Tensioning in winding

Whether your plant is winding spools of wire, paper, or sheets of another web, now's the time to eliminate those tension headaches, folks: Clutches and other components are well suited to spooling material.

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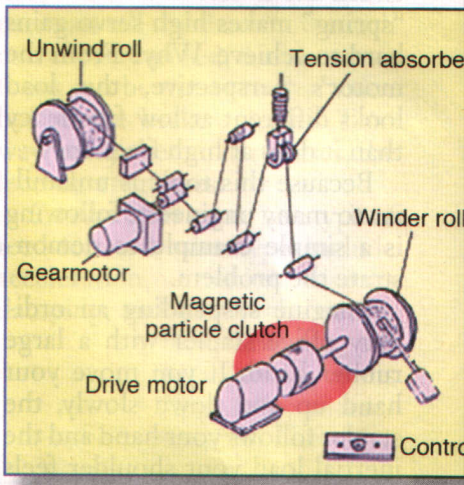
Most wire manufacturers have applications for which magnetic particle clutches and brakes are suitable.

Consider how a plant might control the rewind tension when transferring wire from one large roll to smaller rolls: As wire is rewound onto the smaller rolls, a dancer arm measures the diameter of wire applied. This is fed back into the controller, which controls the voltage going into a clutch, keeping a constant tension on the wire as it is rewound. Here, magnetic particle clutches are often used. Why?

Magnetic particle clutches are suitable for drag and winding applications because their voltage-to-torque relationship is almost linear, so accurate control is easily maintained.

Elsewhere, magnetic particle brakes control wire-spool tension. Consider a scenario in which wire



⊂ A WrinkleSTOP from Converter Accessory Corp., Wind Gap, Pa., replaces limited-angle roll arrangements with fewer rolls, because it accepts extremely short lead-in and lead-out web distances. It's also suitable in food and pharmaceutical applications. The rolls (in various widths and 3.25, 5.5, and 8-in. diameters) run at speeds to 3,000 fpm.

goes through a load cell that measures wire tension as it is pulled into a wire twister. The load cell feeds back tension information to the controller, which in turn feeds voltage back to the brake. Voltage is proportional to torque (assuming a constant current power supply) in magnetic particle brakes, so this provides relatively simple tension control.

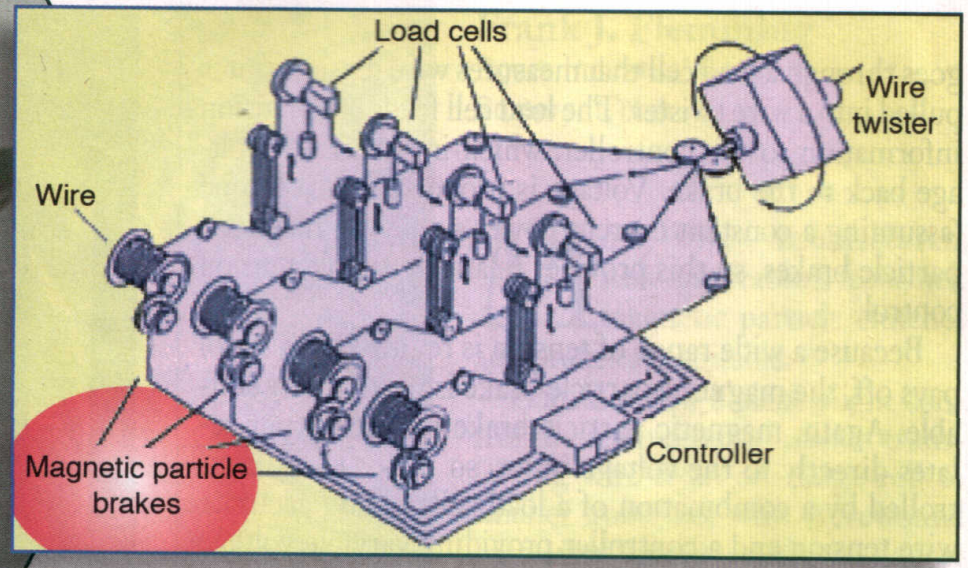
Because a wide range of tension is required as a spool pays off, the magnetic particle brake is particularly suitable: Again, magnetic particle brake torque output relates directly to the voltage input, so this is easily controlled by a combination of a load cells giving accurate wire tension and a controller providing variable voltage to brakes. Brake output is geared into each of the wire spools, simplifying the attachment and removal of both brakes and spools. Magnetic particle clutches and brakes are also totally sealed useful where winders require is an oil mist, which can adversely affect friction brakes.

Elsewhere, permanent-magnet hysteresis brakes control wire tension for coil-winding machines. In one setup using these components, wire is set on a spool on the ground. (The normal tendency for wire coming off a spool is to uncoil, so there is a bit of slack in the line.) Wire goes up to a pulley mounted on a shaft going through the brake. In some setups, the wire is also wrapped around the pulley twice, for a tight connection. Then the wire goes across an idler pulley and down to the coil winder. As the wire is drawn from the brake to

OPC magnetic-particle clutches from Ogura Industrial Corp. keep a constant tension on wire as it is rewound. The voltage-to-torque relationship is almost linear and control is maintained. The installation here does not show a magnetic particle brake on the unwind roll, but many installations have one.

the coil winder, it is drawn at a constant tension, regardless of coil winder speed.

Permanent magnet hysteresis brakes are suitable here, because many small coils do not change that much in diameter, so a constant-torque brake allows for a slight tapper tension on the end of the coil wind. Certain units deliver constant torque regardless of the slip speed so wire tension is constant even at high coil-winder speed. Adjustable brake units also accommodate different wire



Ogura OPB series magnetic particle brakes control tension on wire spools. In the illustrated arrangement, each of the four load cells feeds back the amount of tension on the wire into the controller which in turn feeds the voltage back to each of the brakes. Because voltage is proportional to torque in magnetic particle brakes, this provides a relatively simple control to achieve accurate tension.

sizes, and in some cases, marks on the unit are simply set to the wire tension required.

Other winding applications

Besides coil winding and unwinding, light film tensioning for adhesive, video, and audiotape applications, for example often benefits from magnetic particle clutches and brakes. Alternatively, magnetic film tensioning sometimes leverages hysteresis tensioners: Instead of film wrapping around a pulley, it is usually compressed between two pinch rollers that use the its friction to transfer rag. Likewise, in medical installations, small, thin-walled tubing is common so hysteresis brakes that minimize differences in stick-slip (stiction) are best. Other friction devices with substantially different static and dynamic coefficients cause inconsistencies and even material breakage.

For more information, call (732) 271-7371 or visit ogura-clutch.com.

Ogura's PHT permanent magnet brake supplies constant torque for a slight tapper tension on the end of the coil.