Multi-Carrier-System

Flexibility!

The new Multi-Carrier-System makes your production processes significantly more flexible. This configurable transport system can be freely integrated into your existing intralogistics and precisely synchronised with the process. It supplements traditional materials handling solutions exactly where it is needed in the process. The other conveyors remain unchanged. The integrated control concept allows control of the transport motions and motion control functions and the coordination of additional machine modules. The result is maximum machine flexibility.

**Highlights**

- Highly flexible: infeed and outfeed of the carriers without additional transfer couplings
- Freely customisable acceleration, speed and grouping
- Easily integrated into existing intralogistics
- Synchronous movement of multiple carriers
- Cam disc mode and movement synchronised with the process
- 1 controller, even with additional machine modules
- Dynamic and fast, even with large loads

**Customisable configuration**
The basic mechanical system is modular, allowing you to adapt it easily to the requirements of your machines and applications. You can incorporate it perfectly into your existing materials handling and logistics solutions.

**Flexible transport**
The carriers can be used without any restrictions; options include free infeed and outfeed of the carriers, and mixing different carriers and product configurations on a single system. The motion profile of every carrier in the Multi-Carrier-System can be set separately.

**High productivity**
The fast Multi-Carrier-System accelerates smoothly without jerks and positions the carriers with extreme precision. Shorter retooling times, virtually seamless format changeover and reduced maintenance costs increase the utilisation of your system.

**High-performance controller**
The Siemens controller integrates motion control tasks for the entire system. In addition to motion control of the transport system, it can coordinate motion with other servo-driven machine modules, reducing the number of interfaces considerably.
At a glance: system components and their potential

**Basic profile**
- Standardised mounting interfaces for the motors
- Holds the roller track and the optional external displacement encoder

**Roller track**
- Is glued seamlessly onto the pre-assembled conveyor structure for smooth rolling
- Stainless steel track for low wear, good resistance to corrosion and easy cleaning

**Motors**
- Powerful motor in several variants for optimum machine design
- Standardised mounting interfaces
- IP65 protection or higher on request, easy to clean

**Carriers**
- Directly transport the product on the carrier
- No motor, no cables, no active electronics
- With magnet for position sensing
- Mechanical interface for application-specific holders and adapters
- Plastic-sheathed track rollers and their bearings ensure jerk-free and low-vibration movement

**SINAMICS drive system**
- Modular drive system for machinery and plant construction
- Suitable for single-axis or multi-axis applications
- Facilitates modular and flexible machine concepts
SIMOTION motion control system
• Scalable, modular motion control system for highly dynamic applications
• SIMOTION easyProject project generator for creating a loadable and executable project in just a few mouse clicks
• SIMOTION SCOUT for integrated and seamless engineering across the entire system
• Application-oriented hardware platforms: PC-based or drive-based

Closed-loop and open-loop sections
• Sections with closed-loop control or open-loop control can be combined as required
• This option can be adapted or expanded at any time

Infeed and outfeed of the carriers without additional transfer couplings
• The carriers stop at the transfer point to the traditional materials handling system or existing intralogistics
• Free transfer without mechanical coupling of the systems

Integration into existing intralogistics
• Simple connection to and use of the existing materials handling systems
• Inexpensive linking to other system and production modules
• Optional carrier sensing via RFID for optimised logistics design

Circulating system
• Fixed carriers are conveyed via the internal transport system from one side of the installation to the other
• Transport via the circulating system underneath the Multi-Carrier-System
• Carriers can be conveyed empty or fitted with a specific product fixture
Basic types of motion in the Multi-Carrier-System

Unrestricted possibilities: the movement of a carrier

Every carrier can be moved freely and with its own feed force on the Multi-Carrier-System. It can be freely positioned, accelerated, braked, and synchronised with individual process steps in the application. In addition to this absolute positioning of an individual carrier, it is also possible to move and position multiple carriers relative to one another without the risk of collision.

Simple and limitless: synchronous movement of multiple carriers

In the Multi-Carrier-System, you can group an unlimited number of carriers and move them synchronously. You can bring together any number of carriers with different speeds while the process is running and can create a motion profile which is just as customisable as for individual carriers. All carriers in the group are moved at the same time with fixed distances between them – with the same motion profile for position, acceleration and speed. When the task is finished, the group can be split up and separated or regrouped.

Force definition possible: motion with constant force

Every carrier can be moved with a defined constant force, independent of the motion profile. This allows a “clamping force” to be built up between a series of two carriers, which remains constant regardless of speed or acceleration.

A further feature is movement with force limitation.

How propulsion works in the Multi-Carrier-System

When energised, the electric windings of the motor (stator) generate a moving magnetic field. The carrier (the motor’s rotor) with its permanent magnets is pulled along with the linear movement of the magnetic field. In this process, there is a direct relationship between current intensity, magnetic field and the feed force generated.

Closed-loop and open-loop operation

- Closed-loop and open-loop sections can be combined as required
- Closed-loop sections provide greater dynamic response, force and precision
- Open-loop sections do not need an additional measuring system, thereby reducing costs, especially for long sections
Sturdy standard carrier for direct transport of the product

The permanent magnets in the carrier together with the motors generate the propulsive forces. The carrier is designed so that it can be placed on the system or taken off it at any point. That allows additional carriers to be added easily at any time and unused carriers to be removed from the system – without the need for tools or reconfiguring the system. The magnet on the side for position sensing and the external absolute displacement encoder make closed-loop operation possible.

The mechanism of the transport system ...

... is comprised of a motor, a basic profile and a roller track. The powerful motors together with the permanent magnets in the carrier provide the feed force. Different motor variants in a range of lengths are available for optimised machine layout and customised motor distribution. They are mounted directly on the guide strips in the machine frame, making replacement very easy when required, as there is no need to dismantle the entire section. Seamless assembly of the motors means the carriers move completely jerk-free.

System components in detail
Overview of controllers for motion control

SIMOTION – the scalable motion control system for any requirements

With SIMOTION even the most complex machines can be automated highly efficiently. This motion control system offers an abundance of tools to support the machine over its entire lifecycle. They simplify planning from the development phase onwards and provide valuable diagnostic functions during commissioning.

The modular structure of this motion control system is in keeping with the trend towards modular machine concepts: with just a few modules, many different machine variants can be created and expanded. The SIMOTION software covers the full range of functions. It is all based on an innovative system approach, which ensures maximum flexibility. Motion control, PLC and technology functions are merged in a single system.

• One engineering system for configuration, programming and commissioning
• Motion control, PLC and technology in a single system
• Flexible, dynamic machine solutions
• Short development and commissioning times

SINAMICS S120 – the flexible drive system for advanced motion control applications

The modular SINAMICS S120 servo drive is the modular system for high-performance motion control applications in industrial machinery and plant construction. Highly dynamic single-axis and multi-axis drives, with their extensive range of functions and scalable number of axes, can handle virtually any drive application.

SINAMICS S120 permits the implementation of flexible and modular machine concepts, allowing customer-specific requirements to be swiftly met. Tailored solutions are made possible by a host of compatible components and functions, for example high-performance individual drives and coordinated drives (multi-axis applications) with vector or servo functionality.

With the SINAMICS S120 drive system, users are investing in greater performance, productivity and flexibility.

• Its innovative system architecture and digital communication options make it a perfect basis for modular system and machine designs
• Wide range of control types and drive-related technology functions
• Integrated safety functions

The network structure of the Multi-Carrier-System
Simple implementation of the transport system through efficient engineering

SIMOTION SCOUT – one engineering system for all tasks

The SCOUT engineering system provides assistance every step of the way, making engineering simple and efficient. SCOUT is the common framework for all the tools in the engineering system.

Just one system is used to engineer the motion control functions, PLC and technology functions and the drives. Configuring, programming, testing and commissioning – everything can be done with a graphical interface from one workbench. With its intelligent user navigation, context-sensitive help function and automatic consistency check, SIMOTION significantly simplifies motion control programming.

Further, all of the tools associated with SCOUT are completely integrated into the user interface to make engineering even more efficient.

SIMOTION easyProject project generator – for efficient automation

The SIMOTION easyProject project generator makes engineering even complex motion control projects even simpler and more efficient. Its largely automated process guides the user to a smoothly running application, ideally without any programming. That enables machine builders to cut their production costs and time to market significantly, making them more competitive on the world stage.

Modular software … … with optimum hardware

- Line control
- Base program Multi-Carrier System
- Drive-integrated transition control ("Open Architecture")
- User-specific program section
- Simplification with a standard application for MCS with "zone concept"
- Freely programmable by the user
- Base program as "background service" for the MCS system
- Representation of a carrier on a virtual axis
- Collision monitoring
- Following-area monitoring based on the actual position value
- Variant as library with know-how protection
- Implementation of all segment transitions - also cross-controller
- Switching of the closed/open-loop control modes
- Basic safety functions (STO, SS1) can be used already
- Minimum collision monitoring

Designed for maximum flexibility: the Multi-Carrier-System

The Multi-Carrier-System gives machine builders a whole new kind of flexibility. This innovative system solution makes production processes more flexible inside the machine, as well as synchronised with the overall process. The flexible transport system can be adapted very simply and quickly to different formats, sizes and types of products, and also to seasonal demand. At the same time, it is an important, forward-looking step towards the possible modularisation of machines and complete production plants.

Simple implementation, optimum combination
• Existing intralogistics retained
• Seamless integration
• Efficient engineering
• Proven control platform
• Complete synchronisation of transport and motion control for continuous production processes

Maximum productivity is a question of ambition
Do you share this attitude? We will be glad to help you achieve this goal – through our four outstanding qualities:
• Security • Efficiency • Simplicity • Competency

We are the engineers of productivity.

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