

Direct Drive Technology Prints a Better Picture

Co-engineering reduces powertrain component count and delivers optimized performance with increased accuracy for glass finishing manufacturer



Cocktail glasses are a popular medium for logo and advertising placement in the screen printing process. Tecno5 is a global leader in the design and manufacture of machines and accessories for multicolor printing on glass items. Established in 1986, Tecno5 is a growing and expanding company: its export accounts for 90 percent of its total production to over 45 countries worldwide. In its role as a technology innovator within the Cerve group of companies, Tecno5 designs, produces and installs a wide range of machines, from basic 4 color manual machines to fully automatic 8 color machines specialized in direct screen printing on all kinds of shaped glass container. AS

Original, colorful, elegant and branding adept: silk screen printed glass is highly attractive, reinforces brand recognition and provides excellent point of sale purchase influence. Beverage companies in particular have discovered the various possibilities that screen print finished cylindrical, conical and curved-formed glass products can provide. Printed glass finishing applications also extend to glass promotional objects and containers used in perfumery which can be attractively decorated with brand logos and marque labeling. Given the ever-increasing pressure for attractive designs and higher quality standards along with greater demand for increased productivity, the



Appreciative of working with Kollmorgen, right from the early stages of development: Tecno5's CEO Michele Tirelli and Development Manager Rucco Paolo (right).

motion control requirements for these and other printing processes have become more precise, faster, more flexible and above all much more coordinated. In Italy, the Parma based Tecno5 company has chosen Kollmorgen as its co-engineering partner for servo and machine control technology on its latest generation RX-9011 automatic high-speed screen printing machine to address these challenges.

The innovative machine replaces traditional mechanical powertrain components with several synchronized direct drive servomotor axes. The use of such tightly coordinated multi-axis technology brings engineering specialization at Tecno5 to the forefront, enabling the company to enhance its product proposition to its customers with a number of advantages. "The limination of mechanical coupling elements leads to a dramatic reduction in downtime during product changeover, because fewer components need changing," explains Michele Tirelli, CEO of Tecno5. As well as the leaner electromechanical component count and the ability of electronic motion control to simply calculate machine set-up parameters, other benefits are directly related - such as overall quieter operation and the reduced net mass of the machine components due to lack of power transmission elements. "Thanks to Kollmorgen [direct drive technology](#), our new RX-9011 printer runs much faster with increased accuracy which is due in part to reduced machine vibration" says Rucco Paolo, Development Manager. For the design of the RX-9011, Tecno5 has utilized Kollmorgen rotary direct drive servomotors for positioning the glassware for the translation of the print screen. The motors are supplied complete with servo drives and motion controls.

Power and dynamism without compromise

The use of direct drive servo technology represents only one of the advantage points for the optimization of the screen printing machine which Kollmorgen worked on from its earliest stages of development. The Kollmorgen [Cartridge® DDR series torque motor](#) provides uncompromising power and dynamic performance. The special electromagnetic direct drive design increases the torque density by up to 50 percent compared to conventional servomotors of comparable size. The Cartridge DDR torque motor directly drives the positioning shaft for glasses or bottles, rotating their precise position for multiple colors that the Tecno5 screen printing machine can apply. "The first machines we built deliver such a high dynamic performance that we can print faster. Secondly, we have no gears or tooling to change to

suit the component being printed, so machine set-up is really fast. And thirdly, with the enhanced torque and speed capability we now have, this leads to excellent control accuracy and exceptional printed image quality,” remarks Tirelli. “It is the intention and motivation of Tecno5 to continue to develop our print technology around Kollmorgen’s rotary direct drive servomotors.”



Torquemotoren der Reihe Cartridge DDR sind direkt mit der Achse für die Gläserpositionierung verbunden. Die Vorteile: Kein Getriebe, weniger Spiel, mehr Platz.

Faster installation

Another benefit of the new refined machine design centers on the elimination of the bearings and couplings for the UL certified Cartridge DDR motors which can be mounted and ready within half an hour. The motors are simply pushed onto the driven shaft, which is screwed to the machine housing, and centered in position to a defined torque force fit by an internal press fit coupling with integrated screws. “This simple mounting operation



for the direct drive motors also makes service faster, thus increasing the availability of our facilities - making us altogether more competitive. This was a great benefit of working with the Kollmorgen application engineers,” says a satisfied Tirelli. “We live by the progress of systematic development and our authorized system integrators need to follow this direction,” says Paolo. “Against the background of ever shorter product-to-market timescales, especially in the packaging sector, the fast pace of consumer products and their timely appearance increases the pressure on machine builders like us. From the first product ideas to the shelves of the supermarket, the times are getting tighter. For

Tecno5’s RX-9011 screen prints glasses at the rate of 90 per minute, not least because of the integrated direct drive technology.

this reason, OEMs such as Tecno5 are increasingly dependent on creative and reliable co-engineering partners.”

Curves are easily drawn

The high-speed Tecno5 machine can print up to 90 glass pieces per minute with up to eight colors on round, flat and elliptical surfaces. Precise control of linear and rotary axes is taken care of with Kollmorgen

[AKD® series servo controllers](#) with the [Kollmorgen Automation Suite™ \(KAS\)](#) motion control platform generating motion profiles created as electronic cams.

“We can simply produce the profiles and curves in the software program without complex algorithms, and in this way the KAS functions almost like a flexible black box with which we can do anything,” says Paolo. As part



The AKD Servo controller with EtherCAT communication - the compact design makes the cabinets smaller.

of the co-engineering development process, it was decided to site the AKD servo controller drive cabinet directly into the machine with the [servomotors](#) for positioning the glasses pieces connected in a circle and mounted around the central axis inside the machine. This was achieved with standard motors and drives requiring no additional structural or protection adjustments. As the AKD series provides the ultimate in dynamics and control performance, this was realized in a very small volume ensuring that the overall machine size was kept to a minimum. This smart co-engineering design concept also paves the way for motion and machine control solution for other printing processes in space-saving sized cabinets and restricted volumes. The screen printing machine has a total of 27 servo interpolated axes which are tightly synchronized via EtherCAT. Thanks to the Ethernet-based communication, the AKD servo controllers can quickly and easily integrate into any application and with many other open interfaces available, plug- and-play operation is possible across a wide selection of machine control protocols. With the Kollmorgen Automation Suite, Tecno5 provides its customers with the possibility for internet connected service and assistance and remote monitoring of production figures to make its service even more effective.



The HMI displaying a visualization of all plant processes is part of the Kollmorgen nAutomation Suite. Maximiliano Bigliardi, a technician at Tecno5, is enthusiastic about the drive and automation solution.

Outlook

By working with Kollmorgen and using their Kollmorgen Automation Suite system, Tecno5 is working to integrate electronic image processing in its next generation printing machines. A vision system is used to determine the position of the jars and bottles as they enter the machine and then activate servomotor-based visual features in the desired location. This problem is solved today using a mechanical registration method which requires special tooling to snap into the molded grooves in the base of each glass container. The new system permits even less mechanical intervention on the machine and further

speeds up throughput and set-up times. Other developments include servo-assisted controls for screen and squeegee vertical position in gas well as multiple print heads for double cylindrical profiles such as body and neck bottles. “The ability to add these features to our machines is a direct benefit of electronic motion control from Kollmorgen,” notes Tirelli.



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About Kollmorgen

Kollmorgen is a leading provider of integrated automation and drive systems along with corresponding components for machine builders all over the world. With more than 70 years of Motion Control Design and application experience and profound knowledge of constructing standard and special solutions, Kollmorgen supplies solutions time and again that stand out in terms of performance, quality, reliability, and ease of use. As a result customers can achieve a market advantage which is beyond question. For further information please contact think@kollmorgen.com or visit our website www.kollmorgen.com/uk