

OGURA



“What you need in a clutch”®

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OIC WRITES FOR WIKIPEDIA

Somerset, New Jersey

Over the past year Ogura Industrial Corp. (OIC) has made significant contributions to the Wikipedia site regarding electromagnetic clutches and electromagnetic brakes. Prior information that was posted was either not accurate or relevant to current industry usage of electromagnetic clutches and brakes. Almost all of the updated information on the sites came from published articles submitted to industrial trade magazines by OIC. Pictures of clutches and brakes along with illustrations were added to the Wikipedia site to help explain the functionality of the clutches and brakes.

Electromagnetic brake

Electromagnetic brakes operate electrically, but transmit torque mechanically. This is why they used to be referred to as electro-mechanical brakes. Over the years, EM brakes became known as electromagnetic, referring to their actuation method. Since the brakes started becoming popular over sixty years ago, the variety of applications and brake designs has increased dramatically, but the basic operation remains the same.

Single-face electromagnetic brakes make up approximately 80% of all of the power applied brake sales. This article mainly concentrates on these brakes. Alternative designs are shown at the end of this article.

Construction

A horseshoe magnet (A-1) has a north and south pole. If a piece of carbon steel contains both poles, a magnetic circuit is created. In an electromagnetic brake, the north and south pole is created by a coil shell and a wound coil. (A-2) In a brake, the armature is being pulled against the brake field. (A-3) The frictional contact, which is being controlled by the strength of the magnetic field, is what causes the rotational motion to stop. All of the torque comes from the magnetic attraction and coefficient of friction between the steel of the armature and the steel of the brake field. For many industrial brakes, 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 brake was required to have an extended time to stop or slip time, a low coefficient material can be used. Conversely, if the brake was required to have a slightly higher torque (mostly for low RPM applications), a high coefficient friction material could be used.⁽¹⁾

In a brake, the electromagnetic lines of flux have to attract and pull the armature in contact with it to complete brake engagement. Most industrial applications use what is called a single-flux two-pole brake. The coil shell is made with carbon steel that has a combination of good strength and good magnetic properties. Copper (sometimes aluminum) magnet wire, is used to create the coil, which is held in shell either by a bobbin or by some type of epoxy/adhesive.⁽²⁾ To help increase life in applications, friction material is used between the poles. This friction material is flush with the steel on the coil shell, since if the friction material was not flush, good magnetic reaction could not occur between the faces. Some people look at electromagnetic brakes and mistakenly assume that, since the friction material is flush with the steel, that the brake has already worn down, but this is not the case.⁽³⁾

Basic Operation

There are three parts to an electromagnetic brake: field, armature, and hub (which is the input on a brake) (B-2). Usually the magnetic field is bolted to the machine frame (or uses a torque arm that can handle the torque of the brake). So when the armature is attracted to the field the stopping torque is transferred into the field housing and into the machine frame decelerating the load. This can happen very fast (1-3secs).

Disengagement is very simple. Once the field starts to degauss flux falls rapidly and the armature separates. A spring(s) hold the armature away from its corresponding contact surface at a predetermined air gap.⁽⁴⁾

Wikipedia Electromagnetic Clutch

After the basic information was posted, it was suggested by our online members that the site be expanded to explain the difference between other types of electromagnetic clutches and brakes, such as: magnetic particle and hysteresis. Those sections were added along with multiple disc and tooth styles. As additional articles are published in the future, the Wikipedia site will be updated to reflect any new technical information that should be posted. ●

Electromagnetic clutch

Electromagnetic clutches operate electrically, but transmit torque mechanically. This is why they used to be referred to as electro-mechanical clutches. Over the years EM became known as electromagnetic versus electro-mechanical, referring more about their actuation method versus physical operation. Since the clutches started becoming popular over sixty years ago, the variety of applications and clutch designs has increased dramatically, but the basic operation remains the same.

Single-face clutches make up approximately 90% of all electromagnetic clutch sales. This article mainly deals with those types of clutches. Alternative clutch designs are mentioned at the end of this article.

Construction

A horseshoe magnet (A-1) has a north and south pole. If a piece of carbon steel contains both poles, a magnetic circuit is created. In an electromagnetic clutch, the north and south pole is created by a coil shell and a wound coil. In a clutch, (B1) when power is 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.⁽¹⁾

In a clutch, the electromagnetic lines of flux have to pass into the rotor, and to turn, attract and pull the armature in contact with it to complete clutch engagement. Most industrial clutches use what is called a single flux, two pole design (A-2). Mobile clutches of other specialty electromagnetic clutches can use a double or triple flux case (A-4). The double or trip flux

Wikipedia Electromagnetic Brake

ISO INSPECTORS VISIT OIGURA FOR QUALITY AUDIT

ISO Audits are now being done on an annual basis. In order for Ogura to maintain its ISO9001 and ISO/TS16949 certifications, two inspectors from Lloyds Register visited Ogura in Japan. Approximately half of the various departments were audited. No issues arose during the inspection, although the inspectors did have some minor suggestions for improvements in a couple of departments. ●



Lloyds Register ISO Audit

OGURA PRODUCTS SHOWN AT CHINA'S AUTOMOTIVE AND AIR CONDITIONING SHOW

Don Guan, China

Ogura's new manufacturing plant in China had an opportunity to show its products at the 7th Annual Guang Zhou International Automotive Air Conditioning and Refrigeration Technology Exhibit in March. The products showcased at the exhibit were the automotive air conditioning clutches produced in China and the other specialty automotive clutches produced in Japan. There are almost 280 companies in the Guang Zhou area in China that manufacture and sell automotive air conditioning products and related systems. Almost all of those companies, and some from outside of the area, exhibited at the show. The booth was extremely busy because Ogura's location was right at the main entrance and near air conditioning compressor manufacturers.



High activity at Ogura's booth in China

This was Ogura's first time exhibiting at the show and was a very good opportunity to show off not only air conditioning products, but also to show (potential customers in the automotive industry), the wide variety of other types of clutches and brakes Ogura produces. China has grown to be the largest automotive market in the world and Ogura will continue to support the increasing need for these products for this industry.●

CANS TURN INTO WHEELCHAIRS

Kiryu, Japan

Ogura has successfully participated in Japan's beverages "ECO and HELLO Campaign". The campaign collects aluminum cans as a fund raiser. Once a certain level is achieved, a donation is made to a needy organization. Japan Beverage, who organized this campaign, says most organizations that participate are schools. There are not many companies involved, but because of Ogura's 1,000+ employees in the Kiryu area and the large number of vending machines, it made sense.

21,000 cans were collected and recycled. With the money raised, Ogura acquired and donated a wheelchair to the city of Kiryu. Embroidered on its back is "Donated by Ogura Clutch". It will be placed at City Hall, near the entrance, to be used by the public.

The program will continue because Ogura believes that even a small contribution to the community can make a difference.●



Wheelchair donated by Ogura to Kiryu's Mayor

Application Story

WE GOT THE BEET

Hokkaido, Japan

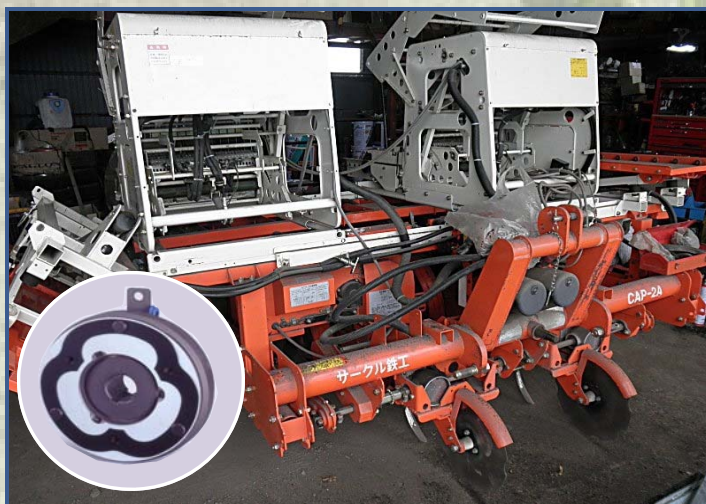
Hokkaido, the northern most major island of Japan, ranks first in Japanese agricultural production. One of the major crops grown on Hokkaido is sugar beets.

Sugar beets were first imported to Japan from Europe in the late 1800s. Because Hokkaido's climate is similar to the beets' native climate in Europe it has become Hokkaido's major crop.

In the spring, beet seedlings are started in greenhouses and then transplanted into the ground. To do this, a self powered riding transplanter is used. This allows multi rows of beet seedlings to be planted at one time.

During the planting process, sensors are used to detect if seedlings have sprouted in the plugs. If a sensor detects no seedling present, an Ogura VCE electromagnetic clutch engages a reject arm, ejecting the plug so a new one can take its place and no space or time is lost. The VCE series provides high torque in a thin profile. The one piece armature spring eliminates the need for a separate drive hub so there is no armature rattle and no chance of the armature getting stuck due to contamination.

During the fall, beets are harvested from early October through mid November. Since the entire beet crop has to be harvested in a short amount of time, harvesters run nonstop day and night.



Seedling Planter with VCE Clutch



Beet Harvester with SMC Spring Applied Clutch

For this process, a PTO driven tow behind harvester is used. The harvester scoops up the beet, separating the dirt and the stalk. A conveyor then transports the beets into a hopper.

For the conveyor drive an Ogura SMC electromagnetic spring applied clutch is used. Unlike most electromagnetic clutches, this clutch disengages when power is applied and is engaged when no power is applied.

Inside the SMC clutch there is a series of friction discs that are normally separated by a light wave spring. Pressing on those friction discs, with no power applied, is a pressure plate pushed by a series of coil springs. When voltage/current is applied to the clutch, an electromagnetic field attracts the pressure plate, compressing the coil springs in the housing, releasing the friction plate and disengaging the clutch.

Since downtime can become critical in this short harvesting window, the SMC clutch was chosen so that in case there is an electrical problem, the conveyor can still operate and still transport the beets. When the conveyor is not harvesting and it is not required to be "timed" with the harvester, the clutch is not engaged, so the harvester can go into its transport mode.

In North America, Asia and Europe Ogura has similar agricultural on grass pluggers, transplanters, harvesters and seeders. But this application in Hokkaido, really "beets" them all! ●

In The News

BALLARD RECOGNIZES OGURA AS PREFERRED FUEL CELL HYDROGEN PUMP SUPPLIER

Vancouver, British Columbia

In a press release and via Ballard's website, Ballard Power Systems formally acknowledged and congratulated Ogura for achieving Preferred Supplier status for outstanding performance during 2009.

"Ballard evaluates the performance of our suppliers using a combination of our suppliers performance index, and a cross functional lean assessment of each supplier's capabilities and contribution to Ballard technology. Suppliers achieving 85% or higher in this evaluation are awarded Preferred Supplier's status as recognition of the quality of their products, on time delivery and service."

Ogura was instrumental in the development of the Hydrogen Recirculation Pump, which is a key component in Ballard's successful fuel cell bus project. The fuel cell buses that ran in the Olympic games are still being run in the Whistler ski area and continue to accumulate operating hours. •



Janusz Blaszczyk, former Ballard Principal Scientist and Fred Cacace, OIC Sales Manager, share the Preferred Supplier Award given to Ogura Industrial

BOBBY CLEVELAND IN THE LEAD FOR 2010 LAWN MOWER RACING



Bobby with 1st and 2nd place finish in Avon Park, FL

With a 1st place finish in Macon, Georgia, at the end of March and a 1st and 2nd place finish in Avon Park, Florida, in April, Bobby Cleveland is currently in the lead in the 2010 national point standing in the BP class of lawn mower racing.

Bobby is back, racing in the BP class after taking off the past couple of years to concentrate on the IMOW division. The BP class is one of the fastest divisions with mowers reaching track speeds of up to 45mph.

Starting in June, races are being held almost every other week in different parts of the country and continue right up until the National Finals in Ohio on September 4th. Bobby will be participating in a number of these races and he will try to maintain his national points lead on his Ogura Clutch machine. •