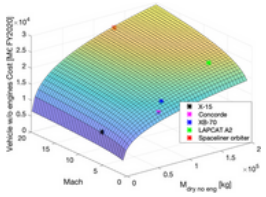
Educational Series & Academy

ECONOMIC ASSESSMENT OF FUTURE ENVIRONMENTALLY SUSTAINABLE HIGH-SPEED VEHICLES

Assessing the economic viability of new high-speed concepts since the early design phases is crucial for the success of future hypersonic vehicles including cruisers as well as reusable access-to-space and re-entry systems. Moreover, matching environmentally sustainable innovations guaranteeing at the same time economic sustainability is becoming a key factor. Besides literature reports few parametric cost models for high-speed vehicles, all of them makes exclusive use of mass as a parameter and none of the models moves beyond the vehicle level, thus preventing estimation of the costs associated with subsystems or technologies. This webinar aims at providing the attendees with a cost estimation model which moves beyond the state-of-the-art methodologies (1) by integrating vehicle design and operational parameters (in addition to the mass) as cost drivers for the prediction of the vehicle life-cycle cost, (2) by introducing prediction margins accounting for the uncertainties on the data-driven correlations, (3) by estimating the impact of environmentally sustainable solutions onto the vehicle life-cycle cost, (4) by providing a first estimate of the costs of every onboard subsystem, including combined cycle engines and multi-functional subsystems, (5) by increasing the granularity of the analysis up to technology level, thus providing valuable support to Technology Road-mapping activities, and, eventually, (6) by providing a ticket price estimation to be then compared with the results of a business case. The webinar contains extensive references to high-speed initiatives currently under development in Europe. The presented case studies have been developed and extensively tested in an international context such as the Horizon 2020 STRATOFLY project (2018-2021), the H2020 MORE&LESS project and other ESA funded activities.



MORE&LESS
MDO and REgulations for Low-boom and Environmentally Sustainable Supersonic Aviation

STRATOFLY
Stratospheric Flying Opportunities for High-Speed Propulsion Concepts

COURSE STRUCTURE

Part 1 (2h)
·Introduction to sustainable aviation and economic viability of a wide range of high-speed vehicles (from supersonic civil aircraft to future reusable access to space vehicles)
·UpToDate business cases for high-speed aviation
·State-of-the-art of parametric cost estimation
Part 2 (2h)
·Research, Development Test and Evaluation Costs of high-speed vehicles
·Impact of Technology Readiness Level (TRL) onto cost estimation
·Moving from vehicle to subsystem and technology level
Part 3 (2h)
·Direct and Indirect Operating Costs for high-speed vehicles
·Impact of Sustainable fuels onto costs (specific attention to hydrogen and biofuels)
·Predicting impact of Upcoming EU ETS on operating costs of future high-speed aircraft
Part 4 (2h)
·Moving beyond the engineering perspective: the airline, the operators, and the final customer perspectives
·Case studies: Mach 2 biofuel aircraft and Mach 8 LH2 aircraft
·Towards sustainable reusable access to space

Learning objectives:

- Introduction to sustainable aviation and economic viability
- Research, Development Test and Evaluation Costs of high-speed vehicles
- Direct and Indirect Operating Costs for high-speed vehicles
- Towards sustainable reusable access to space

Target audience: doctoral students, non-academic professionals, and undergraduate students.

Dates and time: 21-22 and 28-29 April 2022, 14:00-16:00 CEST

REGISTRATION AND CONTACTS

Course Code: 20220421

This course is part of the 2022 institutional activity for AIDAA members. The registration requires the purchase of one of the packages described here LINK, and the completion of the online form available here LINK.

Course platform: Webex, a link will be sent via email as the registration is complete.
At the end of each course, **attendance certificates** will be sent to participants via email.

For further info, please, contact **academy@aidaa.it**

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SPEAKERS

Roberta Fusaro is an Assistant Professor of Aerospace Systems Design at the Department of Mechanical and Aerospace Engineering at Politecnico di Torino since 2018. She is actively contributing (as WP Leader) to STRATOFLY project about hypersonic civil flight and MORE&LESS project about environmentally sustainable supersonic civil flight, both under the Horizon 2020 Program. Her main area of interest relates to the wide field of high-speed aircraft conceptual design. Specifically, she has been working at the development of up-to-date design methodologies to anticipate at conceptual stage reliable estimates for multidisciplinary design aspects including aero-thermodynamic and propulsive characterization, pollutant and noise emission estimation, sonic boom signature, life-cycle cost modelling, the impact of the integrated and multifunctional subsystem, mission analysis and technology road mapping.

Davide Ferretto is Assistant Professor at the Department of Mechanical and Aerospace Engineering at Politecnico di Torino, where he started his career as a Research Assistant in 2014. He received the PhD degree in Aerospace Engineering from Politecnico di Torino in 2020 with a dissertation entitled “Model-Based Systems Engineering approach for the design of hypersonic transportation systems”. His research activities include the design of aerospace systems for conventional and innovative aircraft as well as the systems engineering methods and tools. He is currently contributing to the activities of Horizon 2020 Projects STRATOFLY and More&Less, for which Politecnico di Torino acts as Coordinator, dealing with European calls on "Breakthrough innovation" in the aerospace domain and "Towards global environmental regulation of supersonic aviation".

Nicole Viola is Associate Professor of Aerospace Systems Design at the Department of Mechanical and Aerospace Engineering at Politecnico di Torino since 2018. She is Coordinator of STRATOFLY project about hypersonic civil flight under the Horizon 2020 Program, Coordinator of MORE&LESS project about environmentally sustainable supersonic civil flight under the Horizon 2020 Program and she is Principal Investigator of the technological payload currently onboard the International Space Station “Thermal Exchange”, developed in "Advanced Research for passive Thermal passive Exchange, ARTE”. Nicole Viola is also the Principal Investigator of research programs about high-speed vehicles and reusable access to space and re-entry systems as well as space tug mission design in collaboration with space agencies and industries. Nicole Viola is the Director of the International Post-Graduate Master Program in “SpacE Exploration and Development Systems, SEEDS”, at Politecnico di Torino, in collaboration with ISAE-Supaero (Toulouse, France) and University of Leicester (Leicester, UK), with the support of Thales Alenia Space, Altec, European Space Agency and Italian Space Agency.