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Dry Leak Testing Machine For Front Fork Suspension System

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Abstract - *This paper presents dry leak testing machine for front fork suspension system. Front fork suspension system used in various two wheelers comprises of Inner tube & outer tube. The outer tube is filled with oil meant for absorbing the shocks. Leak testing machine is used for checking leakages of front fork limbs. Leak testing machine includes Cir-clip fitted inside outer tube of front fork limb to retain oil seal which maintains the reserve of the oil in outer tube of limb.*

Key Words: Leak test, Front Fork, Outer tube, Inner tube. Cir-Clip.

1. INTRODUCTION

Dry leak testing machine is a PLC controlled machine for testing the leakage in front fork limb assembly this is a twin station machine and two separate COSMO make leak testing controllers are used to detect leakage. The leakage value is computed as checked by the controller, which gives ok/not ok signal based on prescribed limits. The leak testing machine is called as "dry leak testing" as the air is used to check the leakage instead of traditional water dip leakage checking. This checking is performed by COSMO leak testing controller unit.

1.1 Front Fork assembly

The whole assembly of 2 wheeler front fork is done in the 2 steps of making the part & integrate the assembly of parts as:-

1. OUTER TUBE

2. INNER TUBE

3. OTHER PARTS

Fig -1: Front Fork Suspension system

The cast raw material of outer tube is come from supplier & stored in stores and sent for further operations. The machining of outer tube is done on the VMC machine, which is located at „G" cell in industry. 3 operations of machining is done on machine as Finishing, providing groove of dia. 42 mm. Then the next operation of outer tube is powder coating. Powder coating part is out source. After powder coating outer tube is cleaned an inspected. Then it is sent to assembly.

The cast row material of inner tube is come from supplier to stores and sent for further operations of inner tube. The grinding of inner tube is done on grinding machine in 3 stages and outer diameter is made of 30mm, then for plating inner tubes are sent out to next operation of plating. After plating cleaning and inspection is done and sent it for assembly.

Other parts of front fork assembly includes damping oil, oil seal, M8 bolt , Cir-clip, Dust seal, Piston, springs, piston rings, oil lock, Taper spindle etc. which ensures the whole assembly of front fork.

1.2 Machine Description

Dry leak testing machine consist of two independent leak testing station. Each station is connected to cosmos leak testing controller unit, along with independent swivel arrangement and cir-clip pressing tool.

Fig-2: Dry Leak Testing Machine

The machine consists of the following major assemblies:

[1] Leak testing assembly: this consist of the testing mandrels mounted on a slide, connected to pneumatic cylinder. The mandrel is connected to the leak testing controller, and are design especially with rubber washer to conduct leak testing in very accurate manner.

[2] Cir-clip pressing assembly: this consists of the small pneumatic cylinder connected to the tool designed to press the cir-clip in the outer tube of front fork.

[3] Electrical assembly: this consists of the PLC and all other electrical and electronic items required to machine is define sequence.

2. Sequence of Operation:

[1] Load the component on both LH & RH station when yellow lamp of tower lamp is blinking.

[2] Press two hand cycle start push buttons to start auto cycle. The green lamp of tower lamp confirms auto cycle started.

[3] If component sensors give signals, OD clamping cylinder gets energizes & clamps component.

[4] Clamping cylinder forward position reed switches ensure component got clamped

[5] Top slide cylinder comes down & air supplying nozzles will be inserted into components.

[6] Once top slide cylinder confirmation came through reed switch, the dry leak testing operation starts at a time on both stations depending on component presence status.

[7] Parallel to leak testing operation, operator orients position cir-clips on to component. And he will press two hand cycle start push buttons one more time.

[8] Then cir-clip pressing cylinder comes down & presses cir-clip into components. Pressing cylinder home position ensures pressing is over.

[9] After completing of leak testing operation & circlip pressing operation machine retracts to its home position.

[10] Top cylinder retracts to top position. Home position reed switch confirms top position.

[11] Next OD clamping cylinders & circlip pressing cylinders retracts to their home position.

[12] Unload the component & pass to next station if component is passed or put in rejection bin if component gets fail.

[13]Cycle end & ready for next auto cycle

3. TROUBLE SHOOTING:

Check the inlet air pressure is at 5bar or not Conform the entire reed switch signal that is reed switch signal is coming or not. Check main power supply 415 VAC, 3phases, 50hz.Check all connections are connected properly. Check leak test controller power supply is switched on properly. Ensure proper earthings.

4. CONCLUSION:

Proper selection and implementation of production leak test method starts with an understanding of why the leak test is being performed followed by establishing what the leak rate limit is, and finally a determination of leak test. A careful and thoughtful evaluation at each of these steps, combined with the selection of high quality leak test hardware,

will result in a cost effective, high performance, and reliable production leak test.

This project has described method for finding the leaks in front fork suspension system. Pressure difference obtained by the pressure decay test will give conformation about presence of leaks. This machine is less time consuming and gives quick result and high accuracy. The end result is stricter quality control for leak testing.

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