Industrial research and experimental development vehicles with brushesless electric motors powered by lithium-ion batteries for personal transportation-gentle electric

Cristiana SÎRBU
University of Agronomic Sciences and Veterinary Medicine of Bucharest, 59 Marasti Blvd, District 1, Bucharest, Romania

cris_sirbu@yahoo.com

Abstract

The paper aims to present a Romanian company that currently produces a wide range of electric vehicles: electric scooter, electric transportation vehicle for disabled people, electric bicycle and electric kick scooter. Nextrom predicted that in any field, the future requires innovation and it is necessary to develop projects that respect this trend of offering high-performance products with unique qualities, which not only meet an existing demand, but create the desire to have more. Through the projects implemented by ARIES OLTENIA and PLIMM CALAFAT, the creation of a network for electric bicycles in the entire cross-border area Romania-Bulgaria began in order to achieve an improved individual mobility of sustainable transport. In a globalized economy where life is moving so fast, most consumption habits revolve around public transport, common housing and common work spaces. This research was conducted by the University of Craiova – Faculty of Mechics, SC PARC INDUSTRIAL CRAIOVA SA and The Ecological Initiative and Sustainable Development Group for the Preliminary study on the industrial research and experimental development vehicles with brushesless electric motors powered by lithium-ion batteries for personal transportation-gentle electric, but also for the construction of the industrial hall and endowment with the necessary equipment for the production of vehicles powered by brushless electric motors powered by lithium-ion batteries for passenger transport-GENTLE ELECTRIC.

Keywords: *GPS and online tracking, electric kick scooter, ridesharing, docking stands.*

1. Introduction

Established in 2010, S.C. Nextrom Industries S.R.L. wants to create a range of products generically called "GENTLE ELECTRIC" - the products represent vehicles for transporting people with electric traction. These products are intended for the general public use in current activities. Products include: electric scooter, electric transportation vehicle for disabled people, electric bicycle and electric kick scooter. Given this fact, NEXTROM INDUSTRIES SRL was part of the South-West Oltenia Automotive Competitiveness Pole by carrying out the following 2 projects:

- the research-development project, involves the improvement of the electric motor execution technology, the improvement of the electric motor command and control system, the improvement of the electric vehicle energy management system, the improvement of the electric vehicle self-diagnosis system, the improvement of electric vehicle kinematics and dynamics. as well as improving the technology of execution of electric vehicles.
- the investment project, which involves the realization of a business infrastructure by purchasing a land, the construction of a production hall, the endowment with the necessary equipment for the production of electric vehicles, of conference and exhibition spaces.

The general objective of the first project "Industrial Research And Experimental Development Of Vehicles With Brushesless Electric Motors Powered By Lithium-Ion Batteries For Personal Transport-Gentle Electric" is represented by the realization of industrial research for electric vehicles with brushless motors, to improve their capacity and their efficiency. The total value of the project is in the amount of 1,888,651.75 Lei.

The second project "Construction of industrial hall and endowment with the necessary equipment for the production of vehicles powered by brushless electric motors powered by lithium-ion batteries for personal transport-GENTLE ELECTRIC" has as general objective: the consolidation and development of the business infrastructure of the pole of competitiveness Automotive Sud-Vest Oltenia, by ensuring the material base in order to develop the production capacity of the applicant within the competitiveness pole, by using new technologies, able to compete on national and international markets; achieving the general objective will determine the increase of Romania's competitiveness within the European Union and will create the premises for a better integration of the national economy in the European economy. The total value of the project is in the amount of 21,464,506.56 Lei.

The specific objectives of the project are:

- Acquisition of land with an area of 10,940 sqm at the time of approval of the investigation project;
- Construction of a business infrastructure that will be used by the members of the pole until the end of the project implementation, in the built area of 5902 sqm;
- Increasing the degree of technology by purchasing 85 technological equipment by the end of the project implementation;
- Creation of 62 new jobs by the end of the project implementation;

- Increase in turnover by 20% in 2 years from the completion of the project;
- 60% of the production obtained from the investigation will be destined for export.

2. Results and Discussions

The relevant results of this project are the 5902 sq m Hall built and its connection to water supply, sewerage, electricity and gas. Another relevant result is the acquisition of a number of 152 equipment and 1 software.

The implementation of the project brought benefits for the company that diversified its current activity, by creating an infrastructure for the production of electric vehicles for personal transport, but also by improving the production process of these vehicles resulting from the research-development activity.

The factory is to produce, for sale, light electric vehicles and motors for light electric vehicles.

The dictionary definition is: A moped is a vehicle with two, three or four wheels, whose maximum construction speed does not exceed 45 km / h and which is equipped with an internal combustion engine, with spark ignition, with a cylinder capacity not exceeding 50 cm^3 or electric, with a rated power of not more than 4 kW.

In the assembly and packaging flow, light electric vehicles include:

- Mechanically machined parts
- Painted parts, both metal and plastic.
- Electric motors tested
- Components purchased from sub-suppliers that go directly into light vehicles: batteries, mirrors, brakes, horns, tire wheels, etc. The components come to the assembly stations with the electric bus, brought from the component warehouse.

Nextrom predicted that in any field, the future requires innovation and it is necessary to develop projects that respect this trend of offering high-performance products with unique qualities, which not only meet an existing demand, but create the desire to have more.

Looking at things in this way, we have managed to create products that adapt to the growing demands of our users and give part of the vision of all those who use them.

- Quality is the element on which we base our activity, being paramount in making products appreciated worldwide. Quality is reflected both in the materials used and in all production processes, from design to service provided to each customer.
- Excellence - translated by the refusal to make compromises from the assumed quality proposal, working with experts in the field, always looking for development opportunities and maintaining the status of reference producer.
- Professionalism is another essential aspect, a characteristic of each team member and support of the idea of quality.

- Passion - the Gentle Electric team is an enthusiastic, passionate about the chosen field, in a permanent process of research, development and improvement.

Fig. 1. E-twow electric kick scooter
Source: *https://e-twow.ro/*

ELECTRIC BIKE - Gentle Electric - is an extremely reliable and easy to use product offering advanced technical features.

Through the projects implemented by ARIES OLTENIA and PLIMM CALAFAT, the creation of a network for electric bicycles in the entire cross-border area Romania-Bulgaria began in order to achieve an improved individual mobility of sustainable transport.

For these projects were provided a number of 120 Electric Bicycles with built-in GPS and online tracking, as well as 35 pcs - Charging stations made of a metal panel with a diameter of 600X800 mm, fixed on a metal support, 5 built-in electrical outlets in device with overcurrent protection.

RideSharing E-twow system

The sharing systems for electric vehicles, in our case foldable electric scooters model E-twow, came in order to reduce carbon emissions and ease congestion on public roads, while reducing travel costs for users.

3. Conclusions

In a globalized economy where life is moving so fast, most consumption habits revolve around public transport, common housing and common work spaces. According to existing statistics, transport accounts for 24% of global CO2 emissions. With fewer vehicles on our roads, carbon dioxide levels will be reduced, giving us cleaner air and a healthier environment, which is why E-twow, after the introduction of the foldable electric scooter as a mode of transport, now presents a solution of RideSharing suitable for our cities.

The model we propose is a socially responsible and sustainable business model, coming to meet the needs of the community. The RideSharing E-twow system

provides electric scooters, a docking and charging stand for them, so that, after use, the user parks the scooter in a specially designated space, without disturbing pedestrians or other traffic participants. Through an intuitive application, E-twow RideSharing, now the problem of urban transport is simplified, and E-twow docking stands bring elegance to the system and help to decongest traffic while avoiding sad images of electric scooters parked or abandoned in completely unsuitable areas.

The RideSharing E-twow system was successfully implemented together with the town halls of Timișoara, Oradea and Suceava, being now an integral part of the public transport systems in these cities. You can also use an E-twow scooter in the sharing system in Norway, Malta, Serbia, Slovenia, Croatia, Turkey. Many corporations in Romania and abroad have purchased similar systems with E-twow scooters used in closed circuit mode by employees and their collaborators to replace the use of cars in short distances (10km).

With E-twow RideSharing, people benefit from using a private vehicle, without the costs and responsibilities of ownership. We can use the vehicle whenever we want and pay only for the trips we make, without worrying about maintenance, repairs and insurance.

Fig. 2. E-twow docking stand
Source: https://e-twow.ro/

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