Protoscar
CLEANCAR SHAPERS

PROTOSCAR - FULL PAPER - EVS 26

Author and co-author
Marco Piffaretti, Managing Director
Giorgio Gabba, Project Manager
PROTOSCAR SA
CH-6821 Rovio, Via Ronchi
Tel. +41-91 649.60.60, Fax +41-91 649.72.70,
E-mail m.piffaretti@protoscar.com; g.gabba@protoscar.com
www.protoscar.com

From LAMPO to LAMPO^3: The evolution to a purpose designed premium EV.

Executive Summary

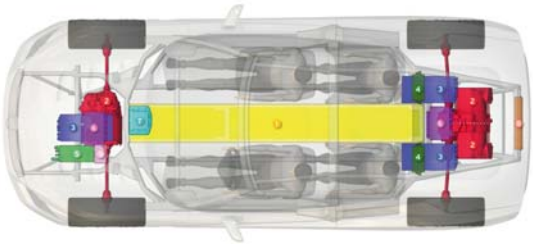
LAMPO^3 is a battery powered electric demonstration sports car developed on the base of 30.000 km lessons learned with its predecessors LAMPO and LAMPO^2. It features a purpose designed light weight chassis, a 2+2 coupé design and a fast charge option. The BRUSA powertrain (3 motors with a total output of 420 kW) guarantee extreme performances without compromises in terms of efficiency. LAMPO^3 has been developed by Protoscar (www.protoscar.com), a Swiss company working for OEMs, power utilities and governments, and since 25 years specialized in the development of CleanCar projects.

Purpose designed chassis

LAMPO^3 is an electric sports car with purpose designed lightweight chassis that impressively shows un-compromised CleanCar design and engineering competences:

1) For the first time a pure electric 2+2 coupé features a chassis specifically built around the electric components, unlike most OEMs' EV-chassis, which are adapted from internal combustion versions. LAMPO^3 is the worldwide first pure electric sports car being a 2+2 seater and providing enough luggage space and optimized ergonomics.
2) The light weight chassis carries actively cooled batteries, optimally positioned in the central tunnel to improve drive dynamics, safety and pay load.

3) Three motors - of which two on the rear axle and one on the front axle - allow an improved dynamic behaviour of the car and an optimized torque vectoring, not only between front and rear axles, but also between the two rear wheels (the motors actively drive on different adapted RPMs for instance in curves, where the inner wheel turns slower than the outer wheel).



Technical description and top performances

LAMPO^3 has three electric motors with a total output of 420 kW (equivalent to 570 HP), 900 Nm and 32 kWh of Lithium-Ion battery capacity. This powertrain layout allows a four-wheel drive with variable torque between front and rear axle for optimal handling, safety and efficiency. LAMPO^3 features real sports-car performances: 4.5 seconds for accelerating from 0 to 100 km/h, 220 km/h of max. speed, and 200 km of range. More than enough energy for driving throughout the whole year is produced by a remote solar plant, allowing a real zero-emission drive.
As the first two LAMPO prototypes, LAMPO^3 impressively demonstrates that from a pure performance point of view (acceleration, torque, overtaking, speed, efficiency) pure E-drive is THE solution not only for city cars, but for all other types of vehicles including premium-segment cars (the only segment, through which new technologies have been introduced into the market successfully so far).

LAMPO evolution

LAMPO^3 is the 3rd sports EV prototype realized by Protoscar, the first company worldwide having developed three generations of 4WD sporty EVs within three years. After more than 30.000 km "lessons learned" with its predecessors LAMPO and LAMPO^2, tested by more than 500 different drivers (mostly OEM's engineers) on European roads and test tracks, Protoscar's highly specialized staff made its dream become true: the purpose designed 2+2 coupé LAMPO^3.

LAMPO (in grey, presented 2009) and LAMPO^2 (in yellow, presented 2010) have permitted to collect all the necessary experience for Lampo^3(in red): the first purpose-designed EV supercar.

Charging Modes

LAMPO^3 can be charged with every kind of power actually on the market: from a standard single-phase 10 A plug, up to a three-phase 32A for charging at industrial plugs (fleet users).
Moreover LAMPO^3 is the first electric vehicle equipped with two different DC fast charging inlets (CHAdeMO and the new German standard), allowing for “Coffee&Charge” breaks.

Home Charge Device

As every electric vehicle, LAMPOs can be optimally charged with the Home Charge Device. This device offers maximum safety to charge any compatible electric vehicle, because its hardware and software is personalized to a specific car brand, model, plug (Type 1 / 2 / 3 or CEEPlus Plug) and to a specific national grid. Electric plugs are available everywhere, but not all of them can withstand the full power required by an electric vehicle charger.
The HCD has to be considered an accessory belonging to the car as a spare wheel. Therefore it follows the specific car once this changes to a second user. This is why the HCD is conceived as a mobile device, and can easily be hanged up on the wall (in the garage or outside, since the HCD is conceived both, for indoor and outdoor use). The marketing concept is to offer the possibility of ordering the HCD equipment device and its proper installation at the same time, including a relevant check of the existing electric domestic installation.

DC Fast Charge

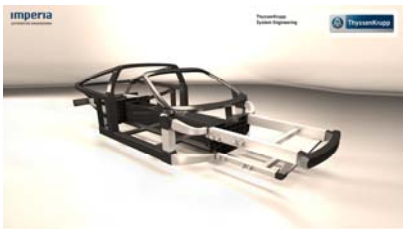
The dual DC inlet of LAMPO^3 allows to recharge enough energy for up to 100km additional range within just 10 minutes, with every type of DC-charger you will find on the highways or at “petrol stations” in the close future. This charging solution is mainly intended as a range extension, not as a recharge system for full charges, although this would be possible as well (at least between 20% and 80% DOD - according to the battery type and status).In fact, such DC-charger will be commercialized and installed on behalf of power utilities and petrol stations very soon in Switzerland and Europe by a recently established company focusing on charging infrastructure, with a strong connection to Protoscar: Alpiq E-Mobility AG.

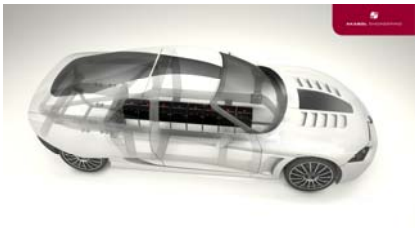
LAMPO^3 GT: the possible further development towards a micro series

During the past 3 years, the LAMPO^s have been fine-tuned together with the partner company EVTEC. The electric sports cars have been tested for more than 40.000km on circuits and streets all over Europe. Since the results are more than promising, LAMPO^3 could now be further developed in a micro series.

Compared to the prototype LAMPO^3, important further technical developments have been prepared in order to meet the needs of the micro series:

- lighter and stiffer chassis has been designed (optimized for production by ThyssenKrupp System Engineering)
- a new 42 kWh battery pack supplied by Akasol Engineering will be introduced and
- new interiors have been designed





In collaboration with Ernst & Young, in charge of selecting potential partners to participate in the spinoff of the new company “LAMPO Ltd.”, Protoscar has started to verify the conditions to produce LAMPO^3 with some of them. Finally a new “Swiss Made” car could hit the dealership floors, if a matching partner for financing, production, distribution and service of the vehicle will be found.

Protoscar

Protoscar SA (www.protoscar.com) is a design company founded in 1987 specialized in CleanCars and based in Rovio (Ticino, Switzerland). It presently employs 14 specialists.
We act like an architect who applies the principles of energy efficiency to vehicles instead of buildings, mainly by introducing electrification. Our unique experiences and holistic approach allow us not only to develop forward looking strategies and outstanding vehicle concepts, but also to support the market introduction of CleanCars and the communication activity of these technologies.

Further information

Detailed specifications, performances, images and further information will be undisclosed in the final presentation.

Authors

Marco Piffaretti
Protoscar SA, Managing Director
CH-6821 Rovio, Via Ronchi
Tel. +41-91 649.60.60, Fax ++41-91 649.72.70,
E-mail m.piffaretti@protoscar.com
www.protoscar.com

Marco Piffaretti has studied Car-Design at the “Scuola d’Arte Applicata & Design of Torino” and the “Art Center College Europe”. In 1984 he started developing solar race cars and in 1987 he set up his own design company Protoscar, a “non-conventional-vehicle”-design consultant company. From 1994 to 2001 he also was director of the most important European EV-demonstration project:
the “VEL-1”, in Mendrisio (Switzerland).

Dott.Ing. Giorgio Gabba
Protoscar SA, Project Manager
CH-6821 Rovio, Via Ronchi
Tel. +41-91 649.60.60, Fax +41-91 649.72.70,
E-mail g.gabba@protoscar.com
www.protoscar.com

Giorgio Gabba has studied aeronautics at the Politecnico of Milan. After his engineering degree, he started working in the field of composites materials. Later he worked in the development of electric vehicles and their components. In 1999 he joined Protoscar in charge of project management.