RAMSIS Industrial Vehicles

HUMANETICS

Digital ergonomics

Working easily with heavy vehicles

YOUR BUSINESS FIRST

Ergonomics as a competitive advantage

If a vehicle is a workplace, it pays to make high demands on its ergonomic design – because after a long day in the cab, it's not just about comfort and health, safety is also a primary issue.

RAMSIS enables the design of heavy construction machinery in such a way that the vehicles can be 100% controlled, so the level of safety remains constant, even with different operators – because the machine itself reduces the risk of accidents, expensive damage and production delays. This is not only a plus for you but also for your customers.

You also create important advantages in your product development, because you save time and money thanks to ergonomic analysis on the computer model – and you ensure high process quality at the same time. RAMSIS tests are weather-independent and their results can be repeated at any time. This means that you can compare the ergonomic aspects of different design options – and that contributes to innovation in your product portfolio.

Your advantages:

- optimal vision and reachability in the cabin
- high level of product maturity as early as the design phase
- reduction of development costs and timeframes
- more safety for drivers and the environment
- improved operability of vehicle controls
- easier execution of maintenance & repair work
- more productivity on the job

ERGONOMICS FOR CONSTRUCTION AND HEAVY MACHINERY

Develop faster and better

RAMSIS is a three-dimensional manikin for ergonomic design in agricultural vehicles and construction & heavy machinery. Even as early as the strategy and concept stage, RAMSIS will give you all the solutions to issues that could affect product quality in terms of the comfort and safety of the driver or the operability of the vehicle. International standards are addressed. The results of your ergonomic studies can be easily reproduced and transferred to other vehicle models. All employees can access these results and analyze the data for their own work environments, enabling them to cooperate effectively.

Thanks to RAMSIS' virtual ergonomics control, you prevent costly, subsequent developments after the design phase has been completed. Planning errors are prevented and the level of market readiness is consequently well above average, even before the first production series is ready to roll.

The use of RAMSIS also enhances ergonomics expertise in the product development process. The results of your studies can be determined quickly, reliably and objectively. Detailed knowledge of ergonomics is not necessary.

THE MANIKIN AND ITS POSITIONING

Model structure

RAMSIS 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 H point or the SIP (Seat Index Point).

Anthropometric database

With RAMSIS Industrial Vehicles 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. These include notable research projects and serial measurement surveys in European, North American, South American and Asian countries. This is why RAMSIS also offers a detailed hand geometry.

Automatic posture calculation

RAMSIS Industrial Vehicles automatically calculates the most probable posture and movement behavior of the driver, passenger and mechanic for individual tasks. This behavior can be interactively defined and quickly transferred to more manikins by means of the simple fixation and orientation of body parts. Even the postures of entire test collectives can be calculated on this basis. The latest ergonomic studies form the foundation for the realistic behavior of virtual test persons in sitting or standing postures.

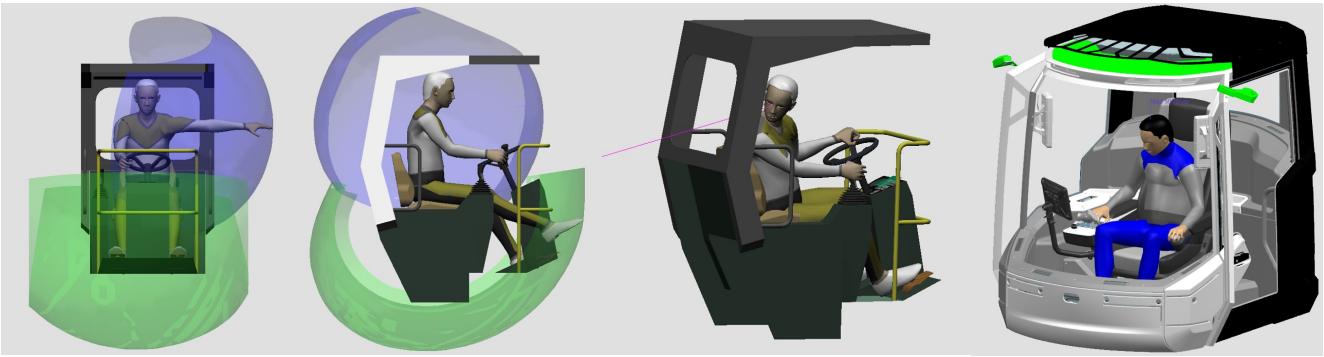

Fig. 1 Reachability

Fig. 2: Vision

Fig. 3: Task analysis

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.

ERGONOMIC ANALYSES

Comfort and the need for space

The more effort it takes to drive a vehicle, the faster the driver will tire. RAMSIS gives you absolutely optimal product design – even for international markets – enabling you to clarify important points right from the outset. For instance: How comfortable or uncomfortable are the various seating positions? Can customers from China, U.S. and Europe also get into the cab? Do very tall or obese individuals have enough freedom of movement?

Direct view and mirror view

In the case of heavy vehicles, the visual field is tremendously important in determining the degree of safety involved when handling the machine. Even during the early concept phase, RAMSIS enables you to analyze the visual field both directly and via mirrors (planar/spherical), perform analyses in and outside the vehicle and ergonomically evaluate the existing visual fields for range & quality. Visual standards can also be checked directly on the digital model using additional modules. Eye movements are included in the automatic posture calculation and the eye position (including head and neck movements) is calculated automatically. This answers even the very specific questions, such as: Can the driver detect smaller persons or low objects near the vehicle? How good is the view of the instruments? Supplementary module: RAMSIS Cognitive objectively evaluates the perceptibility of information.

Reachability

Are all the controls and pedals positioned correctly? Can a mechanic access the parts which require repair and maintenance? RAMSIS already provides answers to these questions on the digital model – for freely definable body parts, reachability areas and envelopes can be calculated for body part chains. This applies to the leg & foot for testing the reachability of pedals, for example, or to the operation of steering wheel elements with the fingers.

Posture-contingent maximum force

Industrial vehicles and intensive maintenance go hand-in-hand. It might be possible to reach levers or screws, but it might not be possible to open or close them, because the corresponding effort is too intensive in a certain posture. To check this, you can use the RAMSIS Maximum Force Analysis to determine the posture-related maximum operating force.

RAMSIS IN THE DEVELOPMENT PROCESS

Project support and documentation

RAMSIS results can be reproduced at any time. Concepts can be directly adopted for new projects. External documentation becomes more or less superfluous.

Availability and platforms

RAMSIS is available as a stand-alone version for Windows and as a fully integrated ergonomics tool in Catia V5, 3DExperience and Siemens NX. 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 like IGES, VDA & SAT – and additional modules can also be used to import and export JT and Catia files.

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