Stress Analysis On Front Car Bumper Jamail Bin Jamal

This project presented about a failure of drive shaft in conventional passenger vehicles. Perodua Kancil front wheel drive shaft was chosen as the specimen of this analysis. This project deals with analysis on stress using finite element method. The solid model of the drive shaft need to be constructs using SOLIDWORK software. The type of material used in the drive shaft need to be known first before stress analysis can be performed using Patran-Nastran software. The known material will provide the information such as density, modulus of elasticity and tensile strength required for the software to perform the stress and failure analysis. Spectroscopic analysis is carried out using FOUNDRY-MASTER UV instrument. The load applied at the ends of the shaft that are lateral bending load of 1/4 of weight of the full car. Boundary conditions are applied at the bearing and geared location. The highest stress at and displacement was predicted occurred at the fillet cross section location. Stresses will concentrate in the smaller diameter portion due to change in shaft diameter as they pass from large to the small diameter. In any case, one must determine the cause of failure and predict the fatigue life to prevent future occurrence and to improve the performance of the device, component or structure.

These proceedings gather outstanding papers presented at the China SAE Congress 2019. Featuring contributions mainly from China, the biggest carmaker as well as most dynamic car market in the world, the book covers a wide range of automotive topics and the latest technical advances in the industry. Many of the approaches included can help technicians to solve practical problems that affect their daily

work. In addition, the book offers valuable technical support to engineers, researchers and postgraduate students in the field of automotive engineering. .

A systematic treatment of current crashworthiness practice in the automotive, railroad and aircraft industries. Structural, exterior and interior design, occupant biomechanics, seat and restraint systems are dealt with, taking account of statistical data, current regulations and state-of-the-art design tool capabilities. Occupant kinematics and biomechanics are reviewed, leading to a basic understanding of human tolerance to impact and of the use of anthropometric test dummies and mathematical modelling techniques. Different types of restraining systems are described in terms of impact biomechanics. The material and structural behaviour of vehicle components is discussed in relation to crash testing. A variety of commonly used techniques for simulating occupants and structures are presented, in particular the use of multibody dynamics, finite element methods and simplified macro-elements, in the context of design tools of increasing complexity, which can be used to model both vehicles and occupants. Audience: An excellent reference for researchers, engineers, students and all other professionals involved in crashworthiness work.

Complete contents include: automotive use of finite element methods introduction and overview; how finite element methods improve the design cycle; illustrations of automotive finite element models statics; illustrations of automotive finite element models dynamics; how finite element methods are introduced in large and small organizations; and future developments in structural analysis.

This book presents selected papers from the 10th International Workshop of Advanced Manufacturing and Automation (IWAMA 2020), held in Zhanjiang,

Guangdong province, China, on October 12-13, 2020. Discussing topics such as novel techniques for manufacturing and automation in Industry 4.0 and smart factories, which are vital for maintaining and improving economic development and quality of life, it offers researchers and industrial engineers insights into implementing the concepts and theories of Industry 4.0, in order to effectively respond to the challenges posed by the 4th industrial revolution and smart factories.

This Second Edition presents a hands-on design methodology for daily technical decisions without immersion in high mathematics.

Modern engineering practice requires advanced numerical modeling because, among other things, it reduces the costs associated with prototyping or predicting the occurrence of potentially dangerous situations during operation in certain defined conditions. Thus far, different methods have been used to implement the real structure into the numerical version. The most popular uses have been variations of the finite element method (FEM). The aim of this Special Issue has been to familiarize the reader with the latest applications of the FEM for the modeling and analysis of diverse mechanical problems. Authors are encouraged to provide a concise description of the specific application or a potential application of the Special Issue.

Based on the principles of engineering science, physics and mathematics, but assuming only an elementary understanding of these, Race Car Design masterfully explains the theory and practice of the subject. Bringing together key topics, including the chassis frame, tyres,

suspension, steering and brakes, this is the first text to cover all the essential elements of race car design in one student-friendly textbook. Race Car Design: - Features a wealth of illustrations, including a full-colour plate section - Demonstrates the important role of computer tools - Uses dozens of clear examples and calculations to illustrate both theory and practical applications - Is written by an experienced author, known for his engaging and accessible style This book is an ideal accompaniment for motorsport engineering students and is the best possible resource for those involved in Formula Student/FSAE. It is also a valuable guide for practising car designers and enthusiasts.

Fundamentals of Machine Component Design presents a thorough introduction to the concepts and methods essential to mechanical engineering design, analysis, and application. In-depth coverage of major topics, including free body diagrams, force flow concepts, failure theories, and fatigue design, are coupled with specific applications to bearings, springs, brakes, clutches, fasteners, and more for a real-world functional body of knowledge. Critical thinking and problem-solving skills are strengthened through a graphical procedural framework, enabling the effective identification of problems and clear presentation of solutions. Solidly focused on practical applications of fundamental theory, this text helps students develop the ability to conceptualize designs, interpret test results, and facilitate improvement. Clear presentation reinforces central ideas with multiple case studies, in-class exercises, homework problems, computer software data

sets, and access to supplemental internet resources, while appendices provide extensive reference material on processing methods, joinability, failure modes, and material properties to aid student comprehension and encourage self-study.

Lightweight Electric/Hybrid Vehicle Design, covers the particular automotive design approach required for hybrid/electrical drive vehicles. There is currently huge investment world-wide in electric vehicle propulsion, driven by concern for pollution control and depleting oil resources. The radically different design demands of these new vehicles requires a completely new approach that is covered comprehensively in this book. The book explores the rather dramatic departures in structural configuration necessary for purpose-designed electric vehicle including weight removal in the mechanical systems. It also provides a comprehensive review of the design process in the electric hybrid drive and energy storage systems. Ideal for automotive engineering students and professionals Lightweight Electric/Hybrid Vehicle Design provides a complete introduction to this important new sector of the industry. comprehensive coverage of all design aspects of electric/hybrid cars in a single volume packed with case studies and applications in-depth treatment written in a text book style (rather than a theoretical specialist text style)

The project focuses on the stress analysis of a car frontal protection system (bumper) simulations. To achieve that, we go to basic concepts of improving the safety on the car by do analysis the car bumper. It is important to know their mechanical properties, how their failure mechanism

during the impact. This analysis was carrying out by using commercial Finite Elements software (ALGOR) to evaluate the behavior of bumper system. Another additional innovative for improving crashworthiness is the use of material to produces the part to absorb energy during the process of a crash. Research concentrates on polymer composite material. It is considering their function, geometry, and other parameters that influence the compatibility of the bumper. In future research, this bumper will face the static test and analyses do on their load distributions by applying the variation of load and locations. Result will be compare for the centre and side load. How the load applied effect the stress distrubution. After that a related study was carried out to know bumper properties during the impact.

The existing designs of the car panel need to be studied by digitizing the surface of the panel of various car models. This research focuses on the static simulation analysis especially to strain, stress and displacement analysis of a front fender panel of the car. The main objectives of this research are to study the design of the existing exterior car body part, analyze and proposed the mechanism to improve the design using Finite Element Method software. To achieve that, three different designs of front fender panel were used, there are Proton Iswara, Honda EG and Proton Saga front fender panel. A 3D Scanner machine used to scan the actual model of front fender panel and to convert the model into the simulation analysis format by using POLYWORK software. SOLIDWORKS software was used to create corner radius and surface of the front fender panel of the car.

After that, analysis was carried out by using commercial Finite Elements software (ALGOR)to evaluate and analyze the behavior and surface of a front fender panel of the car. It is considered the function, design, strength and the rigidity of the stamping parts of the front fender panel. In this research, this front fender panel analyzed using the static simulation analysis for components with linear materials. For this simulation, two types of load will be applied on the surface of the front fender panel which are at all surface area and at selected surface area. The result will be analyzed based on the strain, stress and the displacement of the surface of the front fender panel. The comparison of strain, stress and displacement data of each car front fender model were done using graphs. With this, the process of digitizing the surface of the front fender model can be done easily. After that, a related study was carried out to know the properties of the front fender panel during the impact of the applied load. At the end of this research, the comparison data of various car front fender panels will be known and could be the basis for the future design. Besides that, the area between the optimum line and the minimum line for each graph analysis can be used as a guideline and a mechanism to improve the design of front fender panel in the future.

'An Introduction to Modern Vehicle Design' provides a thorough introduction to the many aspects of passenger car design in one volume. Starting with basic principles, the author builds up analysis procedures for all major aspects of vehicle and component design. Subjects of current interest to the

motor industry, such as failure prevention, designing with modern materials, ergonomics and control systems are covered in detail, and the author concludes with a discussion on the future trends in automobile design. With contributions from both academics lecturing in motor vehicle engineering and those working in the industry, "An Introduction to Modern Vehicle Design" provides students with an excellent overview and background in the design of vehicles before they move on to specialised areas. Filling the niche between the more descriptive low level books and books which focus on specific areas of the design process, this unique volume is essential for all students of automotive engineering. Only book to cover the broad range of topics for automobile design and analysis procedures Each topic written by an expert with many years experience of the automotive industry

This book contains selected papers from the International Conference on Progress in Automotive Technologies (ICPAT) 2019. The contents focus on several aspects of the automobile industry from design to manufacture, and the challenges involved therein. The book covers latest research trends in the automotive domain including topics such as aerodynamic design, vehicle sensors and electronics, engine combustion modeling, noise and vibration in vehicles, electric and hybrid vehicles, automotive tribology, and battery and fuel cell

technologies. The book highlights the use of emerging technologies to tackle the growing environmental challenges. This book will be of interest to students, researchers as well as professionals working in automotive engineering and allied fields.

The automobile industry has demonstrated itself to be one of the most quickly growing industries. However, the growth in the automotive industry has direct implications for fossil fuel reserves. The vigorously depleting fossil fuel reserves, the eminently increasing petroleum prices, the constant increase in pollution levels, and the hazardous effects of atmospheric environmental degradation are the driving forces for gravitation toward vehicular light weighting. The current article discuses the process of lightening the weight of front car seats, which is one of the most indispensable components of the automobile. This article demonstrates the feasibility of replacing metal automotive seats with E-Glassbased fiber-reinforced polymer (FRP) composite automotive seats. Various types of investigations and comparative analyses, such as analysis for displacement, force, force-to-weight ratio, maximum and minimum stresses, and unit cost of fiber composites, are performed on the conventional car seat composed of steel alloy 4340 and that composed of FRP composites. It can be demonstrated from the various analyses that a

substantial weight reduction of front car seat is obtained with respect to alloy steel when FRPs are used as substitutional materials. The weight of the steel alloy front car seat is reduced by 79.76 % with the utilization of carbon fiber composite as an alternative material, whereas the component weight was reduced by 57.27 and 70.31 % with the utilization of glass fiber composite and Kevlar materials, respectively. A cost analysis is also performed, and it is determined that the costs of carbon fiber composite, glass fiber composite, and Kevlar are quite a bit higher than that of alloy steel. The stress analysis for alloy steel and fiber composites exhibits that the maximum stresses of glass fiber composite, carbon fiber composite, and Kevlar are about 1.95, 2.96, and 2.40 times higher than alloy steel.

Topics included are collision and plasticity; structural design; analytical techniques part I and II; structural optimization; and component analysis and design.

This report aims to explain the full design and analysis of the front upright -the car component which links suspension wishbones and steering bar with wheels- of the TAU Racing's 2012 car. The first step is to find the worst load case that might affect the upright. Due to the fact that the study only covers the front ones, the worst load case occurs when the car is cornering and braking at the same time (load transfer effect). Once the loads are studied, the next step is to design the upright and all the components involved in the assembly which will link the wishbones and the wheels. The first

problem appears in this point because there is not enough space for all the components. A little change in the suspension geometry (increase of the scrub radius length), solves the problem. The next step is to carry out the bearings life calculations and the finite element analysis (stress and displacements). The results are correct but, after showing to the team leaders the design, another problem appears: the assembly is heavier than expected. The solution agreed is to reduce the bearings size which affects all the assembly. Therefore, another full design is suggested. The bearings life is calculated and the finite element analysis is carried out once again. This time the results are worse: the bearings life is short but, since the competition only lasts a weekend, it is accepted; and the upright has a factor of safety lesser than expected. Hence the last step is an optimization of the upright and, as a result, the factor of safety increases above the minimum required. The overall weight is reduced in almost 20%, twice as much the team goal.

This book presents selected papers from the 9th International Workshop of Advanced Manufacturing and Automation (IWAMA 2019), held in Plymouth, UK, on November 21–22, 2019. Discussing topics such as novel techniques for manufacturing and automation in Industry 4.0 and smart factories, which are vital for maintaining and improving economic development and quality of life, it offers researchers and industrial engineers insights into implementing the concepts and theories of Industry 4.0, in order to effectively respond to the challenges posed by the 4th industrial revolution and smart factories.

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