

AVIATION TURKEY

MEHMET NANE
WE WILL REGAIN
OUR PRE-PANDEMIC
CAPACITY IN 2022

AIRBUS'
CRITICAL STEP
FOR HYDROGEN
AIRCRAFT

EXCLUSIVE INTERVIEW
WITH GÖRKEM KIRIŞ
GÜMÜŞEL
COUNTRY MANAGER OF
ROLLS ROYCE

MEHMET KEYVAN
ALL COMPANIES DEALING
WITH NAVIGATION DATA IN
THE AVIATION INDUSTRY ARE
NOW AWARE OF THE NAME
KEYVAN AND THAT IT IS A
TURKISH COMPANY



NET ZERO TARGETS
AND TAKEN ACHIEVEMENTS



BETTER - WISER
STRONGER
TURKISH DEFENCE & AEROSPACE INDUSTRY

EMPOWER

YOUR FUTURE



TF

TURKISH FIGHTER

AVIATION TURKEY

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CEO of Pegasus
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will regain our
pre-pandemic
capacity in 2022

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Gümüşel: We
are a science-
led business
and the science
tells us that, to
avoid the worst
impacts of
climate change
society must
limit global
warming



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METAVERSE
AFFECT
AVIATION AND
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Net Zero targets and taken achievements...

The air transport industry has committed to Net Zero CO₂ emissions by 2050. This pledge brings air transport in line with the objectives of the Paris agreement to limit global warming to 1.5°C. Achieving net zero by 2050 will require a combination of maximum elimination of emissions at the source, offsetting and carbon capture technologies. The aim is to reach 65% sustainable aviation, 13% New technology, electric and hydrogen, 3% infrastructure and operational efficiencies and 19% Offsets and carbon capture.

The aviation industry's net-zero carbon emissions target is focused on delivering maximum reduction in emissions at source, through the use of sustainable aviation fuels (SAF), innovative new propulsion technologies, and other efficiency improvements (such as improvements to air traffic navigation). It is estimated that SAF could contribute around 65% of the reduction in emissions needed by aviation to reach net-zero in 2050. This will require a massive increase in production (in order to meet demand). The largest acceleration is expected in the 2030s as policy

support becomes global, SAF becomes competitive with fossil kerosene, and credible offsets become scarcer. In this case non-conventional or advanced fuels and includes any materials or substances that can be used as fuels, other than conventional, fossil-sources (such as oil, coal, and natural gas).

To reach Net Zero by 2050, the aviation sector will require around 450 billion litres of sustainable aviation fuel (SAF). Lately in collaboration with Braathens Regional Airlines and Neste, ATR performed a series of flight tests with 100% Sustainable Aviation Fuel (SAF) in one engine, an interesting development as the current legal limit is 50% blend. Meanwhile, Turkish Airlines flew for the first time on SAF using its Airbus A321 between Istanbul and Paris CDG.

In the US, Boeing announced the largest procurement of SAF by an aerospace manufacturer, buying 2 million gallons of 30% SAF blend from EPIC Fuels. In Asia, Nestlé will start a Singapore sustainable aviation fuel plant by Q1 2023 and Airbus, Rolls-Royce, Safran and Singapore Airlines have signed the Global Sustainable Aviation Fuel Declaration

at the Singapore Air Show. In Japan, the government aims to have airlines replace 10% of their jet fuel with eco-friendlier alternatives by 2030.

The aircraft industry is expected to continue with incremental improvements to existing technology. Geared turbofan engines and further advances in design will drive a further 15-25% fuel efficiency improvements over the next two decades. From the mid-2030s, however, radical new propulsion technologies and advanced designs may become viable that offer the chance to move away from traditional jet engine and tube-and-wing flight.

Within the concept of Net Zero by 2050, aircrafts industry take new actions. Airbus and CFM signed an agreement to collaborate on a hydrogen demonstrator to fly by the middle of the decade. Airbus have stated their aim to have a commercial hydrogen plane available by 2035, so this collaboration marks a crucial step towards zero-emissions flight. GE Aviation continues to mature hybrid electric technology. Rolls Royce has already pledged to reduce emissions from our its operations to net zero by 2030.



Airport Carbon Accreditation is the only institutionally-endorsed, global carbon management certification programme for airports. It independently assesses and recognises the efforts of airports to manage and reduce their carbon emissions through 6 levels of certification:



'Mapping', 'Reduction', 'Optimisation', 'Neutrality', 'Transformation' and 'Transition'. This Programme covers 393 airports from 78 countries. There are a lot of developments in this area. Dublin Airport Authority lodges plans for solar farm to help power Dublin Airport and identified a 27-acre site close to

airfield to help it target Net Zero emissions. Toulouse-Bagnac Airport has met all the necessary requirements to upgrade to Level 3+ 'Neutrality' of Airport Carbon Accreditation. Over 10 years of the airport's engagement within the programme, Toulouse-Bagnac has reduced its gross carbon emissions

by 42%, which constitutes an excellent achievement! Several projects have contributed to this result: buying electricity from 100% guaranteed renewable sources since 2015, energy renovation of buildings (lighting, insulation, air conditioning and heating production and management system), and

reducing the fleet of service vehicles and replacing them with electric vehicles.

Enjoy the issue...

Ayşe Akalın
Editor in Chief



Mehmet Nane, CEO of Pegasus Airlines: We will regain our pre-pandemic capacity in 2022

✈️ Aviation Turkey: How do you evaluate the year 2021 in terms of aviation after two challenging years? Pegasus Airlines announced the 2021 Q3 profitability as €56 million. What can you say about the current situation?

Mehmet Nane: Like 2020, 2021 also passed under the shadow of the COVID-19 pandemic, nevertheless there was a significant recovery process. The most important reason for this recovery was the increase in consumer confidence thanks to the rapid progress of vaccination program and the ease of international

travel bans implemented by the authorities for precautionary purposes. With the increase in demand, the airline industry brought the seat capacities it offered to the market, especially in the summer, to pre-pandemic levels. From a global perspective, according to the International Civil Aviation Organization ICAO data, it is estimated that the total seat capacity has increased to 60% and the number of passengers to 50%, when compared year 2021 with 2019. However, it is forecasted that there will still be a loss of around \$320 billion in total turnover compared to 2019.

In Turkey, on the other hand, the industry saw a more rapid recovery and remained slightly above the world averages. Number of total passengers rose back to 60% of 2019 in 2021. In addition, we witnessed that the number of passengers reached 75% in the second half of the year compared to 2019. We can say that this was due to the surge in passenger demand following the ease of travel restrictions by authorities. We have already expressed our expectation in this direction; there is an intense demand potential in the market and when travel restrictions are eased or lifted, the demand increases immediately.

As Pegasus Airlines, we have outperformed in the recovery of seat capacity since the beginning of the pandemic. In 2021, our seat capacity reached 75% of 2019, and the number of passengers reached 66%. With the recovery in demand, it was pleasing for us that our seat capacity reached 93%, almost the pre-pandemic level, in the third quarter of the year, our high season, compared to the same period of 2019. In terms of financial results, our sales and operating revenues are still below 2019 levels, but we see a rapid recovery trend here as well. For example, in 2021 Q3 we achieved to increase our sales revenues back to

70% of the level recorded at the same period of 2019. Since the beginning of the COVID-19 pandemic, the global airline industry has suffered huge losses each quarter. Under these circumstances, Pegasus Airlines distinguished itself from the sector, posting a net profit for the third quarter of 2020. We also achieved a net profit of €56 million in 2021 Q3, which we consider as one of the developments that encourages us on the way to “return to normal”.

✈️ Aviation Turkey: Eurocontrol announced the figures for 2021 and Pegasus Airlines ranked 8th across Europe. How do you evaluate your company’s position in Europe in terms of passenger growth and number of flights? What is your projection regarding the return to 2019 figures?

Mehmet Nane: The pandemic hit the aviation industry hard, and airlines suffered dramatically. Travel restrictions, especially for international travels,

led to an unprecedented suppression of passenger demand. As Pegasus Airlines, in the first and most challenging period of the pandemic, we were able to perform highly effective capacity management thanks to our lean operational structure and agile decision-making processes and achieved one of the greatest performances in our industry in capacity recovery. The ease or lift

of travel restrictions in the second half of 2021, especially in parallel with the rapid progress in vaccination program, led to an increase in demand again. We also managed to increase our capacity to almost 2019 levels. We are proud to be able to rank high in Europe amid unprecedented challenges.

Of course, we could not manage to go back to 2019 in all our performance

criteria yet, we still need time. Under current conditions, we anticipate that we will regain our pre-pandemic capacity in 2022, and we will make considerable progress in other criteria such as occupancy level, sales revenues and profitability, with an eye on the course of the pandemic and travel restrictions, as well as the impacts of the global inflationary environment on our costs.





Aviation Turkey: Following the diplomatic relations regarding the reopening of the Armenia-Turkey border, Pegasus Airlines has announced to conduct three flights a week between Istanbul and Armenia. Can you inform us about the new routes that have been launched and to be launched?

Mehmet Nane: Our main source of growth is the new markets we have entered in Russia, the Middle East, Asia, Africa, the Caucasus and Eastern Europe. These markets offer significant opportunities for particular reasons. Such reasons can be listed as the growth

potential of aviation in these markets, where low-cost airline penetration remains low, flexibility in visa regulations, and the increasing foreign trade between Turkey and these countries. We continued to expand our flight network in these regions throughout the pandemic and added Karachi, Chisinau, Odessa, Batumi, Shymkent, Kherson, St. Petersburg, Makhachkala, Osh and Tabriz to our flight network. During the pandemic period, we launched 4 new domestic routes and 33 new international routes.

Aviation Turkey: In 2012, the company placed

an order of 100 Airbus aircraft, the largest order placed at that time. What is the current state of the deliveries?

Mehmet Nane: While observing the course of the COVID-19 pandemic, travel restrictions and demand on one hand, we continued, on the other hand, to make investments and received the delivery of a total of 14 A320neo and 6 A321neo during this period. As per our fleet transformation strategy, we continue to expand our fleet and make it younger with new generation green aircraft. As per our order and according to the current delivery schedule,

we plan to add 20 new generation A321neo aircraft to our fleet in 2022. With the exit of our old generation aircraft from the fleet, 3/4 of our total seat capacity will be covered by our new generation NEO model aircraft by the end of this year.

Aviation Turkey: During the pandemic period, the first delivery was made to Pegasus Airlines within the framework of Airbus' "e-delivery" concept. How do you evaluate this concept and process?

Mehmet Nane: Under normal circumstances, our authorized personnel and



consultants from our relevant technical units are assigned for Airbus new A320neo and A321neo aircraft deliveries. Accordingly, the appointed personnel can directly and in detail examine the technical documents and aircraft by being present at the Airbus delivery center during the delivery process of the aircraft. At the beginning of the pandemic period, when travel restrictions and health measures were adopted, it was impossible for us to be physically involved in the aircraft delivery process at the Airbus delivery center. By creating an innovative solution in line with our cooperation with Airbus,

we were able to perform the delivery process under difficult conditions. While Airbus authorized representatives carried out the inspections of technical documents and aircraft in an electronic environment, our authorized personnel from our technical units took part in the delivery processes of the aircraft remotely. Thus, we remained committed to our growth and young fleet goals, at the start of the pandemic even with greater uncertainty than today. We have proven that we are an airline with the agility to respond and adapt to sudden changes affecting the world and our industry in the fastest way possible.

✈️ Aviation Turkey: Pegasus Airlines has selected CFM International's advanced LEAP-1A engine to power its new fleet of 100 new A320neo/A321neo aircraft. What can you say about the contribution of engine selection to your company in terms of fuel efficiency and environmental responsibility?

Mehmet Nane: We broke new ground in the world with the CFM Leap series engines used in our A320neo aircraft. We were the first airline in the world to use CFM's environmentally friendly new generation engines. In other words, as

Pegasus Airlines, we used the world's most efficient engine in one of the world's most advanced aircraft and became a launch customer. Other airlines across the world have learnt about the performance of this model and engine combination from us. As the engines of our new aircraft consume 15% less fuel than other equivalent models, it indirectly contributes to reducing emissions by 15%. In addition, thanks to its passenger capacity, the A321neos also reduce the carbon emissions per passenger. Thus, fleet transformation becomes a critical step for decarbonization.

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✈️ Aviation Turkey: Turkish aviation industry has made a significant progress, reaching a competitive position in international markets. Havelsan with its Training Platform Simulators and STM with its Electronic Flight Bag Capabilities, Cockpit and Cabin Information Management Applications have transferred their knowledge and experience from the defense and aviation industry, where certification processes are of great importance, to the civil aviation industry. How do you evaluate the development of the Turkish aviation industry? As Pegasus Airlines, what is your approach to the domestic ecosystem and cooperation with the domestic industry?

Mehmet Nane: With our digital transformation journey that we started in 2018, we have implemented and continue to implement significant projects. Our PLATO (Planning & Training Optimizer) project, in which we developed the Flight Academy Training Planning System from scratch, is one of such key projects. Thanks to PLATO, we can make highly efficient training plans for our 1,200 pilots, 89 flight instructors and 3 flight simulators, making use of artificial intelligence.

With our Smart Cabin tablet application, which

we developed for use in the cabin, we enable our cabin crew to instantly access information about the flight and our guests. For example, the seat numbers of our guests with disabilities, babies and wheelchairs who need special services can be easily tracked through the system and the services they need can be provided accordingly. With Smart Ops, our other application, we have made it possible for all our flight crew to access information about their duties from anywhere in the world via their own mobile devices.

In order to make aircraft maintenance activities easy and efficient, we have implemented our Smart Technic application for our aircraft technicians. Thanks to this tablet application, our technicians can access the necessary information and make the required entries to the system while they are working in the field and performing their maintenance tasks. Thus, we have enabled paperless, efficient and flawless task management through the application. We continue our efforts to prevent loss of flight time by using augmented reality with wearable equipment and providing remote technician support.

Additionally, we have put into use our SENKRON system, which enables us to manage all our ground operations effectively, efficiently and in real time

with the support of IoT and artificial intelligence. We continue to work on our projects aiming to make use of the power of artificial intelligence and big data on flight safety issues. Thus, we will ensure that the risks are predictable arising from conditions such as the runway and weather conditions at the airport where the flight to be conducted.

We have implemented all such systems and applications together with our domestic aviation companies and technology suppliers in our ecosystem, with the support of our universities and with the cooperation of domestic and foreign authorities such as DGCA, IATA and EASA. Thanks to these efforts, we have not only invested in the areas we deem necessary, but also made substantial contributions to the development of aviation technology in our country. We will see the Turkish origin technology products in the field of aviation to become more available in the market soon.

✈️ Aviation Turkey: Operating with the motto "Turkey's Digital Airline" as of 2018, Pegasus Airlines is known to be a pioneer in this field and attaches great importance to the subject. What are your activities within the scope of digital transformation?

Mehmet Nane: We, as Pegasus Airlines, have already started our digital transformation in 2018. We not only renewed our website and mobile channels, but also started to implement several innovations in the airport and in-flight travel experience. Travel Assistant Program, Express Baggage service, New Chip ID and Travel Technology are just a few of them... Today, as "Turkey's digital airline", we offer our guests exceptional novelties that will facilitate their travel experience by using digital technologies in all our processes from A to Z. Digital transformation will also be one of our top priorities in 2022.

If we look at the passenger side, we will add new features to our Travel Assistant application in 2022 and work to make sure that our guests have a more comfortable travel experience. We plan to include additional self-check-in services in our Express Baggage kiosks, such as seat selection, and expand the locations we serve. We will continue our developments as part of our 360 Flight Search project, in which we started to offer the cheapest flight tickets monthly and annually. Moreover, we will work with the ambition to support all our operational systems with digital transformation and continuous improvement, and to be

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one of the airlines that uses technology best. Our digitalization journey will continue at full steam in order to both facilitate the lives of our guests and increase the performance of our employees and processes.

Aviation Turkey: Recently, Boeing has announced that it will build aircraft in the metaverse. We observe that airlines are starting to position themselves in the metaverse in terms of passenger demands and needs, marketing, entertainment and even personnel training. As Pegasus Airlines, what are your plans regarding metaverse and XR/VR technologies?

Mehmet Nane: We have been thinking about and following very closely the metaverse. We keep a close eye on the developments in order to both adapt to new technologies and take the right steps to align with our own strategies. With the evolution of the internet, we, as "Turkey's digital airline", keep up with these developments, which we think are important for new generations today and will increase in importance in the future. While doing this, one of the most important aspects we focus on is to develop projects that are useful and compatible with the use and philosophy of platforms.

Aviation Turkey: Pegasus Airlines, one of the leading airline companies committing IATA's "Net Zero Emissions by 2050", aims to reduce its emissions by 20% by 2030. Can you inform us about your efforts to this end?

Mehmet Nane: As Pegasus Airlines, we conduct all our operations with the understanding of "sustainable environment". We perform studies as part of the efforts fighting against climate change. Within the framework of reducing greenhouse gas emissions, which is quite critical for the aviation industry, we fully comply with the regulations introduced by the national and international authorities for the industry, and we fulfill the monitoring, verifying and reporting the total carbon emissions during the year in accordance with the international regulations. We also make efforts to reduce emissions at the source of the process, with operational measures such as rejuvenating the fleet, acquisition of low-emission aircraft models, reducing weight in aircraft, and optimizing routes. We plan all such efforts in line with our company's governance strategy in the field of sustainability and to support its outputs.

In line with IATA's "Net Zero Emissions by 2050" resolution approved in 2021, we became one of the leading airline companies

in the world that made this commitment, and we also set our interim target for 2030 in order to reinforce this commitment. We aim to reduce our flight-related carbon emissions per RPK by 20% compared to 2019, by 2030. In addition to our commitment to "Net Zero Emissions by 2050", we have started to share the flight emissions on a monthly basis, with the October 2021 report, on our investor relations website, in line with the principle of transparency. We will continue to manage all our operations and activities with a "sustainable environment" perspective.

Aviation Turkey: You have been elected as the Chair of the IATA Board of Directors to take office as of June 2022. You will be the first Turkish Board Chair of IATA. You previously served as the board member. What is your vision for this role in terms of its contributions to both the Turkish and European aviation industry?

Mehmet Nane: The Turkish civil aviation industry has made a significant progress since 2003 with the foresight and strong support of our government. Turkey is a shining star in the world with its civil aviation industry that continues to develop and grow increasingly. The COVID-19 pandemic has certainly had a negative impact on our industry and our country as well as all other sectors and countries. As all stakeholders of Turkish

civil aviation, we continue to work with all our capacity to return our industry to the pre-pandemic days, to develop it further and to strengthen its rising position in the world.

As for the IATA Board Chair, I am very proud to have been deemed worthy of such an important task. This is also an important indicator of the point that Turkish aviation has reached. The aviation industry, which is a supporter of numerous sectors in addition to its own critical role, is going through one of the most challenging periods in its history. As IATA, our greatest task is to exert efforts so that our industry, a driving force for global economies, can return to the pre-pandemic level as quickly as possible and to continue its sustainable development. I will do my best for this. We will overcome these tough times striving together.

Aviation Turkey: Pegasus Airlines is one of the first airlines in the world that signed IATA's "25by2025" gender balance pledge, an initiative for IATA member airlines to improve female representation in the industry by 25%, or up to a minimum of 25% by 2025. In the following period, the aviation industry has faced the pandemic reality and it seems that there will possibly be a deviation in this target. Can you tell us the progress Pegasus Airlines has made in this regard?

Mehmet Nane: Gender equality is a very important issue for us at Pegasus Airlines and we have ongoing activities. As Pegasus Airlines, we are the first airline in the world to join the UN Women's Empowerment Principles platform. We are performing activities as a member of the DGCA Gender Balance Development Commission. We support organizations such as YANINDAYIZ Association, wtech Women in Technology Association, Women in Sales (WiS) platform. By signing IATA's "25by2025" initiative in 2019, we pledged to ensure gender balance within our company. In this context, we continue to review our target on a quarterly basis. In addition, by taking part in the Target Gender Equality program, one of the programs developed by the United Nations Global Compact for member companies, we set our goals to increase the representation and leadership of women in senior management, and we are taking firm steps towards achieving our goals through performance analysis, workshops and learning opportunities between member companies.

We are happy and proud to have women excelling in their fields at every level in Pegasus Airlines, from pilots to senior

management. Regarding our company's dedication to gender balance, we name our new aircraft after the girls of our employees. We will continue to advocate the gender balance and exert efforts for a gender equal world.

Aviation Turkey: As the first implementer of IATA Travel Pass in Turkey, Pegasus Airlines has fulfilled this integration. Can you inform us about this application?

Mehmet Nane: By signing an agreement with the International Air Transport Association (IATA), we became the first airline to launch the IATA Travel Pass application as a pilot in Turkey, and after successfully completing our pilot studies, we were among the first airlines in the world to offer this application to their guests on international flights. The IATA Travel Pass application, which allows our guests to digitally store and manage the necessary health-related certifications such as COVID-19 test results and vaccination certificates, and to receive approval for flights by declaring them when necessary, can be used on many of our international flights. With this application that combines the verification of health information in a single digital app, our guests can have a

faster and smoother travel experience in terms of the country entry requirements for international travel that vary during the pandemic period.

Aviation Turkey: Pegasus Airlines attaches great importance to social responsibility projects. "Flying into the Future", the social responsibility project launched by Pegasus Airlines in 2018 to support ideas around youth empowerment has entered a new term. What can you tell us about this project?

Mehmet Nane: We care about youngsters and believe wholeheartedly in the importance of supporting them so that they can make a valuable contribution to society. We are also aware that support is essential for putting valuable ideas about their empowerment into action. Now, the 3rd term begins in our "Flying into the Future" project. In this new term, we aim to provide more comprehensive support to the projects of NGOs focusing on youth. Our primary goal is to contribute to the empowerment of our youngsters who are depressed and discouraged especially due to the pandemic.

Within the scope of the project to be co-organized by the Support Foundation

for Civil Society (STDV) between February 2022 and March 2023, we will provide support to three non-governmental organizations for their online or in-person projects focusing on young people between the ages of 18 and 29. Projects that are related with youngsters and contribute to gender equality and the environment, which are also adopted as key principles in our company, will be prioritized during the selection process. Projects aiming to empower young people in three different themes will be supported: "protecting the environment and fighting against climate change", "well-being of young people", "digital literacy and digital security" will be supported.

Aviation Turkey: Is there any message you would like to add for our readers?

Mehmet Nane: We are a company that addresses its passengers as "guests" and our core value is to always treasure people. With our guest-oriented service approach, we are working hard to improve and facilitate the travel experience of our guests as "Turkey's Digital Airline". While working for our guests, we will make every effort for a more equal and sustainable world 🌍



HOW DOES METAVERSE AFFECT AVIATION AND TRAVELS?

by Muhammed Yilmaz

After Facebook changed its corporate name to Meta in October 2021, we have started to hear the term “metaverse” frequently. Metaverse promises us a future where we can be virtually anywhere we want, without the necessity to be there physically. So how will our travels and the aviation industry be affected as we rapidly make steps towards such a digital future?

Metaverse is summarized as the convergence of digital and physical experiences through the internet. Thanks to augmented reality, a world awaits us where digital experiences can be placed in physical spaces with virtual reality

reflecting real-life physical spaces in all details. This scenario certainly seems to rock the foundations of both our travels and the aviation industry.

With the effect of the pandemic, intercity and inter-country business travels have substantially decreased. Physical meetings have moved to virtual meetings. Although business travels seem to regain momentum in the short term in the post-pandemic period, according to many experts, the future of the business travel industry is not very promising in the long term. Businesspeople will no longer need to make long hours of flights to shake hands or make eye contact, as the platforms through which we conduct online meetings will be able to become exact replicas of physical meeting rooms thanks to metaverse.

In the world prevailed by the metaverse, it is claimed that the vast majority of travelers will make these travels for entertainment and touristic purposes. The prevalence of such vacation and leisure travels is expected to change all other transport infrastructure and means, especially airport terminals and airplanes.

METAVERSE AIMS TRANSFORMATION, NOT DEVASTATION!

Don't get nervous about what I've said! The metaverse, which is expected to pave the way to a more digital and robotic world with major changes in every aspect of our lives, from urban transportation systems to business manners, does not aim to wipe out existing systems. Instead, it aims to make a transformation.

Metaverse will enable us to create high-quality digital twins of what we physically experience, such as airports, airplanes, and digitally manage them. And this seems advantageous in theory as it will eliminate inefficiencies and difficulties.

This new way of managing complexity will become autonomous through codes to be continually developed by artificial intelligence and this will accordingly deactivate the inefficient systems and programs developed by the human brain today. Thus, all transportation services where passengers are dynamically routed through multiple models will be managed over a network. For instance, after you get off the plane, the hours of the metro from the airport to your hotel and the traffic jam on the road



will be managed in sync within this complex system. The entire transportation infrastructure will turn out to be more holistic.

BOEING TO BUILD AIRCRAFT IN “METAVERSE”

US aircraft manufacturer Boeing also plans to make a rapid transition to metaverse technology. Boeing pressed the button for futuristic projects worth \$15 billion in total, where it seeks to gather its design, production and services to airlines under a single digital ecosystem.

Boeing preps to lay the foundations of the new aircraft model, which is planned to be launched in the next decade, with the metaverse. The company aims to avoid the manufacturing problems it has experienced in the 787 Dreamliner and 737 MAX aircraft, thanks to the new system.

Boeing describes this move as strengthening engineering and fundamentally changing the way they work across the entire company. At Boeing's future facilities, three-

dimensional virtual designs will be twinned with robots communicating each other. Officials around the world will be able to connect to this system with the \$3,500 HoloLens headsets. A team of over 100 engineers has already started this digital transformation process.

Considering that metaverse will offer faster, higher quality production and better communication, it will be possible to manage it better when a problem arises in processes. As the quality of received parts improves during the supply process, the aircraft manufacturing process will be more smoothly. It is aimed to increase financial performance by minimizing inefficient work.

DIGITAL TWIN ERA IN AIRCRAFT MANUFACTURING

Boeing management estimates that more than 70% of quality issues on existing aircraft trace back to some kind of design issue. With the new digital system, Boeing envisages that a new airplane model will be available to market in just 4-5 years.

Thanks to the metaverse, Boeing will be able to build 3D digital twins of airplanes and conduct various simulations. Digital threads will be integrated into each virtual design. In this way, every piece of information from airline requirements to the basic requirements of millions of parts and to thousands of pages of

certification documents can be combined and processed. Thanks to the resulting digital mockups, it will be possible to master every detail of the aircraft, from its design to its development and performance. The overhaul of existing paper-based practices will also be one of the most critical steps of this important change.

BOEING'S METAVERSE GAMBLE

Perhaps Boeing's metaverse ambitions could be a game-changer. However, Boeing needs to support this digital revolution with organizational and cultural changes it will make across the company. Boeing had previously integrated digital design tools in its 777X and T-7A Red Hawk training jet projects. However, both projects faced various technical problems. Boeing is about three years behind schedule in the 777X project. The T-7A has also suffered from delays.

It is obvious that Boeing has repeatedly made similar ambitious pledges about the digital revolution and failed to achieve its goals. That's why the industry has some second thoughts about Boeing's breakthrough in the metaverse. However, at this time of multiple major challenges, there is a prevailing view within Boeing that the goals to improve quality and safety are far more urgent and important. Boeing, which has suffered reputation

and financial losses while struggling with the 737 MAX and 787 Dreamliner crises over the past few years, needs a big win to get things back on track. So, the US manufacturer took such a gamble of \$15 billion. The metaverse strategy will either get them out of the turbulence they're in, or this turbulence will get even worse and cause irreversible damage. We will see the result together.

METAVERSE: A NEW FRONT IN BOEING-AIRBUS WAR

Boeing's main competitor, Airbus, has also pledged to leverage digital technologies to develop new manufacturing techniques for the optimization of its industrial system. Both aircraft giants are preparing to step into the digital revolution simultaneously. This indicates that the competition in the aviation industry will shift to the metaverse axis soon.

In conclusion, the future seems to be quite different from today. The concept of travel will apparently undergo a major transformation. The aviation industry will also exceedingly get its share from this transformation. That's why the giants of the industry have started to develop strategies to properly position themselves for the future. It is our common expectation that the results will be in favor of us, as the passengers and the entire industry...



Görkem Kiriş Gümüşel: We are a science-led business and the science tells us that, to avoid the worst impacts of climate change society must limit global warming

Ayşe Akalın, editor in chief of Aviation Turkey magazine asked Görkem Kiriş Gümüşel, country manager of Rolls Royce, about companies' activities during pandemic and also the effects of climate change and the role Rolls Royce playing in zero carbon activities in civil aviation

Ayşe Akalın: As an unexpected threat to the globe, the COVID-19 pandemic has unquestionably affected the aviation industry the most. As a world player

within the industry, what are your thoughts on the current status of civil aviation?

Görkem Kiriş Gümüşel: The COVID-19 pandemic had an enormous impact on the aviation industry. Affecting passenger traffic, air cargo demand, airport workforce, and incoming revenues, many industries relying on aviation went through hard times as a result. According to 2021 World Airport Traffic Report (WATR) released on last November, the COVID-19 outbreak reduced the number of passengers at the world's airports by

more than 5.6 billion in 2020 and was forecast to remove an additional 4.6 billion passengers by the end of 2021, compared to 2019 volumes. We don't have the latest numbers for 2021 yet but these numbers reveal how significantly the industry has been affected.

However, the pandemic has buffeted private aviation more lightly than civil aviation, business aviation has almost returned to pre-pandemic levels. We have also seen flying activity for our large engines operated on domestic routes in both the US and China return to levels last seen in 2019.



by Ayşe Akalın

International traffic, meanwhile, has been on a gradual upward trajectory since the low point in April 2020. We remain confident that as border restrictions relax, the recovery of international travel will accelerate. This is what we are already seeing in domestic and business aviation is an encouraging proof point.

we'll protect our business for tomorrow. Our vision as Rolls-Royce is to pioneer the power that matters for a net zero carbon future. That's why we're putting net zero at the heart of our growth and innovation agenda. We see it as our responsibility as well as a business imperative to act on climate change. We are committed to playing a leading part in helping society transition to a net zero carbon economy, whilst maintaining the levels of global connectivity our products provide.

We are a science-led business, and the science tells us that, to avoid the worst impacts of climate change, society must limit global warming to 1.5°C by the end of this century. An average global temperature rise above that level would create risks that the global economy is not equipped to withstand. That's why we joined the UN Race to Zero last year and have pledged

to reduce emissions from our own operations to net zero by 2030 and to play a leading role in enabling the sectors in which we operate to reach net zero by 2050.

Decarbonising power and making the shift to 100 percent clean, affordable, and reliable energy is a major part of our achieving net zero strategy. Our decarbonisation pathway sets out our two primary aims; to reduce the emissions associated with our products to net-zero and, to pioneer breakthrough new technologies that can accelerate the transition to a net zero carbon future. Therefore, our strategy starts with the emissions in our own operations, extends to our value chain, and ultimately focuses on the contribution we can make to the global transition.

Achieving these goals will require us to ensure all our existing fleet can

be operated in a net zero carbon manner, and to introduce new low and net zero carbon products to the market which will act to abate emissions in areas we are not present in today. To enable and accelerate this transition, our teams have made considerable progress by testing lower-carbon alternative fuels, and developing advanced engine designs to further increase fuel efficiency.

Beyond our work and effort, we believe in our technological innovation which can create long-term solutions to the climate crisis, and we remain focused on delivering the breakthrough innovations that society requires of us as technology leaders. Therefore, our top priority is the development of technical solutions that can directly reduce or remove carbon emissions, permanently to leave a healthy planet for the next generations.

Ayşe Akalın: Sustainability has been accelerated all around the globe and many countries are now committed to reducing carbon emissions due to climate change and its effects. How does Rolls-Royce plan to keep up with this transition? What do you and Rolls-Royce think to decrease the effects of climate change?

Görkem Kiriş Gümüşel: Being sustainable means understanding the impact our business has on the world around us, and the impact the world around us has on our business. We use this understanding to inform our purpose, strategy and the decisions we make. It's a vital part of what we do today, and how





✈️ Ayşe Akalın: Rolls-Royce is committed to ensuring its products to be compatible with net zero operation by 2030. What are your priorities in civil aviation within the framework of this change?

Görkem Kiriş Gümüşel: Our family of aircraft engines has been continuing to push the boundaries of what is possible to enable the transition to net zero.

With this aim in mind, we have been working on a new engine architecture called UltraFan since 2014. It features a new architecture and light-weight composite materials as well as the world's most powerful aerospace gearbox. The new generation engine will be 25 percent more fuel efficient than the original Trent 700 and is a key element of the Rolls-Royce sustainability strategy as part of its

commitment to continue to improve gas turbine performance.

Furthermore, under the UN's Race to Zero goals the current 'breakthrough' required for the decarbonisation of aviation is to achieve a minimum of 10 percent Sustainable Aviation Fuel (SAF) use by 2030 with the proportion not reaching 100 percent earlier than 2050. Therefore, we have recently announced that by 2023 all our 'Trent' engines, used across a range of long-haul aircraft, will have been proven compatible with 100 percent SAF. That builds on its earlier commitment to test Trent models currently in production and means that within two years Rolls-Royce will have proven that net zero carbon operation is possible with about 40 percent of the world's long-haul aircraft engines.

Additionally, we have partnered with Boeing and World Energy to carry out a test flight of our 747 Flying Testbed aircraft using 100 percent SAF on a Trent 1000 engine.

We have an increased focus on electrification and a number of projects underway. We have been working on an incredibly exciting project called ACCEL (Accelerating the Electrification of Flight) with the UK Government and partners at Electroflight and YASA. It's a highly specialized challenge to build the world's fastest all-electric aircraft. Through our ACCEL project, we aimed to build the world's fastest all-electric plane and develop our electrical expertise.. Our "Spirit of Innovation" aircraft completed its first flight back in September, and on 16 November 2021,

it reached a top speed of 555.9 km/h (345.4 mph) over 3 kilometers, smashing the existing record by 213.04 km/h (132mph). We have now officially broken two world speed records as verified by the World Air Sports Federation. The aircraft also achieved 532.1km/h (330 mph) over 15 kilometres – 292.8km/h (182 mph) faster than the previous record. As well as a stunning technical achievement, the project and world record runs provided important data for our future electric power and propulsion systems for all-electric urban air mobility (UAM) and hybrid-electric commuter aircraft. The characteristics that 'air-taxis' require from batteries, for instance, are very similar to what was developed for the 'Spirit of Innovation'.

TURKSAT
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✈️ Ayşe Akalın: Operating in Turkey for a long time, Rolls-Royce has made multiple cooperations, one of which is with Turkish Airlines. In this context, can you tell us about the activities you carry out with THY? What kind of solutions do you offer?

Görkem Kiriş Gümüşel: Turkey is full of opportunities and we are committed to do our best to support the country in order to reach its full potential. It is a strategic market for us with its diversified order book and strong business volume.

Our long-term partnership with Turkish Airlines started with the selection of Rolls-Royce TRENT engines powered A330 in 2009. THY is currently operating

28 Rolls-Royce powered Airbus A330s under the Total Care Service Agreement. Additionally, Rolls-Royce powered Airbus A330 & A340 and Gufsteam Business Jets are being used for VIP operation. THY also ordered Airbus A350 aircraft powered with Trent XWB engines which entered into service starting from 2020.

Our Trent XWB engines are world's most efficient large aero-engine balancing fuel efficiency and life cycle costs while delivering weight savings and improved aerodynamics. Therefore, it flies farther on less fuel – reducing fuel consumption by 15 percent compared to the first Trent engine.

With this technology the new fleet will serve increasing

demand from Istanbul's new airport. To help and maintain Turkish Airlines' operations within our partnership, we also have a technical team based in customer facility in the Istanbul Ataturk Airport that provides on-site support for the airline customer in the region. We hope to keep working together with Turkish Airlines as well as other airlines by providing our new technologies and services.

We are also looking for new opportunities to make a positive impact in the community. In this context, we are working on a new STEM project called "Science Movement" in Turkey in cooperation with YGA (Young Guru Academy). With the help of this project,

we will be able to engage with students across the country. To succeed in this new information-based and highly technological society, students need to develop their capabilities in STEM to levels much beyond what was considered acceptable in the past. We hope that our project will help inspire these children to experiment with hands-on learning and boost their curiosity in these critical subjects. Every child we reach could play an important role in the development of our country in the field of science and technology. For this reason, we are determined to help inspire the next generation of engineers, who will be essential to empowering innovation and enabling a net zero carbon future 🌱



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THE DREAM IS OVER!

The world held its breath, cautiously watching the developments in Ukraine. During Russian attacks on Ukraine, one of the most valuable symbols of aviation was also destroyed. The only one of its kind, the world's largest cargo plane Antonov An-225, at its base Hostomel Airport, was rendered inoperable by the attack of the Russian Air Force. The giant plane, which was built by the Russians as a Cold War product, was destroyed ironically by the Russians in a hot conflict.

Ukrainian Foreign Minister Dmytro Kuleba announced on February 27th that the Antonov AN-225 was destroyed by Russia. This news shocked and upset the aviation world.

The dream aircraft was under maintenance in the hangar when it was attacked by the Russian troops. One of the engines was dismantled for repair. Therefore, it could

not fly to another place even though it was under a possible attack.

It seems Ukrainians' determination of never giving up on their dream of a strong, free and democratic European state is also applicable on rebuilding the An-225. With the statement made by the Ukrainian state defense company Ukroboronprom, which also



by Muhammed Yilmaz
Aeronautical Engineer

governs Antonov, it was confirmed that the plane, which was destroyed by occupiers, will be rebuilt for approximately 3 billion dollars in the next 5 years, and the costs will be covered by Russia.



THE GIANT PLANE WAS MAKING A DIFFERENCE!

There are several different answers to the question of which the largest aircraft in the world is. Considering the number of passengers it carries, the answer is Airbus A380. Airbus Beluga XL, if considered as per the fuselage. With its 285 tons of

weight, the heaviest aircraft ever produced is the Antonov An-225. The most distinctive feature of the Antonov An-225, with its impressive appearance, was its gigantic size. Being the largest cargo plane in the world and with its capacity to carry over 250

tons of cargo, this giant was far ahead of all its rivals in this category as well. The An-225 was also the world's longest aircraft with 84 meters length. With a wingspan of 88.3 meters, it was at top of the list among the aircraft currently in active operations.

With 6 engines and 32 wheels, some of which are steerable to assist with maneuverability, the AN-225 was one of a kind. Sorry to say, this giant plane is no longer available.

It is literally not wrong to say that the greatest attribute of the An-225 was captivating the crowds watching its takeoff and landing, wherever it flew in the world. Even the announcement made that she would land in Istanbul for refueling on October 5, 2021 was sufficient to create great excitement among aviation enthusiasts in the country.



For a brief comparison, the single-aisle passenger plane Boeing 737 MAX has a wingspan of 118 ft (approximately 36 meters). Whereas the distance between the two wingtips of the An-225 was 290 ft (88.3 meters).

With a maximum take-off weight of 640 tons, the An-225 had a range of up to 4500 km when fully loaded. The plane, if unloaded, could fly 15,400 km. In other words, it could fly the cargo it received from London to almost anywhere except Antarctica, the East Coast of Australia and some parts of New Zealand.

BUILT TO CARRY A SPACECRAFT!

Initially, the construction purpose of this giant cargo plane was quite different. It was designed and built by Viktor Tolmachev for transporting from the production center to the launch site of the Buran Spacecraft and other space vehicles and equipment produced by Russia, which started competing with the U.S. in the field of space studies, during the Cold War period. The An-225 made its maiden flight on December 21, 1988. It was exhibited in the static area of the Paris Air Show in 1989. It made demonstration flights during the Farnborough Air Show in 1990.

Two An-225s were ordered for the Soviet space program however, only one of the planes could be produced. Due to the collapse of the Soviet Union and the end of the Buran space program, Antonov was never able to complete the production of the second An-225.

AN-225 REGISTERED IN UKRAINE

Following the collapse of the Soviet Union, the cargo plane was towed to the hangar in 1994. The An-225, which remained idle until 2001, was made fit for flight after 7 years at a high cost. Type certificate of the aircraft was granted by the Interstate Aviation Committee (IAC) in May 2001 and it was back in the sky.

The plane, named Mriya, which means "dream" in Ukrainian, held the UR-82060 tail registration. After relaunching in 2001, it was used to transport a wide variety of cargoes around the world. Operated by Antonov Airlines, the aircraft was leased to companies for various purposes.

The fact that it could carry loads on the upper part of the fuselage, (the Buran Spacecraft was also carried in this way), in addition to the cargo compartment inside the fuselage, was a great advantage for the AN-225.

SPECIAL SYSTEM FOR THE CARGO COMPARTMENT

It was possible to use almost the entire 84-metre-long fuselage as a cargo compartment. This gave the An-225 an enormous capacity of 1,200 cubic meters. The 43.35 m long, 6.4 m wide and 4.4 m high cargo compartment allowed the oversize and different shape cargoes to be placed easily on the plane. The length of the aircraft's cargo compartment was even longer than the Wright Brothers' flight distance in its first flight in 1903.

For loading and unloading, the AN-225 had a special design nose mechanism. This mechanism made the difference when handling oversize cargo, allowing the aircraft to "kneel" on the nose landing gear if necessary.

RECORD-BREAKER AIRCRAFT SET 124 WORLD RECORDS

The An-225 was a record-breaker aircraft. Each operation of this giant plane was in fact a record attempt. It managed to set 214 national and 124 world records under various categories, including the record for the heaviest cargo ever airlifted at 253,820 kg on September 11, 2001.

Mriya had already set two different world records the moment it received its airworthiness certificate. The aircraft with the world's highest maximum take-off weight of 640 tons and the widest wingspan among current airplanes quickly brought the An-225 its first two world records.

The aircraft's first commercial flight took place on January 3, 2002. The An-225 carried 216,000 ready meals weighing 187.5 tons from Stuttgart, Germany, to the US military base in Oman.

In 2004, it carried the ventilation ducts of a factory from Billund-Denmark to Kazakhstan for €266,000. The heaviest-ever single cargo transported by air was carried by An-225 in 2009. 189-ton generator was carried from Frankfurt to Yerevan, the capital of Armenia. The longest-ever cargo carried was the 2 wind turbine blades in 2010, with a length of 138 ft. (approximately 42 meters). These blades were transported from Shijiazhuang, China, to Skrydstrup, Denmark.

Mriya's records are not only related with the transport of large or heavy loads. In 2012, the AN-225 set another Guinness World Record by hosting the art exhibition at the highest altitude at 10,150 m above sea level. The exhibition in the sky hosted 500 artworks created by 120 artists.



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TURKISH CARGO

NEW RECORDS SET ALSO DURING THE PANDEMIC

Having delivered a wide range of services from disaster areas to evacuation operations, from commercial transportation to military missions, the An-225 was used to transport emergency medical supplies, personal protective equipment and food all over the world during the COVID-19 pandemic.

Dream plane kept on breaking records with the cargoes it carried during the pandemic. On April 14, 2020, the 1,000 cubic meter load, containing Personal Protective materials was transported from China to Poland, which was the largest cargo volume in history. To achieve a safe loading of such a large volume of cargo on the An-225, the loading specialists dismantled the pallets and loaded each box individually.

THE MOST CHALLENGING OPERATION OF AN-225!

According to the Antonov team, the An-225's most challenging operation was the transport of twelve steam generators from Chile to Bolivia in June 2018. The An-225 was the only option to transport the generators, each weighing 160 tons. This operation was



conducted with the longest consecutive flights in the history of the aircraft. 12 consecutive flights were planned.

The lifters on the top corners of the generators were too long to fit in the cargo containment. After long-lasting efforts, such lifters could be removed. Thus, the generators were fitted into the plane and using bolted connections, the lifters could be reattached to the other end during unloading. For this project, the load planning team also developed a special system to create an even weight distribution of the load to the aircraft floor.

Not done yet! Since night operations and flights were not allowed at the airport, all loading and unloading operations had to be done during daytime. Since there was no towing tractor at the airport with the required power, Antonov had to bring his own towing tractor from Gostomel

Airport, Ukraine, to Chile to load the generators. Mission completed with 12 consecutive flights between Chile and Bolivia to deliver the generators.

WHAT WAS THE HOURLY RATE OF ANTONOV AN-225?

The hourly cost of operations performed by the An-225 was nearly \$30,000. For this reason, it was generally preferred for short-term missions that could not be performed with other existing aircraft.

In 2006, it was announced that the second aircraft was aimed to be finalized within 2 years. However, the schedule was delayed soon afterwards. In 2009, it was announced that the plane was waiting in a hangar in Kiev, 70% complete. In Ukrainian Newspapers, it was reported that 300 million dollars were needed to complete the plane in 2011.

Antonov's CEO Oleksandr Donets stated that the completion of the plane was "economically unviable". It was also claimed that considering the costs of the operations carried out by the current An-225, the completion of the second aircraft was not financially practical.

HOW LONG WOULD THE AN-225 FLY?

The legendary aircraft was planned to continue its operations for a while more. The fuselage of the aircraft certainly was worn-out in 33 years since its maiden flight. However, the An-225's important advantage was that it was used much less than a standard commercial aircraft. Antonov Airlines previously announced that the aircraft's service life was extended to 45 years and would remain in active service until at least 2033. In 2019, the aircraft underwent 18-month major maintenance and overhaul. It was announced that this process was a critical milestone for the aircraft to reach its targeted lifespan.

I hope the Ukrainian authorities are proved right and we will have the chance to see one of the most special icons of aviation, An-225 takes to the skies again. Unfortunately, the legend didn't deserve such a goodbye! 🙏



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Mehmet Keyvan: "All companies dealing with navigation data in the aviation industry are now aware of the name KEYVAN and that it is a Turkish company"

In this special interview we talked about Keyvan Aviation's current activities and future plans in Aviation industry and also being the first company in Turkey to receive the international Type 1 DAT Provider Certificate issued by the European Aviation Safety Agency (EASA) and the 4th company in the world.

İbrahim Sünnetçi: Can we start our conversation by getting information about the journey of KEYVAN Aviation Group, headquartered in Istanbul, which was founded with more than 20 years of aviation experience, and its footprint in the Aviation Industry today?

Mehmet Keyvan: We started the establishment of our company in 2019. Officially, our establishment process was completed

in January 2020. With more than twenty years of experience and vision in the aviation industry, we undertake the most innovative projects. Our biggest capital is our young and dynamic team. Together with our team, we are working hard to constantly produce new projects and, as a Turkish company, to put them at the service of all world aviation.

İbrahim Sünnetçi: Can we get information about

KEYVAN Aviation's current organizational structure, personnel situation and targets and expectations for 2022?

Mehmet Keyvan: The number of employees of KEYVAN Group is 80. The majority of our workforce performs in the field of aviation data generation. We have a quality control team to ensure the quality of the data we produce. All the departments work in



by İbrahim Sünnetçi

cooperation with each other in line with our company's production, productivity and growth targets. In 2022, we aim to reinforce our communication and agreements with our international and domestic

customers compliant with the production process required by our LOA Type 1 Dat Provider certificate.

İbrahim Sünnetçi: Could you please inform us about the products and the projects in which KEYVAN Aviation has been developing core technologies in the field of aviation and implement its projects?

Mehmet Keyvan: KEYVAN Group has a staff of eighty people. The majority of our team works in the field of aviation data generation. We have a quality control team to ensure the quality of the data we produce. All our departments work in communication and cooperation with each other in accordance with our company's production, efficiency and growth targets. In 2022, we aim to strengthen our communications and agreements with our international and local customers in line with the production that our LOA Type 1 certificate authorizes us.

İbrahim Sünnetçi: Aviation databases are used by avionics manufacturers to create a navigation database. Can we get information about Aviation Databases, which are among the services offered by KEYVAN Aviation? Could you briefly summarize the production and update processes of the Aviation and Navigation Database for our readers?



Meriç Cınbarcı: 195 countries with airports in the world are divided into 10 regions. Each of these countries has to regularly publish technical aviation data for their airports. Every twenty-eight days, called the AIRAC cycle, this data is updated. Countries update

this data of their airports thirteen times a year. Type 1 DAT Provider certificate holder companies, such as KEYVAN Aviation, obtain this data from the civil aviation institutions of the countries and pass it through a special process. The purpose of this process is to transfer the

said data to the ARINC 424 database requested by EASA. The compliance of the data produced with this database with international standards in terms of accuracy, resolution, integrity, traceability, timeliness, completeness and format is guaranteed by certification. The amount of data that needs to be processed is huge. For this reason, in case of erroneous data, the produced data is controlled repeatedly by the Quality Department in accordance with data quality requirements. With the data updated every twenty-eight days by our Data Production Department, ARINC 424 database is produced for TYPE 2 DAT Provider certificate holder companies, which is also given by EASA. Companies holding the Type 2 DAT Provider certificate transfer this database to the aircraft's systems called FMS.



INTERVIEW



İbrahim Sünnetçi: What kind of aviation data does the Aviation and Navigation Database processed by KEYVAN Aviation contain and how many million data lines does it consist of? What can you tell us about your user profile/ portfolio around the world?

Serkan Pusat: There are approximately 3 million data lines in total, containing data for 18.200 airports, 29.380 runways and 232.650 waypoints. Around the world, companies with EASA's Type 2 DAT Provider certification, Flight Planning companies and companies developing Simulator applications are our direct customers.

İbrahim Sünnetçi: KEYVAN Aviation announced last February that it was the first company in Turkey to receive the international

Type 1 DAT Provider Certificate issued by the European Aviation Safety Agency (EASA), and the 4th company in the world. Can we get an information about the importance of the EASA approved Type 1 DAT Certificate for both KEYVAN Aviation and our country, and the possibilities and capabilities it will provide to KEYVAN Aviation? Why are so few companies in the world holding this certification?

Mehmet Keyvan: In order to obtain the Type 1 DAT Provider certificate, called LOA Type 1, a really intense and standardized study is required. The standards we mentioned are mandatory standards brought by EASA for companies that want to obtain this certificate. There is no other explanatory or guiding document or guide other than the standards published by EASA and EU for the preparation process. There is no source



that institutions that are in the process of preparing for the certificate can get support from. Not only in Turkey, but in the world. The preparation process includes many challenging stages. Every document, every study is meticulously checked by EASA. It is going through the interrogation process. Every inquiry and review involves making new updates, modifying and developing all documentation crosswise to match those updates. In addition to these, EASA also conducts official audits and these audits should be concluded in a way that there are no major deficiencies. After the entire preparation process is completed, another challenging step is the establishment of a competent team. Since there is no other company holding this certificate in Turkey, there are no experienced staff. For this reason, we have preferred to work with recent graduates from civil aviation departments with no work experience. Among the candidates, we chose those who want to work on data production, are open to new information, and have the desire to improve themselves. We create and develop our own team with continuous on-the-job training. We would like to inform that our recruitment process continues to develop and strengthen our team. We



Quality & SMS Director: Meriç Cınbarcı - CEO: Mehmet Keyvan - Aeronautical Data Production Manager: Serkan Pusat

would also like to point out that being the first and only Turkish company to have this certificate is a source of pride for all our team and our company. We have been awarded this certificate by overcoming all the challenging processes we have mentioned. Our name is officially published on the pages of EASA as certificate holder. All companies dealing with navigation data in the aviation industry are now aware of the name KEYVAN and that it is a Turkish company.

İbrahim Sünnetçi: What can you tell us about the export activities of KEYVAN Aviation? Can we get information about your overseas customers?

Mehmet Keyvan : The customers of our data production are completely international. For this reason, a significant part of our export transaction volume that we will realize with the services we will provide is within the scope of service issuance. The number of companies holding Type 2 DAT Provider certification in the world is limited, just like companies holding Type 1 DAT Provider certification. The names of these companies are also published on the certificated companies page on the EASA website. We are in contact with all these companies. Apart from this direct service, we are about to start working on a project basis

with companies operating in the aviation industry that need navigation information for various reasons.

İbrahim Sünnetçi: What can you say about KEYVAN Aviation's expectations and targets for the next 10 years?

Meriç Cınbarcı: KEYVAN Aviation has determined its short and long-term goals since the day it was founded and made them a strategic road map. To be an industry leader in all service areas in which we operate, to produce technology related to these areas, to make the products we design a sectoral trend in the world, to focus on continuous development,

to be an innovative, leading and pioneering product excellence center and ultimately to make our brand a world brand are expectations and goals for the next ten years of KEYVAN Group.

İbrahim Sünnetçi: As we conclude our interview, is there anything you would like to add or a message you would like to convey to our readers?

Mehmet Keyvan: We would like to support our local Turkish operators with the same quality data but with better cost. So while we are looking for export, we would like to support the companies to reduce their financial cost and keep the capital in our country 🇹🇷

Three Turkish Aeronautical Engineers in Three Distinct Periods: Ali Yar, Salâhattin Alan and Ahmet Cemal Eringen



by Dr. Emir Öngüner
Freelance Researcher in
Aviation History

In today's Turkish aviation history narratives, the "education" has unfortunately been overlooked and not given due consideration. Thus, there are problems in interpreting the aviation history appropriately. Aviation is an industry and engineering branch, like maritime, railway and automotive. Success is achieved in such areas if it is handled by educated people who are technically competent about the subject.

There are three noteworthy periods that Turkish education and aviation history intersects with each other, as well as three important engineers.

a. **Ali Yar** studied aviation in Europe during Ottoman (Turkish) Empire period.

b. **Salâhattin Alan** received aviation education in Europe during the Republican Turkey period.

c. **Ahmet Cemal Eringen** studied aviation at the educational institution established by Turkey during the Republican Turkey period.

Born before the Republican period, these three Turkish engineers lived during the



Prof. Ali Yar [Engineers and Machinery Journal, Issue: 10, 1966]

same period, but continued their lives quite differently.

a) Ali Yar (1885-1965)

Born in the Russian Empire to a Kazan Tatar family, Ali Yar came to Istanbul for his education and enrolled in Galatasaray High School.

After graduating from here, he enrolled in the Sorbonne University in Paris in 1908 for university education. Afterwards, he studied at the newly established École Nationale Supérieure de l'Aéronautique in France for aviation education and became an aeronautical

engineer (MSc). He returned to his hometown in 1912 as the first Turkish aeronautical engineer. Ali Yar's first professional experience was as an assistant mathematics teacher at Galatasaray High School. Then he was appointed as a physics teacher at the same school. In 1915, he transferred to the Faculty of Science of Darülfünun (former Istanbul University's before the reform) and started his academic career. In 1927, he was additionally recruited to the Certified Engineering School (former Istanbul Technical University). He worked as a lecturer in both universities until 1946. He became a professor at Istanbul University and served as the Dean of the Faculty of Science. He did not have a doctorate degree.¹



Ali Yar, third from the right, together with the faculty members of the Istanbul University Mathematics Institute. [Giacomo Saban private archive]

¹ Uluçay, Ç., Karatekin, E., Graduate School of Engineering, 1958, İstanbul, p. 623-624

Considering Ali Yar's education background in France, it is necessary to highlight two more important names who graduated from the same university during the same period: Marcel Dassault and Mikhail Gurevich.

Marcel (Bloch) Dassault's family was former Ottoman citizens. The Allatini mansion where Abdulhamid II was exiled in Thessaloniki was owned by his maternal side. He was educated in France where he was born. He started manufacturing by establishing his company in the 1920s. He was sent to a concentration camp in World War II, but he resumed his activities after the war. Currently, one of France's largest aviation companies bears his name.

Mikhail Gurevich, while studying at the Kharkiv Polytechnic Institute, was expelled from university due to his political stance and continued his education in France. After the revolution, civil war and Soviet order in Russia, he tried to hold down a job in several companies and in 1939 he established the MiG Design Office with Mikoyan. One of Russia's largest aviation companies now bears his name.

Mirage and Rafale produced by Dassault and many MiG models produced by Mikoyan-Gurevich have entered the inventory of many countries of the world. Following questions need review by the Turkish side:



Biplane designed by Salâhattin Alan in Eskişehir

- While Dassault and Gurevich could become giants in France and the Soviet Union, why did Ali Yar only have an academic career?

- Was it Ali Yar's choice or was it an obligation?

- In 1912, were there private enterprises in Turkey as well as an industrialization environment?

b) Salâhattin Alan (1903–1938)

Born in Prilepe - Macedonia, Alan was sent to France for aeronautical engineering education in 1926 with the scholarship provided by the Turkish Aircraft Society (former Turkish Aeronautical Association). He was among the first team to be sent abroad for education in the field of aviation in the Early Republic period. Like Ali Yar, Alan studied at the École Nationale Supérieure de l'Aéronautique and graduated in 1928. He did his internship at Hanriot company and then received a pilot training and returned to Turkey in 1931.²

Since he was supported by a state scholarship during his education, he was assigned to the aircraft workshop in Eskişehir for his compulsory service after returning to the country. During his service there, he completed the design of the aircraft model which he named

Mühendis Salâhattin Alan, Bir Kazaya Kurban Gitti



The death news of Salâhattin Alan [Tan Newspaper, 15.07.1938]

² Erel, C., *Those Leaving a Mark on the Development of Industry in Turkey: Selâhattin Reşit Alan, Kokpit'ten Bakış*, Year: 6, Issue: 31, 2014, p. 46-52



Cemal Eringen, Turkey's first aeronautical engineer graduated from the educational institution in Turkey, during his first assignment [Şükrü Er private archive]

Salâhattin-1. A prototype named MMV-1 was produced within the body of the Ministry of National Defense. This model was the second Turkish type aircraft after the Vecihi K-VI. He could not reach an understanding with the Ministry of National Defense on the production of the MMV-1 and resigned from his position upon meeting Nuri Demirağ. He started his aviation journey in the private sector together with the master of railways, Nuri Demirağ.

In Demirağ's workshop, which was founded in Beşiktaş in 1936, the MMV-1 model was developed and produced as a training airplane with the code Nu.D.36. The airplane took off from Istanbul with mechanic İlhami Bey to attend the commemoration ceremony of the air martyrs

held in Eskişehir-İnönü on July 13, 1938. As a result of an accident during the landing on the runway, Salâhattin Alan lost his life.

c) Ahmet Cemal Eringen (1921-2009)

Born in Bünyan – Kayseri, Eringen started his higher education in

1937 at the Certified Engineering School in Istanbul. Established in 1941 within the body of Certified Engineering School, the Mechanical-Aviation department is Turkey's first training department in the field of aviation engineering. Eringen, who graduated from this department



Prof. Cemal Eringen [Theoretical and Applied Turkish National Committee archive]

with the diploma number 1057 in 1943, was the first aeronautical engineer graduated from Turkey's educational institution with its own curriculum.³

After his graduation, he was sent to the Glenn L. Martin company in the USA for an internship with other graduates. After working at the Turkish Aeronautical Association factory for a while, he went to Brooklyn Polytechnic Institute for his postgraduate education. He received his doctorate in 1948 with a thesis on the elastic stability of cylindrical objects. After his instructor post at the Illinois Institute of Technology and Purdue University, he became a professor in continuum mechanics at Princeton University in 1966. He published more than 100 academic papers. The "Society of Engineering Science" that he founded has been awarding the Eringen medal to successful scientists in their fields since 1975. He is an honorary member of the Turkish Academy of Sciences (TÜBA).

Professor Anwar Beg from the University of Manchester-Salford, who published a book on pioneering engineering scientists in 2003, described Eringen as the "founder of modern engineering"⁴

³ Uluçay, Ç., Karatekin, E., *Certified Engineering School, 1958, İstanbul, p. 698*

⁴ Beg, A., *Giants of Engineering Science, 2003, London, p. 1-12*

Evaluation:

Considering the education and career of these three significant individuals, whose background story is briefly given above, the following findings stand out for Turkey.

Without doubt, it would be impossible for Ali Yar to establish an aircraft industry with private enterprises like Dassault and Gurevich under the current conditions, since educated workforce, infrastructure, capital and an indigenous industry could not be achieved

in Turkey that failed to take advantage of the industrial revolution in the second half of the 19th century. For this reason, Ali Yar's life story is a significant touchstone in Turkish aviation history in terms of education and industry arguments.

Alan's death is a great loss not only for Demirağ but also for the Turkish industry. For the first time in the history of Turkish industry, a capital owner (Demirağ) and an engineer (Alan) who received technical training had started a business in

the aviation field. This partnership has been an important step for Turkey in terms of the private sector.

While Eringen is a world-renowned professor and medals are awarded after his name, unfortunately he is barely known in his hometown. Although he is the first aeronautical engineer that graduated from Turkey's own educational institution, he has not performed any known studies for the benefit of Turkey with this title. He has spent all his productive years abroad

and carried out all his academic studies outside of Turkey.

Among Turkey's "first" aeronautical engineers, Ali Yar and Ahmet Cemal Eringen regrettably could not make any concrete contribution to the country in this field, on the other hand Selâhattin Reşit Alan unfortunately died at a young age while he was practicing his profession. From an objective point of view, it is obvious that Turkey has failed to benefit from its first aeronautical engineers duly 🇹🇷

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AIRBUS' CRITICAL STEP FOR HYDROGEN AIRCRAFT

by Muhammed Yilmaz

Airbus is determined to launch a hydrogen-powered and non-polluting aircraft by 2035. A huge step has been taken towards this goal for the development and testing of the aircraft's hydrogen-powered engine.

Airbus is determined to launch a hydrogen-powered and non-polluting aircraft by 2035. A huge step has been taken towards this goal for the development and testing of the aircraft's hydrogen-powered engine.

Since airplanes run on petroleum-based fuel, known as kerosene, they have negative environmental

impact on our planet. That's why the aviation industry is looking for ways to reduce or even zero its carbon footprint. The way to achieve this goal is for engine makers to produce more efficient and environmentally friendly engines powered by sustainable fuels.

European aircraft manufacturer Airbus is ambitious to launch an aircraft that produces non-polluting gas emissions by 2035. In line with this goal, Airbus is making plans to build a hydrogen-powered aircraft within the scope of the program called ZEROe.

CFM International, partnership by the world's largest engine

manufacturers GE and Safran with 50% shares, has taken action to meet Airbus' hydrogen engine needs. Under the agreement between the two companies, CFM International will modify the combustor, fuel system, and control system of a GE Passport™ turbofan to run on hydrogen.

This developed engine will be mounted along the rear fuselage of an Airbus A380, which will be equipped with liquid hydrogen tanks, and flight tests will be conducted. The purpose of placing the engine in this part of the A380 is to enable the easy monitor of the performance of the hydrogen engine separately

from the emissions of the A380's own engines and the white condensation traces left behind by the engines called contrails.

The fact that the A380 has a large amount of internal space to carry the hydrogen tanks to power the developed engine and all other equipment necessary for test engineers makes it the best fit for these tests. It was also decided to connect the engine in alignment with the upper part of the fuselage so that it would not be affected by any interference while cruising.

The A380, chosen as the test bed, is MSN 001, the first A380 prototype coming off the production line. It was

designed and built entirely for testing. In addition to being the first A380 to meet the sky, it played a key role in the A380's flight test program until the certification process was completed. After it obtained its type certificate, the A380 remained active and was used for other tests in the following years.

Airbus has plans to conduct the first zero-emission flight under the ZEROe program in 2026. As a result, it would not be wrong to say that the A380, which will be used as a test bed, will start test flights soon.

What is a Flying Test Bed?

Each new aircraft engine developed by engine manufacturers undergoes complex, rigorous ground and flight tests before becoming a commercial product. Airplanes that perform flights where engines are tested in the sky are called flying test beds in aviation.

In aviation history, the use of aircraft as a test bed dates back to the 1940s. After the Second World War, the Avro Lancaster bombers were adapted to be used as test beds by British engine manufacturer Rolls-Royce. These planes had four piston engines. During test flights, Rolls-Royce replaced two of the aircraft's engines with newly developed RB41 'Nene' turbojet engines. If the tested engines had a problem in the sky, the



airplane would be able to continue flight with its other two piston engines. In the 1950s, companies such as de Havilland and Armstrong Siddeley also began using the Lancasterian as a flying test bed.

Which modifications are made to the airplane for the test bed?

In order to use an airplane as a test bed, only removing the existing engines and replacing them with newly developed engines to be tested is not enough. Due to the nature of the work, other modifications are required for such airplane in order to safely perform any tests in the sky.

The handling of the airplane's kilometers of wiring is an important part of the process. This is critical not only for ensuring the safe operation of the engine in the aircraft, but also for collecting the necessary data from the engine during testing. Structural changes such as the removal of winglets on the Boeing 747, which is used as a test bed by General Electric, are a good example of the situation.

Four-engine airplanes, like the Avro Lancasterian

and 747, are much better suited to be used as test beds as they offer greater contingency in the event of an emergency or a failure. For this reason, many major engine manufacturers use the Boeing 747 as a test bed for flight testing of their new engine designs.

Test Beds of Giant Engine Manufacturers

Ohio-based engine maker General Electric is one of them. The 28-year-old Boeing 747-400 (N747GF) has started to make test flights of engines developed by General Electric, after serving in the Japan Airlines fleet for approximately 16 years. The world's largest aircraft engine, the GE9X, designed to power the Boeing 777X family aircraft, also used on this test bed for the first time in 2018.

Rolls Royce, major British manufacturer of aircraft engines, is using two different versions of the 747 to test its new engines. The older of these planes (N787RR) is the 42-year-old 747-200 (N787RR). Started to serve in the Cathay Pacific fleet in 1980, the plane arrived in Iceland in 1999 to join the Air Atlanta fleet. In 2005, it was started to be used as a test bed at Rolls Royce.

This airplane, which is also used to test the engines powering the Boeing 787 Dreamliner, recently took a part in the flight tests of a Rolls-Royce Trent 1000 engine using 100% sustainable aviation fuel.

Rolls-Royce's other test bed, the 22-year-old 747-400 (N747RR) retired from the Australian Qantas fleet after its commercial services since 2000 and started to be used as a flying test bed within Rolls Royce in 2019.

On the other hand, Pratt & Whitney progresses a little differently for engine testing than its rivals. In addition to two 747SPs, the short-bodied version of Boeing 747s, it also uses the Dornier Do328-300 JET and de Havilland Dash 8-100 turboprop aircraft for such test flights.

The 41-year-old C-GTFF-registered 747SP joined the Pratt & Whitney family in 1998 after commencing service at Korean Air in March 1981. C-FPAW, on the other hand, began flying at the Canadian engine manufacturer in 2009 after it began flying passengers in China in 1980. The company bases its test airplanes at Canada's Montréal-Mirabel Airport (YMX) 🌐



Leonardo AW139

to Aid in the Security of the United States

Leonardo's presence in the U.S. government continues to grow with an announcement of a contract for two AW139 aircraft by the U.S. Department of Energy's National Nuclear Security Administration (NNSA).

The NNSA through the Department of Energy has two locations: on the East Coast at Andrew's Air Force Base in Maryland and on the West Coast at Henderson Airport in Nevada. NNSA helicopters are equipped with a variety of sensors that relay data back to NNSA headquarters while covering high profile events that include the Super Bowl, in addition to aiding the Federal Emergency Management Agency during disaster relief. The

NNSA AW139s will serve two main purposes, search and rescue (SAR) and disaster topography scans. Both aircraft are expected to be delivered in 2024.

"This contract with NNSA further strengthens our relationship with the U.S. Government," said Clyde Woltman, President of Leonardo Helicopters USA Inc. "We look forward to delivering more aircraft to aid in the security of the United States.

The AW139's rapid response, effective search and surveillance capabilities, coupled with its ability to stay in flight longer makes it an ideal choice for the NNSA. The AW139 delivers these capabilities along with class-leading performance that includes

outstanding technology and safety. Its integrated avionics system will enable the NNSA to gain the maximum benefits from its sensors and comprehensive communications suite. The AW139's inherent safety features, performance capabilities and general payload are unrivaled by any helicopter in its weight/class. With the addition of these aircraft, the NNSA will be able to respond to today's mission with the ability to grow for future mission needs.

The AW139 intermediate-twin engine 7 ton has been ordered by more than 290 operators in 70 countries on all continents, with over 1250 sold. It has more than three million flight hours recorded since first

delivery took place in 2004. Data of use testifies to the extreme versatility of the AW139, meeting the criteria of multiple market needs; approximately half the world's fleet for public service, including search and rescue, air ambulance, law enforcement, firefighting, disaster relief and defence duties. Other leading uses include the offshore transport sector, VIP, government, and corporate transport, in addition to other civil missions. The AW139 fleet has a global presence with over 30% produced at Leonardo's manufacturing facility in Philadelphia, PA. The US Air Force (USAF) will soon introduce the AW139-based Boeing MH-139 to replace the UH-1N fleet.



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ICAO SAFETY GOALS FOR 2030: THE INTERPLAY BETWEEN AVIATION ENGLISH TRAININGS AND COGNITIVE OVERLOAD IN PILOTS



by Gökhan Demirdöken,
Researcher & English
Language Instructor

“Do you know what west is, sir?” This radio message was recorded earlier this year in Lisbon, Portugal. This message is not the first and, for sure, will not be the last when it comes to communication breakdowns in aviation. However, the significance of this incident is explicitly related to the overloaded working memory of pilots during take-off, initial climb, descent, approach, and landing phases in each flight.

It was early in the afternoon in Lisbon when a Cessna 340A departed from Cascais-Tejo Regional Airport (LPCS). Pilots were instructed to comply with ESP3N SID after departure. However, the tower controller noticed an irregularity between the route Cessna was supposed to take and the route it actually took. Therefore, the tower controller tried to contact pilots for five times but they did not receive the

call. When pilots finally responded to the call, they had already diverged from the instructed SID significantly. That’s why the tower controller instructed the Cessna to “fly west immediately” so that the aircraft would be back on the right direction. Unfortunately, this was not the only thing that went wrong with this flight. The pilots were also climbing although they had been instructed to maintain 3,000 feet. This

chain of events was clearly threatening the safety in Lisbon airspace. Amid such chaos, the following magical words were heard from the controller on frequency 120.305, “Do you know what west is, sir?” This appeared to be a milestone in this incident because the pilots finally got clued in their “wrongdoings”. Having realized the problem, pilots then complied with succeeding instructions of the tower controller and



the approach controller later on. Although nobody was hurt in this incident, it shed light on an ongoing issue of cognitive overload in aviation.

This issue has been taken up by aviation authorities as early as 1970s, and many conclusions have been drawn regarding the cognitive processes of pilots. For instance, a report published by Federal Aviation Administration (FAA) in 1992 highlighted

the importance of being a competent decision maker. This finding has its roots in the cognitive information processing system because a great number of aviation accidents had been reported to have caused from “pilot error” in which cognitive information processing was reported to be the underlying cause. Essentially, cognitive information processing theory portrays human mind as possessing a structure consisting of components for processing information. In this structure, attention, perception, encoding, storage, and retrieval of knowledge are the major components and they influence the processing of information heavily. With regard to how it functions, it can be argued that stimuli enter the sensory register and from there go to short-term memory. Here they are stored in long-term memory through rehearsal and encoding. Then, the information can be retrieved from long-term memory and brought to the working memory for use. In this sense, the information processing model is very much like that of a computer. Therefore, the so-called computer may malfunction if it is overloaded. Accordingly, FAA’s report concluded that development and

use of Aeronautical Decision Making (ADM) training materials significantly reduced human performance error (HPE). With this in mind it can still be argued that the incident in Lisbon airspace has once more showed how important it is to reduce the cognitive load of pilots to ensure safety in aviation. Two issues in this incident should be discussed in great detail.

First, it was clear from the voice recordings that pilots were quite busy with flying the Cessna 340A and thus, they were not tuned in the correct frequency. Although it is a standard procedure to comply with the directions of the air traffic controller and tune in the correct frequency based on the instructions, it took the pilots of Cessna a long time before they finally noticed that they were not responding the calls of the tower controller. This clearly showed that the workload of pilots significantly increased their cognitive load and, in turn, impeded the application of basic radio communication procedures. Second, the cognitive load of pilots must be so high at the time of first contact with the tower controller after multiple attempts that they failed to comprehend the instruction to “fly west immediately”. It is possible that the

background noise might have also contributed to this communication breakdown but it is still not as significant as the cognitive overload of pilots. As a conclusion, it should be noted that cognitive load may lead not only to operational drawbacks but also to communication breakdowns.

So, what is this interplay between Aviation English and cognitive load?

Lack of English language proficiency is not an emerging issue in aviation; it rather dates back late 20th century when the industry was shocked by Tenerife disaster. The most significant takeaway from this accident was that civil aviation authorities realized the need to develop a solid understanding of the influence of English language proficiency on flight safety. This led to the implementation of some regulations regarding the attainment of a certain degree of proficiency in English in order to get a license or retain it. However, the authorities were still missing a crucial point, which was described in another report of Federal Aviation Administration on October 2008. The report entitled “Pilot English

Language Proficiency and the Prevalence of Communication Problems at Five U.S. Air Route Traffic Control Centers” heavily reported on the challenges faced by US pilots and air traffic controllers in terms of communicating over radiotelephony. Veronika Prinzo and Alfred Hendrix, the authors, examined the communications of pilots and controllers working at five U.S. air route traffic control centers (ARTCCs) between March and August 2006. The overall findings in this report pointed two issues. First, use of English for radio communication significantly varied in terms of the number of communication problems, time spent on frequency, and the number of messages transmitted. All these three issues were in favor of native English-speaking pilots compared to non-native English-speaking pilots. Second, 75% of communication problems among foreign aircrafts flying over five US ARTCCs were caused by English language proficiency. In a similar vein, US pilots reported having more communication breakdowns when flying over airspaces where English is not spoken as first language. However, these were not the most significant issues in this report. Reading in between lines, it can be noticed that readback errors are common in almost every flight and memory overload leads to these errors. To put it another

way, the limited nature of human working memory makes the jobs of pilots even more challenging. That is, they have to complete several tasks simultaneously during take-off and landing, which include both the control of avionic systems and communication with the air traffic controllers. This burden on the shoulders of pilots is doubled when English language proficiency comes into play in busy airspaces. At these times, pilots have to deal with the psychological problems caused by cognitive overload as well as possible outcomes of lack of English language proficiency, both of which have been reported to have a significant impact on flight performance.

As real as it gets!

Identifying the problems is always the first step and the next step is inevitably providing effective solutions. So, what is the solution to the issue of pilots’ cognitive overload? Here is the answer. It is true that simulator trainings are indispensable parts of pilot trainings. They are used to simulate real flight conditions and they are great ways to get familiar with possible in-flight malfunctions. Also, they are regarded as the safest way to simulate the worst-case scenarios. In this sense, simulators are literally the life savers. That’s why they are used in many other industries including health, engineering, safety etc. However, there is another

area in which the use of simulators is particularly important: education.

For many years instructional designers investigated the ways to optimize learning based on the needs of learners and many theories have been proposed accordingly. These included experiential learning, content and language integrated learning (CLIL), problem based learning, etc. Each theory has been proved to be effective in one way or another since learning is a continuing process and each learner has a different way of preferred learning. However, with the advances in technology and the qualifications needed in the 21st century, we were introduced a new and unique way of learning: simulation. Having its roots in multimedia learning theory, simulation has emerged as a game changer, particularly in pilot training. The principles and heuristics of multimedia learning theory have application with both young and adult learners in various levels of education including K-12 and higher education as well as military, corporate, government, and informal education. Such a diverse application is without doubt based on its core principle that all learners can independently process auditory and visual information. Besides, it envisions that these learners all have limited working memory resources and they require cognitive resources

to process new information.

On the other hand, the multimedia learning is closely tied to cognitive load theory. This theory mainly argues that there is a limited amount of information working memory can hold at one time since it is limited in nature. Therefore, it should be given particular attention that learning materials should not overload the learners by offering additional activities that would not directly contribute to learning. With this in mind, student pilots should not be exposed to more than what they can handle during flight trainings. As for simulation trainings, student pilots should be offered scenarios which would potentially challenge them but not directly cause cognitive overload. Although it is possible that these issues are already taken into account in pilot trainings in general, and particularly in type ratings, it is for sure that simulation is not a part of radio communication trainings yet. Here is where the aviation industry can potentially benefit from multimedia learning theory and simulation.

It is true that poor working memory affects people’s lives negatively. For instance, a person may consistently leave out his/her keys or wallet. Likewise, you plan to do some work at home, but you forget to bring the items you will need. In the case of aviation, poor working memory can

have detrimental effects on pilots as well. During flight operations, working memory capacity pushes pilots to use their executive cognitive abilities, which heavily causes cognitive overloading issues. Therefore, pilots with poor working memory capacity may not attain the same level of flight performance as their counterparts with higher working memory capacity. With regard to working memory workload, it has been set forth that communication task completion rates significantly varied in two groups of pilots: high working memory capacity and low working memory capacity. In the light of this information, airline companies should definitely invest on working memory research so that they can take a big step towards minimizing incidents caused by pilot errors.

Luckily, we now know that we can extend our working memory capacity and thus, we can make room for other tasks. That is, improving the working memory capacity of pilots can help them overcome the issue of cognitive overload which, in turn, enable them to both complete flight management tasks and effectively communicate with air traffic controllers. The real question is “How can the working be improved?” In fact, some of the techniques to improve the working memory



capacity are already in use in the aviation industry. These include using checklists for tasks with multiple steps and breaking big chunks of information into small, bite-sized pieces. Apart from what is already applied by pilots, there is always more they can do. Since the core principle of improving working memory capacity is to familiarize pilots with cases similar to the real life, integration of simulation into air traffic communication practices will definitely make a big difference for pilots.

ICAO safety goals

It is true that stakeholders in the aviation industry have made great contributions to ensure safety by implementing new regulations and offering continuous professional development trainings to pilots and air traffic controllers. However, the status of Aviation English as the lingua franca will

always pose a threat to effective communication since the number of its non-native speakers has outnumbered the native speakers. That's why the incident in Lisbon, Portugal earlier this year involving a Cessna 340A and the tower controller is just one of many other communication breakdowns happening around the world every day. Being a high-tech industry, aviation still has a lot to do with technology in terms of its integration into pilot training. Allocating some of the pilot training to the simultaneous practice of both flight management and air traffic communication can yield great results. To illustrate, during a simulation sessions pilots can be given a scenario in which they need to complete a non-standard flight operation successfully by communicating with an air traffic controller. Most of the time this training is offered in pilots' native language rather than the

target language. Therefore, integrating Aviation English as the lingua franca in such trainings would definitely challenge them since they will be required to complete this task by heavily pushing the limits of their working memory capacity. Besides, pilots can be exposed to Aviation English trainings in which VR is used as part of the training to familiarize them with different accents. Such trainings would contribute to the comprehension of air traffic messages transmitted by other non-native English speaking air traffic controllers. Resolving this issue mentioned in the report of Federal Aviation Administration (FAA) would, in turn, lead to ensuring safer flight operations in the world. These improvements have the potential to greatly contribute to International Civil Aviation Organization's goal to achieve and maintain zero fatalities in commercial operations by 2030 and beyond [✈](#)

TITANIUM CRISIS IN AVIATION AROUND THE CORNER!

by Muhammed Yilmaz

We are going through hard times where we experience once again how deeply the relationship between aviation and politics is. The fact that Russia pressed the button to invade neighboring Ukraine rallied the aviation realm. The mutual showdown will not be limited to the closure of airspaces and the extension of flight routes. A much bigger crisis is around the corner! Possible trade wars between Russia and the West can pose a severe risk in their supply chains. This could put stocks of Titanium, a metal commonly used in aircraft construction, into trouble!

The world had previously experienced an oil crisis, especially during various events involving the Middle East, such as the Iraqi invasion of Kuwait. But no international crisis in the recent past has ever hit all raw material markets so hard and so fast at the same time.

Following Russia's invasion of Ukraine, waves of heavy sanctions were adopted by the US and Europe against Russia.

Western companies, on the other hand, are afraid of running into problems with Russian products in their supply chains if Moscow retaliates against such sanctions. Titanium, most of which is supplied by Russia, has been used in different parts of aircraft for decades, especially in jet engines. Titanium use has increased even more with new generation aircraft such as Boeing 787 and Airbus A350, reaching almost 15% of an empty commercial aircraft weight.

TITANIUM - A STRATEGIC ASSET

Titanium, a Cold War material formerly used to build spy planes and submarines, is perceived as a serious trump card for economic dependency in strategic sectors such as civil aviation.

Russian VSMPO-AVISMA, the world's giant titanium producer, supplies 25% of global demand for titanium, a lightweight,

strong and corrosion resistant metal that is also used in nuclear energy.

European aircraft maker Airbus relies on Russia for half of its titanium needs for its aircraft. US Boeing, on the other hand, is claimed to procure one third of its requirements from VSMPO-AVISMA. At the Dubai Airshow last November, Boeing renewed its twenty-year partnership with VSMPO-AVISMA and committed to continue its collaboration with the Russian company as the largest titanium supplier. Brazilian manufacturer Embraer also supplies most of its titanium needs from Russia.

SUSPENDING TRADE UNFAVORABLE FOR ALL!

VSMPO-AVISMA makes around three quarters of its sales from aviation industry despite efforts to diversify. In 2018, a draft law in Russia's parliament proposed restricting titanium exports in response to tightening Western sanctions. But the country's trade minister was reported

saying the idea was blocked to prevent losing stable foreign buyers.

A draft law drafted in the Russian parliament in 2018 proposed restricting Titanium exports in response to escalating sanctions in the West. However, Russia's trade minister explained that this idea was blocked from being implemented in order to avoid losing stable foreign buyers.

The US Commerce Department imposed several restrictions on VSMPO-AVISMA in December 2020, but only three weeks later such restrictions were lifted.

Therefore, targeting Russia and accordingly VSMPO-AVISMA will uprate Russia's strategic presence with close ties to critical industries such as the defense and aerospace. Western aerospace companies do not seem to be content for this decision.

Although titanium is not directly targeted, it is known that Western aerospace companies have multiplied their inventories or diversified their supply sources since

2014, when Russia was sanctioned for its illegal annexation of Crimea in Ukraine. Decline in aircraft manufacturing due to the pandemic also gives companies the opportunity to increase their reserves and overstock. However, it may take years for companies to include new titanium producers in their ecosystems given the strict quality circle procedures and practices.

CONCERNS OVER HIGHER TITANIUM COSTS

Independent investment research company S&P announced last year that Russia might limit exports of strategic materials due to escalating tensions, but that this is not the most-likely case. It was also commented that suspending the trade would not be favorable for both sides.

Aircraft manufacturers could face higher titanium costs. It is more likely that supply constraints would increase prices broadly, rather than tough sanctions. In addition to the high inflation concerns

across the world in the post-pandemic period, the rise in raw material prices due to such political crises could put severe cost burden on commercial aviation companies.

Why is Titanium Quite Critical in Aerospace Industry?

Since its discovery in 1791, titanium has been a highly sought-after material in manufacturing processes. However, it did show its presence both in the military and commercial aviation industries until the Cold War. Today, the aerospace industry is the leading customer for titanium alloy products. Titanium has several properties that make it a perfect fit for usage in the aerospace industry.

- great strength/ lightweight
- corrosion-resistance
- high-temperature performance

With the demand for innovative, more efficient airplanes on the increase, the demand for titanium is also on the rise. Countries with considerably high military budgets, such as

the US, show high demand for titanium and consider the availability of titanium a matter of national security.

Today, commercial airplanes like the Airbus A350 and Boeing 787 use more titanium than previously developed airplanes. However, the military aerospace industry consumes the largest amount of titanium. Military aircraft, such as the F-22, F/A-18, C-17, F-35 and the UH-60 Black Hawk helicopter are among some of the military's assets that use large quantities of titanium in production.

With the rising fuel prices and the environmental sensitivities, the need for more fuel-efficient aircraft has become a priority. Taking advantage of titanium's weight-to-strength ratio, airplanes that are made from titanium parts are lighter and consume less fuel. Titanium has been replacing aluminum parts in aircraft manufacturing because of its ability to resist heat and corrosion. It is being used in the fastening elements, airframe and landing gear of airplanes.

Aircraft engine manufacturers are also among the customers of titanium. The high strength and low density of titanium can provide aeroengine manufacturers with the high-performance levels they desire. Jet engine and airframe parts need to withstand extreme temperatures both 50-55 degrees Celsius below zero and 600 degrees Celsius, making titanium's high temperature performance ideal. Engines parts manufactured from titanium are used in the exhaust part of the engine, in the discs inside the front fan, in the engine blades, shafts and protective coatings.

It should also be noted that titanium has a significant share in the spacecraft developed by NASA and other companies.

Titanium has proven to be a valuable element in many industries, especially the aerospace industry. The aerospace industry and the titanium industry are very dependent on each other. As the demand for more planes and more efficient air travel continues to increase, titanium's position in the market seems to be much stronger in the future.



New Air-cargo Service from Airbus, Using its Unique BelugaST Fleet

Airbus has launched a new air-cargo service using its unique BelugaST fleet to offer freight companies and other potential customers a solution to their outsized freight transportation needs.

The new service - Airbus Beluga Transport - will provide commercially-contracted customers in a variety of sectors, including space, energy, military, aeronautic, maritime and humanitarian sectors, with a solution to their large cargo transport needs.

The first mission took place at the end of 2021 with a delivery from Airbus Helicopters' manufacturing site in Marignane, France, to Kobe in Japan for an

undisclosed customer. Beluga #3 stopped to refuel at Warsaw (Poland), Novosibirsk (Russia) and Seoul (Korea).

Phillippe Sabo, Head of ATI and Air Oversize Transport at Airbus, said: "The Beluga's wider cross-section will open up new markets and new logistical possibilities for customers. In the case of loading helicopters - not having to dismantle them first - really is a plus. Similarly, the largest commercial aircraft engines can be accommodated in a fully-dressed configuration."

Based on the A300-600 design, the five-strong BelugaST fleet, which has until now been the

backbone of Airbus' inter-site transportation of large aircraft sections, are being replaced by six new-generation BelugaXLs to support Airbus' ramp-up of its airliner production.

The new Airbus Beluga Transport service can cater for a multitude of possible market applications since the planes possess the world's largest interior cross-section of any transport aircraft, accommodating outsized cargo of up to 7.1m in width and 6.7m in height.

In the near future, once Airbus has commissioned all six new BelugaXLs, the fully-released BelugaST fleet will be handed over to a newly-created,

subsidiary airline with its own Air Operator Certificate (AOC) and staff. Philippe Sabo added: "The new airline will be flexible and agile to address the needs of external worldwide markets."

To maximise the BelugaST's turnaround capability for its targeted international customer base, new loading techniques and equipment are being developed for the operation. These solutions include an automated On-Board Cargo Loader (OBCL) for missions where a loading/unloading platform is not available at the origin or destination airport 🌐

MTU Maintenance Starts Using Sustainable Aviation Fuels in its Test Cell with Launch Customer JetBlue Airways



MTU Maintenance is to be a partner with JetBlue Airways for the testing and data-gathering on sustainable aviation fuels (SAF) with the airline's V2500 engines following on from shop visits in Hannover, Germany on 25 January 2022. Conducted in a controlled ground environment, test runs will initially be performed with a 10 percent SAF fuel blend and can be expanded to up to 50 percent, the current regulatory limit, if required. This SAF is sustainably derived from waste fats, oils, and greases and has up to an 80 percent lifecycle greenhouse gas emission reduction per gallon as compared to the conventional jet fuel it replaces.

"MTU Maintenance is the first MRO provider worldwide to be offering test runs with SAF," says Michael Schreyögg, Chief Program Officer, MTU Aero Engines. "We are excited to be doing our part in reducing carbon dioxide emissions at our sites and providing

more sustainable MRO solutions for customers across the lifecycle. MTU is committed to the Paris Climate Agreement and therefore aiming to become carbon neutral in operations across our German production facilities." The company began testing with the V2500 engines in November 2021 and looks to expand this to other engine types, such as the popular CFM56-7B and GE90 engines in due course. "SAF

is a key initiative in reducing the climate impact of the aviation industry and increased and reliable supply will be incremental to this. At MTU, we are implementing SAF early and promoting its usage to and for our customers."

"We are delighted to be MTU Maintenance's launch customer in this pioneering and sustainable initiative," says Sara Bogdan, JetBlue Director of Sustainability

and Environmental Social Governance. "Our goal is to achieve net zero carbon emissions by 2040 and implementing sustainable initiatives along the supply chain, and gathering the necessary data to ensure these initiatives are safe, practical, and meaningful, is a key part of this work." JetBlue currently has an exclusive thirteen year contract with MTU Maintenance for its V2500 pre-select fleet.





The AW609 Will Provide a Unique Contribution to Revolutionize Air Mobility

The AW609 tiltrotor sets another major milestone further expanding its future user base with the addition of an undisclosed, long-established European operator of Leonardo helicopters. Under the signed agreement, this operator aims at introducing four AW609s to carry out a range of passenger transport missions supporting its point-to-point operations worldwide. For this purpose, the tiltrotors will have different dedicated configurations including VIP/Corporate and Passenger/Utility transport.

Gian Piero Cutillo, Leonardo Helicopters MD, said “With the distinguished characteristics of the AW609, combining turboprop-like performance (speed, range, altitude) and rotorcraft versatility (vertical take-off / landing and hovering) in all-weather

conditions and with its limited infrastructural impact thanks to its helicopter-like footprint; the new operator will deliver outstanding services in its markets. Generally, we’re convinced, more than ever, that the AW609 will truly revolutionize point-to-point connections and other air operations, providing a major contribution as the use of air space evolves further.”

This latest result in Europe comes after the first appearance of the AW609 in the Middle East with its official presentation in Dubai in late 2021, which marked the global commercial launch of the revolutionary multirole aircraft as it gets closer to the world’s first civil certification for a tiltrotor. The AW609 will also contribute to maintain Leonardo’s leadership in the VIP multiengine

rotorcraft market, which has accounted for a 45% global share in value over the last ten years, and will be part of the range of VIP solutions offered under the recently launched Agusta brand which embodies the company’s distinctive design, technology and service philosophy and values in the executive transport sphere.

The AW609 excels at providing fast point-to-point transportation at long ranges, whether it is connecting city centres or providing timely access to remote locations, hosting up to nine passengers in the comfort of a pressurized cabin and it is therefore poised to transform not only private and business travel, but also emergency medical service (EMS), search and rescue (SAR), offshore operations and patrol, among other tasks

and with both private and government users.

The first production AW609 has recently started ground testing in Philadelphia while the second one is currently being assembled at the same Leonardo facility in USA. The programme development has logged in excess of 1700 flight hours in USA and Italy to date. Users will be provided with comprehensive support and training packages primarily headquartered at the Company’s new Training Academy in Philadelphia, opened in 2021, also including the world’s first AW609 Full Flight Simulator.

The continuous development of cutting-edge solutions across all domains, including fast rotorcraft and modern air mobility, is a key element of Leonardo’s BeTomorrow2030 Strategic Plan.

THE DESTINATION FOR THE CABIN INTERIORS INDUSTRY

Aircraft Interiors Expo is back in Hamburg from June 14-16, 2022. The world's main marketplace for cabin interiors is where the global industry can meet to collaborate, find solutions to challenges and design the cabin of the future.

Find out more at: aircraftinteriorsexpo.com

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Zagreb Becomes the 31st Airport in the Portfolio of Havaş

Havaş, a TAV Airports and Groupe ADP company, began providing services in Zagreb, the capital city of Croatia. Operating at 29 airports in Turkey, Havaş extended its global reach to Zagreb in addition to Riga, Latvia.

With the agreement signed today, Havaş took over passenger, ramp, representation and supervision services, flight operation, load control and communication services as well as cargo and mail services at Zagreb Airport.

Havaş General Manager S. Mete Erna stated, “We focus on constantly improving our operations through innovative solutions and providing the best service to our airline collaborations. As a member of the Turquality program, we take the opportunities to achieve growth abroad with the know-how we have gained in Turkey. Approximately 30 airlines regularly fly to Zagreb Airport, which is a significant touristic destination in the Adriatic. We will carry out all processes as the sole ground handling service provider at the airport, which also has cargo and general aviation traffic. We will increase the efficiency of our operations, sustain our investments in ground handling services and continue to be the preferred business partner of airlines.”

Havaş will provide service in Zagreb with approximately 500 employees and a machine park consisting of 176 motorized and 346 wheeled equipment. The Zagreb station is holds ISAGO certification by the International Air Transport Association (IATA).

In 2019, Zagreb Airport served 3 million 435 thousand passengers and 45 thousand flights, as well as approximately 13,000 tons of cargo. Due to travel restrictions brought by the COVID-19 pandemic, the passenger traffic at the airport in 2021 was around 41% of the traffic in 2019.

The consortium including TAV Airports and Groupe ADP holds the right to operate Zagreb Airport until 2042.

Satair and Collins Aerospace Have Signed a Long-Term Agreement for the Distribution of Collins’s Engine Mounts



Satair, an Airbus Services company and Collins Aerospace have signed a long-term agreement for the distribution of Collins’s engine mounts, including detail parts and sub-assemblies for the CFM LEAP series on the Airbus A320neo aircraft family. Satair will provide distribution to its worldwide network of airline customers, repair organisations, and aftermarket spare parts providers.

With the foundation of an excellent distribution support setup for Collins’s customers, Satair is equipped to deliver integrated aftermarket customer support on a global scale to operators and repair service providers across the A320neo platform, including the A319neo, A320neo, and A321neo variants.

Bart Reijnen, CEO of Satair, says, “We are pleased to advance our long-standing relationship with Collins Aerospace by entering our first agreement with its Advanced Structures division and we are certain that our Airbus customers will benefit from the access to an updated selection of world-class quality products”

Matt Jessee, Head of OEM Business Development, Satair, adds, “With this new agreement we are leveraging our distribution support capabilities to meet the demands of the propulsion aftermarket. We are enthusiastic about our future with Collins Aerospace”



Spanish Ferrovial Becomes Partner in Dalaman Airport

Turkey's leading investment services and asset management group ÜNLÜ & Co acted as the sell-side advisor in the partial sale of YDA Group company "YDA Havalimanı Yatırım ve İşletme A.Ş.", which holds the operating rights of Dalaman Airport, to Ferrovial (Spain). Upon completion of the transaction, pending Competition Board approval and fulfillment of other conditions, Dalaman Airport will expand their presence under the roof of Ferrovial - YDA Group partnership.

ÜNLÜ & Co Corporate Finance Department Managing Director İbrahim Romano stated: "We observe continuous interest from foreign investors in Turkey's strategic sectors and leading companies. We are proud to be a part of this very important transaction as the sell-side advisor of YDA Group. We continue to move ahead at a brisk pace in 2022, with a steady stream of transactions, which reinforce our expectations of an upbeat M&A market in Turkey, in the short and medium term."

Air Taxi Achieves Proof of Concept Transition Test Flight

AutoFlight announced the successful completion of the proof-of-concept, transition test flight for its air taxi Prosperity I on 17 February 2022, in which the aircraft switches from a vertical take-off motion to the more energy-efficient, horizontal flight and back to vertical flight, before landing. The successful transition test flight was achieved in January 2022. The unmanned flight took place at Autoflight flight test area in JiangSu province, China with CEO Tian Yu, the R&D team and 40 AutoFlight staff present, and Prosperity I rose to an altitude of 150 meters at speeds of up to 123 mph.

Prosperity I was designed for short transfers between parts of a city, airport commutes, connecting two nearby cities or enabling trips to the countryside while avoiding traffic on the ground. When ready for commercial flight in 2025, it is expected that a trip that takes hours by car will be reduced to about 10 minutes with Prosperity I, without being any less safe or more expensive than a car taxi ride.

A 'transition' is when an aircraft moves from a vertical to horizontal motion and is one of the most challenging parts of an eVTOL flight. Vertical flight for the proof of concept for Prosperity I required eight rotors to lift the 3,307 pounds, including four-person, state-of-the-art electric aircraft into the air. Once the aircraft reached an altitude of 150 meters and the airspeed of 100-110mph the fixed wing part of the eVTOL generated lift.

At this point, Prosperity I entered the complex transition phase – the rotors on the top stopped spinning and locked in a streamlined position, while the propellers on the rear pushed the aircraft forward like a traditional fixed wing plane. As shown in the video, the transitions for the Prosperity I are seamless, safe and smooth thanks to the quality of the engineering and the rigorous attention to detail in the complex aerodynamics.





Singapore Airlines Replacing B747-400F Fleet with Airbus A350F Freighters

Singapore Airlines (SIA) is adding the world's newest freighter, the A350F, to its fleet, which will fully meet ICAO's enhanced CO2 emissions standards coming into effect in 2027. Singapore Airlines has signed a Letter of Intent (LoI) for seven Airbus A350F Freighters. With this LoI, A350Fs will begin replacing the airline's existing B747-400F fleet in 2025 Q4.

Christian Scherer, Airbus Chief Commercial Officer and Head of Airbus International said, "We are honored by Singapore Airlines' confidence in the A350F as it renews its freighter fleet. The A350F is the world's all-new large freighter and will be unmatched in its

market segment in terms of operational efficiency, lower fuel consumption and CO2 savings. It is gratifying that Singapore Airlines recognizes the value of the A350F as we build on the strong partnership we already enjoy."

Earlier this year Airbus received Board of Directors approval for a freighter

derivative of the A350 designed to meet the imminent wave of large freighter replacements and the evolving environmental requirements, shaping the future of airfreight. The A350F will be powered by latest technology, fuel-efficient Rolls-Royce Trent-XWB97 engines. As part of the world's most modern

long-range family, the A350F will have a high level of commonality with the A350 passenger versions. With a 109-ton payload capacity, the A350F will serve all cargo markets. The aircraft features a large main deck cargo door, with its fuselage length and capacity optimized around the industry's standard pallets and containers.

Over 70% of the airframe will be made of advanced materials, resulting in a 30-ton lighter take-off weight and generating at least 20% lower fuel consumption and emissions over its current closest competitor. The A350F will fully meet ICAO's enhanced CO2 emissions standards coming into effect in 2027.



SunExpress Closes the year 2021 with a Profit

After a difficult year for the aviation industry, Turkish Airlines and Lufthansa's joint venture SunExpress achieved a profit of 59 million Euros, despite the pandemic. SunExpress welcomed over 6 million passengers on board in 2021 and the load factor was 75% which is close to pre-pandemic levels.

Speaking at the press conference in Istanbul, SunExpress CEO Max Kownatzki, stated that SunExpress will continue to pursue its growth strategy in 2022 thanks to its strong financial structure. He said, "As one of the most important players in Turkish tourism, we have made great efforts to show that Turkey is one of the most attractive destinations to travel to. We have made it possible to access Turkey's tourism centers even during the most challenging periods. We continued to bring families together and have ensured that Turkish citizens living in Europe can reunite with loved ones back home. This success we achieved thanks to the quick and bold steps taken by the Turkish government and the relevant authorities, the personal dedication and commitment of our team members and our loyal passengers who continued to put their trust in us."

SunExpress has carried out the largest network expansion in its history with a total of 25 new routes and an additional 16,250 flights in the summer of 2022. The airline is now offering non-stop flights from more than 175 routes from Turkey to 60 destinations in 30 countries.

Kownatzki: "While maintaining our position as the airline carrying the highest number of tourists to the Mediterranean and Aegean regions with direct scheduled flights, we are moving towards our goal of becoming the number one Turkish tourist airline bringing the highest number of tourists to Turkey. Turkey, which provides its visitors with so many wonderful travel opportunities with its rich history and culture, unique cuisine and various climate conditions at the same time, has a lot to offer not only in summer but also in other seasons. We will continue to work hard to make Turkey a country visited throughout the year by taking tourism beyond sun and beach holidays."

Kownatzki said, "Antalya, Izmir, Dalaman and Bodrum-Milas are the four main airports we focus on along the Turkish Riviera. The touristic demand continues to be strong as the summer season approaches. In 2022, we aim to increase our capacity beyond 2019 pre-



pandemic levels to these coastal cities. In addition to the capacity increase, we offer more connections to these cities with new international services."

In summer 2022, SunExpress will operate 33,000 flights in total from Antalya, Izmir, Dalaman and Bodrum-Milas airports. The airline announced that it is flying from these airports to a total of 52 destinations including the additional 20 new routes of this summer.

Operating direct scheduled flights from 14 Anatolian cities to 18 destinations in Europe this summer with 1,250 more flights compared to last year, SunExpress' 5 new international flights on the Anatolia-Europe network will be Ankara - Copenhagen, Samsun - Vienna, Zonguldak - Dortmund, Ordu - Düsseldorf and Kayseri - Vienna.

Kownatzki added, "We continue to bring our Turkish

citizens living in Europe to their home and reunite them with their loved ones. In 2022, we will continue to support the local tourism and economy of Anatolian cities."

Stating that SunExpress has an undeniable role in enhancing Turkish tourism with its direct flights between Turkey and Europe, Kownatzki said, "The increase in our capacity and frequency, the expansion of our network and fleet, our newly added destinations and connections are all a reflection of our confidence in the strong recovery of Turkish tourism. We will do our part with more capacity than ever to support Turkey to achieve its tourism target in 2022. As SunExpress, we are eager to undertake the role as Turkey's tourism ambassador and will continue to be the number one reliable airline partner of Turkish tourism."

Air Buses will Operate Alongside Air Taxis in Future

The Skybus collaboration project has reached a key milestone by completing the initial feasibility studies. The research project has explored the potential for a six-rotor, 30-person eVTOL concept to help decarbonize and decongest urban landscapes. The studies have identified significant opportunities for air 'buses' to feasibly operate alongside air taxis in future air mobility transport networks. The Skybus consortium also developed a Thames-based Vertiport concept as well as economic models and demand forecasts for a London based intra-city use case, with further analyses now to be carried out.

GKN Aerospace is the leading Tier 1 airframe supplier for Urban Air Mobility (UAM) platforms, and leading the Skybus project has helped develop further understanding of the emerging UAM sector.

Skybus was launched in January 2021 in order to explore the feasibility for mass transit eVTOLs of this size to operate from Vertiports on scheduled journeys in the future, akin to bus network on today's roads. These would operate alongside air taxis to help bypass road congestion in major cities - reducing travel time and emissions - and potentially improve access to more remote areas, such as islands and mountainous regions. A successful zero emissions mass transit system in the air would also ease

congestion on the road network, reducing overall travel time, cost and emissions for all travelers.

Gary Cutts, Future Flight Challenge Director at UK Research and Innovation said: "The Future Flight Challenge has always taken a broad view of the opportunities provided by the many different types of novel clean aircraft emerging. Our market studies show a real potential for a substantial distributed aviation system using the types of aircraft concept envisaged by the Skybus consortium and we welcome the system-wide insights gained from their feasibility studies."

Russ Dunn, CTO GKN Aerospace said: "We are committed to a more sustainable future for

aviation and we believe there is no single solution to achieve this. It will take a range of technologies and collaboration across the whole industry to achieve our net zero goal. Skybus is a great example of GKN Aerospace's ambition to work in partnership to inspire our customers into new markets, products and technologies."

The Skybus project was funded as part of the Future Flight Challenge, a four-year, £125m Industrial Strategy Challenge Fund programme to develop more sustainable aviation solutions. The current phase is focused on the development of integrated aviation systems that enable new classes of electric or autonomous air vehicles.





Critical Facilities Rely On ASELSAN

ASELSAN X-Ray Baggage Scanners are also to be used at Tokat Airport. ASELSAN X-Ray Devices were first put into use at the end of 2021 with the opening ceremony made by President Recep Tayyip Erdoğan in Gaziantep.

ASELSAN continues its breakthroughs in the civilian field in line with Turkey's vision of technological independence. X-Ray Baggage Scanners used for security purposes are of critical importance in ensuring the security of various facilities such as airports, ports, border gates, customs and government buildings. X-Ray devices developed domestically by ASELSAN were delivered to Tokat Airport to be used under the responsibility of the State Airports Administration (DHMI).

ASELSAN Chairman of the Board of Directors, President and CEO Prof. Dr. Haluk Görgün made evaluations on domestic devices started to be used at airports and said, "ARIN X-Ray Baggage Scanners, domestically developed by ASELSAN engineers, will be used in many parts of our country. Where there is high technology, ASELSAN's mark will continue to be there. ASELSAN name will continue to be talked about together with the word of trust."

A Contract for the Supply and Installation of 30 Dual View X-Ray Baggage

Scanners was signed between ASELSAN and DHMI on December 14, 2020. 18 of ASELSAN ARIN X-Ray Baggage Scanners, developed jointly by ASELSAN and HTR, were delivered to the Gaziantep Airport new terminal building, which was opened by President Recep Tayyip Erdoğan on December 25, 2021. Within the scope of the project, 12 ASELSAN ARIN X-Ray Baggage Scanners were delivered to the new terminal building of Tokat Airport. The new terminal building of Tokat Airport is planned to be inaugurated with the participation of

President Erdoğan soon.

ASELSAN ARIN X-Ray Baggage Scanners can classify organic, inorganic and metal substances according to their effective atomic number and display in 6 colors. The devices have capabilities such as automatic detection of explosives, high-density materials imaging, high-density alarm, density zoom (color and black-and-white), organic stripping, automatic geometric and radiometric correction, tunnel entrance and exit scanning, and have an expandable fictional threat library.



Boeing breaks record sales with \$2 billion in e-commerce

Boeing achieved an annual record for e-commerce parts sales last year with more than \$2 billion in online orders. Boeing Distribution Inc. (formerly Aviall), empowered by investing in digital tools, sold nearly 70,000 parts products through its e-commerce site to commercial and government customers, surpassing pre-pandemic levels. Commercial orders accounted for \$1.5 billion in online sales indicated the continued recovery in the airline industry.

Boeing Global Services President and CEO Ted Colbert said, "In this period of a stable recovery, we closed the year 2021 with record sales of 2 billion dollars. Our e-commerce capabilities are a great example of the digital solutions we provide to enable industry recovery and growth. We will continue to create value through our products and services, and partner with our customers as they navigate this dynamic environment."

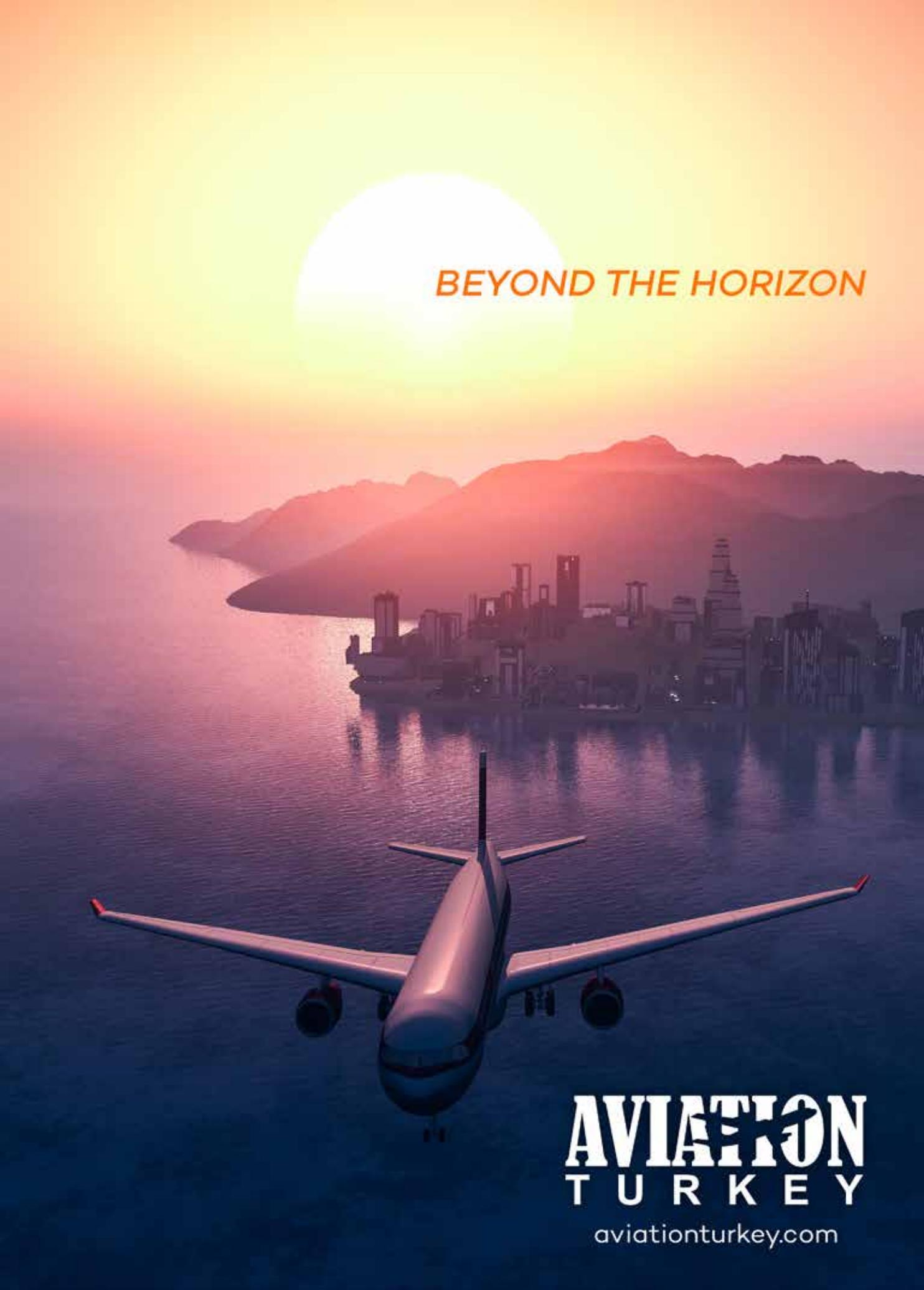
Boeing Distribution

Inc.'s online revenue last year was 15% higher compared to pre-pandemic levels, while orders increased by 20%. The company's sales boosted with the introduction of new tools to improve the customer experience, including a new homepage, a live chat feature, and an online knowledge center.

The renewed e-commerce parts website, which features over 500,000 products, was visited by 5 million visitors from 50 countries last year.

William Ampofo, Vice President of Parts,

Distribution Services, and Supply Chain, Boeing Global Services said, "We are improving e-commerce with the launch of digital tools, taking our customers' needs into account. In addition, we are creating a more efficient process for our customers by realigning strategy, program, and product line management with supply chain and customer support. We will continue to focus on digital and performance improvements and deepen our relationships with our customers."



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