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PLASTICS AND RUBBER INDUSTRY

This is a large industry with high usage of variable speed drives, especially large horsepower, water-cooled, Eddy-Current clutches. These large units are used in the manufacture of basic raw plastics materials, performing such functions as mixing, extruding and palletizing. Smaller drives of all types can be found in the user-type manufacturing operations such as film extrusion, insulation of wire, film and parts molding operations, and the like.

The main characteristic of this industry is that the large clutches sold are generally single-drive applications with simple control requirements, while the smaller drive applications tend to precipitate into engineered and coordinated systems with relatively complex requirements, such as highly accurate control of speed or tension.

DSI/Dynamatic® is a very important and highly regarded supplier to this industry, especially with respect to the larger horsepower, Eddy-Current applications, which have proven to be highly reliable in round-the-clock operations. Typically customers such as DuPont have favored us with repeated orders for large mixer drives, whose process requires absolute reliability. Complete redundancy is provided by supplying two clutches, two controllers, and two closed cooling systems which can be immediately switched over to provide a backup coupling, control, or cooling system in the event of a breakdown, without shutting down the process.

Another customer in this area for many years is Farrel. Their applications are similar to DuPont's, being involved in Mixing and extruding during the manufacturing process of basic raw plastic materials.

In customer applications, DSI/Dynamatic® has the advantage of being able to respond to these special needs through engineering flexibility. We are not tied to a standard mechanical design with only a limited list of available modifications; rather, we can create a system to meet the customer's needs.

Controllers in these large horsepower units are simple from the block diagram standpoint. They are merely speed controls of standard ½ percent accuracy, usually employing a torque limit circuit to protect the driven equipment and some rather extensive relay logic to provide the switch-over function when a redundant controller is used.

Mechanical

1. Inherently reliable operation of water-cooled, Eddy-Current clutch.
2. Availability of additional features, such as:
 - a. Spherical roller bearings.
 - b. Forced oil lubrication systems.
 - c. Closed cooling systems using water, oil or ethylene glycol for coolant.
 - d. Optional provisions for mechanical instrumentation of critical items such as temperature, pressures and flows of coolant and lubricant, and the ability of this instrumentation to sound alarms calling for maintenance in advance of an actual failure.
 - e. Ability to operate at low bleed speed (or even stall) at full torque for prolonged periods.
 - f. Adaptability to alternate cooling mediums where what is bad or unavailable.

Electrical

1. Overall simplicity of controller: no need to handle the conversion and control of thousands of horsepower of electrical energy – the Eddy-Current controller only handles about 1% of the clutch's horsepower.
2. Unlimited availability of *versatile modifications* for controller to provide such things as:
 - a. Automatic switch-over to spare.
 - b. Automatic regulation of speed or torque to maintain a remotely sensed process variable, such as pressure, temperature or flow.
 - c. Alarm annunciation when output speed, torque, or any process variable exceeds set limits, etc.

Secondary Manufacturing Options

As mentioned earlier, the smaller clutches (usually connected as multiple-clutch, engineered systems,) find applications in the areas where the raw plastics material produced by the big equipment is converted to the end user product, such as molded parts, plastic sheeting, insulated wire, etc. These clutch applications are generally speed-controlled, cascade systems driving screw or sheet extruders in conjunction with pressure rolls, capstans, winders, or take-ups, and sometimes material handling systems such as conveyors to carry away and distribute the finished product.

Special tension controllers such as the radius generator circuit sometimes find application on some plastic sheet winders where accurate control of tension is necessary over a large buildup ratio. Our advantage here is that the radius generator circuit can accomplish this without the need for a dance, which usually is not readily available in these processes.

Another operation requiring accurate speed ratio control is the mixing operation of chemicals used to manufacture polyurethane rigid foam. This requires that two or three metering pumps be driven in accurate speed relationships to each other to deliver the proper amount of each chemical to the mixing nozzle per unit of time.

The formulation varies for different products, so ease of ratio adjustment is necessary. These features are readily available with all types of DSI/Dynamic® clutch systems.

Overall Market Composition

The rubber and plastics industry, then, breaks down into two distinct submarkets:

1. Primary raw material production (large horsepower, single-drive applications); and
2. Secondary manufacturing operations (multiple-drive systems using smaller horsepowers).

The Dynamatic® name has been associated with various levels of the rubber industry for many years.

Some of our clientele include:

PRIMARY RAW MATERIAL PRODUCTION

| OEMs | USERS |
|--|---|
| Farrel John Royle Davis Standard Entwistle Modern Plastic Machinery Sterling Davis Electric | DuPont Hercules Monsanto Phillips Petroleum Foster Grant Dow Chemical Exxon Chemical Celanese Shell Chemical Cincinnati Milacron British Petroleum (BP) |

SECONDARY RAW MATERIAL PRODUCTION

| OEMs | USERS |
|--|--|
| Black Clawson/Egan Ingersoll-Rand Uniloy Milacron Battenfeld Gloucester Engineering John Dusenbery | Continental Can Company Rubbermaid Firestone Goodyear B.F. Goodrich Uniroyal Armstrong Johns Manville |

For further information or details on these and more plastic & rubber applications, please contact one of our application specialists.