Ducati: Prospettive nel settore E-Mobility

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Bi-Rex – 18/11/2020
European Commission “Sustainable mobility – The European Green Deal”
**Ducati e-Mobility**

EU Green Deal

**EU funds €3bn for batteries R&D**

- The EU has approved a €3.2bn fund to promote the research and development of batteries

- National and regional granted funds

**Ducati Battery/Electrification initiatives:**

- **Bi-Rex**
  - "Progetto IPPSAL - Integrazione Processo Prodotto Servizio per Accumulatori al Litio"
  - Industry and university consortium
  - Big-data and battery systems advanced technologies

- **University of Bologna**
  - Moto Student
  - Our first significant experience
  - Electrification research & test
  - Advanced cells tests (LEMAD)
  - Know-how!!!
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MotoStudent

MotoStudent championship
› MotorLand Aragón FIM Circuit, 4 – 7 October 2018.
  • MotoStudent electric category (100% electric propulsion system)
    - Podium: 3rd overall in Electric category
    - Best Rookie 2018 in Electric category
    - Best Acceleration time
      - (0-150m 6.28'', 0-100km/h 3.85'')
    - Best Gymkhana time

› Ducati support
  • Fondazione Ducati sponsorship
  • Ducati involved during design phase
  • Some vehicle parts provided

Next championship
› MotorLand Aragón FIM Circuit, 17 – 21 March 2021
› New bike
  • Updated BMS and battery pack
  • New vehicle lighter parts
  • Special cooling system
Why Ducati isn’t entering the big-size electric motorcycles market?

› A very limited market, still
  • Electric vehicles only 1.3% of total motorcycles
    - Mainly mopeds/scooters
  • Small companies struggle to grow
  • Big players are in trouble too

› High costs, small revenues
  • ICE powertrain is far more cheap than an EV battery pack

› High technical barriers
  • EV user experience still not able to overcome the EV limitations
    - Battery ...
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Energy density comparison

Energy storage
› The battery pack is the “Achilles’ heel” for e-PTW
   • Motorcycles are critical in terms of overall weight, a heavy battery pack is crucial, blocking the development of e-PTW

Gasoline
1 kg

Gasoline: 12kWh/kg * 33% ICE efficiency = 4 kWh/kg net energy

Electricity
20 kg

Li-Ion cells: less than 250 Wh/kg net energy (2020 automotive cells)
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Theoretical weight with the same autonomy

Gasoline Monster
2020

206 kg

vehicle 134 kg - engine 60kg – fuel 12 kg

Gasoline: 12 kWh/kg * 33% ICE efficiency = 4 kWh/kg net energy
Li-Ion cells: 250 Wh/kg net energy (2020) up to 300 – 320 Wh/kg in ten years
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Theoretical weight with the same autonomy

Gasoline Monster 2020
- Vehicle: 134 kg - engine 60 kg - fuel 12 kg

Theoretical Electric Monster 2020
- Vehicle: 134 kg - motor/inverter 31 kg - battery + case 206 kg

206 kg

371 kg

Gasoline: 12 kWh/kg * 33% ICE efficiency = 4 kWh/kg net energy
Li-Ion cells: 250 Wh/kg net energy (2020) up to 300 – 320 Wh/kg in ten years
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Theoretical weight with the same autonomy

Gasoline Monster 2020
vehicle 134 kg - engine 60kg – fuel 12 kg
206 kg

Theoretical Electric Monster 2020
vehicle 134 kg - motor/inverter 31kg – battery + case 206 kg
371 kg

Theoretical Electric Monster 2030
vehicle 134 kg - motor/inverter 30kg – battery + case 175 kg
339 kg

Gasoline: 12kWh/kg * 33% ICE efficiency = 4 kWh/kg net energy
Li-Ion cells: 250 Wh/kg net energy (2020) up to 300 – 320 Wh/kg in ten years
Gasoline Motorcycle Fuel Costs (Ducati MTS 1260)

› Petrol, Italy average cost: 1.65€ per liter
  • UK: 1.45€ per liter
  • USA: 0.72€ per liter

› Fuel consumption (urban cycle): 15km per liter (worst case)

› Cost for a 1500km trip: 165€ (Italy)

› Refueling
  • Total 100l
    - 5 stops
      Multistrada 20l tank
      Approx. 5 minutes each ...

Recharge cost less than refuel, but ... it’s not fun!
Ok for urban mobility!

e-Motorcycle Electric Energy Costs (estimated)

› Electricity, Italy: 0.140€/kWh (industrial avg.)
  • UK: 0.14€/kWh
  • USA: 0.12€/kWh

› Battery “consumption” (urban cycle): 10km per kWh
  • Efficiency: 80%

› Cost for a 1500km trip: 21€ (Italy)
  - Almost 8 times cheaper ...

› Recharging
  • Battery pack: 11,7kWh
    - 13 full-recharge cycles (home, several hours ...)
    or
    - 16 fast-charges (80% charge in 30 - 60 minutes)
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Ducati urban & micromobility

› Electric bicycles
  • Collaboration with partners for a whole range of e-MTB and e-bikes

› Electric kick-scooters
  • Complete line, constantly growing
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And so?

Our world is changing at the speed of light!

› New regulations
  - Restrictions for cities and countries
  - ICE bans for the upcoming years

› New mindset
  - Green approach
  - Young generations
  - Social distancing

› New technologies
  - Batteries chemistries
  - Battery pack optimization and cooling
    - Laser welding, an empowering technology?

Stay tuned!!!

New opportunity for Ducati!