



Ergonomics in the digital aircraft

New standards in visibility, operation and space requirements

YOUR BUSINESS FIRST

Ergonomics in the digital aircraft

Aircraft are usually sold as digital models. So design and construction must be specified down to the smallest detail beforehand – and the same applies to the ergonomics. So it would be a good thing if you could include the human beings in your development process right from the start. RAMSIS – quite simply digital.

RAMSIS Aircraft simulates the posture and movements 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 design your development and construction efficiently at the same time. The posture models and functions of the Human Solutions software are precisely adapted to real requirements in later flight operations. And they are further developed in cooperation with leading aircraft manufacturers – one of the reasons why RAMSIS is the first choice of the aerospace industry all over the world.

Your advantages

- > Optimization of visibility and reachability in the 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 design phase
- > Reduction of development costs

VIRTUAL COCKPIT AND CABIN LAYOUT

Develop in the digital model

RAMSIS is a 3D CAD manikin for ergonomic simulation during the strategy and concept phase. Without any physical mock-ups, your employees, partners and customers can all assess how visibility conditions and accessibility areas will actually be in the real aircraft – right in CAD. This is made 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 POSITIONING

Model structure

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

Anthropometric database

With RAMSIS Aircraft you can generate any target group and specify height, gender and population and age-specific characteristics. The elaborate model structure and the comprehensive ergonomic international databases are derived from documented and replicable sources. These include notable research projects as well as serial measurement surveys from European, North American, South American and Asian countries

Automatic posture calculation

RAMSIS Aircraft gives you simulations of statistically 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 ultra-modern posture studies, the virtual test persons behave absolutely realistically whether sitting, standing or carrying out tasks. The advantage with RAMSIS is the automatic posture model with which you can easily control the virtual test subjects – by means of the simple fixation and orientation of body parts, tasks can be interactively defined and quickly transmitted to entire test collectives.

Animation and motion

RAMSIS motions can be recorded for the simple simulation of processes – here you can analyze the spatial coordinates and the joint angles. Some typical examples are the translation/rotation of the manikin, joint movement and the self-running animation of freely definable body part chains. Each animation is carried out either interactively or numerically. Body part chains can also be interactively moved. To achieve this, RAMSIS gives you a standard animation and advanced animation functions. The motion sequences can be exported to AVI.



Figs. 1-3: Cockpit and passenger area layout: visibility, reachability, seating and space requirements

ERGONOMIC ANALYSES

Reachability

To ensure optimal operation, RAMSIS Aircraft lets you check if all the switches and overhead compartments are within easy reach in the cockpit and cabin. RAMSIS calculates reach envelopes and accessibility surfaces for definable body part chains. Postures are calculated automatically and absolutely realistically, as is body weight distribution. Tasks for the virtual test persons can be interactively defined by simply fixing and aligning body parts. Accessibility areas can be calculated for user-defined parts of the body and body part chains – to test the reachability of levers for the hand and arm, for example, or the operation of smaller elements with the fingers.

Visibility

Pilots must have the sky and the take-off and landing runways in their field of vision – but they must also keep an eye on all their instruments, according to priority. That's why RAMSIS Aircraft lets you analyze the visual instruments and signals and ergonomically evaluate the existing fields of vision, for instance – even during the early design phase. Eye movements, the position of the eyes including head and neck movements and the visual distance or the size and quality of the field of view are all addressed.

Space requirements

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

Operating force

The pedals for the tail unit (empennage) or for elements during installation and maintenance *can* be reached – but the amount of effort required may be excessive. And the same goes for installation and maintenance – that's why 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 – based on the exact scheduling with the RAMSIS simulation.

RAMSIS AIRCRAFT IN THE DEVELOPMENT PROCESS

Availability and platforms

RAMSIS is available as a stand-alone version for Windows and as a fully integrated ergonomic tool in Catia V5. RAMSIS (or RAMSIS ergonomic data) can be directly integrated into other established systems within the design environment. The import and export of geometries is also possible via various formats, such as IGES, VDA and SAT. We also offer CATIA V5 and JT interface as an optional add-on.

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