Why and when to install multidrives?

*(A new generation of technology delivers precise control of multiple motors via a compact multidrive design)*

NEW BERLIN, Wis., September 20, 2006 . . . Extremely compact multidrive series from ABB – the ACS800 – offers an array of benefits to integrators, OEMs, panel builders and end users who are optimizing energy usage through precise control of motors. Since drives are available both in multidrive and single drive configurations, it is useful to define the difference – and profile the benefits that the next generation of multidrives now provides to users.

A single ABB industrial drive

Adjustable Speed Drives are used in any application in which there is mechanical equipment powered by motors; the drives provide extremely precise electrical motor control, so that motor speeds can be ramped up and down, and maintained, at speeds required; doing so utilizes only the energy required, rather than having a motor run at constant (fixed) speed and utilizing an excess of energy.

Since motors consume a majority of the energy produced, the control of motors, based on demands of loads, increases in importance, as energy supplies become ever more strained. Additionally, end users of motors can realize 25 – 70% energy savings via use of motor controllers. (Despite these benefits, the majority of motors continue to be operated without drives.)

Single ABB industrial drives are highly flexible AC drives that can be customized to meet the precise needs of a single-motor application. These units convert AC power to DC, and then invert the DC back to an AC output to a motor. These drives cover a wide, full range of powers and voltages. Single industrial drives also feature a wide range of built-in options as standard equipment. They can be installed for most applications right out of the box; and they also can be ordered and manufactured as a customized unit for a particular application.

What is an ABB multidrive?

A multidrive is built from industrial drive modules that are connected to a common DC bus bar. The common bus bar is used to supply the drive modules with DC power, and each module then inverts the DC to AC and powers an individual motor. The DC power is derived from a single supply unit (rectifier) that is built into the front end of the same multidrive configuration.

This construction simplifies the total installation and results in many benefits: savings in cabling; reduced line currents and simpler braking arrangements; energy distribution over the common DC bus bar, which can be used for motor-to-motor braking without the need for a braking chopper or a regenerative supply unit; reduced component counts; increased reliability; and space savings; and there is no need for a separate Motor Control Center (MCC).

Where can multidrives be used?

In general terms, the ABB multidrives can be used whenever several drives/motors form part of a single or integrated mechanical process. The common supply of the multidrive enables the implementation of overall safety and control functions, and permits the close coordination of individual drive motors. For example, a paper machine
has many motors that must be individually controlled as a complete system. The ABB multidrives offer fast
communication of torque and speed signals between the drives, to control the tension in the paper web. Multidrives
also can be used where the shafts of the individual drive motors are not tightly coupled; for example, in processes
where each drive module can be programmed with a speed profile so that the overall use of energy is minimized.
These two examples merely demonstrate the range of applications where ABB multidrives offer substantial benefits
over other types of drive constructions.

ABB multidrive promises

Modular configuration of multidrives provides control of multiple motors across a 1 – 7000 HP power range, from
380 – 600 (690) VAC. A single rectifier unit can be combined with a host of inverter units that are connected in
parallel, to provide output current required by any given application. Additional major benefits include:

-- Encoderless Motor Operation – Superior dynamic-response performance of ABB’s patented Direct Torque
Control (DTC) motor control algorithm. Many applications can be run without encoder feedback.

-- Flexibility – Only four types of diode rectifiers are used to invert AC three-phase input power to the common
DC bus bar across the entire ACS800 power range (200 – 4600 HP). Inverter modules (drives) are available in seven
sizes (R2i – R8i frame sizes) and cover the 1 – 7000 HP range; single R8i units, or R8i units in parallel, supply the
motors.

-- Compact Design – Improvements in technology and power components have reduced the total footprint of
these multidrives by up to 50 percent, compared to the generation of multidrives preceding the ACS800 line! This
frees up significant wall-, panel- and floor-space.

-- Wide Range of Options – I/O extensions, field buses and a pulse encoder module all fit inside the inverters.

-- Adaptive Programming – This program extends the freely programmable I/O and extensive parameter
selections built into the multidrives and accessed via the Start-up assistant. The Adaptive Programming accesses
extensive parameter selections for complete flexibility in precise control of all individual motors; like a mini PLC
built in.

-- Reduced Installation Costs – Since the modular configuration utilizes a common DC bus, the cabling input
power required is a single three-phase AC connection. Further, the cabling is wired to the rectifier module through a
unique plug-in connector, which then powers the entire common DC line-up. And the plug-in connectors for the
inverters (132 kW and up) are wired to the motor terminals. Both the rectifiers and the inverters are rolled in on
their wheels and seated into the connectors.

-- Redundancy – Common spare parts and the ability to keep running at reduced load, if module is disabled.

Overview of the construction

An ABB multidrive is built from several different sections (see Figure 1). The key units within these multidrive
systems include:

- Drive units – inverters have built-in capacitors for smoothing the voltage of DC bus bars.

- Diode Supply Units (DSU) – these units automatically adapt to 6- or 12-pulse operation and, during start-
up, they deploy a built-in control system that automatically charge the inverters’ capacitor banks.
• **IGBT Supply Units (ISU)** – used in regenerative drive systems and applications requiring low harmonics, to convert three-phase AC voltage to DC voltage.

• **Thyristor Supply Units (TSU)** – in a regenerative drive, can regenerate power back to the mains.

• **Dynamic braking units** – in resistor braking, whenever the DC bus voltage of a frequency converter exceeds a certain limit, a braking chopper connects the circuit to a braking resistor.

• **Control units** (optional) – are equipped with communication interfaces, power supplies, etc., for automation equipment.

ABB, Automation Products, Low Voltage Drives, is the world's largest manufacturer of electric motors and drives. In the USA, an integrated channel of sales representatives, distributors, and system integrators allow ABB, New Berlin, Wisconsin, to supply a complete line of energy-efficient electric drives, motors and engineered drive systems to a wide range of industrial and commercial customers. Products manufactured include AC and DC variable speed drives for electric motors from 1/8th through 135,000 HP, and application-specific drive system solutions to meet diverse customer needs (http://www.abb.us/drives).

ABB (www.abb.com) is a leader in power and automation technologies that enable utility and industry customers to improve their performance while lowering environmental impact. The ABB Group of companies operates in around 100 countries and employs about 107,000 people.
Figure 1: Key units of the new ABB ACS800 multidrive system.

For more information please contact:

**ABB ACS800 Multidrive**  
Ari Hedemaki  
262-785-3367 phone  
262-785-8501 fax  
ari.hedemaki@us.abb.com

**ABB Media Relations**  
Ken Graber  
262-780-3873 phone  
262-785-8501 fax  
ken.j.graber@us.abb.com