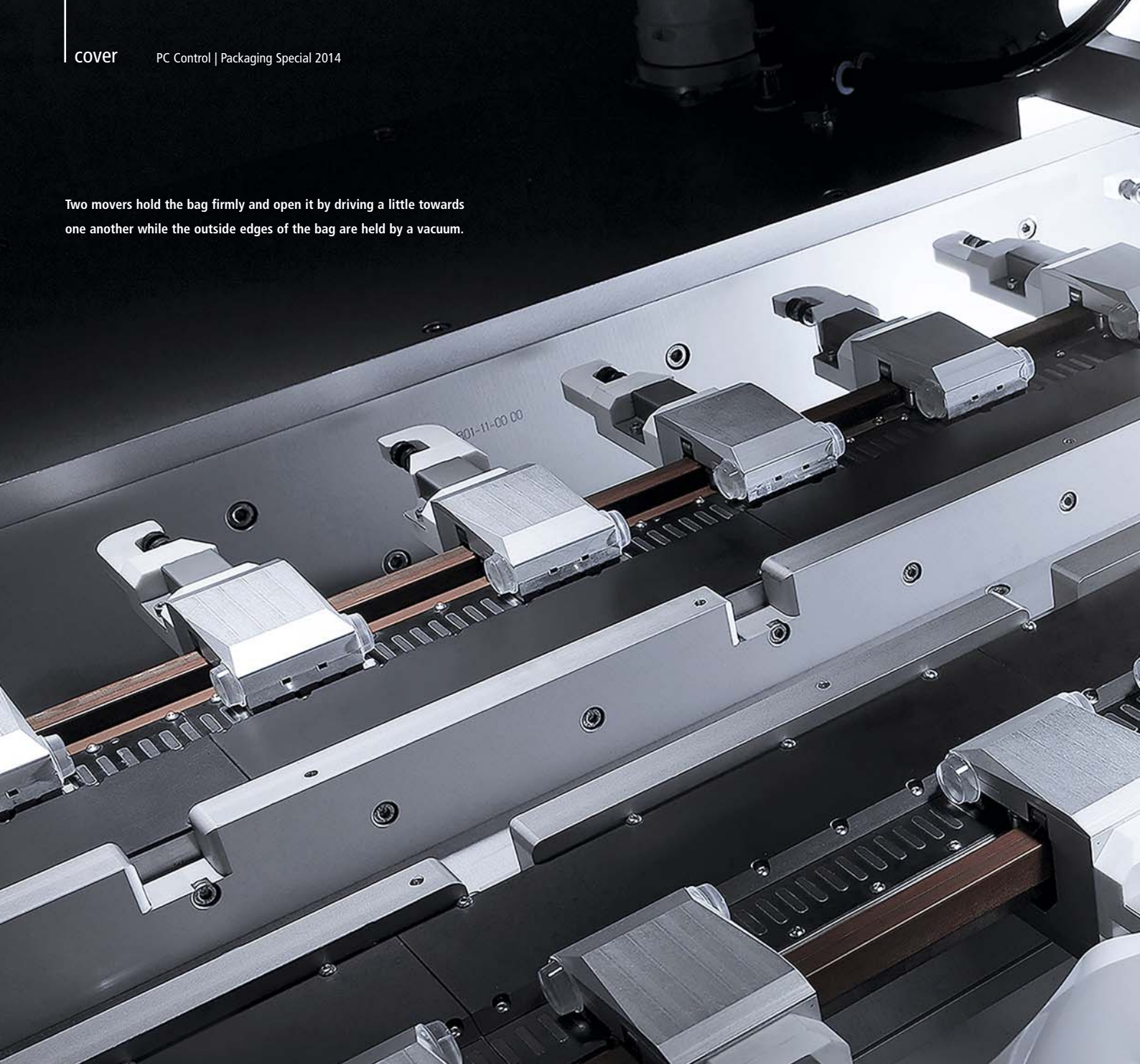


Two movers hold the bag firmly and open it by driving a little towards one another while the outside edges of the bag are held by a vacuum.

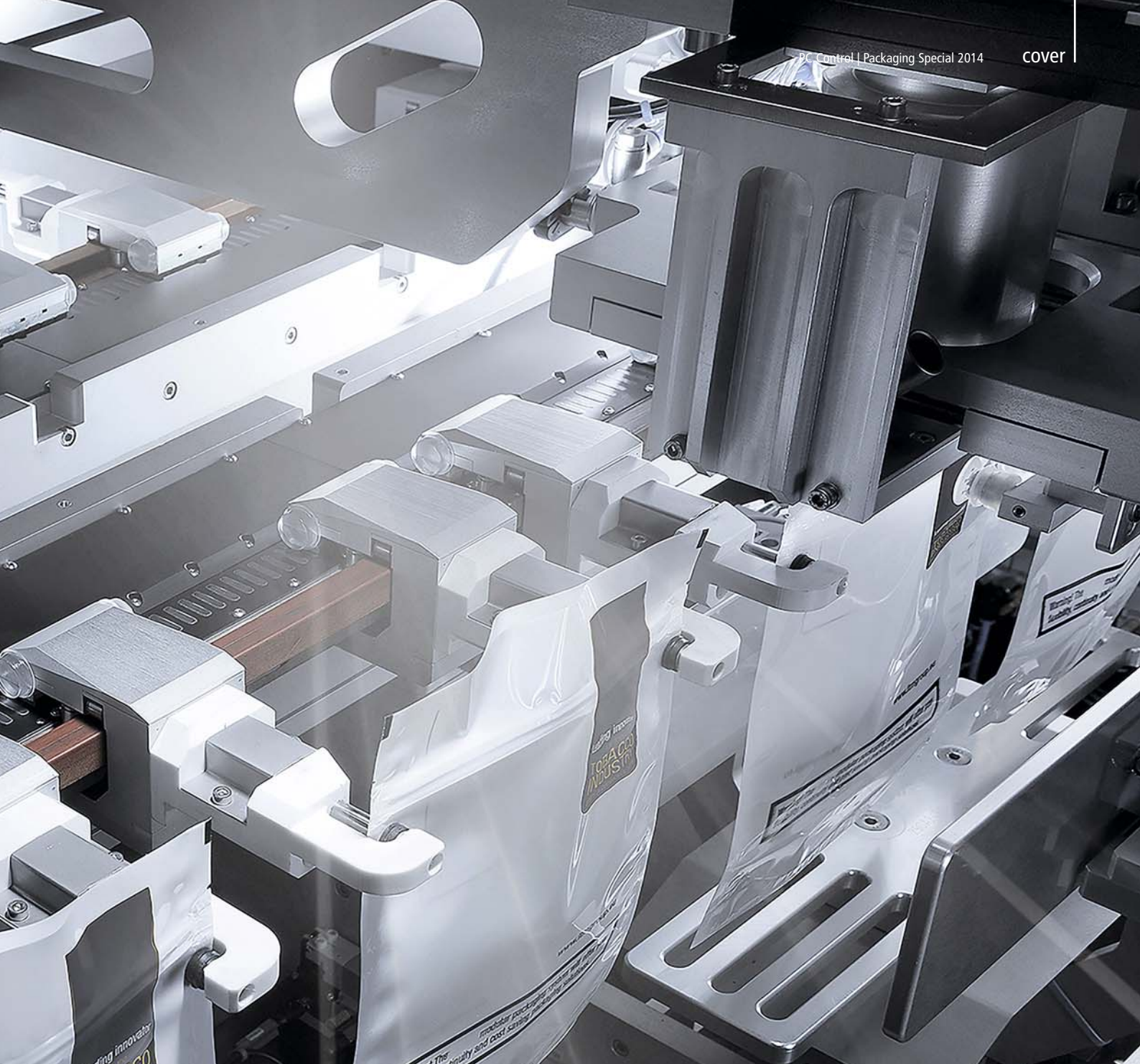


Technical Development Corporation develops one of the first applications on the basis of the eXtended Transport System (XTS)

XTS revolutionizes machine design in the packaging industry

Specializing in machines for the processing and packaging of tobacco, the Dutch company TDC (Technical Development Corporation), has realized a pilot project that leverages the flexibility of the eXtended Transport System (XTS), which is a linear drive solution from Beckhoff: 'Doysis' is a machine for forming, filling and sealing stand-up pouches for tobacco packaging.



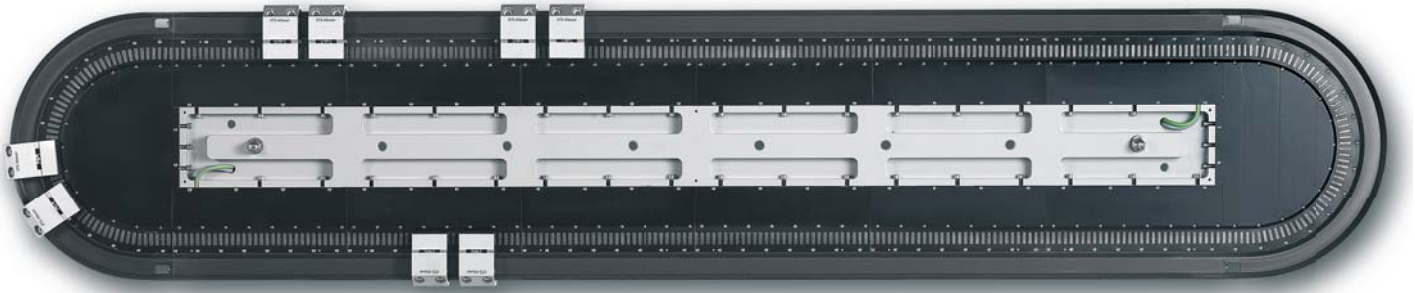


The Doysis packaging line project kicked off in December 2012. That was when TDC received an order from a Polish tobacco manufacturer for the development of a plant to fill tobacco into stand-up pouches – so-called doypacks. The packaging of tobacco is a demanding process, since the natural raw material can vary with regard to dimensions, form, density and bulk weight.

The drive and control system of the Doysis are completely based on standard Beckhoff components: a C6930-0040 Industrial PC with powerful dual-core processor, a Control Panel, EtherCAT I/O terminals, TwinCAT 3 and the XTS linear transport system. The entire machine uses EtherCAT for communication.

Complex production process

At the start of the process, tobacco is weighed outside the filling machine and transported in containers to a pressure chamber, where it is pressed so that the amount to be placed into the bag always has the same size and form. The Doysis production process starts with the manufacturing of the stand-up pouch from plastic film, which is formed into a U-shape, and a zip fastener is attached for reclosing the bag. Subsequently, the sides are sealed together. In the next step the bag goes through a labeler or a text printer, is provided with a notch and cut to size. Afterwards, two XTS movers take each bag and open it by driving a little towards one another while the outside edges of the bag are held by a vacuum. Via a buffer station four bags are placed at the same time under one pressure chamber. These modules de-



The Technical Development Corporation is one of the first companies worldwide to use the eXtended Transport System XTS.

veloped by TDC place the quantity of tobacco, which has been compressed into a small package, into the bags. After filling and buffering again, the bags are shaken, blown clean with ionized air and sealed. Afterwards a hole is punched in the bag for hanging on retail fixtures and an adhesive layer is applied for the revenue (tax) stamp. The presence of the revenue stamp and its correct position are checked by a vision system. Incorrect product packages are unloaded from the machine; correctly manufactured bags are placed on a conveyor belt and transported further.

XTS: optimum flexibility and minimum installation space

In previous machine generations from TDC the filling process was mechanically driven. The major disadvantage of this was that the process took place according to a set pattern and with a fixed cycle time. The development of the new filling line was based on the concept that it should be as flexible and modular as possible. In the search for a suitable transport system with which the packaging concept for stand-up pouches could be realized, TDC came across the eXtended Transport System XTS. The concept of the XTS, a linear motor that drives in a circle with separately controllable, flexible movers, perfectly suited the idea that TDC had in mind for its new machine: in this way, for example, it is possible to attach several pressure chambers or process modules along the line so that its capacity can be increased.

One of the big advantages of the XTS is that the rigid clocking of the production process can be dispensed with. In order to achieve a high production output with a mechanical solution, many stations would have to be implemented twice or more. By using XTS, the number of stations can be reduced considerably. This leads not only to a cost savings with regard to the required hardware, but it also means that there are fewer mechanical components to be maintained.

When changing the product or bag format, the machine also no longer needs to be mechanically retooled; instead, the settings for the movers and

the process sequence will simply be changed in the software, which requires much less effort. Thanks to the individual programming of the movers, the bags can be positioned, filled and handled individually. In principle, the manufacturing of various compositions and filling weights of the tobacco in different sequences, i.e. a lot size of one, is possible with XTS. In the future it will also be possible to move the filling stations together with the movers according to the 'flying saw' principle, resulting in a continuous flow of product.

Over and above that, the compact XTS drive system creates dramatic space savings: a conventional machine that does what the Doysis does would be considerably larger, since virtually all stations would have to be implemented several times. With the reduced footprint of the machine, enabled by the XTS, the end user gains a clear cost benefit.

Efficient engineering with TwinCAT

In terms of software, the Doysis is a sophisticated project: the application software was created using object oriented programming in the engineering environment of TwinCAT 3.1. The XTS is structured on the software side as an object, i.e. each mover is regarded as a servomotor. TwinCAT contains all drivers and routines for every mechanical, magnetic and electrical implementation. The software was developed by the Dutch software specialists Gain Automation Technology who had already carried out several TwinCAT pilot projects and had experience with IEC 61131-3 programming. An important advantage of TwinCAT 3 is that all the processor cores of a CPU can be fully utilized, which is of great importance for the performance of the machine.

All challenges overcome in record time

TDC is pleased with the results in every respect: thanks to close cooperation between TDC, Gain and Beckhoff, it was possible to implement the entire machine, from the concept to delivery – i.e. development,



The Doysis filling line is very complex, but was completed in just eight months. Thanks to its modular and flexible design it is also suitable for other industries in addition to the tobacco industry.

engineering, construction of the machine and the writing of the software – in just eight months.

The Doysis was put into operation by the customer in September 2013 with 32 movers. The machine fills 50 bags per minute. It is planned to increase that to 60 bags per minute, which has already been accomplished with the second filling line, which is standing at the ready in the TDC Innovation Center in Kampen for further development. TDC assumes the machine, thanks to its flexible and modular structure, can be marketed in other industries and packaging applications, too.

Technical Development Corporation (TDC)

The Technical Development Corporation (TDC) was originally based in Switzerland, but was taken over in 1995 by the Dutch company SCM (Sluis Cigar Machinery). The main line of business of this company at that time was the production of tobacco weighing equipment and filling lines. When TDC's head office was relocated to Kampen in the Netherlands, all activities in the 'hand-rolled tobacco' field were concentrated in this group company. TDC's product range extends from the individual machine module up to a complete production line for the tobacco industry.

Further Information:

www.itmgroup.eu

www.gain.nl

www.beckhoff.nl