A&D MANUFACTURING
TAKES ON INDUSTRY 4.0

**HOW 'AEROSPACE & DEFENSE 4.0'
IS HELPING A&D MANUFACTURERS OF
ALL SIZES BECOME MORE CONNECTED,
ADAPTIVE, INTELLIGENT AND SECURE
IN AN INCREASINGLY CYBER-AWARE
ECOSYSTEM**

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IFS

THE FUTURE IS NOW

IT IS TIME TO PREPARE FOR A&D TRANSFORMATION WITH ENTERPRISE SOFTWARE

In a recent report Deloitte highlighted the emergence of 'Aerospace & Defense 4.0'—the A&D manufacturing 'version' of Industry 4.0 technologies being used for developing new cost-effective products and services, making existing products smarter using sensors and connectivity, and leveraging advanced manufacturing processes.

IFS is already witnessing this being put into place across a wide spectrum of A&D manufacturing organizations. A&D manufacturer BAE Systems has been applying the principles of 4.0 in its New Product and Process Development Center since 2017, where 3D printing and virtual reality technology are used to reduce costs and speed up manufacturing processes for combat aircraft.

However, such initiatives may seem like a daunting task for many A&D manufacturers, particularly those tier two and three companies that play a vital supporting role in the manufacturing ecosystem but lack large manpower and monetary resources. But this need not be the case. For example, IFS customer TEST-FUCHS is already seeing the real benefits of a dedicated digital twin approach for the ground support assets and test equipment it manufacturers, implemented as part of a company-wide push for digital transformation.

This paper will zero in on four key focus areas for manufacturers looking to capitalize on Aerospace & Defense 4.0—and centers around some common feedback we hear from our customer base when they look to future-proof their business.

1. CONNECTIVITY AT THE CORE

The significance of the digital thread as a communication network is huge in scale and consequently in importance. Digital thread is one of the key methods to connect asset data throughout the manufacturing process, while making that data accessible to all parties within an A&D manufacturing organization and, even more crucially, tracking asset or part information after the sale and deployment to the end customer. It enables a connected flow of data and an integrated view of an asset across its lifetime through various isolated functional perspectives, through multiple factory walls. According to LNS Research, the digital thread can increase supply chain efficiency by 16% and reduce the time it takes to bring a product to market.

Continuing the theme of connecting outside factory walls alongside these digital initiatives, more manufacturers have realized revenue gains by extending asset management into the field to supply and service customer assets. This brings in service-based contracts with Service Level Agreements (SLAs) which must be met, and the best way to manage these contracts is by providing a suitable mobile platform for field workers and data feedback from the Industrial Internet of Things (IIoT). This means A&D manufacturers need to rely heavily on their supporting enterprise software in order to provide this level of connectivity.

OPEN FOR BUSINESS WITH OPEN FRAMEWORKS

The right software tools can help them connect to this increasingly digital supply chain ecosystem by offering seamless interoperability with other solutions, either through an open integration framework or through pre-built solutions which meet specific government or industry integration standards. With servitization-based business models becoming commonplace among A&D manufacturers, new direct customer connectivity requirements are opened up—right down to IoT, customer systems, in-house Customer Relationship Management and connectivity with third party contractors who may be carrying out repairs on assets in the field. This means supporting enterprise software must be geared to connect these field-based requirements, with specific asset and service management functionalities bringing these various data streams together.

IFS Applications™ connects core data and processes to empower your people, partners and customers with what they need, when they need it, wherever they are. From common office software to in-depth reporting and analysis modeling, IFS Applications securely connects to the tools A&D manufacturers rely on, wherever they are hosted, thanks to modern RESTful APIs and open authentication solutions.

2. CONFIGURABILITY CRUCIAL

The nature of the current manufacturing climate often puts customers in control when it comes to specifying their individual requirements and contractual preferences. Recent manufacturing research from Deloitte shows more than 50% of customers indicate interest in purchasing custom products or services. In the A&D sector this is even more prevalent, with manufactured parts and assets performing highly specific roles in often unique and highly secretive military and aerospace projects.

Feedback from our IFS install base tell us they are seeing their customers becoming more demanding in terms of delivery schedules and customization. In response to this, it is becoming a key differentiator for A&D manufacturers to offer a wide range of project capabilities, as they now have to operate on multiple projects for every customer, each with their own complexities. Reacting to these customer requirements means being as agile as possible. If inflexible incumbent software cannot adapt to these new demands, this can result in long delays.

AGILITY STARTS FROM THE INSIDE OUT

In today's competitive manufacturing environment, where customizations are prevalent, it is understandable that manufacturers bend over backwards to meet customer requests. But accepting a customer order and then finding out you don't have the functionality available to implement and manage the contract can lead to lengthy delays and loss of business—not to mention reputation.

No one wants to be the weak link in the A&D manufacturing supply chain. The key to remaining agile to react to specific customer requests is having a broad functional capability from within the enterprise software you deploy. This should include fundamental manufacturing capabilities and flexible financial controls—particularly around the complexities of the assets in A&D, such as project-driven work and managing quality.

GROW AS YOU GO—ENTERPRISE SOFTWARE CAN SUPPORT YOUR EVERY STEP

Once A&D manufacturers know they have a complete set of functionalities they can rely on, they need to make sure they can deploy them when required, often through a modular approach, and configure them to adapt to both unique customer requirements and internally-driven lean initiatives. This could mean configuring separate screens and interfaces for executives at the top level of the business looking at overall performance, and the engineers logging granular information into the software daily.

But here companies can also take advantage of new technologies to introduce new Industry 4.0 manufacturing processes into the factory—such as additive manufacturing machines with their specialized requirements for material control and process monitoring. The pace of technology is rapid and predicting what may be required next year isn't possible. In such cases, the

relevant screens required to manage the new processes and statistics may not exist yet, but the tools within the software to quickly and easily create them should be there.

Flexible software underpins a flexible manufacturing organization. IFS Applications is quick to deploy and easy to ramp up, with a low total cost of ownership as it isn't 'hardwired' into a business. Onboarding new functionalities to meet changing customer requirements is a quick and agile process requiring minimal disruption; the system's modular nature means there is no need for the complex configurations required to adapt more monolithic software implementations. With deep functionality, full solution coverage, and excellent possibilities to tailor and configure the application, implementation times and costs are kept low. IFS Applications supports the modes of manufacturing you choose to employ with support of the full process—from design, engineering, estimating and configuration through to production, delivery and optional service. It even offers a feature-rich mobile app which can be configured to meet your specific manufacturing workflows.

WE MADE A BIG LEAP FORWARD WHEN WE WENT LIVE. NOW WE NEED TO KEEP EVOLVING.

3. INTELLIGENCE MUST BE EVOLUTIONARY

A&D products produce vast amounts of information—for example the Pratt & Whitney PW1000G engine generates four million data points on every flight. Less complex systems generate less data, but at all levels the value of telemetry and subsequent analytics is well proven. This is a core element of any Aerospace & Defense 4.0 program. A&D companies should leverage this information not only for designing, manufacturing and operating their products but also for developing new and smarter business models.

Standing still means losing out against more forward-looking competitors, particularly as connected machines become the standard, and Industry 4.0 technologies such as additive manufacturing, artificial intelligence and virtual/augmented reality mature and begin to deliver solid ROI. Witness IFS partner PTC and BAE Systems creating interactive mixed reality (MR) work instructions for Microsoft HoloLens. MR enabled BAE to train its first-line workers 30-40% more efficiently.

TECHNOLOGY PROGRESS MUST BE TRACKED

Enterprise IT lifecycles are long-term investments that can be expected to last for decades—'forever ago' in manufacturing terms. As more intelligent technology enters A&D manufacturing facilities, supporting software has to keep pace. Locking into an inflexible system for a set amount of time can mean manufacturers are caught flat-footed and unable to capitalize on new tech initiatives.

In today's market conditions, manufacturers should consider evergreen software built for compatibility through open integration standards. The goal should be to change IT operations from manual to automated processes, driven by intelligent software. The result is an approach where increasing technology investment is matched by software support comprised of components that are always up to date.

Better analytics and intelligence is one of the core goals of IFS A&D manufacturing customer Rolls-Royce. As part of its IntelligentEngine vision, Rolls-Royce is boosting data visibility across engine lifecycles by exchanging valuable engine data with airlines operating its Trent engine family, including the Trent 1000, XWB and 7000. The automated provision of field data is enabled by the IFS Maintenix Aviation Analytics capability, which assures that Rolls-Royce receives timely and accurate information. IFS Maintenix then acts as a gateway to automatically push maintenance program changes from Rolls-Royce back to the airline operator. As a result, life-limited engine part maintenance deadlines can be updated based on actual operating conditions and life consumed by each engine in use.

WE USED TO BE INSULATED FROM THE DOD'S CYBER REQUIREMENTS— NOT ANYMORE.

4. SECURITY PARAMOUNT

One element highlighted in the Deloitte Aerospace & Defense 4.0 report was the need for A&D manufacturers to adapt to the new cybersecurity paradigm. In commercial aviation, according to PwC's 2015 Global Airline CEO Survey, 85% of airline CEOs in the study viewed cybersecurity as a significant risk, likely reflecting the highly sensitive nature of flight systems and passenger data.

On the defense side there are increasing security expectations from military organizations such as the U.S. Department of Defense (U.S. DOD). In fact, the U.S. DOD has just revealed plans for a set of contractor cybersecurity standards that are scheduled to be implemented by January 2020, called the Cybersecurity Maturity Model Certification. Currently, companies supplying products and services to the U.S. DOD must meet 110 security requirements specified in NIST SP 800-171 or risk losing contract awards and new regulations are unlikely to be more lenient. Other countries have followed suit, including the UK with the Defence Information Strategy (DIS) and Australia with the Information Security Manual (ISM). The cybersecurity challenge becomes even more sensitive when combined with the proliferation of cloud-based solutions and the security implementations of access control and the International Traffic in Arms Regulations (ITAR).

SHARE COMPLIANCE AND CYBER RISK WITH A TRUSTED SOFTWARE PARTNER

A fully compliant software partner and applications that demonstrate the security of the organization means A&D manufacturers can trust they are well positioned to compete in an increasingly complex digital arena. Regulatory-compliant software can be a key differentiator when bidding for A&D manufacturing contracts. Your enterprise software should be a strategic enabler for information and cybersecurity. It should be designed from the ground up with security in mind, and address risks and threats throughout all phases of the software development lifecycle. Recent cloud infrastructure has already produced workarounds for the cloud security challenge, most notably Microsoft, which has made its Azure cloud platform ISO compliant.

IFS has developed a security framework through years of experience operating in a global environment, and this is fundamentally based on the model defined by ISO 27034-1 as one of the leading globally recognized approaches for managing application security. This framework highlights that IFS has a dual role in assuring information held in military support chains. On one hand, as a supplier of software solutions, IFS must guarantee it is compliant to operate in the defense environment. On the other, IFS solutions play a pivotal part in ensuring its defense customers can demonstrate compliance of their own programs where applicable to IFS solutions.

PUTTING THE BUILDING BLOCKS IN PLACE FOR AEROSPACE & DEFENSE 4.0

Over the coming months and years Industry 4.0 will continue to permeate A&D manufacturing—but this doesn't need to be an overwhelming thought. With the right software partner in place, A&D manufacturers of all sizes can take a step toward future-proofing their organization to stay connected, adaptive, intelligent and secure. Realizing an Aerospace & Defense 4.0 strategy is perhaps a closer reality than one might first think.

Graham Grose is responsible for supporting all IFS business development within the A&D industry, together with associated industry marketing and overall product direction. Graham has specialized in the supply of Logistics IS tools in a variety of senior appointments within Sema, BAeSEMA, BAe, BAE Systems and IFS since leaving the RAF in 1991, where he was a Supply Officer serving in a variety of operational and IS appointments. Graham is a supply chain specialist and business analyst and is also a Fellow of the Institute of Management Accountants, a Member of the Chartered Institute of Purchasing and Supply, and a Chartered Director.

ABOUT IFS

IFS develops and delivers enterprise software for customers around the world who manufacture and distribute goods, maintain assets, and manage service-focused operations. The industry expertise of our people and solutions, together with commitment to our customers, has made us a recognized leader and the most recommended supplier in our sector. Our team of 3,500 employees supports more than 10,000 customers world-wide from a network of local offices and through our growing ecosystem of partners.

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