

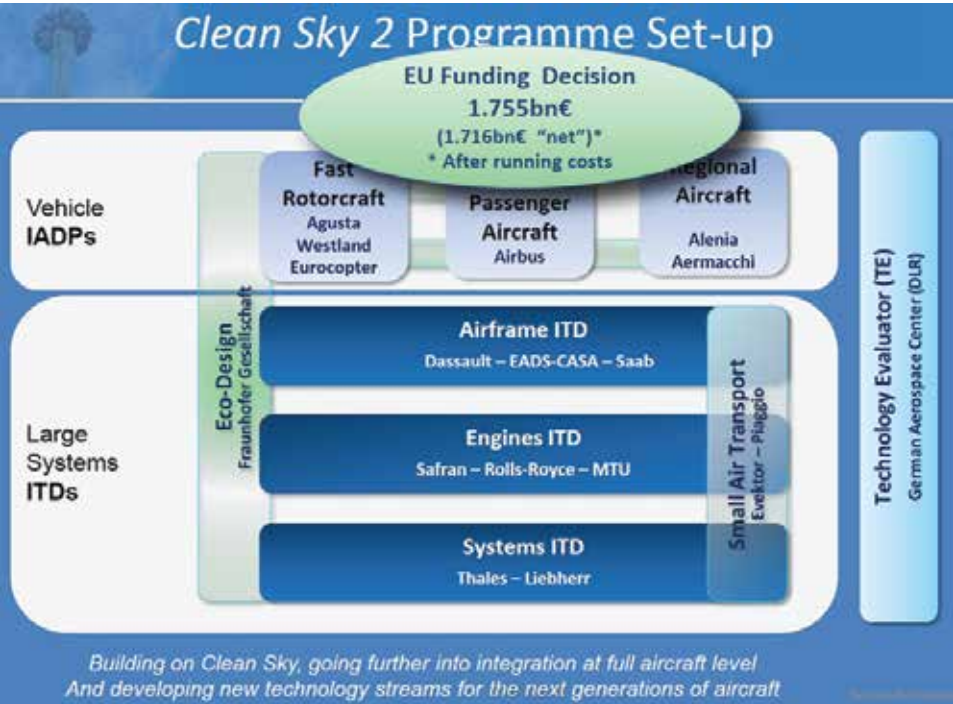
First Mission for Clean Sky 2

Mission: Development of the future European helicopter demonstrator
Subject: Fast RotorCraft
Goal: Efficient transport, Safe and Seamless mobility

Starting 2015, INCAS together with IAR Brasov, the Romanian Consortium (RoC), participates in the Development of the future European helicopter - Fast RotorCraft (RoRCraft), one of the three platforms of the JTI Clean Sky 2. Fast Rotorcraft IADP consists of two separate demonstrators, the NextGenCTR tilt-rotor and the LifeRCraft compound helicopter. These two fast rotorcraft concepts aim to deliver superior vehicle productivity and performance. The main objective of the RoRCraft project is to make usage of the unique capabilities existing at the consortium level for design, manufacturing and testing of the fuselage for LifeRCraft Demonstrator in the Clean Sky 2 JTI, in order to demonstrate TRL 6 using innovative tools, methods and manufacturing processes. Thus, RoRCraft project addresses mainly 'Work Package 2.2.5 LifeRCraft Airframe: Structural design, Stress Analysis & Manufacturing'. Such capabilities have initially been developed in Clean Sky 1, mainly in relation with Airbus and Dassault and fixed wing aircraft community. Now the impact is expected in the rotorcraft community. The LifeRCraft demonstrator will enable both ground and flight tests, under a Permit-to-Fly condition, a major step forward in the rotorcraft industry. In this way, thanks to the planned flight program, the impact of the new manufacturing technologies, as well as advanced concept design for compound configuration will be validated.

According to the Clean Sky mission, INCAS role, is to identify, develop and validate the key technologies necessary to achieve major steps towards the ACARE (Advisory Council for Aeronautics Research in Europe) Environmental Goals for 2020 when compared to Year 2000 levels, namely: fuel consumption and carbon dioxide (CO2) emissions reduced by 50%, Nitrous oxides (NOX) emissions reduced by 80%, reduction in perceived external noise of 50%. Another goal is to improve the environmental impact of the life cycle of aeronautical products (manufacturing, operation, maintenance and disposal). Simultaneously, INCAS will integrate and synthesize the technology into viable development platforms.

The new challenges identified in ACARE SRIA highlight the need for an accelerated innovation and for more far-reaching solutions. A continuation of the existing Clean Sky 2 JTI will ensure that new concepts are fully validated in order to accelerate the market adoption of step-change solutions. Clean Sky 2 will deliver major gains within the key pillars defined in H2020: to develop efficient transport that respects the environment; to



ensure safe and seamless mobility (New concepts will allow the air transport system to meet the mobility needs of citizens: more efficient use of local airports, faster connections, and reduced congestion); and to building industrial leadership in Europe.

The proposed activities in RoRCraft project will substantially contribute to all these H2020 key pillars. In particular, the project is aimed at developing new design, manufacturing and testing technologies that will have a radical impact on a new generation of rotorcrafts.

All competences and technologies developed within RoRCraft will be performed under strict cooperation of ITD/IADP leaders allowing a fruitful exploitation of the results. The project is also structured so as to facilitate the interface with the Technology Evaluator. State of the art technologies will be used for the development of innovative configurations and concepts (such as compound rotorcraft) allowing a reduction of both manufacturing costs, certification time and to increase safety.

Why INCAS?

INCAS is the design authority for all major aeronautical programs developed in Romania. Acting in an integrated environment with industry, INCAS has developed outstanding capabilities for design and analysis of modern aero-structures, integrating state-of-the-art capabilities for virtual enterprise. At the same time, a continuous effort enabled materials department to developed new materials with advanced properties for aeronautical usage, with important spin-off capabilities. This integrated approach enables INCAS to provide full

expertise from conceptual structural design using new materials up to structural testing and validation for the benefit of the industrial partners. The implementation of the RoRCraft project will allow the maintenance of the high level skilled personnel, allowing as well the education of young personnel under the guideline of experience personnel.

Who will work for this project?

Mr. Cătălin NAE, PhD Engineer Director General INCAS

He is a senior research scientist, with 20 years research experience in applied fluid mechanics and wind tunnel testing. Main research interests are for experimental techniques, advanced simulation tools development and analysis using HPC and state of the art IT technologies, flow control using synthetic jets actuators and high speed wind tunnel testing. In his scientific career he is the main author of 15 ISI papers and more than 65 papers in scientific journals all over the world. He was head of INCAS Subsonic Wind Tunnel, expert in experimental techniques for unsteady flows, visualization and data acquisition systems. He was wind tunnel project engineer for 12 aeronautical programs (including civil and military aircrafts) and project manager for AeroTAXI, a 12 pax commuter regional aircraft under development at INCAS. Currently he is acting as General Manager of INCAS, managing also INCAS Cluster activities in Clean Sky. His role in this project will be managing INCAS activities, ground and flight tests planning, simulations, and data post-processing for advanced configurations. He will also interact with airworthiness authorities in order to enable Permit-to-Fly.

Mr. Dorin Bârsan, Engineer

He is a senior engineer, with more than 30 years' experience in aerostructures and applied research in aeronautics. Main interests are for aircraft construction technologies, composite material usage and development for aeronautical field, project management and integration activities for complex aeronautical products. In his engineering career he was the head of different designed and built UAV systems using state of the art technologies in materials and avionics. As design engineer at Avioane Craiova aircraft manufacturing factory was responsible for leading the design of some major subassemblies of IAR 99 jet trainer, solving complex problems linked to composite materials. He was also involved in the Part 23 type airplanes, conducting the design and certification process. In terms of manufacturing activity, he was the manager of various tooling design commercial contracts with ROMAERO S.A. Currently he is acting as Project Manager for IAR-99 TD technological demonstrator. Mr. Dorin Bârsan is the coordinator of the RoRCraft fuselage Project.

Adrian Gâz, Engineer

He is an aircraft engineer, with more than 15 years of experience in aerostructures and industrial projects. Main interests are for aircraft design and manufacturing technologies, especially from composite materials. In his engineering career was deeply involved in two Part 23 type composite airplane design projects, first as designer and finally as project manager, tooling design coordinator for several commercial projects in aerospace field and supervisor of the structure and systems design teams for the IAR-99 TD technological demonstrator. He was also coordinator of the aerospace design departments for several private companies. His excitement about the innovative technologies leads him to take the position of Lead design and the focal point for the RoRCraft Project.

Radu Bîscă, Engineer

He is a stress specialist, with extensive experience in many aeronautical projects both civil, such as Airbus A340, Dassault Falcon and military such as IAR 99 Hawk. His role in INCAS is as the Leader of the Stress Collective, coordinating the stress activities on all the major projects, international or national. As a stress engineer in INCAS he has good knowledge in both analytical and numerical methods and tools, used in the substantiation and certifications of an airworthy structure. Radu BISCA is the Stress Leader of the RoRCraft fuselage project.

Mr. Dorin Lozici, Engineer

He is a senior scientist with 30 years of experience in major industrial activities as: IAR99 Hawk (Military Jet Trainer) - Aircraft Lifespan Extension - Lead Stress Engineer A340-300 BLADE - Fixed Trailing Edge and Ailerons - Stress Engineer Dassault Bordeaux - Innovative Empennage Demonstrator - Stress Engineer AIRBUS 380 - Freighter - Stress, Fatigue and Damage Tolerance analysis (CATIA, PATRAN NASTRAN, NASGRO) for UDCD and MDCD cargo doors AERMACCHI (IT) / SPAZIOSYSTEM SA (IT) - AERMACCHI M-346 - Stress analysis (CATIA, PATRAN, NASTRAN) of the Rear Fuselage IAR-99 Hawk (Military Jet Trainer) - Stress Analysis of wing-fuselage junction in accordance to Av.P.-970 (GB) and AIR-2004 (F) requirements - Certification by Romanian Military Authority.

LifeRCraft Team Work has already started!

Recently, the INCAS RoRCraft team, composed of Radu Bîscă-stress engineer, Adrian Gâz-design engineer, Octavian Nistor-stress engineer, Costin Petre-engineer and Adrian Popescu-design engineer, started working on the project in the Airbus Helicopters Germany site. This is a great opportunity for our colleagues to work together, to share ideas, concepts and technical solutions. with the LifeRCraft Team This experience was chronicled for the INCAS INSIDER magazine by Radu, sharing (with us) how interesting and excited this endeavor is.



Dorin Bârsan, Engineer



Adrian Gâz, Engineer



Dorin Lozici, Engineer

'In the autumn of 2015 my 'German affair' begun. Along with my team, I caught a flight from Otopeni Airport to Munich excited but yet a little bit worried, not knowing exactly how our new and 'out of the box' ideas are going to be received by the rest of the LiferCraft Team. As you probably well know, INCAS's main activities are more focused on designing airplanes so working on a new state of the art helicopter is a new dish for me.

The final destination, Donauwörth, is just 100km from Munich, a small city on the Danube, home of 20,000 people situated on the East side of Bavaria. From my point of view, the city is mainly famous for three things: the former Messerschmitt factory, the current AIRBUS Helicopters factory and for being close to Munich during Oktoberfest.

Once arrived in AIRBUS Helicopters, the LiferCraft team really made us feel at home. I was pleased to have such an unexpected warm welcome and to find people very opened with new ideas. I even got an office facing the power plant, exactly like mine back in Romania. Although many countries with different aeronautical backgrounds are involved in the project, Germany, France, Romania, England, Spain the team members have mostly similar view on the design concepts and ways forward, making working on the project a delight. I was very impressed when I visited the production lines, especially the Tiger Final Assembly Line. The Composite Structures division is quite complex and well developed, with state of the art equipment and very well trained personal. This 2 hours tour of the factory made me realized, in many aspects, the magnitude of the technological gap that we need to fill in order to get this project in the air. The road ahead will be paved with countless challenges but I, for one, am confident that we'll succeed.

I wish I could describe the project more, but it is classified for now. The only thing to remember is that it is going to change the way we think about a helicopter.

On the other hand Bavaria is quite a nice place to be in, filled with old cities, medieval castles, museums and breath taking sunsets. Close to Donauwörth are some of the most representative industrial cities of the Southern Germany like Munich, Ingolstadt or Stuttgart. As a summary of my German experience I would like to point out some things that I enjoyed, in some aspects maybe more than I should: working with the LiferCraft team, the Bavarian cuisine and last but not least the Autobahn.'

Radu Bîscă
INCAS Engineer