Enabling Informed Decisions
Seamless airport and airspace modeling and simulation
Rule-based terminal to terminal fast-time simulation

AirTOP is the leading gate-to-gate fast-time air traffic and airport complexity modeling, simulation and assessment software. AirTOP users include major air navigation service providers (ANSPs), airport authorities, airlines, research labs and consulting companies globally. The software is used to assess air traffic and airport complexity, measure controller workload, improve airspace and airport capacity and much more. AirTOP models have been used to improve the operations of more than 100 major airports worldwide.

Multi-agent based modeling

AirTOP is a multi-agent application, accurately capturing all controller tasks and behavior as well as all concepts or objects with which they can interact or manipulate. This ensures greater application robustness and more accurate simulations.

Single graphical user interface

Simulation scenario editing and debugging are arguably two of the most time-consuming tasks when performing studies using fast-time simulation tools. The AirTOP interface has been specifically designed to reduce the time needed to set up and debug simulations in order to achieve faster results and better cost efficiencies. With its forward-thinking approach, AirTOP offers scenario editing, simulation execution, debugging, reporting and simulation analysis through one single sophisticated interface.

Integrated 2D map and 3D views

AirTOP features an easy-to-use integrated map-based application. This application contains full GIS capabilities, allowing flexible background display of scanned maps, aeronautical charts or vector data, weather data, satellite images and elevation data. The multi-layered and interactive 2D visualization features easy-to-use navigation controls, as well as data creation and editing on the fly. With a single mouse click, the user can visualize the data entry on the map and on the information display simultaneously. Facilitated by easy-to-use navigation controls, the 3D view gives the option to overlay satellite images or charts on top of terrain elevation data. It also makes it possible to see the simulation through custom camera viewpoints.
Seamless airport and airspace modeling and simulation

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Airside Aircraft

AirTOP Airside Aircraft allows airport authorities, operators, consultants, and other stakeholders to assess and improve airport capacity by modeling airside aircraft operations. It facilitates rule-based modeling of:

- Stand/gate allocation
- Push/pull procedures, including taxiboat/etaxi concepts
- Taxi flow control
- Runway entry and exit selection
- Single and multiple runway sequencing
- Runway crossing
- Turnaround management
- De-icing procedures
- Ground metering and Departure Management (DMAN)
- Dynamic runway direction changes
- And more...

In situations demanding anything from the redefinition of taxi routes to changes in the runway mode of operation, AirTOP Airside Aircraft enables users to visualize potential operational bottlenecks and test alternative scenarios. Detailed airside layouts and procedures can be created, modified, simulated and compared using the powerful integrated 2D and 3D graphical user interface and performance indicators such as fuel-burn, taxi-time, or runway queues can be extracted and discussed with stakeholders on a common platform.

Airside Vehicle

AirTOP Airside Vehicle provides rule-based modelling capabilities to simulate the ground support equipment (GSE) vehicles at airports:

- Service equipment allocation to aircraft
- Customizable vehicle performances (speeds, fuel consumption, emissions, etc.)
- Service road networks, including intersections with taxiways or taxi lanes
- Service road closure management
- Dynamic allocation of vehicle parking positions, either for long-term or temporary
- Dynamic allocation of pick-up or drop-off locations for passengers, baggage, or catering
- Dynamic allocation of refueling stations
- Seamless integration with the Airside Aircraft module
- And more...

Limiting investment risks and managing expectations around future capacity and delay levels is made possible thanks to the high-fidelity business rules that AirTOP Airside Vehicle allows for ground support equipment vehicles.

Whether a project involves comparing the performance of alternative airport layouts after expansion, gaining an in-depth understanding of airport bottlenecks, or evaluating the effect of new processes or ground support equipment on capacity or delay, AirTOP Airside Vehicle provides the means for the analysis.
Airport Modeling and Simulation

Terminal

AirTOP Terminal provides a platform to evaluate and communicate the effectiveness of new or revised terminal layouts or operational processes, maximizing benefits and minimizing costs. AirTOP’s pivotal concepts and key benefits are:

- Simulate and visualize processes and systems
- Analyze capacity
- Examine what-if scenarios
- Optimize operations
- Measure Key Performance Indicators (KPI)
- Analyze new layouts
- Evaluate infrastructure constraints
- Report and communicate results
- Build stakeholder consensus
- Maximize benefits, minimize costs.

AirTOP empowers airport operations and planning staff to make informed decisions. The software provides an extensive array of functionality so that decisions can be reached in a cost-effective and educated manner, factoring in financial and environmental impacts.

Runway Capacity Analyzer

Estimating runway capacity is fundamental to all airport planning. For capacity constrained airports, optimizing the usage of runway resources is a primary objective. AirTOP Runway Capacity Analyzer is the perfect tool to assess current and future throughput an airport’s runway system. It achieves this objective by decoupling the runway system from both the airspace and the remaining airfield.

AirTOP Runway Capacity Analyzer overcomes the limitations of existing analytical capacity assessments by applying the Monte Carlo simulation method to propagate uncertainty from input parameters to throughput estimates. The decoupling of the runway system allows for many traffic sequences to be analyzed in order to obtain a robust throughput estimate while respecting constraints on fleet mix, Level of Service, arrival/departure ratio, and schedule times. With AirTOP Runway Capacity Analyzer it is possible to:

- Obtain optimized traffic sequence
- Evaluate throughput of the runway system for various conditions
- Evaluate delay with respect to runway target times for various conditions
- Test future traffic demand in terms of runway capacity shortfall or excess
- Incorporate the effect of uncertainty
- Study the impact of:
  - Fleet mix
  - Required aircraft separation
  - Runway layout and mode of operation
  - Location and use of runway entries and exits
  - Level of Service (accepted delay)
  - Preferential treatment of certain flights

Evaluate the performance of baggage reclaim facilities and their impact on the terminal’s Level of Service
**TMA/TRACON**

AirTOP's TMA/TRACON module supports all key airport approach and departure structures. The software realistically simulates all related aircraft movements in the airport airspace and simulates all required departure/approach controller tasks.

Linking all airport processes and events with air traffic control (ATC) on the surface and in the Terminal Area, such as advanced AMAN and DMAN and emulating air traffic flow and capacity management (ATFCM) and CDM events, AirTOP will help the busy airport to capture and understand capacity issues and underlying delay factors.

The integrated “what-if” capabilities will support quick decision making, from the strategic multi-million investment decision to day-to-day decisions supporting the achievement of performance targets for delay, noise or cost and at the same time give users with diverging business objectives a choice between different scenarios. Furthermore, AirTOP simulation results (for example, flight trajectories) can be easily exported to be then used in external tools tailored to noise modeling.

**En Route**

AirTOP's En Route module supports all key en route structures and controller tasks, as well as all static or dynamic restrictions related to them, providing realistic en route simulation.

The module allows the creation of easy-to-use, high-fidelity airspace and air traffic models which can be used in capacity studies, re-sectorization projects, reorganization of routes, implementation of free-route or Reduced Vertical Separation Minima (RVSM) airspaces.

The AirTOP En Route module is in use at air navigation service providers, civil aviation authorities and service companies across the globe. Metrics such as capacity, workload, delay, economic or environmental performance, are easily made available in the format you need to have meaningful discussions with stakeholders.
Flow Management

4D Trajectory Based Operations (TBOs) is a key component of both the US Next Generation Air Transportation System (NextGen) and Europe's Single European Sky ATM Research (SESAR). AirTOP supports the modeling of this concept, including:

- Planned 4D trajectory synchronization and negotiation
- Airspace planned entry load and occupancy monitoring
- Flow management and Demand Capacity Balancing (DCB)
- Time-based (TTA/CTA/RTA) or distance-based point-in-space metering

Recognized as a state-of-the-art ATFCM model, where huge data samples can be processed and analyzed very quickly, AirTOP is the ideal choice for research projects, for strategic system-wide analysis of flow and capacity, or to develop scenarios standard solutions and “playbooks”.

The presentation of performance indicators can be tailored to your needs and easily shared with stakeholders.
What-if-analyzer

The core concept of WIZer is that it provides live forecast of future situations and real-time what-if-analysis which supports decision making. WIZer mainly supports ACC supervisors and flow managers with its forecasts of the air traffic situation and sector loads, with the what-if-analysis testing alternative sector configurations, altitudes and/or routes.

The functional architecture of WIZer

WIZer takes in input data from multiple points such as flight progress messages, radar tracks and weather forecasts, which is then displayed in the graphical interface of AirTOP. It highlights periods during which the demand is forecast to exceed capacity and provides options to display the results that a reduction in demand, or increase of capacity, would have on the forecast. This allows the user to perform interactive what-if-analysis on the available options.

WIZer can model the full operational environment of any ACC or group of ACCs. It provides complexity and controller workload measurements for all types of sector (e.g. en-route sectors, TMAs, etc.), or for tower controllers, and provides ways to manage this complexity and workload. The workload and complexity model is specified using a GUI within the WIZer application which allows the WIZer administrator to modify, parameterize or customize the model.

The expandable and modular design of the WIZer application allows it to easily be customized to fit the specific needs of our clients. New modules can be added to the application without modifying the system architecture to support:

- Different data sources
- Different workload/complexity calculations
- New traffic counts
- New systems of sector and airspace organizations
AirTOP WIZer can acquire input data and transmit output data via multiple interfaces. The WIZer architecture enables additional Data Links to be easily integrated by AirTOP, such as a local flight data processing system, or custom flight CPR messages. WIZer supports the connection and data exchange with local HR/rostering plan management tools and the acquisition of military airspace activation plans from multiple sources and formats.

Input Data Processing
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Performance
- Number of pre-defined scenarios: limited only by disk space
- Changing a scenario: < 60s
- Number of pre-defined sector configurations: 2500+
- Simultaneously simulated flights: 5000+
- Computation of workload and complexity values: < 60s
- Number of controller working positions (20+)

AirTOP WIZer ACC software can run 24h a day, 7 days a week, with an availability above 99.9%. Some reliability and availability is provided by various auto-correction, auto-recovery and calibration functionalities integrated into the system.

Testing
WIZer contains a specific testing environment which allows for the system to be tested, validated, and calibrated for operational use. A collection of unit tests is included in the testing environment. Non-regression tests are based on the replay feature and on the profiling traces generated by the system when started in Test Mode and provide information about model validation, forecast quality, global performance of the software components on the background side as well as graphical performance of the WIZer Client. Additional procedures for manual testing are also part of the non-regression tests in order to test and stress the HMI of the WIZer Client.
Platform Compatibility

Platform Requirements
Java 8 (1.8) 64-bits

Languages Available
English

System Requirements
Full support for 64-bit operating systems
Windows® 8 or later
MacOS® X 10 or later
Linux kernel 2.6 or later (e.g. Ubuntu, Fedora, RHEL)
The development of AirTOP

Development of AirTOP began in 2006 under the Airtopsoft company name. AirTOP utilizes a flexible, multi-agent based modular architecture, including open-standards where possible, resulting in short development cycles and fast software update deliveries. Formalized, documented processes were implemented as early as 2008. Advancements have been carried out through prototyping and industrialization phases with a strong reliance on the operational requirements, experiences and feedback of existing and potential customers.

To this day, AirTOP users play an active role in determining the software's development roadmap. In June 2018, Airtopsoft was acquired by Transoft Solutions. Visit www.transoftsolutions.com to find out more.

Maintenance Assurance Program

Our technical support personnel are always well informed of new product functionality and issues can be quickly resolved. With our Maintenance Assurance Program (MAP), you receive premium assistance for all your technical needs. Subscribing to the MAP gives you freedom from costly upgrades, unexpected staff downtime, or any disruptions due to operating and CAD system conflicts without the concern of per incident charges.

The benefits of being on MAP includes; cost protection, priority support treatment and exclusive privileges.

Learn more >>
Contact the AirTOP team

AirTOP development head office:
Airtopsoft S.A.
c/o Hive 5
Rue de Francs, 79 - bte 1
1040 Brussels, Belgium
Phone: +32 2 787 08 23
Email: support@transoftsolutions.com

Transoft Solutions Aviation head office:
Transoft Solutions (Aviation) AB
Krokslätts Fabriker 30
431 37 Mölndal
Sweden
Phone: +46 (0)31 60 43 60
Email: infoaviation@transoftsolutions.com

AirTOP regional sales offices:
Europe, Middle East and Africa
Transoft Solutions B.V. Europe
Wijnhaven 60
3011 WS Rotterdam
The Netherlands
Phone: +31 10 258 78 78
Email: eusales@transoftsolutions.com

Asia Pacific
Transoft Solutions (Australia) Pty Ltd
Level 24, 300 Barangaroo Ave
Sydney
NSW 2000, Australia
Phone: +61 2 8067 8414
Email: salesAPAC@transoftsolutions.com

North and South America
Transoft Solutions Inc.
Suite 350 – 13700 International Place
Richmond, BC, Canada
V6V 2X8
Phone: 604.244.8387
Email: sales@transoftsolutions.com

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