



A.I.D.A.A. News #9

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1 AIDAA Educational Series and Academy and Webinars

The Italian Association of Aeronautics and Astronautics (AIDAA) is pleased to announce the creation of the AIDAA Educational Series and Academy. This initiative aims at providing courses, books, manuals, and hands-on experiences to students, professionals, scientists, and professors. The inaugural activity is a series of webinars to be held from February to December 2021. A typical webinar has a duration of 4–10 h and focuses on hard and soft skills covering specific topics and problems, e.g., low- and high-velocity impact problems, urban air mobility, inflatable space modules, successful grant writing. Lectures can be members, non-members, and speakers from other countries are particularly welcomed. The list of webinars and the registration procedure will be available online in the next weeks.

2 Professors Bernelli and Alaimo elected President and Director General of CEAS

The Council of European Aerospace Societies (CEAS) announced the board's new officers with two AIDAA members. Professor Franco Bernelli Zazzera is the new President of CEAS. Bernelli is a full professor of the Department of Aerospace Science and Technology at Politecnico di Milano. His teaching and research activities are in the domain of aerospace systems. Professor Andrea Alaimo is the new Director General of CEAS. Alaimo is a full professor of aerospace structures at the University of Enna "Kore," and director of the M.A.R.T.A. center, one of the largest research facilities in Europe for the Aviation Human Factor.

3 AIDAA to Bid for IAC2024

AIDAA, a founding member of the International Astronautical Federation, announced Milan's candidature as the host city of the 75th International Astronautical Congress (IAC) to be held in October 2024. The Milano Convention Centre (MICO), the largest Convention Centre in Europe and among the largest conference facilities worldwide, is the proposed venue. Various academic and non-academic institutions granted support for this bid, including the Italian Space Agency (ASI), Thales Alenia Space, Altec, Leonardo, and OHB. IAC2024 will gather some 6000 delegates and 100 exhibitors, amounting to 200 scientific sessions and 5000 sqm of exposition. IAC2024 would be the fifth edition held in Italy after Rome (1956 and 1981), Turin (1997), and Naples (2012).



In the case of success, Italy would host the two major aerospace conferences in 2024, namely, ICAS in Florence and IAC in Milan.

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4 AIDAA launched PhD Days of European Students in Aerospace Engineering

The Italian Association of Aeronautics and Astronautics (AIDAA) is pleased to announce the first PhD days of European students in aerospace engineering to share their activities and create a net of young researchers. The event will be online from 15 February 2021. Depending on the number of participants, the event should last 2–3 consecutive days. Each student has ten minutes to present and five of Q&A. Instructions for registration and attendance will be available online in the next days.



5 Mr. Fabio Nannoni receives from VFS the Nikolsky Honorary Lectureship

We are pleased to announce that on January 4th, Mr. Fabio Nannoni, former Chief Technical Officer of Leonardo Helicopter Division, received from the Vertical Flight Society the prestigious 2021 Alexander A. Nikolsky Honorary Lectureship – an award and at the same time a dissemination commitment.



In presenting the lecture “Rotorcraft Design: The Crucial Influence of Safety from Concept to Fleet Support,” Mr. Nannoni will summarize and finalize more than 30 years of experience in the design of rotorcraft and vertical take-off aircraft, initially side by side with other great rotorcraft designers and then at the lead of the technical office of Agusta, today is known as Leonardo Helicopter Division. Among the many excellent professional and personal merits of Mr. Nannoni, he represented AIDAA in the International Committee of the European Rotorcraft Forum (ERF) for

many years, which he often chaired. In the Rotorcraft Technical Committee of CEAS, he concluded by organizing and chairing the largely successful ERF 2017, held at Politecnico di Milano. <https://vtol.org/news/nannoni-selected-for-2021-nikolsky-lectureship>

6 T-TeC/Telespazio Technology Contest

The 2020 edition of the #T-TeC (Telespazio Technology Contest) saw the participation of 50 students, doctoral students and researchers from 32 departments of 20 universities in 15 European cities, who challenged one another with innovative ideas and solutions in the space and aeronautical field. Those taking part in #T-TeC 2020 were able to choose to deal with various technological themes. The competition was divided into two categories: “Light”, dedicated to the integration of existing technologies to create new services; and “Photon”, that dealt with the development of new technologies. In the “Light” category, the team from University of Naples Federico II, who submitted the *MATES- Mars Telecommunications System project*, a telecommunications system for future robotic and crewed missions to Mars, won the prize of 10,000€. The project was

developed within the Space Mission Design course under the supervision of Prof. A. Renga and Prof. M. Grassi. This is the winning team: Riccardo Basile (Team Leader); Luca Andolfi (Payload); Verdiana Bottino (Risks, Reliability and Costs); Francesco Calandro (Payload and Ground Segment); Gabriella Capone (Thermal and Power Subsystem); Camilla Casino (Thermal and Power Subsystem); Marco Cinque (Mission Concept); Clelia Di Costanzo (Design and Engineering); Alessandra Gallucci (Project and Configuration Management); Antonio Gigantino (Attitude and Orbit Control); Pasquale Guida (Market Analysis and User Needs); Francesco Iavicoli (System Engineering); Francesco Marco Riboli (Mission Analysis); Claudio Vela (Mission Analysis).

7 H2020 research project "PARSIFAL" led by University of Pisa successfully concluded

The PARSIFAL project ("Prandtlplane ARchitecture for the Sustainable Improvement of Future Airplanes) has been funded by the European Union with about 3 M€ under the Horizon 2020 Program. The project, started in May 2017 and concluded in July 2020, has been coordinated by the University of Pisa (Italy), with partners ONERA (France), TUD (Netherlands), ENSAM (France), DLR (Germany) and SkyBox Engineering (Italy). The consortium has been supported by an external Advisory Board made up of experts from the aircraft manufacturers (Leonardo, Airbus), airport management companies (Milan and Tuscany airports), airlines (KLM), and aeronautics professionals, who have contributed to steer the research towards concrete objectives with attention to market interests.



Aiming to demonstrate the technical, environmental and economic feasibility of a box-wing configuration, the project has been focused on the needs of short-to-medium routes air traffic (< 4000 km), for which most of the aircraft in service today belongs to category "C" of the ICAO reference code of airports (wingspan within 36 m).

Since this category of aircraft is expected to play the main role in the future increase in air traffic, with expected

growth factors up to 2x in the next 20 years, PARSIFAL has faced the challenge of designing an aircraft of the same category "C" and, hence, compatible with current airports and with most of their infrastructures, but with higher mission performance.

The plane has a box-wing architecture deriving from Ludwig Prandtl's studies of early 1920s. The application of the Prandtl's "best wing system" concept to aircraft design is the starting point of PARSIFAL project. Therefore, in honour of Prandtl, the resulting aircraft configuration has been called "PrandtlPlane".



Taking advantage of the aerodynamic and structural advantages offered by the box-wing configuration, the aircraft studied in PARSIFAL is capable to reduce the fuel consumption per passenger up to 20%, with a significant impact on environment and market opportunities. This performance improvement is made possible thanks to the improvement of the payload capability (up to 308 passengers vs. 186 of competitor aircraft from A320 and B737 families), without increasing the overall dimensions of the aircraft.

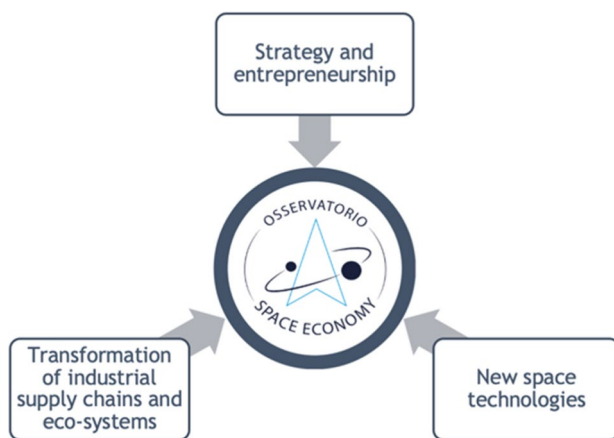
This 3 years long research project has demonstrated the PrandtlPlane introduction can bring to a 20% reduction in CO₂ emissions, up to 18% reduction Global Warming Potential, up to 23% Global Temperature change Potential and up to 12% reduction of the Cost per Available Seat-Kilometer.

In the final months of the project a scaled flying demonstrator has been built, to validate the results coming from simulations and analyses. The demonstrator is a 1:18 scaled model, 2.5 m long, with a wingspan of 2 m and a maximum weight of 22.5 kg. It is equipped with a full set of control surfaces (elevators, ailerons, flaps, rudders), a retractable landing gear and is equipped with sensors for measuring height, speed and position (GPS). The model is powered by 2 electric fans and is controlled through a ground station which allows complete data recording, control laws configuration and control allocation.

8 The Space Economy Observatory at Politecnico di Milano

At the beginning of 2020 Politecnico di Milano created the Space Economy Observatory, to systematize the skills of its Departments of Management Engineering and of Aerospace Sciences and Technologies. The Observatory is a forum of research and debate that aims to become a permanent reference point at national level in the study of technological opportunities and the related business impacts of the Space Economy, with the aim of accelerating cross-sectoral innovation processes by combining the most advanced space and digital technologies to generate a broad portfolio of services.

The use of space technologies and data collected from space, in combination with the most advanced enabling digital technologies, is generating a wealth of business opportunities, which include the creation of new products and services, up to the creation of new business models and the reconfiguration of value chains and relationships between companies. Such technological and business opportunities, if appropriately exploited, can contribute to the creation of tangible and intangible value, through new forms and sources of revenue, operational efficiency and the creation of projects with positive multidimensional impacts (e.g. society, environment).



The Space Economy Observatory, as a third-party research entity, aims to promote the realization of these opportunities, covering the role of technical-scientific advisor and enabler of valuable relationships between all the actors of the Space Economy ecosystem, which includes: (i) space industry companies, engaged in research, development, construction and management of enabling space infrastructures and technologies ("Upstream"); (ii) companies offering Digital Innovation solutions and services (e.g. IT provider, system integrator, consulting companies) and specialized research centers that deal with research, development and implementation of the most advanced digital

technologies ("Downstream"); (iii) companies and institutions interested in new applications and services deriving from the combined use of space and digital technologies ("End-User"); and (iv) policy makers, national and international bodies and institutions that govern and regulate the space economy.



9 SEAGULL, the most advanced hybrid-electric seaplane

NOVOTECH s.r.l. was born in 1992 as a spin-off of the Department of Aerospace Engineering of the University of Naples "Federico II" and during its history has developed specialized skills in design, production, testing and certification of aircraft and parts of them, mainly in the General Aviation industry. The Company boasts over 25 years of technical-scientific collaboration with consolidated companies, Universities and Research centers in transportation field and as proof of the high level of competence and standards that can be ensured within these activities, it is ISO 9100 certified.

In general, NOVOTECH can be considered as a private and independent research center focused on the development of new technologies and methods mainly for aerospace sector, specialized on automated OoA composite manufacturing processes.

Currently, the Company is involved in the development of its own aircraft, the SEAGULL, a new generation ultra-light hybrid-electric seaplane featured by a massive use of composites, high performance and low environmental impact, for dual use, both civil and military applications. It is an aircraft capable of carrying out maritime movements of people and / or goods in full autonomy, operable from any infrastructure, having a retractable wing, which through an automated all-electric patented system make it possible to retract wings for mooring in a common berth.

The SEAGULL represents a new mobility system that can be used not only for recreational and sports activities, but above all to promote communication between human

beings and break down the barriers currently present in the case of public and / or private transport of people and goods. The program started in January 2018 and production of a first prototype has been completed on December 2020. Currently the company is working on certification aspects and production of a second aircraft. Still in the view to develop products that can best meet the new needs of the market, in particular the experimentation of new ways of urban air mobility (UAM), the company is working on the development of a full-electric powered VTOL version of the SEAGULL aircraft.

With continuous research on novel and competitive solutions, NOVOTECH is among the first Italian SMEs ready for enter in the international Urban Air Mobility market. In parallel, in the field of composites the company has developed a well consolidated know-how in the design, experimentation and production of composite material components, primary and secondary structures, with automated (AFP) and out of autoclave manufacturing processes, such as Liquid Resin

Infusion, Resin Transfer Molding, Compression Molding, Continuous Forming and In-situ consolidation.

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