

SIEMENS

Solutions

for the

Printing Industry

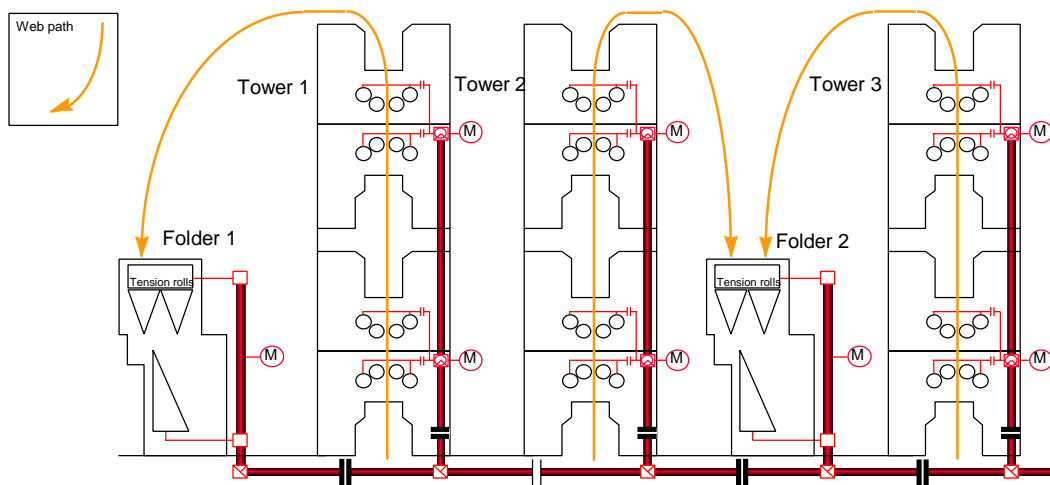


SIMOVERT MasterDrives MC-

The new drive system for the printing press industry

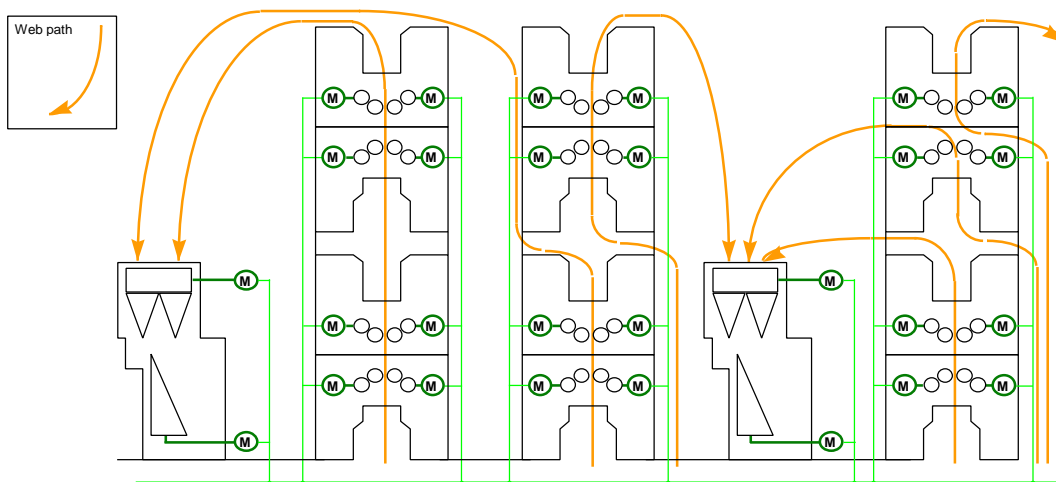
Siemens is a major, worldwide supplier of drive systems for industry. The printing press industry requires highly specialized functions and features. Siemens drives offer technological functions such as angular-locked synchronism, positioning, gear ratio etc. of the highest accuracy and modularity. Siemens use of these features simplifies the mechanical construction of the printing press at considerable saving while gaining flexibility.

For several years there has been a move in the printing press industry toward the shaftless printing machine. In the past, printing units consisted of mechanical components such as printing cylinder, plate cylinder, inker, etc. These were linked with one another and with the main drive by mechanical shafts, gearboxes and couplings.



Picture: shafted printing press (newspaper)

In a shaftless printing press one or several motors drive the printing units. Shafts, couplings and gearboxes are omitted to a great extent.



Picture: shaftless printing press (newspaper)

The shaftless press has the following advantages:

- Unnecessary expensive mechanical components (gear boxes, shafts, and couplings)
- Unnecessary auxiliary drives
- High flexibility of the web path and thus for the operation of the machine
- Faster cycles, higher rate of production
- Less wear and tear

The drives must fulfill the following main demands:

- Highest accuracy in synchronization (electronic line shaft).
- Virtual Master Function.
- Modular construction
- Technological functions (e.g. synchronization, positioning, electronic gearbox, tension control, etc)
- Communication interfaces

All these demands are met by the drive system Motion Control (MC) developed and manufactured by Siemens. It is based on Siemens' worldwide proven frequency inverter system of SIMOVERT MasterDrives and the High Performance Motor family.

The system is comprised of the following components:

SIMOVERT MasterDrives MC	inverter with air- and water-cooling with technology software package
Encoder Boards SBM	for connection of high resolution sincos / Absolute - encoders as shaft- and/or motor-encoder
SIMOLINK SIMOLINK SWITCH SLS	extremely fast setpoint cascade based on fiber optic technology switch for fiber optic cable to redundancy concepts
Profibus / Can / Arcnet / DeviceNet	communication interfaces for connection of the drives to host PLCs
Input / Output Extension EB High Performance Motors	for additional binary and analog I/Os servomotors and squirrel cage motors with air- and water-cooling
SIMOVIS	PC-based software package for drives parameterization.

SIMOVERT MasterDrives MC

The frequency inverters MasterDrives Motion Control are specially designed for complex servo drive applications. Besides the proven hardware modularity, MasterDrives Motion Control offers a modular software in clearly structured, function block technology.

The inverter's basic software already contains a number of free function blocks such as

- Connector-/binector converter, binector-/connector converter
- OR- AND- NAND- EX OR blocks
- flip-flops
- adders, subtractors, multipliers, dividers
- PID-controller for pressure-, temperature-, tension control etc
- Motor-potentiometer
- Basic ramp generator, sophisticated ramp generator
- Polygon curve bloc
- Cam-shaft group
- Communication blocks
- Brake control block
- Encoder evaluation for position control
- Positioning

The technology software contains the following additional function blocks:

- Electronic line shaft of multiple drives
- position manipulation of the slave drive with selectable electronic gears
- register synchronization
- electronic cam shaft
- variable master references
- virtual master (the virtual shaft is calculated in one of the drives and transmitted as reference to the other drives via SIMOLINK)
- automatic processing of a traversing program

The drives exist in the power range from 0,5HP to 250HP as converters or inverters with separate rectifier units in 1Q/4Q. The supply voltage range is 3AC380V to 480V,50/60Hz. The units can control servo- motors as well as squirrel cage motors.

To achieve the necessary accuracy for the electronic line shaft, special care was given to the dynamic response of the drive.

Encoder Boards

For connecting the different kinds of encoders to the converters, the following boards are available:

- SBP for pulse encoder
- SBR for resolver and
- SBM for sin/cos-encoder, absolute encoders with serial Endat- and SSI-interface.

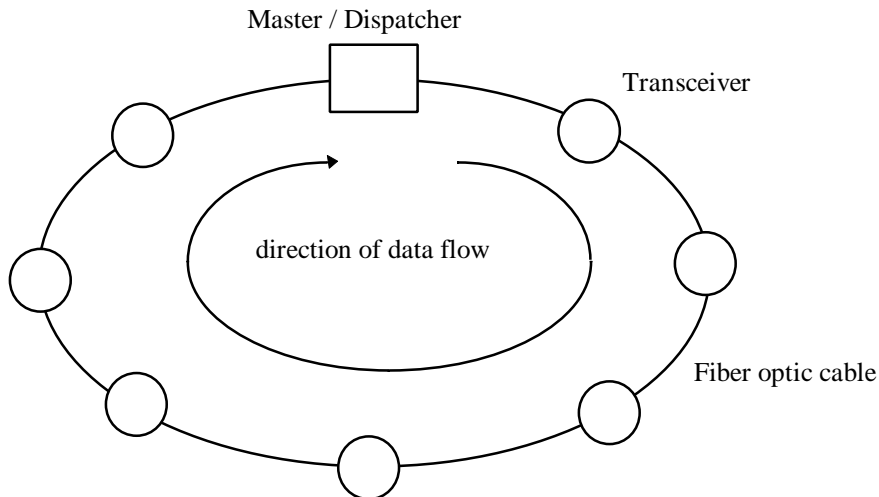
It is possible to plug 2 encoder boards into the electronics box of a drive for simultaneous evaluation of the motor encoder and the machine encoder. The motor encoder is used for the vector control while the machine encoder is used for the exact position control if there are elasticity between the motor and the printing roll. The machine encoder can also be used as real master e.g. if an existing printing press with shaft should be extended, the real master function is needed. The existing shaft is the real master in this case. Since the control needs to be highly accurate, sin/cos-encoders or absolute encoders are used.

SIMOLINK

The high-speed drives communication Autobahn SIMOLINK performs 3 main tasks:

- Fast synchronous setpoint cascading from an external master
- Fast communication between the drives (one of the drives computes the virtual shaft)
- Synchronization of the processor time slices of everything that is connected via SIMOLINK

The transmission media of SIMOLINK is a fiber optic cable consisting of plastic or glass that forms a ring that connects all the drives. SIMOLINK transmits setpoints and measured values (bit-, byte-, word- and double word format).



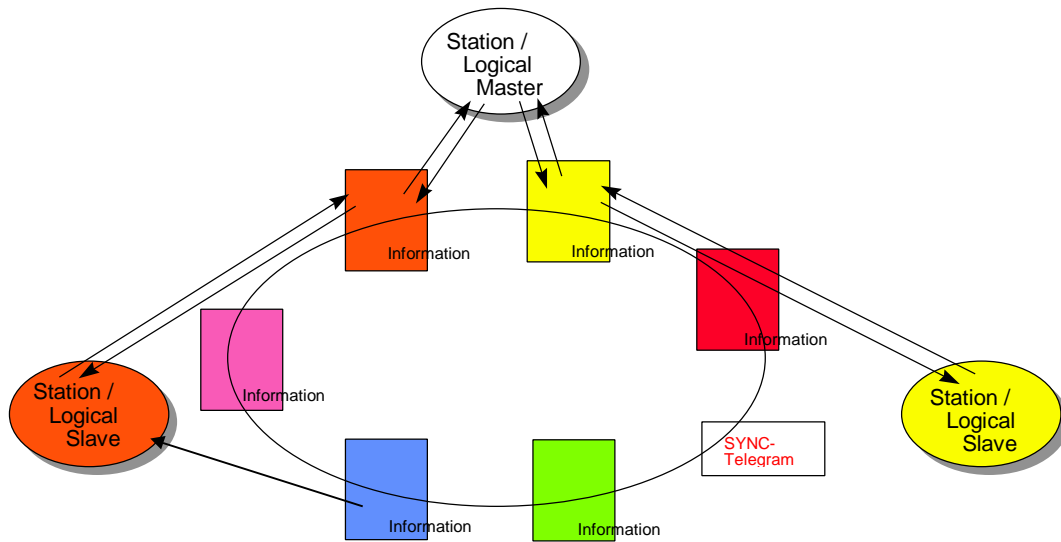
Picture: SIMOLINK fiber optic ring

Every SIMOLINK interface is part of the fiber optic ring. Telegrams are passed from one ring participant to the next. One of the units in the ring must initiate the data frames and keep the data flowing. If this unit is a host system (such as S7, SIMADYN D), the unit is called Master, if it is a drive, the unit is called Dispatcher. All other units in the ring are called transceivers.

Every telegram is exactly 70 bits long and contains a 32-bit word of user data. Every unit in the ring has its own address. Every address has 8 sub-addresses or channels. The transceivers (and also every Dispatcher) can only write information into their own information containers (telegram containers with their own address), however they can read up to eight telegrams from every other container. The Master can read from, and write into, every address up to 1024 telegrams).

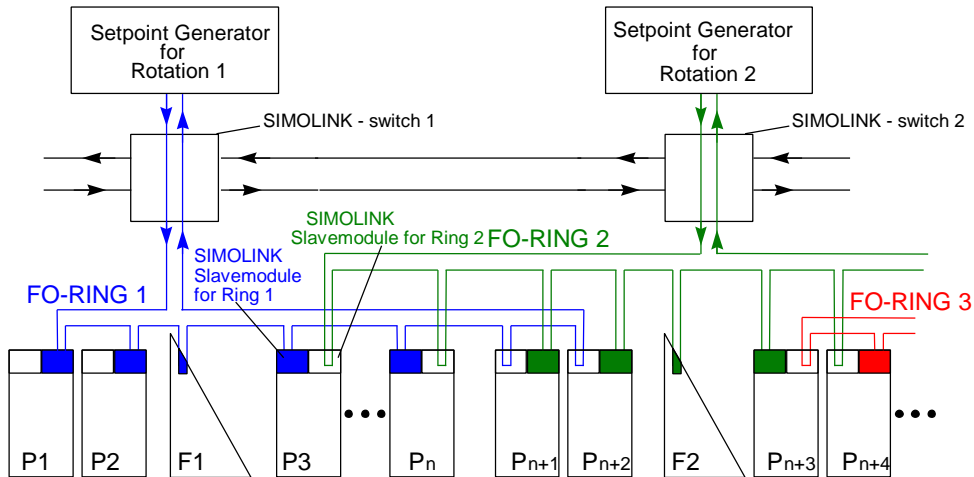
There is no space between the telegrams. Therefore, the telegram cycle time is as accurate as the quartz from which the timing is derived. At the end of every bus cycle the Master/Dispatcher transmits a special synchronization telegram. This telegram triggers an interrupt on the interface board. The interrupt synchronizes the time slices in the drive unit. This mechanism ensures that all inverters connected to the SIMOLINK read the setpoints at the same time, calculate the algorithms and trigger the power circuit simultaneously.

The transmission rate of SIMOLINK is 11Mbit/s.



Picture: The SIMOLINK-Master produces the „information containers“ and can send data to all stations. The slaves can read data from all information containers, but they can only write into their own container.

The MasterDrives MC can be used with two inserted SIMOLINK boards (SLB) in order to achieve a redundant SIMOLINK network or to switch between two folders. Thus, the drive can be connected to two different SIMOLINK networks with one active SLB. The switching from one SIMOLINK ring bus to the other can be done using binary inputs or the serial communication such as PROFIBUS. Thus, switching of print units to different folders is possible.



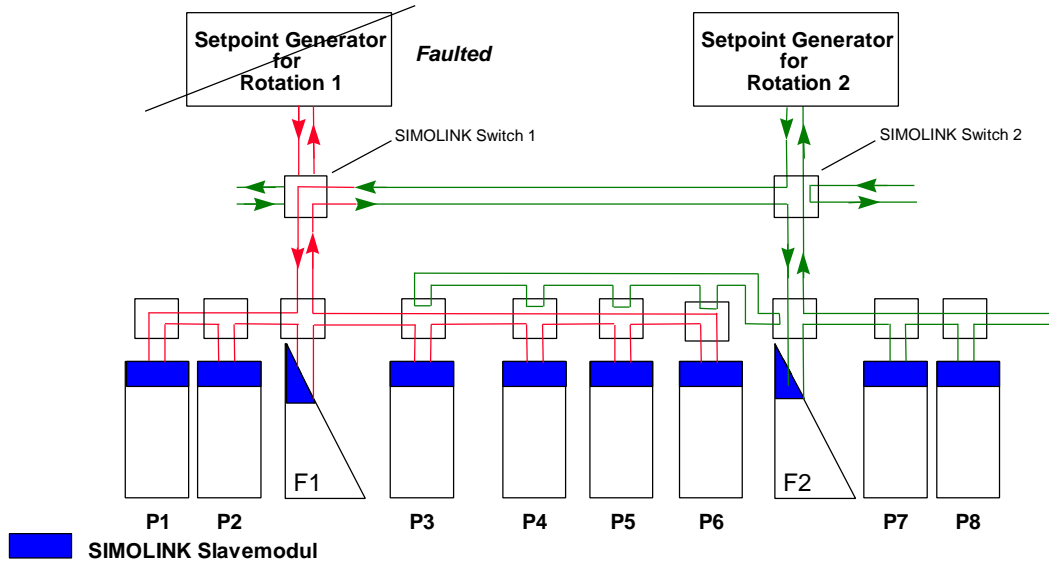
Picture: Flexibility using two SIMOLINK Boards at each Drive.

SIMOLINK Highlights:

- Extremely fast data transfer: e.g. (100) 32 Bit-words in 630µs
- Jitter-free Synchronization
- Cross data transfer between Slaves on the bus is possible
- Up to 200 nodes without repeater (200 slaves, 1 Master)
- Long distances (e.g. 3300ft ring using plastic fiber optic cable)
- Easy Diagnostic: Fault location detection from Master possible.

SIMOLINK SWITCH SLS

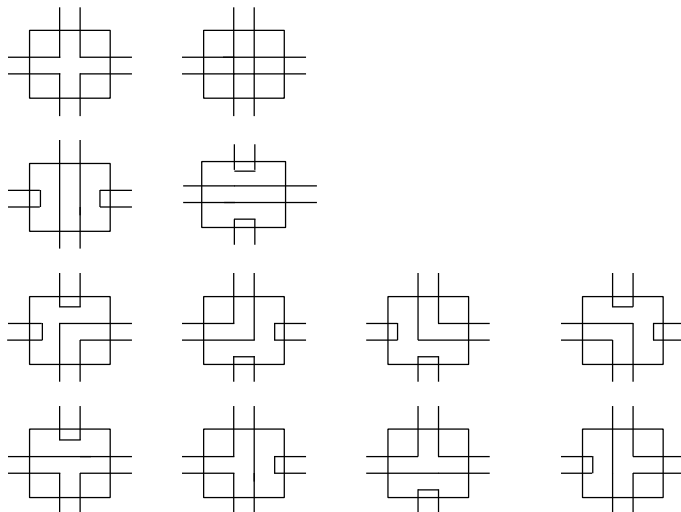
The main reason for using the SLS Switch is to be able to quickly change the SIMOLINK bus configuration. Drives can be switched between two different fiber optic ring busses or can be connected to one large ring in case of a fault on the control level device.



Picture: Redundant configuration using SIMOLINK Switch.

How to switch the bus configuration using the SIMOLINK Switch:

The switching of the different configurations is done through (4) binary inputs. Below you can see the (12) most useful possibilities of (16) total possibilities.



Picture: (12) Useful configurations using the SLS.

Profibus / CAN / ArcNet / DeviceNet

The drives can be controlled via PLC or HMI system using one of the most popular field busses. The field bus e.g. Profibus is absolutely separated from the SIMOLINK bus. The field bus can maintain the following functions:

HMI	Operating and Monitoring
Parameterization	Change of the Drive Setting, SIMOLINK-Configuration while operating, Configuration Change
System Diagnostics	Service (e.g. via modem)

Expansion Board EB

MasterDrives MC come with the following I/O's:

- (2) Binary Inputs
- (4) Bi-directional binary In/Outputs (free configurable)
- (1) Analog Input
- (1) Analog Output

Additional I/O boards can be inserted in order to expand the I/O capability.

The Expansion Board 1 (EB1) contains:

- (3) Binary Inputs
- (4) Bi-directional binary In/Outputs (selectable)
- (3) Analog Input
- (2) Analog Output

The Expansion Board 2 (EB2) contains:

- (2) Binary Inputs
- (4) Relay Outputs
- (1) Analog Input
- (1) Analog Output

High Performance Motors

The High Performance Motor family has been developed to achieve highest performance together with the MasterDrives. Extreme duty cycles, short rise time, high speed and position accuracy are the highlights of the High Performance Motors. They have been constructed as permanent-magnet servomotors and servo-asynchronous motors.

The main features of the High Performance Motors are:

- Power range 0.5 –400HP @ 400-6000rpm base speed
- Compact design using square frame construction
- High overload capability / High power density
- Integrated Encoder
- High Dynamic
- Low vibration level
- Rugged mechanical design, low maintenance
- Built-in temperature sensors
- TENV, TEBV, ODP-BV, TEWC Design available

Permanent-magnet servomotors 1FT6/1FK6:

Additional features of the 1FT6 or 1FK6 motors are:

High zero speed torque
High Protection: TENV / TEBV (IP 64 - IP 67)
Different encoder options: Resolver, Sin/Cos encoder, or Absolute encoder

Asynchronous servomotors 1PH7 / 1PL6 / 1PH4:

Additional features of the 1PH7 / 1PL6 / 1PH4 motors are:

Large field weakening range
Protection: TEBV (IP55), ODP-BV (IP23) or TEWC (IP65)
Different encoder options: Pulse encoder, Resolver, Sin/Cos encoder, or Absolute encoder.

SIMOVIS

SIMOVIS is a Windows 95 based software tool to make it easy for the customer to start up and service Siemens Drives. RS232 can be used to connect one drive in a point-to-point connection with the PC or Laptop. RS485 or Profibus can be used to configure more than one drive on the bus.

These are the main features of SIMOVIS:

Easy parameterization and subsequent parameter monitoring.
Reading, writing, archiving, printing, editing, and comparing of parameter data sets.
Process data control (Control commands, setpoints)
Diagnostic (faults, warnings)
Offline and online selection.

SIMOVERT MasterDrives MC System - Tailored solutions for printing presses with worldwide acceptance and support.

The high performance of the drive system SIMOVERT MasterDrives MC combined with all the different options in hard- and software allow Siemens to tailor solutions for new printing presses as well as retrofit existing press constructions. Siemens' proven worldwide service network with technical drives support, spare parts and repair centers supports customer needs to maintain the installed equipment.

Why is Siemens your best solution for Printing Presses?

Printing OEMs and end-users have relied on Siemens Drive Systems worldwide for offset, flexo and gravure printing presses for more than 28 years. Siemens is well-known for every product and system type -- DC-drives (SIMOREG), AC-drives (SIMOVERT), closed loop control systems (MODULPAC, SIMADYN), PLCs (SIMATIC S5 / S7 / TI) or HMI systems (COROS, WIN CC). Siemens strength has been a combination of standard products and worldwide support.

Your application is our challenge!