

FIGHT AS YOU TRAIN, TRAIN AS YOU FIGHT

Since last year, the Swedish Defence Materiel Administration, FMV, has been the operator of Sweden's largest firing and exercise range, Älvdalen, which is situated in a relatively remote region in the middle of Sweden, about 400km northwest of Stockholm.

With an area of 540km², Älvdalen offers a wide range of capabilities: one main feature is the 700 x 1,000m hardened target area, which is an ideal target site for tracked and monitored firings (inert and live). The effective firing range is about 46km; maximum detonation weight at the hardened target area is TNT 1,000kg.

The hardened target area is also an ideal location for testing of dispenser weapon systems. Dedicated monitoring and tracking systems are present, which track every sub-munition until impact and record the exact place of burst. When it comes to general monitoring, recording, measurement and test systems, a wide selection of radars and optical systems are available.

Besides the hardened target area, there are a number of launch and target sites scattered throughout the range. Furthermore, there are three dedicated helicopter landing sites, an 800m airfield and a 1,500m landing strip within the range. Älvdalen base camp is well equipped with accommodation, assembling, course and workshop facilities.

The remote location and vast area makes Älvdalen a perfect place for the firing of guns, missiles and rockets from helicopters. It is also very well suited for bomb runs with fixed-wing aircraft.

As the place is unpopulated and the radio spectrum is open, Älvdalen works very well for training and exercises with live EW systems and threats. For example, trials with GPS jamming and other electronic attack techniques such as noise and deception jamming and deployment of live expendables (chaffs, decoys and flares) can be successfully implemented. Another aspect of the remote location and

low population is the night sky. Älvdalen is almost totally unaffected by artificial night sky brightness (light pollution), which is very prominent over mainland Europe and the British Isles. This feature makes Älvdalen a perfect place for night-vision goggles evaluation and training, as well as for night-vision operations. The operational conditions achieved in Älvdalen are very similar to the conditions present in recent operational areas, such as Afghanistan, Iraq and Libya.

The winter climate at Älvdalen sees outdoor temperatures down to -30°C. The peak temperature during summer is about +30°C. The vast area makes Älvdalen a natural choice for large-scale exercises (up to and including brigade level), for example joint operations between fast jets, helicopters and ground forces. Through using GBAD and other threat systems, very realistic training and exercise scenarios



can be designed, such as SEAD and DEAD. The target catalog includes static ground targets and remotely controlled ground and aerial targets, all are available for hard kills. Targets can also be furnished in accordance with customer specification.

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AERO-ACOUSTIC AND POWERED MODEL WIND TUNNEL TESTING

Aero-acoustic capabilities have been introduced by RUAG Aviation to its wind tunnels to help customers to efficiently identify and quantify noise sources generated, for example, by high-lift devices or landing gears during aerodynamic testing.

The company's facilities include the Large Wind Tunnel Emmen (LWTE), one of the largest subsonic wind tunnels in Europe, and the Automotive Wind Tunnel Emmen (AWTE), where car models up to 50% scale can be tested on an accurate moving ground simulation.

In 2012, RUAG Aviation teamed up with Dassault Aviation to carry out a demonstration test using an array of 144 microphones to measure the acoustic noise source maps of a business jet. During this one-day test, 60 aero-acoustic datapoints were measured for various model configurations, wind speeds and angles of attack, thus confirming the suitability of the LWTE for aero-acoustic studies. The LWTE is also often used for conducting tests with powered models. A

demonstration in the open section of the Experimental Wind Tunnel Emmen (EWTE), with a hydraulically driven counter-rotating open rotor (CROR) propulsion setup, confirmed that no significant noise from the motors masks the acoustic sources of interest.

RUAG Aviation continues to quickly respond to customers' changing requirements. In recent years, demand for propeller and open-fan-powered aircraft has grown due to economic and ecological constraints. As a consequence, RUAG Aviation has recently upgraded its hydraulic power supply, which is now capable of generating a total of 1MW of power. The pumps are used to drive up to four independent high RPM model propellers/rotors, or can be combined to power a single full-scale propeller. In-house hydraulic motor technology is under constant development to fulfill the customer-specific high-torque/high-RPM requirements in this field.

RUAG Aviation's wind tunnel status as a leading European aerodynamic testing facility



is largely due to the team's experience, flexibility, cost-efficiency and focus on customers' requirements. Whenever standard wind tunnel tests, powered models or acoustic measurements are needed, RUAG Aviation provides the necessary high-quality data.

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