

# Case Study: How Ergonomics Modern Engineering Designs to Transform cabin and cockpit designs (2025)

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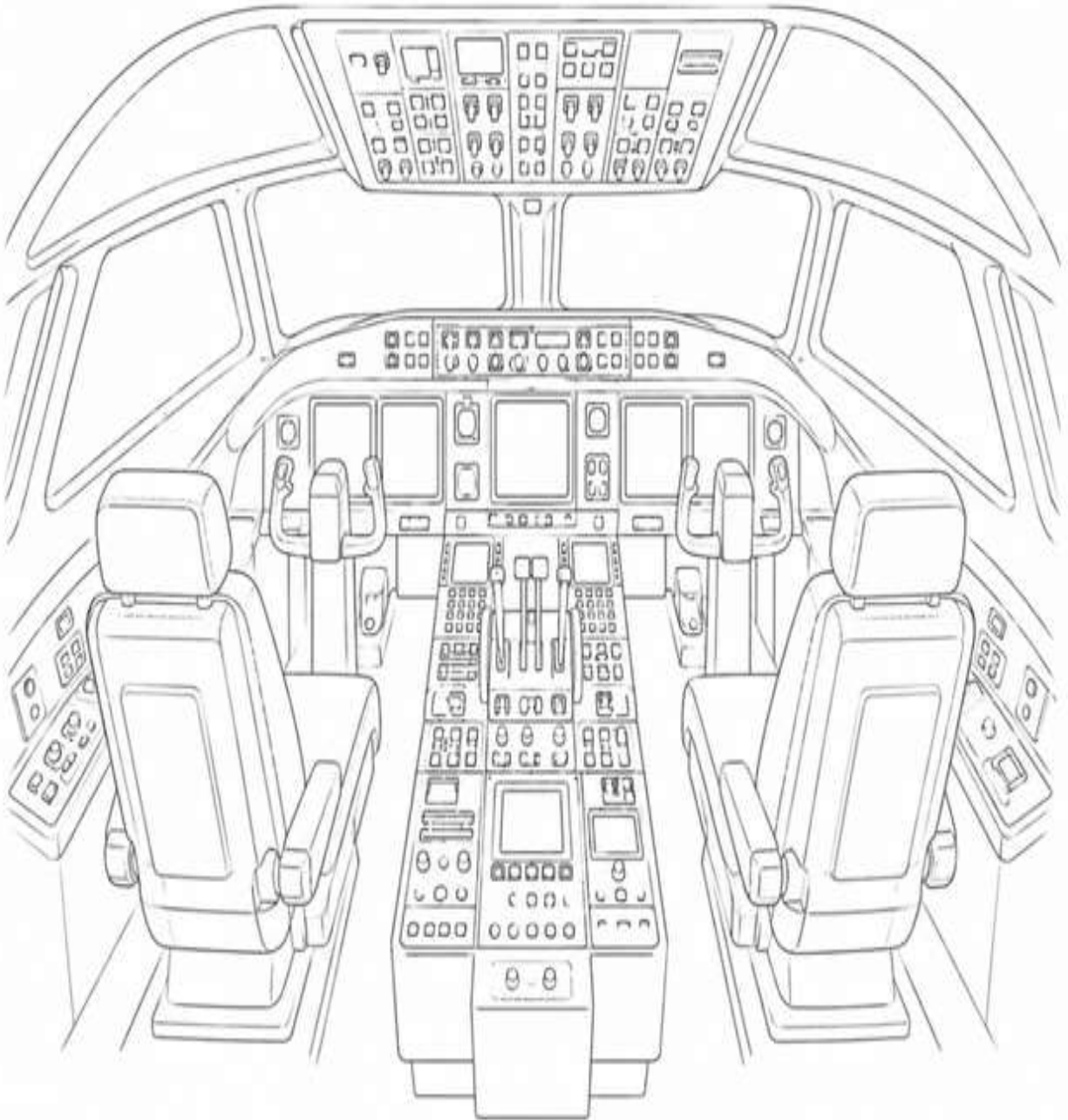


Figure 1: Automotive Ergonomics design

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#### I. INTRODUCTION

Imagine sitting in a car and finding it uncomfortable to reach the pedals or having to stretch to see the road.

#### **It seems uncomfortable and sometimes unsafe.**

Now imagine a similar problem occurring in a ship, a fighter jet, or industries such as automotive and shipbuilding, where differences in body types and habits are significant. Using an average or the same model doesn't work because of the different body types and habits.

Ignoring these designs hampers comfort, performance, and visibility. That's why ergonomics is so important in today's scenario.

#### **The Real Challenge Behind Human-Centric Design**

The core challenges across the industries remain the same. A single solution doesn't work, as every person has different requirements.

And traditional design often misses the diversity and prevails over the common problems, such as

- Uncomfortable seating does not accommodate all body types.
- Reaching the controls comfortably is challenging if they are positioned beyond arm's reach.
- There is no unclear or restricted visibility or even fatigue during extended use.
- These are not the small issues, but they directly impact efficiency, safety, and comfort.

#### **Automotive: Design For Every Driver**

With the advancements, the automotive industry is evolving very quickly and adapting to electrification and autonomous systems, as well as new cabinet designs.

But one challenge doesn't change: to create a vehicle design that fits everyone.

People across the world have different requirements, which may come from body size, posture, height, and even driving habits.

That's why a single one-sided design is not applicable at all.

The solution? RAMSIS enables engineers to test different human models and addresses the issues in the early stage of the designing process.

So instead of guessing, the team has real insights, and they can make better design decisions before even a physical model is built.

#### **What RAMSIS Enables in Automotive**

The early validation helps in minimizing the costly redesign and improvising the exceptional user experience.

#### **Here's how RAMSIS supports automotive design:**

- It brings the stimulation of diverse global body types.
- Improve dashboard layout as well as control placement.
- Control the reach and analysis visibility
- The sitting comfort can be checked on at a very early stage.

#### **Defense: Where Ergonomics Becomes Critical**

In defense applications, ergonomics is not just only about comfort but also significantly impacts performance. Fighter jets, control stations, and armored vehicles can be highly complex and space-limited, so even a small design floor can bring major consequences.

Operators who work under high-pressure scenarios often have to wear heavy protective gear, and in such conditions poor design can slow down the reaction time and increase fatigue with reduced focus.

RAMSIS helps engineers to get accurate simulations of the real conditions with accuracy.

- The model provides users with different body types along with their gears.
- It makes sure that the visibility of critical display intact.
- Optimize position controls when it comes to better efficiency.
- Evaluate accessibility and working posture.

#### **Shipbuilding: Designing for Life at Sea**

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Unlike cars or aircraft, ships are unique because they are both work spaces and living spaces used for long stays. Crew members often spend weeks or even months in these tight spaces.

Because of this, ergonomics becomes directly associated with endurance and safety.

Bridge design is something that is one of the most critical areas. The operators require constant visibility and quick access to control at all times. Even small design flaws or inefficiencies can bring about fatigue and, in some cases, lower reactions.

RAMSIS helps shipbuilders by providing detailed stimulation of these environments. The designer scans the environment to evaluate how people of different sizes interact with the space, how they move in confined areas, and how they maintain comfort during long durations.

The goal is not just about comfort but about consistent performance over the entire journey.

### Comparing Traditional vs Digital Ergonomics

Below is the significant comparison of the traditional and digital ergonomics

| Category             | Traditional Approach     | Digital Ergonomics with RAMSIS |
|----------------------|--------------------------|--------------------------------|
| Human Representation | Average-based            | Diverse global population      |
| Testing Stage        | Late-stage               | Early-stage validation         |
| Prototyping          | Multiple physical builds | Less Physical dependency       |
| Flexibility          | Limited                  | Highly adaptable simulations   |
| Cost & Time          | Higher                   | Well-optimized                 |

### Why Digital Ergonomics is Gaining Importance

Traditional design testing heavily depends upon the physical prototypes, but they have certain limitations. Physical prototypes cannot fully represent the range of human diversity and behavior; additionally, they are expensive and time-consuming.

On the other hand, digital ergonomics brings a solution to this problem by enabling the feature of virtual testing. Engineers can stimulate multiple scenarios virtually, detect risk at the early phase, and improvise designs without needing to go through repeated prototypes. This helps minimize the cost as well as speed of the development.

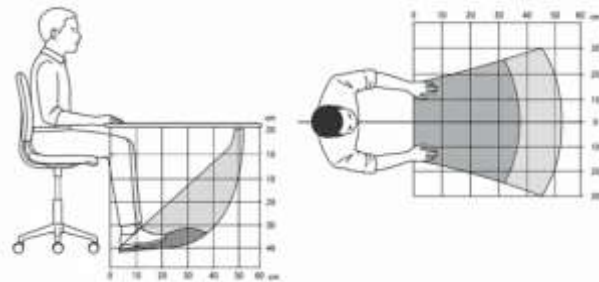


Figure 2: Why digital Ergonomics is gaining importance

RAMSIS is notable for its comprehensive global data on human body measurements and behavioral patterns. It not only represents the appearance but also defines how humans actually sit, move, and interact with the real environment.

### Designing for Every Body

Across different industries, the idea is shifting towards the human-first design. Rather than adapting later, the designs now focus on the real needs of the users.

- Automotive design has moved beyond the standard assumptions of the user.
- Defense systems or equipment should fit the diverse operator profiles.
- Shipbuilders now have to focus on designs that are long-term human use.

RAMSIS makes this possible by bringing the realistic human data into the early design stages.

The result of incorporating the human-first design

- Improved safety
- Better performance outcomes
- More inclusive environments

### Conclusion: The Future of Ergonomic Design

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Technology keeps on evolving, and the way humans interact with technology is also transforming. From self-driving vehicles to advanced defense platforms to automated and modernized ships, the environments are rapidly evolving.

#### The bottom line is:

- With the boost in automation, the human elements or roles become the critical factor.
- Now people spend more time monitoring systems and making designs as well as

interacting with digital interfaces instead of performing manual tasks.

- The key challenge remains unchanged that reflects the system remains safe, accessible, and similar for the wide range of users.

In the future, the measure of success will not be defined by the advanced features but by how technology naturally fits into the human needs and behavior.

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