Enhancing Energy Efficiency in Electric Vehicles: The Role of the Torque Converter in Sustainable Mobility

DANIEL JULIANO PAMPLONA DA SILVA, ICARO HISSAO ROCHA MANDAI
e THIAGO DE ALMEIDA BAZIOTTI

daniel.silva@unifal-mg.edu.br

Introduction

- Emissions from internal combustion engine vehicles are a significant environmental problem.
- Electric vehicles (EV) are a solution with zero gas emissions [1].
- The research addresses the inclusion of a gearbox in electric vehicles, which can reduce consumption.

Materials and Methods

- Transformation of a human-powered cargo tricycle (pedal-powered) – Fig. (1).

Fig. 1: Original tricycle.

- On an electric tricycle with a gearbox – Fig. (2).

Fig. 2: Modified tricycle.

- Equipped with a 1000W motor and bicycle gear system.
- Battery built from 18650 cells from laptop batteries – other works [2].
- Tests at the Poços de Caldas Campus of UNIFAL-MG. 1.2 km circuit (10 laps per gear – 7 gears) – 84 km of testing.

Results

- First gear resulted in lower battery consumption.
- Relationship between gear ratio and energy consumption: higher gear → higher consumption – Fig. (3).

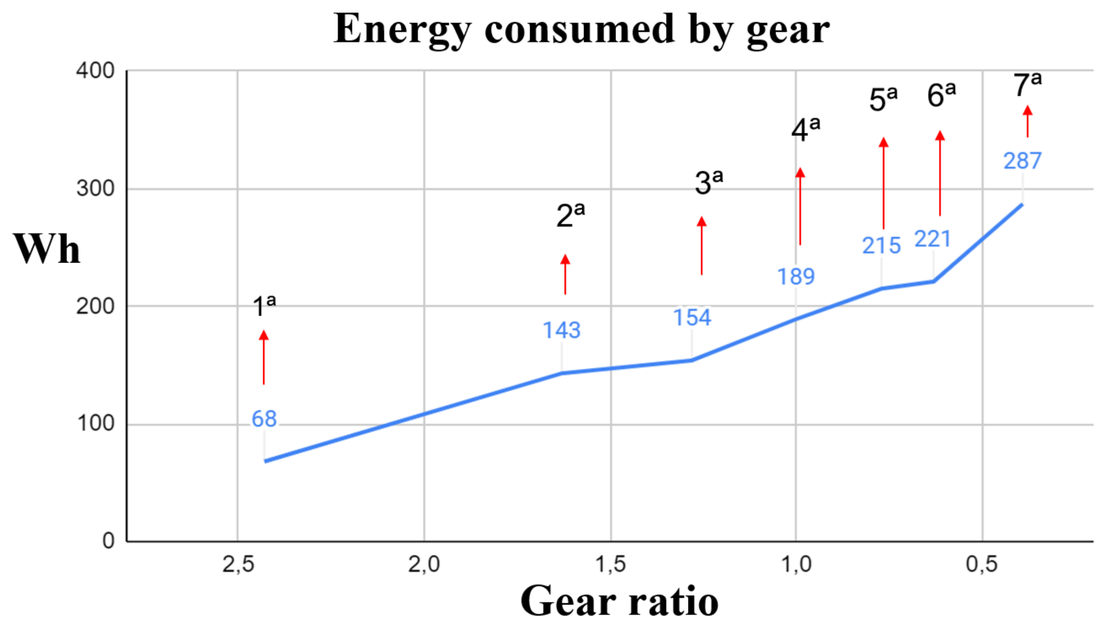

Fig. 3: Consumption by gear.

- Higher gear (7th) increased consumption without an increase in speed – Fig. (4).

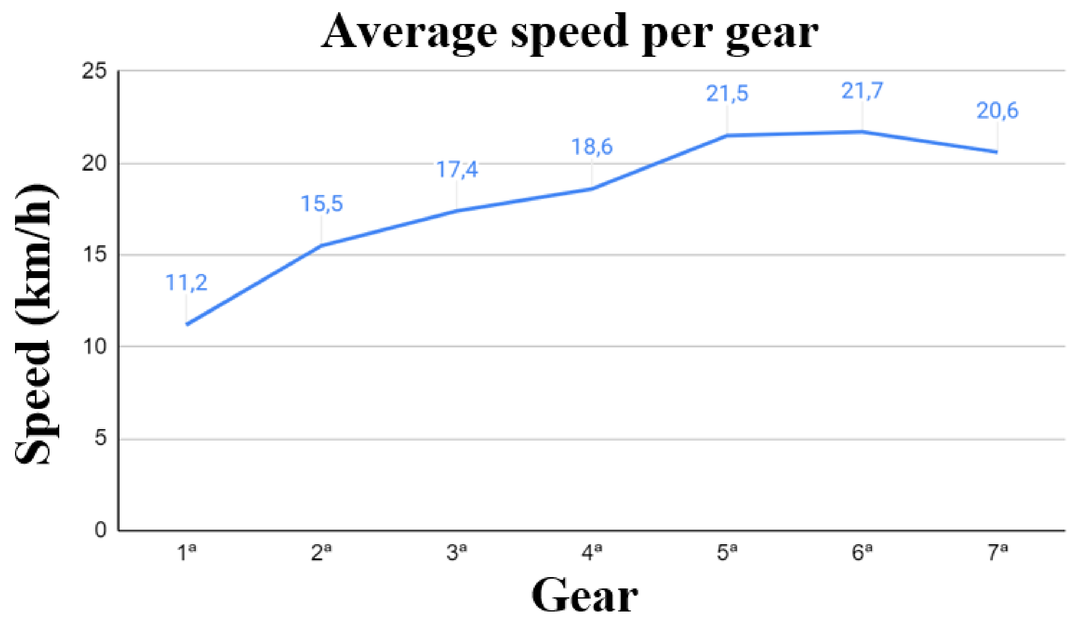

Fig. 4: Speed by gear.

Conclusions

- Gearbox significantly influenced consumption.
- Lower gears provided flexibility for inclines.
- Additional tests are needed on different circuits for more refined conclusions.

Referências

[1] ABVE Associação Brasileira do Veículo Elétrico. Available at: http://www.abve.org.br/2023-supera-todas-as-previsoes-94-mil-eletrificados/. Accessed on: 22 mar. 2024.

[2] BAZIOTTI, T. 2022. Reaproveitamento de células 18650 oriundas de baterias de notebook para aplicação em sistema fotovoltaico off-grid residencial: teste, estudo de caso e viabilidade econômica. Available at: https://bdtd.unifal-mg.edu.br:8443/handle/tede/2338. Accessed on: 23 jun. 2024.