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Report: A Frost & Sullivan Webinar Summary

Digital Persistence: The Path to Digital MRO

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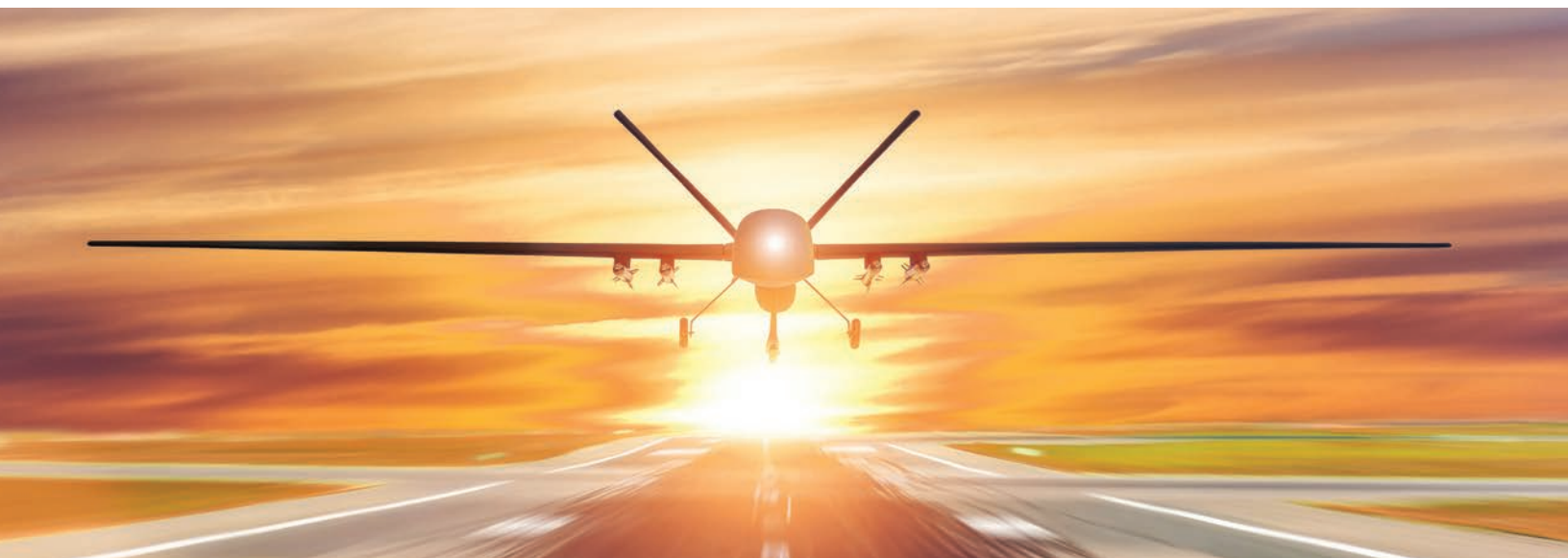
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As the path to digitalization continues to accelerate across business sectors, the aerospace and defense industry—and the maintenance, repair, and overhaul (MRO) process that supports it—is particularly ripe for digital transformation. Traditionally driven by manual and paper-based processes, MRO operations for commercial, private, and military aircraft are closely examined today. There is a movement to expand the use of digital technologies to improve operations and response times and leverage data for greater efficiencies and predictive capabilities.

According to a recent Frost & Sullivan study on MRO in aviation,¹ three key trends are advancing digital transformation and will significantly impact MRO in the near future. These trends are:

- ▶ **Fleet Conversion:** The aerospace and defense industry has accelerated plans to retire older aircraft in favor of new, more efficient planes.
- ▶ **Supply Chain Evolution:** New technologies and vertical integration are being used to increase supply chain efficiency and resilience.
- ▶ **Industry 4.0:** Briefly defined as the digital transformation of manufacturing production and related industries and value creation processes, Industry 4.0 is enabling highly advanced industries like aviation manufacturing to leverage artificial intelligence (AI), machine learning (ML), virtual reality/augmented reality (VR/AR), and other advanced technologies.

Frost & Sullivan recently spoke to senior executives across the aerospace and defense industry as part of a three-part series on digital transformation (DT). We found that while some enterprises were already experimenting with and implementing digital tools and processes, the pandemic and the need to increase virtual work spurred others to begin and even accelerate initiatives. Safety, security and compliance requirements remain evergreen considerations for the industry.



1 Frost & Sullivan's Disruptive Technologies Transforming the Global Commercial Aerospace Industry Through 2035, Published January 2021.

Obtaining Buy-in Across the Ecosystem

The need to obtain buy-in for digitalization across the entire ecosystem of suppliers, partners, engineers and others in the aviation industry is a clear obstacle for many. Technologies like AR and VR, additive manufacturing, big data and digital twins are already in use and poised to make a significant impact. Yet, varying degrees of organizational readiness and the need to coordinate complex value chains of end-to-end stakeholders who provide critical checks and balances are significant challenges. All must be part of any new process.



Many enterprises are currently in a hybrid stage of utilizing some digital systems alongside paper processes and often siloed teams and operations. Yuvaraj Raju, Associate Partner, A&D Aftermarket Digital Transformation, DXC Technology, noted that his client's MRO operations were challenged to better "connect the dots" during the pandemic. Many teams that had previously worked independently needed to partner and collaborate more fully, often virtually, while leveraging digital applications.

The pandemic has accelerated the use of digital tools at many organizations. Physical separation increased the need to think through and solve more problems remotely, often with virtual tools. A critical challenge will be determining where and how to begin implementing digital solutions on a broader scale.

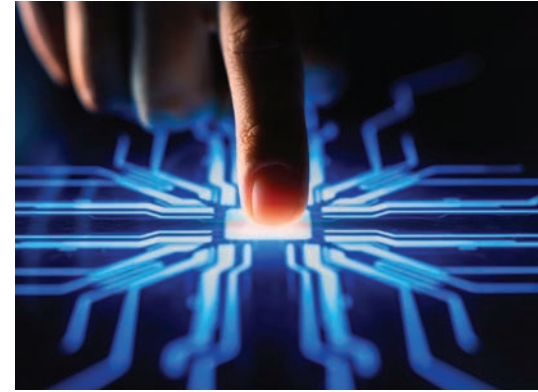
As Walt Lindsley, Director, MRO, Lockheed Martin Aeronautics, asked, "Where do you go fully digital in your MRO solutions? You could do it all the way from upfront preplanning through execution, through how you augment the humans ... where you induce artificial intelligence or robotics to replace humans in caustic or corrosive applications. There's no end to the technologies that you could disrupt that value chain with ... [but] it has to be affordable, has to be reliable. It has to ensure that airworthiness is adhered to in configuration management. So, you have to lock all those in together." Many in the industry also seek opportunities to use technology to simplify logistics, not just for aircraft but for support and industrial equipment as well—a massive undertaking.

Leveraging Additive Manufacturing and Other Digital Advancements

Thomas Atkinson, Executive Officer, FRC East, stated that his team “virtually repaired a gearbox for an H-53 helicopter that was deployed on a ship at sea.” They utilized artisans and engineers to do so, effectively protecting civilians from travel during COVID-19. This type of operation could and probably will occur again in the near future.

Atkinson also shared that FRC East is “establishing a NavalX Tech Bridge for 3D or additive manufacturing.” As he noted, “We are trying to establish links that will evolve into a virtual depot via digital paths and 3D printing machines as well as using other technology.”

NavalX Tech Bridges are part of a connected network that enhances collaboration between naval labs, industry, academia, and other military branches. A big goal of NavalX is to utilize data and digital technology to facilitate repairs and leverage 3D manufacturing that can be shared digitally across the enterprise or even across the globe.



“If you ask our headquarters, they see [digital MRO] as the way for us to increase productivity and maximize our current capacity without adding any additional machines, facilities, other resources, or human resources. And to also make our rates competitive with commercial industry because we're constantly in competition there.”

—Thomas Atkinson, Executive Officer, FRC East

Innovation like developing digital data files and transferring them between engineers, repair workers and departments to check for flight worthiness and other safety requirements will dramatically speed up the repair cycle process and significantly improve the performance of MRO operations.

Whether it's making parts, servicing them, or protecting sensitive data across the value chain, maintaining data security is a prime concern. Not surprisingly, all facets of the aviation industry, including military and commercial enterprises, prioritize data protection and must adhere to strict regulations and compliance requirements. Privacy and safety are key concerns. Creating a high-trust infrastructure is needed. Letting go of long-standing paperwork processes (i.e., where information stays locked in a room) and outdated legacy systems will be necessary. Making the transition to digital requires new procedures, systems and solutions to be accepted, tested and then implemented across the value chain.

Digital Solutions Bring Challenges and Advantages

Utilizing technologies like Blockchain, an extremely secure digital ledger that encrypts data, could mitigate some digital security issues. The agility that the digital process brings is a plus, and digital safeguards like software with built-in security and edge computing also could help enterprises more efficiently adhere to regulatory compliance requirements.

With digital systems, changes can be quickly made, and evolving requirements can be met as they develop.

“Every aircraft, every car that's being produced, and everything else that we would put through an MRO process of some sort is getting smarter. It is getting smarter, and we are going to have to adapt our MRO methodologies”

—Walt Lindsley, Director, MRO, Lockheed Martin Aeronautics

As many legacy systems linger, new tools are ready for implementation, leaving the airline industry at a crossroads. Change awaits readiness from the enterprise, its leadership and other key stakeholders and partners.

Does a digital ecosystem enable or detract from connecting owners, third parties and other value chain participants? The need to create and secure new contracts and meet licensing requirements across a complex ecosystem must be resolved when creating new digital processes and networks. Obtaining cooperation and buy-in from the workers who build and service aircraft and other vessels must be addressed. Getting everyone “on the same playing field” will not be easy. However, digitization will ultimately empower technicians, operators and supply chains by making them more competitive in the long run.

Still, many remain reluctant to change the contours of their intellectual property agreements and enter into a new digital system. A comfort level with the technology is coming but is not quite here yet.

“As humans, comfort comes from assurance. So, once that's built in, the uptake in digital MRO will be essentially exponential.”

—Edward Liu, Quality Engineering Specialist, Magellan Aerospace, Mississauga

A shift in the management of intellectual property will also be necessary. Standardization of contracts and data files might be a way to begin to address this challenge.

Elevating Operational Excellence

Overall, changes due to the pandemic have not affected training and standards of conduct in the MRO environment. Engineers and other physical workers in the MRO field are still functioning much as they did before the pandemic; those workers who need to be physically present to do their jobs are operating largely the same way, albeit following protocol, wearing masks and maintaining social distance. Knowledge workers, however, have moved to a virtual and work-from-home environment. According to industry thought leaders, results have been positive. Productivity has increased as disruption and travel time have been minimized.



The impact of digital on MRO throughput, or the speed of completion of a physical asset, is another critical measurement of MRO effectiveness that was also discussed. This issue was addressed in two parts:

- 1 **Leveraging all accumulated digital knowledge** to speed up solutions to issues and address them more efficiently.
- 2 **Leveraging the predictive capabilities of data** to look ahead and solve for issues or shortfalls that could occur in the physical environment.

As noted, data and digital tools are not subject to human failings or absences (minus flaws in human inputs and analysis). A well-designed and managed digital ecosystem will improve operations, productivity and throughput. Acquiring, managing and leveraging good data is a critical part of any digital ecosystem.

In conclusion, John Simmons, MRO Product Manager, iBASEt, emphasized the need to stay competitive in a world where technology is rapidly advancing. As he stated, “You have a fixed facility. You have a fixed work base, you have fixed machinery. Those are fixed costs. What drives that is your turn time. Get it in, get it out efficiently, airworthy, everything right in place. What you're able to do then [is] to push more through faster. That's where you're going to survive ... that's where you're going to take the lead.”

As the aviation industry has been negatively impacted by the pandemic, the automated tools, just-in-time methodologies and productivity gains that digitalization can bring are needed more than ever. To stay competitive, enterprises are advised to heed the call and start the digital transformation journey in MRO and other related operations today.



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