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## Simulation Centre and Integrated Training System

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### Simulation Centre based at Alenia Aermacchi's Turin Corso Marche plant

Since it was established in 1961, Alenia Aermacchi's Simulation Centre has designed, developed and operated flight simulators, along with hardware and software tools required for their integration.

These simulators are used to support the development of the aircraft that Alenia performs autonomously or within national or international partnerships. In particular, programmes such as AMX, Eurofighter Typhoon, C-27J Spartan and Sky-X and Sky-Y UAS (Unmanned Aerial Systems) technological demonstrators, have been extensively supported since their early stages by one or more dedicated simulators, providing a highly realistic, real-time, man-in-the-loop environment, where systems specialists and test pilots can evaluate various aircraft systems and subsystems configurations.

Simulation technologies are also exploited to support the main European research programmes. For instance, in the civil field, a research simulator has been recently set up for regional aircraft to validate innovative technologies developed within the Clean Sky and SESAR projects.

Flight simulators, interactive pilot stations, scenario and image generators and the related virtual reality facilities are integrated in a distributed simulation network; such a network permits tests to be conducted on complex and multi-platform systems including simulators in remote locations that are connected on a Wide Area Network.

When the aircraft is delivered to the customer and enters the operational phase, the same simulation facilities used to support aircraft development may be used to provide aircrew and ground crew initial training, while dedicated synthetic training simulators are being designed and built specifically to support ground training at customer's sites. Such an approach has proved to be very effective in the case of Eurofighter and C-27J programme, as both initially used Alenia Aermacchi's engineering simulators as interim trainers to subsequently develop relevant flight training simulators (Eurofighter Enhanced Aircrew Cockpit Procedure Trainers and Eurofighter Aircrew Synthetic Training Aids - the latter developed within the ASTA programme - and C-27J Flight Simulators) for several customers.

### Alenia Aermacchi's Integrated Training System at the Venegono Superiore plant

Alenia Aermacchi, with over 50 years of unrivalled experience in military pilot training, has developed unique Integrated Training Systems (ITS) now in service with Singapore's Air Force and under delivery to the Italian and the Israeli Air Forces, including the state of the art M-346 aircraft, Full Mission Simulators, Academic Training Media and Training Management Tools.

To ensure the smooth transition for new pilots from basic trainers to the system's complexity of the 4th/5<sup>th</sup>-generation Combat Aircraft, as well as to maximize efficiency, Alenia Aermacchi conceived from the beginning of M-346 programme a holistic solution encompassing capabilities, syllabus, safety and maintenance – in a nutshell, everything required to provide solutions for 21<sup>st</sup> century training needs.

At the heart of Alenia Aermacchi's ITS is the innovative M-346 lead-in fighter trainer, the most advanced currently on the market.

The goal of M-346 ITS is to fulfil the training gap generated by the new generation of Combat Aircraft's entry into service.

New emerging technologies such as Flight Simulation & Modelling, information technology, e-learning, connectivity-networking, common data-basing etc., are providing clear opportunities to integrate other Training Media beside the Trainer Aircraft, helping the Training System be more effective in teaching and providing complex skills in a time period similar to the current training time frame.

The M-346 ITS concept is based on the above described technology and training philosophy. Modern information technology can be effective in connecting the Training System with surrounding and cooperative entities such as Integrated Logistic Support (ILS), Facilities and Training Management Systems and also connecting the Training Airbase to all the Military/Industry entities involved in the Fast-Jet Pilot Training Management.

Beside the M-346 trainer aircraft, the ITS is composed of a sequence of training media that allows students to rapidly and cost-effectively acquire the proper skills to become new -generation combat aircraft pilots.

Training with the M-346 ITS students will learn basic aircraft systems and procedures on the Academic Training system composed by Computer Based Training (CBT) and Procedural Training Device (PTD). On a Part Task Trainer simulator (PTT) they will put procedure into practice, learning the fundamentals of flying and how to carry out advanced training missions. They will use the Full Mission Simulator to acquire tactical skills. Flying the M-346 will bring together each element of what was learned in the simulations.

An additional benefit provided by the M-346 ITS is the "Mission Oriented" approach, that can be learned through using the Mission Planning and Debriefing System (MPDS) and the Real Time Monitoring Station (RTMS) to:

- Perform Mission Planning
- Perform Mission Briefing/Rehearsal
- Execute Mission (on A/C or Simulators)
- Perform Mission Debriefing

The Training Management Information System (TMIS) is initiating and closing the training loop, managing the syllabus execution, assigning every trainee with the proper lesson in accordance with his/her prerequisite, and recording all the trainee lessons results.

The optimal balance of real aircraft and appropriate simulation reduces costs without compromising quality.

Designed to serve as the backbone advanced trainer for leading Air Forces, the M-346 ITS offers maximum flexibility to train pilots designated to fly current (including Eurofighter, F-16, F-22 and Rafale) and next-generation fighters (F-35).

Coupled with its outstanding performance and increased despatch reliability, the Alenia Aermacchi integrated approach allows customers to download training modules from expensive front-line types, ultimately releasing them for operational duties or conserving vital flying hours and compounding the overall ITS cost-effectiveness.