

Styling Design of the Forza125

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ABSTRACT

The Forza125 was developed targeting 125 cc GT scooter market in Europe, especially focusing on the market in France. The name GT scooter stands for the category of scooters with larger body size primarily used for long distance commuting. Prior to the development, market survey was conducted and customer's real needs were revealed through the results. Based on these findings, the development goal of the Forza125 was defined as a next generation standard scooter under the concept theme of "New Stylish Sport." As the vehicles of this category are used for commuting, it was pursued to fulfill both requirements in performances needed for highway driving and for city driving to highly satisfying level. In its styling design, representation of superior performance of this vehicle was endeavored. In addition, air flow managements were thoroughly investigated by applying appropriate exterior designs. One of such examples is application of an adjustable screen that is the first in this vehicle class. The developed model was favorably received in the marked winning the category top model in the cumulative sales volume after the product release.

1. Introduction

The scooter market in Europe is continuously shrinking after the Bankruptcy of Lehman Brothers in 2008. In this circumstance, 125 cc scooters have been maintaining a certain size of market within overall scooter market in Europe. Honda has been responding to the varying demands and preferences of users for this market by renewing existing core models, such as the SH125 or by introducing new models, such as the PCX. As a consequence, Honda had successfully gained a firm support from the customers of scooter market in Europe, primarily for the models with small-sized body and in lower price range. However, the situation was different in French market. In France, GT scooters, which are larger sized scooters in 125 cc category usually used for a long distance commuting, are leading models in the market instead of compact models like the SH or the PCX.

With these backgrounds, the development of the Forza125 was started in 2013 setting 125 cc GT scooter market in France as a main target. In the development, we tried to identify the real needs that the customers who were not satisfied with the SH or the PCX have and create a design that can meet those needs.

2. Market Backgrounds

One of the significant characteristics of two-wheeler market in Europe is that, in many countries, people can ride two-wheeled vehicles with the license accompanied to a car license if the displacement is not exceeding 125 cc.

Two-wheelers of 125 cc class have several benefits. Their maintenance cost is reasonable and the price is within affordable range. Moreover, it does not require any exclusive license to drive a 125 cc class two-wheeler. With those economical features and their high usability, 125 cc two-wheelers have been supporting the peoples' lives as handy transport means in Europe for a long time. Especially, scooters of 125 cc class, which are equipped with automatic transmission, do not require any special attire or skill to ride. Those scooters are also provided with sufficient utility spaces. Because of those reasons, these scooters have already established the status of existence completely diffused into the peoples' lives to the extent of being deemed as a part of their cultural assets.

The economy has been stagnant since the Bankruptcy of Lehman Brothers and the motorcycle market has been in a contractive tendency. However, scooters in 125 cc class are well supported by users with the values of good economy and utility as a transport means, and those scooters account for a large percentage of 50% in the European scooter market (Fig. 1). Even though the number of the sales units has been declined compared to the peak period, this market is still one of the important segments in the entire market.

In the European 125 cc class scooter market as described above, models representing the presence of Honda are the PCX125 (Fig. 2) and the SH125 (Fig. 3).

PCX125 is one of the favorably received models, which was released all over the world in 2010 targeting a global model. This model was provided with sufficient specification and equipment achieving high quality

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appearance and usability yet was released with affordable price by making use of the advantage of a large production volume only realized by a global model.

On the other hand, the SH125 has been gaining a large market share in South Europe and its neighboring areas where people tend to show favor in scooters with large diameter wheels. The SH is a model with a long history since its first release in Europe in 1984 and is one of the representing

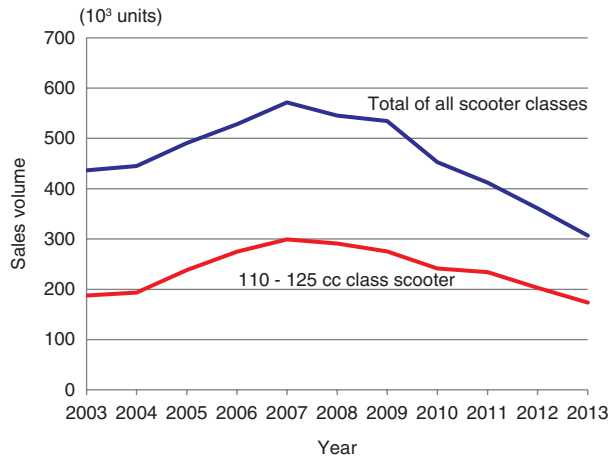


Fig. 1 Transitions of scooter market size for ten major countries in Europe (from Honda internal material)



Fig. 2 The PCX125



Fig. 3 The SH125

models from Honda for commuters' scooter category.

Thanks to these core popular models, Honda can have a large market share in 125 cc class scooter market in Europe. On the contrary, the situation has been lasting long for Honda that it cannot establish a sufficient presence in the same market category in France. Since its release, the PCX125 surely gained a certain size of the market share in the smaller size scooter market but it couldn't fully capture the customers' minds (Fig. 4).

In France, the scooter category called GT scooter is the main category and accounts for about 50 percent of the market. In Honda's scooter product lineup, the S-Wing (Fig. 5) is the model that belongs to the GT scooter category. When they are compared to the models with a compact body, such as the PCX125 or the SH125, scooters of this category usually employ, despite of its small engine displacement of 125 cc, a body with generous size almost equivalent to 250 to 300 cc class scooters. They also have a large storage capacity and wind protection performance as the vehicle features.

More than eight years have passed since the S-Wing was put on the market in 2007. When it was introduced, the

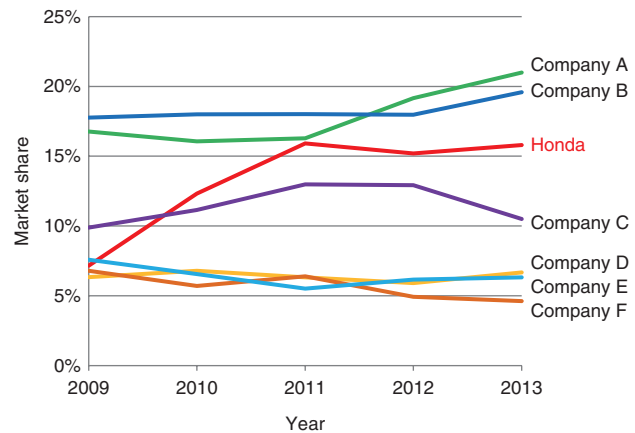


Fig. 4 Transitions of market shares for 110 to 125 cc class scooters among manufactures in France (from Honda internal material)



Fig. 5 The S-Wing

model had technical advantages against competing models. Such technologies included Antilock Braking System that was applied to a scooter in that class for the first time. However, in recent years, ABS is already widely applied and has no significance at all. Moreover, the performances in fuel economy and drive power cannot be counted as characteristics superior enough to the products from competitors.

To overcome those situations, the development of the Forza125 was started in 2013 targeting the 125 cc GT scooter market in France as the main target. To start with, a market survey was conducted to know what would be necessary to attract customers' minds.

3. Market Survey in France

This survey was conducted to identify what the customers want in the market of France. For that purpose, we researched on background situations of their scooter use and the way they use them in the real world. In addition, the subjects also included in the research were the reason why they favor GT scooters and what is the missing feature in existing GT scooters such as the S-Wing. Through these researches, we endeavored to find intimations that may lead us to know what kind of vehicle the developing Forza125 should be.

3.1. Purpose and Background Situations of 125 cc Class Scooter Usage

The purposes and background situations for users in France to use 125 cc class scooters were researched first.

Most of the users are using scooters for their commuting. Many of them privately own four-wheeled vehicles as well, and not a few of the cars are those in expensive price ranges. Two-wheeled vehicles are used mostly for commuting on weekdays. Cars are usually used for their transport needs with family on weekends.

The major reason why they do not use cars for their commuting but two-wheelers is the traffic congestion and unavailability of parking space. The central city areas in France are chronically congested in and around commuting hours on city streets as well as on highways. They use scooters of 125 cc class to evade the congestion. In addition, two-wheelers have been granted with citizenship in France and parking lots are readily available in many places in cities despite those for automobiles are insufficient (Fig. 6). It is assumed that they can choose two-wheeled vehicles without hesitation because these vehicles are publicly accepted totally without any perceived ideas to regard them as a nuisance or an antisocial existence.

Among two-wheeled vehicle categories, scooters are usually chosen because they are suitable for a ride in business attire, such as business suits or leather shoes and they accommodate a business bag to be stored in a body. In addition, it is another reason for choosing scooters that riders can have some protection against wind and rain with a leg shield and other vehicle body structures.

People in France basically deem 125 cc class scooters as convenient transport measures providing an excellent mobility with easy handling and sufficient drive power. Especially, users who use two-wheeled vehicles for commuting with an accompanied license do not have any interest in the two-wheelers over 125 cc as their vehicle options. It rather commonly happens that a business person without any interest or riding experience begins to use a scooter in order to evade traffic congestions. However, most of them actually have no interest in two-wheeled vehicles as their subject of hobby.

As mentioned above, a 125 cc scooter is recognized as a very convenient tool for commuting by many users in France. Moreover, they are selecting a 125 cc scooter not because it is reasonably priced compared to automobiles but it is one of their "smart options" under thorough considerations on the efficiency and the usability.

3.2. Reasons Why GT Scooters are Chosen

Why do the larger-bodied GT scooters have a large share of the 125 cc-class scooter market in France rather than the compact models such as the PCX and the SH? The single most important reason is the use on the highways for commuting to work. Unlike the other countries in Europe,



Fig. 6 Parking spaces spotted in a city area of France

125 cc motorcycles are allowed on highways in France. Because of this, urban areas that are fairly far away can be commuted to from suburbia by a 125 cc motorcycle. Many of them ride their scooters for approximately 30 km one way, totaling 50-70 km every day, between home in the suburbs and the office in the city center. That means that the French customers use the scooter for commuting at high speeds on highways and low speeds on congested general roads. As they travel at a speed above 100 km/h for a certain period of time on highways, they require functions and performance unavailable from compact models made mainly for use on general roads, such as the dynamic performance for high speed cruising, good protection to keep off rain and wind, wobble-free stability when on road, adequately padded seat for long-time comfort, high eye point for good front visibility. The 125 cc GT scooters with the above-mentioned features can be said as a category that has evolved in France having a unique environment that permits 125 cc motorcycles on highways.

In France, compact scooters such as the PCX are starting to gain recognition as a suitable commuter in town for having advantages in environmental protection, such as good fuel efficiency and the idle stop system. Many users choose such compact models since those living in the city use scooters for traveling short distances. Nevertheless, these company scooters do not prioritize dynamic performance for high speed cruising and wind as they are considered city commuters. They do not have the adequate level of usability for those users riding on highways.

3.3. Voices of GT Scooter Users

What has surfaced upon hearing voices from regular GT scooter users is that they are not necessarily satisfied with the current GT scooters.

First, although the engine power is a key feature of GT scooter, many users feel the power is insufficient when overtaking on a highway or launching and accelerating in town. Accordingly, the dynamic performance is a main concern when they choose a model. In other words, the performance the user felt as lacking in the existing GT scooter was the dynamic performance.

The next issue is the body size. GT scooters have evolved to meet user needs such as wind protection and expanded luggage space. As such, some GT scooters grew much larger in body size to respond to those requests. A larger body was advantageous for wind protection and/or luggage space, but it began affecting their agility in town as a trade-off. Since agility is critical when navigating through heavy traffic, users have been seeking an appropriate body size for it. In other words, the users were seeking a model with a body size that best balances two contradicting demands: a large body size suitable for cruising on highways and a compact body size for agility in town.

Also clarified at this time was the importance of the styling. The GT scooters themselves are well accepted without any negative images. On the other hand, they

were not recognized as being particularly “sporty” or “stylish.” The users were more concerned with the functions because a 125 cc scooter as a product was viewed as a utility commodity, not necessarily something for hobby. Notwithstanding that, a styling that is sportier and with a more advanced image is becoming desired even for a scooter for commuting. Needs are growing for a scooter to have a styling design that matches the dynamic performance, rather than having just high dynamic performance. In other words, the styling design of current models lacks a sporty and stylish image that represents the dynamic performance the users seek.

As mentioned earlier, many users in this category are also an automobile user as well. Accordingly, the quality of a scooter’s exterior design is compared to automobiles. Since such users ride in town wearing business attire, demands are high in the visual quality, its luxury image and design quality, even for a commuter. Anything that appears lower in cost or low in performance are not preferred. In other words, they seek from a scooter the same level of quality image as of an automobile.

Many users of scooters in this category are of a class having relative high income. They use a scooter not because they are unable to buy a car, but rather because it is a wise option taking into account its practicality and efficiency. Accordingly, they do not want to be seen as riding something lower in cost or economically pressed. A styling design that adequately meets such demands, however, has not necessarily been offered.

As such, our target users have had complaints in the styling design of existing models. They were not seeking to show off the scooter or attract attention from others; rather, it was a style that has the aura of a solid presence that gives the owner the satisfaction and pride of owning one. What is needed was not a styling as a tool but a design that surpasses that: a styling design that gives a sporty and intelligent image, which is also at the same time cutting edge and high-tech in image.

With such results obtained from the research, it has been concluded that there is a need of development of an entirely new GT scooter that responds to the market demands as mentioned above. In other words, the Forza125 was to become a truly new model that becomes a standard of next-generation GT scooters should be, rather than being an extension of the S-Wing model line.

Mentioned hereafter are the processes of the styling design actually conducted on the basis of the said direction of product development.

4. Aims of Product Development

Based on the findings of the research, the development team established the following six criteria that should be realized in the Forza125, the new development model.

(1) Dynamic performance

- No.1 dynamic performance (max speed, overtaking

acceleration, standing acceleration) in the category exceeding conventional GT scooters

(2) Sporty and intelligent design

- Sporty styling design that expresses high dynamic performance and evokes image of agility
- Styling that gives an intelligent image that makes the owner feel joy and pride in possession, a high-quality image and presence beyond the standards of class

(3) Highway use: Highway comfort, convenience

- Wind protection
- Wind noise countermeasure
- Wide vision and visibility
- Stability
- Safety devices such as ABS

(4) City use: City-use comfort, convenience

- Utility suitable for commuting to work
- Comfort, agility, and maneuverability suitable for city use
- Exhilarating feeling inherent in motorcycles and scooters

(5) Image of advanced technology

- Technology that captures the up-to-date, high-tech image

(6) Economy

- No.1 fuel efficiency in category
- Fuel capacity sufficient for commuting to work for a week

There are following issues when simultaneously satisfying all of the above criteria.

To improve wind protection, the size of the front cowl or screen is usually increased. A large cowl, however, hinders ability to pass through a narrow space on congested city roads, and spoils agility. An enlarged screen reduces exhilarating feeling that a motorcycle or scooter gives from exposure to wind.

An increased tire size is effective for improvement of comfort when riding in city. When the tire size is increased, however, a larger space is taken by the rear tire for movement, which reduces utility box space, and makes it hard to maintain sufficient utility spaces necessary for commuting to work.

While an extended wheel base is beneficial for high-speed stability, it hinders agility and maneuverability in town.

The 125 cc scooter to develop at this occasion is in a moderate price range and the body space is limited. A high engine power like a large scooter cannot hoped to be achieved. A big increase of body weight cannot be allowed from the standpoint of dynamic performance.

It can therefore be understood that the hurdles are very high for development of a product that satisfies performance requirements in two completely different working environments, i.e., highways and city roads. This is the reason why no models that satisfied all of the above existed.

Nevertheless, the development team members tackled the challenge with a goal set at achieving high levels of performance both on highways and city roads. We chose to refer to the new scooter as “New Stylish Sport.” This project is aimed at creation of a GT scooter that will become a standard and play a leading role in the next generation of scooters.

Table 1 Target specifications of the Forza125

Item	Specification
Engine	eSP engine. 4 valves
Power	11 kW/8,750 rpm
Curb weight	160 kg or less
Wheelbase	1,500 mm
Seat height	780 mm
Front tire size	120/70-15
Rear tire size	140/70-14
Fuel consumption	2.29 L/100 km
Fuel tank capacity	11.5 L
Utility space capacity	Accommodating 48 L Full face helmet × 2 or Full face helmet × 1 + Business bag

5. Specifications to Serve as Bases of Styling Design

Keeping in mind the said concept, goals were set for specific performance, dimensions and key specifications. Among those, the specifications closely related to determine its exterior design are listed in Table 1.

The engine referred to as eSP is employed⁽¹⁾. The eSP engine has been developed as Honda's new generation engine that achieves both practical engine power and a good fuel efficiency. In this model, an even higher power output is targeted by incorporating 4-valve design into the base eSP engine. Regarding the key criterion of dynamic performance, goals were set at an engine power output of 11 kW/8750 rpm and a curb weight of 160 kg or less to achieve the best running performance in the category.

The target wheelbase was set at approximately 1500 mm to balance handling and stability.

Considering the visibility on highways and the ease for feet to touch ground on city roads, the seat height was set at 780 mm.

To best balance stability, agility and riding comfort, the tire size of 120/70-15 was selected for front, and 140/70-14 for rear. These are a size larger than S-Wing. Up-sized tires are keys to realization of styling that gives images of dynamic performance and improved riding comfort.

The fuel efficiency of 2.29 L/100 km and the 11.5 L fuel tank capacity are targeted to allow a maximum range of 470 km or more, which requires filling only once a week for most users.

The capacity and shape of the utility box are set presuming storage of two full-face helmets or a full-face helmet and a business bag.

6. Styling Theme and Proportions for Realization of Target Style

6.1. Styling Theme

At the start of styling design, the theme was first

set. GT scooter users are most concerned with dynamic performance, thus a design that matches it is desired. Accordingly, the design team deemed necessary to create a style that conveys to users the model's high performance capabilities at a glance. "A style that produces fast and agile image" was chosen straightforwardly as styling theme appropriate for "New Stylish Sport."

Moreover, it was decided to pursue a design that is appropriate for its functions rather than for differentiation. A target was set at realization of a highly stylish design by incorporating function into the styling design rather than spoiling the function by the styling design. That is because users never want to have the function spoiled for the sake of style in a scooter for daily commuting which in a sense is the harshest operating environment. If the design is too unique, it would fail to become a standard in the long run although it may draw attention for a limited period of time.

6.2. Design Proportions

First, we discussed what styling design would produce a fast and agile image. This was done because it is the proportions of an entire vehicle, more so than the styling of cowls and the details, that is the key for creating such an image.

Generally, a GT scooter body tends to be longer and/or larger relative to its undercarriage parts including the wheels, in order to provide both wind protection and luggage space. Such a balance, however, diminishes the sportiness, making it difficult to create a high dynamic performance image. Accordingly in this project, it was decided to employ two proportion-related elements, "mass forward balance" and "trapezoidal proportions," to create a fast and agile image through styling design.

The "mass-forward balance" in this instance refers to a means of styling design that can emphasize a strong forward motion and good wind protection as well as creating the image of man and machine as being one. Also, the "trapezoidal proportions" is effective to create a fast and agile image by keeping the body as compact as possible while emphasizing the undercarriage parts

that connect the bike to the ground. These methods are often used for the styling design of motorcycles and are far different from the conventional approaches of scooter styling design (Fig. 7).

7. Styling Design Sketch

The style with a "mass-forward balance" and "trapezoidal proportions" was pursued keeping in mind the specifications and equipment to be applied. In the stage of design sketching, styling design was conducted to allow reflection of two intentions mentioned hereafter.

7.1. Styling Incorporating Function into Design

As mentioned in the section on the styling theme, many of the external shapes of the Forza125 were created not only for styling but also from functional requirements.

It was necessary to make the cowls and the body as compact as possible to achieve ideal body proportions, sporty style and agility for use in town. On the other hand, a certain cowl size is necessary for wind protection. To satisfy two contradicting requirements, thorough air flow management was considered when designing the shape. In other words, attempts were made to maintain adequate wind protection from a compact body.

From the stage of design sketch, the styling was created while well keeping in mind how the air should flow, such as how to let the air leave off the cowls, and how to intake and release the air. In particular, the shape of the front cowl directly affects wind protection for rider's upper body and arms. Therefore with respect to the design of this part, many design considerations were taken such as letting air leave from the reverse surface in the rear ends on the sides of the front cowl (Fig. 8).

7.2. Styling Design That Exudes Intelligent Maturity

As the results of market researches indicate, the main target of this model is adult business persons. Moreover, taking into account that the users are mature Europeans, the obvious expectation was a design that would make

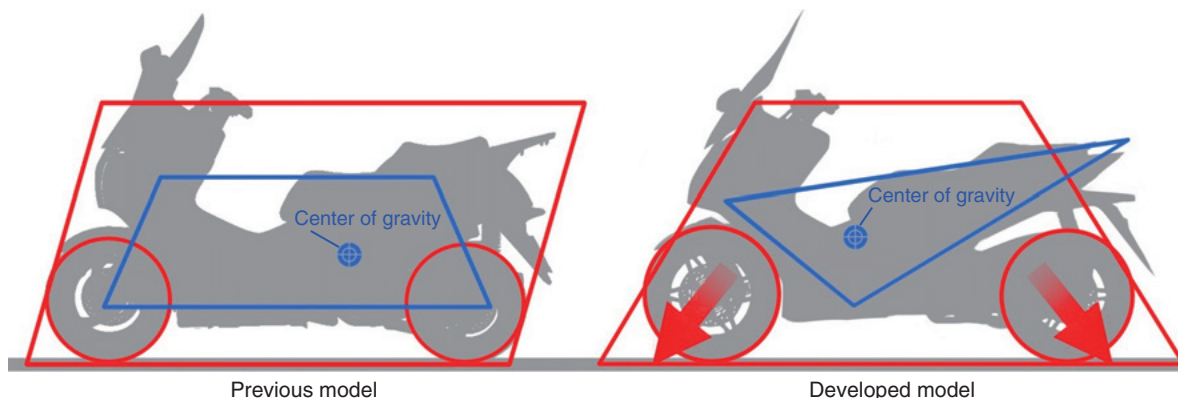


Fig. 7 Objective directions in design for the vehicular proportion of the Forza125

one feel that the product has the image of intelligence and matureness, allure and sexiness, and that it has a presence that gives its owner satisfaction of ownership. Accordingly, the design should satisfy user pride as well as having an intelligent and high-quality feel.

To create a mature, alluring and sexy image, dynamic yet elegant character lines and surface treatments were incorporated into the exterior parts such as the front body and the rear body (Fig. 9). At the same time, sharp and three-dimensional part shapes and the well-balanced layout of painted parts and material-colored parts emphasize sportiness that can satisfy mature users.

In the meantime, a mechanical and solid design was applied to the functional parts to produce an intelligent and high-quality feel give an advanced, high-tech impression. Meticulous attention was paid to designing even the smallest of details based on their functions (Fig. 10).

With the said considerations taken, the sporty yet elegant, aggressive yet intelligent, unique charm of the Forza125 was produced by the contrast of the elegant and glamorous body design against the mechanical and solid functional parts.

Thus completed was the styling sketches which should be well accepted by mature users in Europe while incorporating the function as a part of design (Fig. 11).

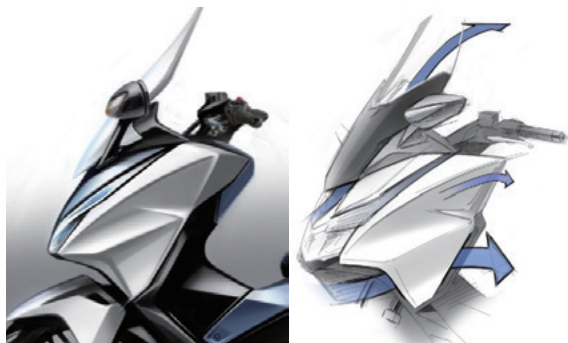


Fig. 8 Body shapes designed by thorough investigations on airflow management



Fig. 9 Character lines



Fig. 10 Design expressions evoking mechanical characteristics of functional parts



Fig. 11 Styling sketch of side view

8. Designing of Details

8.1. Design by 3D Modeling

As the next step, the proportions and the design concept were reflected on the 3D model by repeating the following procedures.

- (1) Produce clay model
- (2) Produce design data
- (3) Produce prototypes
- (4) Test functions and performance using prototypes

With the styling design for this project, more hours were spent than usual for the step (4), especially for the aerodynamic tests and the feedback of test results to the design team.

Prototypes were used to run tests in the wind tunnel to confirm where and how the wind blasts against the rider, with the following as targets to be achieved:

- (1) Adequate wind protection from compact cowls
- (2) Optimum wind protection for riders of various physical builds
- (3) Considerations for comfort such as reduction of wind noise

Based on the test results, detailed shapes of the cowls were repeatedly refined by working together with the clay modelers and engineers. The styling was refined by conducting computer simulation verifications simultaneously with the wind tunnel tests.

At the same time, prototypes were taken to the test course for compound tests of various performance criteria other than the wind protection. Upon reviewing of the test results and hearing from the test riders, the styling was further refined.

In the process leading up to the finalization of styling design of this model, it was extremely challenging issue to achieve both handling stability and wind protection. The design was repeatedly modified without a compromise until reaching a fully satisfying level. The styling design of the Forza125 was finalized through such thorough validation processes (Fig. 12).

8.2. Adjustable Screen

The windscreen, which is a key part of wind protection, is an element that affects significantly to the styling impression. While the screen design started in an early stage, it was the most challenging part to design in the development of the Forza125. First, computer simulation was used to roughly estimate the approximate size, height and shape of screen for adequate wind protection, then the styling design was made based on it.

8.2.1. Advantages and disadvantages of screen

A larger screen provides better wind protection, improving comfort at high speeds. However, a large screen could create issues as well. As a motorcycle/scooter screen is made of plastic by injection molding or hot pressing, it is hard to attain clear and natural view of the windshield of an automobile. It is also vulnerable to scratches. When in rain, rider's vision may be hindered by irregular reflections from water drops on the screen. The fun and exhilarating feeling unique in motorcycle/scooter are attributable to the rider being exposed to wind, unlike in a car. An excessively large windscreen spoils such an exhilarating feeling.

8.2.2. Body size of rider and screen size

To balance such variety of requirements, a screen having a size that matches rider's body size is required. However, it is obvious that an optimum screen size varies depending on the height and build of the rider. An optimum screen size for a short rider may be too small for a tall rider to obtain adequate protection. On the other hand, if the screen is optimum for a tall rider, it may disturb front view for a short rider. The team repeatedly discussed how a screen should be to match a broad range of user physical constitutions.

8.2.3. Employment of adjustable screen and its limitations

The solution finally reached was to apply an adjustable screen.

Though adjustable screens are already employed in some large tourer models, none has ever been applied to 125 cc-class motorcycles. Nevertheless, it was concluded that it was the only option to have the rider feel exhilaration while offering adequate wind protection to a large number of users.

Considering the general price range of 125 cc scooters, any high-cost design requiring a large number of additional parts or high-cost parts had to be avoided. It is necessary



Fig. 12 Finalized exterior design (for mass production)

to make the styling feasible while ensuring screen adjuster rail protection, aerodynamic effects, durability and user-friendliness, taking into account the said limitations. As a means to fill the said needs, a visor as shown in Fig. 13 in front of the screen to cover up the adjuster was devised. Accordingly enabled was the screen appearing more compact than that of conventional GT scooters while protecting the adjuster. The design also contributes to the unique face appearance that gives the impression of individuality and presence while being stylish and sporty. Also to be noted is that the screen is stored behind the visor when lowered.

Additionally, the screen/visor design provides further improvement in wind protection by streamlining the air taken in from the duct under the visor and releasing out of the back of screen (Fig. 14).

8.2.4. Final screen design

The specifications and design of the adjustable screen was also refined gradually while conducting computer simulations and tests in the wind tunnel using actual scooter

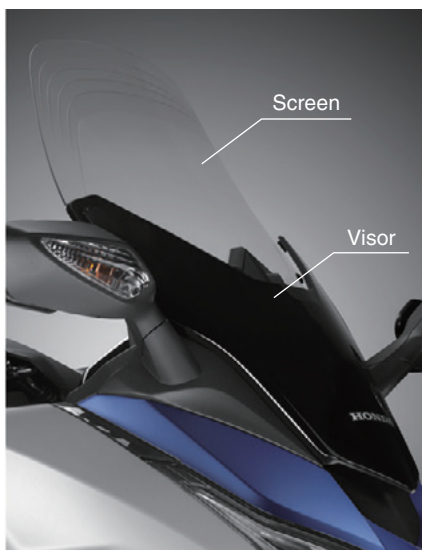


Fig. 13 Adjustable screen and visor

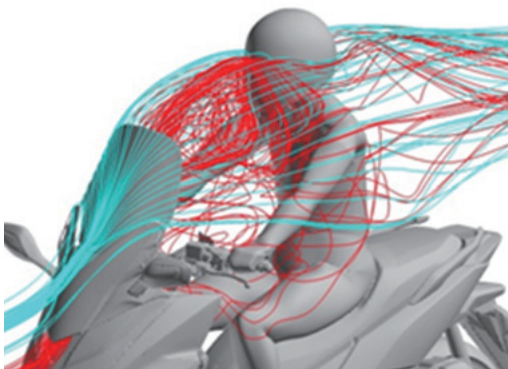


Fig. 14 Airflow straightening effects generated behind the screen, where red lines show the straightened flows behind the screen

as with the development of body cowls (Fig. 15).

Finally, the screen height adjustment range was set at 120 mm with six positions to offer comfortable riding on highways to riders of various physical constitutions. If wind protection is not concerned, the screen can also be lowered to allow the rider to feel the exhilaration and thrill of riding a motorcycle/scooter.

8.3. Design Details

Aside from the entire proportions and cowls of the model, other details were also designed considering functionality, convenience, and safety. Among those, the specifications and design especially noteworthy are introduced hereafter.

8.3.1. Mirror with turn signal light

In France, it is common practice to keep turn signal lights blinking when a motorcycle/scooter maneuvers between automobiles on congested highways (Fig. 16). Taking this into consideration, the front turn signal lights were integrated into the mirrors located at a high position (Fig. 17). This reduces chances of turn signal lights being hidden behind an object such as an automobile, to make the scooter more recognizable. It also contributes to improved visibility from other riders or pedestrians on general roads.



Fig. 15 Design verification using wind tunnel



Fig. 16 Congested motor highway circulated around the city of Paris

8.3.2. Wheel and suspension

The front and rear wheels were designed to appear powerful yet agile by reflecting recent motorcycle trends to give a fast and high-performance image (Fig. 18). The rear suspension units are installed at an angle to emphasize the trapezoidal proportions while reducing vibrations and improving riding comfort.

8.3.3. Lighting system

The LED dual headlights were designed to appear sharp and intense to exude presence by integrating with LED position lights that emit light in linear patterns with light-directing plates enhance presence (Fig. 19).



Fig. 17 Side mirrors installed with turn signal lights



Fig. 18 Front wheel and front fork with bottom case



Fig. 19 Dual LED head lights and LED position lights

Moreover, the LED tail and brake light was designed with a unique M-shape to allow the Forza125 to be immediately recognized when seen from behind (Fig. 20).

8.3.4. Utility spaces

The Forza125 provides top-level capacity in utility spaces for its category. The utility box in the rear body has a 48-liter capacity and can accommodate various usages by using the attached separator plate (Figs. 21 and 22). Also, the glove compartment in the front body is equipped with a power socket to allow charging of devices such as a smart phone, etc. (Fig. 23).



Fig. 20 LED tail and brake light



Fig. 21 Utility space under the seat

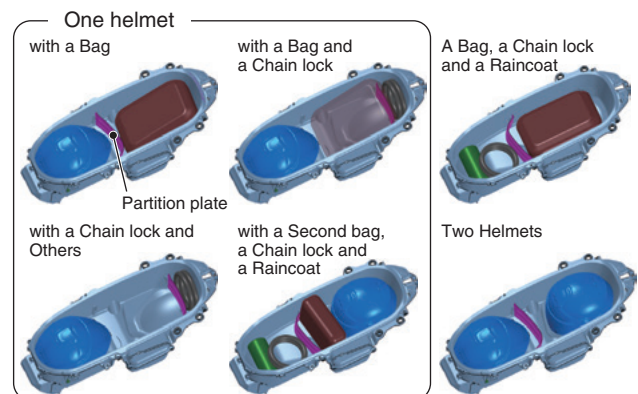


Fig. 22 Examples of practical uses of the utility box

8.3.5. Instrument panel

The instrument panel is an area that the user frequently looks at when using a scooter. It is therefore one of the critical areas in which users get the feel of a product's quality and a sense of satisfaction for ownership. The following was taken into account when designing so that users, whose standards are based on the quality of automobile, perceive that the simple and functional product has a feel of high quality (Fig. 24).

- (1) The speedometer and tachometer are of an analogue type to produce a mature, gentle image.
- (2) The area around the meter is framed with a painted panel to enhance high-quality image and to differentiate from conventional scooters. The frame is colored glossy black, which is the trend in automobile interior, to create a contrast with the polypropylene parts around it. The intention was to create a mature, refined design, rather than being bold.
- (3) The above-mentioned frame visually separates the meter and the indicators inside and the information LCD outside. The differentiated depths create a three-dimensional feel like an instrument panel of automobile.
- (4) The information LCD provides features such as a clock convenient for commuting to work, and a fuel gauge.
- (5) Decorative parts with gloss black finish, as used in the meter, are also applied to the handlebar cover, etc., to enhance the high-quality image around the instrument panel.



Fig. 23 Glove compartment



Fig. 24 Instrument panel

- (6) Accessory parts such as meter frames and handlebar covers painted in colors matching body colors are made available for users seeking an even bolder look (Fig. 25).
- (7) Presuming installation of an after-market part such as a smartphone holder, the handlebar cover was designed to be compact to accommodate such parts while also maintaining its good appearance (Fig. 26).

8.3.6. CVT case cover and air cleaner case cover

In the styling design of a motorcycle except for scooters, the appearance of engine plays a key role to create a high performance image. In a scooter, however, the engine is covered with body panels and virtually invisible. One of the goals of this model was realization of a style that evokes the image of superb dynamic performance. Thus, the model targeted to produce the high engine potential image by design considerations of the CVT case cover containing the power transmission system, instead of the appearance of the engine itself. To achieve this, an image of the swing arm on a sporty motorcycle was created with the CVT case cover by laying glossy painted parts on a background of textured semi-glossy Polypropylene parts. Additionally, a mechanical and solid image was adapted to the air cleaner case cover to give the impression of a high power engine. The design of air cleaner case cover also helps to prevent entry of dirt and water from the air intake opening.



Fig. 25 Example of furnished accessory parts



Fig. 26 Example of smart phone installation

By designing functional parts to the details as per the function and styling concept, the image of entire vehicle is unified, contributing to enhancement of high-quality image (Fig. 27).

8.4. Colors

A total of five color variations are offered (color variations vary slightly by country of sales) (Fig. 28). Scooters sold in Europe are predominantly in the black-and-white range to accommodate various types of cloths in day-to-day commuting. Accordingly, four of the five types are in generally chicly colorless shades such as black and gun metallic.



Fig. 27 Covering of CVT case and covering of air cleaner case



Fig. 28 Color variations

The remaining one type is of a characteristic coloring, intentionally done so to match the sensibility and fashion of the French people. With a combination of matte white and matte blue, the color scheme radiates a strong aura of presence, adds color to user's life, and produces a sporty yet mature allure. Although the combination of white and blue is high in contrast, the matte finish for both colors subdues the design to be not too loud. Thus realized is the color scheme which is unique yet not unusual.

9. Reactions in Market

The Forza125 was introduced at Paris Motor Show in October, 2014, and its sales began in April 2015.

Though the data was from a short period of time including those at the time of release, the sales volume recorded No.1 in the 125 cc scooter category in the cumulative unit sales volume from January through July, 2015, in France (Fig. 29). Accordingly, Honda's share in the 125 cc scooter category in France grew remarkably (Fig. 30). The Forza125

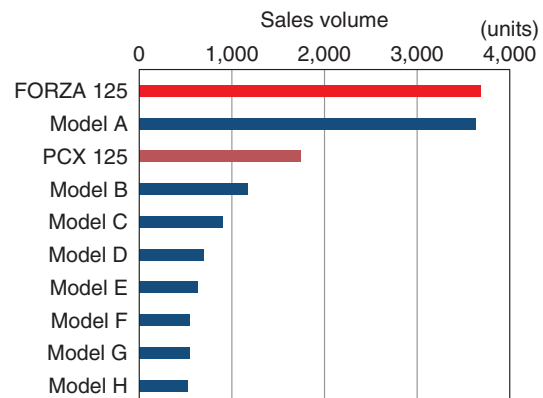


Fig. 29 Top ten models in accumulated sales units of 110 to 125 cc class scooters in France (January to July, 2015) (from Honda internal material)

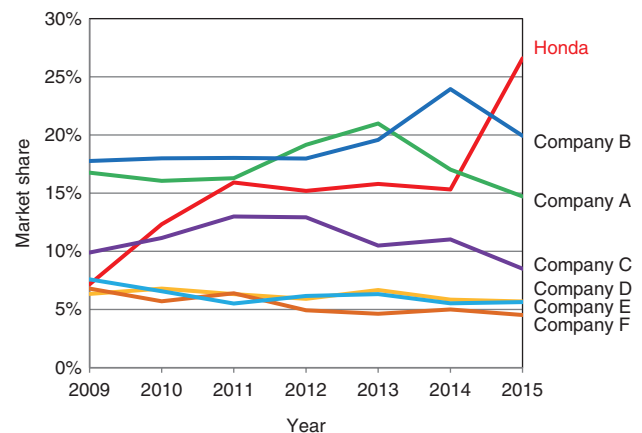


Fig. 30 Transitions of shares among manufactures for 110 to 125 cc class scooters in France (until October, 2015) (from Honda internal material)

received extremely good reviews from the interviewed users and journalists. The styling design in particular received especially high remarks and contributed significantly to the popularity of the model.

With respect to the color scheme, despite the scooter being used predominantly for commuting, the matte white/matte blue combination comprised 25% of all colors. That is the second highest of all five colors (Fig. 31). This fact proves that our intention in the Forza125 color scheme matched the sensibility of the French.

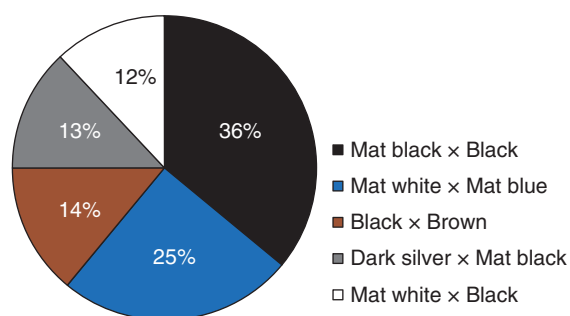


Fig. 31 Constituent proportions of vehicle body color variations for the Forza125 in sales

10. Conclusion

After clarification of customer needs by market research, the development of the Forza125 targeted the creation of an entirely new GT scooter.

Taking into account how the scooters were being used, “New Stylish Sport” was chosen as the key word of product development. Goals were set to satisfy performance demands in highway use as well as in city use at a high level. The aim of the styling design was not only at the attractiveness such as intelligence and allure, but also at creation of the image of highly dynamic performance. To achieve the goal, a style incorporating the functions such as realizing maximum wind protection was thoroughly pursued.

As a result, the Forza125 has been well received in the market, which we see as a proof that our styling intentions were correct.

That said, the real value of a product is not truly revealed until after a long period of use. We will therefore continue to listen to customer voices, look at the product from customer viewpoints, and improve it so that the Forza125 will be continue to be accepted by customers as a true standard model.

References:

- (1) <http://world.honda.com/Global-125cc-engine/>

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