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Fully automated electromagnetic clutch control gearbox

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Abstract
An improved control method activates an electric motor to drive a torque-to-thrust converter for controlling the torque capacity of an electromagnetic clutch mechanism. The control utilizes a model-based feed-forward control in combination with a closed-loop position feed-back control. The desired electromagnetic clutch torque capacity is characterized in terms of a desired motor speed position(rpm), and the feed-forward control models the motor speed and position response to changes in the desired electromagnetic clutch as per motor position. The modeled speed and position, in turn, are used to create a feed-forward command, and the feed-forward command is combined with a feedback command based on actual position error.

Keywords: electric, improved, controlling, characterized, control

Introduction: About

We have designed this project as a major innovation in the field of Automobile industry. Our project Automated Electromagnetic clutch control gearbox is a perfect combination of electronic and mechanical sciences or we can call it mechatronics. We designed our project by using heavy mechanical equipments and electronic microchip atmel 89s52 micro controller & desecrate components. Heart of the project is this strong powerful Electromagnetic clutch; it has a high torque holding capacity at the time of 24v. Power supply. In our project we are using one pair of three different gears and we use these gear as gearbox, we fix one set of three gears in wheel shaft and other three gears with dc gear motor (engine) power transmission shaft, now we fix three Electromagnetic clutch in three transmission side gears and these clutch control by microchip. We fix one rpm counter with wheel shaft when wheel shaft rotate rpm counter give pulse to microchip and microchip decide gear clutching according to the speed by default our circuit attach clutch-1 at time of wheel initial start speed. We control dc motor speed (power transmission shaft) with simple fan regulator.

Construction

A horseshoe magnet (A-1) has a north and south pole. If a piece of carbon steel contacts both poles, a magnetic circuit is created. In an electromagnetic cultch, the north and south pole is created by a coil shell and a wound coil. In a clutch, (B1) when powers applied, a magnetic field is created in the coil (A2 blue). This field (flux) overcomes an air gap between the clutch rotor (A2 yellow) and the armature (A2 red). This magnetic attraction, pulls the armature in contact with the rotor face. The frictional contact, which is being controlled by the strength of the magnetic field, is what causes the rotational motion to start. The torque comes from the magnetic attraction, of the coil and the friction between the steel of the armature and the steel of the clutch rotor. For many industrial clutches, friction material is used between the poles. The material is mainly used to help decrease the wear rate, but different types of material can also be used to change the coefficient of friction (torque for special applications). For example, if the clutch is required to have an extended time to speed or slip time, a low coefficient friction material can be used and if a clutch is required to have a slightly higher torque (mostly for low rpm applications), a high coefficient friction material can be used.

How our electromagnetic clutch woks

Step-1 Electromagnetic clutch (emc) when we provide power to emc, it performs as a magnet and attract iron as shown below pix. Step-2 8 As we see above gear is fixed with iron dice, when we provide power

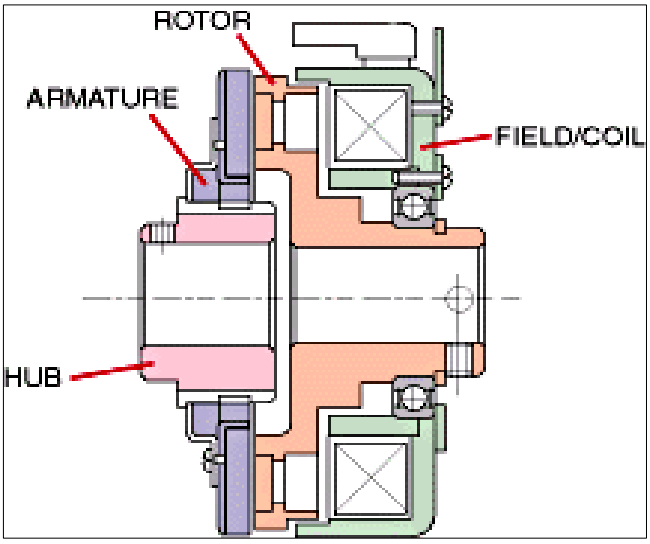

Fig 1

supply to emc it attract iron dice. Step-4 As the above pic shows that we arrange one dc motor (as engine) for providing motion to the shaft, which is passing through emc with help of chain assembly.

Basic Operation

When motor is moving it provide movement to shaft, emc-1 is free from movement when we provide power to emc it attracts to gear dice and gear get shaft turning movement, this gear transform power to the wheel gear as shown above.

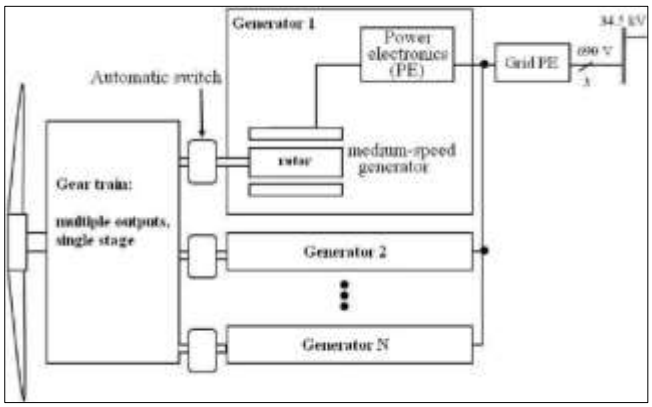

Fig 2

Components requirements

Electromagnetic clutch Bearing Wheel Gear and chain Dc motor Wooden frame Plastic gear Iron shaft Transformer Electronic components Ir sensor Controlling ic Switches Many more as per requirements.

Conclusion

The presented system is designed for practical use as well as will to be adapted by automobiles worldwide.

Acknowledgement

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