

To Remove Complex Linkage System By Using EM Field.

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Abstract: The electromagnetic clutch is very important in vehicles and machinery to transmit the power from driving member to driven member by using clutch linkage. Already the electromagnetic clutch exists, but that clutch has number of problems like wear problem, slipping problem and complicated linkages. Hence for avoiding these problems we have designed a new electromagnetic clutch. In this new electromagnetic clutch the splines are used instead of clutch material (Friction plate & Clutch plate). The design of the clutch engagement controller has also been paid great attention by researchers. As a result, there are several approaches for achieving a fast and smooth clutch engagement [2]

Keywords: EM (Electromagnetic) clutch, matching chuck, eddy current, hysteresis clutch, PM (permanent magnet).

I. INTRODUCTION

A clutch is a mechanism for transmitting rotation, which can be engaged and disengaged. Clutches are useful in devices that have two rotating shafts. In these devices, one shaft is typically driven by motor or pulley, and other shaft drives another device. The clutch connects the two shafts so that they can either be locked together and spin at the same speed (engaged), or be decoupled and spin at different speeds (disengaged). A procedure of optimal path planning is proposed for the operation of the Anthropomorphic low-cost easy-operation LARM clutched arm with only one actuator [1].

The clutch disc (centre) spins with the flywheel (left). To disengage, the lever is pulled (black arrow), causing a white pressure plate (right) to disengage the green clutch disc from turning the drive shaft, which turns within the thrust-bearing ring of the lever. Never will all 3 rings connect, with any gaps.

II. PURPOSE & PRINCIPLE

The operating principle of the actuator of electromagnetic clutch is an electromagnetic effect, but torque transmission is mechanical. The difference between electromagnetic clutch and the regular clutch is in how they control the movement of pressure plates. In the normal clutch, a spring used to engage the clutch whereas in EM clutch an electromagnetic field is used for engagement.

Without using friction, an eddy-current braking system as shown in fig. 1 transforms the kinetic energy of the moving body into heat energy that is dissipated through the eddy current in the conductor [4].

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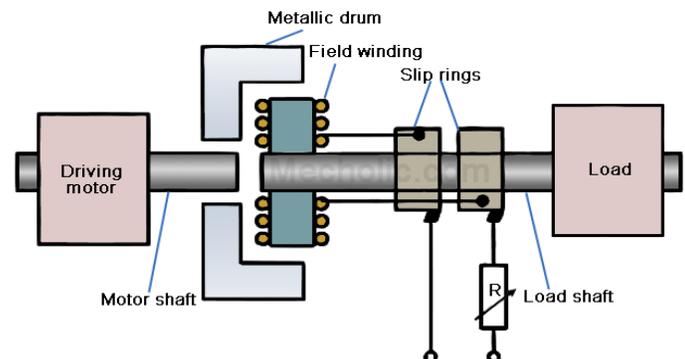


Fig 1. Eddy current working

III. DESCRIPTION OF EMC

Electromagnetic clutches operate electrically but transmit torque mechanically. This is why they used to be referred to as electro-mechanical clutches. However, because the activation energy dissipates as heat in the electromagnetic actuator when the clutch is engaged, there is a risk of overheating.

IV. APPLICATION OF EMC

They can be used for remote application because they do not require linkage to actuate the clutch. They are used in printing machinery, conveyor drives, copier machines and factory automation. In an automobile, it replaces clutch pedal by a simple switch button. A smaller EM clutch is used to drive the compressor of air conditioning system.

For the accomplishment of these tasks designing up to the specific application is necessary. Example: for safeties clutch

not necessary is applying the magnetic tubule and the PM [3], [6].

V. ADVANTAGES

The complicated linkage is not required to control clutch.

VI. WORKING

The main components of EM clutch are a coil shell, an armature, rotor, and hub as shown in fig. 2. The armature plate is lined with friction coating. The coil is placed behind the rotor. When the clutch activated the electric circuit energizes the coil, it generates a magnetic field. The rotor portion of clutch gets magnetized. When the magnetic field exceeds the air gap between rotor and armature and then it pulls the armature toward the rotor. The frictional force generated at the contact surface transfer the torque. Engagement time depends on the strength of magnetic fields, inertia, and air gap. When voltage is removed from the coil, the contact is gone. In most design a spring is used to hold back the armature to provide air gap. Clutch plate engaged with the flywheel and torque is transmitted flywheel from the through friction facing (clutch plates) to the transmission clutch shaft (clutch shafts). Hence real wheel of the car also rotates. • When the clutch pedal is pressed the release bearing acts on the pressure plate's diaphragms and move the pressure plates away from the flywheel. • This release bearing the clamping force on the facings plate and separator plate and allows flywheel to freely move without turning the clutch shaft. • Now the clutch plate disengages with the flywheel, and drive is no longer transmitted. • When the pedal is released, the spring tension forces the pressure plates, clutch plates and separator plates against the flywheel, clamping all components together.

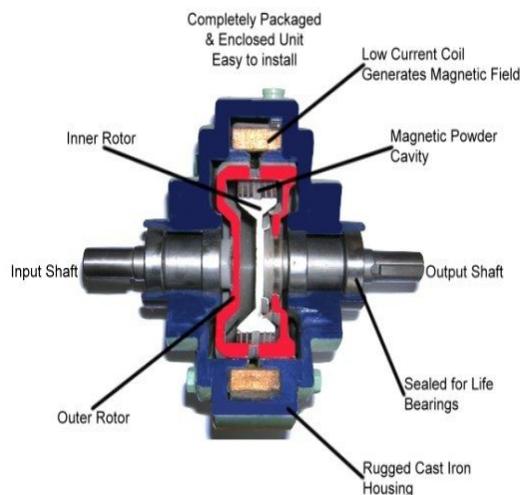


Fig 2. Working of Clutch

The clutch disc (centre) spins with the flywheel (left). To disengage, the lever is pulled (black arrow), causing a white pressure plate (right) to disengage the green clutch disc from turning the drive shaft, which turns within the thrust-bearing ring of the lever. Never will all 3 rings connect, with any gap. Objectively speaking, the transmission efficiency of electromagnetic coupling is lower than mechanical transmission [5], [7].

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VII. CONCLUSION

A clutch is a device used to make and brake contact from the transmission. When it engages, then power is transferred from engine to gear box and when it disengage, power flow is stop, hence it is called free running of engine. There is an innovation done in automobile industry ,called electro magnetic clutch, which is recently used by Renault Car Company, which uses the basic principle of electrical energy as well as magnetic forces .This project revels the manufacturing of electro magnetic clutch. In place of Engine, shaft is directly attached to variance (variable motor) and clutch disc as well as pressure plate is used, in between them friction material called “Asbestos” used to grip between the pressure plate and clutch plate. This project shows, experimental analysis of Electro magnetic clutch, and at last at which speed clutch engage as well as disengage is measured and when clutch disengage, at that time speed of flywheel is also measured

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