

Styling Design for 2018 Gold Wing

– Power unit –

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ABSTRACT

In designing the power unit of the 2018 Gold Wing, we focused on mechanical lines in efforts to express a functional beauty with its exterior design. We strove for a design that clearly telegraphs the functions of the individual parts to sate the desire of motorcycle enthusiasts interested in the function and performance of the motorcycle. In implementing these design themes, we have produced a motorcycle with an advanced feel and a power unit with a finish that satisfies the itch for owning the latest technology.

1. Introduction

We have designed a horizontally-opposed six-cylinder (F6) engine that was newly developed for the 2018 edition of Honda's flagship model, the Gold Wing GL1800. We started by assessing the engine's role in the overall vehicle design.

With a designated styling theme of "Styling with Refined Sharpness and Tension,"⁽¹⁾ first, each element of the design theme was settled with the vehicle divided into two design zones: top and bottom (Fig. 1). The top half of the vehicle was chosen to feature "Fluency and lightness, dynamic fluid-edge surface," while the bottom half would utilize "Functional beauty and advancement through mechanical lines" to showcase the functional beauty and advanced feel of the design.

The engine design forms the core for the mechanical

lines in the bottom design zone. The final sketch for this engine is shown in Fig. 2.

Thus, this engine design is expected both to portray the premium feel of Honda's flagship model and to befit its unrivaled F6 engine.

Furthermore, many users feel a strong affinity for engines as the heart of the motorcycle. Another impetus for the decision was to actively show off the engine to give the Gold Wing the feel of "a pure motorcycle,"⁽¹⁾ one of the designated keyword phrases for the design.

Air flow management around the engine was also aligned accordingly. Up through the previous generation of the Gold Wing, all but the cylinder head portions of the engine were completely sheathed with exterior parts. This approach both shaped the exterior air flow while also serving to protect the rider from engine heat.

Therefore, space was needed on the inner side of the exterior parts to vent this engine heat, a contributing factor to enlarging the vehicle body. For this design, based on the approach of actively showcasing the engine, we used minimal exterior parts with air channeling effects to vent heat, serving to both cool the engine and reduce the weight of exterior parts.

Moreover, design for engines, the soul of the functional components of the motorcycle, requires extensive understanding of how these parts function. Thus, we solicited the engine designers for their opinions in detail as the work proceeded.

With these approaches, our goal with the engine design was to express the beauty of its mechanical functions while serving as a symbol of stylish progression. The engine's prominence should satisfy the many aforementioned engine-loving users and provide them a greater sense of ownership.

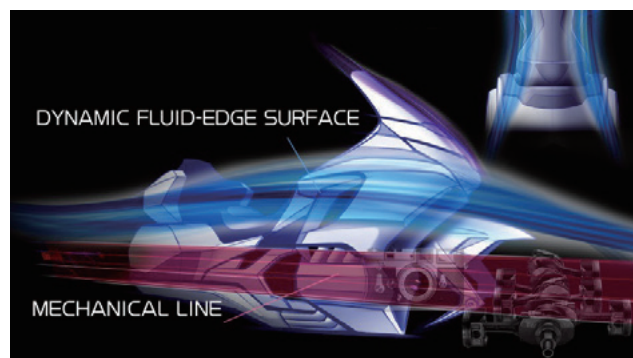


Fig. 1 Two design zones and their designated themes

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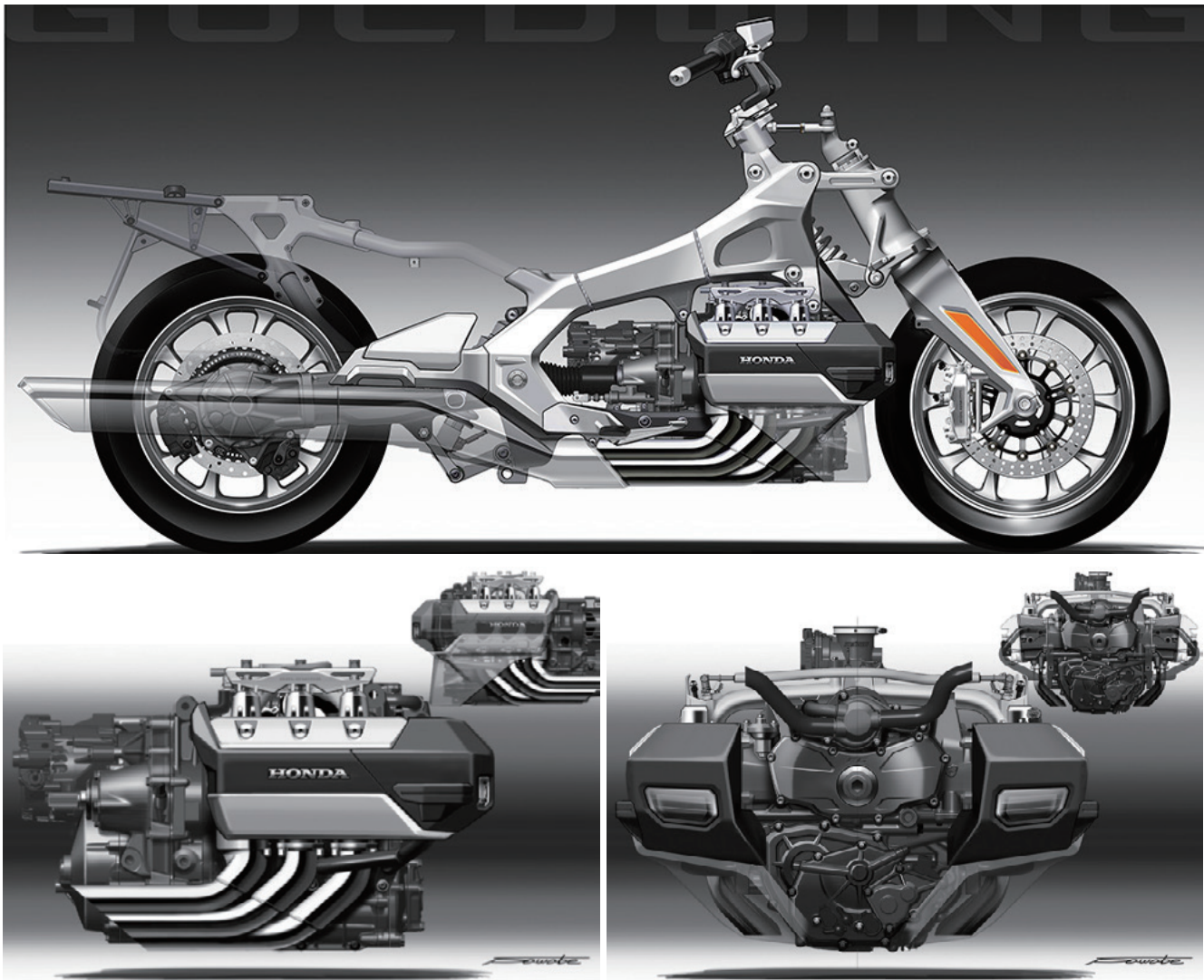


Fig. 2 Engine situated in center of mechanical line

2. Mechanical Expression: An Appealing Machine

Generally, manmade mechanical models take on inorganic shapes comprising arcs and lines (Fig. 3). Thus, in design as well, inorganic elements can be used to transparently convey a mechanical theme.

Conversely, beings in the natural world, such as plants and animals, have organic shapes with no simple arcs or lines (Fig. 4).

For this design, it was consciously decided to actively incorporate inorganic shapes to express the themes set for this design zone: functional beauty and advancement through mechanical lines.

2.1. Transparent Expression of Functionality

In a purely structural design, functional parts such as an

engine will take on complex shapes (Fig. 5). This concept was leveraged to design each part with the quality feel of a flagship model engine and, as mentioned in the previous section, to transparently convey the roles and structure of each part to users infatuated with the engine's appearance.

The below are some of the design features in this development project which model structure and function. By associating the design with internal structure, in addition to their standard roles, the case and covers were used as a medium for expressing the mechanical concept.

2.1.1. Outline of cam chain line

Indentations were added to outline the shape of where the cam chain fits, extending from the front cover at the center of the engine's front across the cylinders and cylinder heads on each flank. These indentations are illustrated in Fig. 6 by red gradations.

2.1.2. Straight lines from intake to exhaust

The intake manifolds and exhaust pipes were intentionally aligned in a straight line cutting from top to bottom. In engines through the previous model, the intake and exhaust were staggered slightly front to back due to

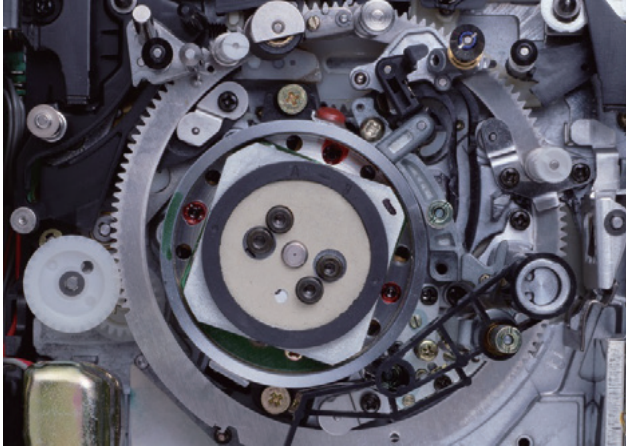


Fig. 3 Objects having mechanical and/or artificial shapes are commonly recognized as geometric shapes



Fig. 4 Shapes of things that exist in nature are commonly recognized as organic shapes

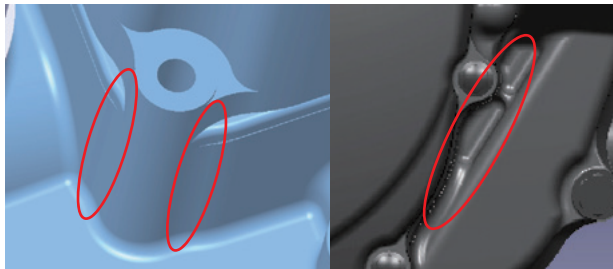


Fig. 5 Examples of things that give sense of inconsistency

the placement of the valves. This was offset by shifting the position of the head cover bolts and other adjustments for a cleaner look (Fig. 7). Meanwhile, as this stagger between intake and exhaust was removed from the developed engine, straight lines were emphasized in the design (Fig. 8).

Furthermore, a simple, functional appearance was targeted due to the arrangement with 3 exhaust pipes converging to one side.

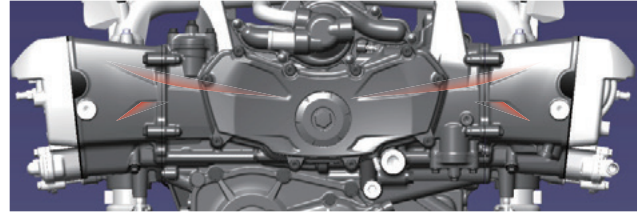


Fig. 6 Front cover design that makes viewer imagine movement of cam chain

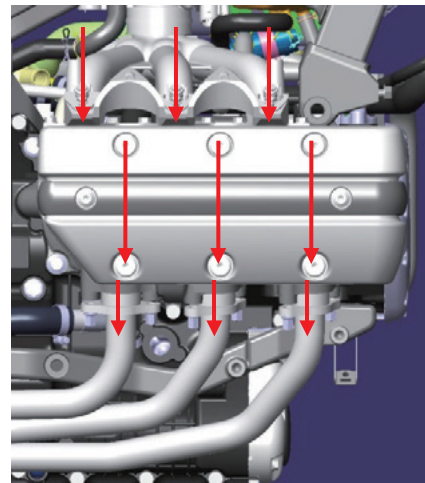


Fig. 7 Design applied to previous Gold Wing

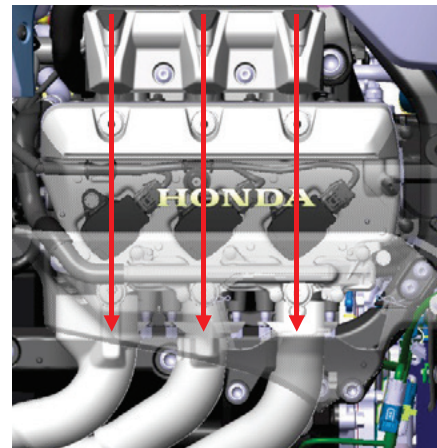


Fig. 8 Design applied to developed Gold Wing

2.1.3. Suggestive expression of intake manifold cover

The intake manifold covers forming part of the straight lines from the previous section are shaped to visually represent the placement of the injectors and fuel pipes housed inside (Fig. 9).

2.1.4. Three drive system covers

Below the front cover are three drive system parts which are not externally viewable in complete build units: a transmission cover, shift motor cover, and reduction gear cover. These covers were designed to maintain the engine design image even with the exterior parts removed, such as during maintenance.

The covers are functional components which support the internal drive system parts and are reinforced to the required strength with ribs inside the cover. These ribs were drawn outward to the extent possible and utilized as exterior design features to contribute to the mechanical image without adding any unnecessary weight (Fig. 10).

2.1.5. Wiring inside cylinder head side cover

Care was also taken in the placement of the electrical components inside the cylinder head side cover. Close attention was paid to the inclination of the top coil plug and the layout for hoses and wires for a pleasing appearance when the cover is removed (Fig. 11).

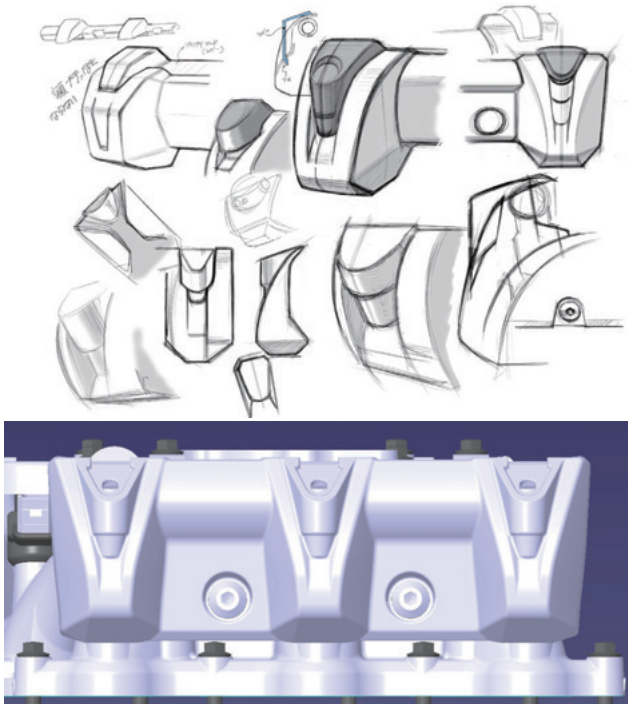


Fig. 9 Design of covering of intake manifold that makes viewer easily imagine inside structures

2.2. Polyhedrons and Styling Base Character Lines to Symbolize Function

In an attempt to manifest the mechanical image described at the beginning of this section, polyhedrons were used as inorganic shapes. This overt expression of how the parts are machine cut from large hunks of metal bares everything, down to the precision of the underlying mechanical parts. Such methods are considered a fitting expression of an engine design centered around functional beauty and advancement (Fig. 12).

Given its central presence, special attention was paid to the aluminum head cover. In order to make it possible to express metallic texture by satin buffs, the uneven shape around the tightening seating surface of the bolt and around the cam chain chamber were reduced as much as possible to make the shape of a simple surface (Fig. 13).

The polyhedron-based design employed in this development, shown in Fig. 14, can be contrasted with a typical design featuring organic shapes as shown in Fig. 15.

Also, these engine-centered mechanical lines form the front-to-back horizontal styling base character lines so key to the proportions of the Gold Wing. In designing engine

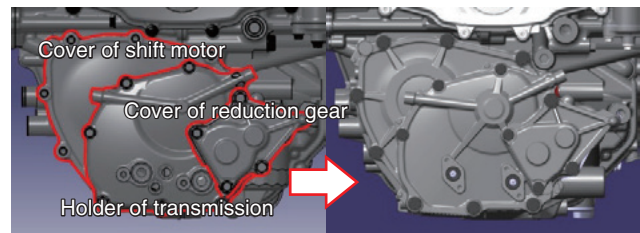


Fig. 10 Covering of drive system that is divided into three pieces

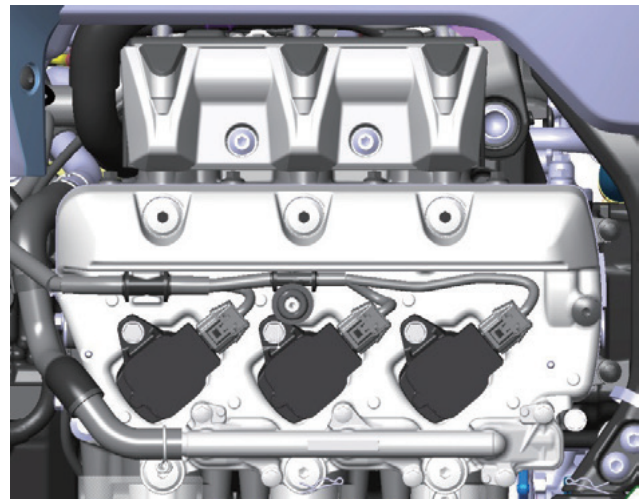


Fig. 11 Consideration on appearance when covering is removed

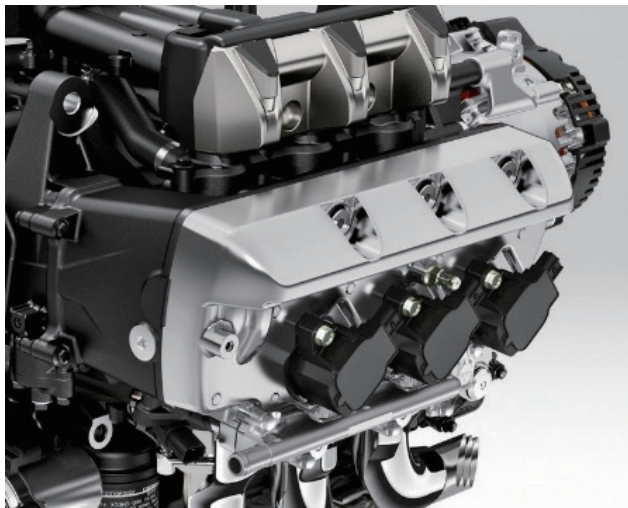


Fig. 12 Engine parts constituted by polyhedrons

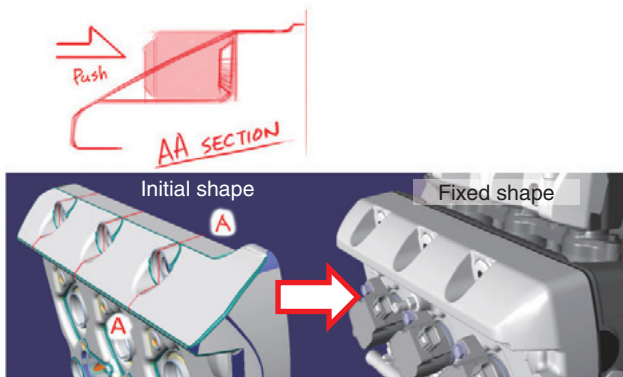


Fig. 13 Simplified surface shape for “polishable shape”

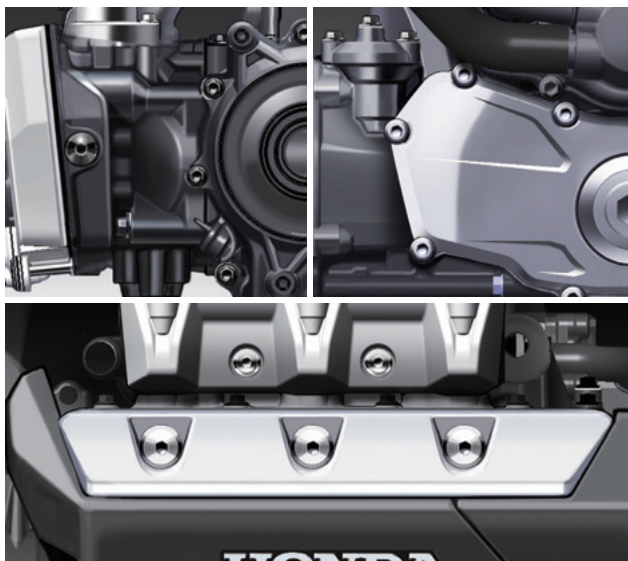


Fig. 14 Designs applied to developed Gold Wing

parts, it is important to align the base components of each section with the vehicle's overall styling character lines (Fig. 16). Doing so gave the vehicle an overall sense of unity. It kept the design from getting too complex and also tied into the bottom half design themes of functional beauty and advancement.



Fig. 15 Example of design using organic shape elements

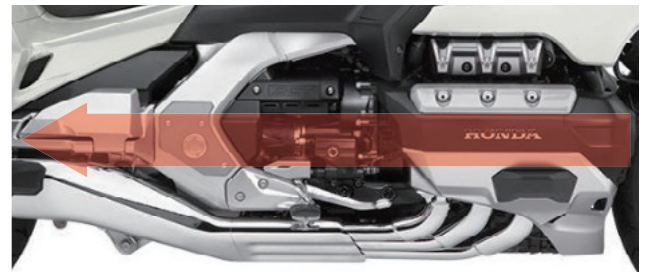


Fig. 16 Integrating components with base character line of the vehicle design

3. Auxiliary Elements to Emphasize Engine Design: Attention to Details

3.1. Shape of Receptacles for Case Tie Bolts

In development for this engine, shapes were even revisited for one of the smallest of details: the bolt receptacles. Previously, these bolt receptacles, of which there were 20 on the engine case surface, were a standard rounded hemispherical shape. For this development, however, the receptacle ends were given a machined conical

shape to match the sharp lines in the engine area with its many polyhedrons (Fig. 17). While this change may not stand out on its own, it is an important consideration in terms of bringing the total design together.

3.2. Bolt Selection

Flange bolts with concave bolt heads were intentionally used for the new M6 bolts. The sharp shape left after cutting this dead material contributes to the overall mechanical feel and, while minor, also serves as a weight reduction (Fig. 18).

3.3. Inconspicuous Changes: Size Reduction

The engine and pannier case guards for protecting the engine and body were also designed inline with the mechanical lines of this model. In the previous generation Gold Wing model, the guards were all matched in chrome plating. In the new design, these guards were left alone functionally but with the pipe diameter reduced to the bare necessities for a more compact cover (Fig. 19). The covers are simply shaped to blend in with the surrounding

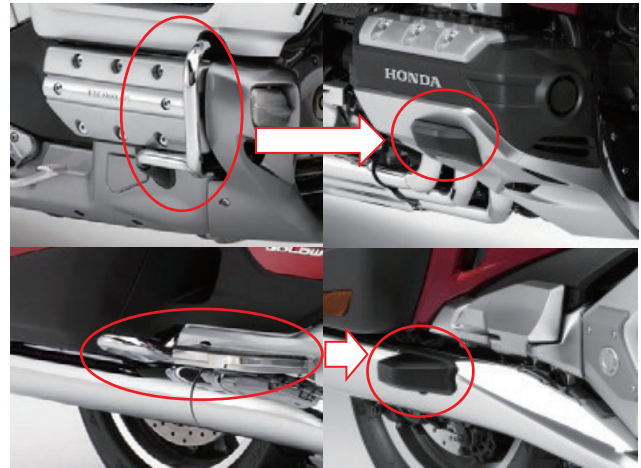


Fig. 19 Design making components inconspicuous

design elements and colored in a subdued black. Rubber was selected for the guard material to avoid generating any debris when the guards come in contact with the road surface.

4. Conclusion

With this design, we expressed a functional beauty and advanced feel to fit the unrivaled F6 engine equipped on Honda's flagship model, the Gold Wing. As the heart of the motorcycle, we designed the engine with intention and a clear design theme, from the external appearance down to the finest parts not outwardly visible in normal conditions. We also added some designer touches for users to notice during maintenance.

Through the engine design for the new Gold Wing, it is our hope that the designers' message will reach users.

References

- (1) Sato, Y., Wakita, N.: Styling Design for 2018 Gold Wing, Honda R&D Technical Review, Vol.31, No.1, p.1-10

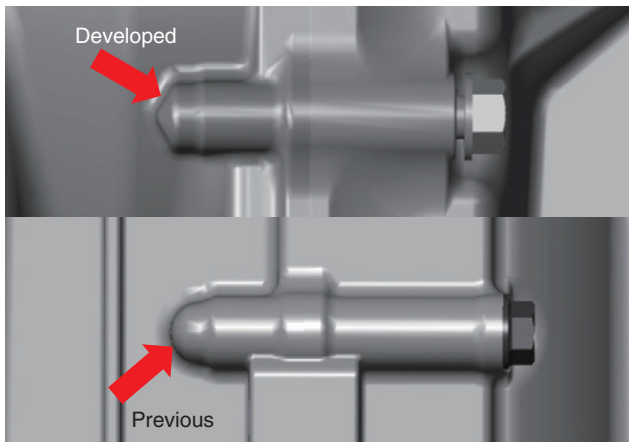


Fig. 17 Example of design applied to fine part (Shape of receptacles for bolts used for fastening engine case)

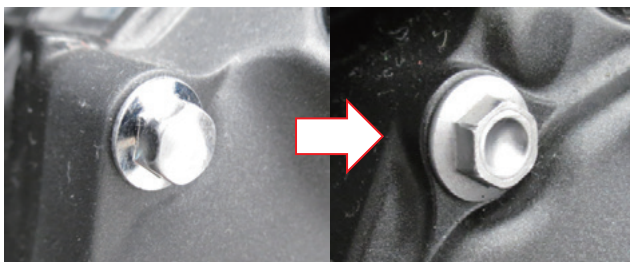


Fig. 18 Adoption of flange bolt contributing to the mechanical appearance and weight reduction

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