aviation training systems including armoured vehicles and tanks, driving and gunnery simulators.

### Network training

A full mission fast jet simulator includes a cockpit reproducing the full visual, tactile and sound environment experienced by flight crews. As well as a visual display of the outside environment the simulator features accelerating and motion systems and an instructor's platform with tools for monitoring and measuring performance, lesson planning and control and communications. Training scenarios can cover high and low speed flight, air-to-air combat, refuelling, instrument flying, formation flying, low-level flying and taxiing. All types of weapons used in combat are covered, including air-to-air and air-to-ground missiles.

As well as honing flying skills, TT&S transport aircraft training systems can also cover aspects such as maritime patrols, reconnaissance, in-flight refuelling and full mission rehearsals. Helicopter sims are also designed to include transition and recurrent training, mission rehearsal training and specialist rotary wing applications such as ground attack, anti-ship and

submarine warfare, tactical transport, search and rescue and offshore support.

TT&S also provides a wide range of simulators offering a series of synthetic environments designed for simultaneous training sessions or mission rehearsals in which a number of simulators and other training platforms in different geographical locations can be integrated into a single interactive network. "Today's military scenarios demand speed, agility and stealth as critical factors," comments Standen. "There is now an increased need for training in a simulator or as part of a synthetic environment."

In addition to manufacturing and delivering systems, Thales also offers training packages together with ongoing support for operators and engineers.

### Upgrades

Recent international defence contracts for TT&S include the supply of a Hawk Mk64 full mission simulator for flight, procedure and mission training to the Kuwait Air Force. Featuring a multi-windows SPACEmagic visual environment and weapons system, the new simulator replaces one that was destroyed in the 1991 Iraqi invasion of Kuwait. TT&S has also supplied Hawk sims to the UK, Saudi Arabia, South Korea, Indonesia, Malaysia, Switzerland and Abu Dhabi.

As the lifespan of military aircraft is stretched out through upgrades and modifications, flight simulators must also undergo changes to remain faithful to the handling qualities of their counterparts. Another ongoing project for TT&S is the upgrading of 12 F-16 MLU trainers currently in operation in Belgium, Norway and the Netherlands. Working in conjunction with Lockheed Martin Information Systems (LMIS), Thales is supplying the second and final stage of the M2 operational flight programme (OFP) upgrade on to the trainers. This includes the fitting of simulated Atlantic navigation pods and Lantirn targeting pods to five selected trainers.

A contract for TT&S to supply simulators frequently goes hand in hand with an agreement also to supply training services. A recent example of the latter was a flight simulation technology education and qualification training course that the company ran for senior Chinese pilots working for the Civil Aviation Administration of China (CAAC) as pilot-inspectors or as captains/flight instructors in China



Upper left: Virtual airport visuals from TT&S.

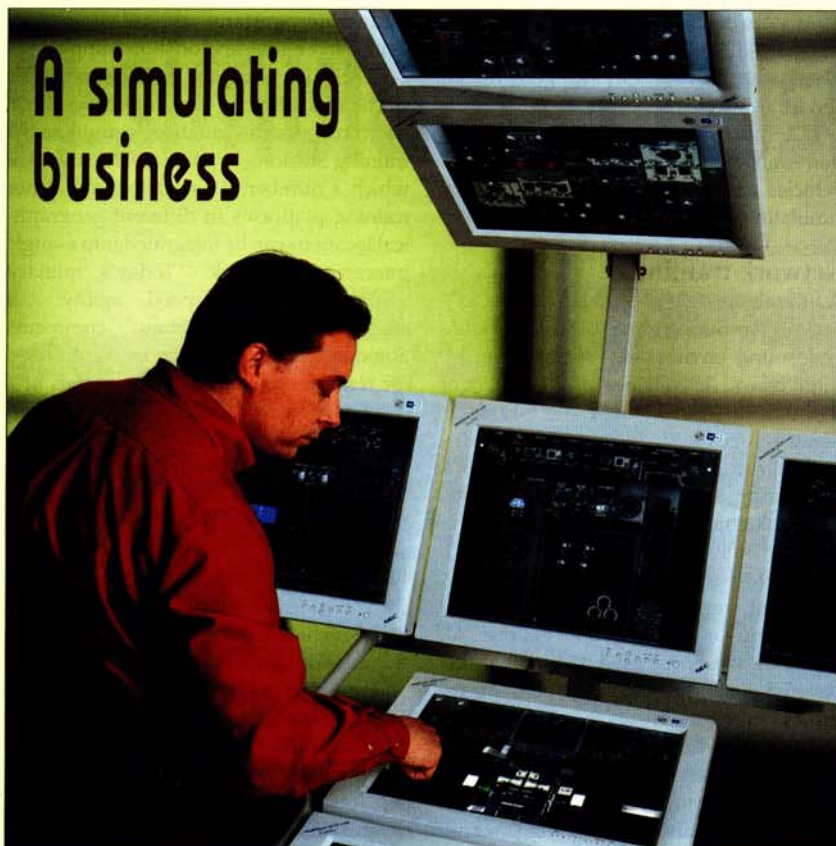
Left: Cockpit interior of TT&S Sea King helicopter simulator.



TT&S produces trainers for nearly all current large aircraft types, such as this Boeing 777 full flight simulator.



### A simulating business



Southern, China Southwest, China Northern, China Northwest and China Eastern airlines. The aim of the course was to evaluate flight simulators as training tools and enable the pilots to acquire the principles of testing acceptance and approval of simulators and associated visual systems. The students would then use the skills learned at training centres run by major airlines and independents.

#### Military takeover

In recent years the UK Government has been opening up more and more defence contracts to private tender as part of its private finance initiatives (PFIs). Training has been no exception and Thales' simulator division has been successful in winning a number of these contracts. These include a 32-year contract to provide all aspects of the Royal Air Force's Tornado GR4 training based at RAF Lossiemouth and RAF Marham. A second 15-year contract has been signed with the British Army Air Corps at Middle Wallop in Hampshire to provide training services for its Lynx Mk 7 and Mk 9 helicopter pilots. A new purpose-built facility will feature a

Above: CAE's instrument procedures trainer (IPT).

Right: TT&S full mission fast jet simulator can reproduce the full visual, tactile and sound environment experienced by flight crews.

systems run by the RAF. Known as the fully integrated aircrew synthetic training service (FIATS), the £100m programme signed in October 2002 covers 20 simulators located in 11 different training sites (Brize Norton, Coltishall, Coningsby, Cranwell, Kinloss, Leeming, Leuchars, Linton on Ouse, Lossiemouth, Lyneham and St Mawgan). During the course of this year Thales will be taking over the running of each site from the RAF with the final



helicopter flight simulator with 200° x 60° field of view visual system together with an applied tactical environment system to support the Army Air Corps' operations. TT&S has also won a Euro 200m ESS joint venture to supply work packages for Eurofighter Typhoon aircrew synthetic training aids. This latter programme includes supplying equipment and software to 31 simulators and reference systems in Germany, Spain, Italy and the UK over a nine-year period.

On 1 January this year TT&S went even further when it took over the management of the majority of all the synthetic training

handover scheduled for October 2003. The simulators include the VC-10, Jetstream, Nimrod MR2, Hercules, TriStar, Tornado F3, Jaguar, Tucano and Sea King helicopter. To service the contract, Thales will be recruiting or transferring up to 100 instructors and managers plus 200 maintenance and support staff. The contract is expected to run for at least 12 years.

#### Meanwhile in Canada

Another leading simulator and training provider is CAE in Canada. Founded in 1947, the company has annual revenues of \$1.2bn and has over 6,000 employees in 13

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countries around the world. On the equipment side, the company provides a full range of simulation systems from full flight simulators, flight training devices, visual systems and computer-based flight training programs. CAE has recently introduced a new lower-cost full flight simulator called the Sim XXI aimed at regional and business operators as well as its enhanced realism Tropos visual generator. Its PC-based system Simfinity allows



students to learn cockpit procedures in their own time away from the classroom.

The company is divided into three business segments covering civil, military and marine applications. The civil division offers full flight simulators, flight training devices, visual systems and computer-based flight training programs. Aircraft covered range from large commercial jets down to regional aircraft and bizjets. In December the company sold a Boeing 737 next generation full flight simulator to Korean Air's training centre in Incheon. Fitted with the Tropos visual system, the new unit will be operational by the



summer of 2003. On the military side, CAE provides simulators for fighter jets, transport aircraft and helicopters, while the marine controls division provides both equipment and training services to a number of navies around the world, including submarine training.

The ongoing economic downturn in aviation has adversely affected all sectors and the simulation and training sector has been no exception. In September 2002, CAE reported second quarter earnings of Ca\$23.3m compared with Ca\$34.3 in the previous year. The decline was due to a fall in sales of full flight simulators for CAE's civil sector which was partially offset by growth in its military and marine controls sectors. CAE anticipates that it will sell only between ten and 12 full flight simulators over the next year. Training demand in the civil sector has experienced some growth but business aviation training has fallen.

### Investing in training

Training is a cornerstone of CAE's plans for the future and the company is actively tendering for new contracts. Already CAE operates a network of ten training centres located at Sao Paulo, Toronto, Amsterdam, Maastricht, Brussels, Dubai, Madrid, Denver plus two in Dallas. At the end of 2002 the centres offered training on over 75 full flight simulators. A division of the company, CAE SimuFlite, provides advanced training to pilots and maintenance personnel operating piston and

turbine-powered aircraft. CAE anticipates that by the end of 2004 its training network will have a turnover of over \$400m.

At the end of 2002 CAE announced that it had concluded aviation training contracts worth Ca\$50m with the US Air Force and ten airlines. Based at Dallas, the new Ca\$33m military contract will provide initial and recurrent training for the USAF's fleet of 70 C-21A Learjets. The civil contracts, which include flag carriers KLM, Malev Hungarian Airlines and Royal Air Maroc, will use full flight simulators at CAE's European training centres.

Two further military contracts were announced by CAE in January this year, the first to provide a CP-140 Aurora surveillance aircraft flight deck simulator for the Canadian armed forces together with an upgraded CP-140 cockpit procedures trainer. The second contract was a Ca\$24m deal from its air training partner Lockheed Martin for additional C-130J trainers as part of its C-130J maintenance and aircrew training system. The deal involves the provision of an integrated cockpit systems trainer and a cockpit.

With new types of aircraft continually being developed together with upgrades of existing designs, the long-term future for simulation manufacturers still continues to look bright. However, companies that wish to prosper in the new market will need to offer more than just equipment and develop integrated training services as part of a complete package. ♦