

A Study of Vibration Control Methods for Front Loaded Washing Machine

C.K Mukherje¹, Ajay Bhardwaj²

Assistant Professor Department of Mechanical Engineering S.S.B.T C.O.E.T Bambhori Jalgaon (M.S) India¹

Assistant Professor & Workshop Superintendent Department of Mechanical Engineering S.S.B.T C.O.E.T Bambhori Jalgaon (M.S) India²

mailme_ajaybhardwaj09@rediffmail.com

Abstract: In this paper study has been done about vibration control methods of front loaded washing machine. Vibration problems are often encountered, both in everyday life like the heavy noise of an unbalanced washing machine, etc. excessive vibrations causes damage and wear on components it should be minimized the aim of vibration control is to reduce unwanted vibrations. The vibrations of washing machine during the spin cycle can shake the whole house, but it can be control with vibration isolation/dampening pads.

Keywords: *Vibration control; Vibration; Forced vibration; Front loaded washing machine; Washer.*

Introduction

[1] Vibration is a mechanical phenomenon where by oscillations occur about an equilibrium point. The oscillations may be periodic such as the motion of a pendulum or random such as the movement of a tire on a gravel road. Vibration is occasionally "desirable". For example, the motion of a tuning fork, the reed in a woodwind instrument or harmonica, or mobile phones or the cone of a loudspeaker is desirable vibration, necessary for the correct functioning of the various devices. More often, vibration is undesirable, wasting energy and creating unwanted sound – noise. For example, the vibration motions of engines, electric motors, or any mechanical device in operation are typically unwanted. Such vibrations can be caused by imbalances in the rotating parts, uneven friction, the meshing of gear teeth, etc. Careful designs usually minimize unwanted vibrations. The vibration which is under the influence of periodic force or motion is called forced vibration like washing machine which shakes because the loads they are carrying are out of balance, front loaded washing machine tends to vibrate more than top loading washing machines, because these have a much faster spin cycle, several things can cause a washing machine to vibrate. High-efficiency front loading washing machines are super. They clean clothing very thoroughly, provide great savings in both energy and water, due to the orientation and high speed of these machines during spin cycle they can react violently with the floor that they are placed on. [2] A Front load washing machine cause more vibration because they spin faster, which helps save energy needed to dry the clothes, and because the direction of the spin adds vibration. Clothes spin to the top of the chamber but then usually drop straight down, over and over.

Washing machine vibrates due to three things i.e. gyrate, shake and basically rattle and roll or walk from its installed location, following are the causes and control methods.

- **Uneven Load**

This can happen when washing a single item such as a large towel or blanket, or several items that tend to group together and merge to one side of the washer during the spin cycle, creating an imbalance that throws the washer into a vibrating mode. Often, the washer will stop on its own but if it does not, you should pause or cancel the cycle, reposition some of the load or add another similar item to help balance the load, and then resume operation.

- **Improper Leveling:**

When the washer was installed, the leveling feet should have been adjusted properly to provide for uneven floor areas. Some washers have self-leveling feet, however on occasion, these also need a slight manual adjustment. Once adjusted, that should remedy the washer vibration problem.

- **Unstable floor**

When a washer is installed on a basement cement floor, there is a very stable platform. But a second or third floor installation however, could have insufficient floor bracing, which can cause the washer to bounce or vibrate when on the spin cycle. There are options to remedy this situation such as add more bracing, or use an anti-vibration washer pad. Washer that vibrates should not use continuously, but should investigate the probable cause and seek a suitable solution. A vibrating washer could literally 'walk' away from its installed space, causing damage to neighboring cabinets or pulling on

its water connections. Shaking could also cause some problems with its electronic components. The problems could be more serious when the vibrating washer is part of a stacking washer/dryer set. Once the washer vibration issue is remedied, you can safely resume operation. [2]

[3]Front load washing machine always fills the same low water level during the wash cycle no matter how many clothes are loaded into the washer. If the load is larger and absorbs much of the wash water causing the level to drop more water is added to maintain the set water level. The water is added to the drum during the tumbling action of the clothes to rapidly saturate the clothes so that less additional water must be added. The internal components of a front load washer are actually simpler than a top load washer. The motor is most often connected to the drum by a pulley belt and wheel. There are no gears or a clutch like a top load washer. There is a flexible bellows system (usually rubber) to keep the clothes - and the water - inside the drum during the cycles. It is essential to keep this system in top working order or small items can slip between the inner basket and tub causing clogs in the drainage system or jamming the rotational motion of the inner basket. Because it is flexible and usually has many folds that flex while the washer is in use, it can trap water and cause odors from mildew or mold to form. Regular cleaning and maintenance of a front load washer is a must. While the mechanical internal components are simpler, the electronic control system is not. [4]One of the advantages of a front load washer is its energy efficiency. The washer uses significantly less water - only 20 to 25 gallons - than a top load washer that uses around 40 gallons. It also is able to spin clothes at a rapid rate to extract more water and lessen time in the dryer. [5]All front-load washing machines have shock absorbers that are used to dampen the tub movement in the spin cycle. The shock absorbers or struts are attached to the base frame and to the outer tub and need to remove the front panel or the rear

panel to access them. When shock absorbers weaken or become damaged, unbalanced loads will cause the washer to shake or move and the machine will often make a loud banging sound during the spin cycle. If the symptom is not corrected, it can lead to damage of other components. Inspect the shocks for signs of broken attachments, leaked fluids or a weakened dampening action and replace both shocks if worn. Remove power from the appliance before attempting this repair.

Conclusion:

Careful technical design is required if front loaded washing machines are to achieve their required lifetime, both structural and airborne noise generated by the washing machine also has to be properly isolated . A person doesn't feel comfortable when their surroundings are noisy and vibrating.

Vibration-related issues can be of major financial significance, decisions made by washing machine designers about its structure and geometry, its components and the materials used to reduce noise and vibration throughout are of fundamental importance. System's vibration characteristics can have a major influence on the lifetime of the product in which it is installed, specific countermeasures are needed.

Reference:

- [1] en.wikipedia.org/wiki/Vibration
- [2] housewares.about.com > ... > Laundry Appliances Use, Care and FAQ's
- [3] laundry.about.com > ... > Selecting a Clothes Washer
- [4] Mary Marlowe Leverette Laundry & Laundry Rooms Expert
- [5] [www.partselect.com/Repair/Washer/Shakes-Moves/Shock Absorber](http://www.partselect.com/Repair/Washer/Shakes-Moves/Shock-Absorber)