IJCRT.ORG ISSN : 2320-2882

INTERNATIONAL JOURNAL OF CREATIVE RESEARCH THOUGHTS (IJCRT)

An International Open Access, Peer-reviewed, Refereed Journal

MODELLING AND 3D PRINTING ON FOOT GEAR SHIFT PEDAL FOR TWO WHEELERS

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ABSTRACT:

3D printing is called as desktop fabrication. It is a process of prototyping where by a structure is synthesized from a 3D model. The 3D model is stored in as a STL format and after that forwarded to a 3D printer. It can use a wide range of materials such as ABS, PLA, and composites as well.3D printing is a rapidly developing and cost optimized form of rapid prototyping. The 3D printer prints the catiav5 design layer by layer forming a real object. 3D printing process is derived from inkjet desktop printers in which multiple deposit jets and the printing material, layer by layer derived from the catiav5. 3D printing significantly challenges mass production processes in the future. This type of printing is predicted to influence industries, like automotive, medical, education, equipment, consumer products industries and various businesses.

KEYWORDS: 3D printing, Rapid Prototyping, ABS, PLA

INTRODUCTION TO FOOT GEAR SHIFT PEDAL:

The terms suicide clutch, and suicide shifter or jockey shifter, refer to a motorcycle's foot-operated clutch and hand shifter to change gears, Foot clutches (rocker-clutches) and hand shifters (tank-shifts) were found on early motorcycle designs from around the turn of the 20th Century to the 1940s or 50s and reappearing on modern retro styled custom motorcycles and choppers. Modern motorcycles do not require removing a hand from the handlebars to shift gears, using only the fingers for the clutch and the toes of one foot to select gears. In contrast, the fanciful slang "suicide" was applied to designs where the rider removes one hand to change gears, or cannot put both feet on the ground while using a foot clutch to disengage the transmission. Sometimes the shifter is referred to as a "jockey shifter" while the foot clutch is called a "suicide clutch". Suicide clutches were common on mid-20th century Harley-Davidson motorcycles and many custom bikes today still employ this system. Harley-Davidson introduced the hand clutch on the 1952 Pinhead.

The suicide clutch is sometimes incorrectly called a suicide shifter. The suicide clutch is a foot-operated clutch that is mounted on the left side of the motorcycle's forward foot controls. The suicide-clutch moniker has derived from difficulties in operating this form of clutch and shifter. On a motorcycle equipped with a conventional hand clutch and foot shifter, the rider places the left foot on the ground when stopped and holds the motorcycle in place with pressure on the rear brake pedal with the right foot, while engaging the clutch with the left hand.

GEAR SHIFTING MECHANISM:

Most of the motorcycles in the market have manual shifting, which means you have to change the gears manually. There are three main motorcycle parts involved in gear shifting, the clutch lever, the throttle and the gear shift lever. The clutch lever is located on the left handlebar. The clutch lever’s work is to engage and disengage the engine’s power to the rear

wheel. The gear shift lever is in the front of the motorcycle's left foot peg. The mechanism of throttle working is discussed in the later part. In clutch less shifting, a quick shifter eliminates the need for a clutch or throttle to change the gears.

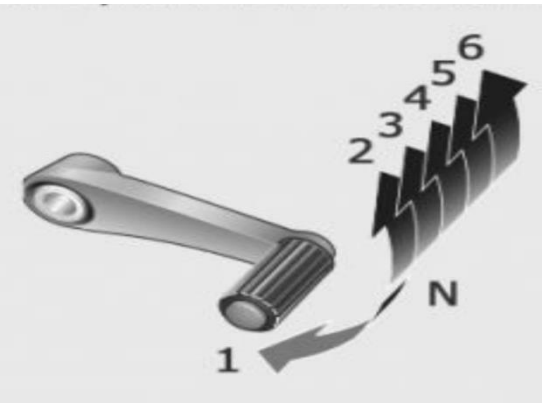

FIGURE 1: HOW TO CHANGE GEARS BY FOOT GEAR SHIFT PEDAL

Riders use their left foot to shift or change gears. The lowest gear is the first gear which is at the very bottom. In a 6-speed bike, the gear pattern is 1, N, 2, 3, 4, 5, 6. Each foot click is equal to one gear shift. In some MotoGP bikes, the gear positioning is opposite, i.e., you shift up for first gear and down to reach second to sixth gear. The process is to change gear when your speed tells you and is actioned by using the coordination of both hands (right for throttle and left for clutch) with your left foot for the gear lever and of course keeping your eyes on the road ahead instead of looking down at the controls.

GEAR SHIFTING MECHANISM PROBLEMS:

The reason for experiencing poor gear shifting can be due to a bad shift mechanism. The shift mechanism is basically a drum-shaped device or spring-loaded cam that operates the sliders via shift forks. Corrosion, damage or friction due to wear can cause problems in shifting gears smoothly. The bad mechanism can be felt through the gear shift lever. Riders often adjust the height of the shift pedal, which may affect the external linkage.

TYPES OF SHIFTERS:

REGULAR CLUTCH HAND SHIFTER:

This is where the shifter is a regular knob either located on the tank, which operates through a linkage to the transmission (tank shifter) or on a lever bolted directly to the top of the transmission (jockey shifter or slap shifter depending on the transmission design) and involves the semi-complex task of foot clutch operation and hand shifting. The foot is used to operate the clutch pedal clutch lever and the second hand is used to shift gears.

FIGURE 2: MOTORCYCLE WITH HAND SHIFTER

QUICK SHIFTER:

It is a device that allows clutch less shifting on a manual transmission, and is commonly found on motorcycles. It can increase the safety and comfort of the vehicle. Since it eliminates the need to use the clutch or throttle before and after a gearshift.

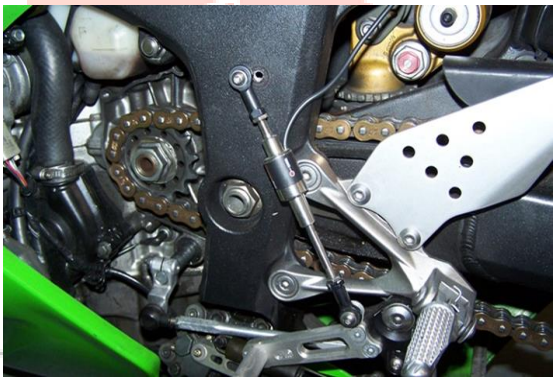

FIGURE 3: QUICK SHIFTER

CLUTCHED SHIFTER:

This shifter has a clutch lever on it allowing one-handed shifting. This design allows the left foot to be free.

FIGURE 4: CLUTCHED SHIFTER

INTRODUCTION TO CATIA V5:

Welcome to CATIA V5 (Computer Aided Three-Dimensional Interactive Application). As a new user of this software package, you will join hands with thousands of users of this high-end CAD/CAM/CAE tool worldwide. If you are already familiar with the previous releases, you can upgrade your designing skills with the tremendous improvement in this latest release.

CATIA V5 developed by Dassault Systems, France, is a completely re-engineered, next generation family of CAD/CAM/CAE software solutions for Product Lifecycle Management. Through its exceptionally easy-to-use and state-of-the-art user interface, CATIA V5 delivers innovative technologies for maximum productivity and creativity, from the inception concept to the final product. CATIA V5 reduces the learning curve, as it allows the flexibility of using feature-based and parametric designs.

CATIA V5 WORKBENCH:

CATIA V5 serves the basic design tasks by providing different workbenches. A workbench is defined as a specified environment consisting of a set of tools that allows the user to perform specific design tasks. The basic workbenches in CATIA V5 are

PART DESIGN WORKBENCH:

The Part Design workbench is a parametric and feature-based environment in which you can create solid models. The basic requirement for creating a solid model in this workbench is sketch. The sketch for the features is drawn in the Sketcher workbench that can be invoked within the Part Design workbench. You can draw the sketch using the tools in this workbench.

WIRE FRAME AND SURFACE DESIGN WORKBENCH:

The Wireframe and Surface Design workbench is also a parametric and feature-based environment, and is used to create wireframe or surface models.

ASSEMBLY DESIGN WORKBENCH:

The Assembly Design workbench is used to assemble the components using the assembly constraints available in this workbench.

DRAFTING WORKBENCH:

The Drafting workbench is used for the documentation of the parts or assemblies created earlier in the form of drawing views and their detailing.

GENERATIVE SHEETMETAL DESIGN WORKBENCH:

The Generative Sheetmetal Design workbench is used for the designing of the sheet metal components.

DESIGN OF FOOT GEAR SHIFT PEDAL:

VIEW TOOLBAR:

The buttons in the View toolbar are used for manipulating the view of the model using the tools such as pan, zoom, normal viewing about a planar surface, face or plane, defining a render style, and so on. The View toolbar is available in all the workbenches.

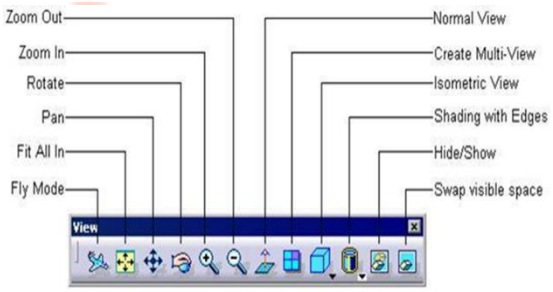

FIGURE 5: VIEW TOOLBAR

PROFILE TOOLBAR:

The tools in the Profile toolbar are used to draw the sketches. It is one of the most important toolbars in the Sketcher workbench.

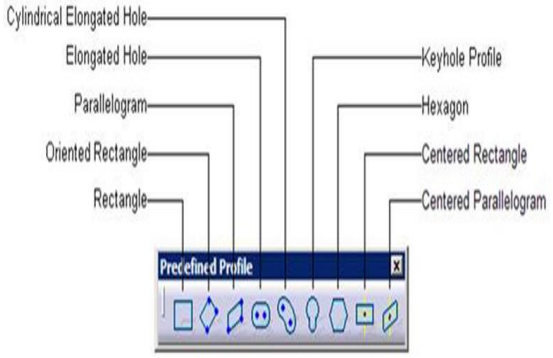

FIGURE 6: PROFILE TOOLBAR

CONSTRAINT TOOLBAR:

The tools in the Constraint toolbar are used to apply constraints to the geometric entities, and assign dimensions to a drawn sketch.

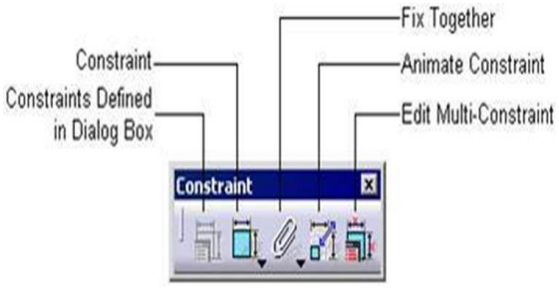

FIGURE 7: CONSTRAINT TOOLBAR

SKETCH BASED FEATURES TOOLBAR:

The tools in this toolbar are used to convert a sketch drawn in the Sketcher workbench into a feature.

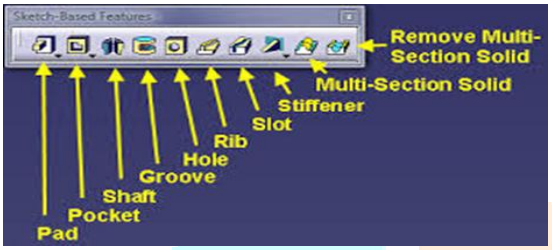

FIGURE 8: SKETCH BASED FEATURES TOOLBAR

DRESS UP FEATURES TOOLBAR:

The tools in the Dress-Up Features toolbar are used to apply the dress-up features such as fillet, chamfer, shell.

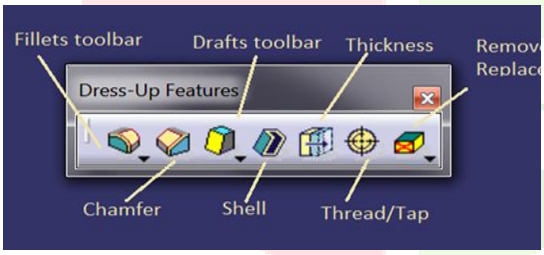

FIGURE 9: DRESS UP FEATURES TOOLBAR

TRANSFORMATION FEATURES TOOLBAR:

The tools in the Transformation Features toolbar are used to apply the transformation features to the parts such as moving, mirror, pattern.

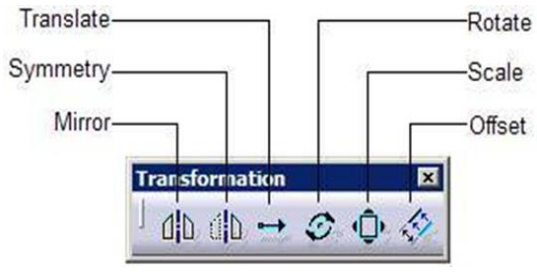

FIGURE10: TRANSFORMATION FEATURES TOOLBAR

FOOT GEAR SHIFT PEDAL:

The design of foot gear shift pedal is done with the Catia v5 software. We need to open Catia v5 software and go to start, mechanical design, part design, create file name. Select xy plane and draw the figure with dimensions. We can get the required figure with the help of view toolbar, profile toolbar, constraint toolbar, sketch and dress up features toolbar.

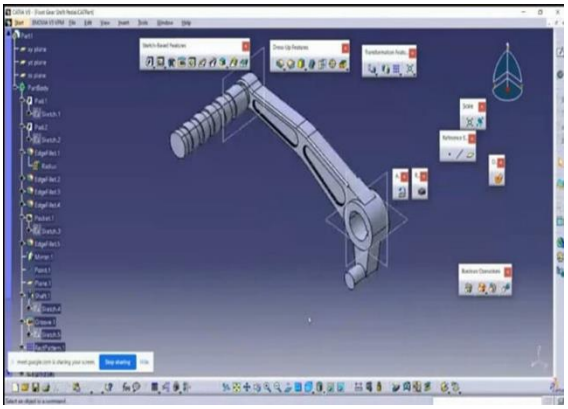

FIGURE 11: FOOT GEAR SHIFT PEDAL

INTRODUCTION TO 3D PRINTING:

Additive Manufacturing or 3D printing (commonly called) is a process that creates a physical object from a digital design. There are different 3D printing technologies and materials you can print with, but all are based on the same principle: a digital model is turned into a solid three dimensional physical object by adding material layer by layer.

WORKING OF 3D PRINTING:

It all starts with making or obtaining a virtual design of the object you want to create. This virtual design can be made in a CAD (Computer Aided Design) file using a 3D modeling program (for the creation of a totally new object) or with the use of a 3D scanner (to copy an existing object). A 3D scanner makes a 3D digital copy of an object. There are also lots of online file repositories where you can download existing 3D files that will help get you started. The 3D printing process turns an object into many, tiny little slices, then builds it from the bottom up, slice by slice. The layers then build up to form a solid object. Some advantages of Additive Manufacturing compared to conventional processes:

•Fewer steps between the CAD model and the production of the part.

•Generally, few human resource requirements due to a high level of automation.

FIGURE 12: 3D PRINTING PROCESS

RESULTS AND CONCLUSION:

Design of FOOT GEAR SHIFT PEDAL is carried out with the CATIA V5 software. After creating model. we save the component in STL file import the component into 3D printing machine and then we apply the GCODES to the component. we get the 3d printed component.

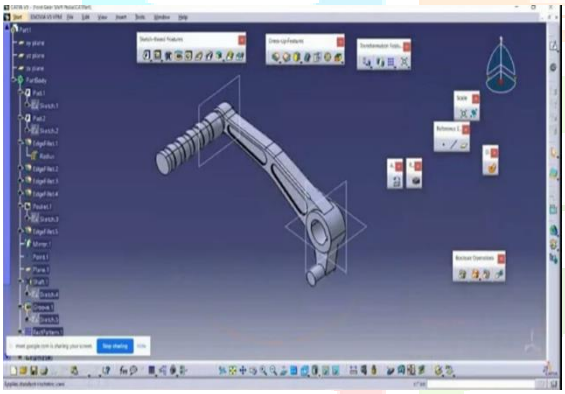

FIGURE 13: FOOT GEAR SHIFT PEDAL

3D printing technology could revolutionize the world. Advances in 3D printing technology can significantly change and improve the way we manufacture products and produce goods worldwide. An object is scanned or designed with computer aided design software, then sliced up into thin layers, which can then be printed out to form a solid three-dimensional product. As shown, 3D printing can have an application in almost all of the categories of human needs as described by Maslow.

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3. Y. Nandwana said manual transmission vehicle incorporates moving component under control of a microchip.