

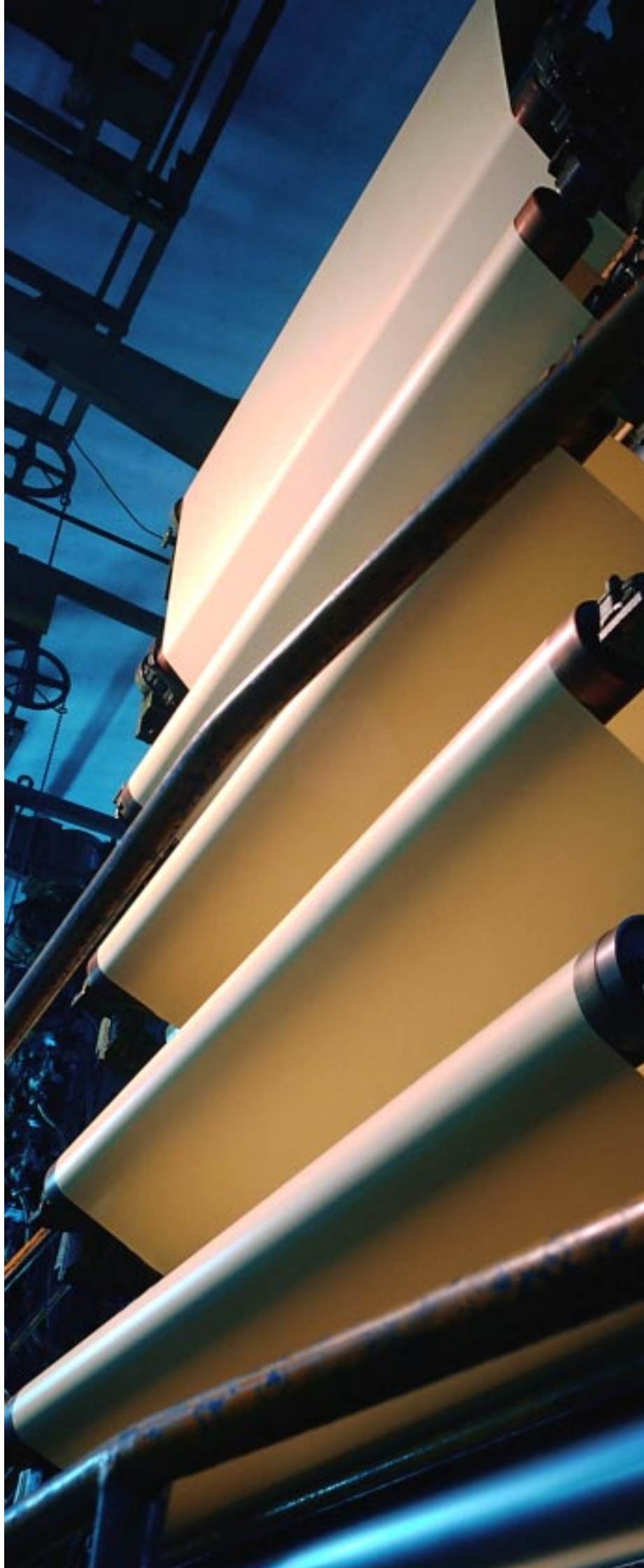
Motion control solution
Modicon TSX Quantum SERCOS
Solving the automation puzzle



GROUPE SCHNEIDER

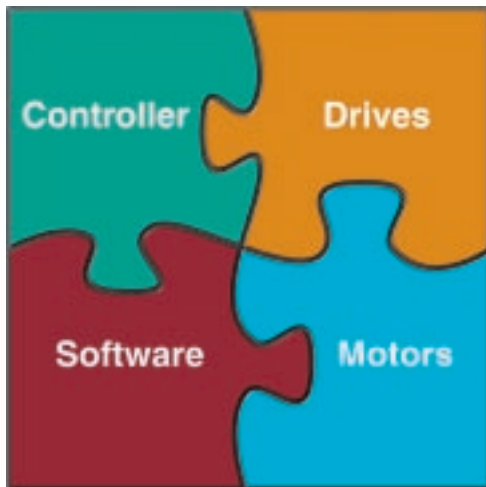
■ Merlin Gerin ■ Modicon ■ Square D ■ Telemecanique

Groupe Schneider has been leading the industry with innovative solutions and time tested products for 30 years - ever since we invented the first programmable logic controller in 1968. With resources all over the globe, as well as support right in your backyard, if you have the need to incorporate motion control into your system, Groupe Schneider has the products and expertise to help you.



Modicon TSX Quantum SERCOS motion control

High performance architecture
for demanding applications



Integrated Control

If integrating PLC control, motion control, variable speed drives and sensors on a machine has become a puzzle for your operation, let Groupe Schneider help you find the right solutions. Our TSX Quantum SERCOS motion controller utilizes an advanced multi-tasking software architecture that integrates motion control and other devices within the familiar PLC environment, making even the most challenging motion control problems easy to solve.

The TSX Quantum SERCOS motion controller uses Intel based processors to give you the ultimate in performance. Choose from the 486 version which will handle up to 8 high performance digital servos and other SERCOS compatible devices, or the 586 version which will communicate with a ring containing 32 SERCOS devices.

The SERCOS solution

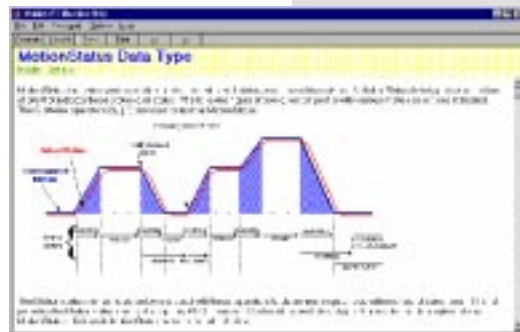
Just 8 years after its introduction as a digital drive control bus for machine tools in the 1989 European Machine Tool show, SERCOS, an acronym for **S**erial **R**ea-time **C**ommunication **S**ystem, has become the de facto standard for all high performance motion control applications.

SERCOS defines the medium, topology, connector, signal level, message structures, registers, timing and data formats for synchronizing digital drives over a fiber optic network. All companies using the SERCOS name are required to submit their products to an independent standards organization to verify compliance.

What benefits are derived from using SERCOS?

- Superior diagnostic capabilities and automatic servo drive configuration deliver increased machine utilization and reduced downtime
- Standard interface provides universal product compatibility
- Flexibility provides easy expansion of the axis count on a machine
- 32 bit digital control eliminates the low resolution analog signal (12-14 bit) between drives and motion controllers which has long been a barrier to productivity
- Fiber Optics reduce wiring complexity and eliminate noise problems





Modicon Motion Framework is a complete Windows® based environment designed specifically for creating motion applications. With a single, easy to use toolbar, axis tuning, programming and backup functions are just a mouse click away.

Programming software

Modicon Motion Framework MMFStart



Motion programming with Concept

The TSX Quantum SERCOS controller offers users the ability to create motion applications within the familiar PLC environment. With MMFStart, the user can develop a complete motion control program within Groupe Schneider's award winning Concept development environment. A custom function block has been created to simplify the interface to the motion engine which generates all the required profiles for a sophisticated motion control application in the PLC.

Motion programming with Modsoft

MMFStart also supports the Modsoft ladder logic programming software through a standard Modbus Plus interface. This makes the Quantum SERCOS controller and MMFStart a perfect solution for retrofits to existing installations where the motion controller needs to be updated.

MMFStart

MMFStart is a standard executive supplied with the motion controller that sets up a high speed communication interface between the motion controller and the PLC. When MMFStart is loaded, the PLC registers are automatically updated with all relevant data from the motion controller. In addition, the position and status information of all axes configured on the SERCOS ring is continuously available.

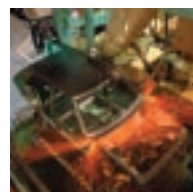
Setting a single bit in the PLC causes all axes to be enabled or halted. If an axis is faulted, a detailed error code describing the fault will be loaded into a PLC register and can be displayed as a real world message on an operator interface. All of this is available without writing any special software, so programmers can focus on writing code for the application rather than creating code to do "house-keeping" chores.

Capabilities of MMFStart

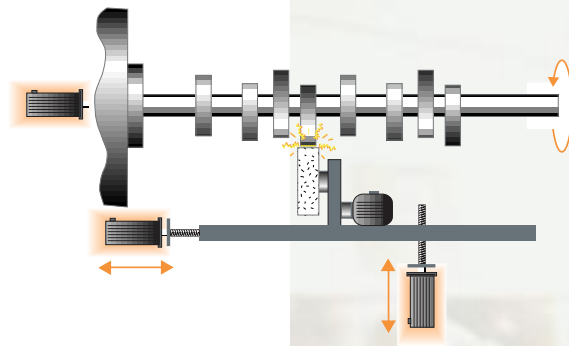
- Move all axes independently
- Electronically gear groups of axes at any ratio
- Have an axis or group of axes follow a CAM table
- Create sets of axes that will move in true coordinated fashion, starting and stopping at the same time and tracing a path defined by a set of cartesian coordinates

Gearing and camming functions use a master axis which can be any of the following:

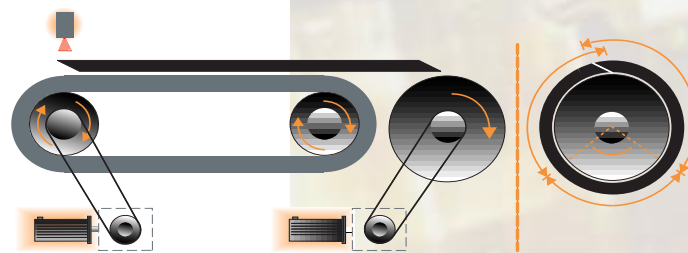
- An imaginary (virtual) axis
- An independently driven remote encoder
- An axis being controlled on the SERCOS ring



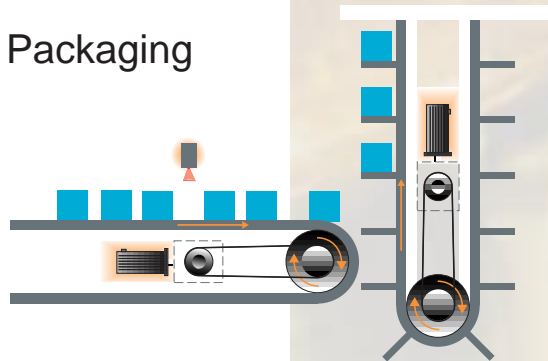
Automotive



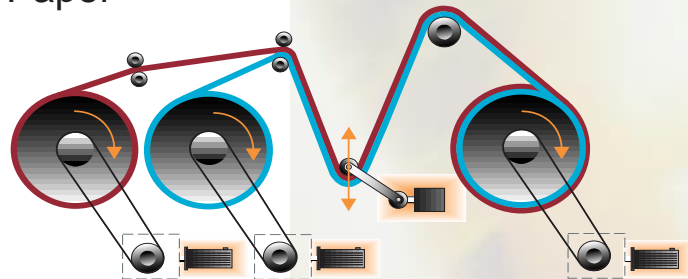
Tire and rubber



Packaging



Paper



Whether you are an OEM or an end user, the powerful, built-in algorithms of the Modicon TSX Quantum SERCOS motion controller are perfect for many different applications.

Industries and applications



Automotive

Typical applications in the automotive industry include gantry robots, transfer line slides, and specialty operations like cam milling or grinding.

The illustration on the opposite page shows a cam grinding operation with the Quantum SERCOS motion controller controlling 3 servo axes. The grinding wheel is kept in contact with the surface of the cam by using the advanced cam table features in the Quantum SERCOS controller. Cam profiles are updated dynamically from the PLC, making it an extremely flexible solution.

Tire and rubber

Applications in the tire and rubber industry include tire building, tread cutting, bead winders and hose wrappers.

The axis coordination features on the Quantum SERCOS controller make these applications easy to control.

One of the key requirements in tire building is to lay the tread on the carcass so that the two ends of the tread precisely overlap (see illustration). The Quantum SERCOS controller does this by first measuring the exact length of the tread just before it is applied to the drum. It then synchronizes the movement of the drum and conveyor in three steps in such a way that the correct stretch is given to the tread during the second move to result in a perfect overlap. The result is a stronger joint and improved product quality.

Packaging

Motion applications in the packaging industry include printing, flying cutoff, labeling, and case packing. All of these processes can benefit from the use of the advanced electronic gearing capabilities on the Quantum SERCOS motion controller.

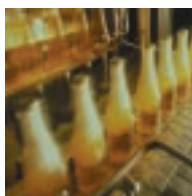
Case packing requires that the system automatically adjust for the uneven distances between parts on a

conveyor so that they can be placed into cartons on another conveyor. The Quantum SERCOS controller does this by coordinating a sensor that detects the position of each part and issuing an incremental change (+/-) in the gear ratio of the second conveyor to compensate for any variance.

Paper

The paper industry has many applications similar to the packaging industry, such as web control, flying cutoff operations, stacking, and packing product. The SERCOS fiber optic network also eliminates the need to daisy chain encoder signals between drives, greatly simplifying the wiring in line shafting applications.

In web applications such as illustrated, the SERCOS controller uses encoder feedback from the dancer arm to control tension on the web. All axes are geared together via the SERCOS ring, and relative movements of axes are commanded with simple incremental moves.



Visit our website at
www.modicon.com

Schneider Automation Inc.

North American Division

1415 South Roselle Road
Palatine, IL 60067
USA
Tel: (847) 397-2600
Fax: (847) 925-7271

Marketing Headquarters

5, rue Nadar
92566 Rueil-Malmaison Cedex
France
Tel: +33 (0) 1 41 29 82 00
Fax: +33 (0) 1 47 51 80 20

European Division

for Central and Eastern/CIC
Europe
43-45 blvd. Franklin Roosevelt
92504 Rueil-Malmaison Cedex
France
Tel: +33 (0) 1 41 29 80 00
Fax: +33 (0) 1 47 14 07 47

International Division

for Africa - South America -
Asia - Caribbean - India -
Middle East - Pacific - World
Trade Center - Europolio
5, place Robert Schumann
38050 Grenoble Cedex 9
France
Tel: +33 (0) 4 76 57 60 60
Fax: +33 (0) 4 76 60 63 63

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