

Case story | VLT® Solutions

# Danfoss ProfiNet's **successful application** in the **Chinese tobacco industry**

**The electronic control system for the prime line at the Ulanhot cigarette factory includes over 130 VLT® drives equipped with ProfiNet cards. The stability and reliability of the ProfiNet system is a significant improvement compared with the original system.**

Ulanhot cigarette factory, founded in 1982, is located in China's Inner Mongolia Autonomous Region. Their products include flue-cured tobacco, cigars and hybrid types of cigarettes. In 2010, a new plant went into operation, and production capacity increased to 30 million cases per year.

The electronic control system for the prime line was provided by Qin-huangdao Machinery Manufacturing Co.Ltd and included over 130 VLT® AutomationDrive FC302 equipped with VLT® ProfiNet MCA120 option cards.

## **Prime line technology**

Cigarette production consists primarily of the prime line followed by cigarette making and packaging. The prime line holds the key to ensuring the quality of the cigarettes, but is also the most complex, employing the greatest variety of equipment. The automatic control system of the prime line is based on leaf line, stem line, aroma feeding and other technology segments. In the whole cigarette

production line, prime line technology offers the best opportunity for automation.

Before using Danfoss VLT® ProfiNet, the automation system mainly used Profibus and the Profibus connected drives played an important role in the prime line distributed control system, but the obvious disadvantage was that the bus topology was too inflexible, due to hardware limitations, making it difficult to expand into a star or tree structure. Profibus merely achieves the integration of the underlying I/O devices, but cannot be directly linked with the factory IT network, thus limiting management integration.



**>80%**

**market share**

of Danfoss VLT Drives in the Chinese tobacco industry and more than 2,500 VLT® ProfiNet cards installed.

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**VLT®**  
THE REAL DRIVE



### Qinhuangdao Tobacco Machinery Company

was set up in 1967 and specializes in the design and manufacture of large tobacco equipment used in prime line, threshing & redrying and carbon dioxide expansion. It has so far supplied cigarette machinery and equipment to 126 cigarette plants in China and, since 2004, has also exported tobacco machinery to Vietnam, South Africa, Japan, Taiwan, Turkey, Hong Kong, Paraguay and others.

ProfiNet achieves standardization and simplification; each VLT® drive has a separate IP address, so the data of underlying devices can be transmitted across the Ethernet. The system's data processing capabilities have been strengthened, simplifying overall operation and also making the operators' tasks easy and convenient. In addition, managers are able to access much more data, thereby increasing the prime line efficiency.

### Proven reliability

Qinhuangdao Machinery Manufacturing Co.Ltd chose Danfoss VLT® AutomationDrive frequency converters since Danfoss is one of the few converter manufacturers offering ProfiNet, EtherNet / IP and Modbus TCP communication interfaces. The ProfiNet option offers two industrial-grade RJ45 interfaces, so star and tree topology networks can be built easily. The network can be composed of redundant, secure and reliable system design which allows the customer peace of mind. The VLT® drives also offer a 24V DC power supply option link external DC power supply, so that the VLT® ProfiNet can continue to work on power off.

Proven reliability is also critical and Danfoss has 40 years of production history in frequency converters and enjoys a high reputation in the Chinese tobacco industry where Danfoss VLT Drives hold greater than 80% market share.

To date a broad range of big tobacco companies have adopted the Danfoss VLT® ProfiNet technology in the prime lines at their cigarette factories – a total of over 2,500 installed Danfoss VLT® ProfiNet cards.

### Star-structure automation system

Using Danfoss VLT® ProfiNet, the Siemens PLC and SCALANCE switch form a star network with the frequency converters, each drive working independently without affecting other nodes' communication. The star or tree topology ensures that all nodes are independent and free from the influence of other bus segments, the whole prime line automation network being divided into management and equipment levels. Management is primarily the implementation of management functions, with the device layer being the implementation of the device control function. The ProfiNet network is a fiber optic ring network and its main advantage is that at any point where the network fails, the rest of the network can still communicate correctly. The new prime line consists of five sections: leaf processing, leaf silk processing, stem processing, blending processing, and the wind section. The ProfiNet network of each process section is a main node. Using

Ethernet switches, SCALANCE (X408) forms a star topology connected with the PLC S7-400, the operating station PC677, and SCALANCE (X216), etc. SCALANCE (X216) is also connected to many more sub-stations such as ET200S and the Danfoss VLT® AutomationDrive FC302 frequency converters. The system creates a star-structure automation system of greater reliability and functionality than is possible with Profibus. If one sub-station fails, the other stations remain operational to ensure that each node within the network is independent of each other.

### The Benefits

This has produced a number of benefits. The VLT® drives' proven reliability ensures its continuous operation in a variety of industrial environments throughout the factory. This ProfiNet system has now been in operation for one year and the stability and reliability is a significant improvement compared with the original system.

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