

Project for Locally Rooted Design Development in Field Tests of Next-Generation Personal Mobility

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ABSTRACT

Honda Motor Co., Ltd. concluded a “Comprehensive Agreement Regarding the Electric Vehicle Testing Program for Next-Generation Personal Mobility Products” with Kumamoto Prefecture in August 2010, directed toward realizing the joy of free mobility and a prosperous sustainable society. On that basis, Honda has been conducting field tests on a variety of different themes. As soon as field testing began, it became apparent that design needs existed in the area of communication to bring together EV field testing with local communities. Therefore, Honda joined with Kumamoto Prefecture and Sojo University in a cooperative development project on the subject of “interface design linking people, EVs, and the community.” Various topics were formulated from the perspective of university students (consumers) who were local residents, such as “field test messages,” “EV charger sign design,” and “design promoting shared use of Monpal four-wheel electric scooters.” A number of items were created and their effectiveness was confirmed during the field test.

One major result of this field test is that concrete form was given to the process of linking the creation of products to activities of this kind to originate new designs in the local community. In other words, local residents engaged in thinking about things they would themselves be using in their own neighborhoods, as well as looking for solutions to issues in their own local community.

1. Introduction

With a view to realizing the joy and freedom of mobility as well as a sustainable society where people can enjoy life, Honda concluded the “Comprehensive Agreement Regarding the Electric Vehicle Testing Program for Next-Generation Personal Mobility Products” with Kumamoto Prefecture in August 2010. Honda conducted field tests from then until March 2014. The purpose of the field tests was to verify the effectiveness of using solar power and other such sustainable electrical energy for personal mobility in terms of achieving a low-carbon society, and to investigate the concept of a future personal mobility capable of contributing to an enhanced quality of life (QOL) for residents (Fig. 1).

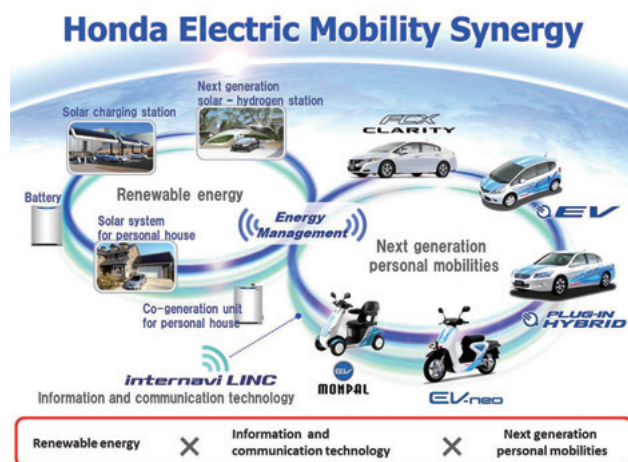


Fig. 1 Honda electric mobility synergy

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2. Design Needs for Field Test Promotion

When testing first began, it was thought that the field test would proceed smoothly if Honda deployed the EVs provided for the testing and the prefectural government completed installing the charging facilities.

As it turned out, however, as soon as the field tests began, many inquiries started coming in: Where are the prefectural charge port facilities located, and how should the vehicle be charged? They want to borrow a Monpal electric cart, but can they stop and park it anywhere?

Even in the campaign to recruit a wide range of people to act as EV trial riders and test monitors, it was found that understanding of the EV itself as well as awareness of the field test were in short supply. There were various concerns, including the question of obtaining participants, and it became clear that promotion of the testing involved issues and design needs.

Initially, Honda styling design departments were tasked to identify the needs and investigate designs to address them. Then, the idea came up that investigating, developing, and verifying designs within the local community, based on distinctive local concerns and preferences, would not only contribute to the output of effective results, but would also provide opportunities to return some of the experience and expertise obtained in real-world design development to the community. It was therefore decided to propose a joint research project to a design school in the prefecture, the Department of Design of the Faculty of Art at Sojo University.

Approval was also obtained from Professor Urushihara, Dean of the Faculty of Art, who said that “the EV is in a transitional period on the way to widespread acceptance, and it would be good to interest our students in participating in the field test.” He also remarked that “the designs that are proposed will be modified out in the world, so this is a fine opportunity for a designer to get that feedback.” Thus, Honda engaged in design development on such themes as “interface design linking people, EVs, and the community” with design students at a local university who are the local leaders of the future.

3. Design Project

3.1. Field Test Message Logo

The first task taken on was message logo design. The idea was simply for a graphic motif for a wrap design on the body of the transporter, which would transport electric carts and electric motorcycles. The aim was to soften the impact of the term “field test” for what the prefecture was engaging in and to foster a sense of closeness to EVs in people. A rather long and explanatory but nevertheless readily understandable and simply phrased slogan was created: “Let’s build it together, an exciting EV community.” This was incorporated into the logo together with the shape of an electric plug that plugs into a power socket.

The field test covered a wide range of objects, extending from electric carts and electric motorcycles to four-wheeled EVs, and beyond that to the infrastructure of those vehicles and their surrounding environment. These were assigned to various working groups that engaged as teams in a full range of activities, but this sometimes had the effect of making them lose track of the full picture. The unified message logo that was produced appears to have had the effect of making those various field tests and projects feel like collaborative parts of one large undertaking.

The promotional figure of the “Kumamon” (a mascot character used in Kumamoto Prefecture promotion) employed in the transporter message logo visually emphasized that this was a Kumamoto Prefecture project. The message logo was, thereafter, applied in a variety of media, including charger guidance signs, banners for special events, leaflets about the field tests, and the design of the luggage box on the EV-Neo (an EV motorcycle manufactured by Honda) bikes loaned out at tourist sites. This became an effective case of increasing the breadth of field test promotion by means of graphic design (Figs. 2 and 3).



Fig. 2 Wrap design for transporter



Fig. 3 Logoed items

3.2. Design of EV Charger Installation Signs

The field test involved numerous different measures, including a system of subsidies, for expanding and upgrading the charging infrastructure. This was considered essential to the popularization of the EV. As a result, charging facilities were installed in numerous locations. The chargers used were themselves of many different forms, and the installation locations were also varied, ranging from Michi-no-Eki (roadside rest areas) to areas within city hall parking lots. Initially, this was left to be handled subjectively by the people in charge of individual installations; consequently, the signs lacked unity, and the necessity for standard signs was keenly felt. What was done, therefore, was to select a number of locations where new charging stations were scheduled to be installed, to consider designs with a new unified look, and to put signs in place accordingly.

People generally were not even initially aware of the difference between quick chargers and normal chargers, and the signs were therefore considered to be very important in terms of enhancing their distinguishability, as well.

In installing the signs, deployment suited to the particular sites was considered (Fig. 4). Some signs, for example, were banners and other temporary items created to promote the field tests; at locations with walls, only panel signs were put up.

3.2.1. Pictograms

There are many places that use the pictogram recommended by Tokyo Electric Power Company for EV chargers. Their use is not uniform, however, and as things currently stand, there are multiple types of pictogram in use. There are even cases where the same charging facility uses different signs on the road than it does on walls. The situation invites confusion.

In order to address these circumstances, pictograms were created to clearly indicate the type of charger (quick charger or normal charger). The pictogram designs were created based on the JIS-approved pictograms of the Foundation for Promoting Personal Mobility and Ecological Transportation. This was done with consideration for ease

of use when the pictograms are used side by side with the existing pictograms that are already displayed on signboards at Michi-no-Eki rest areas and other such locations (Fig. 5).

Where there are charging stations that have dedicated areas for charging, pictograms were also created to match the EV types that are supported (Fig. 6), and consideration was given to making them readily understandable. Honda has registered these pictograms as trademarks, but this is not with the aim of obtaining their exclusive use. The purpose is rather to prevent others from easily altering the original designs and making use of them.

The pictogram coloring was initially made a light green to match the message logo. Considering the poor contrast with the white base and other such factors, however, dark green was instead chosen as the standard color for the Kumamoto specification (Fig. 7).



Fig. 5 New pictogram matching JIS pictograms

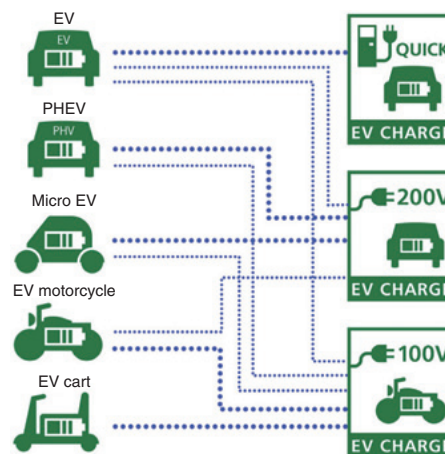


Fig. 6 Guidance signs for charger types available for specific EVs



Fig. 4 Guidance signs for charging stations



Fig. 7 Guidance signs for municipal parking lot No. 2 at Kumamoto Castle

When chargers were installed at Honda dealers, the markings themselves were kept the same but the coloring was changed to blue. Figure 8 shows pictograms that are being used at a number of Honda dealers.

In Kumamoto Prefecture, maps were also made on paper media to provide guidance to charging facilities within the prefecture. It is extremely useful to have pictograms on such maps to indicate the locations with their types of charger. Since it appears likely that charging facilities will also come to be indicated on car navigation systems, it will become important to employ readily understandable pictograms in a unified manner.

3.2.2. Guide to sign design

Display using pictograms basically conveys meaning without depending on written characters or words. Since chargers were at a transitional state of promoting popularization, however, it was thought important to express content in readily understandable form, so some signs were made with the text string “charge available here” prominently displayed. This was also effective for guiding users in from the roadway entrance, for example when chargers are located deeper inside the facility. Information material that explains the sequential arrangement of guide signs was made publicly available on the Kumamoto Prefecture website. Kumamoto Prefecture is endorsing the use of the pictograms and related material outside the prefecture, and they can be freely downloaded in data form and used (Fig. 9).



Fig. 8 Guidance sign at Uto Honda Cars dealership

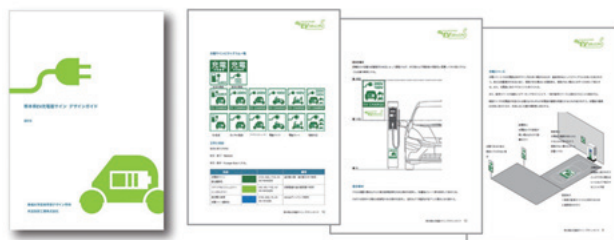


Fig. 9 Design guide pamphlet available on Kumamoto Prefecture website

3.2.3. Application Graphics

Although not a direct development of sign design proper, a smartphone app for monitoring electric carts was created during the field tests, and pictograms are used as graphics in that app interface, as well. This did not advance as far as modifications to the interface reflecting people's comments that using smartphones is difficult for elderly people in itself, but interfaces for this kind of mobile equipment will be important for the future (Fig. 10).

3.3. Promoting Shared Use of Monpal Electric Carts

Field tests of shared use of Monpal electric carts in town were conducted four times in Kumamoto City. In the initial field test, many people showed interest in taking part, but hesitated to take actual test rides. The questionnaires that were handed out also involved a considerable burden on responders. On further thought and reflection, it was decided to first create public information leaflets to make the testing more widely known. The leaflets were distributed to local organizations, and enhancements were made, for instance so that people would relate more easily to the loan-out stations (Fig. 11).

3.3.1. Monpal electric cart wrap design

For the final field test, the six Monpal electric carts used for loaning out were given wrap designs, each with a different motif. The purpose was to make people want to talk about them. Votes were held during the testing



Fig. 10 Application interfaces



Fig. 11 Leaflets for experimental project event and area map

period to decide which design was most popular, and an effort was made to heighten the special event qualities of the project. The wrapping designs were given motifs from specialty products and famous places of Kumamoto such as mustard-pickled lotus root and Kumamoto Castle. In the popularity voting, the “Kumamon” mascot design took first place. This project was planned to appeal to the mass media, but it seems also to have contributed to overturning the impression that Monpal electric carts are just rides for elderly people (Fig. 12).

The Monpal electric cart bearing this “Kumamon” mascot design was taken over (with the design) by a contractor loaning out electric carts for tourists around Suizenji Park in Kumamoto City, and is still in active use there.

3.3.2. Parking spot signs

In the final test, three loan-out stations were used in an arrangement that allowed the electric carts to be returned to any of them. Therefore, it was thought necessary to have a map showing all the station locations. Together with recommended routes for driving, the map also presented information to induce enjoyable activities such as shopping by showing locations in shopping streets where the electric carts could be safely left. On shopping streets that are no-parking zones throughout, people could park such carts in front of shops and enjoy their shopping without worries. In front of shops at eight locations, parking spots were marked on the road surface with mat-type signs. The information was arranged so that plotting those locations on the map would unerringly lead to a place where a cart could be parked (Fig. 13).

These markings on the road surface to show parking spots had been slated for installation only during the testing. However, the shops that had generously loaned their space expressed requests to make further use of those spaces. Signs were then created to indicate that parking was available not just for Monpal electric carts, but for general-purpose electric carts as well, and these continue to be used



Fig. 12 Wrap design options for “Monpal”

even after the field tests. In shopping streets where it is difficult to ride electric carts into a shop, assuring space for parking is crucial. The lack of development of this kind of environment is one of the hurdles that users face.

3.4. New Electric Cart Design

Various needs for the Monpal electric cart were identified by providing these carts on long-term loan to elder care and other such facilities, as well as through short-term loans for field testing in the city center. Some students started addressing those needs with simple modifications, and by the third year they had also created the prototype of a concept model for their graduation research project in product design.

3.4.1. Enhanced parts design

Paper poster stickers were commonly observed affixed to seatback surfaces, and this method was adopted to display a variety of messages on the carts in shared use. Commercially available clear plastic folders were used in the design of a message board that could easily be affixed to a cart. This was simple to make and was used in a variety of scenarios (Fig. 14).

Work was done next to modify baskets on the carts. Baskets that were made slim to match the cart body were particularly unpopular with users who wanted to use them for shopping. Net baskets from bicycles were adapted and made wider. Fittings were added to cloth shopping baskets so they could be attached to and detached from a cart. A number of different designs were made and the prototypes were fabricated.



Fig. 13 Parking spot designation



Fig. 14 Multi-purpose message board

Users had also requested an extension cord for use in recharging the cart, which occasionally became necessary while out riding. Cords were therefore attached together with the baskets, leading to the perception that people actually wanted even more luggage space (Fig. 15).

3.4.2. Electric cart with expanded luggage space

The shopping basket idea described above was further developed, and a design was proposed for a prototype electric cart with expanded luggage space. Taken on as a graduation research project for university students, this design proposal was more for a cart specialized in transporting cargo than for styling. Since it was especially important to confirm the design on a full-size cart, the outer decorative parts were removed from an existing Monpal electric cart, and with just the frame as a base, the modifications were made and a prototype was built.

The prototype was built using simple methods, such as by repurposing motorcycle parts. The parts were combined in a deliberate effort to distance the impression given by the prototype from the styling of the current model (Fig. 16).

The main points in the proposed design are as follows.

- A rough design of a space frame like that of industrial equipment, so receiving some scratches is not worrisome.
- Simplify the seat, change the battery for one more compact, and use the space below the seat for luggage.
- Make the charge cord reel larger and stronger, and the

cord longer.

- Allow for the seatback to be removed and a folding hand cart (for use inside shops) to be carried there.
- A model created to satisfy the above demands was shown to users, who were then asked their impressions and opinions. The results are as follows. (Fig. 17)
- Youthful, fashionable impression. Stylish.
 - Being able to carry luggage down low makes for a lower center of gravity, which is good.
 - It's not certain whether the carriers on either side of the seat can be used or not, but they serve as handholds when getting on and off.
 - Some simpler way of loading the hand-cart should be considered.
 - The seat surface is somewhat high, but it gives better visibility so that is good.

People showed little resistance to the concept of specialization in carrying capacity and having a shape like a construction vehicle. It seemed likely to be acceptable to elderly people.

There were many instances of the resin portions of cart bodies breaking or being marred during the field tests, so the design deliberately exposed the frame. Consequently, the safety aspects of use in urban spaces shared with pedestrians will require adequate verification.

The field tests of Monpal electric carts in Kumamoto Prefecture also included some loaned out to elderly people living in mountainous areas. Some expressed concern about safety on steep slopes and bad roads, however, and some said they could never forgive themselves if they damaged something they had borrowed. This kind of humble user consciousness made them feel hesitant about using electric carts, and it was found that different surrounding environments and methods of use resulted in differing needs and opinions. Given the limits to how many demands can be met by a single model, it appears likely that providing optional parts that allow for multiple alternatives could be a direct and effective shortcut to addressing users' needs.

A variety of methods of shared use were also surveyed during the field tests. The kind of cart body style that is in demand is different for shared use and for private ownership. The suitability of the design will therefore need to be considered.



Fig. 15 Removable shopping baskets



Fig. 16 Modified prototype model



Fig. 17 New models in use on the street

4. Conclusion

The urban setting of the future, endowed with next-generation personal mobility, should be a comfortable space for both resident consumers and visitors. In order to accomplish this, design solutions are sought not just in the design of personal mobility as a single separate component, but also in the interface that effectively links consumers, the community, and personal mobility.

One major outcome of these field tests was the activity of creating new designs locally, expressed as “local residents engaged in thinking about things they would be using in their own neighborhoods” and “local people looking for solutions to issues in their own local community,” leading in a connected fashion to product creation and then to implementation in society.

Reference

- (1) <http://www.pref.kumamoto.jp/site/evtaunkousou/ev-sign.html>, 2013/9/25
- (2) <http://www.honda.co.jp/demo-program/report04/>

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