# AI-Powered Collaboration

## Revolutionizing Digital Thread and Digital Twin

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Turkish Aerospace

PLM Road Map™ EMEA & PDT Europe 2023

*The Digital Thread in a Heterogeneous, Extended Enterprise Reality*

*A call for PLM Professionals to share their knowledge & experience*

15 & 16 November

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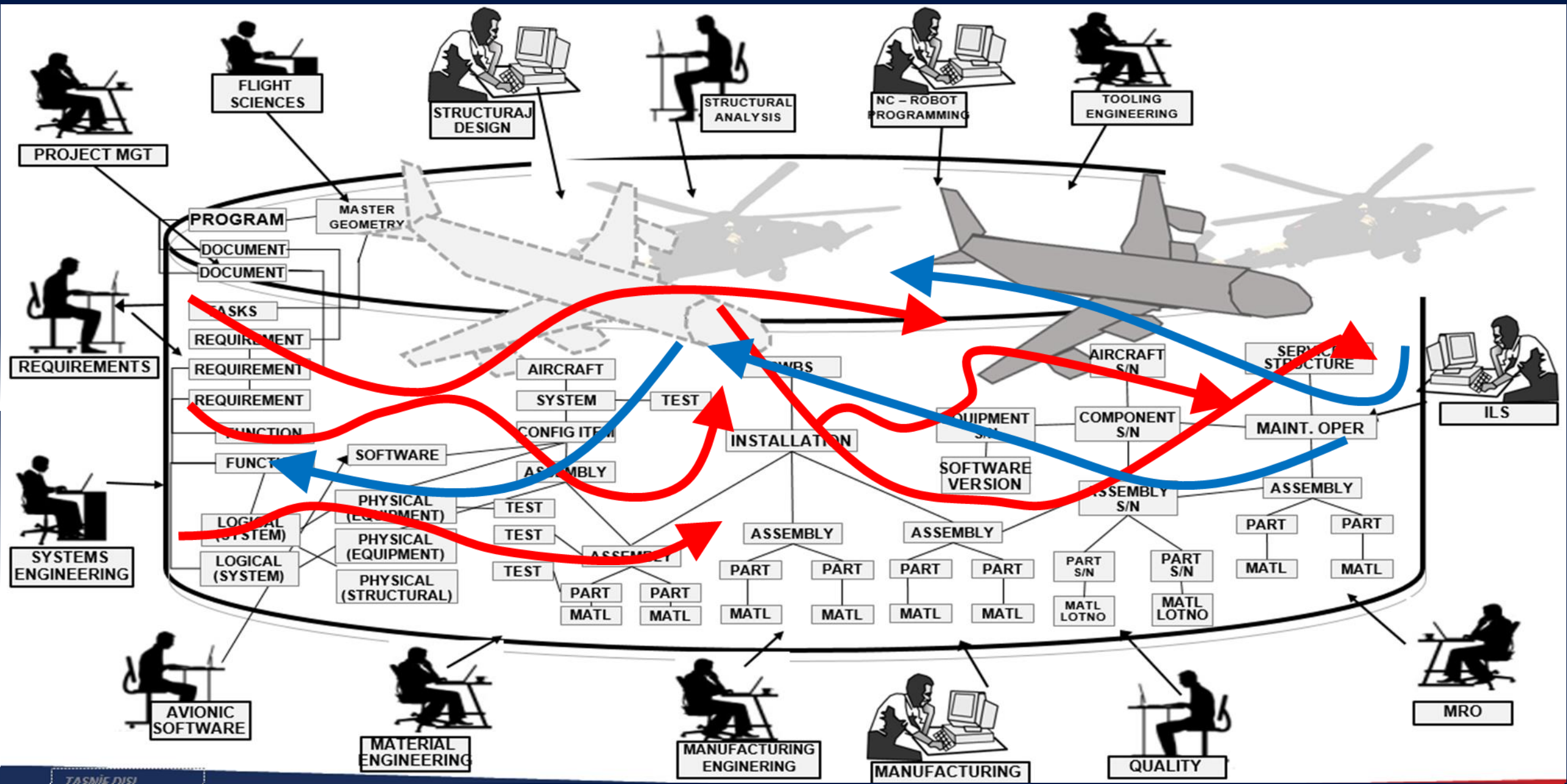
# Introduction

- In today’s rapidly evolving digital landscape, Artificial Intelligence (AI) has emerged as a transformative force.
- AI-Powered collaboration is revolutionizing the way industries operate, particularly in the context of the Digital Thread and Digital Twin.
- Using AI technology, organizations are becoming more efficient, making better decisions, and gaining new insights into their processes like never before.

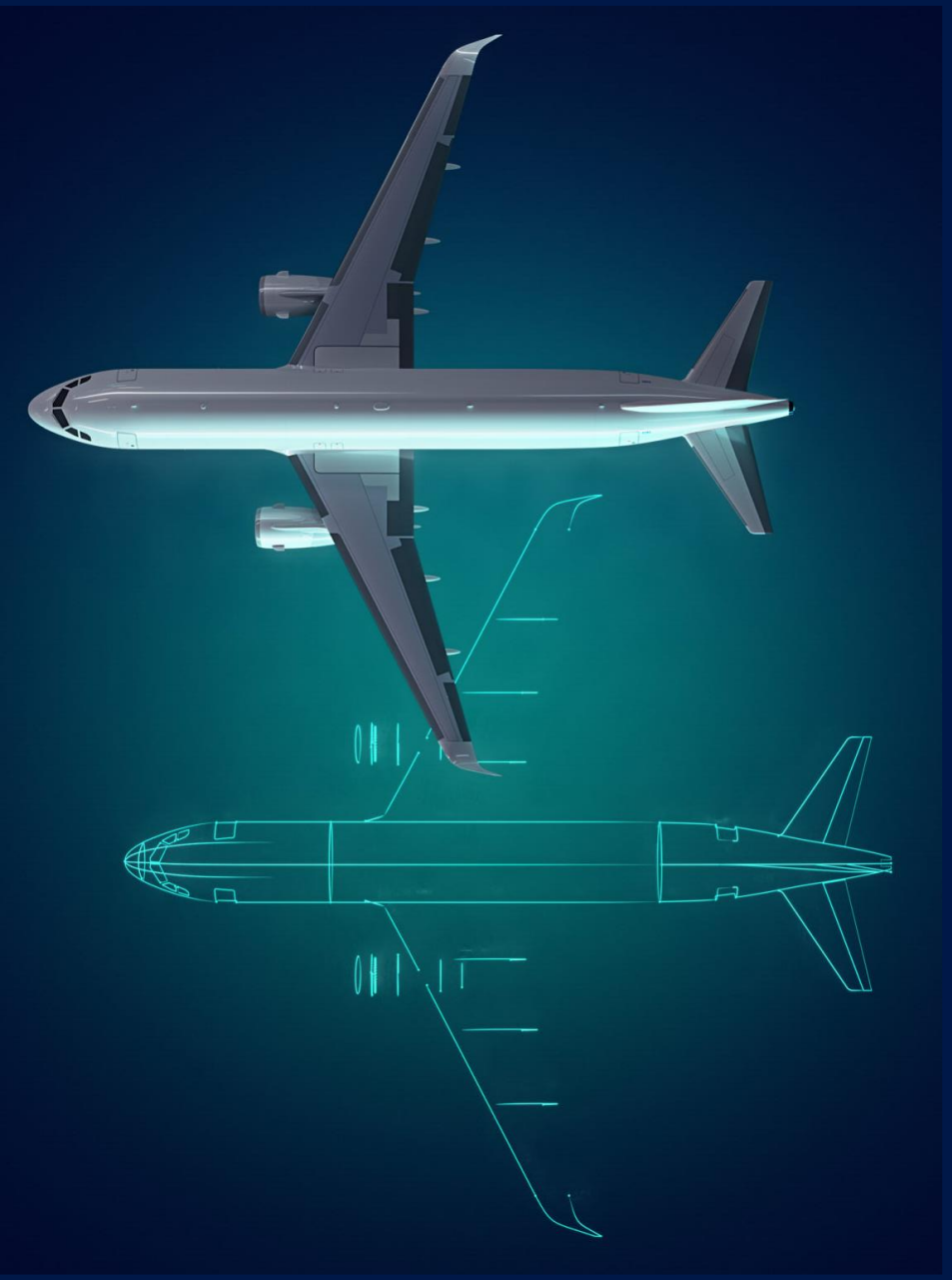
# Understanding the Digital Thread


- The digital thread refers to the seamless flow of data throughout the entire product lifecycle.
- It connects disparate systems and enables a holistic view of product information.
- The digital thread ensures that all stakeholders have access to accurate, up-to-date, and contextually relevant information, enabling better decision-making, collaboration, and traceability.
- However, managing the digital thread can be complex and challenging

# Digital Thread in Aerospace Product Development

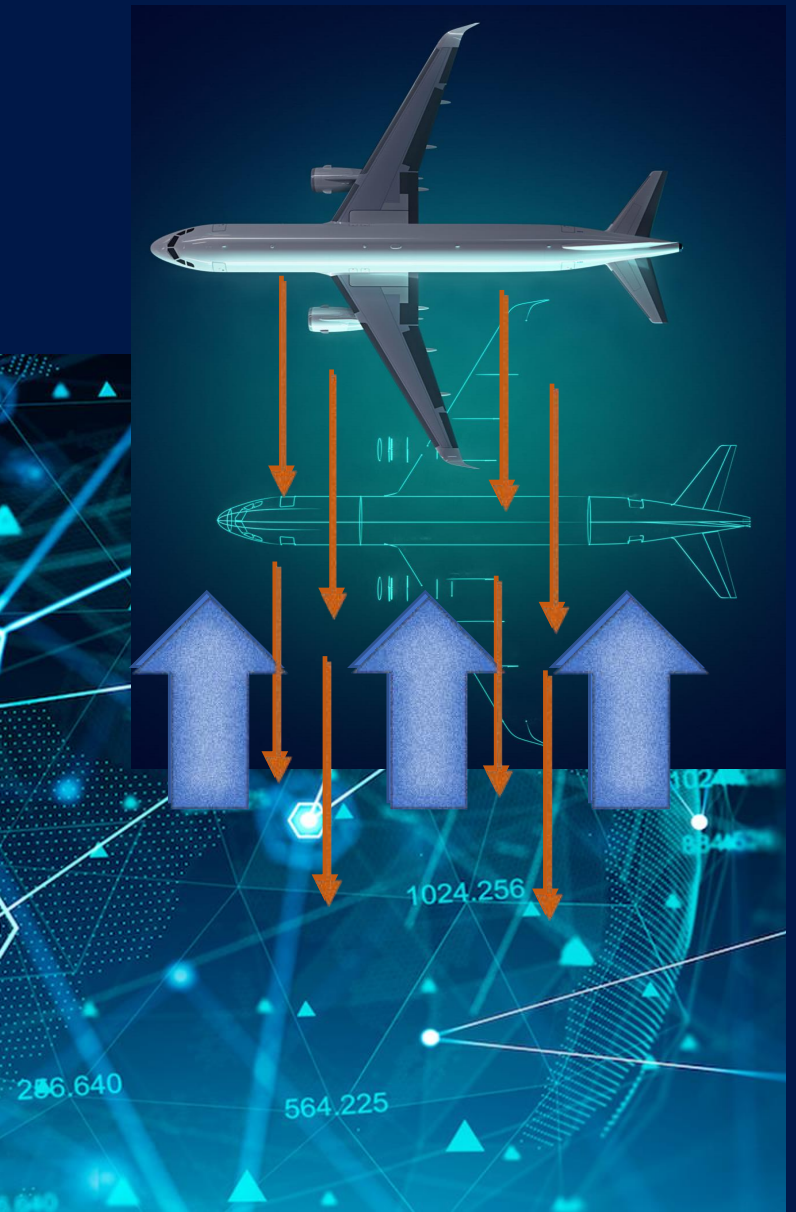


# Introduction to Digital Twins



- The Digital Twin represents a virtual replica of a physical product or system.
- It combines real-time data from sensors, Internet of Things (IoT) devices, and other sources to create a digital representation that mirrors the physical counterpart.
- The Digital Twin allows organizations to monitor, simulate, and analyze the performance, behavior, and condition of the product or system in real time.
- It enables predictive maintenance, optimization, and continuous improvement of performance.

# The Symbiotic Relationship: Digital Thread and Digital Twin




- The Digital Thread provides essential data for creating and maintaining an accurate Digital Twin.
- Digital Twin generates insights and data during the operational phase influencing decisions and improvements in the Digital Thread.
- The Digital Thread and Digital Twin work together to create a seamless flow of data and insights, driving improvements and efficiency throughout the product lifecycle.

# Collaboration in Aerospace Product Lifecycle


- Collaboration in the aerospace industry refers to the coordinated efforts and interactions among various stakeholders involved in the design, manufacturing, operation, and maintenance of aerospace products such as aircraft and spacecraft.
- It is essential for ensuring safety, efficiency, and success of aerospace projects. It enables stakeholders to work together to overcome challenges, meet regulatory requirements, innovate, and deliver high-quality products to the market.
- The symbiotic relationship between Digital Thread and Digital Twin revolutionizes collaboration in the aerospace product lifecycle, shifting from traditional, fragmented approaches to enhanced, data-driven collaboration for improved outcomes

# Traditional Collaboration

- Traditional collaboration methods typically involve face-to-face meetings, email exchanges, phone calls, and physical document sharing.
- While these methods have served us well, they come with inherent limitations. Communication can be time-consuming,  sometimes misunderstandings leads problems.
- Additionally, important understandings could be hidden in messy data, which makes getting useful information out of it hard.

# Artifical Intelligence (AI) Enhances Collaboration Through

- Efficient decision support.
- Automating routine tasks.
- Natural language processing (NLP).
- Computerized visioning.
- Collaborative filtering.
- Predictive analytics.
- Enhanced Creativity.
- Real-time collaboration Insights.
- Continuous Improvement.

Machine learning algorithms can analyze vast datasets

- in real-time,

- providing valuable insights

- that aid decision-making.

These insights enable teams to make informed choices quickly, whether it's in product design, project planning, or resource allocation.

*The data required by AI is provided by Digital Thread and Digital Twin…*

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AI-powered automation can handle
- routine and repetitive tasks,
- freeing up human resources
- to focus on more creative and strategic aspects of their work.

This not only improves efficiency but also reduces the risk of human error.

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NLP technology enables machines to understand and process human language.

This capability streamlines communication and information retrieval, making it easier for team members to find the information they need and communicate effectively, even across language barriers.

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In industries like aerospace, computer vision can play a pivotal role.

It allows for the analysis of visual data, such as images and videos,

to identify defects, monitor equipment,

and even enhance safety through object recognition and tracking.

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AI can help identify and recommend relevant documents, resources, or experts within an organization.

This fosters better knowledge sharing and collaboration,

as team members can easily tap into the collective wisdom of their colleagues.

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AI's ability to predict future trends or issues based on historical data can be invaluable.

It allows teams to anticipate challenges and proactively address them, preventing potential roadblocks.

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AI can also stimulate creativity through generative models.

It can assist in

- brainstorming sessions,
- creative content generation,
- and even design optimization,

offering fresh perspectives and ideas.

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AI can provide real-time feedback on collaboration dynamics within a team.

It can identify bottlenecks, communication gaps,

or potential conflicts,

allowing for swift interventions and improved team dynamics..

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AI-enabled collaboration systems can learn from historical data and user interactions, adapting and improving over time.

This fosters a culture of continuous improvement in how teams work together.

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# Artifical Intelligence (AI) Enhances Collaboration Through

In conclusion, AI-enhanced collaboration represents a significant leap forward in how we collaborate and work together effectively.

By harnessing the power of AI technologies, we can streamline processes, make smarter decisions, and unlock new possibilities for innovation and efficiency

*The data required by AI is provided by Digital Thread and Digital Twin…*

# Industry Applications of AI for Aerospace

## Simulation and Prototyping for Design Optimization:

- Aerospace designs can be tested and optimized through employing AI-Driven simulations before physical prototyping.
- AI-enhanced digital thread can accelerate the design iteration process, leading to more innovative and efficient aircraft design.


## Optimizing Production Workflows:

- Aerospace companies can optimize the scheduling and allocation of resources in aircraft manufacturing through employing AI algorithms.
- The Digital Thread integrated data from suppliers, production lines, and logistics. AI algorithms are used for predictive analytics to optimize production schedules, reduce bottlenecs, and streamline operations.
- AI-Driven Digital Thread can lead to more efficient production workflows, reduced lead times, and improved resource utilization.

# Industry Applications for Aerospace

**Digital Twin Driven Quality Assurance:**

- Aerospace Manufacturers can implement a digital twin to monitor and analyze the production process of aircraft components.
- AI Algorithms continuously compare real-time sensor data from the assembly line to the virtual representation in the digital twin. Deviations and anomalies can be detected early, leading to improved quality control and reduced rework.



**Predictive Maintenance for Aircraft Components:**

- Aerospace manufacturers can implement AI-Powered predictive maintenance for aircraft engines and other equipment. Real-time data from sensors embedded in the engines and other equipment, can be fed into a Digital Twin, where AI algorithms can predict maintenance needs based on wear and tear.
- AI-enabled Digital Twin can enhance aircraft availability and reduce maintenance costs by proactively identifying issues before they lead to operational disruptions.

# Turkish Aerospace Overview

- Turkish Aerospace Corporation was established in 1973.

- Turkish Aerospace has become Turkey's center of technology in design, development, modernization, manufacturing, integration and life cycle support of integrated aerospace systems, from fixed and rotary wing air platforms to UAVs and satellites.

AIRCRAFT

HELICOPTER

UAS

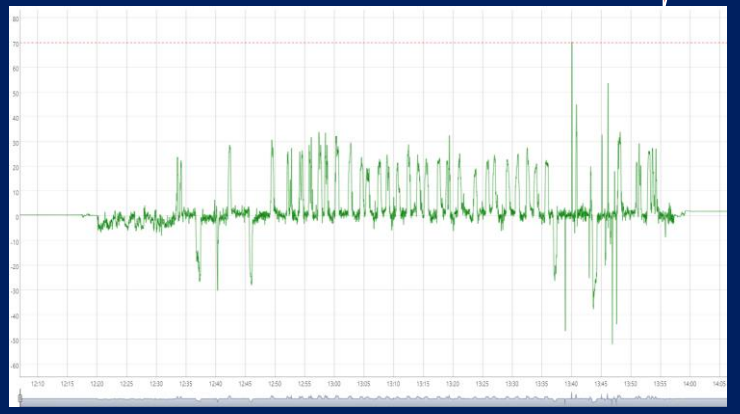
SPACE SYSTEMS

AEROSTRUCTURES

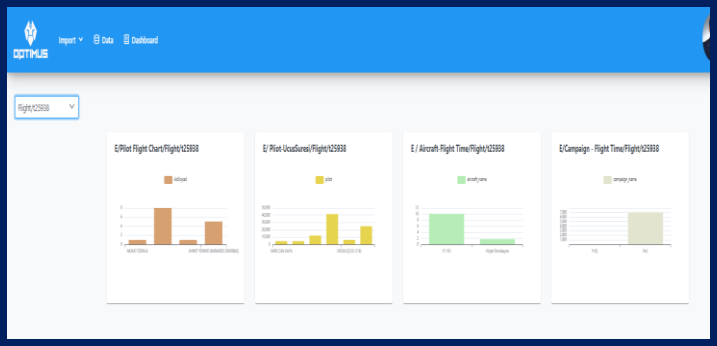
(for more information, visit https://www.tai.com.tr).

# Turkish Aerospace Utilizes AI for Flight Tests

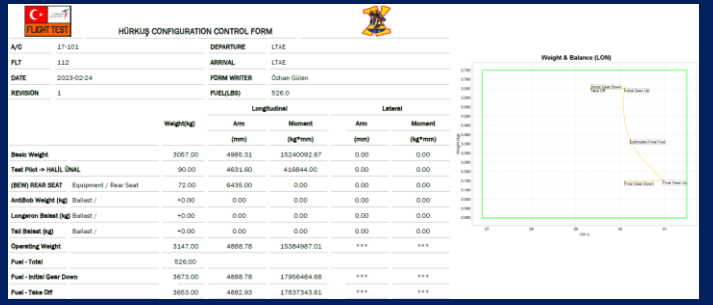
- Sensor data from flight tests are stored and fatigue damage calculations are made through an AI application Optimus which is developed at Turkish Aerospace.



- In addition, an AI application is being developed to manage processes such as pilot, flight, weight/balance information and aircraft configuration.



- Development of an AI application for test campaign planning, and test point management still continues.



# Conclusion

- AI-powered collaboration transforms teamwork and streamlining processes.
- Embracing these technologies empowers organizations to navigate complexity with agility and efficiency.
- AI-powered collaboration is a transformative force shaping the future of teamwork,

….not just a trend.

# Thank You For Your Attention

# Questions ?