

GS Yuasa E-Learning Support Documentation

Lead Acid Battery Failure Modes Overview

Overview:

This support documentation has been designed to work in conjunction with the GS Yuasa Academy “Lead Acid Battery Failure Modes Overview” course and covers of the following subjects:

- **Battery failure overview**
- **Battery failure modes**

Battery failure overview

Understanding the life cycle and factors that affect both the performance and failure of lead acid batteries is key to accurate battery issue diagnosis.

Once the condition of a suspect battery has been established it is possible to use this data to identify the reasons for the failure. This can help to prevent further failures for the same reasons by educating end users about good battery care, usage and maintenance. To do this we must first understand the life cycle of a Lead acid battery before looking at the reasons for battery failure.

Battery failure modes

Incorrect application

If the battery installed on the vehicle has insufficient specification compared to the OE requirement, the battery is likely to fail prematurely. Always fit the correct battery as recommended by GS Yuasa as failure to do this will immediately invalidate warranty.

Physical damage

Physical damage can be caused by using the wrong handling practices when in storage or by incorrect installation or removal procedures on the vehicle.

Service wear & tear

Service wear and tear is the loss of plate active material caused by the natural cycling of the battery when in service resulting in a gradual loss of capacity and performance over time.

Deep cycling

Deep cycling greatly increases the loss of plate active material and resulting in an accelerated loss of performance due to the battery being rapidly/repeatedly charged from a deeply discharge state (<65% state of charge)



Sulphation

Sulphation is a chemical process which occurs in any lead acid battery and is a natural consequence of battery discharge. Permanent sulphation damage is a result of a battery being allowed to remain in a discharged state (<12.40V) either on or off a vehicle for an extended period and can be caused by:

- The vehicle charging system incorrectly charging the battery
- An uncontrolled parasitic drain on the electrical system
- Vehicle used for short journeys only, infrequent vehicle use or long periods of inactivity (seasonal garaging)

Sulphation significantly impairs battery performance and lifespan and will result in premature failure

Overcharging

Overcharging damage is caused by a fault in the vehicles charging system that results in the battery being charged at an excessively high voltage resulting in:

- Battery overheating
- Electrolyte evaporation
- Accelerated break up of plate material
- Loss of performance
- Premature failure

Undercharging

Undercharging damage is also caused by a fault in the vehicles charging system that results in the battery being charged at lower voltage than that required to fully charge the battery resulting in sulphation damage and premature battery failure as previously described.

