



Project Name: Blink Station Design
Application: DC Fast Charger for Electric Vehicles
Customer: ECOtality
Website: www.ecotality.com



THE FASTEST CHARGING STATION - FROM 0% TO 100% IN UNDER 30 MINUTES

BACKGROUND AND PROJECT CHALLENGE

With the surge of electric vehicles comes the need for fast and convenient charging solutions for both the general public and commercial fleet vehicles. Previous charging stations require hours to recharge a vehicle contributing to the limited viability of electric vehicles.

The ECOtality Blink DC Fast Charger is now the fastest method for charging vehicles; it uses intelligent, user-friendly features to intuitively and safely charge electric vehicles in under 30 minutes (208 or 480 volt, 3-phase, AC input).

ECOtality approached PADT to develop the Charge Dispensing Unit (CDU), the customer-facing part of the world's first Blink DC Fast charger. The design requirements were written to ensure speed, safety, ergonomics, and intuitive operation while incorporating a 42" LCD display for optional media and advertising revenue. In addition, the CDU needed to be rugged, reliable, waterproof, and able to withstand demanding outdoor installations in every type of weather.

PROCESS AND SOLUTION

PADT's product development group received preliminary product requirements and a conceptual model to represent the overall look and feel of the Charge Dispensing Unit (CDU). PADT engineers worked closely with Ecotality to finalize requirements, incorporate existing modules, design, build, and perform verification testing for the Blink DC FAST charger. In short, PADT turned a solid foam model into a real production-ready product.

The main challenge of this project was to incorporate multiple electrical



In 2011 PADT worked with ECOtality to develop the first functional prototype Blink DC fast charger for electric vehicles.

DISCIPLINES EMPLOYED

- Mechanical Engineering
- Electrical Engineering
- Simulation
- Design for Production
- Verification Testing

and mechanical subsystems into an ergonomic, robust, and user-friendly housing that met multiple regulatory requirements. Full CAD models were generated and design reviews were held at appropriate project milestones. Throughout the development process PADT remained in constant communication with Ecotality program managers and engineers.

We utilized our in-house analysis and simulation expertise to assure reliable operation over a wide range of temperature, environmental and operating conditions; including internal and external heat loads, seismic loading, wind shear, installation loads, and material characteristics. The CDU uses a two stage cooling system to ensure internal components remain functional under full solar load during a 120F Phoenix summer day. This cooling system was developed based on results of a thermal performance simulation performed at PADT. The first stage uses a blower to simply circulate outside air. A second stage turns on an air conditioning system to boost heat removal when internal temperatures exceed a critical limit.

The charger handle presented ergonomic and functionality challenges when not in use. To ensure reliable performance and a positive experience for EV drivers an alternative method for retaining the charge handle was proposed. The charge handle docking assembly utilizes a system of cam rollers to simplify the actions required to remove and replace the charge handle. By eliminating the need for precision actions and precise positioning, the charge handle more closely resembles a gas pump handle, lending familiarity to this new technology.

CONCLUSION

The Blink DC Fast Charger was successfully launched into production in 2011, paving the way for the successful rollout of electric transportation across America.

The project reflects PADT's commitment to advancing clean technologies and energy efficient design. PADT has installed a Blink Fast Charger in the parking lot of our Tempe AZ headquarters, thus joining the emerging EV charge infrastructure.



TESTIMONIAL

"PADT did a great job translating our prototype ideas into a fully-designed, manufacturable product. From multi-disciplinary engineering to project management to fabrication, PADT did it all. PADT worked collaboratively with our team to understand requirements and to solve technical hurdles in order to deliver a product that best fit our expectations."

Garrett Beaugard
Senior VP of Engineering
ECotality Inc.



PROJECT HIGHLIGHTS

- Project completed in 9 months
- Incorporation of multiple mechanical and electrical subsystems
- Charger meets all appropriate regulatory requirements (i.e. UL, CHadeMO, FCC, Carrier, PTCRB)
- Designed for ease of manufacturability and serviceability
- Prototype built and tested within PADT's product development lab
- Multiple safety features incorporated

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