



## Synchronous motor combined with compact amplifier – a perfect match!

By Dieter Uhl, Sales Engineer at WITTENSTEIN cyber motor GmbH (Igersheim), and Siegfried Wallauer, Product Manager at WITTENSTEIN motion control GmbH (Igersheim)

**Two top players in an unbeatable doubles team – they'd win hands down in a table-tennis tournament and for WITTENSTEIN, too, they're an ideal tactic. The new, compact "simco drive" servo amplifiers and the innovative "cyber dynamic line" family of synchronous motors complement one another perfectly when it comes to specialized solutions for complex drive tasks.**

The "simco drive" servo amplifier facilitates smart actuator solutions and distributed integration concepts. High IP65 protection, space-saving installation with reduced wiring, simple operation and customizable communication options – for example, for real-time capable fieldbuses – are just a few of its many hallmarks. The new brushless DC motors in the "cyber dynamic line" are three-phase permanent magnet synchronous motors for performance ranges between 25 and 335 watts. A series of advanced and optimized features – chiefly linked to dynamics and torque – creates new opportunities for machine design. Together, simco drive and cyber dynamic line make a perfect match – and the ideal actuator solution for precise traversing and positioning tasks at high speeds, for instance in the machine tool, electronics and packaging industries, robotics and handling systems or novel applications like heat-sensitive measuring devices.

### Synergies at WITTENSTEIN add up to a perfect match

With around 1500 employees worldwide and sales of €233 million in the 2011/12 fiscal year, WITTENSTEIN AG enjoys an impeccable reputation for innovation, precision and excellence in the field of mechatronic drive technology – not just in Germany but internationally. The group comprises eight pacesetting Business Units with separate subsidiaries, including WITTENSTEIN cyber motor GmbH and WITTENSTEIN motion control GmbH. The "perfect match" project combines the expertise of these two strong BUs.

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High-tech products made by **WITTENSTEIN** fly into space and win Formula One races. Intelligent drive systems – from the world's smallest high-performance servo drive to the latest state of the art in medical technology – are developed, produced and marketed by a team of around 1.400 employees. With a blend of dedication and enthusiasm, we set benchmarks – every day – worldwide.



A perfect match: the new "simco drive" servo amplifier from WITTENSTEIN motion control and the "cyber<sup>®</sup> dynamic line" family of synchronous motors from WITTENSTEIN cyber motor

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WITTENSTEIN cyber motor specializes in user friendly solutions featuring highly dynamic, permanently excited servo motors and drive systems while WITTENSTEIN motion control develops and markets rotary and linear servo systems as integrated mechatronic drive solutions.

### **simco drive: smart servo amplifier for distributed integration concepts**

The "simco drive" servo amplifier was specially developed by WITTENSTEIN motion control for electronically commutated (EC) servo motors with up to 500 W continuous power and 1 kW peak power over five seconds. It offers very high-resolution current control (up to 16 bit) in measuring applications as well as fast current sensing (less than 8  $\mu$ s) – ideal preconditions for high-precision torque control and high dynamics in the current control loop. The amplifier is equally suited for autonomous positioning with definable trajectories and motion block tables or for incorporation in a closed control loop with setpoint communication in real time over an EtherCat bus. A version with a CANopen interface can also be supplied to permit fieldbus integration – with a choice between ENDAT 2.2, BiSS C, incremental encoder or resolver for the encoder interfaces. The STO (Safe Torque Off) option provides integrated safety functions in accordance with IEC 61508.

Designed with IP65 protection, the simco drive servo amplifier can be installed in the field at distributed locations, i.e. directly adjacent to the actuators. This not only means far less wiring compared to centrally arranged amplifiers; it also allows the entire actuator solution to be flexibly integrated into the architecture of a wide range of machines. The operator is guided by an intuitive graphical user interface whenever the machine is started up, diagnosed or serviced, enabling condition monitoring or integration and maintenance work to be completed very efficiently in minimal time – especially as an event logger with a real-time clock tags all errors or events with a date and time stamp. Failures or parameter changes can be easily reconstructed.

### **cyber dynamic line: synchronous motors create new opportunities**

"cyber dynamic line" is the name of a new motor family in an attractive, elegant design that enlarges the WITTENSTEIN cyber

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motor portfolio of powerful synchronous motors. The motors are offered in four sizes with a 17, 22, 32 or 40 mm diameter and are suitable for performance ranges between 25 and 335 watts. All cyber dynamic motors unite the compact, robust standard encoder type with 1024 increments and an open BiSS interface in a rugged, one-piece stainless steel housing with easy-to-clean surfaces. They feature a plug connector at the rear, which avoids the huge costs that are often incurred in the event of a fault if they are connected with a cable end. There is no longer any need to replace the whole motor if the cable is damaged and a motor failure does not automatically mean rewiring.

This synchronous motor series creates multiple new opportunities for machine design with a set of advanced and innovative features. Amongst other things, the cyber dynamic line is ideal for applications involving high acceleration or short motions with frequent changes of speed, as is typically the case with pick & place systems. Thanks to the cyber dynamic line's high dynamic factor, which is unmatched in this size class, the machines in which these motors are installed achieve higher throughputs and cycle rates. The excellent ratio of high torques to low motor weight means there is less mass to be accelerated and braked in moving axes and machine throughput is raised still further. The optimized torque / weight ratio of the cyber dynamic line and the high efficiency resulting from its optimal use of energy are moreover ideal for battery powered and mobile devices because the operating cycles between two charging processes are now considerably longer – with positive repercussions for availability. The high torque constant is another advantage of all cyber dynamic motors. It paves the way for smaller cable cross-sections and more compact servo controllers – saving space, weight and money. The high torque at low speeds not only gives these brushless DC motors a higher degree of control stiffness; it also makes them quieter and more durable, so that they can also be used as direct drives.

### **A perfect match: the ideal doubles team for machine builders, integrators and end customers**

The features of the simco drive smart servo amplifier and the cyber dynamic line of synchronous motors match together like the pieces of a jigsaw puzzle, providing a great starting point for innovative actuator solutions with high performance potential. One the one hand, WITTENSTEIN's triple principles of Security, Intelligence (in the form of functionality) and Resource efficiency are extensively

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integrated into the product development process at an early stage. At the same time, the product strategy takes account of four key technological trends – Miniaturization, Integration, Network and Intelligence – for instance with automatic interface detection as a basis for product development. simco drive and the cyber dynamic line share the same development philosophy, with important benefits for machine builders, integrators and end users. The fact that the motor and controller are both available from one supplier results in technically optimized solutions – with no interface risks. The elimination of the parameterization step cuts the time for commissioning. The one-cable concept adopted for the amplifier-motor connection guarantees fast, economical wiring. Both components were incidentally also designed for use in adverse environmental conditions – which they withstand without any problems. Their functional surfaces are quick and easy to clean – a crucial argument in industries like textiles, paper and packaging.

The performance of the servo amplifier is perfectly matched to the performance potential of the synchronous motors, thanks not least to its fast current control and high current resolution. Maximum dynamics are assured whatever the application – and the diversity on offer is enormous. The "ideal doubles team" makes a competitive alternative in several common market segments. Short-stroke axes or side-by-side motors with small pitches in packaging machines are two conceivable examples along with component placement or wire bonding in electronics production. simco drive and the cyber dynamic line make just as perfect a match as a drive solution for needles and cutters in the textile and paper industries as they do in pick & place applications or on weight-sensitive robotic and automation axes. Measuring applications like heat-sensitive measuring devices also stand to profit because the high efficiency of the motors in the cyber dynamic line goes hand in hand with dramatically reduced heat input and the simco drive servo amplifier delivers the required power.

The simco drive servo amplifier and the brushless DC motors in the cyber dynamic line together form the backbone of high-performance drive solutions in the ranges and applications described here. The combination of innovative technologies and features to facilitate future expansion – plus sizing, planning and functional implementation all from one supplier – guarantees optimal investment security.

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## Photos

**Photo 1:** A perfect match: the new "simco drive" servo amplifier from WITTENSTEIN motion control and the "cyber dynamic line" family of synchronous motors from WITTENSTEIN cyber motor.

**Photo 2:** The "simco drive" servo amplifier was specially developed by WITTENSTEIN motion control for electronically commutated (EC) servo motors with up to 500 W continuous power and 1 kW peak power.

**Photo 3:** Designed with IP65 protection, the "simco drive" servo amplifier can be installed in the field at distributed locations, i.e. directly adjacent to the actuators.

**Photo 4:** cyber dynamic line is a new family of synchronous motors with a 17, 22, 32 or 40 mm diameter that enlarges the WITTENSTEIN cyber motor portfolio of three-phase permanent magnet synchronous motors.

**Photo 5:** Thanks to the high dynamic factor of the synchronous motors in the cyber dynamic line, higher acceleration values can be realized, leading to correspondingly higher machine throughputs and cycle rates.

**Figs. 6 and 7:** Authors of the report: Dieter Uhl, Sales Engineer at WITTENSTEIN cyber motor GmbH (Igersheim), and Siegfried Wallauer, Product Manager at WITTENSTEIN motion control GmbH (Igersheim)

Texts and photographs in printable quality can be downloaded from <http://www.wittenstein.de/presse.html>.

### WITTENSTEIN AG – being one with the future

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