

## Customer Profile



### Industry & Application

- Refrigeration equipment
- Compressor controls

### Location & Web Site

- Milwaukee, WI
- [www.vilter.com](http://www.vilter.com)

## Key Benefits

### Productivity

- 75% reduction in programming time

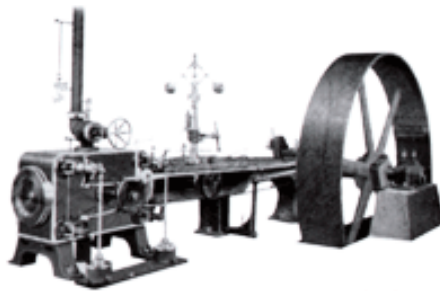
### Flexibility

- Two-day control program update cycle reduced to minutes; end user can change embedded program
- Solution provides *personalization* for specific customers and *verticalization* for specific vertical market applications

### Connectivity

- Windows® CE environment eases connecting various elements such as C++ HMI function, ModBus link, and Think & Do flowcharts

**B**ACK in 1867, Vilter Manufacturing Corporation (originally named “Weisel & Vilter”) began supplying steam engines to Milwaukee industries. With its many breweries, Milwaukee had a big need for mechanical refrigeration. In 1882, Vilter developed a horizontal compressor, ushering in the dawn of industrial refrigeration. When ice was needed it would finally be made by machine rather than Mother Nature. Today, Vilter ushers in the new millennium with their Vission™ micro-controller-based refrigeration compressor unit. The embedded controller uses Think & Do software in a Windows® CE environment to allow field-customizing the controls for specific vertical markets or specific end users. When these modifications are needed, the new Vission™ micro-controller provides this flexibility.



*Corliss Steam Engine*



*Vilter's World Headquarters*

With a history that dates back 130 years, Vilter is known for dependable, high-performance refrigeration. Vilter equipment is used throughout the world, from the smallest cold storage room to huge food processing operations. Products include a complete line of compressors, condensers, heat exchangers, and related equipment to solve any refrigeration challenge. In fact, Vilter is the sole provider of single screw compressors in North America. Single screw compressors are more efficient and have decreased vibration and sound levels compared to their twin-screw counterparts. According to John Kopp, Product Development Engineer from Vilter's R&D Department, “ We have the best single-screw compressor on the worldwide market.”

## More than Cool... The Vission™ Micro-controller

Vilter sets the gold standard on their products by offering industry's longest warranty and delivering user-friendly flexibility with their Vission micro-controller for their single screw compressors. Vilter's Vission micro-controller has been developed in Windows CE utilizing Think and Do Software for user-friendly operation, ease of custom programming and maximum flexibility. It features dual processors providing unmatched reliability. Think and Do software allows for custom programming of all spare I/O points and the touch screen display. Multiple menus are offered, including all setpoints, multiple-level passwords, maintenance functions, an event list and graphical trending, allowing the user to modify compressor operation. Standard languages in the user interface include English, Spanish and French, as well as English or SI units of measure.

## The Need for a Flexible Solution

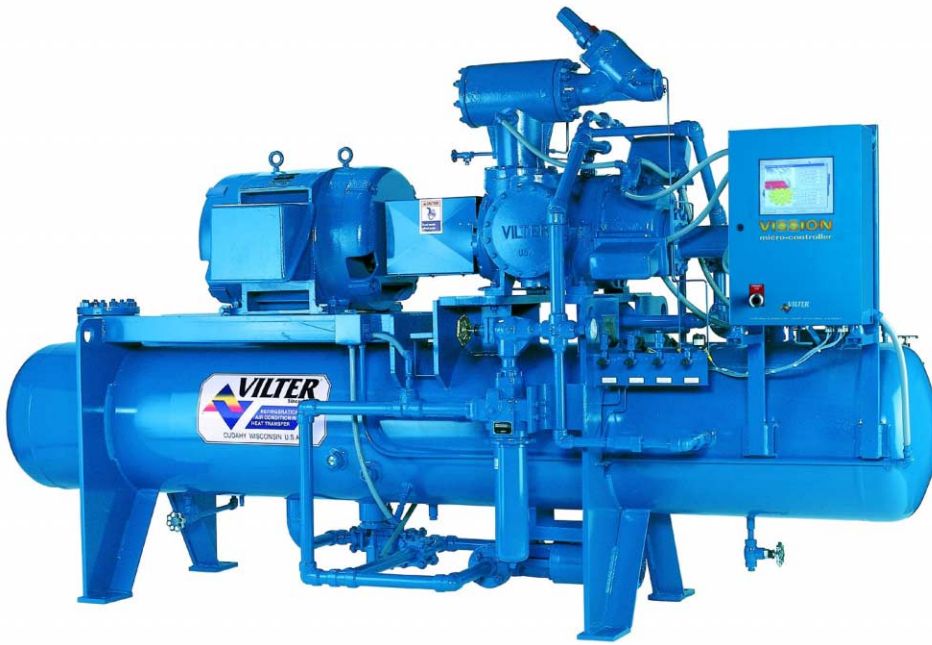
The previous technology used for the compressor control was a dedicated 8-bit controller that directly connected to an alphanumeric keypad. The customer had a stand-alone

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— John Kopp



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*VSS Single-screw compressor with the Vission™ micro-controller*

compressor unit with limited customer interface capability. Kopp explains the flexibility value, “One of our customers wanted to use some spare digital I/O points to control other equipment. It normally took two days to have our factory hard-code the system’s EPROM. With our new Vission micro-controller, the customer can modify the I/O subsystem themselves in just a few minutes using Think & Do Software.” From a 2-day change cycle to just a few minutes! Thus, Vilter’s customers receive the benefits of an embedded controller, but now they can easily refine it to their needs!

### Plug-n-Play Architecture and Tool Set

Vilter’s R&D engineers designed their new generation control architecture with flexibility from the start. They accomplished this by removing the control aspects from the individual compressor’s dedicated analog controller and creating a new Intelligent Analog Module. By removing the control aspects and adding a ModBus communication link to the Intelligent Analog Module, a separate controller could manage the module’s I/O. Vilter wanted to use a readily available integrated tool set such as Think & Do, so that customers or trained technicians could easily modify the Vission micro-controller program.

According to Kopp, “Think & Do delivers the integrated tool set we need. In fact, it took me just *one* week to write the entire control program, or about 25% of the setup time alone of an alternative 3rd-party, pieced-together solution.” From Kopp’s previous experiences it could have easily taken up to four weeks just to get the packages to work together and that estimate does not include the application design time or the support nightmare.

The control project consisted of three basic system functions using Think & Do as the glue to make them work together:

1. Embedded PC platform with Windows CE operating system
2. Communication with Vilter’s intelligent analog module
3. New Human Machine Interface (HMI)

### Choosing the Right Embedded Platform

Kopp recalls, “After visiting the Embedded Systems Conference and the National Industrial Automation Show in Chicago, we looked seriously at using Think & Do Software’s solution with a Windows CE platform.”

Microsoft developed Windows CE for use in small, real-time embedded systems and it is rapidly emerging as the preferred real-time operating system for industrial applications where diskless operation,

small size, and/or very low cost are important considerations.

Vilter chose a commercially available embedded PC from a high-quality OEM single-board computer manufacturer. The embedded platform runs a version of Windows CE built specially for the Vission micro-controller. The Windows CE build incorporates support for the unique features of the Vission micro-controller including the touchscreen interface and the Think & Do Runtime. Windows CE was customized with additional or reconfigured device drivers to support and enhance the PC platform’s standard features. The changes to Windows CE provide a solid foundation for running the Think & Do application and the Vilter HMI.

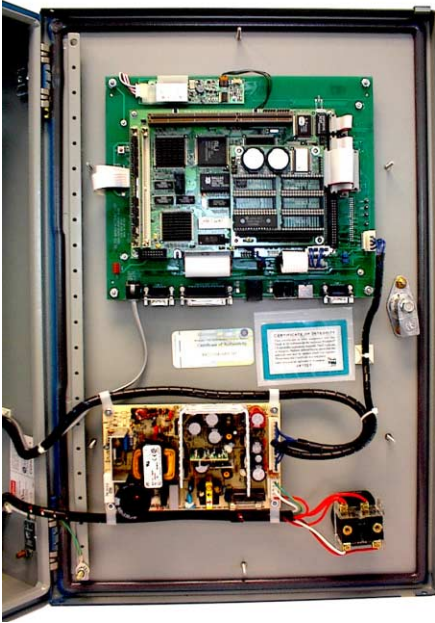
The embedded controller had to communicate with the new Intelligent Analog Module. Its functions include an I/O intelligent subsystem, basic safety controls, and a ModBus communications link. According to Vilter’s Kopp, “Think & Do was responsive to our needs; they added Master capability to their ModBus protocol to allow us to communicate to the new module.” There are approximately 8 temperatures, 8 pressure values, and 48 digital I/O status points that are exchanged four times a second between the Intelligent Analog Module and the Think & Do database.

### The Connectivity of Windows and Think & Do

According to Kopp, “The value of using an embedded PC with a standard operating system is that we used standard development tools such as Visual C++ to write our HMI application. In addition, we are using DDE to exchange data between Think & Do’s database and the HMI.” In the future, Kopp expects to use OPC to pass data.

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*Inside-door view of Vission's embedded controller with Windows® CE and Think & Do*

The HMI provides multiple menus to access data, including all setpoints, multiple-level passwords, maintenance functions, an event list and graphical trending allowing the user to modify operation of the compressor. The Think & Do database saves the operator's inputs and the control application uses these inputs to make control decisions. Using Think & Do, Kopp programmed the control application in one week. The control application glues the system

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*— John Kopp*

together by communicating to the Analog Intelligent Module and interfacing to the HMI application. Basically there are four flowcharts that call 125 subcharts. Subcharts are reusable flowchart control logic that has its own set of parameters and local data items. Subcharts can be “called” by standard flowcharts or other subcharts.

Kopp found Think & Do's flowchart Calculation block easy to use. Kopp also mentions, “The String functions made it simple to communicate between the Think & Do database and the HMI application.”

“Once the programming was completed,” Kopp explains, “debugging the program was easy by using Think & Do's AppTracker. I was able to troubleshoot flowcharts and quickly identify problems.” AppTracker is a multi-paned application debug tool that is designed to give the programmer a clear picture of the whole project. It indicates active flowcharts and active data values. With its effective use of color, the programmer is quickly able to understand I/O and control logic status simulating the manufacturing process using just the software.

### Getting Ready to Deliver

Vilter plans on arming some domestic distributors with Think & Do technical training. Then they can provide technical services to their customers to best utilize the flexibility of the new Vission micro-controllers. Kopp notes, “Some of our most advanced customers can handle this flexibility right now.”

Where will the future be? Kopp responds, “Pending customer feedback, we expect to add more supervisory capability. Actual refrigeration systems have provisions for additional components, which can range from simple to complex with multiple compressor systems. A more complex application example would be if the Vission micro-controller supervised



*Intelligent Analog Module in the main panel has a ModBus interface to the embedded controller with Think & Do*

multiple temperatures.” For example, a shrimp processing plant could have three temperature setpoints — one for cooling down the fresh catch, the second for the processing room temperature and the third for the blast freezer. As Kopp goes on to explain, “With our new architecture using Think & Do, we have an expandable technology base to address more of those supervisory system needs. I'd say the future looks good.”

In summary, Think & Do Software provides great flexibility and advanced control functions for the Vission micro-controller. It also provides the technology base for future Vilter product enhancements.

For more information on how Think & Do can help solve your application, visit our website at [www.thinkndo.com](http://www.thinkndo.com), or call (800) 722-6875.