

1 Motor Choice

Maybe an intro?

1.1 Required Parameters

The main requirements of the motor are:

- Size- the motor has to fit under the board
- Torque- There should be enough torque to accelerate uphill - 10Nm at the wheel [figure]
- Speed- The Kv motor parameter should be
- Power

1.2 AC Brush-less Motor

The AC induction motor is the most common type of motor in large industrial applications as it is very efficient durable and reliable. However, using a DC battery source would require a variable frequency inverter to produce an AC output to the motor and be able to control the speed, and particularly with single phase induction motors the starting torque is very low which is unsuitable for the application of a skateboard.

1.3 DC Brushed Motor

Using a commutator allows a motor to be run from a DC supply but by using carbon brushes adds a large amount of friction to the operation and varying the speed of this type of motor is harder especially if two motors were to be used as ensuring they are running at the same speed is challenging

1.4 DC Brush-less Motor

With electronic speed control a motor can be run from a DC supply with relatively simple control of speed. Also as this eliminates the need for a commutator there is less friction so greater efficiency, longer lifespan and reduced weight for the same output power. This motor family also gives a large starting torque so the board will be able to accelerate quickly from the start. For these reasons it was decided a DC brush-less motor would be used.

2 Power-train

2.1 Belt

Due to elasticity of rubber belts this option provides low noise and vibration and allows for efficient power transmission. Furthermore, they are very low

maintenance and have a long lifespan.

2.2 Gearing

Having the output of the motor go directly into a gear arrangement or a gear box would allow for a vast array of gear ratios however this would require strong gears to provide the required torque and the large range of output speeds of DC motors means a large gear ratio may be unnecessary.

more specific
torque info

2.3 Chain

Using a chain drive is the most efficient way to transmit power out of the options covered with an typical efficiency of 98%. [REFERENCE P80 mechanical power efficiency] However it is high maintenance due to the need of lubrication to prevent wear and oxidation.

2.4 Hub Motor

Hub motors are entirely contained in the wheels of the skateboard and they offer many advantages- mainly they are extremely quiet, low maintenance and have a sleek appearance. [Details] However as they have no gear ratios and are limited in terms of space of the wheels they provide less torque than a traditional drive. [cooling?, wheel customization, ride- thin polyurethane]