AIR TRAFFIC MANAGEMENT

ATM SIMULATION SYSTEMS

Supplying ATM systems around the world for more than 30 years

indracompany.com
Indra experience

Indra has a full extensive experience in provision of turnkey ATM training solutions, providing APP/ACC and Tower simulation systems, either standing-alone or with a real ATM replica system in a back-up and contingency mode.

Indra has designed, developed and installed En-Route/Approach and Tower Simulation Systems in Europe, Latin America, Africa and Asia. Our experience includes all phases, from design to commissioning, as well as performing all developments and required Air Control Centre integrations when necessary.

Focused on its exhaustive didactical purposes, Indra’s En-Route/Approach and TWR simulation system provides simultaneously a multi-exercise and multi-level of difficulty environment, in which the students/controllers receive their evaluation reports automatically, including infringements and workload. Voice, data and 2D/3D-images are recorded, synchronized with given instructions, that will be analyzed during the exercises evaluation.

The Spanish Centre for Training of Air Traffic Controllers (SENASA) is a worldwide reference of integration of Indra’s Simulators in a “Total Training Solution”.

Since SENASA centre was born in 1990, Indra has been continuously updating its systems and functionalities. Nowadays, this centre contains three Enroute/Approach ATC simulators, six control tower simulators with 180° (three with 360°) environment, and CBT and Brief/Debriefing Rooms. More that one hundred students can simultaneously practice in different positions.
Indra’s En-Route/Approach & TWR Simulator provides a total training for 2D/3D-TWR/APP/ACC controllers in a multi session and multi-exercise system. Its mission is to enhance basic and advanced training of TWR/APP/ACC controllers, providing information of air/ground movements from radars, flight plans, air-ground data link capabilities, directional finders, external centres coordination, meteorological and aeronautical information and with 3D images of air/ground movements on aerodrome visual scene.

**Advanced Training for Controllers**

- **Two simultaneous training types**
  - Stand-alone complete training: Simulated TWR/APP/ACC controller positions, pilot positions, traffic generator and 3D-TWR visual system.
  - Advanced training using the replica of a real ATM system: Real APP/ACC controller positions and real data processing servers connected to simulator system.

- **Flexible and Homogeneous Architecture**
  - Integrated and scaled COTS based architecture.
  - Total system matching technical, operative and functional requirements.
  - HMI’s under Motif and X-Windows standards.
  - Control, supervision, exercise preparation and evaluation, design, management and maintenance functions.
APP/ACC Simulator

The En-Route/Approach Control Simulator is an exact reproduction of the environment found in an ATM Control Centre, with configurable student positions, totally equipped with all elements and devices used in real operations.

Each APP/ACC Control Working Position equipped with:
- Radar/ADS display screen and CPDLC messages display screen, computer with keyboard and mouse. One strip printer is associated to radar controller.
- Voice Communication System (Radio, telephone, Intercom) with HMI based on a “touch” monitor.

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2D Airport Layout & Situation Data Display

Flight Plan Management Interface

CPDLC Message Display

Simulator Functions

- Air Traffic Generation (ATG)
- Flight Data Processing
- Surveillance Data Processing
- Meteorological and Aeronautical Information
- Supervision/Session control
- Recording (Data and vocal synchronization)

Main Characteristics

- Total ATM training solution – En-Route/Approach and Tower Simulator
- Real ATM System replica as Back-Up system for advance training
- Up to 12 training exercises simultaneously and independently performed
- Tailored design of aerodrome and air space procedures
- Up to 64 working positions per exercise simultaneously
- Simultaneous active piloted flights: 1000
- 2D and 3D TWR Simulator. One selected exercise (360° configuration). Two selected exercises (180° configuration each one)
- Tailored visual solution for 3D-TWR training including the visual image generators. Aerodrome visualization by screen, front or rear-projectors
- Tailored desiging of airport environment and FIR sectors
- Exercise script preparation management and control support
- Exercise replay and playback
- Automatic input generation
- Ground & air mobile dynamic and navigation
- TWR/APP/ACC Controller and Pilot support
- Student/Controller infringements and workload evaluation
The Tower Simulator developed by Indra is designed as a complete reproduction of a real Airport Control Tower, displaying both 2D and 3D visual environments.

Student positions are equipped with all the monitors, elements and devices as those found in a real control tower room, set in a virtual environment by means of a 180-360 degree visual system, which allows a total reproduction of operating conditions found in a real airport tower.

Movement Management: target, aircraft and ground vehicles are managed automatically (by ATG) or by pilot positions. Easy manage of large quantity of targets and abnormal situations (fine, engine/smoke effects, landing gear malfunctions, turning on/off aircraft position lights...).

On-line adaptation of external tower environment, modifying student’s “point of view” and weather conditions, simulating clouds, rain, snow, wind...

Each TWR Control Working Position equipped with:
- FDP system with electronic flight strip in the HMI
- Approach Radar and Surface Radar Display system
- Voice Communication system (Radio, Telephone, Intercom)
- MET/AIS information processing and display system
- Airport Lighting Control System, Nav aids, status information, Signal Light Gun, Binoculars and all relevant information and instruments in a real airport tower

- Tailored to customer airport environment
- Image refresh rate: 30Hz or 60Hz
- Full scene antialiasing with 4,8,16 subpixel samples
- Anisotropic filtering to 16x
- Horizontal displacement for covering 360° and vertical displacement for covering +/- 90
- Up to 50 mobiles displayed per channel and up to 300 in the visual system
- Vertical Field of View per channel: 40°
- Covering +/- 90 degrees using the vertical displacement