New Canola Oil Refinery Using IPH

Recently, LDM Foods completed construction of a new canola crushing and oil refining plant at the heart of Canada's canola growing region in Yorkton, Saskatchewan. This plant is capable of processing 2,500 metric tons of canola seed per day. The seed is processed into food-grade Canola oil and pelletized meal for use as livestock feed. Canola is the world's only "Made in Canada" crop and it is often the nation's most valuable one, with annual exports of canola seed, oil and meal that are valued at over three billion dollars.

Who Turned to Banner-Day?
Dilling Mechanical Contractors, a leading design and build contracting firm, was responsible for delivering pipe heating recommendations for this new green field plant. LDM Foods and Dilling sought a robust solution to provide freeze protection for the piping exposed to the extreme cold conditions expected at the plant. Trace element type pipe heating was initially considered, but from experience, the project team was concerned with the cost of installation and the ongoing high cost of ownership associated with trace element systems. This would be further compounded by the expansive nature of the project (over a mile of heated pipe), the numerous elevated pipe locations and the extreme temperatures expected throughout the winter months.

How Did This All Come About?
The mechanical design company learned about impedance pipe heating as a possible solution for the new plant through an LDM Foods associate. To explore the technology, Dilling Mechanical contacted Banner-Day to explain the application and use of electric impedance pipe heating and how it might favorably impact this important project. Impressed with the ease of installation, reliability, minimal maintenance requirements and overall low cost of ownership, Dilling Mechanical and LDM Foods elected to implement the Banner-Day's ***TraceFREE™*** impedance pipe heating solution.

With the decision made to utilize impedance pipe heating, the next step was to quickly review and design the necessary systems to support heating pipe throughout the plant and meeting the aggressive project schedule.

Why Important?
The majority of the heated pipe throughout the plant is located in the often harsh Canadian Great Plains outdoor environment where temperatures can dip to minus 50° F. During these cold periods plant operations must be sustained. Refining processes and delivery of product to storage tanks and eventually rail cars and trucks demand temperatures be maintained to ensure products flow easily during processing and delivery. The need for a reliable pipe heating system is essential.

The Following is a Brief Summary Overview of the Actual Project:

- Total Number of *TraceFREE*™ Systems Installed – 27
- Pipe Materials Heated with *TraceFREE*™ – Carbon Steel and Stainless Steel
- Total Length of Pipe Heated – In Excess of 6,000 Feet
- Longest System – 413'
- Shortest System – 41'
- Project Systems Average Length – 215'
- Range of Pipe Diameters Heated – 1" To 8"
- Materials Heated – Canola Oil, Water, Spent Clay, Caustic
- *TraceFREE*™ System Transformer Sizes – 1 kVA to 5 kVA
- *TraceFREE*™ system secondary voltages designed operate at less than 30V per Canadian Electric Code requirements.
- *TraceFREE*™ systems designed to provide temperature maintenance and freeze protection down to a -50° F ambient condition. Maximum system temperature delta of 90° F while maintaining pipe temperature @ 40° F.

Application of Banner-Day's experience varies from project to project and this particular project had a scope and complexity that proved both interesting and challenging. Based on the overall facility construction plan, the design of the *TraceFREE*™ impedance pipe heating systems occurred while the process pipe installation was being completed. Throughout the design process, Banner-Day engineers maintained close communications with LDM Foods and Dilling Mechanical personnel so any necessary design alterations to the pipe heating systems were made to accommodate construction field changes. This was important, as it helped maintain the project schedule.

TraceFREE™ RemoteTemperature Legs.

Remote Temperature Legs

In a facility of this size, it is not unusual to have sections of pipe with multiple drops (for example feed lines serving multiple tanks). In order to avoid the canola oil congealing in the pipe when all the drops are not being used during cold weather, Banner-Day designed a remote temperature leg to accommodate the multiple branches in this application. Typically temperature legs are integrated directly into the piping system as a "dead leg". Use of a temperature leg allows pipe temperature to be maintained throughout all heated pipes between any number of drops whether the pipe has sections of stagnant or flowing product. In some instances application of a pipe mounted temperature leg was not practical due to local space constraints. To address this challenge Banner-Day designed a remote temperature leg. This creative design is shown in the photo above with two remote temperature legs that provided the necessary system performance while addressing the design challenge.

In spite of good planning, projects of this scope typically require field alterations which are made onsite during construction. If and when this happens you have to be prepared to accommodate and respond to the circumstances at hand. How you respond proves the value of good communications and team work amongst the numerous project stakeholders. This project was no different. When LDM Foods requested a 15 foot section of previously undocumented field installed pipe be heated, Banner-Day's onsite personnel responding creatively and quickly. An adjacent *TraceFREE*™ system with available capacity was identified and the extra 15 foot section was integrated into it.

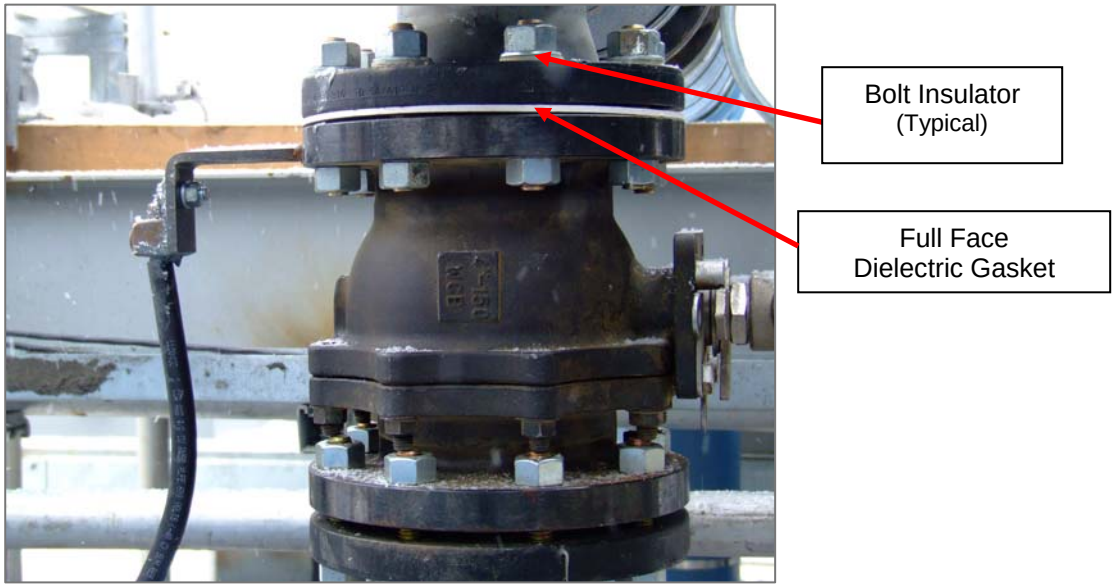
TraceFREE™ heated lines installed on Pipe Bridge.

Two (2) TraceFREE™ heated lines serving a Load-Out Tank.

The above photos provide an excellent view of the size and complexity of the pipe heated requirements throughout the plant. After all the pipe heating systems were installed, they were labeled and accurately documented with detail drawings to make it easy for LDM maintenance personnel to identify and track the various impedance pipe heating systems.

In the photo below, two items can be observed. First, valves of an appropriate size and material can be heated by the very same impedance pipe heating system heating the pipe it is installed in. Second, impedance pipe heating systems utilize insulated pipe joints, IPJ's, to define a system's boundaries.

Often flanged valves can be utilized as a convenient location for an IPJ system boundary eliminating the need to install a dedicated set of flanges. An IPJ typically includes application of a full face gasket and bolt sleeve insulators of sufficient dielectric strength.



As support to installing contractors, Banner-Day regularly provides on site instruction and *TraceFREE*™ installation Best Practices recommendations for skilled trades personnel. These services are provided in addition to the published system installation instructions, project specific drawings and documentation provided. This service helps reduce both system installation time and time required for startup and commissioning. With minimal effort, skilled trades personnel quickly become educated and experienced with the installation and application of *TraceFREE*™ pipe heating systems. This tactic was employed with positive results at LDM Foods.

After the *TraceFREE*™ system installations were completed training was conducted with LDM Foods refinery operators and maintenance personnel. Upon completing the training LDM Foods personnel were left with a solid understanding of *TraceFREE*™'s use, operation and maintenance requirements.

Prior to departing the facility, exit interviews were conducted with key project and plant management personnel to assess their satisfaction working with Banner-Day and the *TraceFREE*™ impedance pipe heating systems. And finally, follow up communications were made including copies of all system start-up documentation and "As-Built" system drawings and wiring diagrams are provided.

In summary, the selection of *TraceFREE*™ electric impedance pipe heating by LDM Foods provided them with a necessary and dependable freeze protection solution for their key canola oil refining processes. In addition, the system was easy to install, will be reliable to operate with minimal maintenance requirements and a low cost of total ownership.