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Think & Do Featured Applications

A "Cool" Think & Do Software Application

Nestled in a peaceful, quiet corner of the Great Northwest is Techni-Systems, a leading supplier of atmosphere and industrial refrigeration control systems. Techni-Systems has carved out a niche in providing state-of-the-art control solutions to a variety of food industry related clients throughout the northwest. Their extensive customer list includes: Foster Farms, Columbia Colstor, Tree Top, Oregon Freeze Dry and a host of others.

Techni-Systems recently installed three industrial ammonia refrigeration systems utilizing **Think & Do Software**. All three systems were delivered to Washington state customers, each with their own food processing requirements. The refrigeration systems are being used for:

- juice stock for blended products,
- fresh chickens, and
- fresh and frozen beef.

Technical Overview

For Techni-Systems, Industrial Ammonia Refrigeration Systems involve integrated control of the entire refrigeration system. This includes the compressors, condensers, and evaporators. Precise temperature monitoring and control are achieved while at the same time optimizing energy efficiency through:

1. variable speed fan control,
2. wet bulb approach condensing temperature control,
3. auto-suction pressure compressor control,
4. intelligent compressor sequencing, and
5. demand defrost scheduling.

Zone	Probe Number	Temp	Coil	Avg	ID	Fans	Liquid Temp	CoilTD	High Inhibit	Hi Trip	Lo Trip	Refrigeration Status	
Tanks													
Zone A-1	28.7	28.4	30.1	29.4	2.3	82	On	13	5	45	25	0.4 Hrs Since Last Defrost	
Zone A-2	28.8	29.3	30.3	29.6	3.8	63	On	13	5	45	25	0.4 Hrs Since Last Defrost	
Zone B-1	28.3	28.2	30.0	28.9	2.0	80	On	13	5	45	25	0.4 Hrs Since Last Defrost	
Zone B-2	28.3	28.2	31.0	29.7	2.2	80	On	13	5	45	25	0.4 Hrs Since Last Defrost	
Zone C	28.4	28.2	29.4	29.8	1.1	40	On	13	5	45	25	0.4 Hrs Since Last Defrost	
Frozen													
Zone 1	3.2	8.4	-4.3	-4.4	-4.0	6.2	70	On	4.5	5	0	0	0.4 Hrs Since Last Defrost
Zone 2	3.4	8.2	-4.1	-4.4	-4.0	4.8	60	On	4.5	5	0	0	0.4 Hrs Since Last Defrost
Zone 3	3.0	-8.7	-3.7	-4.2	-3.9	4.9	85	On	4.5	5	0	0	0.4 Hrs Since Last Defrost
Zone 4	3.0	-3.9	-3.7	-4.2	-4.6	1.9	43	On	4.5	5	0	0	0.4 Hrs Since Last Defrost
Shipping Dock	38.0	38.0	42.1	41.5	41.5	1.1	40	Off	0.5	5	0	0	0.4 Hrs Since Last Defrost

Each control system has 75-100 analog inputs and 100+ digital I/O . The I/O platform selected by Techni-Systems is Opto 22 s Optomux family. For each installation, **Think & Do** communicates to multiple Optomux analog and digital racks via a RS232-RS422 serial adapter card connected to the PC serial port.

The operator interface provides detailed information on system operation through graphical presentation of data. Operator interface is provided by a simple keyboard command interface and well designed

Compressor	Run Load	Unload	Motor Amps	Slide Valve	Trips	Run Hours	Discharge Temp	Stop Delay Setpoint	Emergency Stop	Step
Compressor 1 100hp	0	0	0	0	0	1.2	195	30	0	0
Compressor 2 100hp	0	0	0	0	0	0	73	30	0	0
Compressor 3 50hp	47	0	0	0	0	5.9	195	30	0	0
Compressor 4 300hp	0	0	0	0	0	0	70	30	0	0

graphic screens. While **Think & Do Software** has an integrated HMI (Human Machine Interface) capability, Techni-Systems elected to *use previously developed operator screens* they had developed in Visual Basic. They were able to easily *link their Visual Basic application to the **Think & Do** control logic using standard Windows interfaces.* The integration of **Think & Do** with VB (and other Windows programs) can be easily accomplished via built-in OPC, COM/DCOM, and DDE interfaces.



Functional Details

For each installation, control panels provide the *analog and digital inputs/output* interface with pressure transmitters, compressors control circuits, temperature probes, valves, fans, pumps, and other related devices. *Auto/manual switches* allow manual operation of equipment for testing or backup control purposes. Techni-Systems supplies each customer with AutoCAD format wiring diagrams for each panel supplied.

In order to insure maximum system integrity, *local and remote alarms* are initiated. *High/low zone temperature*, high suction pressure, high/low refrigerant vessel level, compressor failure, ammonia leak, and system failure are all *critical alarms*.

One of the benefits of PC-based control is the ease of remote *monitoring* due to built in tools and features. Techni-Systems is able to remotely access via modem link their computer control systems. They can view color graphic displays, make setpoint adjustments, and perform technical support and/or training. Further, with **Think & Do**, Techni-Systems can monitor the actual control logic remotely, and if necessary, they can even *make on-line changes remotely* while the system is running.

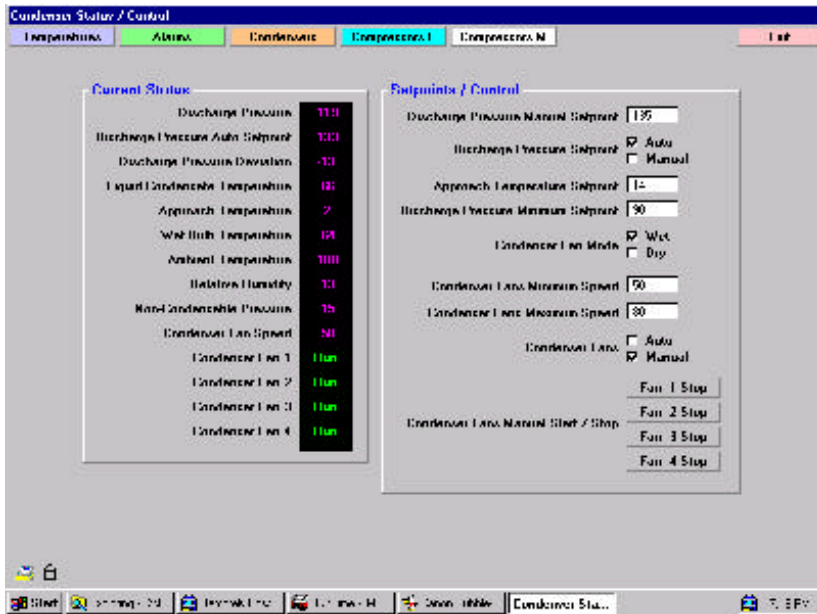
There are many functions that can be performed by an Industrial Refrigeration Control System. Typical features found in a Techni-System s based solution include:

- Temperature Monitoring and Control
- Defrost Cycles
- Fan Cycling
- Float Counting
- Vessel Level Monitoring
- Condenser Control
- Condenser VSD Fan Control
- Ammonia Leak Monitoring
- Compressor Control
- Compressor Sequencing
- Compressor Variable Speed Control
- Auto-Suction Setpoint Control
- Kilowatt Monitoring/Control
- King Valve Control
- Underslab Temperature Monitoring
- Glycol Heat Exchanger Monitoring/Control

Techni-Systems custom designs each client's solution based on their specific needs. Fortunately, **Think & Do Software's** modular flowcharts and full support for subroutine flowcharts enables Techni-Systems to develop *libraries of re-useable logic*. As a result, they can create *semi-custom control systems* solutions in a fraction of the time required to write them from scratch. They just pull existing control flowcharts from a central repository and design the high-level logic to link them together. Big-time time savings? You bet!

Think & Do Software, A Strategic Choice Based On Careful Evaluation

Techni-Systems has evaluated a number of control software products over the last decade. Dan Black, a Techni-Systems Controls System Engineer, had this to say in regard to their search for the best fit solution: "Most so-called solutions were very inadequate in terms of direct PC control functionality. I wasn't interested in just an HMI package - I wanted to do control with the PC because it is so much easier and cost effective." He added, "I knew that PC reliability was not a concern because my company has been using direct PC control for over a decade with a very low failure rate."



Explaining his view of **Think & Do Software**, Dan said: "I was attracted to the flowchart programming language running under the Windows NT/real-time kernel architecture. We are not proficient with computer languages, and have no desire to become so, and therefore depend on a versatile and powerful language, which is easy to use. **Think & Do** has really achieved this combination. With no training, I was able to begin development on a project that had to be operational in less than a month; a very risky decision, but one that has proven to be right. I was particularly impressed with the way **Think & Do** organizes system variables into data tables by type (input, output, float, number, flag, timer, etc.) It is very easy to lay out a project by initially defining the variables to be incorporated, and then starting the flowchart development. This approach keeps the project organized, and

makes it easy to replicate repetitive control functionality."

Think & Do Software: Easy to Learn and Fun to Use

Continues Dan, "I appreciate the fact that the **Think & Do** manual is not so big that it is intimidating, but yet provides enough information to effectively utilize the functionality of the software. The on-line help system is very useful also. When in need, however, factory support is readily available from headquarters or regional offices. When beginning development on a critical project, I was even offered support over the weekend if needed."

"I really like the Data Watch Window feature that enables quick access to any system point for debugging or troubleshooting a program. This saves a lot of time that would otherwise have to be spent making graphic screens to provide the necessary interface."

"**Think & Do** really impressed me with it's extremely high value. It has great functionality at a low cost. It is priced at a level that is far below other, less capable, control software products on the market. And for all of us who have had to deal with the hassle of software protection keys, this product is copyrighted by law, but protected by the integrity of the user. I think that philosophy deserves to be praised and respected."

And one more thing "In my opinion, **Think & Do** is establishing a new trend in control software. Forget European standards! Other companies would benefit by following the ingenuity of this American company."

Summary

Techni-Systems Industrial Ammonia Refrigeration Systems provide powerful, versatile, and reliable functionality for refrigerated storage facilities. Each system is carefully custom designed to meet the customer's needs and comes with excellent technical support. Energy savings of 25-50%, and improved product quality can be achieved through the intelligent PC-based control strategies outlined in this application story. These are just a few of the many benefits realized with a Techni-Systems refrigeration control system.

For more information on the systems and services provided by Techni-Systems, please [visit their web page](#).

(Many thanks to Dan Black of Techni-Systems for providing information and assistance in the preparation of this application story.)

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