

## DESIGN OF A TWIN ENGINE PROPELLER AIRCRAFT ; AERODYNAMIC INVESTIGATION ON FUSELAGE AND NACELLE EFFECTS

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### SOMMARIO

*Durante l'anno 2006 la Tecnam ha portato avanti la progettazione di un velivolo bimotore leggero denominato P2006. Il progetto del Prof. L. Pascale è basato sullo sviluppo di un velivolo quadriposto motorizzato con due motori Rotax leggeri da 100 hp. Il nuovo velivolo è caratterizzato da un peso massimo al decollo paragonabile con quello di velivoli monomotori e per questo denominato VELT (Very Light Twin). Nel presente lavoro vengono delineati gli elementi principali del progetto alla base della scelta della configurazione. Nel lavoro vengono poi mostrati i risultati di indagini numeriche e sperimentali svolte presso il Dipartimento di Ingegneria Aerospaziale dell'Università "Federico II". Le prove e le ricerche, oltre che alla determinazione delle caratteristiche aerodinamiche del velivolo, sono state incentrate sulla valutazione degli effetti aerodinamici della fusoliera e delle gondole sull'aerodinamica ed in particolare sulla distribuzione di carico aerodinamico lungo l'apertura, fondamentale ai fini della valutazione dei carichi certificativi.*

### ABSTRACT

*Design of a new twin propeller aircraft named P2006 VELT (Very Light Twin) has been carried out at Tecnam aircraft industries during 2006. The new aircraft design, performed by Prof. L. Pascale, is based on the idea to build a 4-seat aircraft with two light engines (Rotax 912, usually used for ultralight aircraft) and to enter the market with a twin-engine aircraft with the same weight of a single engine aircraft (VERY Light Twin). The present paper shows all main criteria on which the design of the aircraft and the choice of the configuration have been based. At Dipartimento di Ingegneria Aerospaziale (DIAS) of University of Napoli "Federico II" a deep aircraft aerodynamic investigation has been performed both numerically and experimentally (through wind-tunnel tests). All tests and research activities have been focused on the evaluation of aircraft aerodynamics and in particular on the measurement of fuselage and nacelle aerodynamic effects. Deep investigations have concerned the evaluation of fuselage and nacelle effect on lift distribution along wing span, fundamental for the evaluation of certification loads.*

### 1. INTRODUCTION

During the last 15 years *Tecnam Aircraft Industries* has been designing and developing more than 10 light and Ultralight(ULM) 2-seat aircraft characterized by high-wing or low-wing configurations and introducing interesting technological innovation (for light aircraft with the weight of 500-600 Kg) like the retractable gear. The market of light aircraft has been growing in the last decade all over the world and Tecnam has reached a leadership with more than 2000 aircraft sold in 15 years. The Department of Aerospace Engineering (DIAS) of University of Naples have been deeply involved in research activities concerning almost all of these aircraft[1,2]. Extensive activities have been carried out in collaboration with Tecnam on structural analysis, structural tests, aerodynamic analysis and optimisation, noise and vibration tests, wind-tunnel tests and flight tests. Almost all light aircraft produced by Tecnam have been tested in the main wind-tunnel belonging to DIAS. An example of some light aircraft that have been an important commercial success are shown in fig. 1.































