



# **VEHICLE SERVICING AND REPAIRING**

**NTQF Level II**

## **Learning Guide- #34**

**Unit of Competence: Remove, Inspect, and Refit  
Vehicle Wheel & Hub Assemblies**

**Module Title Removing, Inspecting, and Refitting  
Vehicle Wheel & Hub Assemblies**

**LG Code: EIS VSR2 M09 LO4-LG-34**

**TTLM Code: EIS VSR2 TTLM 0919v1**

**LO4: Clean up work area and finalize work  
processes**

<b>Instruction Sheet</b>	<b>Clean up work area and finalize work processes</b>
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This learning guide is developed to provide you the necessary information regarding the following content coverage and topics –

- Final inspection
- Check and store Tools and equipment's
- Complete workplace documentation

This guide will also assist you to attain the learning outcome stated in the cover page.

Specifically, upon completion of this Learning Guide, you will be able to –

- ✓ Final inspection is made to ensure work is to workplace expectations and vehicle is presented ready for use
- ✓ Tools and equipment are checked and stored according to workplace expectations
- ✓ Workplace documentation is completed according to workplace procedures

Learning Instructions:

1. Read the specific objectives of this Learning Guide.
2. Follow the instructions described in number 2 to 16.
3. Read the information written in the “Information Sheets 1”. Try to understand what are being discussed. Ask you teacher for assistance if you have hard time understanding them.
4. Accomplish the “Self-check 1” in page 6.
5. Ask from your teacher the key to correction (key answers) or you can request your teacher to correct your work. (You are to get the key answer only after you finished answering the Self-check 1).
6. If you earned a satisfactory evaluation proceed to “Information Sheet 2”. However, if your rating is unsatisfactory, see your teacher for further instructions or go back to Learning Activity #1.
7. Submit your accomplished Self-check. This will form part of your training portfolio.

**Information Sheet-1**

**Final inspection**

**Cleaning Equipment Safety**

Parts cleaning are a necessary step in most repair procedures. Cleaning automotive parts can be divided into three basic categories.

- i. **Chemical cleaning** relies primarily on some type of chemical action to remove dirt, grease, scale, paint, or rust (Figure 4 –1). A combination of heat, agitation, mechanical scrubbing, or washing may be used to help remove dirt. Chemical cleaning equipment includes small parts washers, hot/cold tanks, pressure washers, spray washers, and salt baths.
- ii. **Thermal cleaning** relies on heat, which bakes off or oxidizes the dirt. Thermal cleaning leaves an ash residue on the surface that must be removed by an additional cleaning process, such as airless shot blasting or spray washing.
- iii. **Abrasive cleaning** relies on physical abrasion to clean the surface. This includes everything from a wire brush to glass bead blasting, airless steel shot blasting, abrasive tumbling, and vibratory cleaning. Chemical in-tank solution sonic cleaning might also be included here because it relies on the scrubbing action of ultrasonic sound waves to loosen surface contaminants.



Figure 4- 1 A solvent-based parts washer.

## Guide to Inspection

To check a wheel bearing, the auto technician should grasp the wheel at top and bottom and attempt to rock it. If there's any movement there, it means the bearings are loose and need to be replaced. Another option is to rotate the wheel by hand – any roughness or noise will tell you that the bearings are worn or damaged. If the vehicle has a lot of miles on it, and one wheel bearing has given out, be sure to check all of the others as well. Chances are, they are nearing the end of their lifecycle.

### Wheel assembly run-out testing

The term wheel run-out or out of round refers to any component of a wheel or tire assembly that is not perfectly round. Radial run-out is where the radius of the tire is not consistent from the wheel midpoint to any point on the rim. Too much radial run-out can cause up and down vibrations which means there will be up and down hopping when it spins. Radial run out as well as other wheel and tire malformations can be a cause of bumpy rides and sometimes even collisions. Lateral run-out is the amount of sideways motion or the amount of “wobble” in a wheel or tire as it rotates which feels like dynamic imbalance problem.

### BALANCE/RUNOUT

Tire and wheel imbalance may result in irregular tire wear. Steering axle and drive axle tires should be balanced dynamically for best results. Vibration may also be the result of mismatch of the high and low spots of the tire and wheel.

To resolve vibration problems, the run -out of tire and rim should be measured, and then matched in the following manner:

1. With the tire mounted on the rim, number both at 12 asymmetrical points.
2. Measure run -out at the shoulder of the tire and record the results. (Note: accuracy in these measurements is essential.)
3. Demount the tire, measure the rim for runout, record the results, then average the inside and outside measurements.
4. Matching the lowest average point of the rim to the highest average point of the tire, remount the tire, then balance accurately.
5. It may be necessary to repeat this procedure since the tire cannot be measured accurately while on an imperfect rim. Note: If a run-out dial is not available, rotate the tire 180° relative to the rim and remount. If the vibration persists, rotate the tire another 90 °, then another 180 °.
6. The maximum suggested radial run-out for a rotating tire/wheel assembly is .125 inches for both front and rear tire positions. If run-out exceeds suggested limits, check for bent rims, cocked rims, improperly adjusted wheel bearings, improper tire bead seating, tire flat spots, improperly tightened rim clamps and rear rim spacers.

### Tire Run-out

Tire run-out — also sometimes referred to as out-of-round — involves a tire which is no longer perfectly round. As a result, the tire's balance will be thrown off. Up to a certain point, run-out won't affect the performance of a car. Yet once it reaches a critical threshold, problems like vibration and excessive wear will ensue.

Tire run-out may take one of two forms, known respectively as radial and lateral run-out. Radial run-out, which tends to be more common, has to do with the distance between a tire's tread and the center of the wheel. Ideally, this distance should be the same at virtually any point on the outside of the tire.

Radial run-out involves distance discrepancies from one point to another. The greater this discrepancy, the more it will cause the wheel to bounce up and down as it rotates. This bouncing causes the vibrations that often travel up through the steering column, becoming noticeable inside of the car.

Lateral run-out has to do with the distance between the center and the edge of a tire's tread. The greater the amount of lateral run-out, the less support a tire will have at certain points in its rotation. This lack of support can cause the tire to wiggle or vibrate. It may also cause a car to veer erratically left and right as it moves.

### **Causes**

Tire run-out tends to be a self-propagating issue. In other words, once the process of run-out has begun, it will progressively grow worse and worse. Yet run-out may have a number of root causes that set this spiral into motion. In the majority of cases, the initial issue involves a wheel or tire that was not installed correctly.

You can avoid this cause of run-out by always having a professional mechanic install your wheels and tires. Not only will they have the experience necessary to perform this task correctly, but they will also check their work using a special run-out gauge. Such tools allow them to ensure that a wheel goes on straight and true.

Run-out may also stem from tires with manufacturing flaws. Less expensive tires often suffer from this issue. For one thing, cheaper tires are not subject to as many quality control protocols. Second, the manufacturers of such wheels often use inferior wheel molds. High-quality tires should be manufactured using segmented molds.

### **Prevention**

Proactive car owners can prevent tire run-out in a number of ways. The first involves stocking your automobile with only the highest quality tires. While it can be daunting to pay more for such tires, remind yourself that you will be saving money in the long run by preventing run-out and associated problems.

Second, have your tires inspected, rotated, and maintained on a regular basis. An ounce of prevention will go a long way to ensuring that your tires stay as close as possible to a perfectly round state. For more information on what it takes to keep your tires in tip-top shape, contact the experts at Evans Tire & Service Centers.

<b>Self-Check -1</b>	<b>Written Test</b>
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**Directions:** Answer all the questions listed below. Use the Answer sheet provided in the next page:

**Sort answer**

1. Write the basic classification of cleaning automotive parts and detail explain them
2. Define the term of wheel run-out
3. What are result of imbalance Tire and wheel
4. Write the prevention of run-out

**Note: Satisfactory rating - 60 %**

**Unsatisfactory - below 60%**

**Answer Sheet**

Score = \_\_\_\_\_

Rating: \_\_\_\_\_

**Name** \_\_\_\_\_ **ID NO** \_\_\_\_\_

<b>Information Sheet-2</b>	<b>Check and store Tools and equipment's</b>
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## Receipt handling and storage

Suppliers of tires, wheels, rims and assemblies have an obligation to ensure they are delivered in a safe manner and are assembled in a way not to cause an unacceptable level of risk. This should include:

- ✓ the vehicle used to transport tires, wheels, rims and assemblies is fit for purpose
- ✓ Manufacturers' transport and handling instructions are followed (e.g. bead protectors are in place on new tires)
- ✓ Tires are secured during transport using the correct slings or strapping, not chains, to avoid internal damage to the tires
- ✓ ensure tires are loaded and unloaded correctly with suitably rated mobile plant, preferably a tire handler (if using a forklift, to avoid damage, do not insert tires through the center of the tire)
- ✓ Tires assemblies are assembled and inflated to OEM (original equipment manufacturer) requirements for transportation.

On receipt of assemblies, where tires have been fitted to wheels or rims off site, conduct a verification check that all wheel and rim components are secure and that the tires are at the OEM (original equipment manufacturer) recommended pressure for transport, prior to handling.

A record of the details of tires, wheels and rims that have come to site and are to be used as part of operations must be maintained. This should include inspection and repair information. This may be achieved by using the stamped or branded serial numbers for identification.

## 5.2 Handling

Handling damage to tires can lead to tire failure at any time. As a minimum, the tire manufacturers' instructions should form the basis of correct handling technique. General guidance includes:

- use only fit-for-purpose tire handling equipment
- using flat slings or straps for lifting—never use steel wire rope slings, chains or rope
- where possible leave the bead protector in place until the tire is ready to be fitted
- Consider keeping the bead protectors in case the tire is removed in the future for repair or re-tread.

Large heavy equipment tires and tire assemblies can weigh a significant amount.

Some vehicles use water ballast in the tires which may weigh some 20-30% more than similar sized air-filled tires. At this size there is no other option but to use mobile machinery to handle the items. If tire assemblies move unexpectedly during transport, handling or fitting there is potential for crush injuries to tire fitters or machine operators.

The following should be considered, when working with, or handling heavy objects during tire, wheel and rim repairs:



- use jacking pads, jacking equipment and stands that are designed and rated according to the instructions of the OEM
- the weight of wheel assemblies should be clearly marked in a prominent location
- Never work near or under a suspended load—this includes vehicles that are on jacks. A vehicle on a jack is considered a suspended load until it is supported on appropriate work stands
- apply sound communication and traffic management procedures when tire fitters or spotters are interacting with heavy mobile equipment

Aside from purpose-built tire handling machines, various tire-handling equipment and attachments are commercially available for use with forklifts, telehandlers, loaders and hydraulic vehicle loading cranes.

<b>Self-Check -1</b>	<b>Written Test</b>
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**Directions:** Answer all the questions listed below. Use the Answer sheet provided in the next page:

**Sort answer**

1. Write three points about cause of unacceptable level of risk
2. Write three points about basis correct handling technique from tire manufacturers' instructions.

**Note: Satisfactory rating - 60 %**

**Unsatisfactory - below 60%**

**Answer Sheet**

Score = \_\_\_\_\_

Rating: \_\_\_\_\_

**Name** \_\_\_\_\_ **ID NO** \_\_\_\_\_

### Information Sheet-3

## Complete workplace documentation

### Workplace Conditions

- Workplace conditions are very critical to ensuring the safe demounting, mounting and inflation of tires of heavy mechanical vehicles. It is essential to ensure that the premises are safe prior to the work.
- Areas used should be enclosed or fenced off. Warning notices on prevention of unauthorized entry should also be posted in conspicuous area as well as around the vehicle. The servicing worker or supervisor should ensure that the area surrounding the vehicle is clear of persons and equipment before performing such work. When considering a suitable place for the work, barriers such as walls, containers or other natural barriers should be set up or arranged with the aim of reducing the effects or injuries to anyone once the tyre or rim components fly off or explode.
- The work should not be performed on grades, slopes, ramps or cambers with gradient.
- The surfaces or floors should be:-
  - a) firm, flat, smooth and level;
  - b) Free from debris, bumps, objects or contaminants;
  - c) Free from potholes or loose materials; and
  - d) Well-drained.
- The working environment should be sufficiently well lit by natural or artificial lighting. Lighting should be so arranged to avoid glare where practicable. Extremes of light and dark between adjacent areas should be avoided as it needs some time for the eyes of servicing workers to adapt to a sudden change in light intensity.
- Any work should be avoided when weather conditions may possibly endanger the stability of the equipment or cause danger to the servicing workers working nearby. Attention should also be paid to weather warnings announced by the Hong Kong Observatory such as the thunderstorm warning, rainstorm warning, typhoon signal, flooding signal and strong monsoon signal, etc.

### 10. Documentation

- To perform tyre demounting, mounting and inflation work safely, manufacturers' manuals such as rim manuals, tyre manuals, service manuals and maintenance manuals should be readily available for reference by the relevant personnel in the workplace.
- A logbook system should be in place to record all inspections, tests, repairs, maintenance and hours of service of the respective wheel components. All entries

should be dated and signed by the operators, maintenance staff or supervisors. The person responsible for the heavy mechanical vehicle should ensure that the logbook is kept up-to-date and easily accessible for inspection.

<b>Self-Check -1</b>	<b>Written Test</b>
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**Directions:** Answer all the questions listed below. Use the Answer sheet provided in the next page:

**Sort answer**

**Note: Satisfactory rating - 60 %**

**Unsatisfactory - below 60%**

**Answer Sheet**

Score = \_\_\_\_\_

Rating: \_\_\_\_\_

**Name** \_\_\_\_\_ **ID NO** \_\_\_\_\_

### List of Reference Materials

- 1- Crawford's Guide to Beginners Auto Maintenance & Repair  
([www.CrawfordsAutoService.com](http://www.CrawfordsAutoService.com))
- 2- Using a Fire Extinguisher From OSHA Webpage:  
([http://www.osha.gov/SLTC/etools/evacuation/portable\\_use.html#Using](http://www.osha.gov/SLTC/etools/evacuation/portable_use.html#Using))
- 3- ↑ <https://www.safework.nsw.gov.au/safety-alerts/safety-alerts/uncontrolled-movement-of-vehicles>
- 4- ↑ <https://checkers-safety.com/chocking-procedures/>
- 5- ↑ <https://www.2carpros.com/articles/wheel-removal-and-re-installation>
- 6- ↑ <https://www.2carpros.com/articles/wheel-removal-and-re-installation>
- 7- ↑ <http://cf.linnbenton.edu/eit/app/mackd/web.cfm?pgID=7739>
- 8- ↑ <http://www.safebraking.com/top-ten-brake-job-mistakes-pads-rotors-calipers/>
- 9- ↑ <http://www.boatus.com/magazine/trailering/2013/october/repacking-or-replacing-your-trailer-tire-bearings.asp>
- 10- ↑ <https://www.2carpros.com/articles/how-to-replace-front-wheel-bearings-and-seals>
- 11- ↑ <http://knowhow.napaonline.com/dirty-jobs-pack-wheel-bearing/>