Conceptual And Preliminary Design For A Hale Uav Process Tools And Design Methodologies Applied To High Altitude Long Endurance Unmanned Aerial Vehicle

A multidisciplinary integration framework (MIDAS- an acronym for Multidisciplinary Integration for Design and Analysis Software) is developed for a quick and accurate assessment of aircraft performance. The system allows for the continuos integration of the conceptual and preliminary design stages. The MIDAS system is starting from the definition of the configuration layout to provide basic aerodynamic data for performance analysis, sizing, structural layout and early handling qualities. The first aerodynamic dataset is provided by an Excel-based module in a highly automated way. This data base can be updated by computational and experimental fluid dynamics findings. Another MIDAS module integrate the preparation of CFD meshes. The paper deals with the integration of aerodynamic methods within the aircraft design.

The report describes the conceptual studies which were carried out, and the development of the preliminary design, for the 300 Ton Capacity Cargo Transporter Barge. Conceptual design studies were carried out to determine the optimum barge concept; in these studies, particular emphasis was given to determination of the optimum arrangement of the stowed MILVANS, since the basic information on optimum hull forms, propulsion/maneuvering systems, and cargo handling systems had been developed for the 180 ton Transporter Barge design. The preliminary design which has been prepared includes a description of the major barge subsystems, a summary of all significant design analyses performed, and a set of standard preliminary design drawings. (Author Modified Abstract).

The Preliminary Aircraft Design and Optimisation tool, PrADO, is an in-house program of the Institute of Aircraft Design and Lightweight Structures, TU Braunschweig, Germany, which covers a wide range of aspects of aircraft preliminary design. An initial aircraft concept serves as a basis for various analysis modules. Each module is designated to fulfil one special task e.g. aerodynamic analysis, estimation of structural mass, etc. The available methods grouped within those modules range from statistical methods to physics based models. From an aircraft developer's point of view PrADO is used within both, the conceptual and the preliminary design phase. The aim of this thesis is to introduce methods and methodologies to aircraft conceptual and preliminary design, more precisely to PrADO, that allow to judge supersonic aircraft concepts. Therefore, the aerodynamic analysis module, the structural analysis module and the propulsion module are extended. An inviscid flow solver is integrated to obtain aerodynamic coefficients. The calculated data serves as input to other analysis modules of PrADO. While the aerodynamic analysis module solely uses the outer geometry of the aircraft, the structural analysis module uses its internal structural layout as additional input to a herein developed finite element model generator. The distribution of secondary mass, fuel loading and payload distributions as well as loads for ground cases and trimmed flight cases are taken from the PrADO database, whereas the aerodynamic forces are calculated by solving the inviscid Euler equations. The model serves as basis for structural sizing and consequently the estimation of structural mass. The purpose of the propulsion module is to size the engine, to calculate the engine performance map and to provide reliable mass data based on the thermodynamic cycle. PrADO provides various models for the analysis of turbojet, turbofan and turboprop engines. It is extended by a turbofan engine with mixed

Preliminary Design of Bridges for Architects and EngineersCRC Press

Design Chits resulted from the External Conceptual Design Review (CDR) held at Cadarache on July 21-23, 2009 (Reference [5.1.3]). Those

Chits were categorized into 3 categories in accordance with the following rules: Category 1 - Chits to be resolved before proceeding with preliminary design; Category 2 - Chits to be resolved during preliminary design; and Category 3 - Chits already resolved or covered by higher category Chits such that no further action is required. Prior to the preliminary design, all the category 1 chits were resolved and the category chit 1 resolution report was approved (Reference [5.1.4]). However, as the design has been evolving, one of the category 1 chits needs to be re-addressed. The purpose of this report is to present the resolutions to one CDR Category 1 Chit (Cat 1 Chit No. 5) and twenty-three CDR Category 2 Chits. The Category 2 Chit resolutions presented are listed in order from item number one to item number twenty-three.

This Preliminary Design Report (PDR) provides a revised concept for the K Basins Integrated Water Treatment Systems (IWTS). This PDR incorporates the 11 recommendations made in a May 1996 Value Engineering session into the Conceptual Design, and provides new flow diagrams, hazard category assessment, cost estimate, and schedule for the IWTS Subproject.

Since the education of aeronautical engineers at Delft University of Technology started in 1940 under tae inspiring leadership of Professor H.J. van der Maas, much emphasis has been placed on the design of aircraft as part of the student's curriculum. Not only is aircraft design an optional subject for thesis work, but every aeronautical student has to carry out a preliminary airplane design in the course of his study. The main purpose of this preliminary design work is to enable the student to synthesize the knowledge ob tained separately in courses on aerodynamics, aircraft performances, stability and con trol, aircraft structures, etc. The student's exercises in preliminary design have been directed through the years by a number of staff members of the Department of Aerospace Engineering in Delft. The author of this book, Mr. E. Torenbeek, has made a large contribution to this part of the study programme for many years. Not only has he acquired vast experience in teaching airplane design at university level, but he has also been deeply involved in design-oriented re search, e.g. developing rational design methods and systematizing design information. I am very pleased that this wealth of experience, methods and data is now presented in this book.

Over the last few years, Unmanned Aerial Systems have proved to be highly efficient and capable of performing a wide range of applications, as well as development being more economical when compared to equivalent manned systems. This has resulted in the market for UAS increasing. An emerging role in this market is played by what is referred to as 'HALE' (High Altitude Long Endurance) UAV. This category of UAV presents itself as the ideal platform from which a wide range of different missions can be undertaken, both Military and Civilian, with versatility and a low maintenance cost. As a consequence, a growing number of Aerospace Companies from all over the world have shown interest in this innovative form of UAV. The purpose of this report is to present the design of a contemporary HALE UAV. The design process starts with the Conceptual phase, with the definition of the statistical analysis and the Matching Diagram. The results are optimized in the Preliminary phase by iterative procedures. Tools and methods used to size the aircraft design

parameters are also presented. The research for this project was conducted at Imperial College of London and submitted to Politecnico of Turin.

This document expands the scoped AS-IS environment in terms of cost drivers, human factors, and activities that are performed for the system identified as the Integrated Composites Center Project Priority 1105, Task C. This document is part of the Final Technical Report. Phase I of the Integrated Composites Center Statement of Work Outlines three areas which are to be incorporated into the Needs Analysis Document (NAD). The first area is the project scope; the second is appropriate documentation, and the third--the crux of the NAD--provides a narrative in the determination of the cost, the performance, and the human factors affecting the existing system. This activity culminates in a prioritized list of needs. Upon completion of the required NAD, a thorough understanding of current composite manufacturing will emerge. This will provide the foundation for the systematic development of candidate solution/concepts and the subsequent Preliminary Design (PD) for the Integrated Composites Center.

This 2001 book covers theory and applications of conceptual design, the initial stage of engineering design.

Design structure matrix (DSM) is a straightforward and flexible modeling technique that can be used for designing, developing, and managing complex systems. DSM offers network modeling tools that represent the elements of a system and their interactions, thereby highlighting the system's architecture (or designed structure). Its advantages include compact format, visual nature, intuitive representation, powerful analytical capacity, and flexibility. Used primarily so far in the area of engineering management, DSM is increasingly being applied to complex issues in health care management, financial systems, public policy, natural sciences, and social systems. This book offers a clear and concise explanation of DSM methods for practitioners and researchers. The book's four sections correspond to the four primary types of DSM models, offering tools for representing product architectures, organization architectures, process architectures, and multidomain architectures (which combine different types of DSM models to represent multiple domains simultaneously). In each section, a chapter introducing the technique is followed by a chapter of examples showing a variety of applications of that DSM type. The forty-four applications represent a wide range of industries (including automotive, aerospace, electronics, building, and pharmaceutical), countries (among them Australia, Germany, Japan, Turkey, and the United States), and problems addressed (modularity, outsourcing, system integration, knowledge management, and others).

Intended for people who are not boat designers, this book describes how to bring a dream boat into being. Written by an experienced naval architect, it prepares intelligent amateurs create conceptual vessel designs ready for a naval architects finishing touches. Included are the basic rationales and data needed to undertake a designing project, presented in a style that successfully bridges the gap between technical approach of naval architecture and the simplification of consumer magazine articles. This volume covers a variety of watercraft, so it can be equally useful if youre envisioning a cruising yacht or a sixty-foot fishing boat.

Focusing on the conceptual and preliminary stages in bridge design, this book addresses the new conceptual criteria employed when evaluating project proposals, considering elements from architectural aspects and structural aesthetics to environmental compatibility.;College or university bookstores may order five or more copies at a special student price. Price is available on request.

The design and development of new aircraft are becoming increasingly expensive and timeconsuming. To assist the design process in reducing the development cost, time, and late design changes, the conceptual design needs enhancement using new tools and methods. Integration of several disciplines in the conceptual design as one entity enables to keep the design process intact at every step and obtain a high understanding of the aircraft concepts at early stages. This thesis presents a Knowledge-Based Engineering (KBE) approach and integration of several disciplines in a holistic approach for use in aircraft conceptual design. KBE allows the reuse of obtained aircrafts' data, information, and knowledge to gain more awareness and a better understanding of the concept under consideration at early stages of design. For this purpose, Knowledge-Based (KB) methodologies are investigated for enhanced geometrical representation and enable variable fidelity tools and Multidisciplinary Design Optimization (MDO). The geometry parameterization techniques are qualitative approaches that produce quantitative results in terms of both robustness and flexibility of the design parameterization. The information/parameters from all tools/disciplines and the design intent of the generated concepts are saved and shared via a central database. The integrated framework facilitates multi-fidelity analysis, combining low-fidelity models with high-fidelity models for a quick estimation, enabling a rapid analysis and enhancing the time for a MDO process. The geometry is further propagated to other disciplines [Computational Fluid Dynamics (CFD), Finite Element Analysis (FEA)] for analysis. This is possible with an automated streamlined process (for CFD, FEM, system simulation) to analyze and increase knowledge early in the design process. Several processes were studied to streamline the geometry for CFD. Two working practices, one for parametric geometry and another for KB geometry are presented for automatic mesh generation. It is observed that analytical methods provide quicker weight estimation of the design and when coupled with KBE provide a better understanding. Integration of 1-D and 3-D models offers the best of both models: faster simulation, and superior geometrical representation. To validate both the framework and concepts generated from the tools, they are implemented in academia in several courses at Linköping University and in industry

This report covers the conceptual and preliminary design of closed-cycle, ammonia, ocean thermal energy conversion power plants by Westinghouse Electric Corporation. Preliminary designs for evaporator and condenser test articles (0.13 MWe size) and a 10 MWe modular experiment power system are described. Conceptual designs for 50 MWe power systems, and 100 MWe power plants are also descirbed. Design and cost algorithms were developed, and an optimized power system design at the 50 MWe size was completed. This design was modeled very closely in the test articles and in the 10 MWe Modular Application. Major component and auxiliary system design, materials, biofouling, control response, availability, safety and cost aspects are developed with the greatest emphasis on the 10 MWe Modular Application Power System. It is concluded that all power plant subsystems are state-of-practice and require design verification only, rather than continued research. A complete test program, which verifies the mechanical reliability as well as thermal performance, is recommended and described.

A previous review of the state-of-the-art of seafloor pile emplacement indicated that three types of mechanical systems could be developed for deep-ocean seafloor pile emplacement. The systems are: vibratory drivers, screw piles, and jack-in piles. Conceptual design for multiple-pile emplacement systems using each of these mechanical systems were developed and compared. The comparison showed that screw-piles would be the most effective in meeting the given operating requirements. A preliminary design for a pilot-model screw-pile emplacement system is presented. (Author).

The report describes the conceptual studies which were carried out, and the development of the Preliminary Design, for the 180 Ton Capacity Cargo Transporter Barge. Conceptual design studies were carried out primarily to determine the optimum Barge concept; in particular, variations in hull form, propulsion/maneuvering system and cargo handling system were examined. The Preliminary Design which has been prepared includes a description of the major Barge subsystems, a summary of all significant design analyses performed, and a set of standard preliminary design drawings. (Author).

The results of a conceptual and preliminary design study of Ocean Thermal Energy Conversion (OTEC) closed loop ammonia power system modules performed by Lockheed Missiles and Space Company, Inc. (LMSC) are presented. This design study is the second of 3 tasks in Phase I of the Power System Development-I Project. The Task 2 objectives were to develop: 1) conceptual designs for a 40 to 50-MW(e) closed cycle ammonia commercial plant size power module whose heat exchangers are immersed in seawater and whose ancillary equipments are in a shirt sleeve environment; preliminary designs for a modular application power system sized at 10-MW(e) whose design, construction and material selection is analogous to the 50 MW(e) module, except that titanium tubes are to be used in the heat exchangers; and 3) preliminary designs for heat exchanger test articles (evaporator and condenser) representative of the 50-MW(e) heat exchangers using aluminum alloy, suitable for seawater service, for testing on OTEC-1. The reference ocean platform was specified by DOE as a surface vessel with the heat exchanger immersed in seawater to a design depth of 0 to 20 ft measured from the top of the heat exchanger. For the 50-MW(e) module, the OTEC 400-MW(e) Plant Ship, defined in the Platform Configuration and Integration study, was used as the reference platform. System design, performance, and cost are presented. (WHK).

The Preliminary Design Review (PDR) is intended to be performed at the conceptual phase of a design request. The design request is initiated with a Design Specification document which includes a problem statement, design details, a design checklist and supporting documentation and/or projected sample output. In addition to this, the design specification has a chapter devoted to the completion of the Preliminary Design Review. This document describes the process of documentation of the PDR in the Design Specification.

The primary purpose of the program is to develop an electrical power generation and distribution system that can supply electrical power to the various critical systems on the aircraft with a reliability and power quality level commensurate with the requirements of the loads. Phase II consisted of 4 task, Task I-FTEPS Demonstrator Basic Requirements, Task 2-Analysis, Task 3-FTEPS Demonstrator Conceptual Design, and Task 4-FTEPS Demonstrator Preliminary Design. In Task 1, the basic fault and reliability requirements of the system were developed and a load profile was established for the baseline aircraft. Task 2 activities included development of specific system requirements and reliability analysis of power delivered to the main power buses of different architectures. A data bus analysis was performed on an integrated single data bus and an integrated hierarchical data bus. The hierarchical data bus was selected for the FTEPS. In Task 3, conceptual designs were developed for a 3 generator configuration and a 4 generator configuration with the 4 generator configuration being selected for further development in Task 4, Preliminary

Design. Preliminary designs were developed for the power generator system, the distribution system, the data bus control system, the integrated load simulator and a laboratory support system. Keywords: Computer applications.

Although the overall appearance of modern airliners has not changed a lot since the introduction of jetliners in the 1950s, their safety, efficiency and environmental friendliness have improved considerably. Main contributors to this have been gas turbine engine technology, advanced materials, computational aerodynamics, advanced structural analysis and on-board systems. Since aircraft design became a highly multidisciplinary activity, the development of multidisciplinary optimization (MDO) has become a popular new discipline. Despite this, the application of MDO during the conceptual design phase is not yet widespread. Advanced Aircraft Design: Conceptual Design, Analysis and Optimization of Subsonic Civil Airplanes presents a quasi-analytical optimization approach based on a concise set of sizing equations. Objectives are aerodynamic efficiency, mission fuel, empty weight and maximum takeoff weight. Independent design variables studied include design cruise altitude, wing area and span and thrust or power loading. Principal features of integrated concepts such as the blended wing and body and highly non-planar wings are also covered. The quasi-analytical approach enables designers to compare the results of high-fidelity MDO optimization with lower-fidelity methods which need far less computational effort. Another advantage to this approach is that it can provide answers to “what if” questions rapidly and with little computational cost. Key features: Presents a new fundamental vision on conceptual airplane design optimization Provides an overview of advanced technologies for propulsion and reducing aerodynamic drag Offers insight into the derivation of design sensitivity information Emphasizes design based on first principles Considers pros and cons of innovative configurations Reconsiders optimum cruise performance at transonic Mach numbers Advanced Aircraft Design: Conceptual Design, Analysis and Optimization of Subsonic Civil Airplanes advances understanding of the initial optimization of civil airplanes and is a must-have reference for aerospace engineering students, applied researchers, aircraft design engineers and analysts.

A comprehensive approach to the air vehicle design processusing the principles of systems engineering Due to the high cost and the risks associated with development,complex aircraft systems have become a prime candidate for theadoption of systems engineering methodologies. This book presentsthe entire process of aircraft design based on a systemsengineering approach from conceptual design phase, through topreliminary design phase and to detail design phase. Presenting in one volume the methodologies behind aircraftdesign, this book covers the components and the issues affected bydesign procedures. The basic topics that are essential to theprocess, such as aerodynamics, flight stability andcontrol, aero-structure, and aircraft performance are reviewedin various chapters where required. Based on thesefundamentals and design requirements, the author explains thedesign process in a holistic manner to emphasise the integration ofthe individual components into the overall design. Throughout thebook the various design options are considered and weighed againsteach other, to give readers a practical understanding of theprocess overall. Readers with knowledge of the fundamental concepts ofaerodynamics, propulsion, aero-structure, and flight dynamics willfind this book ideal to progress towards the next stage in theirunderstanding of the topic.

Furthermore, the broad variety ofdesign techniques covered ensures that readers have the freedom andflexibility to satisfy the design requirements when approachingreal-world projects. Key features: • Providesfull coverage of the design aspects of an air vehicle including:aeronautical concepts, design techniques and design flowcharts • Featuresend of chapter problems to reinforce the learning process as wellas fully solved design examples at component level • Includes fundamental explanations for aeronautical engineeringstudents and practicing engineers • Features a solutions manual to sample questions on the book’scompanion website Companion website - ahref="http://www.wiley.com/go/sadraey"www.wiley.com/go/sadraey/a