PUBLISHABLE EXECUTIVE SUMMARY

1.1 Project summary

Project acronym: **CESAR**
Project name: **Cost-Effective Small AiRcraft**

The project of 6th Framework Programme supported by European Commission
Contract number: 30888

Number of participants: 39 organizations from 14 countries

Total budget (€): 33.7 million
EC subsidy (€): 18.1 million

More information: www.cesar-project.eu

CESAR focuses on small-size commercial aircraft providing manufacturers with an enhanced ability needed to become fully competitive in the world market. The objective is to build up a new development concept for this aircraft category and to improve selected technologies enabling a significant reduction of the time-to-market and lowering the overall development, operation and maintenance costs, while considering safety, passenger comfort and environmental impact.

The project consists of five RTD areas sufficiently covering the complexity of the aircraft design process, namely aerodynamic and structural design, propulsion integration, aircraft system optimisation and design integration aspects. In particular CESAR aims at enhancing aerodynamic and structural design tools and structural evaluation methods. RTD work comprises development, validation and integration of design tools and methodologies to provide suitable environment for virtual aircraft simulation. Enhancement of design processes, knowledge management and collaboration tools is an essential part of the project.

Another important part of the project is technological development for aircraft subparts and systems. The CESAR aspires to provide technologies and knowledge for advanced wing, competitive and environmentally acceptable propulsion unit and new technologies for selected aircraft systems to reduce aircraft operating costs and improve safety.

The activities also include the integration of the latest technologies already applied to large commercial aircraft and their modified economical use within the category of small-size commercial aircraft, e.g. cost effective actuation, complex power-plant control system, competitive technologies for air systems, structural health monitoring and on condition maintenance systems.

Validation is carried out on two levels: a) on the task level (hardware platforms), b) on the project level (two baseline a/c configurations for assessment and trade offs).

General Project Objectives

- **Time to market reduction by 2 years**
- **Development cost reduction by 20%**
- **Reduction of manufacturing and assembly costs by 16%**
- **Propulsion unit efficiency and affordability**
- **Optimization of selected aircraft systems**

Time to market reduction by 2 years

Nowadays it takes on average 6-7 years to design, develop and fully certify a small passenger aircraft. The goal of the CESAR project is to reduce development time necessary for this category of aircraft to 4 years (28% reduction). Such improvement can be done through the use of reliable and affordable design tools, mainly for aerodynamic and structural design and integrated software environment enabling virtual simulation of the aircraft.

Development cost reduction by 20%

The development costs form part of the aircraft selling price. Using convenient and affordable design tools and methodologies, with straightforward applicability to project and knowledge management can bring significant effects in terms of development cost reduction. The goal of the CESAR project is to reduce development cost at least by 20%.

Reduction of manufacturing and assembly costs by 16%

The production effectiveness depends on materials used and on particular production technologies, joining processes and on assembly itself. The majority of these production factors, related primarily to the airframe of the aircraft, are already determined at the early stages of the aircraft design. A distinct part of expenses is formed by power plant (20-30 %) and by other aircraft systems (15-30%) that are also addressed by the project. The goal of the CESAR project is to reduce assembly costs by 16%.

Propulsion unit efficiency and affordability

Affordable turboprop engines powered of 200-400 kW are not available on the European market. The only option for today airplane manufacturers which need such power-plants is to buy them from the companies based in the North America. CESAR can give a real chance to change this nearly monopoly situation. The project will challenge technologies to reduce fuel consumption by 5 to 15 % employing modern propeller and engine control system. New propeller propulsion units can reduce noise emissions in the far field by 3 to 6 dB(A). The plan is also to reduce overall engine weight by 7-9%.

Optimization of selected aircraft systems

HUMS (Health and Usage Monitoring System) customized for small airplane should reduce maintenance costs by 30 % and improve serviceability.

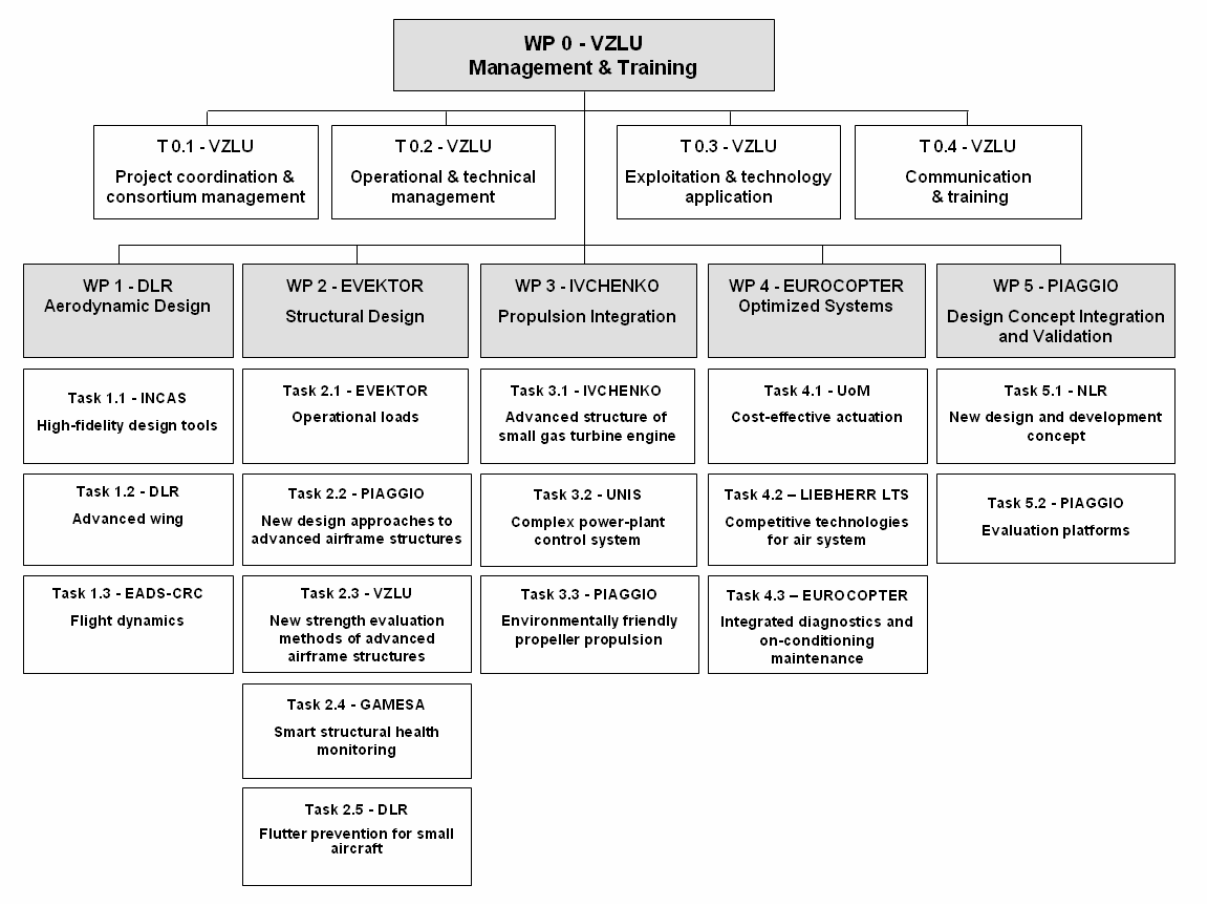
New technologies based on electro-hydraulic and electromechanical actuation technologies (EHA, EMA) specifically tuned for small commercial aircraft can contribute to the aircraft weight reduction and operational cost-efficiency.

Air systems are essential part of passenger's comfort aboard an aircraft. For small airplanes such technologies must be low-weighted and very affordable. Reduction of air systems noise by 5 dB can improve passengers comfort in cabin and reduce even external noise emissions. CESAR seriously tries to cope with these issues.

Project Structure

The project is structured into the five RTD workpackages domains comprising 16 tasks in total. An extra workpackage is devoted to management and training.

Figure 1 - Overall project structure



CESAR Consortium

39 participants from 14 European countries have joined their effort to achieve ambitious objectives of the CESAR project. They are 7 aircraft designers and manufacturers, 13 aircraft systems providers, 11 research establishments and 6 universities. Seven participants belong to SME category.

Table 1 - List of participants

Nr	*Organisation*	*Participant short name*	*Country*
1	Výzkumný a zkušební letecký ústav, a.s.	VZLU	Czech Republic
2	Aero Vodochody a.s.	AERO	Czech Republic
3	Austrian Research Centers GmbH	ARC	Austria
4	Centre de Recherche en Aéronautique, ASBL	CENAERO	Belgium
5	Centro Italiano Ricerche Aerospaziali ScpA	CIRA	Italy
6	Deutsches Zentrum für Luft- und Raumfahrt e.V.	DLR	Germany
7	EADS Corporate Research Centre	EADS -CRC	Germany
8	EUROCOPTER S.A.S.	EUROCOPTER	France
9	EVEKTOR, spol. s r. o.	EVEKTOR	Czech Republic
10	Swedish Defence Research Agency	FOI	Sweden
11	AERNNOVA Engineering Solutions, S.A.,	AERNNOVA	Spain
13	HELLENIC AEROSPACE INDUSTRY S.A.	HAI	Greece
14	HEXAGON Systems, s.r.o.	HEXAGON HGS	Czech Republic
15	National Institute for Aerospace Research "Elie Carafoli"	INCAS	Romania
16	Instytut Lotnictwa - Institute of Aviation	IoA	Poland
17	IVCHENKO PROGRESS SE	IVCHENKO	Ukraine
18	Jihlavan a.s.	JIHLAVAN	Czech Republic
19	JIHOSTROJ a.s.	JIHOSTROJ	Czech Republic
20	Liebherr Aerospace Toulouse SAS	LIEBHERR LTS	France
21	Materials Engineering Research Laboratory Ltd	MERL	UK
22	MESIT pristroje spol. s r.o.	MESIT	Czech Republic
23	Stichting Nationaal Lucht- en Ruimtevaartlaboratorium	NLR	Netherlands
24	OFFICE NATIONAL D'ETUDES ET DE RECHERCHES AEROSPATIALES	ONERA	France
25	První brněnská strojírna Velká Bíteš, a.s.	PBS	Czech Republic
26	PIAGGIO AERO INDUSTRIES S.p.A.	PIAGGIO AERO	Italy
27	Polskie Zakłady Lotnicze Sp. z o.o.	PZL	Poland
28	SICOMP AB	SICOMP	Sweden
29	EADS SOCATA	SOCATA	France
30	SPEEL PRAHA, Ltd.	SPEEL	Czech Republic
31	Svenska Rotor Maskiner AB	SRM	Sweden
32	Technofan SA	TECHNOFAN TF	France
33	TURBOMECA	TURBOMECA (TM)	France
34	UNIS, spol. s r.o.	UNIS	Czech Republic
35	The University of Manchester	UoM	U. K.
36	Brno University of Technology	VUT Brno	Czech Republic
37	RWTH Aachen University	RWTH-AC	Germany
38	Université de Liège	ULg	Belgium
39	Technische Universität München, Institute of Energy Systems	IES	Germany
40	Univesity of Patras	LMS-UPATRAS	Greece