

# Design and Investigation of Safety Cross Stand For Scrambler

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**Abstract** - The safety side stand relates to the side stand for general motorcycle. It is characterized by means to rigid the stand, in an inclined area. When the motorbike is in the respite on a ramp, the typical stand would reverse, where as in safety stand the inverse action is locked, and simultaneously the movement of the bike is sealed by a trifling mechanism that works mechanically. The prototype was generated and analyzed using the Dassault System Solid works software. The 2D view was engendered in AutoCAD

**Key Words:** AutoCAD, FE Analysis, Side stand, Solid works, spring.

## 1. INTRODUCTION

Kick stand has been in use, since the early 18th century. In the year 1869 Albert Berruyer designed the earliest known kickstand. From then it has been reformed and reinvented many times. It was very long and was attached below the handle bars. Then the size of the stand was condensed as side stand style kick stand and came to use from 19th century. Nowadays motorcycles are used throughout the creation. The side style kick stand plays a major role in driving the vehicle in rest position.

This category of kickstand has two disadvantages: -

- 1) It is problematic to park the vehicle in the sloppy region.
- 2) If the handler disremembers to retract the stand, before riding, that will lead to hefty accidents.

In this safety stand, these two drawbacks have been eliminated. The normal design of the stand is not reformed. The normal stand is just fabricated with some attachments. The working is mechanically oriented with the help of spring locks. The motorcycle side stand is detained in both park and normal position with the help of over centred spring. The spring also affords stability and support for the motorcycle when parked

## 2. DESIGN FEATURES

The structural components include,

- A. Side stand.
- B. Spring.
- C. Stand lock attachment.
- D. Accelerator lock attachment.
- E. Clutch wire
- F. Clutch Wire guide

### A. Side Stand

A normal side stand is fabricated. So for this purpose, the side stand of Royal Enfield Deluxe 350 is chosen. The bike side stand is shown in Fig.2.1. This stand is fabricated with a stand lock attachment

### B. Springs

Springs are the chief element that locks the side stand in the place either up or down. The center spring used in side stand is shown in Fig. 2.2 In safety side stand, three springs are used.

1. Spring in stand lock attachment
2. Accelerator lock attachment spring
3. Side stand center spring



**Fig -2.1:** Present side stand of Royal Enfield Deluxe 350

#### 1. Spring in stand lock attachment

This spring controls the piston which curls the stand as it is entirely deployed and prevents the reverse movement of the spring, when the motor bike is parked in the sloppy area

#### 2. Accelerator lock attachment spring

The spring in this attachment controls the piston that locks the accelerator when the stand is in the rest position, and unlocks the accelerator when the stand is in upright place

#### 3. Side stand spring

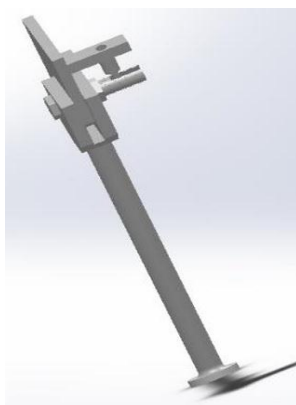
The side stand spring is stretched when it is partly deployed and less stretched when fully or all the way deployed.



**Fig -2.2:** Centre spring

**C. Stand lock attachment**

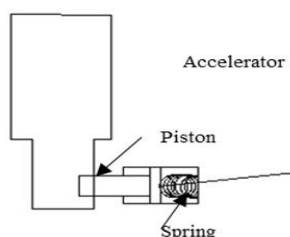
This attachment is used to keep the stand stable when the stand is deployed in the sloppy region as shown in Fig. 2.3. This attachment has a locking piston that is controlled by the spring. This piston gets locked into the groove of the bolt and nut assembly of the stand, thus preventing the reverse action of the stand.



**Fig. 2.3.** Stand lock attachment.

**D. Accelerator lock attachment**

This attachment has a small piston which is controlled by the spring as shown in Fig. 2.4. A small hole in the size of the piston is drilled in the accelerator pipe, when it is in the rest position. When the stand is pulled down, the piston locks the accelerator and when the stand is released, the piston automatically unlocks the accelerator.



**Fig. 2.4.** Accelerator lock attachment

**E. Clutch Wire (or) break wire**

Two clutch wires are used for two dissimilar purposes. One wire which connects the stand lock attachment and clutch. The other which connects the stand as well as the accelerator lock attachment.

**F. Clutch wire guide**

The clutch wire or break wire guide is used to direct the wire appropriately, as shown in Fig.3.2. So that the normal functioning of the wire is not distressed.

**3. WORKING**

**1. Stand in upright position**

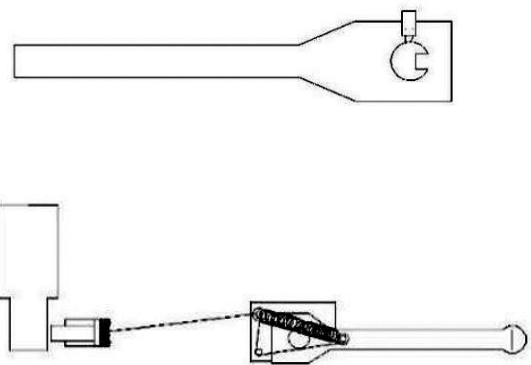
To lift the stand in upright position the clutch lever is to be pressed. This will lift the piston of the 'stand lock attachment' from the groove of the bolt and nut assembly as shown in Fig. 3.1. Now the stand is free to move and hence then it can be brought to upright position.

At the same time the piston of the 'accelerator lock attachment' is pulled by the stand with the aid of clutch wire and its guide, thereby releasing the accelerator as shown in Fig. 3.2

**Fig. 3.1.** Piston lifted up from groove.

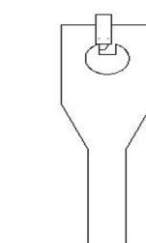
**Fig. 3.2.** Accelerator unlocked

**2. Stand in all the way deployed position**



When the stand is fully deployed, the piston of the 'stand lock attachment' locks the movement of the stand through grooves as shown in Fig.3.3.

At the same time the piston of the accelerator lock attachment' locks the accelerator as shown in Fig. 3.4.



**Fig. 3.3.** Stand locked

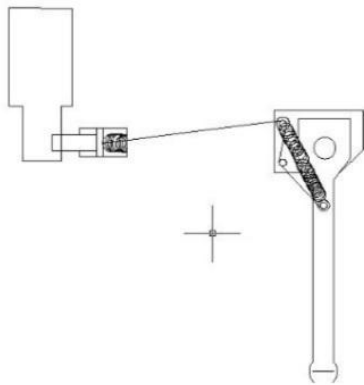


Fig.3.4. Accelerator locked

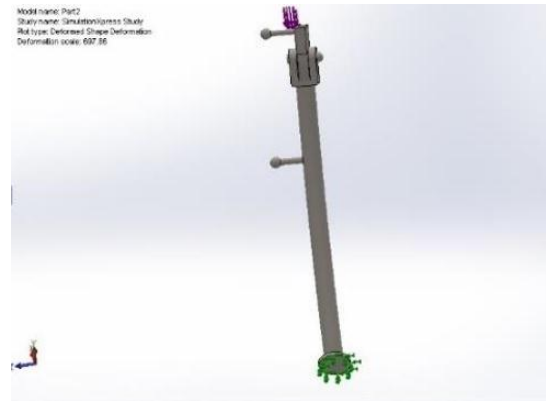


Fig. 4.3. Shape deformation

#### 4. ANALYSIS

##### A. Analysis I

Stand analyzed	:	Royal Enfield Deluxe 350.
Material used	:	<b>Stainless steel.</b>
Weight of bike	:	187 kg.
Assumed weight	:	210 kg.
Weight acting on stand	:	70 kg.
Load acting on stand	:	686.7 N.

##### Results:

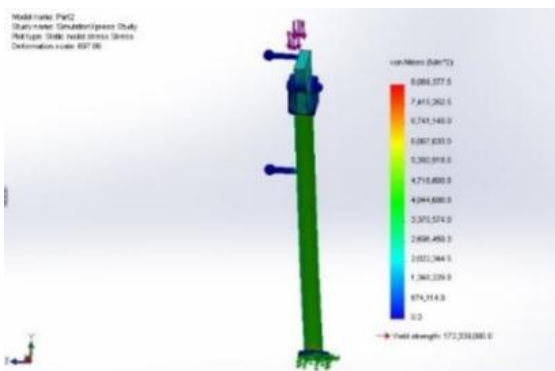


Fig. 4.1. Static nodal stress

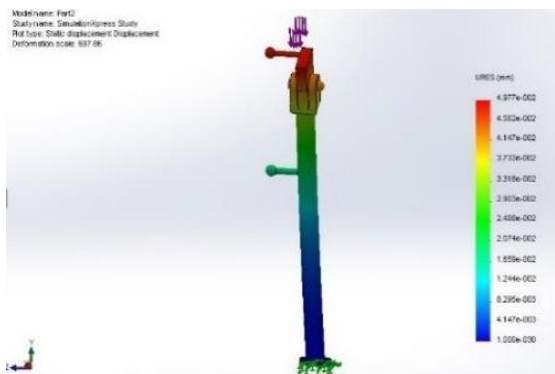


Fig. 4.2. Static displacement

##### B. Analysis II

Stand analyzed	:	Royal Enfield Deluxe 350.
Material used	:	<b>Grey cast iron</b>
Weight of bike	:	187 kg.
Assumed weight	:	210 kg.
Weight acting on stand	:	70 kg.
Load acting on stand	:	686.7 N.

##### Results:

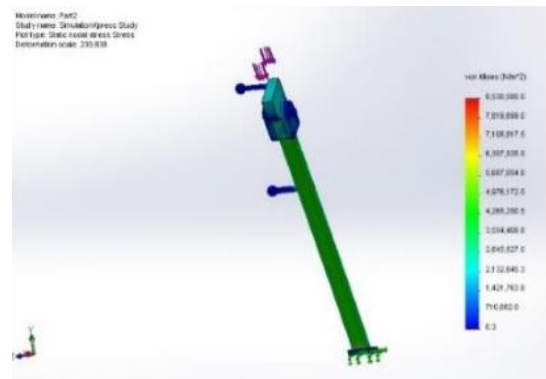


Fig. 4.4. Static nodal stress

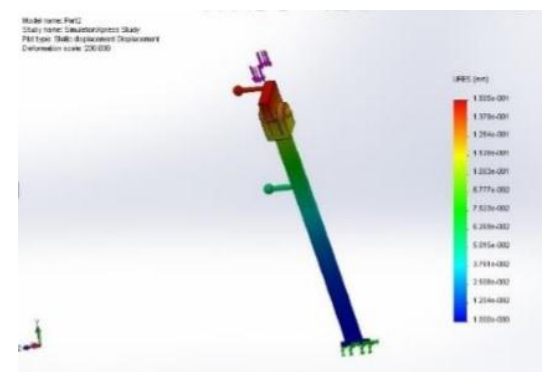


Fig. 4.5. Static displacement.

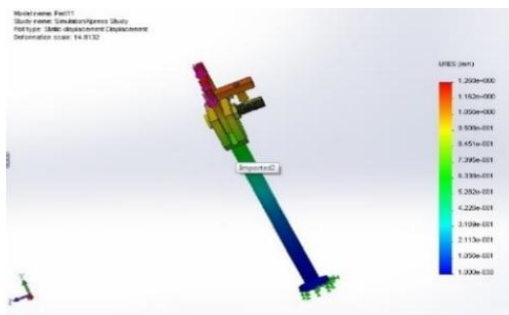
**C. Analysis III**

Stand analyzed	:	Safety Side stand.
Material used	:	<b>Stainless steel.</b>
Weight of bike	:	187 kg.
Assumed weight	:	210 kg.
Weight acting on stand	:	70 kg.
Load acting on stand	:	686.7 N.

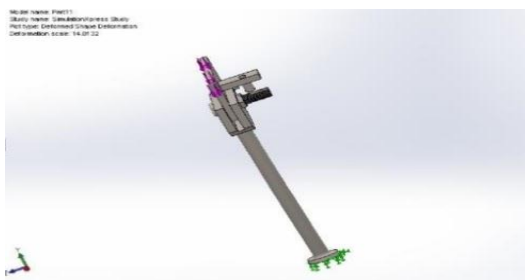
**Results:**



**Fig. 4.6.** Static nodal stress



**Fig. 4.7.** Static displacement.

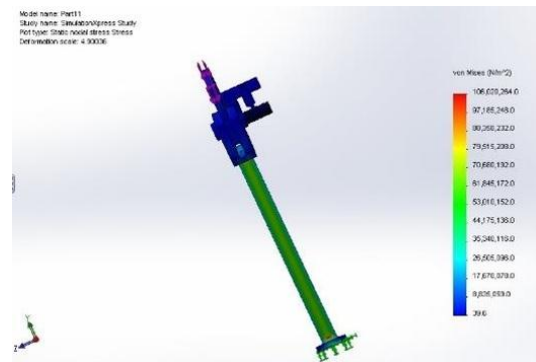


**Fig. 4.8.** Shape deformation

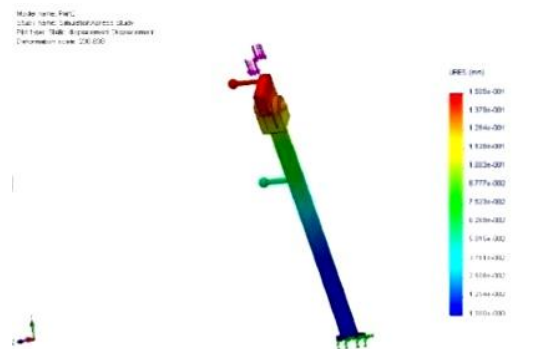
**D. Analysis IV**

Stand analyzed	:	Safety Side stand.
Material used	:	<b>Grey cast iron.</b>
Weight of bike	:	187 kg.
Assumed weight	:	210 kg.
Weight acting on stand	:	70 kg.
Load acting on stand	:	686.7 N.

**Results:**



**Fig. 4.9.** Static nodal stress



**Fig. 4.10.** Static displacement



**Fig. 4.11.** Shape deformation

**5. RESULT AND DISCUSSION**

Discussions were made in the ensuing criteria

- ✓ Hitches faced by the people to park the two wheeler in sloppy region.
- ✓ Living status of modern world.
- ✓ Side stand is the universal method to park the motorcycle to rest when unattended
- ✓ Accidents caused due to side stand.
- ✓ Frame of motorcycle and its weight

The result of the above all criteria is the safety side stand



**Fig. 5.1.** Safety side stand.

## 6. CONCLUSIONS

The safety side stand design is proved as safe theoretically. We are in the progress of implementing the theoretical design practically. It is intended in a way not to affect the working of side stand and the frame of motor cycle. The safety side stand is informal to install, low in price, well-organized, no extra power source mandatory. The design is very compact and so it does not affect the normal functioning of scrambler. This can be implemented in almost all kinds of commercial bikes. Since the mechanism is fully based on springs the life of spring matters in the life of the stand. This can be augmented by using springs along with Pascal's principle of hydraulics. Associating with other kinds of stands the safety stand will surely act as a life saver.

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