FACULTY OF ENGINEERING AND NATURAL SCIENCES

ENS 209

INTRODUCTION TO COMPUTER AIDED DRAFTING & SOLID MODELING

TERM PROJECT PROPOSAL

"BICYCLE"

Prepared by: Aral Ülker

Muhammad Abdulrahman

Sarp Kubilay

Supervised by: Utku Seven

Introduction:

Since Karl von Drais's invention in 1817, bicycles are facilitating our lives however with the latest car emission restrictions, bicycles started to become more popular as the electric cars. For some countries, since they cannot afford an electric vehicle, bicycle is the safest choice therefore our project goal is to design a bicycle which is functional and comfortable for two people at the same time. The objective of the project is to design a basic bicycle by hand in 2D and convert it to 3D by using SolidWorks.

Detailed Description of the Product:

Bicycle is a complicated product which can be done by the combination of various parts. Each part can be composed from different materials such as steel, aluminum etc. The specific goal of the bicycle is to create a different transportation system to the riders by using mobility and accessibility. For detailed perspective, even if each part of the bicycle had an importance for mobility and accessibility, the possibilities that it can provide is not limited. Each part of the bicycle is designed and developed to meet the demands of riders. Demands can vary over each rider such as comfort, speed and balance. Combination of the bicycle contains 8 main parts. For the detailed research, main parts gathered from 25 distinct parts.

The main aim of a bicycle is mobility. Mobility of a bicycle can be provided by the wheels of the bicycle. Wheels designed to be in the front and back of the frame and enable the bicycle through linear motion. Wheels designed from a combination of 5 side parts. Spokes are the connection point for the hum and the rim. Main objective of the spoke can be defined as the transfer of the loads caused by the weight of the rider. Spokes can be designed with high carbon steel due to the crucial role of resistance. Hubs can be found in the front and rear side of the bicycle. Hub is the central part of the wheels and should be designed by aluminum or steel. Rims are designed to hold the tires and enhance the brake system of a bicycle. Tires can create a better balance for the bicycle. The last part is the valve. Valve designed to prevent the air from moving through or out of the tire.

Design of the pedals and the endurance of the material that used to produce pedals are non-negligible. The main objective of the bicycle is to provide mobility for the riders. Without pedals the bicycle's motion will be disabled. Pedals are the key components of the bicycle since their role is crucial to meet the main purpose of the bicycle. Materials can be polycarbonate.

Saddle designs can be varied to provide comfort to the riders. Crucial for the usage, however, can be designed and developed for the demand of the users. Materials can be used as plastic or polymer in order to increase the rider comfort satisfaction rate. Saddle can be defined as a part of the saddle area. Seat post is another part of the saddle area which contributes to the bicycles frame providing a connection between the saddle and main frame.

Chains designed to transfer the energy from pedals to the drive-wheel. Due to the endurance concerns, material of the chain can be selected as steel. Chain part composed of three parts. Front derailleur, chain and chainrings are combined to provide the chain part for the bicycle.

Rear systems are composed from the brakes and cogset. Rear brakes of the bicycle are designed to increase the balance in the bad weather conditions. Without the rear brakes, riders will be unable to reduce the speed of the bicycle and cause problems. Therefore, rear systems should be designed to be flawless.

Frame is the main component of the bicycle since it is designed to hold wheels and other components in the layout. Frame holds the bike together. Frame of the bicycle designed with the combination of 3 tubes and 2 stays. Tubes are named by their places in the bicycle and stays are named by their connections.

Front set of the bicycle generated by the combination of 5 main parts. Handle grips are designed to increase the comfort of the riders. Head Tubes are designed to provide a front fork to pivot independently. Front brakes of the bicycle can be examined as the upper systems of rear brakes. Front brakes designed to stop the bicycle. Forks are designed to hold the wheel. Furthermore, the last part is the shock absorber which enhances the control of the rider and the suspension systems efficiency.

Market:

There are various types of bicycles for different purposes. For example cargo and non cargo bicycles, racing and mountain bicycles, electric and non-electric bicycles etc. These categories have different demands. However, The global bicycle market size was valued at 20,280.0 million dollars in 2019 with a growing CAGR of 4.8% from 2021 to 2027. Also, the global bicycle market size is expected to increase approximately 35% in the next 5 years to 28,667.3 million dollars. Due to all the changes happening in the world because of the coronavirus, people tend to buy bicycles in order to avoid public transportation and crowded areas when commuting, traveling and even exercising. So, it is expected that the market size of bicycles will increase in order to match the demand for bicycles.

Time table:

24th of March 2022, the group assembled for the first time in order to discuss the product and the process of the project. There has been a division of responsibilities among the group members. Every member of the group started their individual study and carefully prepared the term project proposal.

Between 1st of April and 1st of May 2022, the group will plan for the progress report. Individual parts will be hand-drawn and completed, also the technical drawing and solid models of all the parts will be finished. Important measures of components will be taken into consideration and finally the Project Progress Report will be submitted.

Between 2nd of May and 29th of May 2022, all the technical drawings as well as the models of each part will be completed. These drawings will be used in order to assemble the project of the group, which is a bicycle. After all these steps are completed, the group will prepare a Project Final Report. The group will include a Product Description, a Dissection of the product, the Design, a Motion Study and finally a Suggestions/ Improvements sections.

Planned Work Distribution Table:

FRAME AND BASKET the main component which holds every other component and an apparel for extra storage	**4) Sarp Kubilay**
SEAT AND HEADSET Seat for the customer to use while riding and the headset for direction and stability.	**1) Aral Ülker**
PADDLE AND CRANKSET The paddle for acceleration and the crank system is the gear system behind the paddle which connects to the wheels	**3) Muhammad Abdulrahman**
WHEEL AND BACKSEAT The wheels for linear motion and the backseat for carrying and extra passenger	**2)Barış Can Yiğit**

- **Measurements will be carried out together**
- **Each member will take perspectives of individual parts**
- **Each member is responsible for drawing each part selected**
- **Each member is involved in writing the progress report**
- **Assembly will be carried out together**

Resources:

- Bicycle market size, Share & Key Segmentation: Forecast- 2027. Allied Market Research. (n.d.). Retrieved March 27, 2022, from https://www.alliedmarketresearch.com/bicycle-market-A07775
- Zimmerman, M. (2015). *Motorcycle Valve Adjustment Simplified*. Motorcycle Cruiser. https://www.motorcyclecruiser.com/valve-adjustment-simplified/
- Annis, R. (2016, April 12). *6 Things You Might Not Know About Your Bike Chain*. Bicycling. https://www.bicycling.com/repair/a20022235/6-things-you-might-not-know-about-your-bike-chain/
- Wikipedia contributors. (2021b, October 19). *List of bicycle parts*. Wikipedia. https://en.wikipedia.org/wiki/List_of_bicycle_parts#/media/File:Bicycle_diagram-en.svg
- Lindsye, J. (2021, Mar 1). What's the Difference Between a Schrader Valve and a Presta Valve?. Bicycling. https://www.bicycling.com/repair/a20048610/the-difference-between-a-schrader-valve-and-a-presta/