

DESCRIPTION

TITLE OF INVENTION: DRIVING SYSTEM OF ELECTRIC MOTORCYCLE

Technical Field

[0001] The present disclosure belongs to the technical field of electric motorcycle drive, and more specifically relates to an electric motorcycle drive system.

Background

[0002] With the widespread application of new technologies, user demands for electric motorcycles are increasing. Traditional electric motorcycle drive systems typically adopt a two-in-one structure consisting of either a controller and a motor, or a motor and a reducer, and a drive manner of a parallel-axis gear reduction mechanism is used. These subsystems are interconnected mechanically and electrically while remaining independent from each other, resulting in insufficient integration of a drive assembly, large size, high cost, low reliability, and low synergistic efficiency among components of a transmission mechanism, thereby causing inherent drawbacks such as energy loss and control instability, and also increasing maintenance costs.

Summary

[0003] In view of the deficiencies of the prior art, the present disclosure provides an electric motorcycle drive system, to improve transmission efficiency and reduce the cost of a drive system.

[0004] To achieve the foregoing objectives, the present disclosure provides the following technical solutions. An electric motorcycle drive system includes a rear fork bracket connected

to a motorcycle frame. A motor housing is disposed on one side of the rear fork bracket. A controller, a motor, and a reducer are disposed in the motor housing. The controller and the reducer are located at two ends of the motor, respectively. An output shaft is disposed on the reducer, and a wheel hub is disposed on the output shaft. The output shaft is rotatably connected to the other side of the rear fork bracket.

[0005] Further, a spacer sleeve is disposed on the output shaft, and the spacer sleeve is located between the wheel hub and the rear fork bracket.

[0006] Further, the rear fork bracket includes a fixed bracket. The fixed bracket is connected to the motorcycle frame. Two ends of the fixed bracket are connected to a motor bracket and a right fork bracket, respectively. The motor housing is connected to the motor bracket, and the output shaft is rotatably connected to the right fork bracket. The spacer sleeve is located between the wheel hub and the right fork bracket.

[0007] Further, a motor end cover is disposed at a rear end of the motor housing, and a motor bearing mounting plate is disposed inside the motor housing. The motor housing, the motor end cover, and the motor bearing mounting plate form a sealed control chamber, and the controller is located in the control chamber. The motor bearing mounting plate is rotatably connected to a main shaft of the motor, and a bearing is disposed between the main shaft of the motor and the motor bearing mounting plate. The motor and the controller are electrically connected via wires, and the wires pass through the motor bearing mounting plate.

[0008] Further, the controller includes an electrical control module, an adapter base, and an encoder. Leads of the motor pass through the motor bearing mounting plate and are connected to the adapter base. The adapter base is electrically connected to the electrical control module,

and the electrical control module is connected to the motor end cover. The adapter base is connected to the motor bearing mounting plate, and the encoder is connected to the motor bearing mounting plate and is located at a rear end of the main shaft of the motor.

[0009] Further, a reducer end cover is disposed at a front end of the motor housing, a reduction chamber is formed between the reducer end cover and the motor housing, and a reduction gear pair is disposed in the reduction chamber.

[0010] Further, the reduction gear pair includes a central gear, a plurality of planetary gears, and an internal gear ring. The central gear is connected to the main shaft of the motor, and the internal gear ring is fixedly connected to an inner wall of the motor housing. Both sides of the planetary gears mesh with the central gear and the internal gear ring, respectively. A planetary carrier is disposed on the output shaft. The planetary carrier is connected to the plurality of planetary gears, and bearings are disposed between the planetary gears and the planetary carrier.

[0011] Further, the main shaft of the motor, the output shaft, and the internal gear ring are coaxially arranged.

[0012] Further, a plurality of heat dissipation fins are disposed on the outer side of the motor end cover.

[0013] Compared with the prior art, the present disclosure has the following beneficial effects. The controller, the motor, and the reducer of this drive system are tightly coupled, to reduce energy loss during transmission. This design decreases friction and energy conversion losses in a transmission system, thereby improving overall transmission efficiency. Furthermore, a transmission ratio may be optimized to further improve system efficiency. The system exhibits a high level of integration and efficiency, and the cost of the drive system is reduced.

Brief Description of Figures

[0014] Fig. 1 is a schematic structural diagram of an electric motorcycle drive system according to the present disclosure;

[0015] Fig. 2 is a schematic diagram of an internal structure of an integrated motor in an electric motorcycle drive system according to the present disclosure;

[0016] Fig. 3 is a schematic structural diagram of a controller at a rear end of a motor housing in an electric motorcycle drive system according to the present disclosure; and

[0017] Fig. 4 is a schematic structural diagram of a reducer at a front end of a motor housing in an electric motorcycle drive system according to the present disclosure.

[0018] Reference numerals: 1, motor housing; 2, controller; 3, motor; 4, reducer; 5, motor end cover; 6, motor bearing mounting plate; 7, control chamber; 8, electrical control module; 9, adapter base; 10, encoder; 11, reducer end cover; 12, reduction chamber; 13, motor chamber; 14, bearing seat; 15, oil seal; 16, central gear; 17, planetary gear; 18, internal gear ring; 19, planetary carrier; 20, output shaft; 21, connecting shaft; 22, heat dissipation fin; 23, wheel hub; 24, spacer sleeve; 25, fixed bracket; 26, motor bracket; and 27, right fork bracket.

Detailed Description

[0019] In the description of the present disclosure, it is to be noted that orientation-related terms such as "center", "transverse (X)", "longitudinal (Y)", "vertical (Z)", "length", "width", "thickness", "upper", "lower", "front", "rear", "left", "right", "upright", "horizontal", "top", "bottom", "inner", "outer", "clockwise", and "counterclockwise" are used to indicate orientations and positional relationships based on the orientations and positional relationships shown in the accompanying drawings. These terms are used solely to facilitate the description of the present

disclosure and simplify the description, and are not intended to indicate or imply that the referred apparatus or elements must have a particular orientation or be constructed and operated in a particular orientation. These terms should not be construed as limiting a specific scope of protection of the present disclosure.

[0020] Furthermore, terms such as "first" and "second" are used for descriptive purposes only and should not be interpreted as indicating or implying relative importance or implicitly specifying the quantity of technical features. Thus, features defined by "first" or "second" may explicitly or implicitly include one or more of such features. In the description of the present disclosure, the term "a number of" or "a plurality of" means two or more, unless explicitly defined otherwise.

[0021] The present disclosure will be further described with reference to Fig. 1 to Fig. 4.

[0022] An electric motorcycle drive system includes a rear fork bracket connected to a motorcycle frame. A motor housing 1 is disposed on one side of the rear fork bracket. A controller 2, a motor 3, and a reducer 4 are disposed in the motor housing 1. The controller 2 and the reducer 4 are located at two ends of the motor 3, respectively. An output shaft 20 is disposed on the reducer 4, and a wheel hub 23 is disposed on the output shaft 20. The output shaft 20 is rotatably connected to the other side of the rear fork bracket.

[0023] As shown in Fig. 1, in this preferred example, a spacer sleeve 24 is disposed on the output shaft 20. The spacer sleeve 24 is located between the wheel hub 23 and the rear fork bracket.

[0024] As shown in Fig. 1, in this preferred example, the rear fork bracket includes a fixed bracket 25. The fixed bracket 25 is connected to the motorcycle frame. Two ends of the fixed bracket 25 are connected to a motor bracket 26 and a right fork bracket 27, respectively. The motor housing

1 is connected to the motor bracket 26, and the output shaft 20 is rotatably connected to the right fork bracket 27. The spacer sleeve 24 is located between the wheel hub 23 and the right fork bracket 27.

[0025] Specifically, a bearing hole is provided on the right fork bracket 27. The output shaft 20 passes through the bearing hole. A bearing is disposed in the bearing hole. The bearing is connected to the output shaft 20.

[0026] Specifically, two ends of the fixed bracket 25 are connected to the motor bracket 26 and the right fork bracket 27 via bolts, respectively.

[0027] As shown in Fig. 2, in this preferred example, a motor end cover 5 is disposed at a rear end of the motor housing 1, and a motor bearing mounting plate 6 is disposed inside the motor housing 1. The motor housing 1, the motor end cover 5, and the motor bearing mounting plate 6 form a sealed control chamber 7, and the controller 2 is located in the control chamber 7. The motor bearing mounting plate 6 is rotatably connected to a main shaft of the motor 3, and a bearing is disposed between the main shaft of the motor 3 and the motor bearing mounting plate 6. The motor 3 and the controller 2 are electrically connected via wires, and the wires pass through the motor bearing mounting plate 6.

[0028] As shown in Fig. 3, in this preferred example, the controller 2 includes an electrical control module 8, an adapter base 9, and an encoder 10. Leads of the motor 3 pass through the motor bearing mounting plate 6 and are connected to the adapter base 9. The adapter base 9 is electrically connected to the electrical control module 8, and the electrical control module 8 is connected to the motor end cover 5. The adapter base 9 is connected to the motor bearing

mounting plate 6, and the encoder 10 is connected to the motor bearing mounting plate 6 and is located at a rear end of the main shaft of the motor 3.

[0029] Specifically, the electrical control module 8 includes a printed circuit board (PCB), power components, filters, and electrical elements such as connectors symmetrically arranged on both sides.

[0030] Specifically, the PCB of the electrical control module 8 is attached to the motor end cover 5 by using a thermal adhesive and is secured by screws.

[0031] As shown in Fig. 3, in this preferred example, a reducer end cover 11 is disposed at a front end of the motor housing 1, a reduction chamber 12 is formed between the reducer end cover 11 and the motor housing 1, and a reduction gear pair is disposed in the reduction chamber 12, to achieve reduced output speed and increased torque.

[0032] As shown in Fig. 2 and Fig. 4, specifically, a motor chamber 13 is disposed in the motor housing 1, and the motor 3 is located in the motor chamber 13. A bearing seat 14 is disposed between the motor chamber 13 and the reduction chamber 12. The main shaft of the motor 3 passes through the bearing seat 14, and an oil seal 15 is disposed between the main shaft of the motor 3 and the bearing seat 14.

[0033] As shown in Fig. 4, in this preferred example, the reduction gear pair includes a central gear 16, a plurality of planetary gears 17, and an internal gear ring 18. The central gear 16 is connected to the main shaft of the motor 3, and the internal gear ring 18 is fixedly connected to an inner wall of the motor housing 1. Both sides of the planetary gears 17 mesh with the central gear 16 and the internal gear ring 18, respectively. A planetary carrier 19 is disposed on the

output shaft 20. The planetary carrier 19 is connected to the plurality of planetary gears 17, and bearings are disposed between the planetary gears 17 and the planetary carrier 19.

[0034] As shown in Fig. 4, in this preferred example, the main shaft of the motor 3, the output shaft 20, and the internal gear ring 18 are coaxially arranged.

[0035] As shown in Fig. 4, specifically, a connecting shaft 21 is disposed on the main shaft of the motor 3, and the central gear 16 is located on the connecting shaft 21.

[0036] As shown in Fig. 3, in this preferred example, a plurality of heat dissipation fins 22 are disposed on the outer side of the motor end cover 5, to improve the heat dissipation efficiency of the electrical control module 8.

[0037] In this preferred example, the motor 3 is a six-phase permanent magnet synchronous motor 3 having a flat-wire structure, or may be a motor 3 having another structure.

[0038] The above description presents only preferred embodiments of the present disclosure, and the scope of protection of the present disclosure is not limited to the foregoing embodiments. All technical solutions falling within the idea of the present disclosure shall be considered within the scope of protection of the present disclosure. It is to be noted that those of ordinary skill in the art may make various modifications and refinements without departing from the principles of the present disclosure. Such modifications and refinements should also be regarded as falling within the scope of protection of the present disclosure.

What is claimed is:

- 1.** An electric motorcycle drive system, comprising a rear fork bracket connected to a motorcycle frame, wherein a motor housing is disposed on one side of the rear fork bracket; a controller, a motor, and a reducer are disposed in the motor housing; the controller and the reducer are located at two ends of the motor, respectively; an output shaft is disposed on the reducer, and a wheel hub is disposed on the output shaft; and the output shaft is rotatably connected to the other side of the rear fork bracket.
- 2.** The electric motorcycle drive system according to claim 1, wherein a spacer sleeve is disposed on the output shaft, and the spacer sleeve is located between the wheel hub and the rear fork bracket.
- 3.** The electric motorcycle drive system according to claim 2, wherein the rear fork bracket comprises a fixed bracket, and the fixed bracket is connected to the motorcycle frame; two ends of the fixed bracket are connected to a motor bracket and a right fork bracket, respectively; the motor housing is connected to the motor bracket, and the output shaft is rotatably connected to the right fork bracket; and the spacer sleeve is located between the wheel hub and the right fork bracket.
- 4.** The electric motorcycle drive system according to claim 1, wherein a motor end cover is disposed at a rear end of the motor housing, and a motor bearing mounting plate is disposed inside the motor housing; the motor housing, the motor end cover, and the motor bearing mounting plate form a sealed control chamber, and the controller is located in the control chamber; the motor bearing mounting plate is rotatably connected to a main shaft of the motor, and a bearing is disposed between the main shaft of the motor and the motor bearing mounting

plate; and the motor and the controller are electrically connected via wires, and the wires pass through the motor bearing mounting plate.

5. The electric motorcycle drive system according to claim 4, wherein the controller comprises an electrical control module, an adapter base, and an encoder; leads of the motor pass through the motor bearing mounting plate and are connected to the adapter base; the adapter base is electrically connected to the electrical control module, and the electrical control module is connected to the motor end cover; and the adapter base is connected to the motor bearing mounting plate, and the encoder is connected to the motor bearing mounting plate and is located at a rear end of the main shaft of the motor.

6. The electric motorcycle drive system according to claim 1, wherein a reducer end cover is disposed at a front end of the motor housing, a reduction chamber is formed between the reducer end cover and the motor housing, and a reduction gear pair is disposed in the reduction chamber.

7. The electric motorcycle drive system according to claim 6, wherein the reduction gear pair comprises a central gear, a plurality of planetary gears, and an internal gear ring; the central gear is connected to the main shaft of the motor, and the internal gear ring is fixedly connected to an inner wall of the motor housing; both sides of the planetary gears mesh with the central gear and the internal gear ring, respectively; a planetary carrier is disposed on the output shaft; and the planetary carrier is connected to the plurality of planetary gears, and bearings are disposed between the planetary gears and the planetary carrier.

8. The electric motorcycle drive system according to claim 7, wherein the main shaft of the motor, the output shaft, and the internal gear ring are coaxially arranged.

9. The electric motorcycle drive system according to claim 4, wherein a plurality of heat dissipation fins are disposed on the outer side of the motor end cover.