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Design and built of Bicycle Chopper Hybrid (BCH) via Project Based Online Learning (PBOL) an engineering students project development

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ABSTRACT

Methods of design and built become new invention of Outcome Based Education (OBE) at Politeknik Kota Bharu (PKB). This paper prefer to the process of development Bicycle Chopper Hybrid (BCH) with Project Based Online Learning (PBOL) match with OBE that implemented at PKB. The Project Based Online Learning (PBOL) was implemented based on online learning management system call eSOLMS for this project development. This process related with engineering survey, planning, design and development of BCH by using sophisticated technology combination with mechanical machines at inside/outside of workshops at Politeknik Kota Bharu (PKB). The concept of Hybrid vehicle become the new innovation ideas for outcome based project 2012. The product of BCH generate with the power of 1400 rpm motor's to mobilize this vehicle machine. The use of coupling and chain extension as its power mechanism make this project function properly. The testing data's of product BCH was carry out on Mac 2012 shows that the movement of Bicycle Hybrid Chopper is between 30 till 50 km/h. This speed is safe to ride for a people. In addition, the battery using can function for 3 hours journey. Distance can be traveled is between 10 km depending on battery power. Power Inverter playing role to convert DC current from the battery to AC current turn on. The cost of RM1000.00 for BCH product manufacture is a significant low cost factor of its new creation. This invention shows the effective of Project Based Online Learning (PBOL) implementation match with OBE needs. Hopefully this concept of Project Based online learning become next invention of Project Based Mobile Learning (PBML) of engineering student project development at Polytechnics & Community College, Malaysia.

Introduction

Nowadays there are various types of vehicles designed to facilitate and expedite the movement of people (Joseph E. Shigley, 2003). The first motorcycle was invented in 1885 by Daimler Gootlieb. The following year, in the year 1903 the Harley Davidson motorcycle was produced by William Harley and Davidson Walter. Produced by their motorcycle known as the chopper motor (Joseph E. Shigley, 2003). Among the vehicles that have been created at PKB is a hybrid bicycle producing by using innovation ideas & process such project based learning methods (Md Baharuddin et al., 2011a). I lately, a lot of interesting designs can be produced by implemented systematic engineering process, for example the standard engineering design of hybrid chopper component bike via project based online learning monitoring system become new invention of learning standard at PKB(Kamaruzaman et al., 2009). The design & built of BCH is the outcome based of learning implementation for engineering student and project development at PKB (Md Baharuddin et al., 2011b). The producing of an innovative BCH with combining bicycle and AC motor as mechanical power machine become new environmental friendly product. This PBOL become successful process & good result match with OBE needs (Md Baharuddin et al., 2011c).

The objectives of this project design & built focus on 1) Design & built (Modification) of bicycle frame to make bicycle chopper hybrid, 2) To obtaining and analysis of graph velocity against load. The statement problem of need to design & built BCH includes:- 1) not yet produce a suitable design for recreational BCH purposes. Most BCH build is not currently suitable for recreational purpose because of its design is not suitable for outdoor's activities. 2) Some product of BCH need highly maintenance cost, so the cost maintain of BCH project development needs to recover low cost maintenance. 3) Not all bicycle at market focusing on style & sporty look, so this chopper design will bring the sporty design of new invention BCH. The scope of works and component specification for BCH development is :-

i. Using electric motor as engine.

ii. Modified and alter the bicycle frame to chopper frame.

iii. To obtain test data and graphs based on the velocity.

Literature View

Project based online learning (PBOL)

Project based online learning (PBOL) is a curriculum fueled via online medias such eSOLMS, this include online management system & standards on project based teaching method that engages students in on line learning knowledge and skills through an extended inquiry process structured around complex, authentic questions and carefully designed, products and tasks. Project based online learning (PBOL) is a learning

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method are implement through the process of project based learning (PjBL) modul via eSOLMS towards students whose are involved with hybrid chopper project. By PBOL methods, lecturer will act as a facilitator and will observe student's project (Md. Baharuddin et al., 2011e). Through the process of online monitoring with formative evaluation process to accomplish the project development, student need to draft project blueprint, planning and design the mechanical project are they want to develop (Md. Baharuddin et al., 2011d). Hence, student need to working in group. According to the process of learning, the student attributes will be enhance. The student's soft skills such as working in group, communication skills, resources finding skills, decision making skills and learning skills will be gained. The benefit of PjBL are;- Increased motivation, Increased problem-solving ability, Improved library & Internet research, skills, Increased collaboration, Increased resource-management skills, Increased presentation and public speaking, skills and research.

Estimated Cost of Materials / Components

Table 1.4: Estimated Cost of Materials / Components

Materials / Components	Cost / Price (RM)	Quantity (units)	Total (RM)
Motor	80	1	80
Chopper bicycle frames hybrid	150	1	150
Tyre	40	2	80
Seat	27	1	27
Disk brake	10	1	10
tube	4	2	8
Motorcycle chain	9	2	18
Rear Hub w100 std	26	1	26
Clutch Hub	14	1	14
Udam tail rxz	2	2	4
Skru sprocket	3	1	3
rubber hub	3	1	3
Rim 1.60 x 17	30	1	30
stick	9	1	9
Sprocket back	7	1	7
Disk hose w125	15	1	15
M.pum w125	23	1	23
Caliiper Assy w125	40	1	40
H. switch r/h ex5	8	1	8
Throte pipe ex5	3	1	3
the grease	6	1	6
Switch	5	1	5
H grip ex5	3	1	3
B fuel	5	1	5
B level w125	4	1	4
Free wheel	6	1	6
lout	2	1	1
Sat hands	4	1	4
founded hands	14	1	14
The neck of a set of BMX	24	1	24
grinding points	9	1	9
Cat remove	10	1	10
Get in Bicycles	24	1	24
Put the stick	15	1	15
paint	34	1	34
Hulk bcycle	22	1	22
Tube bcycle	6	1	6
stick	9	1	9
sprocket	4	5	20
Bearing	6	1	6
Plate	15	1	15
bolt	4	1	4
rod	6	1	6
Total			**Rm 1000**

Chopper Hybrid Bicycles

During the process of building Chopper Hybrid Bicycles, various problems have arisen. Especially when welding process in the body and motor install chassis. some measures and strategies taken to overcome them. Analysis of the project should be done when it has finished, this is to ensure that project can run smoothly without any problems. It must meet all the objectives done. Modification should be done if the project made it not achieved the desired. Further testing should be made after modification or repair to the project made. It aims to compare the performance of the project before and after modification is made. Normally, this second test will give an analysis of test results or better than before. Projects will be considered successful when it does not have any problems.After several months, eventually the project was completed. Various experiments have been conducted on this project. By doing the experiments, students can identify problems that may occur or arise during the operation performed

Hybrid Chopper Bicycle Technology

Chopper hybrid bicycle is a vehicle used to transport people from one area to another in short journeys. Most of the currently used four - stroke petrol engine and compared to the motor. Bicycles chopper initially only be moved only by human power is moving by foot pedal.Chooper bicycle sprockets are usually driven by the rear wheels attached to and connected with a chain.Bicycles frame or frame hybrid Chopper usually designed using iron-fortified circle hole with metal plates. It is designed to withstand maximum loads up to 150 kg or more. Metal plates to be used as a floor and serves as a stirrup.

Types of Bicycles chopper

A wide range of chopper bikes that use the hybrid two-stroke engine, but I will show some examples chopper bicycle hybrid

Chopper Bicycle (TMH-16BA)

Product Description

Our main products include city bicycle, mountain bike, racing bicycle, folding bike, freestyle bike, beach cruiser bicycle, chopper bike, city bike, kids' BMX bike etc.
Product:16"ChopperBicycle
Item:TMH-16BA
FRAME:Hi-tensteel
FORK:Steel,double,shoulder
CHIANCOVER:Steel,half-type
Fender: Steel, front and rear

Chopper* Electric *Bicycle

Product Description

Chopper electric bicycle
Mod: Ht-ech02-24
Frame: 24" hi-ten
Fork: 26"hi-ten
Color: To order

Crank: Forged steel crank, 44t steel
Chain: Kmc
Freewheels: 20t
Rims: Alloy f/48h, r/36h
Front hub: Steel
Spokes: 45# steel 13G
Tires: F/26"*2.10, r/24"*4.125"
Pedals: Alloy
Brakes: Alloy v-brake
Brake levers: Alloy, cut-off when braking
Throttle: Thumb twist intelligent speed control
Handlebar: Steel
Seat post: Steel
Motor: Light weight speed, brushless geared motor or gearless motor 450w.
Battery: 48v/10ah lithium-ion
Charger: 100v-240v, 50/60Hz. Smart charger, charger time 4-6hours
Controller: 48v intelligent pas, brushless

Size and Weight

Size plays an important role in the design for the success and appeal. In this context, hybrid bikes chopper is according to standard size. In addition, dimensional measurements were based on the width and length of a mini scooter, the height from the surface, the dimensions of each component and the distance the position of each component. Weight of the vehicle can significantly influence the performance of the required maximum speed. Selection of materials component manufacturing, engine weight, fuel consumption, increased accessory on the frame and the rider's own weight. It will also influence stability during movement. Used wheel, the wheel-V100 is commonly used in scooters because of the difficulty to obtain the mini bike wheel. Is the chain used a bicycle or motorcycle chain motorcycle chain type RKM. Sprocket that you want to use a motorcycle front sprocket. It is smaller and suitable for use in

The research BCH components

This process of PBOL, student needs to full fill the project research **b**ased on research and observation, students will have trouble to learn and to understand the topic of linear motion. It is as though a problem for students to understand because the topic is comprised of movement, graphs, velocity, speed, related to this topic. To make a sketch of the graph, students should use their imagination to imagine how the graph is going to happen. Movement is a changing position. All movement relative some fixed point or object.

Speed measurement is a change in position from time to time. The velocity in the direction of product calculation also need to measure with given speed. Acceleration is the increase in speed or velocity over a period of time. Cessation is the reduction in speed or velocity from time to time.

In this project development, students need to make a study for each component for development of BCH. The group of student need to studies about equipment to be used in BCH project, they are required to get some specification, including a details of design & product description. The equipment will be used in this project such as:

The transmission System

Power transmission system is a mechanism that allows the power generated by the motor or engine is transmitted to the wheels to propel the vehicle.

Chain

Chain connected by a pin. It was moved by coating sprocket is online. This type of spin chain relationships and communication as the driving oval. It is also known as spiral chains. Only used at low speeds.

Spocket

Sprocket used as an aide to the movement of the belt and chain. It's dimensions using low carbon steel. Sprocket usually made from 180 m / min, tooth sprocket is hot to get thes trength of 180 BHN for appling a high speed, the strength of teeth suitable sprocket is300 to 500 BHN.

The System of electric motor

The electric motor is a machine that uses electrical energy to produce mechanical energy and this is because the effects of magnetic and electric current and flow .However, the process to produce electricity is by using the mechanical energy of the dynamo and the electric generator use. Traction motor using a conventional vehicle and is normally used for both tasks.

The electric motor is also used for the fan, pump industry and other, between tools in the machine, home appliance equipment, power tools and computer disk drives and other. The electric motor works by direct flow and current from the battery in the machine tools or machine shift in the vehicle or it can also work to and from the time of the union of electrical distribution. Is the smallest motor in watches. However, medium sized motor with uniform dimension can easily provide mechanical forces that can be used in the factory.

Large motor with a thousand of ships used in kilowatt big boost and it also serves as a pipeline compressor. Electric motors can be categorized as a source of electricity, the internal compartment and it works.Since early 1821, the principle of physic was known about the mechanical energy can be produced from electric and magnetic fields. During the 1900 century, become more efficient electric motors. However, the use of electric motors for trade on a large scale still require electricity generators and electricity distribution networks.

Figure 2.4.1 Electric Motor

Casing

Iron is an element in the periodic table that has the symbol Fe and atomic number 26.Iron is the most commonly used of all metals, comprising 95 percent of all the metal tonnage produced worldwide. The combination of low cost and high strength make it indispensable, especially in

applications such as automobiles, the hulls of ships, and structural components of buildings. Iron alloy steel the best known, and some form of iron known include:

I. Raw Iron or 'Pig iron containing 4%- 5% carbon with number of impurities such assulfur, silicon and phosphorus. Means is that the transition from iron ore to cast iron and steel.

II. Cast Iron (cast iron) contains 2% - 3.5% carbon and small spaces. Impurities in the 'pig iron' that negatively affect material properties, such as sulfur and phosohorus, was reduced to an acceptable level. It has a melting point in the range 1420-1470 K, the lower of the two main components, making it the first product to be melted when heated with carbon and iron. Changes in mechanical properties, depending on the form of carbon alloys. Cast iron 'white' carbon in the form of cemen tite, or iron carbide. Hard, brittle compound is dominated major properties because it is difficult to 'white' cast iron, but could not stand the shock. In a cast iron 'gray', the carbon present in the form of small pieces of graphite, as well as brittle materials because of the characteristics of graphite edge sharp edge of the high-pressure area.

New types of gray iron, called "ductile iron, mixed with trace amounts magnesium to transform graphite into sferoid, or nodules, and thus increase the rigidityand strength of the iron **:**

I. Carbon steel contains between 0.5% and 1.5% carbon with small amounts ofmanganese, sulfur, phosphorus and silicon.

II. Wrought iron (wrought iron) contains less than 0.5% carbon. It is fusible hard, flexible, and easy of pig iron. It has a small amount of carbon, one-tenth of a few percent. If honed edge, it evaporates quickly.

III. The carbon content of iron alloys (Alloy steel) variable and other metals such aschromium, vanadium, molybdenum, nickel, tungsten, and others.

IV. Iron oxide (III) is used in the production of magnetic storage in computers.Itis oftenmixedwith othersubstances, and maintain theirproperties in solution. Iron is one of the most common element on Earth, forming 5% of the Earth's crust. Most of the iron is present in various iron oxides, such as the mineral hematite, magnetite, and taconite.Most of the Earth's core is believed to contain iron-nickel alloys. About 5% of the samemeteorite consists of iron-nickel alloys. Although rare, this is a major form of naturalmetallic iron on the surface of the earth.

Metal Tubes for Frame

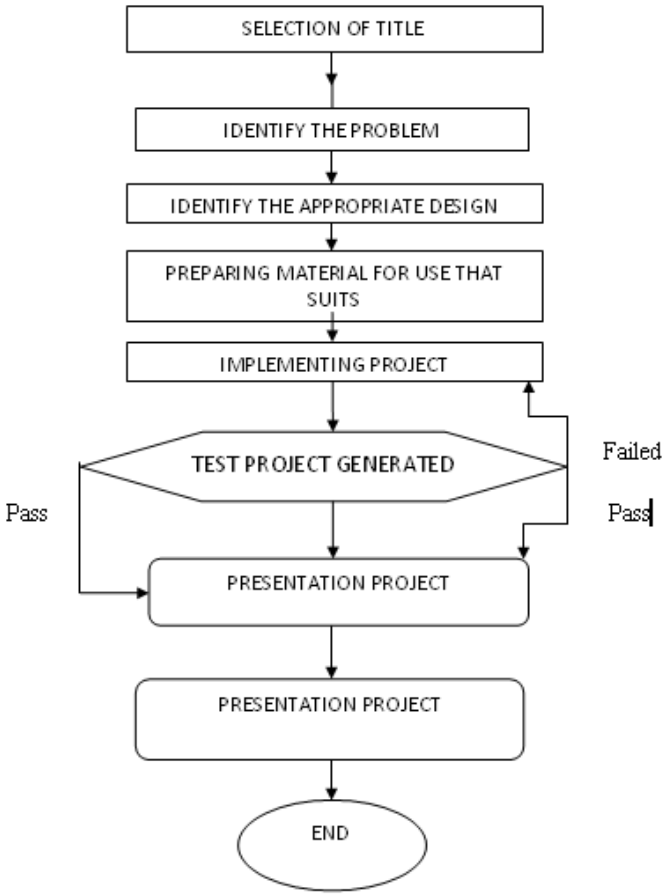
Fi,is a, usually cylindrical, metal strap. Wire used to bear mechanical loads and to carryelectricity and telecommunications signals. Wire is usually formed by drawing the metalthrough a die or plate hole draw. Standard size is determined by various wire gauges.Long wire is also used more loosely to refer to pieces of the file, 'multistranded wire' as a more accurate termed a wire rope in the mechanical, or electrical cables.

METHODS

In this chapter, described the renovation project planning, research methods, and several boxes moforlogi concept project proposal selection of new items listed. To implement this project, various processes are performed before it is built and fully functioning. It aims to be sure that the projects undertaken to provide the best result sand satisfaction in accordance with general requirements. In carrying out this project, various observations and planning made the choice to determine the project is constructed according to available resources in addition ,this chapter also contain detailed explanations of the rules,safety measuares, procedures, and idea concepts that have been built for the project 'chopper bicycle hybrid.

Draft for Project Implementation

The draft project implementation plan or procedure is done in stages from the beginning until the completion of the proses.



Project implementation Procedures and Measures

Procedures and project implementation will facilitate the implementation of the project arried out in accordance with planning requirements. In addition, it can prevent the occurrence of errors during the project. Several measures were developed as the implementation procedures are: -

Modification Process Framework

Bicycle frame

Renovation is the process of modifying existing materials for the better. It is not produced spontaneously or accidentally, but it was a long time to think of the best modifications to design appropriate to the project that is due to be selected. It requires a process of thought, trial and error methods, testing, trial and improvement. The process is renovate some existing bicycle frame, cut and connect the additional iron was measured according to the size specified by

using the arc welding process. This process requires high skills that connection does not have defects that cause the strength and durability of the connection to be weak. It is important to ensure rider safety is assured. In the process of modification of this bicycle frame, other than metal joining process, the bridging effect of the update process is also performed. After the joining process is done, will the resulting membrane that covers parts attached. This membrane must be crushed to make sure the parts are connected get the best results and look just right. Process is performed with caution because the resulting film is heat welding process.

Process draws on the size of a large painting

Make sketches of the original in size

Tools

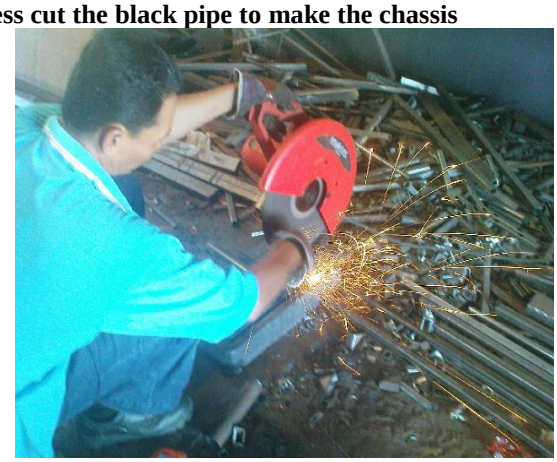
Chalk, a ruler and tape measure

Work steps

Create original sketches on the ground, to determine the actual size of the chassis to be made. We have done the right size so that the chassis to be built to meet the specified criteria Gauge measurements made using a ruler, after the measurements made was to meet

The original size of the project, we will use a tape measure to measure the part to bebent and then we will check the size of the chassis that has been made with lime

Process cut the black pipe to make the chassis



Cut bars of iron

After the measurements made according to the size of the original project, we are grinding machine to cut a piece of metal pipe into a number of areas that we need. To build the chassis, we used black iron pipe type ,because this steel is better quality and more durable than other metals .For a start we have cut the stem chassis that is at the bottom first, then we cut the chasis at the top and the chassis to the rear

Prosess Welded the stem pipe

Welded the stem pipe

Tools

Stick rod And welding machine

Worked Step

After a piece of metal cut to the correct size, we'll list the parts using welding. At the beginning is the center of the chassis we combination advance to facilitate the consolidation of the chassis parts are other .to back we had to take about the same size with because in the back of a motorcycle, we want to put a wheel. then we have combination chassis components on the front, in this section we take the measure of distance that can be placed on the front wheel. To the middle of the chassis also, we provide a site to put the battery, inveter and other component-component

Process Grinding the chassis

Figure 3.4.5 Grinding the chassis

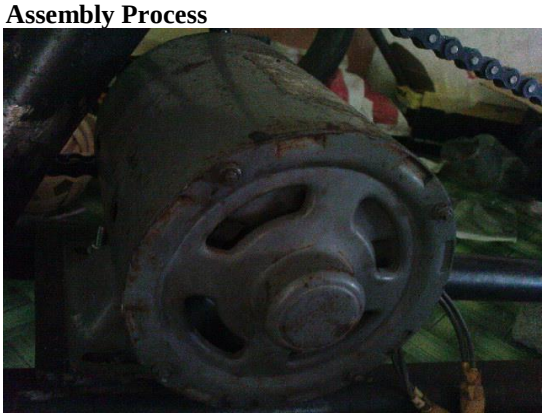
Tools

grinding machine

Work steps

Once the component projects in welding, we use surface grinding machines for the chassis. Chassis surface becomes flat as affecte by welding

Motor Assembly Process



3.4.6 Figure motor assembly process

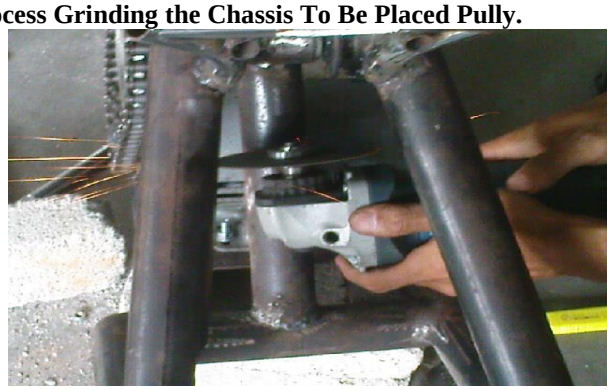
Motor is a key component used in this project. It is intended as a source of project movement. It will move the power transmission system to move the motion.In this motor assembly process, a metal plate to be provided to menyakut engine. Plate

used was of the iron bar. It is welded to the bottom of the seat. This engine base is made parallel to the center of the rear wheels. When finished metal plates are installed, the motor will be tied up with the screw on the base provided. Between the engine and the metal plate, a rubber bush will be placed. This is to ensure that the engine vibration and vibration is not up to the frame while reducing the back rider comfort.

Component Assembly Process

The installation process is the process of assembling the components and assemble the components found in projects such as brake system, installation of front and rear wheels, handles, seats and so on. This process can be done after the process of the project sketches. Before the installation process made components, the components must be installed in accordance with the framework of the project.Brake assembly process is done by making the appropriate brake pad and wheel position. This is because the brakes are applied is the type of hydraulic brakes. This type of brake used for braking grip. It aims to slow the movement when it comes to the destination and it also aims to stop the vehicle in an emergency. Front and rear wheel assembly must be done in the framework of the project so produced can be moved. Wheel installation process must be done right on the set. Wheel height should be in accordance with the size of the project. This is to ensure the stability of the project. If the wheel is too high, then it becomes a low stability. If the distance the wheel from the ground level is too low, then the frame will be in contact with the ground when the road is not flat.

Process Grinding the Chassis To Be Placed Pully.



3.4.7 Figure grinding the chassis to be placed pully

Tools

Grinding machine

Work steps

To put pully on the chassis, we need to grind at the rear of the nearby tire for easy connection to the motor combination chain to move the chasjs to move ,, we built a few pully also uses a lot of sprockets to ensure that the motor can move the chassis. Of many connection sprockets, motors that we use will be able to move the chassis interior.

Process Ranking Chain

Draft for Project Implementation

The draft project implementation plan or procedure is done in stages from the beginning until the completion of the proses.

Connection chain is important for determining the movement of Hybrid Bikes chopper, connection chain started in the motor which is connected to the sprocket on there wheels, then we make the connection between the motor and the sprocket on the gandalf with flywell bicycle. Next make connection flywell bicycle to chain bicycle sprockets ..

Process Handlebar Assembly

3.4.9 Figure handlebar assembly

Construction of bicycle handlebar stem is cut iron pipe, having taken the correct calculations we bend metal bars using special instruments We use black iron pipe to be used as bicycle handlebars, the first step required to measure the handlebars and black iron pipe is cut. Then indicate by means of welding iron.

Figure 3.4.10 install the brake disc

To install the brake disk at the end we had to mewelding dreams to be a place to park a bicycle brake caliper. After brake caliper is installed, the next steps are to do the connection between the brake caliper with the brake hand using a wire.

Process Seats Already Fitted

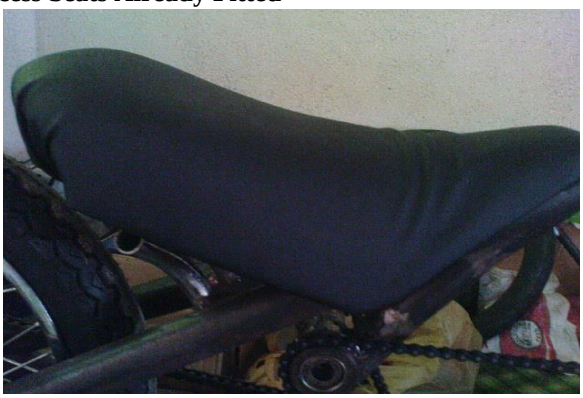


Figure 3.4.11 seats already fitted

We have used the saddle as the saddle rxz motor used in hybrid chopper bike. The first step, take the right measurements and body suitable with chopper bike to make sure riders get comfortable then we cut the rxz motor saddle. To ensure a more

stable chopper bicycle saddle, we use screws to fasten the saddle.

Process Connecting The Circuit In Hybrid Chopper Bike

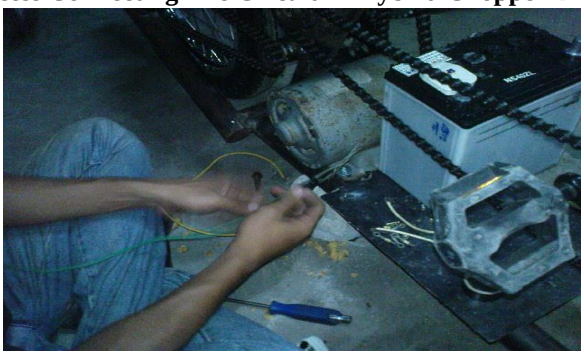


Figure 3.4.12 Prosess Connecting the circuit in hybrid chopper bike

Tools

2 wires over 3 feet, wrapping wire and tapered nose pliers

Work steps

Wire connection to the connection wiring diteleti inverter and inveter connection to the battery. We have cut the wire that has been purchased by the proportion that is required,for the first step, we have connected the wires with inveter, after the connection is successfully done, we connect the wires on the switch that is on the bicycle handlebars. Then the wireless connection has been done completed. We wrap the wire so that the project is neat security faetures Then we make the battery connection to inveterto create electricity

Updating Process

After completing the process of building the frame, install components such as brake system, install the engine and power transmission system, the process of updating. Project needs to be done. It aims to streamline the building and to get the beautiful and best. The process of tightening the screws may be loose also done to ensure no problems arise during the process of testing done. This enhancement process is like file any film produced during the welding process, ironframe with sandpaper and paint. This process is intended to get the neat and perfect .Painting process began by painting the base color is 'black'. next required paint color is light purple. During the process of painting the frame, all components will be reopened. After the painting is finished and has dried, the components are reassembled with careso as not to impair the paint on the frame after the installation process is complete. So I completed this project and they could be operated and tested.

Process Color hybrid bike chopper

Figure 3.5.1 Color hybrid bike chopper

Tool

2 cans of blue paint and a can of black paint

Work Step

After completion of the chopper bicycle components installed, we have color all the hybrid chopper to look more attractive this process takes a long time of 3 hours . The first step, we have the center of the chassis color first as the center of the chassis has a component-component material, such as batteries, motor, and other inveter. process this should be done carefully to prevent the paint from the affected components and other motor. After we painted the center of the chassis. Start painting on the front and rear chassis.

Process Drill Is Used To Make Holes On The Metal Surface.

Drill is used to make holes on the metal surface

The process usually di byat drill holes using a drilling machine or lathe machine. Taha drill made of durable steel and tungsten carbideDrill bits and drilling machine

Data Analysis

The testing data's of product BCH was carry out on Mac 2012 shows that the movement of Bicycle Hybrid Chopper is between 30 till 50 km/h. This speed is safe to ride for a people. In addition, the battery using can function for 3 hours journey. Distance can be traveled is between 10 km depending on battery power. Power Inverter playing role to convert DC current from the battery to the motor current AC to turn on. The cost of RM1000.00 to manufacture this Hybrid Bicycles Chopper is a significant factor of its new innovation and creation.

Conclusion

Generally to create a project, it requires high skills and creativity. So with this project students can enhance their skills and creativity in various category such as hardware, software, analysis of projects implemented in order to control properly. In addition, students can use as well as expanding and enhancing knowledge and experience after creating the project. The project implementation is also able to produce and uncover the ideas and creativity, creative and innovative. Students can train yourself to produce formatted reports that work is packed with technical data and perform tasks with the neat and attractive. After the creation of this project students will be exposed to the skills to analyze, review and repair. When doing a project the students would have to know a bit about the project either at learning in the classroom or from other sources, the students should be able practical the theory learned in the course of this project.

In this project development, certainly not free from problems either big problem or small problem. Therefore, this project will produce students who are psychologically stable, perseverance and competent in the success with more confidence. The project implementation is also able to produce students who are disciplined as bound by the schedule given by the lecturer. The project will also foster a spirit of cooperation and solidarity between students and lecturers and students with students to implement this project.

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Lampiran

Product: Bicycle Chopper Hybrid (BCH)

Item: Code BCH 2012

FRAME:Hi-tensteel

FORK:Steel,double,shoulder

CHIANCOVER:Steel,half-type

Fender: Steel, front and rear