

FACING THE DISRUPTION IN AEROSPACE AND DEFENSE

To remain competitive in a fast-changing economic and political climate, A&D companies must digitally transform to deliver new, advanced technologies as quickly as possible.

EXPONENTIAL CHANGE

90% OF A&D COMPANIES SEE A NEW ERA OF TECH ADVANCEMENT MARKED BY EXPONENTIAL CHANGE

KEY DRIVERS OF CHANGE



ECONOMIC

- Rising defense spending
- Cost of maintenance, repair & operations (MRO)
- Low margins



COMPETITION

- Supplier consolidation
- The new space race
- Emerging markets
- Disruptors & startups



POLITICAL

- Geopolitics
- Space: the final frontier
- Tariffs & trade



ENVIRONMENT

- Emissions reduction



LEGAL

- Noise & emissions
- Safety
- Certification



SOCIAL

- Aging workforce
- 24/7 connectivity



TECHNICAL

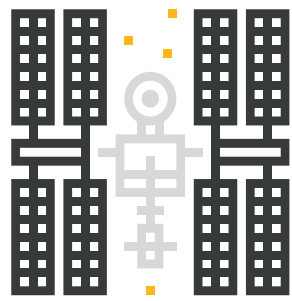
- Autonomous systems
- Digital enterprise
- Advanced materials & additive manufacturing
- Electrification
- Enhanced communications & 5G



INDUSTRY KPIS

COMMERCIAL AVIATION

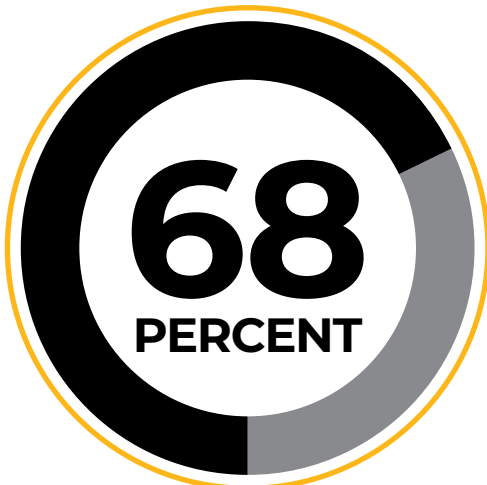
- Quieter, more fuel-efficient & environmentally friendly aircraft
- MRO revenue growth
- Improved safety & lower design, testing and certification costs



SPACE

- Launch cost reduction and commercialization of space
- Satellite miniaturization, constellations & high-altitude pseudo-satellites
- Advanced telecommunication, observation & exploration capabilities

DIGITAL TRANSFORMATION



OF AEROSPACE COMPANIES INVESTING IN DIGITAL TECHNOLOGIES AS PART OF OVERALL BUSINESS STRATEGY

OF AEROSPACE EXECUTIVES WILLING TO DIGITALLY REINVENT THEIR BUSINESSES

(Yet aerospace trails auto and industrial manufacturers in digital implementation)

DRIVING THE DIGITAL STRATEGY



NEW LEVELS OF EFFICIENCY

SpaceX's Falcon 9 rocket operates at an average of **\$60 million** per flight vs. NASA's Space Launch System at **\$1 billion+**



NEW SOURCES OF GROWTH

By 2028, **37,978** aircraft will be in service and commercial MRO industry will grow to **\$14.7 billion**



CUSTOMER SATISFACTION

67% of airline passengers more likely to rebook if Wi-Fi available; **54%** prefer no Wi-Fi to poor-quality Wi-Fi

DISRUPTION & GROWTH

ADVANCED ROBOTS

The complex optimization of weight, sensors & electronics integration, control software and power management is enabled by multiphysics simulation

INDUSTRIAL INTERNET OF THINGS (IIoT)

Simulation-based digital twin mirrors the life of an asset for performance optimization and predictive maintenance

ADDITIVE MANUFACTURING

Only simulation predicts distortions and thermal stresses; helps avoid trial-and-error 3D printing

SIMULATION

Simulation-based production
Simulation-based design
Digital twins

BIG DATA

For new products, unavailable predictive and prescriptive data can be generated with simulation

CLOUD

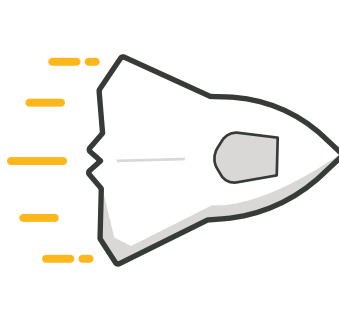
Simulation leverages the cloud to provide on-demand, unlimited high-speed computer power

BLOCKCHAIN & CYBERSECURITY TECHNOLOGIES

Results from critical failure analysis can aid with system cybersecurity

INNOVATION THROUGH ANSYS SIMULATION

DELIVERING FUEL-EFFICIENT & ENVIRONMENTALLY FRIENDLY AIRCRAFT



WINNING THE SPACE RACE

AERODYNAMICS

4.5% Drag Reduction **\$27 billion** Saved from 15% reduction in fuel burn

ADDITIVE MANUFACTURING

10 - 100X Reduction in Volume **\$500 billion** Available to space race winners in 2030

AEROSTRUCTURES

18% Weight Reduction **\$10 billion** Saved in fuel consumption due to winglets

ACCELERATED INNOVATION

50% Reduction in Development Time **400%** 10-year cost reduction to reach low Earth orbit

PROPULSION

15% Fuel Burn Reduction **\$1.3 billion** Saved for each 1% reduction in mass

PROPULSION

10X Reduction in Temperature **\$1 billion** Invested in space startups in Q1 2018