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Design of Dip Stick Spanner for Bike

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Abstract - The head of dip stick is made up of plastic material, so it may get damaged due to the teeth of plier mouth or some times its head may get broken due to sudden rotations of the plier. So to overcome these problems and to provide ease to workers/Garage men we design dip stick spanner after studying various types of dip stick of Mopeds and Bikes. It allows easy removing and mounting of dip stick on the engine. It also allows workers/Garage men to do his work safely and efficiently.

***Key Words*:** Dip stick, Dip stick Spanner, Moped and Bike.

1. INTRODUCTION

Dip stick is used to measure the quantity of oil in an engine by inserting and removing the stick and then checking the extent of it covered by the oil. Generally it is made up of plastic material. At one end there is a narrow stick on which required marking for maximum and minimum level is done for understanding the available level of oil. While at other end suitable small rectangular or cross head is provided. At the bottom of head few thread turns are provided for securing the dip stick on to the engine crankcase. A dipstick is one of several measurement devices. Dipsticks are dipped into a liquid to provide a measure of quantity of the oil. The other kinds of dipsticks are used to measure everything from fuel or oil levels to the amount of any liquid that left in a container.

Fig 1: Oil Dip Stick.

2. NEW PRODUCT DESIGN

The development of a new product begins when the need to create a new product appears either due to the emergence of a new technology or the appearance of a competitive product or a change in the existing legal framework and is completed with the final introduction of the product in the market.[1]

Product design methods mean all procedures and techniques used in the design. We have two categories,

1. Systemic methods according to which model artifact should be designed.
2. Analytical methods determining step by step artifact, analyzing reality.[2]

3. PROBLEM STATEMENT

While removing the dip stick from engine crank case for pouring oil into the bike engine in most of our observation we found that many Garage men remove the oil dip stick by using plier. But use of plier damages the dip stick head or sometimes due to sudden rotation head may get broken or a small crack may be generated. To solve these issues we decided to design a special spanner which is called as Dip Stick Spanner.

4. DESIGN CALCULATIONS FOR DIP STICK SPANNER

Here while designing dip stick spanner we have considered two major failures,

1. Design of cross section of lever considering failure of lever in bending,

Given: L = 100 mm, B = 50 mm

Where L= Length of lever in mm ,

t= Thickness of lever in mm,

B= Width of lever in mm.

For Mild steel (MS) σ_b = 90 N/mm^2 (From design data books)

Considering Load(P)=1875 N

$$\sigma_b = M / Z$$

$$\sigma_b = \frac{(P*L)}{\text{----------}}$$

$$90 = \frac{(1875*100)*}{(t*50^2)}$$

$$t = 5 \text{ mm.}$$

2. Checking induced crushing stress in the cross section of dip stick slot i.e.- Plus slot,

Let l= Length of Plus slot=80 mm

t=Thickness of lever = 5 mm,

b= Width of plus slot= 6 mm

For Mild steel (MS) σ_{ck} = 45 N/mm^2 (From design data books)

$$\sigma_{ck} = \frac{P}{2*t*l}$$

$$\sigma_{ck} = \frac{1875}{2*5*80}$$

$$\sigma_{ck} = 2.34 \text{ N/mm}^2$$

Induced crushing stress is less than permissible or allowable crushing stress hence design is safe.

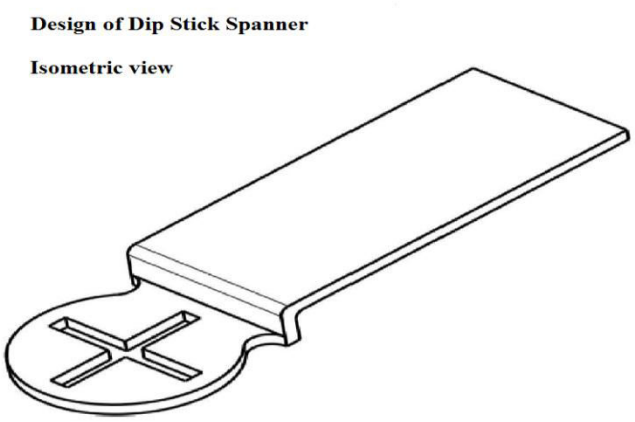

Fig 2: 3d Design of Dip Stick Spanner.

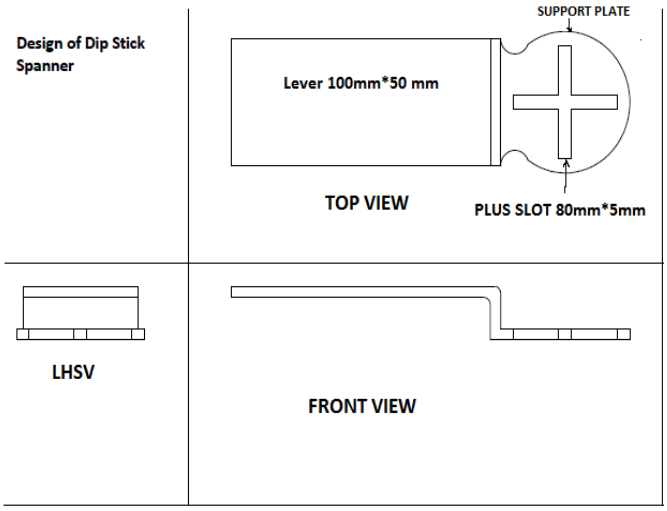

Fig 3: 2d Design of Dip Stick Spanner.

5. PROPOSED METHODOLOGY FOR MANUFACTURING DIP STICK SPANNER

Following methodology has been adopted for making the design of Dip stick spanner,

1. Suitable design of dip stick spanner is made in Auto Cad software as per the dimensions obtained in design calculations.
2. Select a suitable M.S plate with 5mm thickness.
3. For making lever cut MS plate with dimensions 100*50 mm.
4. For making support plate cut the circular MS plate having diameter ϕ 100 mm.
5. In the circular MS plate make Plus slot of having dimensions 80*6 mm by using proper machining method.
6. Join lever and support plate by using arc welding method.

6. DESIGN PRINCIPLES CONSIDERED WHILE DESIGNING DIP STICK SPANNER

1. **Contrast-** It refers to the different elements that contain the complete design.

2. **Alignment-** It helps to create a sharp, ordered appearance by ensuring the elements have a pleasing connection with each other.

3. **Hierarchy-** Using this principle in design indicates the goals of your design.

4. **Repetition-** Repetition is an important design basic because it helps to strengthen the overall look of the design.

5. **Proximity-**Similar or related elements are grouped together to create a relationship between them.

6. **Balance-** It gives form and stability to an individual design and helps to distribute the elements evenly throughout the whole design.

7. **Color-** It should be carefully considered each time because it is largely responsible for dictating the mood of a design.

7. AESTHETICS AND ERGONOMICS PRINCIPLES CONSIDERED WHILE DESIGNING DIP STICK SPANNER

1. **Aesthetics principle-** While designing the handle of dip stick spanner care is taken that instead of using corners we have provided curve or small fillet radius at the ends. Due to such provision it improves the look or appearance and simultaneously it reduces stress concentration at the curve or fillet.
2. **Ergonomics principle-** The length for handle for Dip stick Spanner is selected in such a way that the whole handle can be accommodated by the hand. In this way handling of spanner becomes easy.

8. CONCLUSIONS

After completing this work following things are concluded,

1. While starting any product design problem statement should be clearly specified.
2. The Design process must be consisting of scientific principles for development of product in design stages.
3. Actual application or end use should be studied by the designer in order to avoid further complications.

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