



Digital ergonomics with RAMSIS

New standards in vision, operation and space requirements

YOUR BUSINESS FIRST

Ergonomics in digital aircraft

Aircraft are developed digitally. Design and construction are determined virtually at an early stage. This also applies to ergonomics. It is essential to integrate the human being into your development process right from the start. Quite simply digital – with RAMSIS.

RAMSIS Aircraft simulates the posture and motion of pilots, flight attendants, passengers and machine operators in realistic digital design. You can give the cockpit and the cabin the best possible layout and at the same time increase the efficiency of your development and construction. The posture models and functions of the Humanetics Digital Europe GmbH software are precisely adapted to real requirements in later flight operations. They have been further developed in cooperation with leading aircraft manufacturers – one of the reasons why RAMSIS is the world's first choice for the aircraft industry when it comes to ergonomics.

Your advantages:

- > Optimization of vision and reachability in cockpit and cabin
- > Shorter development times
- > Faster iteration and coordinated development
- > Simple testing of different design options
- > High level of product maturity as early as the concept phase
- > Reduction of development costs

VIRTUAL COCKPIT AND CABIN LAYOUT

Highly efficient development – on the digital model

RAMSIS is a 3D CAD manikin for ergonomic simulation in the strategy and concept phase. Without a physical mock-up, your employees, partners and customers are able to assess how visibility conditions and reachability areas will actually be in the real aircraft – right in CAD.

This is possible because RAMSIS combines scientifically sound data on the body dimensions and behavior of people – with market-leading functionality for the ergonomics analysis.

THE MANIKIN AND ITS POSITIONING

Model structure

RAMSIS Aircraft gives you a sophisticated ergonomic simulation environment – the software works with grid, shading and surface models, imaging the motions of human beings with physiological joint simulation. The starting point for positioning is the eye point position.

Realistic test collectives

With RAMSIS Aircraft, you can generate any target group and specify height, gender, population and age-specific characteristics. The elaborate model structure and the comprehensive ergonomic international databases are derived from documented and replicable sources, including research projects and size surveys from countries all over the world. RAMSIS also offers a detailed hand geometry based on this data.

Role-based posture calculation

RAMSIS Aircraft gives you simulations of the most probable posture and motion behavior of human beings on the plane – including the pilot, co-pilot, cabin crew, passengers, engineers and maintenance personnel. Thanks to state-of-the-art posture studies, the virtual test persons behave absolutely realistically whether sitting, standing or carrying out tasks. The RAMSIS advantage here is the automatic posture model with which you can easily control the virtual test subjects – tasks can be defined interactively and quickly transferred to entire test collectives by simply fixing and orienting body parts. Each role knows its typical posture and movement models for its respective tasks.

Animation and movement

To easily simulate sequences, RAMSIS postures can be recorded and extended to animated movement sequences with automatically calculated intermediate postures. Each recording can then be saved as an AVI video for presentation and documentation purposes. Besides automatic posture calculation, the manikins can also be moved interactively by varying individual joint angles or dragging entire joint chains along the user-defined movement using inverse kinematics.



Figs. 1-3: Cockpit and passenger area design: vision, reachability, seat & space requirements

ERGONOMIC ANALYSIS

Optimal reachability

To ensure optimum operation, you can use RAMSIS Aircraft to check whether all the switches and storage space in the cockpit and cabin can be reached easily. RAMSIS calculates reach envelopes and accessibility surfaces for definable body part chains. Postures are automatically and realistically calculated, as is body weight distribution. Tasks for the virtual test persons can be interactively defined by simply fixing and aligning body parts – this applies to e.g. the hand and arm to test the reachability of levers, and to fingers to test the operation of small elements.

Clear vision

Pilots must keep an eye on the sky, on the runways and on all the instruments – depending on their priority. This is why in RAMSIS Aircraft you can analyse vision during the early concept phase and evaluate existing vision fields ergonomically, e.g. for instruments and signals. Eye movements, the position of the eyes including head and neck movements as well as the visual distance or size and quality of the visual field are all addressed.

Room/space requirements

Pilots and cabin crew operate in extremely confined spaces – and you can determine just how this space should be measured with RAMSIS Aircraft, e.g. in the cockpit seating layout. To ensure that all pilots can see and reach the instruments optimally, the most important ergonomic issue in the layout of the cockpit seating layout is the size of the seat adjustment field. In RAMSIS Aircraft, this is determined via the eye point. The space required in the cabin can also be examined, e.g. the width of the passenger seats, the distance to the seat in front, the space required for the cabin trolley or in front of the emergency exits.

Operating force

The pedals for the tail unit (empennage) or elements during installation and maintenance can possibly be reached, but the amount of effort required may be excessive – and the same goes for installation and maintenance work – so RAMSIS Aircraft lets you check the maximum, posture-contingent operating force. Thanks to the analysis of body dimensions and weight distribution, a realistic posture can be simulated for

every task carried out. Tutorials for operational, installation and removal procedures can also be created

RAMSIS AIRCRAFT IN THE DEVELOPMENT PROCESS

Project support

RAMSIS Aircraft consists of three basic modules, Framework, Ergonomics and BodyBuilder. They allow the software to be flexibly supplemented with additional RAMSIS modules or internal content. RAMSIS also reflects the project-oriented perspective in modern development: project, test collective/filter, examination and role can all be adopted for new concepts and studies and easily adapted. External ergonomics documentation becomes almost superfluous.

Integration of field studies

RAMSIS can integrate the data of individual test persons and can be used for defining the test-sample population. The software can also be expanded for individual projects, enabling the incorporation of the results from specific ergonomics evaluation studies.

Availability and platforms

RAMSIS is available as a stand-alone for Windows and as a fully integrated version ergonomics tool in Catia V5, 3D-Experience and Siemens NX. RAMSIS or ergonomics data from RAMSIS can be directly integrated into other common systems in the design environment. The import and export of geometries is also possible via various formats like IGES, VDA & SAT – and additional modules can be used to import and export JT and Catia files.

Humanetics Digital Europe GmbH
 Europaallee 10
 D-67657 Kaiserslautern, Germany
 P +49 631 343593-00
 F +49 631 343593-10
www.humaneticsgroup.com