

# THE STATE OF AEROSPACE AND DEFENSE

**Welcome to the  
Acceleration Economy**

DECEMBER 2018



Change, like one of the U.S. Navy's new stealth technology-equipped F-35B Lightning II war planes, comes at you really fast and with little-to-no warning. Every year more and more change gets packed into the business cycle. Yet the last decade stands out for the scope and the speed at which change has occurred. Technological innovations are rapidly changing the landscape in many ways, from growth in air travel to increasing demand for cheaper, more reliable aircraft, combined with the emergence of new technologies and supply chain models. The aerospace and defense industry has traditionally evolved quite slowly, but no more. The speed of business is accelerating faster than ever, and strategic partnerships have never been more important to fostering innovation, speeding time to market and enhancing competitive advantage.

## THE AEROSPACE AND DEFENSE INDUSTRY FACES OPPORTUNITIES AND CHALLENGES

### Commercial aviation shows huge growth potential

The commercial aviation industry is seeing strong passenger demand, lower commodity prices (including crude oil), and growth in emerging markets, particularly the Middle East and Asia Pacific. According to the International Air Transport Association (IATA), passenger traffic grew 7.6% in 2017, compared with a 10-year average of 5.5%, while air cargo grew 9%.<sup>1</sup>

The market's growth potential is enormous. Global demand for new aircraft production over the next 20 years is expected to reach more than 42,000 commercial aircraft, with a market value over \$6.3 trillion, according to Boeing's Commercial Market Outlook 2018-2037.<sup>2</sup>

At the same time, passengers are demanding improvements in the quality and comfort of their experiences, leading to better offerings in cabin comfort, in-flight entertainment and connectivity options.

This will impact the industry in two key ways: it is becoming attractive to new competitors, and it will dramatically affect the supply chain.



### PASSENGER TRAFFIC



International Air  
Transport Association

### GLOBAL DEMAND FOR NEW AIRCRAFT PRODUCTION

**\$6.3 TRILLION**



2018 – 2037



## Increased Military Spending is Driving Demand in Defense Markets

Defense is a regional, country-specific market for many reasons, not the least of which is national security. Geopolitical uncertainties and political instabilities are leading to an increase in military spending around the globe, and a seemingly endless demand for new technologies and new aircraft.

Several governments have already started increasing their defense budgets, including purchases of next-generation military equipment. But the U.S. remains the largest defense spending nation. The country spent \$611 billion in 2017, representing 35% of the total global military spend of \$1.76 trillion in 2017.<sup>3</sup>

### Obstacles to Success

Just as this growth in commercial and defense aviation presents many opportunities for the Aerospace and Defense (A&D) industry, it also creates many challenges. Chiefly, OEMs are under enormous pressure to lower their overall cost of operations while continuing to provide highest product reliability and fast time to market in the face of rising customer demand.

This creates constant pressure on A&D OEMs to better leverage data management; maintain and service mature systems while addressing product obsolescence; and still leave time to focus on next-generation innovation. They are hard pressed to address all three simultaneously, which should compel them to seek out partners who apply a holistic approach to the entire product lifecycle and help eliminate the complexities inherent to the traditional product realization process.

Success requires becoming more nimble, adaptive and innovative in delivering products, services and experiences on a globalized scale, and optimized for the end customers' exacting expectations. The world is different, and it will never be the same again.

## GLOBAL MILITARY SPENDING IN 2017



**\$1.76**  
**TRILLION**




The Stockholm  
International Peace  
Research Institute  
(SIPRI)



## WELCOME TO THE ACCELERATION ECONOMY

We call this transformative era the **Acceleration Economy** - a world of challenges and opportunities ushered in by the three powerful forces that affect every company, in every industry, and across every geography:

- 1. Higher-than-ever customer expectations.** Demanding customers translate to ever-increasing demands for faster delivery, lower prices and an always-on service relationship. Companies must respond with products and services that not only meet but anticipate the next level of customer expectations. Product-price-service mismatch and slow delivery can cripple any company. Speed is the new competitive differentiator.
- 2. Constant technological innovation.** The current crop of emerging technologies is driving a new super-cycle of digital transformation that will have a profound and lasting impact on the entire A&D industry. Every part of the enterprise gushes data. More and more software and sensors are hooked to cloud services harvesting new and greater streams of data. A&D companies are racing to deploy AI and machine learning to interpret these data streams to create valuable insights, better services and new products.
- 3. Globalized innovation and competition.** This may be the most powerful force hitting businesses today. Despite tit-for-tat tariffs and newly nationalistic trade postures, the world is a highly interconnected and globalized space. Things are made and sold everywhere, and innovation and competition can come from anywhere. Businesses that create and maintain deep and lasting partnership networks will be best positioned to spot changes, pick-up new ideas and fend off global rivals.



These forces have forever transformed the industry, and it will never be the same again. The gains for the winners will be profound. The pain for the losers will be devastating.

Winning demands that companies collaborate across deep partner networks and bring new products to market faster; meet disruptive change with innovation; foster new ideas to strengthen competitive advantage; and leverage technological adoption to secure a lasting market presence.

A&D companies must become more agile, adaptive and innovative in delivering products, services and experiences on a globalized scale, and optimized for their customers' exacting expectations. For example, incorporating new technologies into maintenance, repair and overhaul (MRO) processes can facilitate health monitoring, predictive maintenance, dynamic maintenance records or augmented-reality work instructions to reduce costs and improve profitability.

Capitalizing on these kinds of new technology trends and innovations requires an MRO partner that is able to engage early in the product lifecycle to allow for "design for reliability," ensuring components and processes are sourced, designed, tested and qualified to perform in challenging, real-world conditions in line with regulatory criteria. Leveraging insights from the design, manufacturing and test processes into the repair and maintenance cycle to deliver faster repair turnaround is critical.

Oliver Wyman reports that the steady transition to new-generation aircraft over the next decade means OEMs need to work with MRO providers that are able handle the work associated with the newer fleet types or focus their strategy to capture end-of-life markets. The firm's recent "Global Fleet & MRO Market Forecast Commentary 2018–28" report states that from an airframe MRO perspective, providers need to handle the new composite and metal matrix materials dominant in the latest-generation aircraft. Advancements include highly sophisticated avionics and systems that interface with health monitoring technology designed to recognize pending system or component failures. Additionally, the ability to capture, analyze and process big data requires "a clear strategy to take full advantage of its potential," according to this Oliver Wyman report.

**Succeeding in the Acceleration Economy requires embracing these five guiding principles:**

## **1. Transform or Risk Irrelevance**

Technological innovations are bringing together developments in big data and analytics, smart automation, artificial intelligence, machine learning, augmented reality, additive manufacturing and cloud computing. Consider the rise of the Internet of Things (IoT) trend, marked by an ever-growing variety of smart sensors that collect and analyze data in real time. Among IoT's most interesting promises for A&D is predictive maintenance, where sensors embedded in components and systems transmit real-time data if a part needs to be repaired or replaced, even while an aircraft is in the air. Implementing and leveraging this digital transformation will be a challenge, but the reward is realizing new efficiencies and improvements in many aspects of fleet management and flight safety, resulting in industry savings in the billions of dollars. The companies that triumph will do so based on these new and digitally-enabled products, services, infrastructures and supply chains that their competitors cannot immediately match. That demands partnering with strong partners that optimize supply chains and drive lower operational costs and inventory. Those that don't will struggle.

## **2. Extend Innovation**

As OEMs build new aircraft to catch up on delivery backlogs and speed the replacement of previous generations, they face the constant challenge of keeping up with the latest technological innovations in areas such as fuel efficiency and avionics technology. Few companies have sufficient R&D resources and capabilities to meet all their future needs for new products. To accelerate and succeed companies must first eliminate silos: today's supply chain has to be dynamic and flexible, seamlessly integrated with engineering, manufacturing, planning and execution. Through close collaboration with strategic partners throughout the value chain, companies must maximize their innovation capabilities and shorten product development cycles.

## **3. Expect to be Challenged**

Technological innovation quickly becomes available to all industry players. That's good news for challengers, but often destabilizing for incumbents. New technologies emerging in the supply chain and connected factors such as cloud, mobile, analytics, blockchain, 3D printing, and advanced security are together pushing the current capabilities of the supply chain – and creating new openings for nimble, digitally-native competitors. Simultaneously, A&D is seeing consolidation in the form of increased merger and acquisition activity in the supplier base, while Tier 1 manufacturers such as Boeing and Airbus have begun to rationalize their supply bases from thousands of suppliers to just a handful. These factors combine to challenge OEMs and their supply chains to become more dynamic and flexible.



#### **4. Put Quality and Efficiency Hand-in-Hand**

Airlines and government defense officials want more for less, which puts pressure on pricing and production capacity for OEMs and their suppliers. OEMs must increase production rates for components and systems, and supply chains have to keep pace. Other supply chain challenges include long lead times that can stretch from months to years, and government contracts that introduce profit-draining complexities to the inventory management process. Digital transformation means quality and productivity are not in conflict, and both can be delivered to bring a product to market.

#### **5. Make Flexibility an Imperative**

Supply chains need to keep pace and be sufficiently agile to capture fleeting upside opportunities or to mitigate fast-moving risks. While production has ramped up, the aerospace supply chain is challenged to keep pace with emerging technologies such as smart automation, machine learning and additive manufacturing, as well as the human capital and skill sets required to support these technologies.

The choices are clear. Manufacturers with complex products and portfolios must collaborate within multi-tiered supply chains while collecting and analyzing huge amounts of data flowing from the full product lifecycle: from factory floor, shipment, sales and service to full lifecycle management.

## CELESTICA HELPS COMPANIES SUCCEED IN THE ACCELERATION ECONOMY

The need to compete and grow in today's transformative environment requires partners, with specialized expertise across the supply chain, to foster innovation, gain competitive advantage and establish sustained growth.

As the leading manufacturing services provider to the A&D industry, Celestica helps its customers improve competitiveness by optimizing supply chains and driving innovation in the design, engineering, manufacture and after-sales support of mission-critical applications.

With over 15 years of experience in enabling high reliability aerospace and defense applications and 25 years of transforming supply chains for multiple markets, Celestica understands the pivotal role supply chains play in driving growth.

Celestica recently completed a major study led by global market intelligence firm IDC titled, "Surviving Supply Chain Disruption – Digitally Transforming from Innovation to Execution." Among the key findings is that, in multiple instances, companies are struggling to balance their priorities around supply chain evolution, which makes it even more important for them to engage partners to fill in the gaps and address the rich opportunities around digital transformation.

As companies look to modernize their supply chains, the most successful ones recognize they cannot do it alone. Businesses that create and maintain deep and lasting partnership networks will be best positioned to spot changes, pick-up new ideas and fend off global rivals.

*“Businesses need experienced partners to close gaps in technological expertise, help mitigate supply chain and operations shortages, and build solutions around the customers' unique needs.”*

– **Simon Ellis**, Vice President of Supply Chain  
for IDC Manufacturing Insights



## A SNAPSHOT ON SUCCESS

Celestica focuses on the complete value chain and has been working with leading Tier-1 A&D OEMs for several years to develop and implement a strategic network rationalization roadmap and several operational solutions that drive significant business benefits. They include the first-ever A&D 'Operate-in-Place' engagement in Mississauga, Ontario where Celestica took over complete elements of the customer's production – including aspects such as employees, inventory and supply chain – to provide enhanced capabilities and added value. This model enables the customer to lower operational costs and inventory and focus on core issues such as innovation and business growth.

With the successful execution of this model, Celestica expanded the relationship with a second Operate-in-Place agreement in the southwestern United States. Celestica now provides final assembly, testing, repair and overhaul operations for a number of product lines. This agreement helps reinforce Celestica's leadership position in A&D electronics manufacturing, and provides a broad set of capabilities to support customers in this market.

The results speak for themselves:

- 10%-20% reduction in cost of goods sold
- Up to 35% improvement in on-time delivery
- 50%-80% improvement in PPM
- >30% reduction in inventory

“Companies need to grow and scale just as quickly as the market is demanding. Ultimately, our customers are looking for a partner who will help enable and accelerate their strategy.”

— Jack Jacobs, Vice President,  
Aerospace and Defense, Celestica

## DRIVING TRANSFORMATIONAL RESULTS

**10% -  
20%**  
REDUCTION  
IN COST OF  
GOODS SOLD

**MORE THAN  
30%**  
REDUCTION  
IN  
INVENTORY



**UP TO  
35%**  
IMPROVEMENT  
IN ON-TIME  
DELIVERY

**50% -  
80%**  
IMPROVEMENT  
IN PPM

The Acceleration Economy demands that you constantly strive to drive innovation forward. Celestica enables its customers to do just that by freeing up personnel to focus their time and energies on new technologies that drive business objectives, and funding future growth opportunities through quick cash injection and royalties.

Another example of value across the product lifecycle is the recent acquisition of Atrenne Integrated Solutions, which complements Celestica's capability to assemble, test, certify and repair avionics equipment LRUs. Our end-to-end product lifecycle solutions support the most complex products across the A&D industry, from communications to the controls and electronics that are transforming air travel.

From nose to tail and across the value chain, we help customers navigate the daunting challenges of the Acceleration Economy and collaborate to provide supply chain solutions that maximize the value of their assets, enabling them to focus those assets on innovation and profitable growth.

**Celestica's smart supply chain solutions for the entire product lifecycle help A&D industry OEMs gain a competitive advantage in market. To learn how Celestica can help you succeed in The Acceleration Economy, visit our website at:  
[www.celestica.com/our-expertise/markets/aerospace-and-defense](http://www.celestica.com/our-expertise/markets/aerospace-and-defense)**

## FOOTNOTES:

1. "2017 Marked by Strong Passenger Demand, Record Load Factor," International Air Transport Association (IATA) online. February 1, 2018, <http://www.iata.org/pressroom/pr/Pages/2018-02-01-01.aspx>
2. "Boeing Commercial Market Outlook 2018-2037," <http://www.boeing.com/resources/boeingdotcom/commercial/market/commercial-market-outlook/assets/downloads/2018-cmo-09-11.pdf>
3. "Here's how US defense spending stacks up against the rest of the world." CNBC - May 2, 2017. <https://www.cnbc.com/2017/05/02/how-us-defense-spending-stacks-up-against-the-rest-of-the-world.html>



## LOOKING AHEAD: CELESTICA'S 2019 PREDICTIONS FOR THE A&D INDUSTRY

- 1.** The 2019 A&D supply chain will see fewer niche suppliers supporting OEMs. OEMs will look to partners who can innovate at scale and create more flexibility in their supply chain management methodologies.
- 2.** As major OEMs merge to create new opportunities, suppliers who put more investment in solutions that span the entire product lifecycle will be in a better position to support OEMs' growth objectives.
- 3.** A&D OEMs will raise the bar on its automation litmus test. Suppliers will need to demonstrate to a greater degree how they are bringing more automation to their own processes and carry over to the OEM to generate significant time savings.
- 4.** As the industry continues to experience materials constraints, OEMs will lean on their 'trusted partners' in the supply chain. All 'trusted partners' are suppliers, but not all suppliers can be labeled 'trusted partners'. A 'trusted partner' who is nimble, adaptive and innovative in navigating the near-term challenges such as materials constraints while helping OEMs take a long-term view of their supply chain and implement strategies to evolve and address future challenges, will be in high demand.