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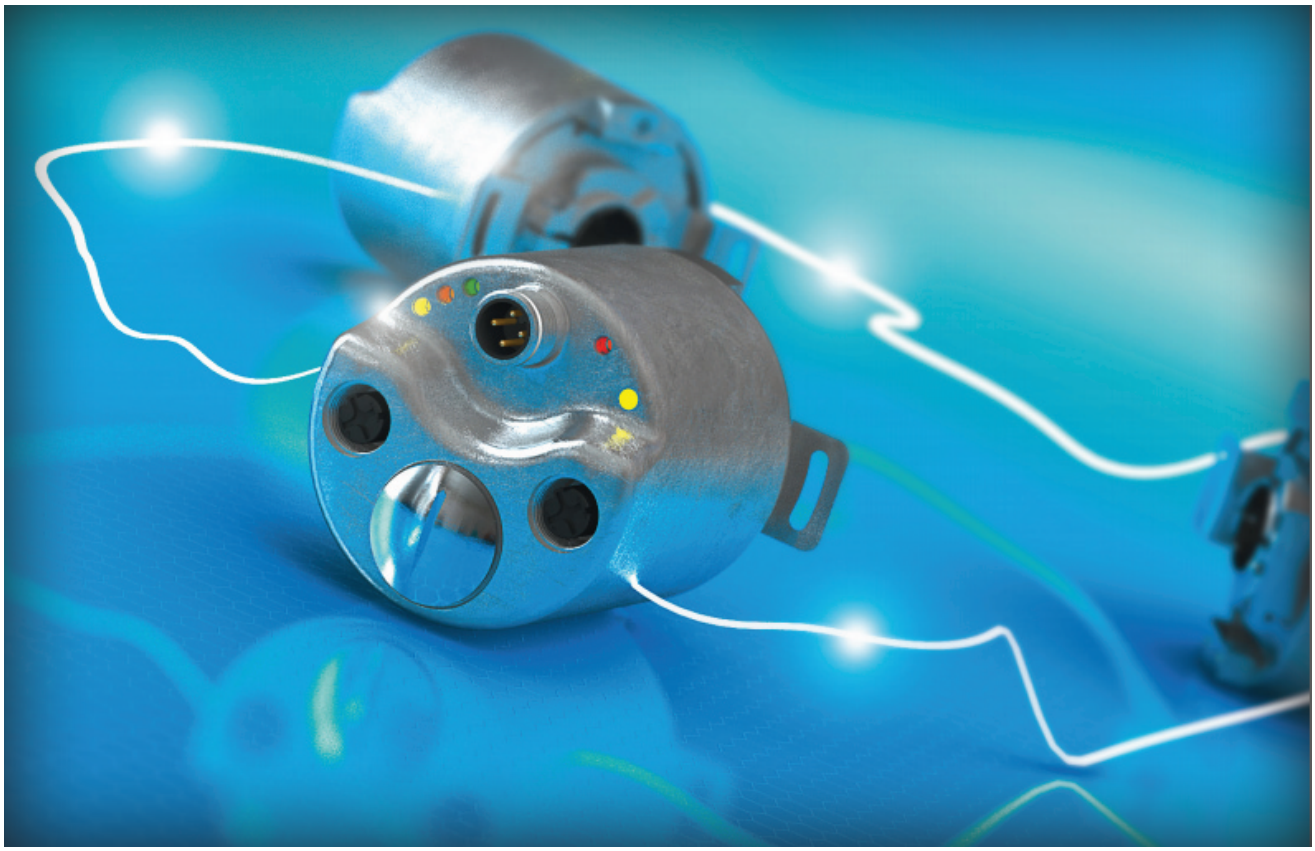

3 Advantages of Incorporating DLR Technology into Motion Applications

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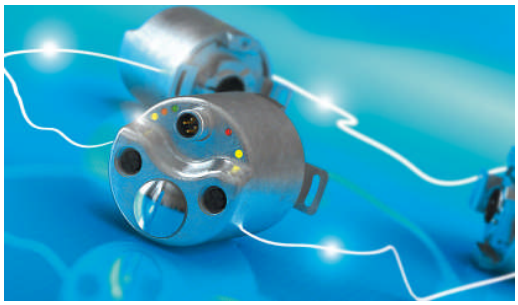
In a fragile global economy fraught with challenges, manufacturers and OEMs alike must, of necessity, operate efficiently and precisely. One recent development offering opportunities to optimize performance is the use of a device level ring (DLR) in industrial control applications with a ring topology. DLR essentially acts like an embedded switch within a device, rerouting data by detecting cable breaks in the network. Devices with DLR are finding their way into manufacturing environments with increasing frequency. DLR-enabled devices greatly reduce the need for external switching components, making the system cost less to implement and are fault-tolerant. In a motion monitoring system, if an encoder detects a break in the communications ring, and is DLR enabled, the DLR functionality within the device provides an alternate path for the data to travel, allowing the network to recover quickly and incur little or no downtime.

The caveat to this near *too good to be true* option is that a DLR is designed for implementation in EtherNet/IP-enabled devices. EtherNet/IP is becoming more a prevalent network in a number of industries, providing the flexibility and adaptability many plant systems seek and need. On the component side, more and more controllers exclusively are equipped with EtherNet/IP networking interfaces to improve system performance; and machine builders are retrofitting existing machines with Ethernet-based fieldbus systems.

Most notably on this front in motion applications is the recent introduction of the first EtherNet/IP-enabled encoder line with built-in DLR functionality from SICK. The ODVA- (Open DeviceNet Vendor Association) compliant AFS60/AFM60 EtherNet/IP family of single- and multi-turn absolute encoders puts a failure-tolerant, fast, and above all a safer and more reliable control network easily within the grasp of most operations.

Advantages of integrated functionality



Applying devices integrated with DLR functionality opens the door to numerous advantages for a motion monitoring system. Let's take a look first at what DLR brings to the operation and then focus on the capabilities of the device itself. Because a DLR topology is fault tolerant, it affords users added protection against system failures and unwanted downtime. If products in a ring topology do not have DLR functionality, a disruption causes the network to go down, resulting in downtime until repairs are made.

A device with DLR can be retrofit into any existing standard topology with little difficulty. A component with DLR functionality built in is able to determine how it is connected to the network. The device can recognize a disruption and reroute the signal or message in another direction, restoring communication between the device and the controller fast, typically in less than 3 ms. Further, DLR capability in the device offers the added benefit of eliminating or reducing the number of required switching components. In the past, a system using this topology would need to be fitted with an external switch to handle signal rerouting in the event of a connection failure. Products equipped with DLR capability perform this function inherently, boosting reliability as well as eliminating the need for added parts inventory.

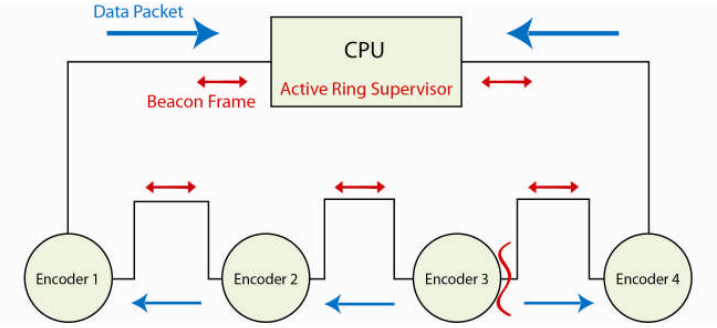
In a nutshell, DLR offers three primary advantages:

- Very high system reliability through redundancy, due to cable-break detection
- Easy adaptability to existing topologies
- Lower installation and maintenance costs

Plants and equipment manufacturers use a number of topologies in their applications – ring topology is one popular choice. The nice thing about SICK’s EtherNet/IP encoder is that it can adapt to the topology that makes the most sense for the application whether it be star, line, or ring. If ring topology is the configuration of choice, DLR functionality in the encoder provides huge benefits to the user. It integrates seamlessly into the network without additional hardware, such as switches, and keeps the network running even if there is a cable break somewhere in the ring.

Intelligent, powerful, precise operation

Now let's look at the importance of incorporating DLR technology into a device in a bit more detail. Among the important features of a DLR-equipped encoders are:



- **Continuous operation.** A DLR-enabled device allows the system to continue to operate even if fault occurs. A DLR adds needed media redundancy.

- **Easier networking.** DLR-equipped encoders work with any of a number of topologies. A big advantage of this type of device is that you don't have to force your network to work with the encoder. You fit the encoder into your network whether it is a star topology, a ring topology, or other type.

- **Lower cost/easier installation.** As noted, building DLR capability into the device eliminates the need for added external switching components. And fewer components also mean less cabling. Instead of running cabling to the switch and then to the encoder, the switch and related cabling are eliminated, the connection being made to the encoder directly.

Applications to meet most every need – from machine builders to manufacturers

Without a doubt, use of DLR-enabled absolute encoders is growing. Selection, as always, depends on the application and, in this case, on the type of network in use. However, an absolute encoder is usually the device of choice any time position data must be retained in the event of a power loss. These cutting-edge devices can be used in almost any application in nearly any industry when critical, precision performance is required. They are an optimum solution for manufacturers and integrators of processes, handling systems, production machines, and print systems, as well as measurement and inspection equipment.

Absolute encoders are especially common in the robotics industry to track the position of different axes on the robot. For a pick-and-place machine, a robot with a number of different axes will pick up disparate products from a conveyor and place them in another location. An absolute position is needed so that the position of each axes required for the movements could be determined. A field bus interface is beneficial in this motion monitoring environment, as there will be a number of components connecting to a controller. EtherNet/IP allows these components to be connected together, saving on cabling costs, and DLR functionality allows for even more costs savings as it eliminates switching components and the cables in between those components as well.

Absolute encoders with DLR functionality are also particularly well suited for the electronics industry. The movement of silicon wafers, for example, during the processes of loading and unloading need to be carefully monitored. The aggressive media, fluctuating temperature and limited accessibility require devices to be reliable in tough conditions while providing high precision. The high resolution AFS60/AFM60 with EtherNet/IP has wide spread bearings that reduce load on each individual bearing, a metal code disc that handles greater shock and vibration, and has a wide temperature range that can handle the tough environments. Pair these advantages with DLR functionality for network availability, and the risk of component failure drops dramatically.

For more information, contact Mandee Liberty, Encoders Product Manager at mandee.liberty@sick.com, visit our web site at www.sickusa.com or call 800-325-7425.