

Concept Creation and Styling Design in the X-ADV

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ABSTRACT

X-ADV was developed as a new 750 cc class motorcycle model targeting European customers. In this model, we aimed to further expand the joy of movement for customers in the mature market in Europe. The concept and styling design were begun to be investigated voluntarily before the development started. First, we conducted a survey targeting customers in Europe and derived the product concept “Go Everywhere with Excitement.” The intention is that it is a commuter motorcycle with ‘Adventurer spirit’ that allows smart movements in the city on weekdays and invites them to adventure on holidays. The direction of the styling design was set to represent the attributes of the four-wheel sport utility vehicles, expressing toughness and protections for the rider. A concept model was created for verification of this direction. In that model, taking into consideration the riders’ physiques and postures, the attributes of protection that makes it looked like the motorcycle is protecting the rider was expressed. Furthermore, in order to verify whether the set directionality is acceptable to customers, the concept model was exhibited at European motor shows and hearings were conducted. As a consequence, we could get customers’ understanding, and we gained highly favorable evaluation results as well. Furthermore, based on this result, the commercial production of this model was decided and styling designs for mass-produced cars were implemented. The developed model of the X-ADV captures the customers’ mind with the unprecedented concept and styling and is favorably accepted in the market.

1. Introduction

The X-ADV is a model developed as a 750 cc class motorcycle based on a new concept. It has functions suitable for commuter use that offers an easy handling just like scooters, and driving performance that enables riding on a rough road and an enjoyable long distance cruise (Fig. 1).

This model was developed aiming at expansion of the joy of mobility for customers in Europe where the culture of using motorcycles, for living their daily lives and for getting pleasures, has been taking root. Before getting into details of styling of the X-ADV, the circumstances before the development of this model started will be explained.

First of all, I will describe the outline of the European motorcycle market. In addition, I will touch on the outline of the crossover models that currently occupies a large market portion in the major markets in Europe. The European motorcycle market had greatly expanded due to the economic boom after the monetary union, but after the European debt crisis in 2008 the market shrank, of which impact continued until 2012, when we started planning this model. Until that year of 2008, the number

of customers who can afford two or more motorcycles had been increasing, and the number of motorcycles owned had continued to rise. One of the motorcycles they owned was a super sports model, suitable for sporty running on roads and/or in a circuit, or a touring model that can travel at high speed comfortably over long distances. In other words,



Fig. 1 The X-ADV (production model)

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those were motorcycles to enjoy running with an expensive, high power engine. The other motorcycle they had was a scooter used for daily commuting.

However, with the deterioration of the economy since 2008, the markets of super sports models and touring models have greatly decreased. In association with this economic decline, the voice wishing for a model with “a versatile crossover concept” that combines the enjoyment of running and the convenience of day-to-day commuting had been strengthened. Honda responded to this change in market circumstances and began to develop a multi-use motorcycle model, and the model was put into the market. The VFR1200X (Fig. 2) is a representative model of such multi-use models. The model of this category is easy to use in urban driving for commuting, and it is also a model that can run on both paved road and off-road area enjoyably.

As mentioned above, changes were taking place in the motorcycle category market. However, similar changes had not been occurring in the scooter category, which is another big market.

One of the assumed reasons for this is that the market size of the models called maxi-scooters among scooter categories did not decrease greatly even after the economic crisis of 2008. Maxi-scooter is a 500 cc class scooter excellent in daily use, and it was widely used for commuting. In addition, the maxi-scooter has high versatility being capable of providing comfortable performances not only in use in urban areas but also in high speed cruising.

Based in Rome, Italy, Honda R&D Europe Italia s.r.l. has a survey and planning team (hereinafter referred to as “HRE-I team” or “the team”) and is conducting market research and product planning within the European region. This team had a conviction for a possibility that new values had been emerging under the influence of environmental changes of the market in the scooter category as well, even though no changes seemed to be witnessed in the present

situation. With that in mind, we started investigation of the market, on our own initiative, aiming at a goal of providing a new pleasure of mobility for scooter users.

2. Customer Survey

2.1. Direction of Vehicle Model Concept - Study Results Acquired by Interviewing Target Users -

To start with, HRE-I team asked users in France and Italy, which are the major markets in Europe, what are the functions or performances that they think important as inevitable characteristics or they just feel attractive, when they use conventional maxi-scooter models. Furthermore, in this user survey, we interviewed them also asking whether there is any demand for something different from those already provided by existing models, or something that had not been provided so far.

As a result, it was found out that the group of users who are using maxi-scooters mainly for daily commuting are satisfied with the functions and the design.

Users who belong to this group unchangingly want to purchase and use maxi-scooters that inherit the same characteristics current models have, and they do not have any particular desire for seeking something new.

On the other hand, the users using maxi-scooters for touring on their leisure time, in addition to commuting, are hoping to further expand their accessible areas to a variety of places that are currently not reachable by existing models. “If the scooters could be transformed beyond the vehicles just providing driving capabilities for paved roads or for cruising on highways, and if the scooters could make us possible to visit hotels or camping sites that are only reachable through rough roads in mountain areas or through roads along sandy coast areas, the scooters would increase our enjoyment of riding in off-urban areas.” In the interviews, we got a lot of such answers.

Furthermore, interviews asking preferences in vehicle



Fig. 2 The VFR1200X

styling design were also conducted to the users of maxi-scooters having interest in touring.

Many of the interview results showed that, if the motorcycle could offer accessibilities to the places that cannot be reached by conventional models, in accordance with that, a new styling design representing an adventurous atmosphere is desirable.

The results of these surveys revealed that there are two different groups of maxi-scooter users, and they also revealed that there exists an unrecognized potential market in which they desire the scooter with a new value of offering a wider accessibility to virtually anywhere they want.

2.2. Conceptual Direction of Styling Design

After completing the aforementioned survey, we gathered and organized the opinions from users, and discussed the direction of the entire styling design.

As described earlier, the vehicle we were targeting was a scooter that, same as current maxi-scooters, can provide the functions for offering comfortable commuting in daily use and performances that enable sporty driving. In addition to that, our proposing target vehicle should have functions to provide enjoyable running in natural environments, such as running through coastal areas or mountain areas, in their leisure time. Based on the results of the study, we clarified factors required for the design of the target scooter.

- (1) The vehicle body should have a sturdy and robust design to inspire the users to have a dream that anyone can go anywhere with it.
- (2) The detailed designs should make users imagine the assured stable riding even in roughened roads, and, for that it is naturally expected for the vehicle it be equipped with long-stroke shock absorbers, firm suspension systems and protectors for a rider.

The direction of our styling design was set to propose a new scooter that is differentiated from conventional maxi-scooters by crossing features of off-road motorcycles over those of scooters while satisfying two requirements mentioned above.

3. Determining Design Concept and Vehicle Packaging

3.1. Concept <Go Everywhere with Excitement>

The direction of styling design described above includes a lot of elements that have HRE-I team members feel sympathy through their daily experiences such as commuting by motorcycles or scooters and enjoying touring in their leisure time. If a scooter is equipped with suspension systems as sturdy as those applied to off-road motorcycles, riders can drive with a sense of security with a margin of maneuvering, which cannot be provided by scooters in their daily commuting driving on roughened road surfaces. Moreover, it expands the areas of their accesses when touring. The value was defined as our core

concept expressed by the phrase “Go Everywhere with Excitement” with an ambition of representing it by styling design that offers customers excitements only explorers can experience.

Furthermore, as a phrase that concretely describes the concept, we set up the phrase of “Commuter’s motorcycle that holds adventurers’ spirit that tempts users into adventurous experiences away from day-to-day lives while performing a smart mobility in cities on weekdays” and, with that in mind, we undertook the study of the vehicle styling design.

3.2. Vehicle Packaging

In line with the concept of bringing about an excellent riding performances together with functional features of scooters, HRE-I team members determined three requirements described below as indispensable elements for the vehicle design, so that elements that make users feel unique characteristics of off-road motorcycles are expressed through visual representations as well as through the functionalities.

- (1) The riding position should be designed to realize the posture of raised upper-body to secure a high viewpoint and the handle grip points should be located so as to keep widely spaced arrangement to keep the freedom of control of vehicle movements by the rider.
- (2) It should be equipped with suspension systems that ensure the secured riding even on roads with rough surfaces.
 - a. Secure minimum ground clearance and suspension stroke comparable to those of crossover motorcycles.
 - b. Large diameter tires with on-off type tread pattern should be adopted.
 - c. Spoke wheels adapting to tubeless tiers should be adopted in order to realize a riding with supple maneuvering responses and easy maintenance.
 - d. Adoption of inverted front forks with 41 mm diameter, which symbolize powerfulness, and a front brake with double discs with calipers radially mounted.
- (3) The styling design should make users feel the potential to offer light maneuvering, while giving an impression of sturdiness, and it should be tempting to have them motivated to “go anywhere.”

Furthermore, in order to provide an easy riding even in driving on a rough road without requiring any special driving skill, a low-gravity-centered front-tilted two-cylinder 750 cc engine that features the powerful characteristic of generating a large torque was selected. For the transmission, an automatic transmission (in specific, a Dual Clutch Transmission) was applied. On the other hand, for the storage space, a full face helmet can be stored underneath the seat. As a result of combining these characteristics, it became possible to propose a new category commuters’ motorcycle packaging that also has the touring performance as well as the rough road running performance.

4. Styling Design

4.1. Styling Design Concept

In parallel with the study of the concept of the overall vehicle packaging, we advanced the study of the concept of the styling design that creates a new appeal not found in the conventional categories. For the styling, we wanted to merge the different characteristics that three motorcycle categories have into one. These characteristics are the comfortableness that maxi-scooters have, the nimbleness that off-road motorcycles have, and tough wildness that adventure motorcycles have. We defined the following items as the core values of the styling design. These core values are represented as a concept board shown in Fig. 3.

- (1) Expressing characteristics of maxi-scooters - Reflecting elements that offer comfort -
 - a. The dimensions of the straddled portion, located at the middle of the vehicle body, and the dimensions of the floor step should be set virtually equivalent to those of the NC750D INTEGRA⁽²⁾.
 - b. Within the vehicle body, a space should be secured for the full face helmet storage.
- (2) Expressing characteristics of off-road motorcycles

- Vehicle body proportions that make them imagine feelings of light maneuvering -
 - a. By arranging the tires to be exposed frontward and backward without covering with the parts surrounding the suspension systems, the appearance that the tires are firmly grasping the ground should be created.
 - b. The longitudinal length of the vehicle body is shortened to make it appear floating in a higher position so as to create a trapezoidal body proportion.
 - c. A comfortable riding should be secured and the degree of spatial freedom of the rider should be properly kept.
 - (3) Expressing characteristics of adventure motorcycles - Expression of wildness and toughness -
 - a. The vehicle front area should be constructed so as to have the functional parts directly visible without equipping plastic covering for shielding the handlebar and the gauge unit.
 - b. Adopt twin headlights symbolizing adventure motorcycles.
 - c. Adopt metallic protectors over the foot pegs and the front covers.
- In addition to these, to express its sporty feature throughout the vehicle body, it was decided to apply shape



Fig. 3 Styling concept board

of rugged rocky appearance with mechanical atmosphere, that is on the leading edge of the design trend for adventure type of motorcycles.

With consideration to the styling design elements mentioned above, creation of the styling sketches were attempted.

4.2. Styling Sketches

As mentioned above, the core values are defined being strongly conscious of the expressions of the wild characters symbolizing the challenging attitude against dangers and the sturdy character that supports that attitude, which is what adventure type of motorcycles inherently possess. To deploy the styling sketches, as a specific approach we had already experienced in the styling design for the VFR1200X of a crossover motorcycle model, aimed design work was conducted by implementing the design elements representing the core values into the vehicle packaging to be created.

Being drawn based on the requirements described above, one of the sketches was designed by composing whole vehicle body through creating drawings of the functional parts, such as upper cowls, engine hangers, fuel tank and rear cowls, separately. The proposed sketch created this way is shown as “Proposed sketch A” (Fig. 4).

On the other hand, in the sketch created as another attempt, a longitudinally shortened vehicle body shape was applied to enhance the impression of agile maneuverability. In addition, a beak-shaped upper fender was installed under the headlight unit to produce a feeling of vibrant emotions. Moreover, the design sketch was drawn so as to emphasize the connections of the parts composing the outer surfaces of the body by concealing up the body frames with covers installed around the engine area. The proposed sketch is shown as sketch B (Fig. 5).

Both proposal A and proposal B were the design having lack of coherence in the arrangement of each composing part because of a large distance between the area of front periphery and the seat, even though they were successfully expressing agility and wildness.

The biggest challenge common to these proposals was, because they were both created by incorporating the design motifs from the existing crossover motorcycles, they inevitably caused viewers’ reminiscence of the existing two-wheeled vehicle designs. As a consequence, neither design was suitable for a new concept.

After making these trial sketches, the team members continued drawing sketches while trying various approaches, but we could not defeat the wall “to create a new form that has never existed”. In the end, we just quitted the way of thinking over and over it within the office. Instead, we decided to revisit what we had been seeking to this motorcycle and reinvestigate the origin of our aspiration. For that purpose, we decided to arrange a plan that would help us change our way of creation, through the method of putting ourselves in an environment where users are actually experiencing touring and/or off-road riding. Specifically, we rented a temporary studio located at the foot of the Alps, the renowned area good for motorcycle touring in Italy. We hoped to rebuild an approach method to create our sketches, while watching the landscapes, breathing the air and being contact with the inhabitants there.

Furthermore, we designers ourselves experienced the touring actually running over mountain roads, and, while experiencing that, we struggled to get some new finding, regarding the elements sought for the styling design that makes riders feel excited, which had never existed in our minds before (Fig. 6, 7).

It was the scene in which we saw a local driver operating a four-wheel-drive vehicle. Despite driving on a rough road, the driver was casually dressed in a day-to-day-life wear and overtook us without effort.

The vehicle we come across was a sports utility vehicle (hereinafter referred to as SUV), which is a vehicle in the category of four-wheeled vehicles that provide ease of driving in urban areas and in high-speed cruising, having drivability on bad roads. In Europe, as with some other markets, vehicles in SUV category hold one of the major markets. The concept we sought this time for a new



Fig. 4 Proposed sketch A



Fig. 5 Proposed sketch B

motorcycle was “a motorcycle for commuter use with an adventure spirit that allows users to smartly move in city areas on weekdays and tempts to an adventure in holidays being away from their daily life.” We had noticed that a clue for the creation of our styling design, that meets our seeking concept described above, can be found among the SUV’s styling design elements.

As a result of discussions we had at the studio in the foot of the Alps, we decided to try to develop a styling design with a new direction. The direction we set was not a design making people imagine a tough driving, described as a scene in which a rider, wearing a firm riding gear for protection of his/her body, is driving exposing his body to surrounding dangers, as in off-road or adventure type motorcycles. What we aimed was to incorporate the design elements that make people feel that the rider is protected by the body of motorcycle, just like as in four-wheel drive SUVs.



Fig. 6 Wide- area farm road in central Italy



Fig. 7 Gravel road leading to a town in central Italy

Specifically, a mass feeling of the body, which is formed of solid iron plates applied for rider protection parts such as front bumper, side bumpers and handlebar protector, was represented. At the same time, we tried to express modernity that looks stylish even in a city area with the sketch. The sketch created with these ideas is shown in Fig. 8.

In the design of SUVs of recent years, body parts are constructed so as to make the under-guard and the bumper stand out against engine hood. The same method was applied to our two-wheeled vehicle design, and we tried to create perceptual sensation of the parts connection throughout the vehicle body ranging from the cover on the top of the engine, the gauge unit, the handlebar and to the headlight. In order not to disturb this sense of connection of the parts, we decided to install the windshield separately from the body structure.

Furthermore, in order to express the sturdiness that four-wheeled SUV models have, the surfaces constructing the body shape were arranged in a continuous manner having them seem as if they are made by a single metal panel. By doing that, the whole massive feeling of the total body surfaces was emphasized.

In the design of front part of the body, twin headlights were adopted. In addition, a grille-shaped frame between the headlights, and a frame designed borrowing the form of an automobile bumper arranged around the headlights were adopted. Through application of these design forms, a unique expression of the front mask was created.

Based on these design studies, the HRE-I team selected the drawing shown in Fig. 9 as the final sketch plan. As the next step, we went back to our base office in Rome to advance further ahead creating a three-dimensional model.

5. Making Styling Design Models

5.1. Making Three-dimensional SUV Design with Clay Model

Since the rider’s body is exposed when riding a motorcycle, styling of a motorcycle is designed so as to be balanced with the body of the rider when straddling over the vehicle. Especially, considered with the design direction we set for this particular vehicle, it was important to give a sense of unity expressing that the motorcycle is protecting the rider. We had to create a fully satisfying proportion by constructing a solid body through thorough observations on how the vehicle looks with a rider straddling over it.

Based on the information given through the sketches, we formed the model with clay by putting it so as to represent roughly the desired mass volume of the vehicle body. After that, we carried out the modeling work reflecting necessary functional elements yielded through the confirmations of the seating comfortableness and the positions of riders’ arms and legs, by having riders frequently seated on the vehicle (Fig. 10).

During the early stages of modeling, the point we

specially paid our attention was to make the riding position and shapes of the body and the seat the most suitable for a good maneuverability and freedom of the rider's body

motions when driving on rough surface roads. For that purpose, we took in the knowledge and experiences of the experts of test riding involving in off-road motorcycle

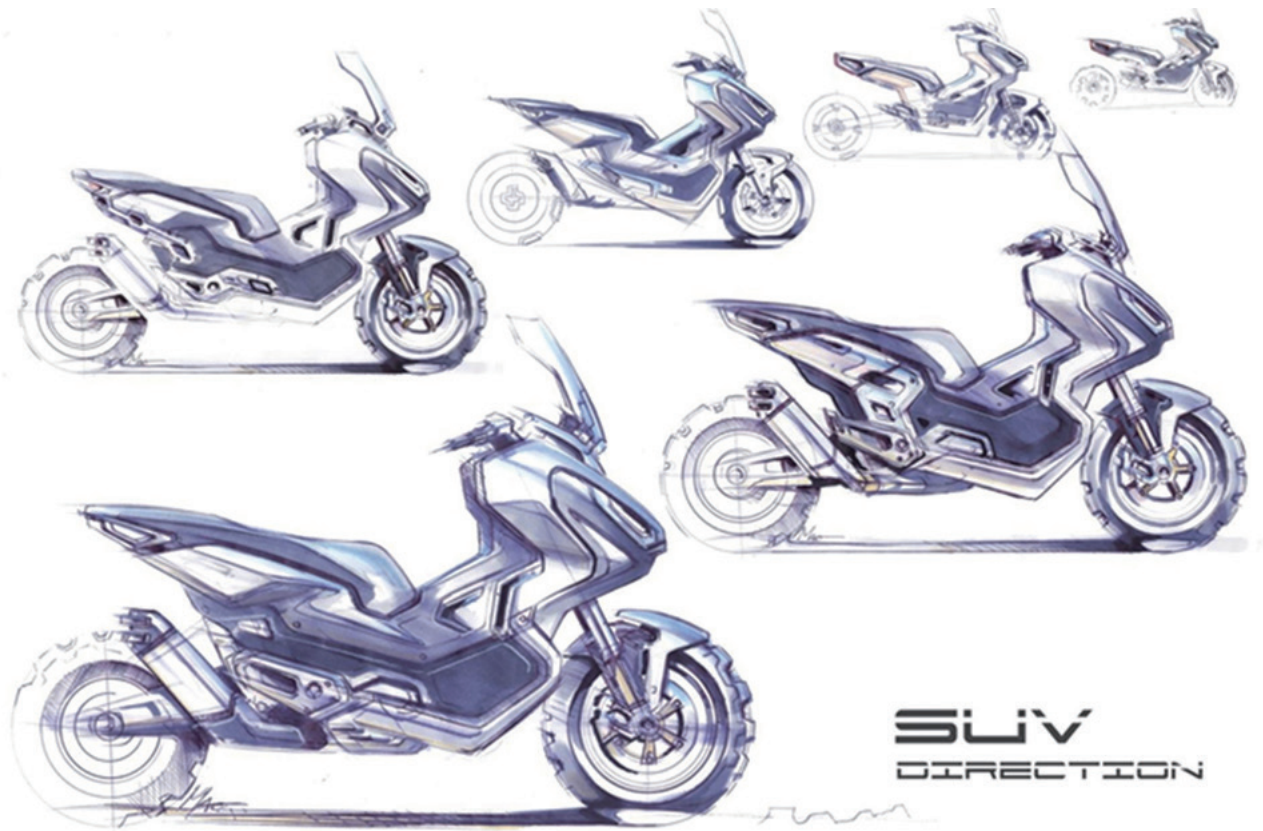


Fig. 8 Key sketches inspired by styling designs of SUVs



Fig. 9 Final sketches

developments.

Moreover, we checked the positional relationships of the feet, knees and buttock of a big rider of 190 cm height and took the whole balance so as not to feel cramped even by big riders in Europe.

Furthermore, in order to ensure comfort for touring driving, the widths of the body and the seat were increased to accommodate buttocks and shoulders of various rider physiques. On the other hand, in order to prevent it from looking dull when viewed from the front quarter, a frame that shifts the position of the windshield was attached to the front cowl portion, and nimbleness produced in the appearance was pursued.

The following pictures are those taken when the clay model was finalized. The longitudinally short-sized body parts and the upstroke shaped muffler express sprightliness. Parts design is made up of rugged shapes that look like protectors, laid out from the front cowl through the floor and the pillion step. This parts design together with movable windshield expresses toughness and mechanical appearance.

For the surface compositions of the body with solid-mass look, the polyhedrons were connected continuously and smoothly. By applying this method, a powerful shape with full of expressiveness was formed (Fig. 11).

5.2. Hard Mockup Model

With the completion of the clay model, the design concept that we had been studying became able to be evaluated as a three-dimensional shape.

By putting this newly designed model into an auto show as a piece of exhibit, the team members wanted to verify the degrees of understanding and sympathy our customers



Fig. 11 Completed clay model

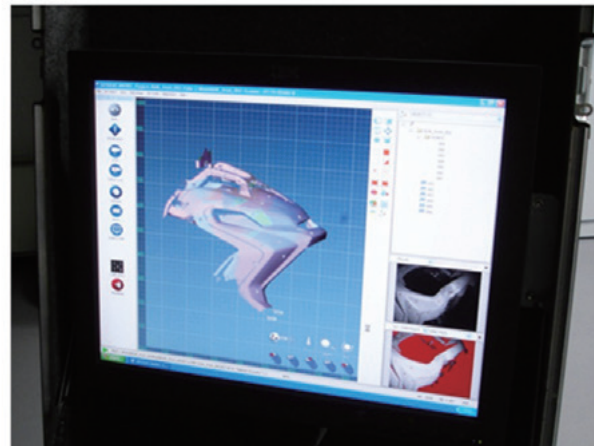


Fig. 10 Riding position checks using clay model before its final finish to investigate dimensions of each part

in the market have regarding our concept. Having that intention, we reviewed the design over the details of each part, and made a hard mockup model that could express the proposed concept at a higher perfection.

First, we measured the outlines of the parts molded with clay, and created three-dimensional data. Using these data, individual parts made from fiberglass, plastics or metals were produced (Fig. 12).

Next, we designed the parts that could not be molded with clay.

Among these parts, examples of distinctively characterized parts in terms of expression of the concept are the windshield and the gauge unit. The structure for moving the windshield consisted of pantograph type of linkage. For the gauge unit, a 7-inch large liquid crystal display was adopted with a rectangular shape to make it look simple. Moreover, a mechanical impression was represented by the stay, which connects the windshield and the gauge unit stay, and the linkage mechanism. By adopting a space surrounded by the frames that make up the stay for the windshield, an effect of helping to represent nimbleness was applied to the structure that tends to appear dull (Fig. 13).

In addition, an aluminum tapered handlebar was adopted that gives an impression of a characteristic of an adventure motorcycle model. The handlebar holder of this vehicle is designed to be a single unit integrating the right and left sides holders that are usually separated. In the middle of this handle bar holder, another indicator unit separate from the gauge unit was placed to enhance information transmitting functionality to a rider. That is, by using this indicator unit, the information that gives convenience and secured feelings when driving in city areas, such as indicators for turn signal operations, engaged or disengaged status indicator of the parking brake and an alarm indicator for ABS, is

provided at the area where a rider can easily recognize, in an integrated manner (Fig. 14). Figure 15 shows the photograph of the completed hard mockup model.

6. Exhibition and Hearing Survey at European Motor Show

What we chose as the sites for the presentation to the public were motorcycle shows held in Italy and France, both of which have a large commuter motorcycle market. That is, they are the EICMA (Esposizione internazionale

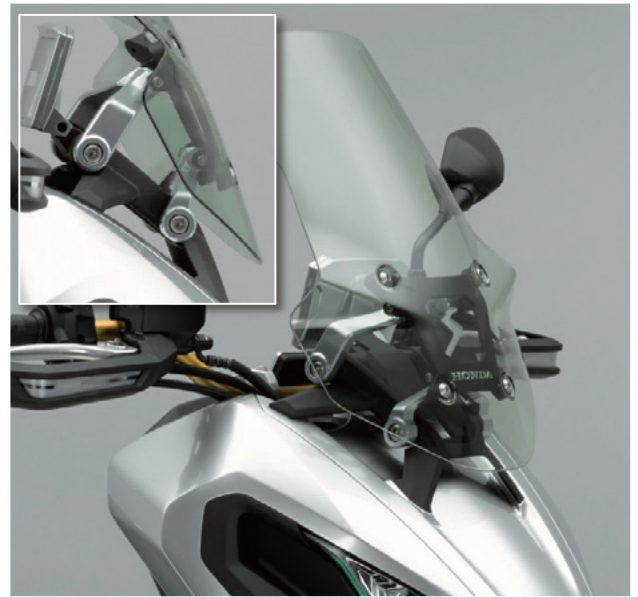


Fig. 13 Movable windshield with pantograph linkage

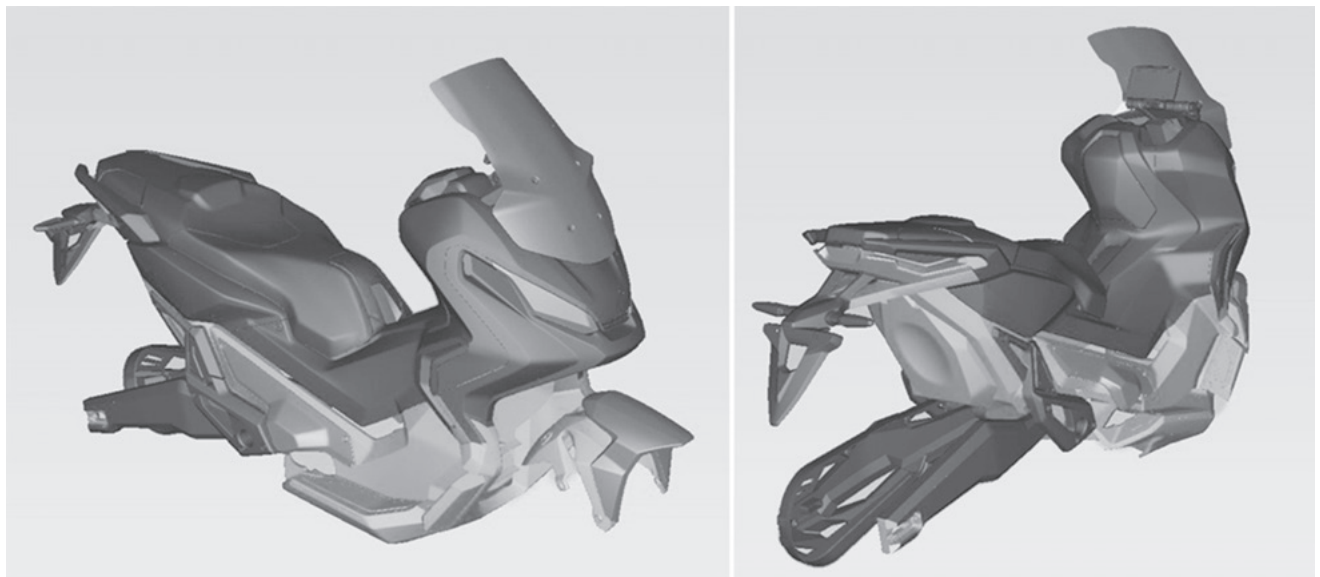


Fig. 12 Three-dimensional data of vehicle body

del ciclo, motociclo, accessori) held in Milan, Italy, and Salon de la Moto Paris held in Paris, France. As mentioned earlier, exhibitions at these shows, coupled with interviews with people visited there, were defined as an important step to verify the evaluations by customers against the concept the team was proposing.

The exhibition booth was designed with an emphasis on conveying a view of a world provided by a motorcycle that has two aspects: comfortable movement in cities when commuting, and freedom of driving through lands full of nature spent in their leisure time. On one side of the exhibition booth, a stone-paved road was re-created. On the other side of the booth, covered with large rounded gravels, a diorama reproducing the camp scene was tailored. Furthermore, in order to emphasize the scenario for each scene, accessories that match with the exhibitions were also designed and displayed (Fig. 16).

For the scene demonstrating being in a town, was prepared a detachable top box that can also be used as a trolley bag. In the center of this top box, the alphabet “X” was arranged symbolizing the concept of crossover. For the side of outdoor scene, a tent and a backpack for storing it were designed and arranged in the display. On the surfaces of these accessories, we arranged the logo type “ADV” which was decided by taking the three letters from the word “adventure,” using silver and green coloring matching the body color of the exhibited model (Fig. 17).

In the exhibition booth designed in this way, the hard mockup model of the vehicle was exhibited. By doing that, we expected the viewers to understand that it is a motorcycle with a specific styling that gives the coolness to be experienced when commuting and the sturdy impression in rural or off-road driving, which had been defined as our aiming concept “Go Everywhere with Excitement.” Using this exhibit, it was tried to verify whether the proposed concept could be received with a favorable impressions by



Fig. 15 Hard mockup model



Fig. 16 Diorama type of exhibition booth expressing Belgian pavement in city and the scene of outdoor



Fig. 14 Display and adjacent area with visibly arranged mechanical parts convenient for commuting

customers.

The survey to the people who saw the exhibited model in the booth was conducted in a form of interviewing. Specifically, we asked about the degree of understanding of the concept, the favorable impression on the design, and the price assumed by the viewer.

The results of the survey are summarized below.

(1) Degree of understanding of concept

The convenience as a commuter's motorcycle, the styling design feeling playful mind, and sporty feelings like those of off-road motorcycles had been understood by the people. It was found out that many of them perceived this motorcycle as a new type of crossover motorcycle.

(2) Attractiveness of design

Attractive styling fitted both of business suits and adventure riding jacket was highly appreciated by many people.

(3) Assumed price

Compared with existing maxi-scooters, the higher ownership value and presence were felt, so there were many answers that price setting equivalent to the motorcycles of the class from 800 cc to 1000 cc is possible.

Confirmed through the results described above, it was verified that European motorcycle users understood the vehicle concept and the styling design of this model as those of a "new crossover motorcycle model," gaining a highly favorable overall evaluation response.

What the team sought for in our concept proposal was a motorcycle that can provide a pleasure of new mobility to the current maxi-scooter users. Two hypotheses obtained in the concept making process, described hereafter, were proved to be correct.

- (1) There is a market of a crossover motorcycle model of an unprecedented category that can run various roads including off-road while providing the convenience of maxi-scooters.

- (2) The four-wheel SUV model has a design that combines modern atmosphere and sturdiness, while ensuring occupant comfort at the same time. By applying this to the design method of motorcycles, it was made possible to realize a design that satisfies both the cool riding in the city and the adventure spirit in a holiday excursion, by a single motorcycle as well.

7. Styling Design for Mass Production Model

As mentioned in the previous chapter, it was able to obtain high evaluation results by users regarding the concept model exhibited at the European motorcycle shows. At the same time, there was a strong demand for releasing this model as a mass production motorcycle. Based on these positive reactions from the market, it was decided to start a project to design mass-production model of this motorcycle.

7.1. Detailed Design of Functional Parts

As mentioned above, high customer evaluation results were yielded for the concept model, and the degree of sympathy for the proposed concept was high. The reason for that was that the specifications and equipment of this concept model were matched with the vehicle category class setting and the proposed direction of the styling design, with appropriate association among them. As a consequence, it is assumed that the presented concept was intuitively understood by the viewers.

Therefore, when designing the mass production model, emphasis was placed on faithfully keeping the design image and the equipment specifications having presented in the concept model as much as possible and reflecting them in the mass-production vehicles as well. It is because we hoped that, by doing so, we wanted to offer that mass production model having features in line with the expectations that our customers had when they saw the motorcycle exhibited as the concept model.

The hard mockup model is shown in Fig. 18, and the mass production model is shown in Fig. 19. From these photographs, it can be understood that the original image is almost faithfully reflected.

A movable windshield is one of the most difficult parts to meet the functional requirements while maintaining the original design.

This windshield is supported by a pantograph type movable stays and is held, as if, floating apart from the front outer contour of the vehicle body. In the hard mockup model, the holding mechanism, actually, was designed to allow only two positions, the highest position and the lowest position, for its fixation, and the fixing mechanism to be applied in the final model had not been decided yet. To cope with this issue, the fixation mechanism and the movable stay, which are installed between the body and the windshield, were designed afresh for the final production model so that it can be fixed at five different heights (Fig. 20). In addition, these parts were designed taking into



Fig. 17 Exclusively designed trolley top case and touring tent with storage case

account the riders' differences in their physiques and the flow of air during riding obtained through a computational simulation.

In the hard mockup model, indicators that appear on the screen of the gauge unit had not been presented in detail. In the design work for the mass production model, they were also designed. Regarding the adjacent areas to the handlebar, considering day-to-day commuting use, the designs adopting many high convenience functions were applied.

The gauge unit was equipped with a speedometer at the center, with a tachometer surrounding it, and indicators to provide variety of information in the periphery. In addition, it was designed to give a sporty atmosphere to the whole display area. Furthermore, a clock with calendar function, a fuel gauge, an ambient air temperature gauge, which are

highly practical for commuting use, were also arranged. In the designs, we tried to design such that these information items can be displayed as large as possible on the liquid crystal surface effectively utilizing the limited area of the display screen. Note that the ambient air temperature gauge also has a warning indicator function for frozen road surface (Fig. 21).

Moreover, a smart key was also adopted to this model. Used with a knob type main switch, it enables to start the engine, and locking and unlocking of the fuel lid and the seat, without an insertion of the key. For this knob type main switch, an original design fitted to the vehicle concept was applied. In other words, this knob type main switch was formed in a symmetrical shape to the longitudinal center line of the vehicle, and the presence of the knob was enhanced by adding a thin ring in chrome color. With



Fig. 18 Exhibited hard mockup model



Fig. 19 Production model

these design techniques, we successfully created a sense of quality being felt when the person is sitting in the driver's seat of a four-wheeled vehicle (Fig. 22).

7.2. Coloring Design

According to the set concept, this model combines two characteristics: cool moving in city and sporty riding on off-roads. In coloring design, the distinctiveness of each characteristic was enhanced by designing multiple color variations that demonstrate the characteristics. This was because it was intended to meet a wide range of demands according to customers' tastes.

Specifically, two color types of coloring group were set: mono-color type and adventure color type. Mono-color type is the color type that comes with a fine quality sense of luxury, which is fitted to the scenes of running through a city wearing a business jacket. The adventure color type is a color type full of dynamism, which is fitted to the scenes

of wildly running on off-roads wearing an adventure riding jacket. Pictures of these coloring designs are included in Fig. 23 that shows whole color types.

For coloring designs that recollect the driving in a city, two types of monotone color types were set. As mentioned earlier, among the possible design approaches for the styling design of the concept model, the SUV design elements applied in automobiles were adopted. The body shapes created by this approach were effectively expressed by adopting the monotone color. For the monotone colors, we set two colors: a metal-toned silver color with strong reflections and shiny appearance (Fig. 23, Type 1), and matte gray which makes feel an atmosphere of tranquility as well as strength (Fig. 23, Type 2). This model has a property of having significant extrusions and dents in the body surfaces, and those are making the whole vehicle body shape look highly three-dimensional. The two selected colors were chosen as those that satisfy the criteria of main body color which can provide luxurious impressions while emphasizing the features associated with town and adventure ridings mentioned above.

For the coloring to give impression of off-road riding, we adopted an off-road sports coloring tailored to the color of the Dakar Rally machine⁽¹⁾. Honda has participated the Dakar Rally since 2013. The reason why we incorporated a race machine color into this model is that the concept of this vehicle is not the one taken over from a scooter model but, aiming to appeal, that it is evolved from the world created by leisure-purposed motorcycle models.

This approach to inherit the coloring image of a rally vehicle has been also applied to one of the coloring derivations of the CRF1000L Africa Twin⁽¹⁾. This model is showing the continued strong sales in Europe, and it is contemplated that a coloring reflecting the scenes of the rally is considered to be one of the colors that customers in Europe prefer favorably.

In styling design, this model has no proportion like off-road motorcycles. Therefore, we applied design techniques



Fig. 20 Windshield in production model



Fig. 21 Gauge unit in production



Fig. 22 Knob type main switch with specification for mass production

to reminisce the rally machine (Fig. 24) and the Africa Twin (Fig. 25) that is the vehicle also expressing that impression. Specifically, a big redesigning was carried out on the white and black stripes, and a unique coloring design was applied. Red and black constitute the body color featuring their strong contrast, and white stripes were garnished with them to express the feeling of lively motions. In addition, metal panels were used for the side covers of the engine and for the skid plate. Engine side covers are easy to be scratched by being rubbed with rider's boots and by being thumped with scattered stones from the road surface. In addition, the skid plate is attached to protect the front part of the engine. By using metal for the parts related to protection functions required for off-road riding, the impression of an adventure machine was further emphasized.

Moreover, the coloring types were set as two color variations. One of them is the coloring featuring scenes of a rally racing, which is previously mentioned, using red as the main color (Fig. 23, Type 3). The other one is the coloring using tricolor scheme consisting of white, blue and red, which is the inherited coloring having been applied to the CRF1000L Africa Twin (Fig. 23, Type 4). By providing these two types of coloring, the adventure character claimed

by this vehicle was made appealing strongly.

In addition, a pet name suitable for claiming a new concept was devised, and a logotype to represent that was



Fig. 24 The Dakar Rally machine



Fig. 23 Variations of coloring

also designed. In order to express the comfortableness of riding as a commuter motorcycle and the pleasure of riding as an adventure motorcycle, the alphabet “X” was placed at the head of the pet name. This “X” means crossover and has been used traditionally in Honda’s crossover type motorcycles. In order to further claim the adventure spirit, ADV was adopted as an abbreviation of “Adventure.” These two words were combined and the vehicle was named X-ADV (eks-ay-dee-vee).

In addition, a logotype for the decided pet name was designed as well. The letter “X” was interpreted as an intersection of roads and expressed by crossing a pair of parallel lines with another oblique line. To give a simple and powerful impression, the character string of “ADV” was given a design based on a black powerful bold typeface (Fig. 26).



Fig. 25 The CRF1000L Africa Twin



Fig. 26 The X-ADV logotype

8. Conclusion

In view of the changes in motorcycle market conditions in Europe after the economic crisis, we endeavored to create a motorcycle that can provide new pleasure to the customers belonging to the existing market of maxi-scooter. Accordingly, a project for proposing a new concept began. From the results of the survey conducted on existing maxi-scooter users, we were able to sense the customers’ new desire. It was a desire for a motorcycle with an unprecedented value. That desired vehicle was a two-wheeled vehicle capable of providing expectations that it can go anywhere, from city driving to off-road riding.

In addition, the styling design required for this new crossover model was realized by applying the design approach of SUV models in automobiles to motorcycles. That was a design approach to have the strength to cope with tough running against bumpy lands while keeping the sophisticated styling atmosphere. By applying this approach, it was made possible to create a styling design that excites the riders’ heart, which has a cool personality that suits the city and evoke the desire to go out of city for an adventure on vacations. The concept model of this vehicle got the opportunity to be presented to customers at the motorcycle shows in Italy and France. At these shows, the concept that the team formulated gained understanding and sympathetic acceptance from the customers, and a decision was made for mass production of this model.

The production model was released in Europe in March 2017 and this motorcycle has been continuing to sell well receiving favorable reviews from journalists and customers (Fig. 27). Based on the responses and evaluation results of these markets, we were convinced that our concept and the styling design incorporating our own ideas reflecting the customers’ opinions have increased the pleasure of motorcycle users in Europe and revitalized the market.

The concept of this model and styling design were created seriously considering the customers’ viewpoints. We hope that this approach of design creation and its



Fig. 27 The X-ADV running through in city and on rough roads

deployment process would be one of the new indicators for product developments and its styling design work in the future.

Reference

- (1) Komatsu, A., Katsuragawa, M.: Styling Design of the CRF1000L Africa Twin, Honda R&D Technical Review, Vol. 28, No. 2, p. 6-8
- (2) Kudo, K.: Styling Design of NC700 Series, Honda R&D Technical Review, Vol. 24, No. 2, p. 15-22

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