York Refrigeration Introduces New Pressure Test Installation, Enabled by Emerson's DeltaV™ system and Asset Management Solutions (AMS)

RESULTS

- 150% production increase
- Increased throughput
- Reduced energy cost
- Early return on investment cost

APPLICATION

Pressure testing of cooling compressors, containers and finished condensing units

CUSTOMER

Sabroe Refrigeration, one of the largest suppliers of industrial and maritime cooling systems, was recently purchased by York International Corporation. Now operating under the name York Refrigeration, the company produces cooling compressors, containers and finished condensing units for the cooling industry. York Refrigeration has more than 6,800 employees with branches all over the world and yearly sales of approximately Dkr 8 billion.

CHALLENGE

The products are sold throughout the global market and cover both land-based and maritime applications. In order to meet all requirements for pressure testing and certification from customers in different countries on the global market, it is necessary to maintain a considerable testing and certifying system.

York Refrigeration found that the pressure testing, which is part of the continuous production control and the final certification, has been a bottleneck during the production sequence and also a considerable expense. Previously, the pressure testing was carried out as a hydro test using water. However, by using this procedure, it was necessary for the tested items to dry out, which required a lot of time and a huge amount of energy for heating and for air transportation during the drying process.

"The aim of eliminating the bottleneck problem and reducing energy costs was fulfilled 100% due to the modifications of the test procedure and the construction of the test chambers."

Jan Marcussen
Quality Director, York Refrigeration

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www.EmersonProcess.com/DeltaV

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SOLUTION

In order to eliminate the bottleneck problem, York decided to modify the pressure test procedure and use compressed air instead of water. This procedure would eliminate both the bottleneck problem and the energy consumption required by the drying process. This solution demanded a modification of the test chambers as any error in the test items followed by an explosion had to take place in a safe environment without any risk of personal injury. When building the test chambers, the company therefore decided to use reinforced concrete, (similar to a Second World War bunker), which could resist an explosion of the tested item as big as a 15 cubic meter vessel and at the same time relieving the surplus pressure without exceeding the noise limit stated by the local authorities.

A close co-operation concerning the functionality and construction of the test chambers between Emerson Process Management, who was in charge of the pressure testing including control and registration, Dansk Trykluft Industri which handled the compressed air supply and the end-user began as early as the planning phase.

The most important aims for the construction of the chambers were:

- It should be possible to execute several independent pressure tests simultaneously in each chamber to eliminate the bottleneck problem.
- It was necessary to fulfill the requirements of the different authorities and accredited agencies concerning the execution of the pressure tests, certification and the safety issues during the testing itself.
- The tests and procedures should be traceable and a part of the end-user's ISO 9000 system. This is maintained by the AMS package via the DeltaV™ digital automation system.

Today 4 test chambers have been established—two large chambers each with a capacity for 6 separate pressure test outputs and 2 smaller chambers each prepared for two separate pressure tests. Each test output is built with two Baumann 54-24577SB control valves with DVC5010-SD (one FO and one FC) plus a Rosemount® 3051 HART® pressure transmitter. A total of 38 valves and 17 pressure transmitters are included. One of the pressure transmitters is a master unit, calibrated against a national standard on a regular basis at an accredited laboratory. It is possible to perform pressure tests with a pressure load as high as 90 bar.

Safety loops verify that the test chambers are fully closed and locked before it is possible to carry out a test sequence and enables at the same time that any pressurized items are relieved to the atmosphere should a fault occur during a test sequence. The compressed air for the chambers is supplied dry and oil-free by separate high-pressure compressor stations. The supply from these can be cut off if an error occurs.

"Considering all aspects, the project has been an unconditional success."

Jan Marcussen
Quality Director, York Refrigeration

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The actual pressure tests are started by connecting the test items to the respective test outputs in the test chamber and sealing off the chamber. The test specifications for each test sequence are then loaded into the DeltaV station.

If the safety loops are OK, it is possible to start the test sequences. The safety loops controls, among other things, closing and pressurizing of the large doors into the chambers (each 4,000 kg in weight), to avoid leakage. All sequences are started simultaneously and when all test sequences are finished it is possible to open the chamber. During the test period all test results are logged and related curves are printed out. The curves verify that during the test period the pressure level is subject to the specified requirements according to the relevant standard with regards to pressure levels and to test time. The master pressure transmitter is used to verify that the pressure registration meets the national standard. The test result follows the respective vessel or compressor as documentation as defined in York Refrigeration's ISO 9000 system.

As part of the approval by the authorities for the construction of the first large pressure chamber, an explosion of a vessel, whose size was specified by same authorities, was performed after the vessel had been weakened.

The test did not go unnoticed—several mobile alarms in the neighborhood started off due to vibrations transferred underground. However the noise limit was not exceeded and the chamber was approved.

Jan Marcussen, Quality Director with York Refrigeration says that the aim of eliminating the bottleneck problem and reducing energy costs was fulfilled 100% due to the modifications of the test procedure and the construction of the test chambers. The investment in connection with the modification of the test procedure is expected to be covered within the originally fixed time schedule based on the savings of energy consumption alone. However, the biggest advantage is the elimination of the bottleneck problem itself as the new procedures have made it possible to increase production by around 150%.

"Considering all aspects, the project has been an unconditional success," says Marcussen.

DeltaV

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