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The push for digital technology in aerospace continues. *Photo: Lufthansa Technik*

Aviation and MRO businesses are actively seeking digital solutions to overcome the current challenges faced by the industry, **Keith Mwanalushi** looks at the current influences for the adoption of new technology solutions.

MRO has a notorious reputation for falling behind every other sector of aviation in the adoption of digital solutions; but things are changing. An interesting development recently for instance is Digital Flight, a new hub for digital technology in aerospace that launched in July, the online hub is designed to promote the digital technology available to the aerospace market.

Kirk Baugher, EVP, Business Development at PENTAGON 2000

Looking back though, airlines and MRO's have pursued digital initiatives since the "green screen" days of the 1980's. Kirk Baugher, EVP, Business Development at PENTAGON 2000 Software reminds what started as in-house software development in the early years was supplemented by a set of packaged software from software vendors. The set of third-party software products typically required teams of in-house IT staff just to maintain and integrate the separate packages.

"If we look at current times, most airlines and MROs are utilising a mix of systems that include internally developed software, vendor packages, and more modern web or cloud-based systems. The forward-thinking shops have taken a more wholistic view of their enterprise applications and consolidated their IT infrastructure using modern platforms," Baugher notes.

At Swiss-AS they have been looking to further advance the digitalisation of processes over and above what they have offered for some time now. As well as paperless processes by utilising e-signature for the production staff, they plan to support the store personnel with mobile solutions, reports Chris Clements, Sales Representative at Swiss-As. "An area of interest has been start-ups that are looking to get up and running with the

> "The difficulty is in developing constructive algorithms that can transform statistics into dynamic and beneficial predictions."
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> *Camilo Sarmiento, TRAX*

The pandemic has boosted the adoption of automation and digitalisation. *Photo: Lufthansa Technik*

most efficient, digital processes possible from day one," observes Clements. He says whilst a large part of the aviation industry has had to focus on survival, there are some operators that have taken the opportunity to build new business and, regardless of their business model be it LCC, scheduled, cargo or MRO, they are understandably keen to harness the best that is available on the market.

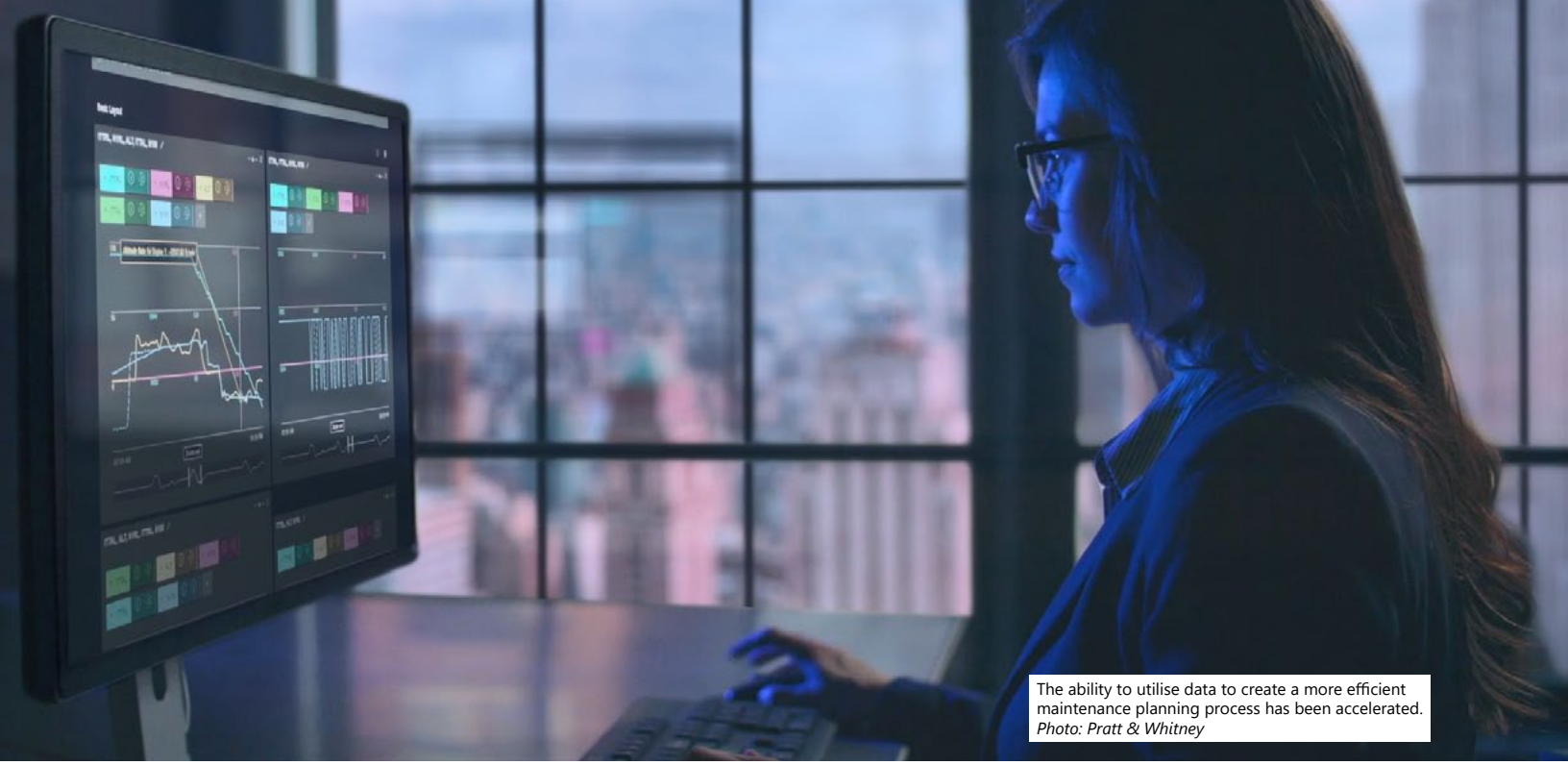
Additional areas of interest lie in the digital procurement processes, utilising Spec2000 standards, to further enhance the digitalisation processes available to the operators and how they interact with their vendors.

The experts at TRAX see a couple of reasons why the pandemic has boosted the adoption of automation and digitalisation. "One clear motivator has been the need to adapt work processes to meet social-distancing requirements, avoid 'contamination' from paper handling and to enable remote work conditions," says Camilo Sarmiento, eMobility Product Owner at TRAX. He adds that the remote inspection capability is an example of responding to today's challenging pandemic restrictions. "Remote digital visual inspection allows a mechanic or inspector to look at objects that are at an out-station or at an aircraft storage location. In addition, regulatory authorities have begun to remove roadblocks to such methods."

In 2020, flight loads were significantly reduced, and redundancies increased due to the pandemic, as Sarmiento looks back - "yet some airlines and MROs were still able to maintain staffing levels due to government subsidies, this meant they

Chris Clements, Sales Representative at Swiss-As

Camilo Sarmiento, eMobility Product Owner, TRAX



The ability to utilise data to create a more efficient maintenance planning process has been accelerated. *Photo: Pratt & Whitney*

could devote resources to technology implementation plans such as digitising their operation, implementing new technology, and training their workforce." And at TRAX they found that some of their operators did proceed with such plans. "The cargo business appears to have grown significantly and a large proportion of TRAX customers in this sector have also started paperless projects to enable efficiencies," he says.

Over at AJW Technique, they have been testing several technologies via proofs of concept. "For example, we tested asset location tracking using RFID and Bluetooth," tells Sajedah Rustom, CEO at AJW Technique. "The proof of concept deployed an off-the-shelf solution developed by a software development company, originally designed for engines, which we customised for repairable components and tooling." Rustom expects that in the long run, this application will create increased internal workflow efficiency by ensuring adherence to turnaround time, fast flow through each repair gate, with pre-emptive bill of material and capacity planning. "It will maintain accuracy of turnaround time clocking on repairs from receiving right through to quality approval. The application of RFID on the tooling side further enhances repair efficiency by saving our technicians time searching for tools during a repair, especially where major tooling is shared amongst repair cells. It also provides the added benefit of proactively managing calibration, cost and down-time of tooling, which can cause turnaround time delays if not strictly managed."

Sajedah Rustom, Chief Executive Officer, AJW Technique

AJW are also presently designing a tablet application, integrated with an ERP system, to streamline the entire workflow of the business. Rustom states that from receiving to shipping, technicians, material controllers, and others will have one-touch access to all the information they require during a repair form bill of

material to task list to repair manuals and technical data. – "This will hugely improve direct touch-time spent by technicians on doing what they do best."

Arun Srinivasan, Associate Director, Strategy, Engine Health Management, Pratt & Whitney

Arun Srinivasan, Associate Director, Strategy, Engine Health Management at Pratt & Whitney notes that several airlines are working to optimise operations and minimise costs so there is a trend towards higher digital investments. He says the ability to utilise data to create a more efficient maintenance planning process has been accelerated in a post-Covid world. "Using flight data analytics, airlines can move to an on-condition maintenance plan. Airlines are utilising data analytics to augment their internal engineering and maintenance teams so that they can more easily integrate flight operations and engine health insights during service and with work scope customisation for MRO shop visits to allow targeted maintenance actions and improved turnaround times."

Will technology and data strategies change after the Covid crisis?

For many companies, the Covid crisis has been a trigger to change their technology and data strategies as increased remote work called for a higher degree of digitalisation and the capabilities of data analysis have further improved. Jonathan Mayer, Head of Innovation, Data and Quality at Spairliners GmbH reckons this will absolutely continue post pandemic, as we observe a desire for even more efficiency in the processes and exchange of information between operators and suppliers.

Mayer says in the field of component support the crisis has led all players into a more "balance sheet driven" approach in the management of inventories. "This is causing an acceleration of inventory management solutions aimed at improving the operational support while decreasing the amount of assets on shelf." Spairliners have been at the forefront of using data analysis coupled with engineering expertise for many years now and developed tools to calculate and calibrate optimal stock levels at component pool locations as well as the on-site inventories that they provide to their customers. In practice, Mayer indicates that this translates into high coverage levels for airlines, meaning a low level of AOG situations, while keeping just the right assets on site.

"The importance of data driven decision support tools to leverage on the wider spectrum of inventory optimisation solutions is also growing. The increased availability of components on the used serviceable material market, coupled with declining prices, is further fuelling this approach as it allows for more levers to provide the right support to airlines," Mayer continues.

David Purfurst, Global Pre-Sales Director at Rusada Aviation MRO Technologies argues that there was already a push towards mobile apps and remote working prior to the pandemic, "so we don't feel that strategies will change post Covid, rather that certain ones will be accelerated."

Purfurst emphasises that the benefits of being untethered from your PC are clear, which is why Rusada have put a lot of work in the past 18 months into their apps. ENVISION Tasks, for instance was released earlier this year to streamline maintenance execution and there are two more on the way for 2021, he reports. "These apps allow you to work more efficiently and collect more data on the go which is why so many companies are looking to adopt this technology.

"With organisations having to work with less resources in a post Covid world, the tools that can provide the greatest gains in

David Purfurst – Global Pre-Sales Director at Rusada

efficiency for the lowest amount of investment will be the most in-demand," Purfurst suggests.

As operators and MRO's transition to the post COVID era, they are faced with some new realities. And as Baugher from Pentagon 2000 highlights, technology has already evolved well to support remote and mobile users; however recent labour shortages and inflationary pressures have caused companies to focus their technology and data strategies on automation and trading partner integration.

The Covid crisis has perhaps highlighted pain points in current processes, and the digital processes currently available would go a long way in alleviating those pain points whilst adopting the current industry best practices. "I am not sure that we have seen the full adoption of available technology and processes to such an extent that any drastic change would be seen post Covid," comments Clements. "The recovery phase may well see those businesses that are in a healthy enough state look to invest more heavily in their digital solutions, as well as their staff, to digitalise. Swiss-AS has services available for our customers to help them review their current adoption of AMOS and identify where they can leverage more from data and business."

Intelligence-driven maintenance planning

Predictive maintenance takes the currently existing capacity for analysing past performance to an entirely new level that anticipates future trends and forecasts solutions. Sarmiento from TRAX says extraordinary amounts of aviation operator data are available – "the difficulty is in developing constructive algorithms that can transform statistics into dynamic and beneficial predictions." For example, Sarmiento indicates that the TRAX eMRO system has a robust component reliability tracking and reporting module that aids engineers, mechanics, and planners in their work. "Our plans are to build on this by taking advantage of new technologies such as machine learning, predictive analytics, and virtual reality digital twins that extend our software's utility beyond historical reliability data and formulas. OEMs and operators are increasingly sharing data and incorporating more sensors, and developers would be remiss not to take advantage of this data to build a more dynamic and predictive software solution."

Big data has enabled AJW Technique to produce a series of solutions including in-house inventory modelling to identify optimum levels of stock to de-risk the operation, pricing algorithms to evaluate and manipulate repair pricing in line with internal and external benchmark factors and more, according to Rustom.

"We are also in the process of working with prospective industry partners to develop a predictive maintenance solution, for improved troubleshooting, component reliability, material provisioning, maintenance capacity and manpower planning thus further integrating the supply chain and delivering customer value." Rustom adds that whilst the industry has a lot to work through to ensure maturity and applicability in predictive maintenance, it will be a game-changer if airframers, component OEMs and MROs alike work together in a trifecta for success.

Big data analytics for processes like predictive maintenance are obviously critical for engine OEMs. At Pratt & Whitney digital capability is paramount to ensure the care of engines throughout their lifecycle. Data analytics and engine health management systems like ADEM™ (Advanced Diagnostics and Engine Monitoring) employ a suite of web-enabled software tools to provide expert analysis of engine health data for more than 8,000 engines in service. P&W say they can create customised, intelligent work scopes, provide early warning detection focused on preventative maintenance, and improve visibility into the overall health of the fleet. "We work to maximise each customer's specific engine performance and engine time on-wing, while maintaining predictable MRO spend," says Srinivasan.

Interestingly, the engine OEM recently announced a collaboration with Teledyne Controls, a data delivery solutions provider, which will enhance engine health management services offered to Pratt & Whitney powered aircraft, focused on Teledyne Control's global customers.

Meanwhile, at Spairliners, they are leveraging on the insights provided by the past data of the extensive fleets they have been supporting over the years. "We employ machine learning solutions to forecast component removals and ensure accurate spare part availability as well as cost prediction," sates Mayer. He says developments in predictive maintenance are the result of operating data combined with shop reports and enriched with engineering expertise. As a service provider and with expertise in integrated component support, Spairliners are positioning as an important catalyst to this process.

Jonathan Mayer, Head of Innovation, Data and Quality, Spairliners

Airlines and MROs should continue to eliminate inefficiencies in their operations and it's clear that to achieve this, they need more data and better ways to evaluate it. "We are seeing data being captured through more avenues than ever before, especially where organisations are using mobile applications over traditional methods," concludes Purfurst from Rusada.