Hypermiling

Introduction

Hypermiling is the practice of maximising the mileage achieved by automobiles involving (but not limited to) the cumulation of optimising the following variables listed below to maximise fuel efficiency and minimise mechanical and thermal losses.

Under the adverse current economic circumstances resulting in high interest rates and rising fuel prices, it has become increasingly necessary to explore ways of managing our fuel consumption more efficiently to maximise the cost-effectiveness of private automobile ownership and stem the demand for fuel, enabling for the prices to recover to more affordable levels.

On the other hand, several hypermiling enthusiasts merely partake in the activity for recreational purposes, gamifying the practice into a competition for achieving the highest mileage.

Engine

An optimum gear ratio for cars tends to be one that favours engine torque over engine speed, as a larger proportion of the combustion pressure moves the car as opposed to being lost internally. However the torque should still be moderated to avoid excessive pressures that could damage the engine. Furthermore, if the engine speed is too low, the thermal losses will be greater as the gases would have insufficient time to expand before the heat escapes.

It is best practice to lubricate the internal combustion engine using the grades of oil recommended by the manufacturer to minimise frictional losses between the reciprocating pistons and shafts.  
Whilst thicker oils offer a more protective lubrication layer with a lower rate of deterioration, their higher viscosity renders them less able to seep into smaller crevices, hence providing a smaller surface area of coverage compared to thinner oils.

To mitigate the development of internal rust and particulate matter, the engine can be occasionally cleaned with ethanol-rich fuel or even pure ethanol. The main drawback is that prolonged use of alcohol may accelerate the corrosion of the engine.

Fairing

The turbulence of the airflow around the automobile exterior will resist the motion of the car, increasing the brake specific fuel consumption (fuel consumed per unit of power output) of the engine.   
Consequently, it is best practice to leave all windows shut and not allowing objects such as flags or bicycles to hang externally.

To reduce the drag coefficient, the bodyshells of some cars have been modified with fairings to become more streamlined. An aerodynamic front reduces the form drag, allowing the air to flow around the car exterior more smoothly. An aerodynamic rear delays the separation of the airflow from the car body, reducing the suction effect that results from low pressure behind the car.

Tyre

An adequate tyre pressure should be maintained at all times to minimise the rolling resistance between the wheels and the road. Larger diameter wheels tend to have lower rolling resistance, along with offering a smoother ride, useful especially on roads with potholes. The main drawback is that increasing the wheel diameter will increase the car’s centre of mass and increase drag (at the wheels).

Low profile tyres offer lower rolling resistance, however offer less comfort and less shock-absorbency for the wheels.

Weight

To minimise the total weight, the car should be rid of all unnecessary items (especially in the boot). Likewise, the amount of fuel stored in the tank should also be reduced to better reflect the amount of fuel you actually require for the particular journey.

These marginal gains will stack up to make the car lighter, reducing the loads and frictional losses in the bearings, reducing maintenance costs.

Coasting

Engines perform optimally under steady-state conditions, therefore it is good practice to maintain a constant speed and avoid sharp accelerations. This is where the momentum of the car can offer a great benefit.  
When descending down a noticeable gradient, the accelerator can be disengaged so that no fuel is consumed during the descent.

As increasing the engine power provides a diminishing return on the achieved speed due to increased drag, hypermilers tend to slightly reduce their speed to greatly reduce their fuel consumption.