

TOPICAL REPORT

AVIATION

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AVIATION



'Blue skies' research boosts electric-powered aviation

"A project managed by Cranfield University to advance electric aviation has achieved a significant milestone with what is thought to be the first ever flight by a British designed and built all-electric conventional aeroplane.

After taxi tests and low hops, the single seat Sherwood eKub made its first flight of 10 minutes and then a second flight later in the day of 22 minutes from Little Snoring airfield in Norfolk.

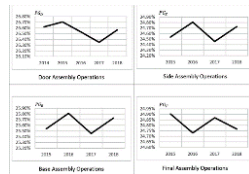
The flights were piloted by Dr Guy Gratton, Associate Professor of Aviation and the Environment at Cranfield University and an Associate Fellow of the Society of Experimental Test Pilots, who is also programme manager for the Enabling Aircraft Electrification (EnabEI) project."

Source: Business Weekly UK

Singapore supports aviation's recovery, sustainability, and resilience

"Mr. Juan Carlos Salazar, the ICAO Secretary General undertook a recent mission to Singapore, from 6 to 9 April 2022. The focus of his visit to the city-state was to affirm and enhance the strong support and co-operation from Singapore for a sustainable and resilient recovery for air transport

AVIATION



Productivity Gain by Combination of Lean Manufacturing and Mass Customisation Methods in Aviation Industry

"Aviation companies are experiencing increased demand for products due to growth in air travel. Variations in product volume and variety, limited availability of skilled labour and costs are challenges for these companies. It is necessary to explore innovative ways to mediate such issues. A research study was carried out at an aviation manufacturing company to transform its assembly operations by implementing lean manufacturing and mass customisation methods. Time studies were conducted and process times of random samples were recorded before and after transformation. Hypothesis testing was done for testing statistical significance of process times reduction after transformation. Productivity gains were investigated in all four areas of its assembly operations. Regular time studies of process times continued while assembly operations ran for 5 years after transformation."

Source: Springer Link

Study on the disposal strategy of civil aviation passenger

AVIATION



Growth Opportunities for Global Commercial Aviation Privatization

"The privatization trend in aviation has picked up pace globally during the last 2 decades. Historically, a majority of airlines and airports were part of the public sector, and focus remained mostly on providing connectivity and affordability. However, the travel experience was often less prioritized. Changing market dynamics have made the passenger experience much more central to the travel industry, and service providers can no longer ignore this shift. Airports that traditionally had a monopoly on travel are finding it difficult to maintain their profitability with the entrance of the low-cost carrier model. Airlines operating on the LCC model operate on a thin margin, which forces them to optimize operational costs as much as they can to maintain their margins through high volumes of travel. But optimizing operational costs alone is not sufficient to ensure margins or to fight the competition, which is why both airports and airlines are finding innovative ways to ensure profitability. The personalization of services and focus on travel experience are the 2 major aspects where airlines and airports can generate the ancillary

regionally and globally, as well as in other fields of work for the global civil aviation sector. The Secretary General and Mr. Han Kok Juan signed an agreement to jointly develop and deliver a global programme on aviation recovery and resilience for the DGCAs of ICAO's 193 Member States."

Source: ICAO

What will it take to improve aviation safety in Singapore?

"SINGAPORE - The Civil Aviation Authority of Singapore (CAAS) has published a Singapore National Aviation Safety Plan to address safety risks in the coming years.

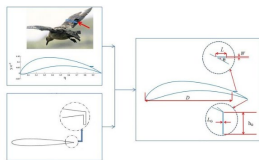
Here are some of the issues addressed in the report.

The Singapore aviation sector is expected to face safety challenges in these areas:

1. Five high-risk categories faced by aviation operations worldwide: runway incursion, runway excursion, mid-air collision, loss of control in-flight and controlled flight into terrain.
2. Two safety risks that are particularly relevant to Singapore: systems component failure and ground occurrences resulting in damage.
3. Risks linked to Covid-19 disruption, such as decreased competency of flight crew and airworthiness of grounded aircraft that are returning to service.
4. Other risks associated with changes in the operating environment and the use of technology."

Source: Straits Times

AEROSPACE ENGINEERING



Bionic Wing Flaps Improve Wind Energy Efficiency

"In the Journal of Renewable and Sustainable Energy, by AIP Publishing, scientists from China show a bionic approach combining features of a seagull's wing with an engineered flow control accessory, known as a Gurney flap, can greatly improve wind turbine performance.

A Gurney flap is a small tab projecting at right angles from the trailing edge of a wing. Its presence disturbs wind flow patterns and is especially effective at improving performance at low angles of attack. In aerodynamics, the angle of attack is

collective events based on evolutionary game theory

"It is very crucial to prevent the influence of passenger collective events because of the increasing number of such emergencies, which arise from flight delay. To solve this complex problem, this study constructed a tripartite evolutionary game model of airlines, the airport, and passengers. The simulation results show that the initial probability of the tripartite game strategies can influence the time length as well as convergence rate of system evolution, but will not influence the overall trend and final result of the evolution. Our results further suggest that the airport and airlines should adopt targeted measures to serve different types of passengers and control their costs within an appropriate range in order to improve passengers' satisfaction and effectively avoid the occurrence of passenger collective events."

Source: Elsevier

Analysis method of micro stress sensitivity of aviation bearing based on Voronoi model

"The micro-stress distribution of the bearing in actual work directly affects its service performance. This paper attempts to unify the bearing multi-field coupling service conditions with the micro-inhomogeneity of the internal material of the bearing steel, establish a micro-stress sensitivity analysis method for aviation bearings. The bearing motion parameters are solved based on the pseudo-dynamics method. The bearing fluid lubrication model was then established to calculate the lubricant state based on the CFD method. A bearing heat-fluid-solid multi-field coupling model is established based on the grid mapping method. According to EBSD, SEM and nanoindentation experiment, the microstructure model of bearing was established, and the micro stress of bearing was solved based on sub model method. A response surface model is established by the BOX-Behnken Design method. A multivariate random parameter evaluation method is proposed based on the SPEA coefficient."

Source: Elsevier

Risk identification of civil aviation engine control system based on particle swarm optimization-mean impact value-support vector machine

"The actual risk of the engine control system in operation is often higher than expected risk level, which brings hidden dangers to the safe operation of aircraft. Therefore, a PSO-MIV-SVM

revenue streams that form a considerable percentage of overall revenue. Privatization plays a significant role in achieving operational efficiencies and profit margins without compromising safety requirements and conflicts of interest. Airports, airlines, and all industry stakeholders must analyze their desired actions and results to fully understand the structural changes required in privatization."

Source: Frost & Sullivan

IATA Safety Report 2021(published April 2022)

"The 58th edition of the Annual Safety Report (2021), is a comprehensive review and analysis of the industry's 2021 safety performance. It presents an in-depth examination of both global and regional accident statistics, including:

- Essential review and insight into global and regional accident rates and contributing factors
- Accident Classification Task Force (ACTF) determined actions with recommendations, guidelines and measures aimed at preventing accidents.
- Regional overview of the safety metrics and corresponding activities for targeted risk management
- Essential Insight into the aggregate performance of airlines on the IATA Operational Safety Audit (IOSA) registry"

Source: IATA

MARKET REPORT



Global Regional Commercial Aviation Market Report 2022: Increasing Dominance of Low-Cost Carriers Drives Transformational Growth in Regional Connectivity

"This research service provides an insightful overview of the global commercial regional aviation industry, highlighting crucial growth drivers and opportunities on which key stakeholders can capitalize.

Saturated air traffic demand in developed regions where aviation penetration is high creates the need for an adjacent market. Globally, the COVID-19 pandemic has forced governments and aviation stakeholders to rethink their strategies

the angle between a line through the center of an aircraft wing and the oncoming flow of air."

Source: American Institute of Physics

Scientists develop environmentally safe, frost-resistant coatings

"We questioned the lifetime of the cryoprotectants and looked at new ways to increase their effectivity," Anand said. "Glycols dissolve very fast in the water and get washed away before the plane takes off, and it's a serious problem that costs hundreds of millions of dollars -- most of which literally ends up in the drain. We thought, why not improve such chemicals themselves, and make alternatives that can last longer while being more biofriendly. And that is what we ended up doing."

To accomplish their goal, the researchers developed an extensive family of more than 80 anti-freezing coatings, which can be classified as polymeric solutions, emulsions, creams and gels. The formulations can be easily applied to aluminum, steel, copper, glass, plastic or any industrial surface without preconditioning or expensive surface treatments."

Source: University of Illinois Chicago

AIRCRAFT TECHNOLOGY



Hydrogen Infrastructure Needs Rival Aircraft Tech Challenges

"Of all the various renewable energy sources under development, hydrogen represents the so-called 'holy grail' in the effort to eliminate carbon emissions from future aircraft, say many scientists. But while the technology exists today to build a hydrogen-powered aircraft, prompting several startup enterprises to develop fuel-cell-based vehicles for the burgeoning advanced air mobility (AAM) industry, for example, scaling the production and distribution of hydrogen for the wider air transport market presents its own set of challenges."

While several companies continue work to advance fuel cell technology using hydrogen gas for generally small aircraft, the application of liquid hydrogen, or LH2, appears to carry the most promise for larger airliners due to its superior energy density and versatility. The use of liquid hydrogen stored in a cryogenic tank onboard to power turbine engines presents the most feasible means to introducing a passenger-carrying aircraft to the

(particle swarm optimization-mean impact value-support vector machine) model is proposed to identify the risk of engine control system. Firstly, seven characteristic variables are extracted through the analysis of engine unsafe information, and 810 typical engine event samples were selected and normalized. Secondly, the SVM-based engine control system risk identification model is established and optimal kernel function of the SVM model is selected. Thirdly, the SVM-MIV method is used to sort the importance of the seven characteristic variables, and the identification accuracies of different characteristic variable groups are calculated to obtain the optimal combination of characteristic variables. Finally, the parameters of the SVM model are optimized by using the PSO algorithm and the accuracy of the PSO-MIV-SVM model for the risk identification of the engine control system reaches 93.58%."

Source: Sage Journals

AIMing for Equity in Aviation Accessibility: Development of the Aviation-accessibility Integrated Mobility (AIM) Metric

"As federal spending and planning for air transportation infrastructure looks to prioritize access for disadvantaged populations, aviation systems planning metrics that measure accessibility at the individual level are necessary. Existing metrics, from the mobility-driven metrics focused on efficiency and on-time performance to geographic accessibility metrics focused on connectivity, lack the detail of the multiple, interlocking constraints that limit potential travelers (especially lower-income travelers) from executing their agency and accessing the aviation system. We seek to develop a methodology, resulting in new analysis metrics, to quantify accessibility on an origin-destination basis based on individual constraints, time- and cost-based impedance, and aviation travel supply. We develop and apply our Aviation-accessibility Integrated Mobility (AIM) metric to empirically model relative accessibility based on traveler-specific constraints, accounting for individual-level sensitivity to travel costs and propensity to travel by ground access modes."

Source: Sage Journals

AIRCRAFT SYSTEM

and mitigate risks associated with their dependence on international travel and tourism.

Airports are considered strategic economic activity hubs and investment hotspots, offering new revenue streams through increased demand for regional connectivity. Establishing efficient regional connectivity could act as a feeder for existing airlines.

Having efficient and affordable network connectivity drives regional passenger traffic. Regular flights to key areas are appealing to passengers, such as major cities and emerging business hubs. Regional airports play a vital role in advancing and ensuring equal regional growth in a country, especially in areas with limited transportation access."

Source: PRN Newswire

STATISTICS



Air Passenger Numbers to Recover in 2024

"The International Air Transport Association (IATA) expects overall traveler numbers to reach 4.0 billion in 2024 (counting multi-sector connecting trips as one passenger), exceeding pre-COVID-19 levels (103% of the 2019 total)."

Expectations for the shape of the near-term recovery have shifted slightly, reflecting the evolution of government-imposed travel restrictions in some markets. The overall picture presented in the latest update to IATA's long-term forecast, however, is unchanged from what was expected in November, prior to the Omicron variant.

"The trajectory for the recovery in passenger numbers from COVID-19 was not changed by the Omicron variant. People want to travel. And when travel restrictions are lifted, they return to the skies. There is still a long way to go to reach a normal state of affairs, but the forecast for the evolution in passenger numbers gives good reason to be optimistic," said Willie Walsh, IATA's Director General."

Source: IATA

The Air Transport Monthly Monitor for March 2022

"The air transport industry is not only a vital engine of global socio-economic growth, but it is also of vital importance as a catalyst for economic development. Not only does the industry create direct and indirect employment and support tourism and local businesses, but it

market, according to experts in the field."

Source: AIN Online

Planes running on batteries and hydrogen to become a reality under new group of aviation experts

"Transport Secretary Grant Shapps and Business Secretary Kwasi Kwarteng have today (20 April 2022) set out a new group of aviation experts across industry and government who will work together to make zero emission flight a reality.

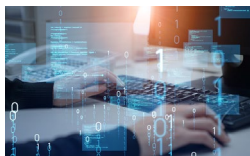
As world leaders in aviation decarbonisation, the new Zero Emission Flight (ZEF) Delivery Group, will further Britain's role in the global effort to end flight emissions.

Launched at the fifth meeting of the Jet Zero Council, the new steering group will help position the UK at the forefront of the global shift to green aviation by supporting the development of zero emission aircraft and airport infrastructure. It will also look at how the law needs to adapt so that sustainable flying can truly become a reality.

The new group will sit under the Jet Zero Council – an advisory forum with experts from across the industry – and will focus specifically on the technology, infrastructure and regulation needed to make zero emission flight a reality."

Source: Gov.UK

DIGITALIZATION



Digital identity to redefine distribution chain

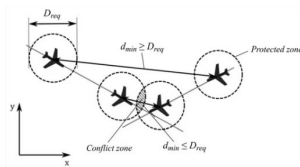
"New Distribution Capability (NDC) is the first step towards the evolution of airlines into retailers through a data exchange format based on offer and order management processes...

"Digital Transformation is a critical enabler of customer centricity. Airlines must accelerate their journey to becoming digital retailers, using modern technologies.""

Source: IATA

Boeing and Microsoft deepen partnership in digital aviation

"Boeing Company (NYSE: BA) and Microsoft Corp. (Nasdaq: MSFT) on Wednesday announced they are deepening their strategic partnership to accelerate Boeing's digital transformation. Through the expanded collaboration, Boeing will leverage the Microsoft Cloud and its AI capabilities to update its technology infrastructure and mission-

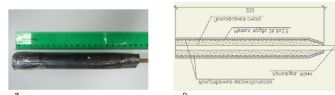


Stochastic Dynamic Aircraft System Conflict Distribution under Uncertainties

"A dynamic aircraft system conflict (concurrent event) situation exists when a time with a loss (-es) of separation (LOS) in their true or predicted trajectories is determined. Regional air traffic management (ATM) programs aim to make ATM safer and more efficient through a higher level of automation for such processes as dynamic aircraft systems concurrent events detection and, consequently, resolution. Therefore, wind and aircraft speed uncertainty parameters should be properly addressed. This paper offers an approach to a dynamic aircraft system flying under a certain concurrent event situation and demonstrates situation stochastic distribution results (output) based on determined wind speed values (while wind direction angles and the dynamic aircraft system speed values are random)."

Source: MDPI

MATERIALS



Study of the properties of polymer composites – reinforcement based on glass and basalt fibers

"Composite fittings are increasingly used in various industries and the economy. The use of such compositions in construction requires a modern engineer to have in-depth knowledge of the choice of materials. In this regard, a comparative analysis of composite reinforcement based on glass and basalt fibers was conducted. Price monitoring of composite fittings from leading local manufacturers was conducted. The main deformation-resistance properties of basalt-plastic and fiberglass reinforcement are determined based on the results of numerous tensile tests of rods. A more efficient and economical design of the anchor sleeve is given in comparison with the recommendations. By many criteria, it was concluded that basalt-reinforced plastic reinforcement was slightly superior to fiberglass."

Source: Eurasian Scientific Herald

Effect of the Phase Composition of Austenitic-

also stimulates foreign investment and international trade.

Informed decision-making is the foundation upon which successful businesses are built. In a fast-growing industry like aviation, planners and investors require the most comprehensive, up-to-date, and reliable data. [ICAO's aviation data/statistics programme](#) provides accurate, reliable and consistent aviation data so that States, international organizations, the aviation industry, tourism and other stakeholders can:

- make better projections;
- control costs and risks;
- improve business valuations; and
- benchmark performance.

The UN recognized ICAO as the central agency responsible for the collection, analysis, publication, standardization, improvement and dissemination of statistics pertaining to civil aviation. Because of its status as a UN specialized agency, ICAO remains independent from outside influences and is committed to consistently offering comprehensive and objective data. Every month ICAO produces this [Air Transport Monitor](#), a monthly snapshot and analysis of the economic and aviation indicators."

Source: Uniting Aviation

critical applications with intelligent new solutions that are data driven, further opening new ways of working, operating and doing business.

"Today's announcement represents a significant investment in Boeing's digital future. Our strategic partnership with Microsoft will help us realize our cloud strategy by removing infrastructure restraints, properly scaling to unlock innovation and further strengthening our commitment to sustainable operations," said Susan Doniz, Boeing chief information officer and senior vice president of Information Technology & Data Analytics. "Microsoft's demonstrated partnership approach, trusted cloud technologies and deep industry experience will help us achieve our transformation goals and strengthen Boeing's digital foundation."

Source: Microsoft

SUSTAINABLE AVIATION



Solar fuel aids sustainability ambitions

"Sustainable Aviation Fuels (SAF) are crucial if aviation is to achieve its target of net-zero carbon emissions by 2050. Even if electric, hybrid and hydrogen aircraft projects materialize as planned, a fleet rollover will extend well beyond 2050 and, in any case, will only be a solution for short and medium-haul flights for the foreseeable future.

SAF, on the other hand, can be blended with fossil fuel and so serve as a drop-in fuel to be used with existing aircraft and engine technologies. Furthermore, they can be transported via the established supply infrastructure. Most SAF reduce CO₂ emissions by up to 80% compared with fossil fuels and power-to-liquid (PtL) or sun-to-liquid (StL) processes almost completely eliminate CO₂."

Source: IATA

Sapphire fibre could enable cleaner energy and air-travel

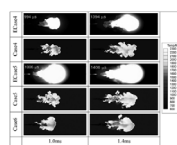
"Oxford University researchers have developed a sensor made of sapphire fibre that can tolerate extreme temperatures, with the potential to enable significant improvements in efficiency and emission reduction in aerospace and power generation. The work, published in the journal Optics Express, uses a sapphire optical fibre – a thread of industrially grown sapphire less than half a millimetre thick – which can withstand temperatures over

Martensitic VNS9-Sh TRIP Steel on the Characteristics of Dry Sliding Friction in the Triboccontact with ShKh15 Steel

"The effect of the martensite phase content (from 0 to 50 vol %) on the hardness and tribotechnical properties of VNS9-Sh TRIP steel under conditions of dry sliding friction on ShKh15 steel (counterbody) is studied. The best combination of the hardness and the wear resistant is found in the steel with a martensite phase content of ≈32 vol %. The strength of VNS9-Sh steel is higher by a factor of more than two than that of 110G13L steel at comparable hardnesses and tribotechnical properties."

Source: Springer Link

AVIATION FUEL



Spray Combustion Characteristics of Single/Multicomponent Surrogate Fuel for Aviation Kerosene

"In this research, n-dodecane and world-average jet fuel (JW) are selected as single and multicomponent surrogate fuel of aviation kerosene to study the Jet-A spray combustion characteristics. The spray combustion phenomena are simulated using large eddy simulation coupled with detailed chemical reaction mechanism. Proper orthogonal decomposition method is applied to analyze the flow field characteristics, and the instantaneous velocity field is decomposed into four parts, namely, the mean part, coherent part, transition part, and turbulent part, respectively. The four parts have their own characteristics. In terms of different fuels, JW has a higher intensity of coherent structures and local vortices than n-dodecane, which promotes the fuel-air mixing and improves the combustion characteristics, and the soot formation is significantly reduced."

Source: ASME

Electrical conductivity of aviation turbine fuel (jet fuel) and its affecting factors: a case study

"Electrical conductivity is an important characteristic for safe and economic handling of aviation turbine fuels which have the potential to accumulate static charges. Jet fuels are highly refined product with very low conductivity. To ensure safe

2000°C. When light is injected onto one end of the sapphire fibre, some is reflected back from a point along the fibre which has been modified to be sensitive to temperature (known as a Bragg grating). The wavelength (colour) of this reflected light is a measure of the temperature at that point."

Source: University of Oxford

Lignin-based jet fuel packs more power for less pollution

"An experimental plant-based jet fuel could increase engine performance and efficiency, while dispensing with aromatics, the pollution-causing compounds found in conventional fuels, according to new research.

In a study published in the journal Fuel, researchers analyzed a Washington State University-developed jet fuel based on lignin, an organic polymer that makes plants tough and woody. Using a range of tests and predictions, the researchers examined fuel properties critical to jet engine operation, including seal swell, density, efficiency and emissions. Their results suggest that this sustainable fuel could be mixed with other biofuels to fully replace petroleum-derived fuels."

Source: Washington State University

What contributions does air transport make to the UN sustainable development goals?

"The United Nations adopted the Sustainable Development Goals (SDGs) in 2015 as a call for action for all countries to end poverty, promote prosperity, protect the planet and ensure that by 2030 all people can live safely and have access to clean water and education. Aviation is a crucial driver of economic and social growth and plays an essential role in supporting the UN SDGs through generating connectivity between nations.

The aviation sector develops millions of jobs, enables tourism and supports sustainable progress worldwide. To ensure that air traffic development is managed safely, efficiently, and securely, ICAO has established five Strategic Objectives (SOs): Safety, Air Navigation Capacity and Efficiency, Security and Facilitation, Economic Development of Air Transport and Environmental Protection. With an association to 15 of the 17 SDGs, ICAO's SOs highlight civil aviation's immense role in improving people's lives worldwide. We are highlighting these contributions below."

Source: Uniting Aviation

fuel storage and distribution, Jet fuel specifications have been established specifying permissible levels of fuel conductivity. Static Dissipater Additive (SDA) or conductivity improver, is often added to fuel to achieve specification requirements. Controlling of SDA concentration via conductivity measurement is essential for commercial practice due to its surface active nature and anti-electrostatic properties"

Source: Taylor & Francis

The Influence of Geometrical and Inlet Parameters on the Impingement Cooling of Aviation Kerosene

"In the present paper, numerical study of flow and heat transfer properties of RP-3 kerosene in an impingement model are conducted with SST $k-\omega k-\omega$ turbulence model and a 10-species surrogate of kerosene. The independence of grids is first studied and the numerical results are compared with experimental data for validation. Characteristics of flow and heat transfer of kerosene flow in the impingement model are studied with different inlet temperatures, dimensionless open areas, and separation distances. The heat transfer coefficients and pressure losses increase with decreasing dimensionless open areas. The separation distance $H/d=2$ gets the best heat transfer performance and the separation distance $H/d=3$ gets the best heat transfer uniformity on the target plate. Higher inlet temperature gets a higher heat transfer performance and heat transfer uniformity on the target plate."

Source: ASME

AIRCRAFT TECHNOLOGY



Impact of distributed electric propulsion technology on the performance of a four-person general aviation aircraft

"With the increasing use of airplanes over the past years, the consumption of fossil fuels by airlines has increased exponentially. Therefore, in an attempt to decrease the dependence of fossil fuels, the possibility of using electric energy as the aircraft's main power source has been studied in the past years. One distributed electric propulsion technology that can have a greater impact in the current small aircraft market is the Leading Edge

Decarbonizing Aviation Will Require Big Leaps from These Pioneers

"We are seeing a big push happening this year in aviation, driven by calls on airlines to decarbonize and investor interest in new aviation technology startups."

Source: Bloomberg

UAV



Hoverfly visual systems mapped to detect sound of distant drones

"For the first time, Australian researchers have reverse engineered the visual systems of hoverflies to detect drones' acoustic signatures from almost four kilometres away."

Autonomous systems experts from the University of South Australia, Flinders University and defence company Midspar Systems say that trials using bio-inspired signal processing techniques show up to a 50 per cent better detection rate than existing methods.

The findings, which could help combat the growing global threat posed by IED-carrying drones, including in Ukraine, have been reported in The Journal of the Acoustical Society of America."

Source: University of South Australia

Avian secret: The key to agile bird flight is switching quickly between stable and unstable gliding

"While it had been assumed that unstable gliding was the key to agility in bird flight, a collaboration between aerospace engineers at the University of Michigan and biologists at the University of British Columbia revealed that stability plays a role."

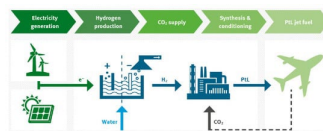
The discovery could lead to the design of more agile aircraft, specifically uncrewed aerial vehicles (UAVs)."

Source: University of Michigan

Asynchronous Propellers Technology (LEAPTech). The purpose of this thesis is to allow to have a deeper understanding on the impact of a LEAPTech aircraft on the performance and flight profile of a current state-of-the-art combustion aircraft. In order to make this study, two softwares are used. Firstly, the main software in which almost all the analyses are made is SUAVE. The second software, which is used to build various surrogate models for the aerodynamic analysis is OpenVSP. With the utilization of these two softwares, the reference aircraft (Tecnam P2006T), its electric counterpart and a LEAPTech aircraft with 12 high-lift propellers were developed. All these aircraft configurations' flight profiles were converged for their respective maximum range."

Source: TU Delft

SUSTAINABLE AVIATION



Use of Sustainable Fuels in Aviation—A Review

"As the push for carbon-neutral transport continues, the aviation sector is facing increasing pressure to reduce its carbon footprint. Furthermore, commercial air traffic is expected to resume the continuous growth experienced until the pandemic, highlighting the need for reduced emissions. The use of alternative fuels plays a key role in achieving future emission goals, while also lowering the dependency on fossil fuels. The so-called sustainable aviation fuels (SAF), which encompass bio and synthetic fuels, are currently the most viable option, but hydrogen is also being considered as a long-term solution. The present paper reviews the production methods, logistical and technological barriers, and potential for future mass implementation of these alternative fuels. In general, biofuels currently present higher technological readiness levels than other alternatives. Sustainable mass production faces critical feedstock-related challenges that synthetic fuels, together with other solutions, can overcome. All conventional fuel replacements, though with different scopes, will be important in meeting long-term goals. Government support will play an important role in accelerating and facilitating the transition towards sustainable aviation."

Source: MDPI

Analysing the opportunities and challenges for mitigating the climate impact of aviation:

A narrative review

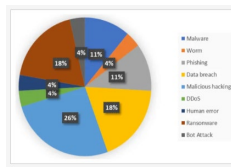
"Aviation accounts for approximately five percent of global greenhouse gas emissions through the combustion of fossil fuels. This paper analyses the opportunities and challenges of mitigation measures in limiting travel volume, energy and emission intensity to reduce the climate impact of aviation in Sweden. Several measures are in place that aim to reduce the climate impact of the aviation industry, ranging from regulations to technology alternatives to fossil-based jet fuel. These measures face several crosscutting challenges, many of which are of a socio-economic and political nature, and these aspects are often neglected in favour of focusing on technological solutions. The market creation for alternatives to fossil-based jet fuel is a major challenge, as most consumers today have a limited awareness of and willingness to pay for these innovations."

Source: Elsevier

Pathways to Achieve Rapid Decarbonization of ASEAN

"As a region, the ten countries of ASEAN emitted 1.65 Gt of CO₂ in 2020 which was 4.75% of worldwide emission. The biggest CO₂ emitting nations were Indonesia, Malaysia, Thailand, Vietnam and Philippines. This paper conducts a detailed analysis of total primary energy consumption (TPEC) and CO₂ emission profiles from these five countries as well as Singapore and Brunei (ASEAN-7). Analyses show that in 2018, TPEC of ASEAN-7 consisted of 35% oil, 29% coal, 19% gas and 17% renewables, whereas CO₂ emission came 44% from coal, 39% from oil, and 17% from gas. Seven pathways for rapid decarbonization of ASEAN are proposed. They include: (1) increasing the share of renewable energies in power generation, (2) replacing coal by gas in power generation, (3) electrification of road transport, (4) hydrogen for marine transport, (5) biofuels for aviation, (6) blue hydrogen for hard-to-decarbonize industries, and (7) establishing regional carbon capture and storage (CCS) corridors to accelerate implementation of large-scale CCS projects."

Source: One Petro



Cyber-Security Challenges in Aviation Industry: A Review of Current and Future Trends

"The integration of Information and Communication Technology (ICT) tools into mechanical devices in routine use within the aviation industry has heightened cyber-security concerns. The extent of the inherent vulnerabilities in the software tools that drive these systems escalates as the level of integration increases. Moreover, these concerns are becoming even more acute as the migration within the industry in the deployment of electronic-enabled aircraft and smart airports gathers pace. A review of cyber-security attacks and attack surfaces within the aviation sector over the last 20 years provides a mapping of the trends and insights that are of value in informing on future frameworks to protect the evolution of a key industry. The goal is to identify common threat actors, their motivations, attacks types and map the vulnerabilities within aviation infrastructures most commonly subject to persistent attack campaigns. The analyses will enable an improved understanding of both the current and potential future cyber-security protection provisions for the sector."

Source: Cybersecurity

DATA PROCESSING



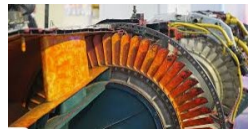
A Paradox in aeronautical data processing: A case study review

"Undoubtedly aeronautical data and information of appropriate quality are the enablers of a safe and efficient aviation industry. Hence nowadays, before the utilisation of tools and software developed to collect and process aeronautical data, in Europe software developers are required to demonstrate that their solutions meet determined levels of data quality and accuracy as they are defined by the Commission Regulation (EU) No 73/2010. Accordingly, within validation and verification processes solution developers are required to conduct a safety assessment of their solution, demonstrate that it meets aeronautical data quality requirements and carry out a risk assessment. In that respect, this research paper presents a paradox in aeronautical data processing that has been identified within one

solution's validation and verification processes."

Source: Elsevier

AIRCRAFT EMERGENCY LANDING



Evaluation of the Biomechanical Responses During an Aircraft Emergency Landing

"Passengers' safety in unconventional situations, such as those of an emergency landing, has become more and more important due to the increase of air traffic. To improve passengers' safety, certification authorities have imposed specific crashworthiness requirements in airworthiness regulations as defined in Title 14 of Federal Regulations Code—Part 25 for transport aircraft. Over the years, a series of drop tests were carried out to evaluate the structural performance of the airframe and seats and their effects on the occupants. However, the development of a single test is not only time-consuming but also very expensive. In this context, computer modelling and simulation have become increasingly popular for efficient and quick investigations on aircraft's dynamic behaviour. This study aims to develop a numerical procedure to assess passengers' safety during a crash landing and optimize the occupant lumbar load for which the impacts of different seat cushion foams are analysed."

Source: Springer Link