Dematic GmbH uses drives with integrated oscillation damping

Software expansion in the drive system significantly improves the performance of storage and retrieval machines.

In order to provide users with a specific value-added, Siemens has developed an electronic oscillation damping function for its modular Sinamics S120 inverter system. Dematic GmbH (Offenbach) is the world’s leading supplier of intralogistics and logistical automation, and was involved in the development at an early stage. This oscillation damping function is predestined for use in the widest range of Dematic storage and retrieval machines.

**Benefit from oscillation damping**

The main benefit of the software solution VIBX (stands for VIBration EXtinction) – implemented as OA (Open Architecture) application – is the reduction of mast oscillation of storage and retrieval machines when accelerating and braking. Based on the oscillation damping function, it has been clearly proven that the mast comes to a standstill in a shorter time, so that the load handling unit can enter the rack earlier and remove the goods. This reduces the average cycle time, which means that the operator can move more goods in a shorter period of time.

New storage and retrieval machines equipped with the oscillation damping function are subject to lower mechanical loads and stresses, and can be designed to be less stiff and lighter. The material is subject to lower stresses, which is reflected in the maintenance intensity as well as the service life. The system operates far smoother, extends previous limits and allows higher mast heights to be achieved, i.e. it allows the storage capacity to be expanded. The oscillation damping function has a positive impact on the dynamic performance, so that the target position can be found far faster and can be maintained more precisely. This means that operating companies certainly benefit from this innovative function.
Value-added without additional cost

The function involves a pure software solution, an expansion of the basic positioning module EPos in the CU320-2 Control Unit of the Sinamics S120 inverter system. This does not require any additional sensors or actuators, the storage and retrieval machine does not require any mechanical modifications.

The software is loaded into the firmware of the Sinamics Control Unit. It is simply activated by just parameterizing the natural frequency and the damping; in fact, the preset damping value generally does not have to be changed. The relevant natural frequency can be determined using the trace function integrated in the Starter commissioning tool by recording the speed and torque actual values with respect to time. This value is then transferred into the drive system. Here, the ViBX acts as setpoint filter and ensures fast motion with low associated jerk and oscillation when the storage and retrieval machine accelerates and brakes.

Field proven

Together with Dematic GmbH, the optional functions were intensively tested and checked out on a real system. Jörg Cavelius, Head of development storage and retrieval machines for Dematic:

“The ViBX is also predestined for use on our high-speed storage and retrieval machines for automatic small part warehouses belonging to the Rapid Store ML series. They have travel velocities of up to 6 m/s and acceleration rates of up to 5 m/s² in the main travel direction. This makes them presently the fastest of their class. We will equip all of the new Miniload systems with this oscillation damping function.” Pallet storage systems for heavier loads is another application area. “Also in this class, we see that cycle times can be significantly improved based on this oscillation damping function. Not only this, we can also reduce the mechanical design costs of our storage and retrieval machines and logistics systems.”

Based on ViBX in Sinamics, cycle times can be significantly reduced and the throughput boosted by about 5 percent.

Advantages of the Sinamics oscillation damping function:

• Shorter cycle times
• Throughput
• No additional hardware
• No mechanical modifications
• Simple to retrofit
• Operation with low stress on the mechanical system

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