



SIEMENS

Application Notes

Regenerative drives save energy and costs

Every day, around the world, thousands of lifts, hoists and conveyors raise and lower loads within high-bay warehouses, food and beverage processing and packaging plants, parcel handling facilities, automotive factories and other manufacturing facilities. These material handling systems consume or produce energy with every movement, yet the energy generated by the motor in the downward movement of the equipment is too often dissipated as heat.

A unique Siemens drive train solution that combines SIMOGEAR helical bevel gear motors and SINAMICS G120D distributed drives can capture this wasted energy for re-use

by other equipment in a facility. The resulting energy savings can significantly lower a company's power bills and help meet corporate sustainability goals. In one automotive production plant, for example, this regenerative power system reduced annual energy consumption in lift applications by 40 percent.

This Siemens solution is designed for use in many applications, including automated storage and retrieval systems, vertical reciprocating conveyors, lifts, hoists, decline conveyors and in theater or entertainment venues that need to move sound systems, lights, curtains, stages and performers.

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A wide range of benefits

In addition to putting energy back onto a facility's power lines, this integrated drive system presents other benefits for machine builders and end-users alike:

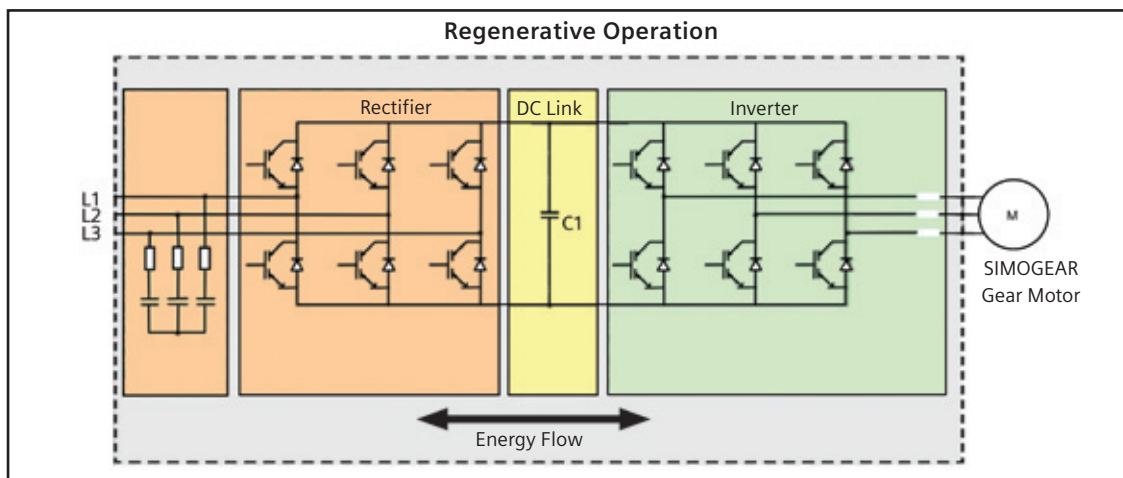
- Fewer components. This regenerative power solution eliminates the need for the large, externally mounted brake resistor typically required to remove the excess energy generated by the motor during a lift's downward movements. That's one less component to purchase, and one less point of potential failure and maintenance.
- Simplified brake management. Most variable speed drives must send a control signal to a contactor to switch AC voltage on or off to power the gear motor's mechanical brake. A separate rectifier is required to convert the AC power to DC. The G120D drive, on the other hand, has a dedicated output that is connected directly to the DC brake. This simplifies brake management and eliminates two more components. Braking parameters can also be easily changed within the drive to fit the specific application requirements.
- Wider range of applications. Regenerative power technology has not been common in small drives, particularly in distributed or decentralized architectures. This technology has typically been reserved for large cabinet-mount drives. The G120D drive now brings this technology to small (1-10 HP) applications.
- Built-in position control. The G120D decentralized drive has on board encoder evaluation for closed-loop positioning control in a distributed layout. This simplifies control system programming and management.
- Integrated safety. SLS and SS1 functions are met within the drive to achieve a safety integrated architecture without needing

a separate encoder and cables. This Safety Integrated approach offers a streamlined and cost-effective way to meet safety standards. By connecting the drive train to a PROFINET industrial Ethernet network, equipment diagnostics can be communicated directly to the control system or, if a Safety PLC is used in conjunction with the drive, then safety data can pass directly over the network using the PROFIsafe protocol.

- Efficient, quiet gearing. Energy captured in a regenerative system has to pass back through the entire drive train before it reaches the power lines, which makes efficient mechanical gearing essential to gain maximum energy savings. Helical bevel gear technology, which is more energy-efficient than spiroid or worm gearing, is standard in Siemens right angle gear motors. These gear motors also operate at low noise levels, which is important when operators work near equipment and in entertainment applications.

The Integrated Drive System

Integrated drive trains that provide durable, energy-efficient performance with minimal maintenance are a Siemens hallmark. Choosing from over 5,000 different possible combinations of components, Siemens engineers ensure a near perfect fit for each application's unique requirements. These Integrated Drive Systems help reduce operating costs by delivering longer equipment life, increased uptime, lower energy costs and extended maintenance intervals. Siemens Integrated Drive Systems also reduce project risk, complexity and overhead, since the entire drive system is engineered, assembled and delivered by one source.



By using an IGBT front-end instead of the rectifier circuit found in most drives, the Siemens G120D distributed drive recovers energy generated by high-inertia loads and places it back onto the incoming line. This saves energy, simplifies the design and installation, and saves costs.

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