Design Fabrication Of Shaft Driven Bicycle Ijste Journal

A selection of annotated references to unclassified reports and journal articles that were introduced into the NASA scientific and technical information system and announced in Scientific and technical aerospace reports (STAR) and International aerospace abstracts (IAA)

Over the last several decades, gearing development has focused on improvements in materials, manufacturing technology and tooling, thermal treatment, and coatings and lubricants. In contrast, gear design methods have remained frozen in time, as the vast majority of gears are designed with standard tooth proportions. This over-standardization significantly limits the potential performance of custom gear drives, especially in demanding aerospace or automotive applications. Direct Gear Design introduces an alternate gear design approach to maximize gear drive performance in custom gear applications. Developed by the author, the Direct Gear Design® method has been successfully implemented in a wide variety of custom gear transmissions over the past 30 years. The results are maximized gear drive performance, increased transmission load capacity and efficiency, and reduced size and weight. This book explains the method clearly, making it easy to apply to actual gear design. Describes the origin and theoretical foundations of the Direct Gear Design approach as well as some of its applications—and its limits Details the optimization techniques and the specifics of Direct Gear Design Discusses how this approach can be used with asymmetric gears to further improve performance Describes tolerance selection, manufacturing technologies, and measurement methods of custom gears Compares Direct Gear Design with traditional gear design from both an analytical and an experimental perspective Illustrates the applicability and benefits of this gear design approach with implementation examples Written by an engineer for engineers, this book presents a unique alternative to traditional gear design. It inspires readers to explore ways of improving gear transmission performance in custom gear applications, from higher transmission load capacity, efficiency, and reliability to lower size, weight, and cost.

National Emergency Specifications for the Design, Fabrication and Erection of Structural Steel for BuildingsDesign, Fabrication, and Testing of a High-Speed, Over-Running Clutch for Rotorcraft

This Special Issue is a collection of twelve papers on the design and application of biomedical circuits and systems. We hope you enjoy reading this Special Issue and become inspired to address technological challenges toward helping the medical industry and biologists to increase the quality of life for humans, which is the main objective. Several topics have been highlighted: muscle electrostimulation, analog front-end (AFE) circuits, waveform generators, real-time velocimetry estimators, interference suppression, bio-signal encryption, IoT electronic nose, ultrasound image processing, noise in medical imaging, elbow actuators, and aids for visually impaired people. We are conscious about the very wide scope of biomedical circuits and systems applications, and that our contribution represents only a grain of sand, though we expect to be useful in contributing to the progress of knowledge in the field.

The objective of this program was to evaluate the feasibility of a very high overrunning speed one-way clutch for rotorcraft applications. The high speed capability would allow placing the one-way clutch function at the turbine output shaft, that is, the input of the rotorcraft's transmission. The low drive torque present at this location would allow design of

a relatively light one-way clutch. During the course of this program, two Mechanical Diode (MD) type overrunning clutches for high speeds were designed. One of the designs was implemented as a set of prototype clutches for high speed overrun testing. A high speed test stand was designed, assembled and qualified for performing overrunning and engagement tests at speeds up to 20,000 rpm. MD overrunning clutches were tested at moderate speed, up to 10,000 rpm and substantial thermal problems associated with oil shear were encountered. The MD design was modified, the modified parts were tested, and by program end, clutches were tested in excess of 20,000 rpm without excessive lubricant temperatures. Some correctable wear was observed and remains as a clutch characteristic which needs further improvement. A load cycle tester with a special, long, sample section was designed, built and then prototype clutches were fatigue tested to verify that the clutch design was suitable for carrying the specified power levels.

The Pericyclic drive is a breakthrough power-transmission concept that has the potential to address many of the problems posed by large gearboxes- noise, maintenance cost, and low power density. The key innovations of the Pericyclic drive are its nutational motion kinematics which enables dramatically enhanced gear ratios from a single gear stage (50:1), load sharing over many teeth (10% of tooth complement), and power density capabilities well beyond the current state-of-the-art. Kinematically, a Pericyclic drive is similar to Epicyclic gear trains with axes intersecting at large angles (175 - 178). Traditionally, the usage of the transmission concepts that offer high reduction ratio in a compact space has been limited to very low torque applications. An extensive amount of work done has been in the field of Pericyclic drivetrains in the past decade to scale up the concept for large input power levels. Power flow in the mechanism and loads transferred to the components of the drivetrain - gears, bearings, and shaft are well understood. Baseline designs for Rotorcraft applications also exist. There have been ample concept demonstrations with prototypes, fabricated using additive manufacturing techniques, which operate under very lightly loaded conditions. There is however, a need to develop a comprehensive methodology that offers a detailed analysis of gear teeth contact when the drivetrain is loaded, a better understanding of component life and system efficiency, and a framework to select optimal design for any input conditions.This research attains three of the goals in the development of Pericyclic transmission technology: (i) mature the component level design analysis tools, (ii) integrate these individual design modules in a system level framework to design the transmission for given operating parameters, and (iii) use this framework to design a prototype for actual fabrication and testing under load. With the recent advances made by Gleason Inc. in internal bevel gear teeth cutting, it has become possible to fabricate a Pericyclic drivetrain that can take up large torque loads. Therefore, this work focuses on development of Pericyclic transmission utilizing straight bevel gear meshes.A detailed 3-D analysis of kinematics and dynamics of the Pericyclic drive mechanism is presented to realize the component level

and gyroscopic loads in the system. A novel numerical loaded tooth contact analysis (LTCA) model is developed for the internal-external straight bevel gear mesh that exhibits large number of teeth in contact, well beyond the involute line of action limits. Due to high conformity of meshing gear surfaces, a parabolic profile modification is applied to the external bevel gear surface to localize the contact. A thick plate finite strip method (FSM) has been utilized to formulate the gear bending deflection. Based on the tooth deformation calculation model, a variational framework is developed to simultaneously solve for load distribution and gear tooth deformation field. This is followed by calculation of contact stress, bending stress, mesh stiffness, and transmission error. The solution is validated against FEA analysis carried out in ABAQUS. Thereafter, an elastohydrodyamic lubrication (EHL) model is developed to calculate mesh efficiency and Flash temperature rise. The effects of torque loads and gear micro-geometry parameters on all of the above mesh characteristics are also studied.A systematic methodology is developed to select appropriate bearings for the drivetrain, from existing catalogs. This is based on bearing fatigue life, efficiency, and weight considerations. The effects of inertial loads due to nutational motion of the internal bevel gear members are significant for bearing life calculations.Bearings have been shown to be the most critical components in the Pericyclic drive-system. The system level design procedure integrates LTCA, EHL analysis, bearing analysis, and shaft design, within a framework in which design decisions are guided by constraints posed by several factors such as assembly, ease of manufacturing, operational space, component life requirements, optimal component geometry and positioning etc. The designs for different input power levels obtained from the framework demonstrate the high torque per weight capability, and efficiency comparable to conventional multi-stage planetary drivetrains. Finally, a small scale 50 HP prototype design with a reduction ratio of 32:1 has been refined for fabrication and subsequent testing at NASA Glenn transmission test facility. The performance evaluation charts for the test article have been obtained from the overall system analysis model for validation against future test results. Step-by-step procedures for planning, design, construction and operation: * Health and environment * Process improvements * Stormwater and combined sewer control and treatment * Effluent disposal and reuse * Biosolids disposal and reuse * On-site treatment and disposal of small flows * Wastewater treatment plants should be designed so that the effluent standards and reuse objectives, and biosolids regulations can be met with reasonable ease and cost. The design should incorporate flexibility for dealing with seasonal changes, as well as long-term changes in wastewater quality and future regulations. Good planning and design, therefore, must be based on five major steps: characterization of the raw wastewater quality and effluent, pre-design studies to develop alternative processes and selection of final process train, detailed design of the selected alternative, contraction, and operation and maintenance of the completed facility. Engineers, scientists, and financial analysts must utilize principles from a wide range of disciplines: engineering,

chemistry, microbiology, geology, architecture, and economics to carry out the responsibilities of designing a wastewater treatment plant. The objective of this book is to present the technical and nontechnical issues that are most commonly addressed in the planning and design reports for wastewater treatment facilities prepared by practicing engineers. Topics discussed include facility planning, process description, process selection logic, mass balance calculations, design calculations, and concepts for equipment sizing. Theory, design, operation and maintenance, trouble shooting, equipment selection and specifications are integrated for each treatment process. Thus delineation of such information for use by students and practicing engineers is the main purpose of this book.

Named as one of Choice's Outstanding Academic Titles of 2012 Every year, Choice subject editors recognise the most significant print and electronic works reviewed in Choice during the previous calendar year. Appearing annually in Choice's January issue, this prestigious list of publications reflects the best in scholarly titles and attracts extraordinary attention from the academic library community. The authoritative reference on wind energy, now fully revised and updated to include offshore wind power A decade on from its first release, the Wind Energy Handbook, Second Edition, reflects the advances in technology underpinning the continued expansion of the global wind power sector. Harnessing their collective industrial and academic expertise, the authors provide a comprehensive introduction to wind turbine design and wind farm planning for onshore and offshore wind-powered electricity generation. The major change since the first edition is the addition of a new chapter on offshore wind turbines and offshore wind farm development. Opening with a survey of the present state of offshore wind farm development, the chapter goes on to consider resource assessment and array losses. Then wave loading on support structures is examined in depth, including wind and wave load combinations and descriptions of applicable wave theories. After sections covering optimum machine size and offshore turbine reliability, the different types of support structure deployed to date are described in turn, with emphasis on monopiles, including fatigue analysis in the frequency domain. Final sections examine the assessment of environmental impacts and the design of the power collection and transmission cable network. New coverage features: turbulence models updated to reflect the latest design standards, including an introduction to the Mann turbulence model extended treatment of horizontal axis wind turbines aerodynamics, now including a survey of wind turbine aerofoils, dynamic stall and computational fluid dynamics developments in turbine design codes techniques for extrapolating extreme loads from simulation results an introduction to the NREL cost model comparison of options for variable speed operation in-depth treatment of individual blade pitch control grid code requirements and the principles governing the connection of large wind farms to transmission networks four pages of full-colour pictures that illustrate blade manufacture, turbine construction and offshore support structure installation Firmly established as an essential reference, Wind Energy

Handbook, Second Edition will prove a real asset to engineers, turbine designers and wind energy consultants both in industry and research. Advanced engineering students and new entrants to the wind energy sector will also find it an invaluable resource.

Wind Turbines and Aerodynamics Energy Harvesters not only presents the most research-focused resource on aerodynamic energy harvesters, but also provides a detailed review on aeroacoustics characteristics. The book considers all developing aspects of 3D printed miniature and large-size Savonious wind harvesters, while also introducing and discussing bladeless and aeroelastic harvesters. Following with a review of Off-shore wind turbine aerodynamics modeling and measurements, the book continues the discussion by comparing the numerical codes for floating offshore wind turbines. Each chapter contains a detailed analysis and numerical and experimental case studies that consider recent research design, developments, and their application in practice. Written by an experienced, international team in this cross-disciplinary field, the book is an invaluable reference for wind power engineers, technicians and manufacturers, as well as researchers examining one of the most promising and efficient sources of renewable energy. Offers numerical models and case studies by experienced authors in this field Contains an overview and analysis of the latest research Explores 3D printing technology and the production of wind harvesters for real applications Includes, and uses, ANSYS FLUENT case files

A design methodology employing computer programs was developed and used to provide five designs of composite helicopter tail rotor drive shaft segments. Shaft test specimens were fabricated from MODMOR I and CELION GY-70 graphite fiber reinforced epoxy resin. Results from the laboratory testing of these 18-inch (nominal) long specimens plus those from a previously fabricated THORNEL 50S specimen were used to compute performance expected from standard 57-inch (nominal shaft segments). All designs tested exceeded the minimum design requirements for stiffness, fatigue life, Vibration, and residual strength. When the artificial constraints of windup and segment length were removed, the developed design methodology using a composite of 75 million psi modulus fiber and ERLB 4617 epoxy resin yielded a shaft train of only three segments. These tubes were only 39% as heavy as their aluminum counterparts; the combined weight savings from lighter tubes and bearing assembly elimination due to longer shaft segments resulted in a 53.1% weight saving for the total shaft train if compared with the current 2024 aluminum shaft train.

Beginning in 1985, one section is devoted to a special topic

This report describes the third phase of work, the objective of which was to overcome the excessive brittleness of the previously developed UH-1 helicopter tail rotor drive shaft design which demonstrated a shaft train weight savings of 53.1% over the current 2024-T3 aluminum shaft train. A materials impact program demonstrated exceptionally noteworthy performance of two woven constructions containing E-glass and PRD 49-III (designation later changed to KEVLAR 49) fibers in an epoxy resin matrix.

Thermoplastic matrices and PRD 49-III fiber provided impact resistance at low weight which was superior to composites having the same fiber in a thermoset resin matrix. A design, fabrication, and test program showed that shaft impact resistance could be improved over the previously developed graphite composite design at a cost in shaft train rate savings. The shaft train weight savings of the most impact tolerant construction was 4.0% over the current aluminum shaft train. Alternating plies of graphite and glass appear to provide substantially greater tube impact durability than that provided by hybridization of the two fibers into one tape wound to a ply design equivalent in strength and stiffness to that of the alternating ply design. Recommendations were made to continue research work to exploit the potential for more impact-durable structures through the use of KEVLAR 49 fiber, woven structures, thermoplastic matrices and THORNEL 50-S/KEVLAR 49 blends with thermoset matrices.