

Over 1000 square metres dedicated to simulation expertise

Since the end of 2007, ESG Elektroniksystem- und Logistik-GmbH in Fürstenfeldbruck has been home to one of Germany's most advanced simulation centres. On a surface area of some 1000 square metres, engineers build simulators and demonstrators and develop new avionics systems that will be employed in the aircraft of the future.

The simulators are used for training pilots and technical ground personnel, and provide a convenient means of enabling helicopter or aircraft crew to practise co-operation and run through the tactical and operative procedures that apply during real missions. The simulators also support the development of new systems and functionalities for the aircraft of the future. For example, several series of tests on the human-machine interface and the functions of an intelligent support system for the pilot, a kind of electronic co-pilot, are being performed at the ESG facilities. In addition, an unmanned air vehicle equipped with sensors is being tested for networked operation with a helicopter. Working together with German military pilots who have experience of landing in dust, the ESG experts have used the CH-53 simulator to test innovative sensors and display elements designed to assist crews during brown-out landings.

The simulator cockpits are built as close reproductions of the originals. Among the models that can be flown at the ESG simulation centre are the CH-53 and TIGER helicopters and the TORNADO, EUROFIGHTER and A400M fixed-wing aircraft. These systems are the fruit of long years of development at ESG – a company that has been operating in the field of simulation for over twenty years. The novel aspect is that these simulators are integrated in an ultra-modern high-tech environment.

As an example, a completely new vision system has been installed for helicopter simulations. It gives the pilots a nearly natural range of vision and is one of the most advanced facilities of its kind in Germany. Simulator flights are now far more realistic than ever before.

The cockpit structures are located at the centre of a spheric projection screen measuring seven metres in diameter, which has a range of vision of 240 degrees in the horizontal plane and 70 degrees in the vertical plane (extending to 45 degrees below the horizon). In order to provide enough space for the half-dome, which is four metres high, a double-storey technical equipment room was built specifically for this purpose.

A total of seven projectors generate an extremely realistic image of the flight environment with no discernible breaks or overlaps. Any desired weather conditions including fog, clouds, rain or snow can be simulated, as can the lighting conditions for any time of day. The extremely detailed databases that ESG has been compiling for more than ten years help to create this realistic impression. These databases use topographical survey data and are adapted to meet the specific requirements of simulated missions.

To ensure that more than just a single cockpit simulator can benefit from the dome projection, ESG has implemented a “roll-on-roll-off” concept as part of the new facility. Various simulators have been designed as mobile structures, and can be rolled into place inside the dome within the space of only two hours. To make this possible, a standardised interface was created to link the cockpits with the vision system and the associated operating and monitoring station.

The modular concept of the simulation landscape at the technology centre goes a step further. Rather than being designed as standalone solutions, the ESG facilities are all interconnected. This makes it possible to perform more complex investigations that call for tactical scenarios with several helicopter or aircraft types. The simulation environment permits networked operations and special missions, thus covering a large section of the missions involved in network-centric operations.

External networking is a further possibility: For example, several ESG simulators took part in the VIRTEL 2007 exercise at the end of November 2007, when complex military missions including deployment on water, on land and in the air were simulated in a network encompassing 50 participants throughout Germany.

Data and software can also be seamlessly transferred from the simulators to the ESG mission equipment carrier (MAT). The MAT is a flying test-bed that enables helicopter components to be tested under operational conditions while still at the development stage.