

## ABOUT NITROS

Helicopters are currently used in important applications providing a valuable contribution to society and economic growth. Thanks to the operational flexibility of helicopters it is possible to accomplish complex missions. Today, the service of helicopters includes, search and rescue, coastguard, firefighting, disaster relief, territorial control, monitoring and inspection, heavy-lift support to construction and other sectors. In the future, rotorcraft are expected to see widespread use, as means of transport, exploiting the formidable capability to provide point-to-point connections.

If the expansion of the usage of rotorcraft vehicles is to follow the pace of growth followed by the fixed-wing public transport in the last years it will be essential to increase safety due to the fact that in the last 20 years helicopter accident rates, worldwide, remained unacceptably high. The complexity of the phenomena involved in rotorcraft flight calls for the training of engineers with genuine multidisciplinary background.



## UNIVERSITIES



**POLITECNICO**  
MILANO 1863



## INDUSTRIAL PARTNERS



Project Coordinator  
**Giuseppe Quaranta**  
**Politecnico di Milano**  
[giuseppe.quaranta@polimi.it](mailto:giuseppe.quaranta@polimi.it)

[www.nitros-ejd.org](http://www.nitros-ejd.org)  
[nitros.ejd@gmail.com](mailto:nitros.ejd@gmail.com)

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# NITROS

ENGINEERING FOR ROTORCRAFT SAFETY

**NETWORK FOR INNOVATIVE TRAINING  
ON ROTORCRAFT SAFETY**

A MARIE SKŁODOWSKA-CURIE ACTION JOINT  
EUROPEAN DOCTORATE ON ROTORCRAFT SAFETY

[www.nitros-ejd.org](http://www.nitros-ejd.org)





# RESEARCH PROJECTS

Each research program is focused on a problem that affects the safety of the current or innovative rotorcraft configurations. The possible implications of the problem in terms of manufacturing, operations and certification procedures will be thoroughly discussed with the industrial partners.

SIMULATION AND PREVENTION OF ICE FORMATION AND SHEDDING ON ROTORCRAFT

IN SERVICE HEALTH MONITORING FOR ROTORCRAFT STRUCTURES

INNOVATIVE DESIGN FOR TILTROTOR COCKPIT FOR THE REDUCTION OF PILOT WORKLOAD

ROBUST FLIGHT CONTROL OF ROTORCRAFT MANOEUVRES IMMERSED IN OBSTACLE'S TURBULENCE

ROTORCRAFT WAKE MODELLING

DEVELOPMENT OF THE PHASE AGGRESSION CRITERION FOR ADVERSE ROTORCRAFT PILOT COUPLING PREDICTION AND REAL-TIME DETECTION (PAC)

MITIGATION OF AIRWAKE HAZARDS

MODELLING OF BROWN / WHITE-OUT

ENHANCED HELICOPTER HANDLING QUALITIES THROUGH VIBRATORY LOADS EXPLORATION

REVEALING ADVERSE ROTORCRAFT PILOT COUPLINGS INDUCED BY FLIGHT CONTROL SYSTEMS

UNDERSTANDING THE USE OF AUTOMATION IN HELICOPTERS

ALLEVIATING FLIGHT SIMULATOR NEGATIVE TRANSFERENCE FOR HELICOPTER OPERATIONS



## OUR MISSION

*Train a new generation of “safety vaccinated” aerospace engineers*

The goal of NITROS is to train a new generation of talented young aerospace engineers capable of developing innovative approaches in a unique cross-disciplinary research and training program encompassing Control Engineering, Computational Fluid Dynamics (CFD), Modelling and Simulation, Structural Dynamics and Human perception cognition and action, to address complex solutions for rotorcraft safety.

Develop a detailed framework for rotorcraft modelling integrating rigid-body and aero-servo-elastic modelling features capable of dealing with structural or propulsion / mechanical system failures in rotorcraft.

Understand how humans can safely and efficiently use and be interfaced with rotorcraft technology.

Enhance the understanding of the unique and complex aerodynamic environment in which the rotorcraft are working, often in hostile conditions of wake encounter threats, undesirable interactions with obstacles, icing and, brownout conditions.

# HOW IT WORKS

The H2020 MSCA Joint European Doctorate NITROS projects will guide 12 Early Stage Researchers through a Double PhD program. Training of ESRs is aimed at developing them as independent scientists, with high level in:

1  
Problem-solving  
decision making skills

2  
Management  
communication and  
leadership skills

3  
Discipline-related  
research skills

4  
Transferable skills  
improvements on a  
personal level

TO APPLY PLEASE GO TO THE WEBSITE [WWW.NITROS-EJD.ORG](http://WWW.NITROS-EJD.ORG)  
APPLICATION WILL BE OPEN UNTIL THE END OF FEBRUARY 2017

