

INTRODUCTION:
Motorcycle handlebar refers to the steering mechanism for motorcycles. Handlebars often support part of the rider's weight, and provide a mounting place for controls such as brake, throttle, clutch, horn, light switch, and rear view mirrors. The two wheeler and the four-wheeler industry is normally faced with challenges related to function and safety. The compliance of vehicle in this regard is of utmost importance while the same could be approved by the concerned regulatory authorities for being used on the public roads. Besides, all other parts and components that support and/or form an integral part of the assembly of the sub-system could be required to comply with the norms. The other areas attracting compliance are the warranty claims received from the customer during usage over the field or the report filed by the concerned field engineer observing the field test for the vehicle. The breakage and/or damage to the component could be highlighted during the time the vehicle is put to actual use. The scope of this dissertation work lies in this area where the design of the component or the sub-assembly needs to be reviewed for the sake of failure during use. For our case, the housing of the handle bar is met with failure near the accelerator end of the handle. A study is being initiated by the sponsoring company for identifying the source of this failure and addressing the same with modified or improved design feature/s for reducing the incidence of failure. The material in this case is LM6 or equivalent Aluminium alloy. Whole handle bar assembly is more susceptible to the failures as it experience numerous forces such as bumps, braking, engine vibrations, rider force, road excitations etc. Two wheeler handle-bar assembly is user's first touch point to the vehicle, also it is very complex in construction and important in functionality and safety point of view. To simulate vehicle operating condition, modal frequency response analysis enables to analyze the strength of structural mountings within assembly for the excitation frequency range on the vehicle.

Fig-Typical fig of Handle Bar

Fig-Typical 3D Geometry of Handle Bar

OBJECTIVES:
- To carry out the structural analysis for the handle bar as mounted over the frame.
- To recommend most suited design alternative for the application.
- To correlate the experimental test results with FEA results.

LITERATURE REVIEW:
1. **S.J. Hu, J. Ko, L. Weyand, H.A. ElMaraghy, T.K. Lien, Y. Koren, H. Bley, G. Chryssolouris, N. Nasr, M. Shpitalni**, In this paper we first review the state of the art research in the areas of assembly system design, planning and operations in the presence of product variety. Methods for assembly representation, sequence generation and assembly line balancing are reviewed and summarized. Operational complexity and the role of human operators in assembly systems are then discussed in the context of product variety.

2. **Marion Case of Paris Maestracci Franc, ois Prochasson, Aurélie Geffroy, Florian Peccoud**, in this paper, the first study focused on the perception of situations where accidents are most likely to occur. The second one was an analysis of police reports of accidents involving at least one powered two-wheelers and the drawing up of prototypical accident scenarios. Comparing the results of the two studies revealed a gap between perceived and objective risks of these users.

3. **Patrick Seiniger, Kai Schröterb, Jost Gaila Bundesanstalt für Straßenwesen (BASI), Bergisch Gladbach, Germany Technische Universität Darmstadt (TU Darmstadt)**, this paper describes the potential of stability control systems to help save motorcyclists' lives. It summarizes safety research conducted and commissioned by the Federal Highway Research Institute (Bundesanstalt fur Strassenwesen, BASI) during the last twenty-five years, with particular focus on the authors’ own work in the last five years, and the state of the art in motorcycle control systems. In this paper, the authors will show how active safety technologies fitted to powered two-wheelers can contribute to motorcycle accident reductions and give an overview on measures, state of the art and what can be expected in the future.

4. **Véronique Hutha, Francesco Biralb, Oscar Martina, Roberto Lot**, the aim of the study reported in this paper was to evaluate the Curve Warning system, both regarding objective changes in riding behaviour as well as the subjective appreciation of the system and the effects of its use.
5. Elisabetta M. Zanettia, Giordano Franceschinia, Alberto L. Audeninob, this work analyses blunt abdominal trauma produced by driver–handlebar collision, in low speed two-wheel accidents. A simplified dynamic model is introduced, whose parameters have been estimated on the basis of cadaver tests.

**STEPS OF WORK:**
- Secure inputs for existing application for material properties and dimensions.
- Evaluate the part design for fit and function.
- Explore the existing 3D models for component.
- Use preprocessor for descritization and loading conditions.
- Perform analysis using suitable CAE software.
- Study the results of analysis.
- Generate a revised layout for the component/s.
- Finalize the specifications.
- Conduct trials for experimentation.
- Document the results for validation.

**METHODOLOGY (FLOW DIAGRAM):**

1. Secure the 3D model for meshing
2. Analysis the model using FEA
3. Change the design parameter
4. Conduct the experiments over a physical setup.
5. Documenting results for further research

**EXPERIMENTATION:**
For experimentation the assembly would be mounted on the rig and the frequency of the cyclic loading for torque and or buckling would be set based on the historical data as well as the input received from the analysis data. Failure can be predicted before the modified component is produced through the use of software which rely on FEA principles. The prediction at the component design stage ensures that the chosen geometry is compatible with the conditions of use. Close collaboration between Component designers, Process Engineers and the Test Engineers assures the compliance with very short development times. The parameters influencing the performance of the subject application are listed below:

- Type of material
  - Mechanical properties of the material
  - Thickness of the component at a given section
  - Method of assembly and type of joint with mating parts
  - Type and magnitude of force exerted
  - Frequency of loading.
- A few of the parameters above would be studied for research work.

**REFERENCES:**
2. "Powered two-wheelers road accidents and their risk perception in dense urban areas: Marion Case of Paris" Maestracci*, Franc,ois Prochasson, Aurelie Geoffroy, Florian Pecoud City of Paris, Roads and Mobility Department, Mobility Agency, Road Safety Unit, 40 rue du Louvre, 75001 Paris, France article info: Received 15 July 2010 Received in revised form 1 April 2011
3. "Perspectives for motorcycle stability control systems" Patrick Seiniger, Kai Schröterb, Jost Gaia Bundesanstalt für Straßenwesen (BAS), Bergisch Gladbach, Germany b Technische Universität Darmstadt (TU Darmstadt), Darmstadt, Germany Article history: Received 20 June 2010 Received in revised form 10 November 2010 Accepted 24 November 2010
4. “Comparison of two warning concepts of an intelligent Curve Warning system for Motorcyclists in a simulator study” Véronique Hutha,*, Francesco Biralb, Oscar Martina, Roberto Lotc, A Accident Analysis and Human Factors Department, CIDAUT Foundation, Parque Tecnológico de Boecillo, P.209. 47151 Boecillo, Spain b Department of Mechanical and Structural Engineering, University Of Trento, Via Mesiano, 77, 38050 Trento, Italy c Department of Innovation DIMEG, University of Padova, Via Venezian, 1, 35131 Padova, Italy
5. "Rider–handlebar injury in two-wheel frontal collisions” Elisabetta M. Zanettia,a, Giordano Franceschinia, Alberto L. Audeninob, Department of Industrial Engineering—University of Perugia, Via Duranti 67, 06125 Perugia, Italy b Department of Mechanical and Aerospace Engineering, Politecnico di Torino, C.so Duca degli Abruzzi 24, 10129 Torino, Italy article info: Article history: Received 26 June 2012 Received in revised form 4 December 2012 Accepted 8 January 2013.