arranged on the opposite sides.

[0017a]

In view of the above, according to one aspect of the present invention, there is provided a crane including travel devices which are arranged on opposite sides with a gap in a transverse direction crossing a travel direction and a crane structure which is supported by the travel devices, the travel devices each including a travel wheel, a motor which transmits power to the travel wheel, an inverter which is connected to the motor and which controls a rotation speed of the motor, and a controller which gives a command of the rotation speed to the motor via the inverter, the crane characterized in that each of the inverters includes a torque measurement unit which measures a torque generated in the motor to which the inverter is connected and a control unit which reduces the rotation speed in the command from the controller to the motor such that the greater a value of the torque obtained by the torque measurement unit is, the greater a ratio of reduction is, the inverters independently perform measurement with the torque measurement units and the control with the control units, and the range in which the control is performed is that the ratio of the obtained torque by the torque measurement unit with respect to the rated torque of the motor is at least greater than 0 % and smaller than 150 %.

[0017b]

According to another aspect of the present invention, there is provided a method of controlling a crane including travel devices which are arranged on opposite sides with a gap in a transverse direction crossing a travel direction and a crane structure which is supported by the travel devices, the

travel devices each including a travel wheel, a motor which transmits power to the travel wheel, an inverter which is connected to the motor and which controls a rotation speed of the motor, and a controller which gives a command of the rotation speed to the motor via the inverter, characterized in that the method comprises: performing a control of causing each of the inverters to independently measure a torque generated in the motor to which the inverter is connected and reduce the rotation speed in the command from the controller to the motor such that the greater the measured torque is, the greater a ratio of reduction is, so as to reduce misalignment in the travel direction between the travel devices arranged on the opposite sides, and the range in which the control is performed is that the ratio of the measured torque with respect to the rated torque of the motor is at least greater than 0 % and smaller than 150 %.

EFFECTS OF THE INVENTION

[0018]

In the present invention, the rotation speed in the command to the motor is reduced such that the greater the torque of the motor measured by the torque measurement unit is, the greater the ratio of the reduction is. Accordingly, the torques generated in the motors are controlled to be even. Making the torques generated in the motors even can reduce misalignment in the travel direction between the travel devices arranged on the opposite sides. Accordingly, strain is less likely to be generated in the crane structure and the present invention is advantageous in suppressing vibration occurring in the crane structure due to this strain.

[0019]

The crane can be configured to include a brake device

configured to apply a brake to the travel devices after a predetermined waiting time elapses from a point where a speed command of maintaining the rotation speed to zero is given from the controller to the motors. In this configuration, the brake is applied to the travel devices after the rotation speeds of the motors are maintained at zero and the magnitudes of the torques generated in the respective motors are made even by the control units, that is after the misalignment in the travel direction between the travel devices arranged on the opposite sides is reduced. Accordingly, the present invention is advantageous in suppressing vibration occurring due to the strain in the crane structure after the braking.

[0020]

The crane is a quay crane and the crane structure can be

CLAIMS

[Claim 1] A crane including travel devices which are arranged on opposite sides with a gap in a transverse direction crossing a travel direction and a crane structure which is supported by the travel devices, the travel devices each including a travel wheel, a motor which transmits power to the travel wheel, an inverter which is connected to the motor and which controls a rotation speed of the motor, and a controller which gives a command of the rotation speed to the motor via the inverter, the crane characterized in that each of the inverters includes a torque measurement unit which measures a torque generated in the motor to which the inverter is connected and a control unit which reduces the rotation speed in the command from the controller to the motor such that the greater a value of the torque obtained by the torque measurement unit is, the greater a ratio of reduction is,

the inverters independently perform measurement with the torque measurement units and the control with the control units, and

the range in which the control is performed is that the ratio of the obtained torque by the torque measurement unit with respect to the rated torque of the motor is at least greater than 0 % and smaller than 150 %.

[Claim 2] The crane according to claim 1, comprising a brake device configured to apply a brake to the travel devices after a predetermined waiting time elapses from a point where a speed command of maintaining the rotation speed to zero is given from the controller to the motors.

[Claim 3] The crane according to claim 1 or 2, wherein the crane is a quay crane and the crane structure includes a boom extending in the transverse direction.

[Claim 4] A method of controlling a crane including travel devices which are arranged on opposite sides with a gap in a transverse direction crossing a travel direction and a crane structure which is supported by the travel devices, the travel devices each including a travel wheel, a motor which transmits power to the travel wheel, an inverter which is connected to the motor and which controls a rotation speed of the motor, and a controller which gives a command of the rotation speed to the motor via the inverter, characterized in that the method comprises:

performing a control of causing each of the inverters to independently measure a torque generated in the motor to which the inverter is connected and reduce the rotation speed in the command from the controller to the motor such that the greater the measured torque is, the greater a ratio of reduction is, so as to reduce misalignment in the travel direction between the travel devices arranged on the opposite sides, and

the range in which the control is performed is that the ratio of the measured torque with respect to the rated torque of the motor is at least greater than 0 % and smaller than 150 %.

[Claim 5] The method of controlling the crane according to claim 4, comprising:

applying a brake to the travel devices after a predetermined waiting time elapses from a point where a speed command of maintaining the rotation speed to zero is given from the controller to the motors.

[Claim 6] The method of controlling the crane according to claim 4 or 5, wherein the crane is a quay crane and the crane structure includes a boom extending in the transverse direction.