



Ansys



/ STAYING AHEAD OF THE THREAT
Why Digital Mission Engineering is **THE** Critical Capability

/ EXECUTIVE SUMMARY

In a world in which traditional competitive technical advantages are rapidly eroding, a simulation-based digital mission engineering strategy is the only way to stay ahead of the threat.

To succeed in the new era, industry and military leaders are challenged to:

- Increase asset operational availability to meet increasing mission-capable rate targets
- Accelerate modernization to deliver more advanced capability faster
- Be more cost informed across the entire asset lifecycle
- Address a growing personnel skills gap

Over **90% of aerospace and defense executives intend to digitally transform their business** and industry to meet these challenges, yet **only 10% have made impactful progress**.

Closing that gap is the surest way to extend the technical advantage of our defense industry over those of our adversaries. And the faster it can be closed, the greater the advantage becomes.

Digital mission engineering is a powerful component of digital transformation that accelerates design, development, and testing by simulating the operational environment.

This ebook identifies the 5 CAPABILITIES that are critical to the successful deployment of digital mission engineering in the military industrial ecosystem and includes real-world case studies.

6x Overall Program Acceleration

30% Maintenance Cycle Time Improvements

30% Acquisition Labor Efficiency Improvements

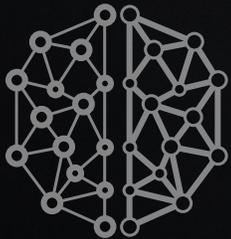
/ THE STRATEGIC IMPERATIVE

It is a national security imperative that the defense industry rapidly transforms to stay ahead of the threat. Three powerful trends are shaping the future of the aerospace and defense industry.



Rising Geopolitical Tensions

As the race for supremacy expands into the domains of space and cyber, global defense spending exceeds \$2 trillion; and it's growing at the fastest rate in over a decade.¹



Accelerating pace of disruptive technology

75% of aerospace and defense executives believe the stakes for innovation have never been higher.² This is an era of exponential growth in technical complexity with disruptive technology like AI, ML and hypersonics



Workforce Upheaval

More than 50% of aerospace and defense companies do not believe their talent management strategies will enable them to outperform the competition over the next five years³

In response to these trends, organizations are implementing digital strategies and initiatives to affect a digital transformation that spans the entire acquisition life cycle.

¹ <https://www.sipri.org/media/press-release/2020/global-military-expenditure-sees-largest-annual-increase-decade-says-sipri-reaching-1917-billion>

² <https://www.accenture.com/gb-en/insights/aerospace-defense/tech-vision>

³ <https://www.mckinsey.com/industries/aerospace-and-defense/our-insights/call-to-action-how-a-and-d-companies-can-build-the-workforce-of-the-future>

/ THE TRANSFORMATION MISSION

Digital transformation is a priority across the entire aerospace and defense industry, and digital mission engineering is an essential facet of such a transformation. Consider this:

90%+

Of aerospace and defense executives intend to digitally transform their business and industry to stay ahead of the mission and competitive threat*

For those that can successfully transform, the impact is clear:

Business Impact

15%

Revenue Increase¹

10%

Cost Reduction²

Innovation Impact

20%

Acquisition Cycle Time Reduction³

30%

Labor Efficiency Improvement³

Sustainment Impact

30%

Maintenance Cycle Time Improvements⁴

79%

Greater Confidence in Service Performance⁵

Mission Impact

6x

Overall Program Acceleration



¹Accenture: Seizing the Digital Opportunity in Aerospace & Defense 2018

²McKinsey & Company: Five Keys to Digitizing Aerospace and Defense Companies 2017

³Mediafly and Ansys simulation ROI study

⁴<https://aviationweek.com/mro>

⁵Aberdeen Group: Simulation: The Secret Weapon to Cut Costs, Accelerate Innovation and Boost Quality

/ SIGNIFICANT OBSTACLES REMAIN

Despite the benefits, transformation is lagging. It **MUST** accelerate.

10%

According to a research study by Accenture, just **ten percent** of aerospace and defense firms had fully integrated digital threads, capable of supporting the strategy and work of multiple teams.

To accelerate, critical challenges must be overcome:

- Disconnected digital tools that do not easily integrate across the acquisition life cycle or scale from the component to the system of systems to the mission.
- Legacy digital tools that lack the accuracy and flexibility to address the complexity of multi-domain, next-generation defense technologies and their operational environments.
- The intensely accelerating pace of the industry today, which makes it difficult for engineering teams to pause and learn, validate, and adopt improved practices.
- A generational shift in workforces that demands new approaches to recruiting, retaining, upskilling, and inspiring talented personnel.



* Accenture: The Digital Thread Imperative 2017

/ THE MISSION CRITICAL CAPABILITIES



Digital Mission Engineering, built on five critical capabilities, is the difference between those that are trying and those that are succeeding

1

Software that can be deployed across the acquisition process

Integrated simulation tools, deployed throughout the acquisition process, empower you to establish a digital thread that extends from concept development through sustainment.

2

Software that integrates from the component to the mission

Simulation tools that you can integrate and interoperate across the modeling and simulation hierarchy enable you to connect everything about a system from the microchip to the mission.

3

Accurate, validated and proven simulations

Precision is everything, but the complex behavior and extensive interconnectedness of modern systems mean that simulations must have exceptional breadth, as well as depth, of accuracy.

4

Open and collaborative simulation environment

It's not enough to have the best precision in one domain or the greatest speed at one fidelity. You need simulation environments that link tools together to leverage the best each has to offer into the most potent solutions for your needs.

5

Workforce development and enablement

One thing that hasn't changed: your personnel remain your greatest asset. You need access to expert support and resources that can upskill your workforce for the tools and practices of digital mission engineering.

MAKING DIGITAL MISSION ENGINEERING POSSIBLE

7 Software that can be deployed across the acquisition process

Ansys pervasive simulation capabilities enable simulation to be deployed across the entire acquisition process with tools specifically designed for each phase

Common Military Acquisition Process:

PRE-SYSTEMS ACQUISITION		SYSTEMS ACQUISITION		SUSTAINMENT
Material Solution Analysis	Technology Maturation & Risk Reduction	Engineering & Manufacturing Development	Production & Deployment	Operations & Support
Analysis of Alternatives	Design Prototyping	Detailed "Build-To" Design	Low-to Full-Rate Production	Life Cycle Support

Ansys Capabilities:

IDEATION

With Ansys 3D Design, you can explore ideas, iterate and innovate with unprecedented speed.

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DESIGN & ANALYSIS

The unequalled depth and breadth of Ansys software coupled with its unmatched engineered scalability, comprehensive multiphysics foundation and adaptive architecture sets our technology apart.

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MANUFACTURING

Ansys additive manufacturing simulations help you to optimize your design for 3D printing, eliminating trial and error and giving you confidence that the part can be successfully built the first time.

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OPERATIONS

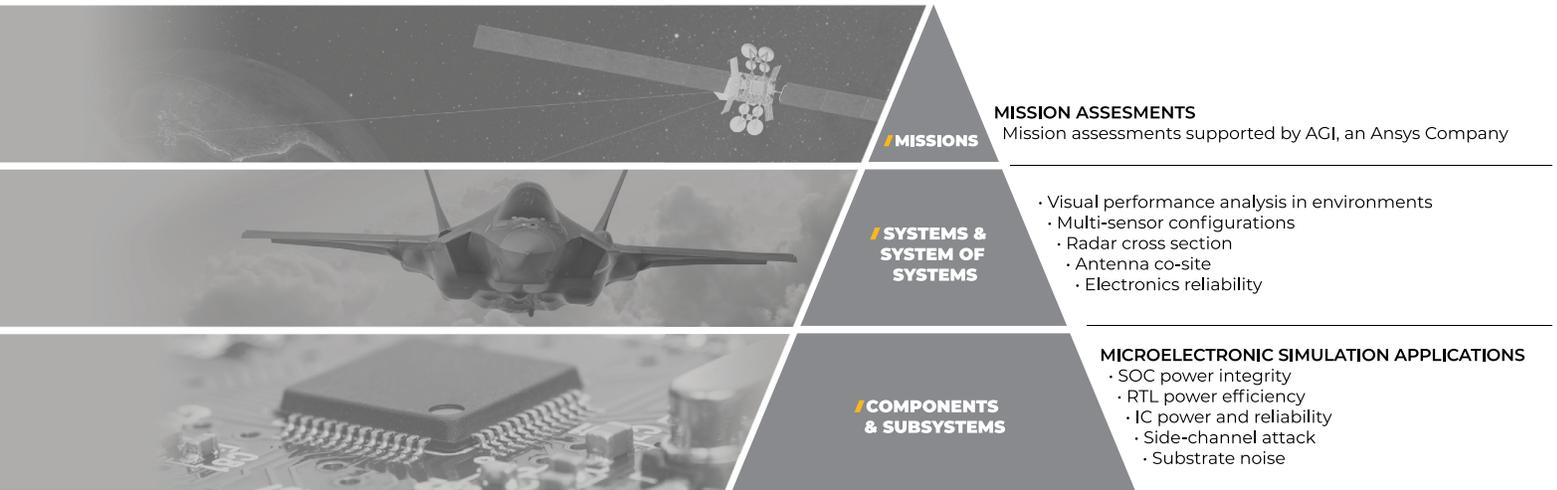
Ansys Twin Builder improves predictive maintenance outcomes by enabling the creation, validation and deployment of a physics-based digital twin to optimize your sustainment and operations.

[LEARN MORE](#)



/ MAKING DIGITAL MISSION ENGINEERING POSSIBLE

2 Software that integrates from the component to the mission
With Ansys simulation software you can create an integrated and persistent high-fidelity digital thread from the microchip to the mission.



3

Accurate, validated and proven simulations

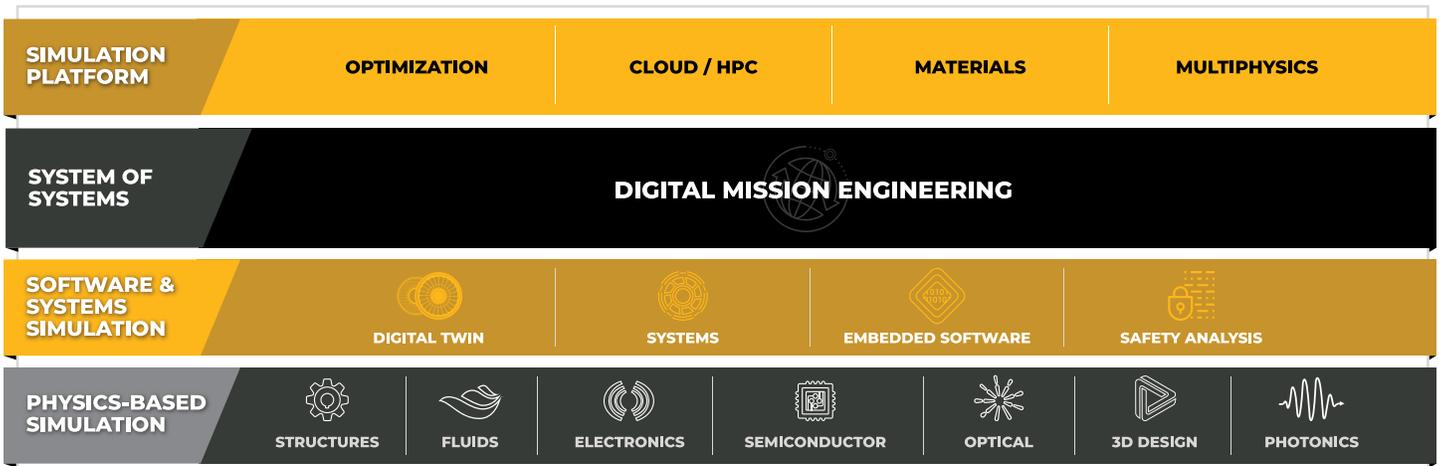
Ansys is the world's leading physics-based simulation provider with a 50-year history of delivering the most accurate simulation capabilities available, able to predict the behavior of even the most complex systems.

4

Open and collaborative simulation environment

Ansys software is supported by an open and interoperable platform to integrate with myriad, non-standardized digital tools. And, it provides access to cloud and high-performance computing resources.

Technology Stack - Integrated from Component to System of Systems



5 **Workforce development and enablement**

Ansys is the world's leading simulation center of expertise, delivering a combination of training, technical support, consulting and professional services.

Training

A variety of training and pricing options help you realize the potential of your Ansys software.



Ansys Learning Hub

Provides the necessary training resources for tackling current projects and offers development opportunities to enhance your skills.

Consulting and Professional Services

Ensures you are getting the most from your investment.



Reliability Engineering Services

Accelerates design, saves time and costs and improves quality.

[LEARN MORE](#)

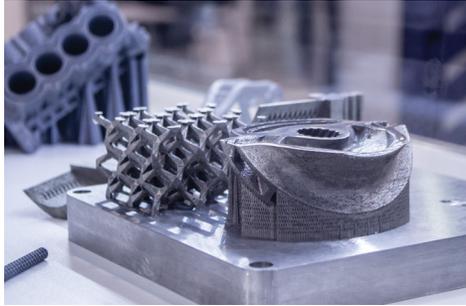
/ DIGITAL MISSION ENGINEERING DEPLOYED

Accelerated Advanced Military Electronics Innovation



A world-leading defense prime contractor used Ansys simulation capabilities to develop antenna and microwave components at higher power levels and higher frequencies while being contained in smaller form factors. The simulations showed that the design worked perfectly in its operational environment and this was confirmed by physical testing.

Lighter and Smaller with Additive Manufacturing



A defense industry startup applied Ansys simulation software, high-performance computing, and 3D printing technology to deliver order-of-magnitude reductions in size, weight, and development time for a SATCOM-integrated array antenna.

Improved Operational Availability with Cost Savings



A branch of the U.S. military used Ansys physics-based simulation software to address repeated failures in operational assets, resulting in millions of dollars in savings and improved operational readiness.

Press Releases

Navantia leverages Ansys' digital transformation solutions to design next-gen naval vessels

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U.S. Army, L3Harris and Ansys Collaborate to Improve Aviation Performance and Affordability

[LEARN MORE](#)

Airbus and Ansys Partner to Enable Autonomous Flight to Support Future Combat Air System by 2030

[LEARN MORE](#)

Physical Optics Corporation and Ansys Streamline Avionics Development for U.S. Military Aircraft

[LEARN MORE](#)

University of Texas at Arlington and Ansys Accelerate High-Speed Hypersonics Research and Development

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“The discriminators are speed and cycle time.”

- OUSD (R&E)



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