curriculum vitae

Personal information

Surname(s) / First name(s)	**Nicolosi Fabrizio**
Address(es)	494/E, Corso Vittorio Emanuele, 80135, Naples, Italy (Home) 21, Via Claudio, 80125, Naples, Italy (Work) Department of Industrial Engineering-Aerospace Division, University of Naples "Federico II"
Telephone(s)	+39 081 17869194 (Home) +39 081 7683583 (Work) Mobile: +39 3284593835
E-mail(s)	fabrnico@unina.it
Nationality(-ies)	Italian
Date of birth	June, 30th, 1968
Gender	Male

Desired employment / Occupational field

Academic, Scientific Research, Research Manager

Work experience

Dates	Dec. 2021 to date
Occupation or position held	**Full Professor** **Eligible as Full Professor** (Abilitazione Nazionale for Full Professor) **since 2017**. https://asn16.cineca.it/pubblico/miur/esito-abilitato/09%252FA1/1/1
Main activities and responsibilities	Research and Teaching (Flight Mechanics-Performances (6 CFU), Aircraft Design (9 CFU)) Coordinator of DAF Research Group (www.daf.unina.it) @ Dep. Industrial Eng – Univ. of Naples
Name and address of employer	**University of Naples "Federico II", Naples-Italy**, Corso Umberto I, Naples
Type of business or sector	**Department of Industrial Engineering**, P.le Tecchio 80, Naples, Italy
Dates	Dec 2011-Dec. 2021
Occupation or position held	**Associate Professor**
Main activities and responsibilities	Research and Teaching
Name and address of employer	University of Naples "Federico II", Naples-Italy
	Jan 2006-Dec 2011

Dates	**Assistant Professor** (Professore Aggregato)
Occupation or position held	
Main activities and responsibilities	Research and Teaching
Name and address of employer	University of Naples “Federico II”, Naples-Italy
Dates	June 1997-Dec. 2005
Occupation or position held	**Senior Researcher**
Main activities and responsibilities	Research and Teaching
Name and address of employer	University of Naples “Federico II”, Naples-Italy Department of Aerospace Engineering (Dep. of Aeronautical Eng., DPA)
Dates	May 1996-June 1997 (14 months)
Occupation or position held	Visiting Researcher at Technical University of Delft (TU Delft), Netherlands
Main activities and responsibilities	Research on High-Performances Sailplane Design (Antares Saiplane wing-fuselage junction)
Name and address of employer	Scholarship for Foreign Research - University of Naples “Federico II”
Dates	March 1995-Jan 1996
Occupation or position held	Research Scholarship
Main activities and responsibilities	Research on airfoils wind-tunnel tests and improvement of wind-tunnel design for airfoil tests.
Name and address of employer	Italian National Research Council (CNR)

Training(courses)

Dates	April, 2009
Title of qualification awarded	Workshop “Dynamic Wind-Tunnel Testing”
Name and type of organisation	German-Dutch Wind-Tunnel (DNW), Gottingen and Braunschweig (Germany)
Dates	April, 2003 (for 3 weeks)
Title of qualification awarded	Visiting Researcher for Light Aircraft Flight Testing
Name and type of organisation	Federal University of Minas Gerais, Belo Horizonte (Brazil) in collaboration with Prof. P. Iscold
Dates	June-July, 2002 (for 2 months)
Occupation	Visiting Researcher at Kansas University(USA) in collab. with Prof. J. Roskam and D. Downing
Principal subjects	Aircraft Design and Certification
Name and type of organisation	Kansas University, Lawrence Kansas (USA)
Dates	June, 2002
Course	University of Kansas Aerospace Short Course
Principal subjects	Performance Flight Testing, Performance Prediction, and Certification of Airplanes
Name and type of organisation providing education and training	Kansas University, Lawrence, Kansas (USA) Instructors Prof. J. Roskam and Prof. D. Kohlman

Education and training

Dates	Feb. 1994
Title awarded/Thesis title	MSc in Aeronautical Eng. “Design Aerodinamico Bidimensionale e Tridimensionale tramite ottimizzazione numerica”
Name and type of organisation providing education and training	University of Naples “Federico II” – Relatori Prof. Luigi Pascale and Prof. D. Coiro
Level/classification	Magna cum laude (110/110 e lode con menzione speciale)

Personal skills and competences

Mother tongue(s): **Italian**

Other languages: **English (good, written and spoken)**
French (acceptable, intermediate)
Spanish (elementary, colloquial)

Organisational skills and competences

Capabilities of preparation, organization and development of scientific research projects.
Experiences in management and organization of Italian and European (E.C. FP) research projects.
Scientific Responsible for University of Naples of 7 **European financed research projects** and two National Research projects (PON) in the last 6 years for about **5 M€ global budget**.
Attraction of financial resources for research (research contract with companies).
Scientific Coordination of Aircraft Design Research Group (DAF) at University of Naples which includes two Associate Prof. (A. De Marco and P. Della Vecchia, 3 RTDA and several young researchers (4 post-doc, 4 PHD, etc.), see www.daf.unina.it

Technical skills and competences

Aircraft Design, Analysis and Optimization, applied to conventional and hybrid-electric aircraft
Light aircraft (ULM, LSA, GA) and Transport aircraft (Regional Turboprop) design and optimization
Aircraft aerodynamic analysis and design (applied and experimental)
Development of software for aircraft analysis (aerodynamics, flight performances) and design
Wind-Tunnel testing (experimental aerodynamics)
Flight Mechanics and aircraft performances for conventional and hybrid/electric aircraft
Flight tests and light aircraft flight certification
Applied aerodynamics. Aerodynamic design. Civil aerodynamic applications (race-car, trains).
Renewable energies (wind turbines and water turbines for marine current exploitation)

Aircraft analysis and design (num and exp, research and consultancy)

1994 – Tecnam P92 ultralight aircraft, aerodynamic analysis and wind-tunnel tests
1997 – Tecnam P96 ultralight aircraft, aerodynamic analysis, stability and wind-tunnel tests
1997 – TU Delft , Antares Sailplane, aerodynmaic design of the wing-fuselage junction
1997-2004 – G97 Ultralight aircraft, design, aerodynamics, wind-tunnel, flight tests
2002 – Tecnam P2002 wing-fuselage junction aerodynamic design
2002-2003 Design, analysis and flight tests of a 3-lifting surface aero-model
2005-2005 Aerosoft EASY-FLY ultralight STOL analysis and design (Design, CFD, wind-tunnel)
2005 – OmaSud SKYCAR Far23 aircraft, aerodynamic analysis and wind-tunnel tests
2006-2007 – Piaggio P1XX Business jet aerodynamic analysis and wind-tunnel tests
2007 – Tecnam P2006T aerodynamic design and wind-tunnel tests, winglet design
2008 – Tecnam P2006T flight tests
2009 – K4A light Helicopter aerodynamic analysis and wind-tunnel tests
2009-2011 ATR , aerodynamic analysis and optimization of ATR72 /ATR42 aircraft
2011-2014 Tecnam P2012 aerodynamic design, optimization and wind-tunnel tests
2011-2012 ATR , Analysis of performances, stability and control of repowered configurations of ATR42/ATR72
2013-2015 , Alenia (Leonardo) , development of design methodologies for advanced turboprop
2015-2016, ATR , analysis of ATR42 STOL version, aerodynamic design of rudder
20017-2019 with Leonardo, analysis, design and wind-tunnel tests of a 130 pax innovative turboprop configuration (IRON project)
2019-2020 Research project ELICA on design of a hybrid/electric Commuter 19-pax aircraft
2020-2022 Research project IRON on design exploration of a 50-pax hybrid-electric regional aircraft

Computer skills and competences

Capabilities of software development in Fortran, Basic and Visual Basic and Java
Development of more than 10 software written in Fortran and Visual Basic for aircraft and wind-turbine analysis. Use of Mathcad, Matlab, Excel (development of aircraft design teaching tool)
2005-2013 Development of software named “ADAS” for Aircraft Design and Analysis (VBasic)
1998-2004 Dev. of software named “AEREO” for aircraft aerodynamic deriv. prediction (in Fortran)
2012-2020 Development of JPAD software for analysis and optimization of transport aircraft

Other skills and competences

Sailing (Hobie Cat, Laser)

Teaching Activities (Academic Courses)

As Associate Professor at University of Naples "Federico II", F. Nicolosi is responsible of the course of Aircraft Design (M.Sc in Aerospace Eng, II year) and the course of Flight Mechanics (Bachelor in Aerospace Eng., II year). Additional teaching of Flight Test course. The following table describes all academic courses given at University of Naples "Federico II" since about **1998**.

ACADEMIC COURSE	YEAR	CFU/ hours	period	average stud. per year
(MSc in Aerospace Engineering)				
Aircraft Design (Progetto Generale dei Velivoli)		7 CFU, 60 h.	**2011 to date**	40
Flight tests		2 CFU, 18 h.	**2019 to date**	20
Num. and Exp. methods for Aircraft Design		3 CFU, 24 h	**2022 to date**	10
Sperimentazione di volo		6 CFU, 50 h.	2005-2009	25
Aircraft Design Exercises (tutorial act.)		25 h.	1998-2010	60
(B.Eng in Aerospace Engineering)				
Flight Mechanics (Performances)	II year	6 CFU, 50 h.	**2006 to date**	120
Maneuver and Stability	II year	6 CFU, 50 h.	2009-2010	80
Aircraft Performances and Stability	II year	6 CFU, 50h.	2002-2005	90
Flight testing 1	III year	3 CFU, 24h.	2003-2005	15
Introduction to Aerospace Eng.	I year	3 CFU, 24 h.	2006-2009	120

Teaching of "Flight Mechanics (Performances)" course (6 CFU, 60 h.) for the National Aeronautical Military Academy since 2008 to date.
Teaching of "Advanced Flight Performance" course (4 CFU, 40 h) for pilots of the National Aeronautical Military Academy since 2022 (Laurea Magistrale Scienza dei Sistemi Aerospaziali per la Difesa - SSAD)

Teaching Activities (II lev. Master Degree and Seminars)

Teaching of the following II level Master Courses (University of Naples "Federico II")
"Introduction to Aeronautics" (20h.) , II lev. Master in Aeronautical Technologies, 2009
"Flight Mechanics and flight Dynamics" (20h.) , II lev. Master AEROTECH, 2007
"Wind-Tunnel testing" (20h.) , II lev. Master AEROTECH, 2007

High-level Continuing Education Courses with Companies (financed by Italian Ministry for Education and included in PON)
2006 "Flight Mechanics" (30h.), II lev. Master GAFACS (collaboration with VulcanAir and CIRA)
2005 "Flight Mechanics" (30h.), II lev. Master VITAS (PON in collab. with Piaggio Aero)
2015-2016 "Principi di Aerotecnica" (40 ore) Progetto Formativo EXAM, PON MAVER(PON03_PE 00142-1/F1)

Industrial Courses (IFTS)
2010 Teaching of course: "Wind Turbine principles and applications" for ADL Group
2006 Teaching of courses for Officine Aeronavali.
2004 Teaching of courses for ATI-TECH Company.
2002-2010 Teaching of several IFTS (Istruzione e Formazione Tecnica Superiore) courses (financed by Italian Ministry of Educ.) in collaboration with several technical school and Alenia Aeronautica.
Corso FIT – Università di Napoli Federico II – a.a. 2017-18 Laboratorio di didattica di scienze, tecnologie e costruzioni aeronautiche (30 ore)
Teaching of a Module **"Electric and Hybrid Aircraft Design"** at the **AEROTECH ACADEMY** (Leonardo Aircraft and "Federico II") **– about 24 h , For year 2020, 2021, 2022, 2023.**

Seminars
2004, 2015, 2017, 2019 Several invited seminars @ ISAE-SUPAERO, TU Delft, etc.

Dissemination and Scientific Event
2017 (May, 2017) Participation to **Futuro Remoto 2017** with a stand on Dome 7 on "Esperienze sul Volo ed Aeroplani del futuro" together with the DAF research group.

Teaching Activities (Thesis Tutor/Supervisor)

Supervisor/Tutor of more than 170 M.Sc.and B.Eng. thesis at University of Naples (since 1997)
Assistant supervisor of about 60 M.Sc. thesis and B.Eng. thesis at University of Naples
Assistant supervisor of 2 M.Sc. thesis at Delft University of Technology
Tutor of 11 PHD thesis at University of Naples (Ended in 2013, 2015 and 2016 and 4 in 2020, 2 in 2022, 2 in 2024). Tutor for University of Naples of "ERACLE" student group, AIAA Design Build and Fly Contest, 2005
Member in the examination Commission of a PHD Defense at ISAE-SupAero (Tolosa), Dec. 2019
Member in the examination Commission of a PHD Defense at Delft University of Tech., April 2017

Research Contracts (External research financing)

Scientific and Technical Responsible (Main Responsible of Contract) for University of Naples of the following Research Contracts (**13 research contracts**) with Italian and European Companies for a global amount of about **0.5 M€.**

YEAR	COMPANY	AMOUNT	RESEARCH TOPIC
2025	UAS srl (Brindisi)	20,000 €	Wind-tunnel tests of a scaled model of a UAS (Unmanned aircraft)
2017	Jcoplastic s.p.a.	9,000 €	Wind-tunnel tests and analysis of safety barrier
2016	University of Rome	30,000 €	Wind-Tunnel tests of a wing prototype for RIBES project
2015	ATR-Toulouse (FR)	60,000 €	Aerodynamic analysis of ATR42 yaw stability and control derivatives for different rudder configuration.
2013	Alenia Aermacchi	91,000 €	Development of new design methodologies for modern regional turboprop airplanes
2012	Tecnam Aer. Ind.	24,000 €	Support in aerodynamic design and wind-tunnel tests of a 11-seats commuter aircraft
2012	CIRA	25,000 €	Analysis of hybrid propulsion (electrical) for UAV and general aviation aircraft.
2011	ATR-Tolouse (FR)	58,000 €	Analysis of performances, stability and control of repowered configurations of ATR42/ATR72
2011	Tecnam Aer. Ind.	5,000 €	Preliminary analysis of aerodynamics, performances, stability and control of P2012 aircraft
2009-10	ATR-Tolouse (FR)	70,000 €	Design guidelines and analysis of aerodynamic and performances of new regional turboprop aircraft
2009	K4A Engineering	10,000 €	Aerodynamic analysis and wind-tunnel tests of a light helicopter
2008	Piaggio Aero Ind.	100,000 €	Wind-tunnel tests and optimization of a low-speed configuration of a new business jet (semi-model tests)
2007	Tecnam Aer. Ind.	5,000 €	Winglet aerodynamic design for P2006T twin-engine aircraft
2006	Tecnam Aer. Ind.	10,000 €	Wind-tunnel tests and aerodynamic analysis of P2006T twin-engine aircraft

Main Technical Responsible for University of Naples of the following Research Contracts:

YEAR	COMPANY	AMOUNT	RESEARCH TOPIC
2011	Jcoplastic SpA	40,000 €	Development and wind-tunnel tests of a new small vertical axis wind turbine
2010	Ponte di Archimede	40,000 €	Numerical analysis and towing-tank tests of vertical axis water turbine for marine current exploitation
2009	ATR – Tolouse (FR)	50,000 €	Aerodynamic analysis and performances optimization of Regional Turboprop aircraft
2009	Ponte di Archimede	30,000 €	Numerical analysis and design of a 100-250 kW vertical axis water turbine for marine current exploitation
2007	Piaggio Aero Ind.	100,000 €	Aerodynamic analysis and wind-tunnel tests of a new business jet aircraft configuration
2005	Oma SUD	40,000 €	Wind-tunnel tests of a new GA 4-seats aircraft
2004-05	Aerosoft S.p.A.	250,000 €	Design, analysis and wind-tunnel tests of a new STOL ultralight aircraft in composite material
1997-2000	SAI S.r.l.		Aerodynamic design, wind-tunnel tests, flight tests of a new rear-propelled ULM aircraft (G97 Spotter)

Research Contracts (External research financing) (continue)

Deep involvement and participation :

YEAR	COMPANY	RESEARCH TOPIC
2011	Ansaldo SpA	Experimental aerodynamic analysis (wind-tunnel tests) of railway car heat-exchanger
2007	Fri_El	Analysis of new systems for marine current exploitation
2006	FIAT Elasis	Aerodynamic analysis, optimization and wind-tunnel tests of multiple-winglet systems for hang-gliders
2004-06	CIRA	HALE-WING project. Application of synthetic jets for lift improvement/drag reduction of new UAV wings
1997	FIAT Auto Corse	Aerodynamic design and wind-tunnel tests of a racing-car wing

Research Projects (Public financing)
(Scientific Responsible and PI)

Scientific Responsible and Coordinator for Univ. of Naples

of the following **EUROPEAN and National** research projects.

2013-2025 : 14 Research Projects. Global funding for University of Naples about 5 Million Euro.

YEAR Public Authority AMOUNT (UNINA) Name of Project

14) 2024-2026 Clean Aviation (Horizon Europe) 120,000 € HEROPS

Grant Agreement number: 101140499 - HORIZON-EUROPE

HEROPS aims to introduce climate-neutral propulsion into regional aircraft by developing MTU's Flying Fuel Cell (FFC) propulsion system concept for entry into service in 2035. This disruptive hydrogen-electric propulsion system uses fuel cells as sole power source and a liquid hydrogen fuel system, without the need for high-power batteries. Integration of both the fuel cell system and the electric propulsion unit into a compact engine nacelle will ensure an efficient system at high power-to-weight ratio. HEROPS targets to demonstrate a 1,2 MW propulsion system based on a scalable 600 kW core module at TRL4. The core module and all further sub-systems will be validated up to TRL5. Complemented by simulation and electrical network testing of the overall modularised system, scalability to the 2 – 4 MW power level will be confirmed. The certification programme will build upon on-going certification activities, enabling timely maturation of the aviation-native HEROPS technology against relevant certification requirements. The two-phase approach of the overall programme - including extensive development, test and validation cycles at each stage - is expected to advance the FFC concept to TRL6 for integration and demonstration on a regional aircraft by 2028. It will pave the way for commercial prototyping and entry-into-service by 2035, delivering a key propulsion technology to reach the European Green Deal's objective of climate-neutral aviation by 2050 with 100% prevention of CO2 and NOx emissions and up to 80% reduction of the climate impact from contrails and contrail cirrus.

The 3-years project financed under Clean Aviation JU (Horizon program) involves 10 European partners with a global cost of about 40 million euro. The project is coordinated by MTU Aero Engines.

https://cordis.europa.eu/project/id/101140499

https://aeroreport.de/en/innovation/cleaner-flight-europe-explores-paths-to-climate-neutral-air-travel

13) 2024-2026 Clean Aviation (Horizon Europe) 251,250 € FAME

Grant Agreement number: 101140559 - HORIZON-EUROPE

The project focus on the hardware implementation of a new green propulsive system for aviation based on fuel-cells and Liquid Hydrogen. The integration on the aircraft becomes really important.

This means moving away from the current "plug and play" (separate motor development and aircraft architecture) philosophy towards a disruptive integrated way of development, which requires a co-creation approach of the propulsion system and the aircraft. FAME follows this approach by collaborative research and development between on one hand partners involved in development of the needed systems of the fuel cell and on the other hand Airbus as and aircraft designer, manfacturer und integrator. The focus of FAME is on developing a complete compact high-efficiency full electric propulsion system based on LH2 as energy source for short to medium range (SMR) aircraft. The system will provide the basis for Clean Aviation in phase 2 to undergo a system flight test. The research project financed by Clean Aviation JU (Horizon Europe) involves more than 20 partners with a global cost of about 40 million euro. The project is coordinated by AIRBUS.

The research project is highly supported by AIRBUS in parallel with their internal project ZERO-e. (https://www.airbus.com/en/innovation/energy-transition/hydrogen/zeroe-our-hydrogen-powered-aircraft)

https://cordis.europa.eu/project/id/101140559

https://www.linkedin.com/company/clean-aviation-fame/

12) 2024-2026 Clean Aviation (Horizon Europe) 246,250 € ODE4HERA

Grant Agreement number: 101140510 – HORIZON EUROPE

The objective of the Open Digital Environment for Hybrid-Electric Regional Architectures (ODE4HERA) project is to enable and accelerate the development of Hybrid-Electric Regional (HER) aircraft thanks to improved tools and techniques implemented in a transferable and Open Digital Platform (ODP). HER configurations imply far higher complexity than conventional configurations while involving new aircraft technologies and broader collaboration across the value/supply chain. State-of-the-art digitalization techniques limitations put at risk the achievement of the 2035 HER Entry-Into-Service (EIS) target. To address these challenges, the ODP developed in

ODE4HERA will combine MBSE, MDO, SDM and PLM technologies and extend them with novel open interfaces, formats, smart model and data transformation technologies efficiently handling and processing HER configurations complexity, including frontload verification at design stage and virtualize validation for improved virtual certification.
The project involves 15 european partners with a global cost of about 9 million euro.
The project is coordinated by DLR and involves Leonardo aircraft and Airbus DS.
https://www.ode4hera.eu/
https://clean-aviation.eu/research-and-innovation/clean-aviation/clean-aviation-projects/ode4hera
https://cordis.europa.eu/project/id/101140510
https://www.linkedin.com/company/ode4hera/

11) 2023-2027 Clean Aviation (Horizon Europe) 1,264,000 € HERA
Grant Agreement number: 101102007 - HERA - HORIZON-JU-Clean-Aviation-2022-01
HERA - Hybrid-Electric Regional Architecture
HERA is a very big Clean Aviation project coordinated by Leonardo Aircraft and with more than 30 partners (among them UNINA) and a total budget over 30 M€. HERA project will identify and trade-off the concept of a regional aircraft, its key architectures, develop required aircraft-level technologies and integrate the required enablers in order to meet the -50% technology-based GHG emission set in SRIA for a Hybrid-Electric Regional Aircraft.
The HERA aircraft, having a size of approximately of 50-100 seats, will operate in the regional and short-range air mobility by mid-2030 on typical distances of less than 500 km (inter-urban regional connections). The aircraft will be ready for future inter-modal and multi-modal mobility frameworks for sustainability. The HERA aircraft will include hybrid-electric propulsion based on batteries or fuel cells as energy sources supported by SAF or hydrogen burning for the thermal source, to reach up to 90% lower emissions while being fully compliant with ICAO noise rules. The HERA aircraft will be ready for entry into service by mid-2030, pursuing to the new certification rules, able to interact with new ground infrastructure, supporting new energy sources.
HERA will quantitatively trade innovative aircraft architectures and configurations required to integrate several disruptive enabling technologies including high voltage MW scale electrical distribution, thermal management, new wing and fuselage as well as the new hybrid-electric propulsion and related new energy storage at low GHG.
The project involves 48 participants with a global cost of over 48 million euro.
The project is coordinated by Leonardo Aircraft. ATR and Airbus DS are also involved as partners together with many research institutions and Universities.
https://project-hera.eu/home
https://www.clean-aviation.eu/research-and-innovation/clean-aviation/clean-aviation-projects/hera
https://cordis.europa.eu/project/id/101102007
https://www.linkedin.com/company/hera-project/

10) 2023-2026 Horizon Europe 321,875 € COLOSSUS
Grant Agreement number: 101097120 — COLOSSUS— CALL HORIZON-CL5-2022-D5-01
COLOSSUS - Collaborative System of Systems Exploration of Aviation Products, Services and Business Models
COLOSSUS paves the way for future European aviation products and services which are designed in a truly holistic approach and to thus provide a major contribution to the digital transformation of aviation and air transportation in order to enable European competitiveness in a key industrial sector. Main technical objectives of COLOSSUS are:

1) To create a Transformative Digital Collaborative (TDC) Framework that allows European aviation to perform research, technology development and innovation in a holistic system-of-systems approach.
2) To expand and test the capabilities and performance of the TDC Framework with two Use Cases, a sustainable 4-D intermodal mobility vehicle (Urban Air Mobility) and an integrated fast-response approach for preventing, detecting and fighting wildfires.
3) To perform conceptual studies for two products which could be transverse technology enablers for multi-modal mobility and affordable decarbonisation of aviation: a multi-role seaplane with hybrid propulsion and a product for eVTOL-based advanced air mobility of passengers and goods.

The project is coordinated by DLR and has a global cost of about 4.5 million euro.
https://cordis.europa.eu/project/id/101097120
https://colossus-sos-project.eu/

Research Projects (Public financing) (continue)

9) 2021-2023 H2020-Clean Sky 2 170,000 € GENESIS

Grant Agreement number: 101007968 — GENESIS— Call H2020-CS2-CFP11-2020-01

GENESIS - Gauging the ENvironmEntal Sustainability of electrIc aircraft Systems

GENESIS project will gauge the environmental sustainability of electric aircraft (A/C) in a life-cycle-based, foresight perspective to support the development of a technology roadmap for transitioning towards sustainable and competitive electric A/C systems. The focus is on regional class, 50 pax aircraft to identify, design and assess prospectively the best energy storage and transmission topology. Different alternatives within battery, fuel cell, hybrid and conventional powertrain technologies are evaluated and compared over different time horizons. To meet these objectives and scoping, GENESIS relies on a strong consortium of 10 partners, 4 R&D-active SMEs and 1 large company – gathering excellence and complementary competences that cover all key aspects of the project. GENESIS will design electric (all-electric and hybrid) aircraft and elicit specific requirements, which will feed into technology foresight analyses. These will allow highlighting technological limits and potential solutions within each component of the aircraft system life cycle, which includes the life cycle of the aircraft itself as well as the life cycle of the fuels and that of the on-ground infrastructures. The analyses will enable the development of time- and technology-specific life cycle inventories, used as basis for a full-fledged prospective life cycle assessment. Combining the resulting environmental performances with those from an economic analysis and a technical analysis, comprehensive scenario comparisons between the different powertrain alternatives will be made, enabling a sustainability-based Technology Roadmap. GENESIS is anticipated to have large impact on all aeronautics stakeholders as its outputs will help moving towards environmentally sustainable aviation.

The project involves 9 European partners and has a global financed cost of about 1.6 million euro.

https://www.genesis-cleansky.eu/

YEAR Public Authority AMOUNT (UNINA) Name of Project

8) 2020-2023 H2020-Clean Sky 2 151,250 € IMPACT

Grant Agreement number: 885052 — IMPACT — H2020-CS2-CFP10-2019-01

IMPACT - Aircraft advanced rear end and empennage optimisation enhanced by anti-ice coatings and devices.

The research project is a 36-months project started in September 2020 and coordinated by AIT (Austrian Institute of Technology). IMPACT tackles all the challenges of the call “Rear fuselage and empennage shape optimization including antiicing technologies” by unlocking the capability to perform fast and accurate 3D ice accretion simulation suitable for non-straight leading-edge empennages, accounting for effects of passive anti-ice coatings and devices like leading-edge undulations, by characterising, integrating, and exploiting the passive anti-ice coatings and devices for non-straight leading-edge empennage configurations, reaching TRL 5 at the end of the project and by developing and applying innovative aerostructural optimisation methods for advanced rear ends (ARE), including the effects of the passive antiice coatings and devices, to minimise drag and include structural and aeroelastic constraints. The project will validate the accuracy of the 3D icing accretion simulations and the performance of passive anti-ice coating and devices by means of large scale icing wind tunnel (IWT) experimental tests. IMPACT will ultimately support Airbus’ progress with the advanced rear end concept, enhancing the competitiveness of the European LPA industry and value chain. IMPACT Partners are AIT, CEST, ANSYS Canada, EUROTECH company, University of Southampton, etc. and AIRBUS is the topic leader.

The project involves 10 European partners and has a global financed cost of about 1.7 million euro.

https://www.impact-cleansky-project.eu/

7) 2019-2022 H2020 (European Commission) 382,000 € AGILE 4.0

Grant Agreement number: 815122 — AGILE$^{4.0}$ — H2020-MG-2018-TwoStages

AGILE$^{4.0}$ Towards cyber-physical collaborative aircraft development.

The research project, coordinated by DLR, involves several partners, among them several relevant industrial partners such as Leonardo, Airbus, Embraer, Bombardier. The high level objective of AGILE 4.0 is to bring significant reductions in aircraft development costs and time-to-market through the implementation of an integrated cyber-physical aeronautical supply chain, thereby increasing the competitiveness of the European aircraft industry, from integrators and high-tiers suppliers to SMEs, leading to innovative and more sustainable aircraft products. The research project is developed with DLR (coordinator), Airbus, Bombardier, Embraer, Leonardo Aircraft, CFS, TU Delft, Fokker, Polit. Of Turin, Aachen University, etc. The project involves 16 European partners and has a global financed cost of about 6 million euro.

https://www.agile4.eu/

Research Projects (Public financing)

6) 2019-2022 H2020, CS2 (European Commission) 154,000 € ELICA
Grant Agreement number: 864551 — ELICA — H2020-CS2-CFP09-2018-02
ELICA - Electric Innovative Commuter Aircraft
The ELICA research project activities are focused on the conceptual design of a 19 passengers commuter aircraft based on alternative propulsion concepts, targeting near-zero CO2 emissions. The project aligns with the environmental expectations of the European Commission towards the aeronautical industry formulated in Flightpath 2050 , and is in line with the economic objectives of the European Commission to safeguard high-quality jobs in the aerospace sectors by strengthening the technological leadership and the competitiveness of the European's aerospace industry. The high-level objective of ELICA is to provide a concept design of a 19 passenger commuter aircraft with new zero-emissions with respect to CO2, NOx, and noise. ELICA project is developed in collaboration with **Roll-Royce (coordinator), Siemens** and University of Naples Federico II.
The project involves 5 European partners and has a global financed cost of about 0.75 million euro.
https://cordis.europa.eu/project/id/864551/it
https://cordis.europa.eu/project/id/864551

YEAR Public Authority AMOUNT (UNINA) Name of Project

5) 2018-2021 MIUR (PON) 1,300 000 € (UNINA) PROSIB
PON PROSIB (PON 2015-2020) - Progetto ARS01_00297 – Coordinator Leonardo Aircraft
PROSIB *- **PRO**pulsione e **S**istemi **IB**ridi per velivoli ad ala fissa e rotante*
The project will investigate configurations for regional aircraft and rotary wing platform (VTOL - Vertical Take-off & Landing) and architecture for the propulsion systems including distributed hybrid/electric technologies to identify the best strategy to use the different on board energy sources. Configuration studies will be supported by trend analysis of the main enabling technologies and their preliminary validation through wind tunnel and lab tests. The multidisciplinary analysis environment will be extended by developing models adequate to handle distributed propulsion systems and their interaction with aircraft aerodynamics. Various on-board system architectures will be evaluated, and the expected target performance for the technological enablers (e.g. batteries, electric machines, power electronics, etc.) will be identified together with the associated main issues. The research activities are developed by University of Naples Federico II, in collaboration with Leonardo Aircraft, University of Pisa, Aeromechs, Skybox, etc.
https://www.ponricerca.gov.it/opportunita/progetti-di-ricerca-industriale-e-sviluppo-sperimentale/aerospazio/#http://adm-ponricerca.miur.it/umbraco/#/content/content/edit/8395

4) 2018-2022 Europ. Comm (JU) (Clean Sky 2, H2020) 310,000 € Project ADORNO
Grant Agreement number: 821043 — ADORNO — H2020-CS2-CFP07-2017-02
ADORNO - Aircraft Design and nOise Rating for regional aircraft
Description:
The activities related to the ADORNO project are focused on the development of aircraft models for a regional aircraft engine platform. The main objective is to provide aircraft requirements (e.g. thrusts, offtakes, etc.) as well as trade factors for specific fuel consumption, engine drag and engine weight on fuel burn for both a year 2014 reference aircraft and a CS2 target aircraft. In addition, an aircraft noise method will be developed and integrated in an aircraft design chain. The research project is coordinated by University of Naples Federico II in collaboration with **MTU Aero Engine** as topic leader.
http://www.adorno-project.eu/

3) 2016-2022 Europ. Comm (JU) (Clean Sky 2, H2020) 900,000 € Project IRON
Implemented through several H2020 projects
Grant Agreement 699715 – IRON - Call H2020-CS2-CPW02-2015-01
Grant Agreement 807089 — REG GAM 2018 Call H2020-IBA-CS2-GAMS-2017
Grant Agreement 945548 — GAM-2020-REG Call H2020-IBA-CS2-GAMS-2019
Description:
The research project *IRON (Innovative turbopROp configuration)* is coordinated by CIRA.
An innovative turboprop configuration with a rear propeller installation can lead to a cleaner wing with possibilities to achieve laminar flow extension. In addition the wing without engine nacelle and free of propeller interference effects will be characterized by a more efficient high-lift system with a possible increase in aircraft maximum lift coefficient which will positively affect the ground performances. The analysis of the proposed innovative configuration with rear propeller installation,

which is one of the main topics dealt by the IRON project proposal, is characterized by several aerodynamic, performance and propulsion feature that must be predicted with high accuracy and deep comprehension of involved phenomena in order to lead to a possible improved configuration respect to the classical configuration with wing-mounted engines. During 2020-2022 the activities have been addressing the design and optimization of hybrid /electric regional aircraft configuration, involving the effect of Distributed Electric Propulsion (DEP). For the period 2020-2022 the research project has been developed under EU grant agreement **GAM-2020-REG (GA 945548)** with a global cost of about 44 million euro.
https://www.cira.it/en/aeronautics/aeronautical-propellers/iron
https://cordis.europa.eu/project/id/945548/reporting/it

2) 2015-2018 Europ. Comm (H2020) 430,000 Research Project AGILE
Title : Aircraft 3rd Generation MDO for Innovative Collaboration of Heterogeneous Teams of Experts (AGILE). H2020 Project (3 years, June 2015-June 2018). Proposal 636202.
Description:
The Research project is coordinated by DLR (German Aerospace Center) and is focused on development of integrated and multi-disciplinary framework for Aircraft Design.
The **AGILE** innovation project is granted by the European Commission. **AGILE** targets multidisciplinary optimization using distributed analysis frameworks. The project is set up to proof a speed up of 40% for solving realistic MDO problems compared to today's state-of-the-art. The use cases are realistic overall aircraft design tasks for conventional, strut-braced, box-wing and BWB configurations. The scope of development:

- Advanced optimization techniques and strategies
- Techniques for collaboration
- Knowledge-enabled information technologies

The project ran from 2015 to 2018 and was part of the Horizon 2020 program.
https://www.agile-project.eu/

1) 2014-2017 MIUR(PON) 1,200,000 € Project PON CERVIA
(Italian Res. Ministry) through DAC
(Regional Aerospace District)
CERVIA - (Innovative Aircraft Design and Certification Methods).
The Industrial research project (PON) PON 03PE_00124 is characterized by a global funding from MIUR of about 6.4 M€.
Description: In the research project are involved many companies. The project leader is Alenia Aermacchi. The research funding for University of Naples is about 1.2 Million €. F. Nicolosi is scientific responsible for the project for all the activities to be performed by University of Naples. The specific research activities to be performed by Prof. Nicolosi deals with the development of a new industrial aircraft design software platform. The research funds for this activity are 300,000 €.

2003	Campania Region (L.R. 5)	24,000 €	AIRFLUX Project. In collaboration with CNR ISaFom. Flight Measurement of biogenic emissions through Light and ultralight aircraft
2002	Univ. Napoli Federico II	7,000 €	Preliminary study and development of a flight simulator for light and ultralight aircraft

Deep involvement and participation in of the research activities for University of Naples of the following Research Contracts with Italian and European Authorities:

YEAR	Public Authority	AMOUNT	RESEARCH TOPIC
2011	MIUR (PON with FIAT)	500,000 €	Numerical and Experimental (wind-tunnel tests) analysis of car drag reduction through synthetic jets
2010	MIUR Research Ministry (PRIN) (National Research Projects)		Tests of hydraulic micro-turbines. Ministry Protocol number 2008JT29L5_003
2003-05	MIUR (PON VITAS)	850,000 €	Analysis of new business transport aircraft
2004-06	Campania Region		Implementation of research activities for the Regional Centre of Competence in "Transport". Light aircraft flight tests and flight simulation for certification and safety improvement

Deep involvement and participation in of the research activities for University of Naples of the following Research Contracts with Italian and European Authorities:

YEAR	Public Authority	AMOUNT	RESEARCH TOPIC
2002-05	E.C. (5th FP)	250,000 €	CAPECON Civilian and Commercial Unmanned Air Vehicles (UAVs) for the benefit of the European Society
1997-98	MIUR, Research Ministry (PRIN) (National Research Projects)		Non-linear aerodynamics and flight qualities analysis for light aircraft and sailplanes Ministry Protocol number 9709248767_006

Spin-Off and Technological Transfer

2022 – Participation as Smartup-Company founder to the activities of ROBOSAN spin-off company. ROBOSAN is involved in the production of a machine for aims at increasing both safety and process efficiency in the context of the pre-analytical phase of Laboratory Medicine. The product is a fully automated system for the sanitization, the tracking and the packaging of containers filled with biological samples.

Since 2019 is founder of the Spin-off Company Smartup Engineering s.r.l.
The Smartup company will develop and sell software for aircraft preliminary design and will support aircraft design activities for both general aviation and commercial transport airplanes.

2006-2012 is one of the founder of the **Spin-Off Company Eolpower.**
The company was a Spin-Off Company approved by University of Naples.
The company had the goal the development , design and installation of small wind-turbines and similar systems for wind and marine current energy exploitation.
In 2006 Eolpower is winner of Start-Cup Competition promoted by University of Naples
In 2006 Eolpower is winner of a financement promoted by CIRA (CIBA-PARK)

Other

2013-2015 Member of "Giunta" (Committee) of Department of Industrial Engineering
2013-present Member of CEAS Technical Committee on Aircraft Design (CEAS-TCAD)
2018-pres Member of the AIAA ADTC (AIAA Aircraft Design Technical Committee)
2004-2011 Member of Commission for evaluation of students study plan in Aerospace Engineering
2007-2013 Member of PHD Board for PHD in Aerospace Engineering – Univ. of Naples
2018-pres Member of PHD Board for PHD in Industrial Engineering – Univ. of Naples
2000-pres Member of Degree Course Board in Aerospace Engineering – Univ. of Naples
Chairman at many sessions at ICAS and AIAA Conferences
Support and reference point as Professor to the research office of the University for implementation of digital time-sheet

Reviewer

Reviewer AIAA Journal of Aircraft (2014-2022)
Reviewer for Aerospace (MDPI) (2021-2022)
Reviewer Aerospace Science and Technology (ELSEVIER) (2014-2022)
Reviewer ASME Journal of Dynamic Systems, Measurement and Control (2013)
Reviewer CEAS Aeronautical Journal (2015-2021)
Reviewer for Journal of Aerospace Engineering (2017-2021)

Scientific Production

- Scopus Author ID 8719508800
- **ORCID 0000-0003-4908-6194** https://orcid.org/0000-0003-4908-6194
- Info retrieved on Scopus, August, 2025:
  Products : 113
  Citations: 1453
  H-Index: 22
- 51 articles published on international peer-reviewed journals (among them AIAA Journal of Aircraft, Aerospace Science and Technology, Progress in Aerospace Sciences)
- 128 papers presented at national and international conferences (AIAA, ICAS, CEAS, etc.)
- International Patent WO 2005/024226 A1, 2005 of a new vertical axis water turbine to exploit tidal currents.
- National Patent IT1388799-B (on innovative vertical axis wind turbine), 2011
- 5 book chapters, 3 Internal Research Reports
- Several Software and among them ADAS software for Aircraft Preliminary Design and JPAD software for transport aircraft design and optimization.

Links and Collaborations

Collaborations and developed research projects with the following companies:

- Tecnam (Prof. L. Pascale, Ing. M. Oliva, Ing. C. Caruso)
- Piaggio Aero (Ing. A. Cozzolino, A. Sollo)
- Leonardo Aircraft (Ing. G. Cerino, Ing. G. Piscopo, Ing. F. Salvato)
- ATR–Tolouse (Ing. A. Zizolfi)
- MTU Aero Engine (Roland Schmier, Reinhold Schaber)
- Rolls Royce (Qinyin Zhang)
- DLR (Bjoern Nagel)
- ONERA (Peter Schmollgruber, Thierry Lefebvre)
- AIRBUS Spain (Raul Llamas)
- CIRA (Ing. D. Quagliarella, Ing. G. Mingione, Ing. R. Donelli)

Collaborations with the following Universities and Research Centre:

- Delft University of Technology (NL) (G. La Rocca, L. Veldhuis, R. Vos)
- Hamburg University (Germania) – Prof. Dieter Scholz
- West Virginia University (USA), Prof. M. Napolitano
- Politecnico di Madrid (SPAGNA) , Prof. R. Martinez Val
- Federal University of Minas Gerais (BRASIL) – Prof. P. Iscold
- DLR – Hamburg (Institute of System Architectures in Aeronautics, B. Nagel, P.D. Ciampa)
- Collaboration with NLR

Congress and events Organization

Principale organizzatore del **convegno EWADE 2011** (10th European Workshop on Aircraft Design Education), Napoli, sede Congressuale di Via Partenope dell'Ateneo Federico II, 24-27 Maggio 2011. Il convegno che ha visto la partecipazione di circa 40 docenti Europei.
https://www.fzt.hawhamburg.de/pers/Scholz/ewade/EWADE2011

Principale organizzatore del **convegno SCAD** (Symposium on Collaboration in Aircraft Design) dal **12-14 Ottobre 2015**, presso la sede congressuale di Via Partenope dell'Ateneo Federico II. Il convegno ha visto la partecipazione di circa 60 ricercatori, docenti e rappresentanti dell'industria. Hanno partecipato ricercatori della NASA e c'è stata una invited lecture di Mark Moore sui velivoli elettrici (sul velivolo X-57 della NASA).
http://wpage.unina.it/fabrnico/SCAD2015/

Principale organizzatore del WORKSHOP Internazionale
COMMUTER AND REGIONAL HYBRID-ELECTRIC AIRCRAFT DESIGN
6-7 October 2022
Location : Via Partenope,36 University Congress Centre, NAPLES.
https://www.smartup-engineering.com/workshop/

Description of Main Research Activities and Competences

Main Research activities performed

All research activities have been characterized by high level of application, mainly by experimental aspects and strong link and collaboration with companies for possible application and industrial development. Here follows a general description of research activities carried out in several general areas (topics).

Aircraft design

Research activities on light aircraft design and sailplane design. In particular some research activities have been addressed on sailplane fuselage design, wing-fuselage interference effects and wing-fuselage junction design (under the guidance of Prof. Boermans at TU Delft) for high performance sailplanes(sailplane *Antares*). Research activities have been often focused on industrial projects. Many collaborations with company for light aircraft design (Tecnam) and transport regional turboprop aircraft design (ATR). Preliminary design of general aviation and transport aircraft, aerodynamic design and optimization of aircraft components (i.e. winglets, wing-fuselage junction, karman, tailplanes, etc.). The research activities performed have been important for the design and certification of airplanes like G97 Spotter, Tecnam P96, Tecnam P2002, Tecnam P2006T and recently P2012 Traveler. Some research efforts have been dedicated to the development of software for the estimation of aerodynamic derivative and performances of light aircraft. In the period 2011-2014 deep research activities have been carried out on the P2012 11-seat aircraft designed by Tecnam. Several research articles have been also published on the aerodynamic analysis and optimization of this commuter aircraft.

Since 2005 a software named **ADAS** has been developed for transport aircraft preliminary design. The software has been intended mainly as a teaching tool and is used in the Aircraft Design course classes. See http://wpage.unina.it/fabrnico/Articles/ADAS_CEAS_Proceedings.pdf for more details.

Research activities dealing with UAV and RPV (Remoted Piloted Vehicles) design have been also developed. In 2012, through a collaboration with CIRA, some research activities have been devoted to the analysis of hybrid propulsion (with electrical engines) for small UAV and light/general aviation aircraft. Since 2009 deep research activity has been performed on regional turboprop aerodynamic design and optimization. Several investigation concerning the design of fuselage and vertical tailplane have been carried out and through the application of CFD analysis performed on modular configurations, new proposed semi-empirical approaches have been derived for the estimation of aerodynamic characteristics in the preliminary design phase. Since 2015 the DAF research group is involved in the development of new aircraft design advanced framework, for A/C preliminary design and MDO/MDA. One interesting experience is the **JPAD project**, with a framework developed in Java language. JPAD is the product and core-activity of Smartup-Engineering company, a spinoff generated by DAF research group. Other project dealing with aircraft design framework development and application is the AGILE European project. In AGILE project the research is focused on the development of advanced and 3rd generation framework for improved and collaborative aircraft design procedures. Recent research activities (2016-2017) are addressed to the design of innovative regional configurations (130 pax) with rear propeller installation (IRON project). Recent research activities also focuses on hybrid and electrical propulsion applied to general aviation and regional transport aircraft (PROSIB project with Leonardo). Recently, additional research activities dealing with the design of Commuter electric/hybrid aircraft for financed project ELICA in collaboration with Rolls Royce Germany have been developed. Other activities for research project ADORNO have been carried out since 2018 in collaboration with MTU Aero Engines on the design of regional jet (like Airbus A220) focusing on the optimization of emissions and noise. A noise prediction tool has been developed by University of Naples (Prof. Marulo) and integrated in the aircraft design framework for the configuration optimization. Recent research activities concerning project COLOSSUS are involving system of system design, the focus is the development of a design architecture procedure to optimize not only the vehicle, but the whole transport system. Together with Tecnam in COLOSSUS the application case will be a 15-19 pax seaplane with also firefighting conversion. The project Clean Aviation HERA(2023-2026), in collaboration with Leonardo aircraft and AIRBUS DS Spain, will be focused on the complete design and deep analysis of a regional 80-pax aircraft with hybrid powertrain using fuel cells and liquid Hydrogen. The design of the optimal powertrain system for hybrid/electric aircraft has been also addressed in FAME research project (Clean Aviation) where a collaboration with AIRBUS is focused in the development of a 100-pax full-electric regional aircraft with fuel cells and liquid hydrogen tanks.

Flight Tests, flight dynamics, flight simulation

Many flight tests have been performed on light and ultralight aircraft. Flight test research activities has been focused on flight performances measurement, flight certification, low-cost sensor

development, flight test data analysis software and derivatives estimation from flight data with maximum likelihood method. Research activities have been also addressed to the choice and development of sensors and flight test instruments (FTI), including data acquisition systems, data storage and transmission for real-time visualization. Flight test campaign performed on P92 and P96 ULM aircraft, P2002, P2006T (Tecnam twin-engine FAR23 certified aircraft), support to Tecnam in flight test of P2008 aircraft. Flight test for G97 LSA aircraft, Lambada ultralight, DG400 motorglider, Curumin (collaboration with Univ. of Minas Gerais, Brazil). Some software for flight simulation has been also developed. Some paper presented at conferences have shown comparison between flight test and flight simulation results on the above mentioned aircraft. Recent research activities are dealing with scaled flight tests, or flight tests of small scaled airplane to be used as demonstrator or test platform to build the flight model behavior of a real aircraft.

Applied (mainly to aircraft) and experimental (wind-tunnel tests) aerodynamics

Development of some computer codes for the analysis and design of two-dimensional (airfoils) and three-dimensional bodies. Airfoil design, analysis and optimization in the high angles of attack range. Extensive experimental activities (wind-tunnel tests) in the low speed wind-tunnel belonging to DPA on airfoil tests and aircraft scaled model tests(more than 15 aircraft model tested). Research activities of main importance on winglet and multiple winglet design and testing, estimation and measurement of wing span load (including influence of fuselage and nacelle) for light aircraft, aerodynamic optimization of rear-propelled light aircraft (G97 ULM aircraft) through numerical CFD analysis and wind-tunnel tests. Relevant recent activities have been carried out on numerical CFD analysis and wind-tunnel tests of commuter aircraft and regional turboprop aircraft. In particular some research activities have been focused on wing-fuselage junction (called Karman) design and optimization for regional turboprop aircraft. Since 1998 responsible of all wind-tunnel tests performed at University of Naples on Tecnam aircraft and in general responsible of tests on aircraft models.
An intensive numerical and experimental (wind-tunnel) activity have been performed for Tecnam in 2006-2008 for P2006T aircraft.
Concerning wind-tunnel tests, recent activities have been carried out for P2012 wind-tunnel tests (2013-2015). Other wind-tunnel test activities have been performed on a modular model for the project Cervia, to derive useful new guidelines for the design of the vertical tailplane for the category of regional turboprop airplanes. Many wind-tunnel tests have been performed for other commercial airplanes or projects. In 2006 a detailed wind-tunnel test campaign has been performed for Piaggio Aero for P1xx Business Jet aircraft. In 2004-2005 another wind-tunnel test and numerical aerodynamic analysis have been performed for Oma Sud for SkyCar aircraft.
Also research activities on race-car aerodynamics, sail aerodynamics and wind-tunnel tests and performance measurement of horizontal axis and vertical axis wind-turbine (see also next item). Since 2016 the activities for IRON project have investigated the aerodynamics (stability, aerodynamic efficiency, maximum lift coefficient in landing) of an innovative regional turboprop configuration with 3 lifting surfaces (canard, wing and h-tail). Some combined experimental and numerical (CFD) activities have been performed for PROSIB project, with applications concerning the aerodynamic effects of distributed electric propulsion (DEP). The activities of IMPACT research project in collaboration with AIRBUS have been addressed to the design and optimization of an innovative rear end configuration of a civil aircraft, including a patented idea of Airbus with an horizontal tail with negative sweep. Some recent research application in the low-speed wind-tunnel of the department of industrial engineering are focused on experimental verification and estimation of the aerodynamic effects of distributed propulsion.

Renewable energies exploitation (Wind-Turbines and water turbines)

Design of wind and water turbines for renewable energy exploitation. Development of computer codes to predict all performances and loads of horizontal and vertical axis wind and water turbines. Design of airfoil blade for horizontal and vertical axis turbines. Experimental tests in DPA wind-tunnel of wind turbines. Experimental tests in water towing tank of marine current turbines. Analysis and tests of full-scale Kobold turbine installed in Messina strait by Ponte di Archimede Company. The research activities have been dealing with the numerical prediction of efficiency, performances and load estimation for the Kobold turbine. Many tests of a scaled model of the turbine have been performed in the towing tank belonging to Dept. of Naval Eng. of University of Naples. The technology of Kobold turbine have been also patented (WO 2005/024226 A1, 2005). Other research activities have been addressed to design, analysis, optimization and tests of vertical axis wind turbines. Many tests and CFD numerical aerodynamic analysis have been performed on a scaled model of this micro-wind turbine (about 1-3 kw) in the wind-tunnel of University of Naples.

Detailed list of Research Projects and Research Activities (1994-Present)

1994-1998 : **Design of low-drag fuselages and bodies. Design of laminar-flow fuselages** for sailplane applications. Development of software for fuselage drag optimization. The approach deals with the implementation of a 3-D fuselage geometrical modification method and the aerodynamic analysis performed through the coupling of 3-D panel method calculations with drag coefficient estimated through a simplified approach considering axi-symmetrical integral boundary layer calculations. During 1996 some research activities dealing with sailplane fuselage design were carried out at TU Delft with Prof. L. Boermans. A remarkable finding was that the cockpit length could be increased by 0.3 m without any drag increase. This result offers the possibility for improved crashworthiness measures as a longer crumbling nose cone and keeping the pilot's feet out of this zone. These features have been implemented in the design of the fuselages of the Advantage and Antares high-performance sailplanes.
[IR2], [2, 4, 6, 9].

1994-1996 : Research activities performed at University of Naples on **low-speed wind-tunnel testing and low-speed wind-tunnel analysis and design**. The activities were dealing with the optimal approach for 2-D airfoil testing in low-speed academic wind-tunnel and with the proposed modification for the main low-speed subsonic wind-tunnel belonging to University of Naples. The design of modifications were based on re-design of the contraction and the increase of the flow-speed in the test section. A fortran software for wind-tunnel loss and wind-tunnel performances analysis were ad-hoc developed.

1996-1998 : **Design of optimal wing-fuselage junction for high-performance sailplanes**. The research activity has been carried out mainly at TU Delft (Holland) under the supervision of Prof. L. Boermans during a 14 months period spent there as visiting researcher. The research activities were focused on the design of a low-drag wing-fuselage junction for Antares sailplane, using ad-hoc geometrical parametric description and aerodynamic solver based on 3-D panel method calculations and integral boundary-layer analysis. The design has been accomplished also using aerodynamic inverse calculations. [B1], [IR3], [2, 4, 9]

1997-2002 : **Design and aerodynamic analysis of a new ultralight aircraft with rear-propeller configuration**. The ULM aircraft, named G97 Spotter, has been completely designed at the Department of Aeronautical Engineering of University of Naples. Research activities have been performed for the numerical analysis and optimization of airfoil, fuselage and complete aircraft configuration. Many multi-disciplinary design aspects have been studied and solved. F. Nicolosi has been technical responsible of a deep wind-tunnel test campaign that has been performed on the airfoil and on the 3-D model of the aircraft during 1997-1999. The aircraft prototype has been built in 1999 and first flight was performed in the same year. [J1, J2, J3], [5, 14, 15, 16, 17].

1997-2000 : **Development of tool for complete aircraft aerodynamic derivatives prediction in preliminary design phase**. The research activity dealt with the development of a software tool named *AEREO* in which many semi-empirical methodologies were implemented. The analysis were involving both longitudinal and lateral-directional derivatives and aircraft performance prediction. Some higher-order methodologies (like the lifting line theory extended at non-linear condition) were developed and implemented in the software together with classical semi-empirical approaches (like those suggested by Roskam, Raymer, NASA reports, etc.). The derivative estimation was extended including non-linear flight conditions dealing with high angles of attack and sideslip.The analysis were focused on light aircraft and general aviation aircraft category. [J1, J3], [5, 7, 18, 19].

1997-1998: **Design and wind-tunnel testing of high-lift airfoils**. Research activity were performed together with CIRA and FIAT auto for the analysis and design of a rear wing for a race car application. The design was focused on the improvement of lift and efficiency. A 2-D airfoil section was designed and tested at the Dep. Of Aeronautical Eng. of University of Naples. All problems dealing with the experimental testing in wind-tunnel of such airfoils developing high-lift were deeply studied and highlighted through dedicated experimental activity. In 1997, some wind-tunnel tests (showing similar problems) were carried out at TU Delft on an extreme high-lift airfoil shape by F. Nicolosi and a Dutch student at the low-speed wind-tunnel of Delft Technical University. [1, 3].

2001-2003 : **Design, aerodynamic analysis and flight tests of a small RPV with 3 lifting surfaces**. The design of a small Remoted Piloted Vehicle with 3 lifting surfaces (wing, hor. Tail and

canard) was performed with the aim to investigate the effect of canard and the mutual aerodynamic interference between components. The design were accomplished through the use of 3-D aerodynamic calculations and the use of software *AEREO* which was ad-hoc modified to deal with this configuration. An extensive wind-tunnel test campaign was performed on the configuration and on the fuselage with the rear engine and propeller installation. The propeller efficiency was measured during aerodynamic tests. In 2002-2003 the model was built and equipped with small and light instrumentation for flight test recording. The activities were also focused on flight test analysis and aerodynamic derivative estimation through parametric estimation (MLM). [J5], [21, 23, 26, 30, 32].

1999-2016 : **Light aircraft Flight Tests, flight performance measurement and aerodynamic parametric estimation**. Some flight test campaign has been carried out on some light aircraft and light motorglider. A dedicated light and low-cost flight instrumentation has been designed, acquired and assembled at Dep. of Aeronautical Engineering at Univ of Naples by Coiro and Nicolosi. Flight test campaign for the acquisition and measurement of flight performance and for the application of MLM (Maximum Likelihood Method) for aerodynamic derivative estimation on light aircraft were performed for some light aircraft and motorglider. Flight tests were performed on P92 ultralight, on G97 Spotter ultralight, on DG400 motorglider and on Curumin light aircraft. Curumin flight tests were performed in Brasil, at Federal University of Minas Gerais. [J6, J10], [10, 17, 20, 22, 27, 30, 32, 35, 43]. Recent **Flight test** campaign with very interesting obtained results have been performed on certified aircraft such as **P2006T**. The flight test allowed aircraft performance measurement and the evaluation of the effects due to the winglets (tests performed with and without winglets) [J16, J17].

2000-2008 : **Flight dynamics and flight Simulation of light aircraft.** Research activity dealing with flight dynamics and flight simulation was performed. Some activities dealt with the analysis of optimal trajectories for light aircraft landing during 2002 and during a short period of applied research at University of Kansas under the supervision of Prof. D. Downing. During 2000-2001 the research was focused on the analysis of the behaviour of sailplane in thermal performed through a specific flight simulator with thermal modelling written in Java. In 2001, in collaboration with TU Delft, the problem of flight simulation of a re-entry axyalsimmetric space module was investigated and presented at AIAA conference [25]. In 2002 F. Nicolosi received a small research grant for the development of a small flight simulator for ultralight with stick force reproduction. In the period 2005-2007 some specific activities were performed on the implementation of a 6 DoF flight Simulator at University of Naples that was acquired through the Regional Centre of Competence “Trasporti”.
[J4], [13, 20, 25, 46, 49, 50].

1998 – 2011 : **Design, analysis and tests of an innovative vertical axis water turbine to exploit tidal currents**. Since 1998 Prof. D. Coiro and F. Nicolosi were involved in the design and tests of an innovative vertical axis turbine called *Kobold*. The research activities were developed in collaboration with Ponte di Archimede Company. The innovative turbine has been internationally patented [P1] in 2005. The turbine prototype has been built and installed in Messina strait since 2001 and is fully operative as demonstration plant since 2005. Many experimental tests performed on scaled models in the wind-tunnel and in the towing tank of University of Naples have been carried out since 1998 to measure and highlight turbine’s characteristics. Some tests (measurement of torque and blade loads) have been also performed on the prototype installed in Messina strait. Recently, in 2011 some new towing tank tests were performed on scaled model to measure the blade loads in several conditions and to experimental characterize the turbine’s behaviour and efficiency in case of waves and for two turbines close to each other. A relevant article published [J7] received 29 citations as reported in Google Scholar. [J7], [11, 24, 29, 37, 45].

1998-2003 : **Activities in the aerodynamics of bridge section, sails and america’s cup yacht bulb**. During 1998-2000 some experimental research activities were carried out at the low-speed wind-tunnel of the Dep. of University of Naples on bridge sections, to the aim of measurement and improvement of stall flutter behaviour. Some tests were showing very good improvement obtained through a rotating cylinder at the bridge section leading edge.[11, 15]. Other activities during 2002-2004 were focused on the analysis of the aerodynamic behaviour and performance of sails for high-performance yachts. During 2003, in collaboration with Chalmers University, the problem of induced drag reduction of an America’s cup Yacht bulb through winglet (appendices) has been deeply investigated through CFD and experimental activities. [28, 34, 39].

2003-2005 : **Design, aerodynamics and performance of a MALE turboprop UAV**. Under the European financed project called Capecon (5th FP) deep research activities were carried out in

collaboration with other partners (among them IAI, CIRA, EADS) on the design and aerodynamic optimization of a MALE UAV platform equipped with one turboprop engine. Many aspects dealing also with aircraft structure, aircraft safety and operative requirements were taken into account. [J9], [41].

2006- 2015: **Winglet and optimal wing-tip design for light aircraft**. Many research activities were carried out for the numerical and experimental analysis of multiple winglets to be mounted on delta-glider or very low-speed flight vehicle. Some wind-tunnel tests were performed on multiple winglets (remiges) and on classical winglet and very interesting findings were highlighted. The optimization of shape, angle position and number of multiple winglets were performed and published in some journal articles. The activity on multiple winglets, very similar to the bird tip feathers called remiges, has been carried out in collaboration with FIAT for the hang-glider belonging to Angelo D'Arrigo, a world champion pilot and record holder. [J13, J14], [48, 53, 54, 58].
The design of winglet of P2006T Tecnam 4-seat aircraft has been carried out by F. Nicolosi in 2008. The optimal design of the winglet allowed the flight measured OEI climb rate to be improved from 150 ft/min to more than 300 ft/min as also shown in [J17].

2004-2006 : **Application of synthetic jet for airfoil aerodynamic improvement**. Some research activities were carried out in collaboration with CIRA (Italian Aerospace Centre) to investigate the effect of unsteady blowing for the control of boundary layer turbulent separation on high-lift airfoils to be employed in UAV vehicles. Many experimental tests performed in the low-speed wind-tunnel highlighted the possibility to improve the airfoil and aircraft aerodynamic efficiency at low-speed conditions. [J11], [40, 47].

2006-2010 : **Design, aerodynamic analysis and optimization and flight test characterization of P2006T aircraft**. Since 2006, in collaboration with Tecnam aircraft Industry, the design of a new light 4-seat aircraft has been carried out. Many aspects dealing with the aerodynamic design of the aircraft have been highlighted. The nacelle effects on lift, drag and pitch has been investigated in details. An extensive wind-tunnel test campaign has been conducted on a scaled model. Since 2008 up to 2010 research activity has been devoted to flight tests and certification of P2006T aircraft. **The flight dynamics, flight stability and flying qualities** characteristics have been carefully measured during an intensive **flight test campaign** and reported in [J10, J16, J17].

2004-2006 : **Design and aerodynamic optimization of a new STOL Ultralight aircraft in composite material**. Design of a STOL (Short Take-Off and Landing) ultralight aircraft has been carried out at Dep. of Aerospace Eng. of University of Naples in collaboration with Aerosoft S.p.A. Design of the aircraft has been focused on an accurate design of the high-lift system that allows very good STOL performances. The general design of flap and slat on the wing allow to achieve an airfoil maximum lift coefficient of about 4.0 in landing configuration. The numerical analysis and design activities (airfoil and 3-D design) have been supported by deep and intensive experimental activities that have been performed in the main wind-tunnel belonging to the Dep. [J8, J15], [36, 42, 52].

2005-2016 : **Development of Software for Aircraft Preliminary Design**. Since 2005 a software named **ADAS** has been developed for transport aircraft preliminary design. The software has been intended mainly as a teaching tool and is used in the Aircraft Design course classes. See http://wpage.unina.it/fabrnico/Articles/ADAS_CEAS_Proceedings.pdf for more details. Research dealing with the development of software tool for MDO and for transport aircraft preliminary design has been carried out and is at the moment in development at the Department. In 2014, a research activity has been started together with **Alenia Aermacchi** for the development of an industrial software written in JAVA for the preliminary design and MDO of transport aircraft with the aim of reducing design time and related costs. The project has been financed by MIUR (Italian Ministery of Research and Education).

2009-2012 : **Design and aerodynamic analysis of a new vertical axis wind-turbine**. Research activities have been performed for the design, optimization and aerodynamic analysis of a new small vertical axis wind-turbine with inclined arms called X-ONE. The activity has been performed in collaboration with Jcoplastic company. Many wind-tunnel tests, full scale tests and CFD analysis have been performed highlighting many interesting aspects on the effects of inclined arms and interferences between turbine's blades. [J19].

Recent research activities (2010-2025)

2012-2015 : **Design and aerodynamic analysis of a new 11-seat Commuter aircraft (P2012 Traveler)**. In collaboration with Tecnam aircraft Industry, the design of a new 11-seat Commuter aircraft has been carried out at Dep. of Industrial Eng. of Univ of Naples. The research activities have been dealing with general and conceptual design of the aircraft, with numerical aerodynamic analysis, with wind-tunnel tests and with detailed CFD analysis performed on the configuration. Through the detailed aerodynamic analysis many interesting aspects dealing with horizontal tailplane wing-wake interaction and vertical tailplane directional stability contributions have been highlighted. The winglets have been designed by the research group of Prof. Nicolosi. Research activities (both numerical and experimental) have also allowed an optimal sizing of the aircraft horizontal tailplane and vertical tailplane and rudder. [J21], [68, 71, 73, 75].

2009-2016 : **Aerodynamic design of new regional turboprop aircraft**. Since 2009 many research efforts have been focused on the aerodynamic design and optimization of regional turboprop transport aircraft. A research contract and collaboration with ATR company (Tolouse, FR) has been conducted since 2009 for about 3 years. The research activities were focused on the optimization of ATR 72 aircraft through the accurate design of karman, fairing and through the introduction of ad-hoc designed winglets. The activity were also involving flight performances and economical operative aspects. Since 2011 up to 2012 the aerodynamic design of a new possible configuration of a regional turboprop with 90 passengers has been carried out. The aerodynamic design and analysis were focused on airfoil, wing, winglet, karman, fuslelage and tailplanes. Other activities have been performed in 2012, always with ATR, for the analysis of performance improvements achievable through modification of engine power and small shape modification of existing ATR72-600 aircraft. Since 2013, the aircraft design group of Prof. Nicolosi is working in collaboration with Alenia Aermacchi (specific research contract) for CFD aerodynamic activities focused on the development of new aerodynamic predictive methods for new regional turboprop aircraft to be used in the preliminary design phase. The activities were mainly focused on fuselage shape, karman, airfoil, wing and high-lift system. Many configuration have been analysed through CFD to obtain useful information on the effects of shape and configuration on aircraft aerodynamics.
[J20], [66, 72, 76]. Recently, a detailed activity dealing with the design and aerodynamic analysis and optimization of an innovative regional turboprop with 130 pax and with rear propulsion has been started together with Leonardo aircraft, CIRA, GE Avio and TU Delft for the financed CS2 IRON project. The analysis of the proposed innovative configuration with rear propeller installation, which is one of the main topics dealt by the IRON project proposal, is characterized by several aerodynamic, performance and propulsion feature that must be predicted with high accuracy and deep comprehension of involved phenomena in order to lead to a possible improved configuration respect to the classical configuration with wing-mounted engines. The final configuration is characterized by a 3-Lifting surface solution with canard, wing and tailplane with propulsive unit.

2012-2016 : **Development of new Preliminary Design Methodologies for Regional Turboprop Aircraft through CFD Analysis and wind-tunnel tests.** Several investigation concerning the design of fuselage and vertical tailplane have been carried out . Through the application of CFD analysis performed on modular configurations, new proposed semi-empirical approaches have been derived for the estimation of aerodynamic characteristics to be used in the preliminary design phase. Especially concerning vertical tailplane aerodynamic effects to be used in the preliminary design phase, we have highlighted that classical semi-empirical methodologies like ESDU or Datcom often lead to wrong predictions and wrong design. The accurate estimation and the detailed explanation of interference effects on the vertical taiplane side-force has been recently highlighted in journal articles [J18, J22] and in conference papers [69, 70, 72, 76]. The derived methodology is intended for application addressed to the regional turboprop aircraft category. The derived methodology concerning vertical tail design has been published on relevant journal [J27],[J29].

2014-2019 : **Development of Advanced Framework and software for Aircraft Preliminary Design**. Research dealing with the development of software tool for MDO and for transport aircraft preliminary design has been carried out and is at the moment in development at the Department by DAF research group. In 2014, a research activity has been started together with **Alenia Aermacchi** for the development of an industrial software JPAD (Java Program for Aircraft Design) written in JAVA for the preliminary design and MDO of transport aircraft with the aim of reducing design time and related costs. The project has been financed by MIUR (Italian Ministery of Research and Education). Also the research project AGILE(2015-2018) https://www.agile-project.eu/ was addressing at European level the topic of efficient aircraft design framework for collaborative and multi-disciplinary design of future aircraft. The DAF research group has been deeply involved in

AGILE project. AGILE has received the ICAS Award for Innovation in Aeronautics. Recently, on this topic, another project is running and is AGILE 4.0, also financed by EC, is involving many industrial partners like Bombardier, Airbus, Leonardo, Embraer (https://www.agile-project.eu/2019/01/11/agile-4-0/). See [J24, J26, J36, J33, J38].

2016-2017 : **Design, integration and effect on flight performance of wing morphing devices**.
This research deals with an extensive estimation of the possible benefits related to the implementation of this device on that class of planes. Parametric aerodynamic analyses are performed to evaluate the effects of different architectural layouts (in-plane geometry extension) and different shape envelopes (namely, the rotation boundaries). Finally, the expected improvements in the global high-altitude long-endurance aircraft performance are evaluated [J28].

2017-2020 : **Design, aerodynamic analysis, optimization and performance of a 130-pax rear engine regional airplane**. In the project IRON (financed by Clean Sky 2) DAF group has been deeply involved in the design and aerodynamic optimization of a regional airplane. The analysis have been made involving low-fidelity and high-fidelity CFD calculations. The final configuration with three lifting surfaces (with a forward canard) has been deeply analysed also through a dedicated wind-tunnel test experimantal campaign. The propulsive effects on the tail (affecting longitudinal and lateral-directional stability and control) have been carefully analysed through CFd and wind-tunnel tests.

2017-2021 : **Development of design tools, methodologies and framework for hybrid and electric aircraft**
This research activity has been pushed by the need at scientific level of investigating new aircraft configurations addressed to a lower impact on pollution. Since 2017 the DAF group is developing software frameworks and tools for the design of hybrid aircraft also characterized by new and innovative propulsive solutions (Distributed Electric Propulsion, Tip propeller installation, etc.) The research activity has been also developed through the following research projects: PON PROSIB (National project with Leonardo), IRON project (Clean Sky 2 project wih Leonardo and GE Avio), ELICA Clean Sky 2 project with Rolls Royce and Siemens focused on the design of a 19-pax electric aircraft [109, 115]. The topic of aerodynamic effects of distributed propulsion for GA and regional aircraft has been also carefully addressed and some relevant article have been produced [J31, J34].

2020-2025 : **Development of design tools, methodologies and framework for hybrid and electric aircraft, including aircraft powered by fuel cells and liquid hydrogen storage. Design and relative design applications**
This research activity has been developed through several European projects like IRON together with Leonardo, like HERA (2023-2027) with Leonardo aircraft and recently with the two projects FAME (with Airbus) and HEROPS (with MTU Aero Engine) for the development of regional 100 pax aircraft with full-electric powertrain using fuel cells and liquid hydrogen.
DAF research group is involved in the optimization of the powertrain and optimization of the whole aircraft configuration.
The EU project Colossus has been implementing also hybrid-electric powertrain on a small seaplane commuter aircraft with fire-fighting capability.

Transversal Research Activities

1997-2014 : **Low-speed wind-tunnel testing of airfoils and aircraft models and components**.
In almost 17 years many wind-tunnel test activities were performed in the low-speed wind-tunnel of the Department of Aeronautical Engineering of University of Naples. More than 15 airfoils for light aircraft and other civil applications were tested and in some cases optimized. Experimental aerodynamic campaign has been conducted on more than 15 scaled model of light aircraft and general aviation aircraft in the same tunnel. Since 1998 F. Nicolosi is responsible of wind-tunnel tests at the Department for Tecnam aircraft testing. Tests have been conducted on Tecnam models of P92, P96, P2000RG, P2002, P2006 and recently on P2012 aircraft. Wind-tunnel tests have been also performed for G97 Spotter, Easy Fly STOL Ultralight, P1XX business jet (Piaggio), SkyCar (OmaSud), K4A light Helicopter. [J14, J15], [14, 15, 16, 57, 73].

1998-2014 : **Applied Aerodynamics**. **Aerodynamic design and optimization of airfoils and other aircraft components**. Many airfoils for light aircraft applications have been optimized and designed since 1998. The activities, dealing with applied aircraft aerodynamics have been specifically dealing with airfoil efficiency and hig-lift improvement, with wing-fuselage junction,

fairings and karman for regional turboprop, on light aircraft nacelle influence, on low-drag fuselage design and on tailplane optimal design[J3, J8, J11, J12, J15].

1999-2014 : **Flight testing**. Flight test campaign for flight performance, static and dynamic stability and flight qualities measurement has been conducted on more than 8 light and general aviation aircraft. Flight tests have been performed also to the aim of the aircraft aerodynamic parametric identification through the application of MLM(Maximum Likelihood Method). Flight tests have been carried out for P92, P96 and G97 Spotter ultralight, for DG400 motorglider, for Curumin light aircraft and recently for the flight certification of P2006T Tecnam aircraft. Recent flight tests have been performed on a P92 ultralight for the accurate measurement of aileron efficiency in linear and non-linear conditions(high aileron deflections). [J10, J16, J17].

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