AIR TRAFFIC MANAGEMENT

ATC SIMULATION SYSTEMS

Supplying ATM systems around the world for more than 90 years

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ATM SIMULATION SYSTEMS

ATC SIMULATION SYSTEMS

Advanced Training for Controllers

Indra’s En-Route/Approach & Tower 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 radar/ADS-B/MLAT sensors, 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.

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 ATC system: Real TWR/APP/ACC controller positions and real data processing servers connected to simulator system.

Flexible and Homogeneous Architecture

- Integrated and scalable COTS based architecture.
- Total system matching technical, operational and functional requirements.
- HMIs under Motif and X-Windows standards.
- Control, supervision, exercise preparation and evaluation, design, management and maintenance functions.
Indra has an extensive experience in the provision of turnkey ATC training solutions, providing integrated APP/ACC and Tower simulation systems, either standing alone or with a real ATC replica system in back-up and contingency modes.

Indra has designed, developed and installed En-Route/Approach and Tower Simulation Systems in Europe, Latin America, Africa, Middle East and Asia. Our experience includes all phases, from design to commissioning, in addition to 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 exercise 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 180º (three with 360º) environment, and CBT and Brief/Debriefing Rooms. More than one hundred students can simultaneously practice in different positions.
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 the radar controller.
- Voice Communication System (Radio, telephone, Intercom) with HMI based on a “touch” monitor.

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

Main Characteristics
- Total ATC training solution – En-Route/Approach and Tower Simulator
- Real ATC 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 Controller Working Positions per exercise simultaneously
- Simultaneous active piloted flights: 1000
- 2D and 3D TWR Simulator. One selected exercise (360º configuration). Two selected exercises (180º configuration each one)
- Tailored visual solution for 3D-TWR training including the visual image generators. Aerodrome visualization by screen, front or rear-projectors
- Tailored design of airport environment & FIRs
- 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 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 or by pilot positions. Easy management of large target loads and abnormal situations (fine, engine/smoke effects, landing gear malfunctions, turning on/off aircraft position lights...).

Each TWR Controller 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

Visual System Features

- Multichannel visual system and cylindrical screen with 180°/360° of panoramic view
- One Image Generator and Projector for each synchronized visual channel
- Up to Full HD resolution per visual channel
- Digital geometry correction and soft edge blending between channels for cylindrical projection
- Latest generation projectors and latest C.O.T.S. technologies for the Image Generators
- Commercial tools for 2D/3D database creation and maintenance
- 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