



A Rockwell Automation Company

McCain Foods Limited Coaldale French Fry Plant

The Client:

McCain Foods Canada Ltd. is a part of the McCain Foods Group of companies in Canada. Head office is located in Florenceville, N.B. The Coaldale French Fry Plant is McCain's first fry plant in Alberta and complements four other Canadian fry plants. McCain produces green

vegetables, desserts, pizza, juices and beverages, oven meals and other processed and frozen foods but is best known for their French fries. One of every three fries consumed in the world is made by McCain.

The Requirement:

The Coaldale French Fry Plant has the capacity to produce 33,000 pounds per hour (15 metric tons per hour) or 200 million pounds (91 million kilograms) of potatoes annually. The plant produces straight cut French fries and specialty potato products for the western Canadian, US and overseas markets. The plant can also produce batter-coated French fries.

Raw potatoes are brought into the plant in the receiving area where they are washed to remove plant material, dirt and rocks. To make the best possible use of the raw materials the potatoes are next sized. Large potatoes are separated for use on French fry production lines. Smaller potatoes are used in specialty items or French fries not requiring long length. Peeling and scrubbing comes next; high pressure steam loosens the potato skins. Any remaining skin is removed by automated brush peelers. The potatoes then move to the trimming area where gross defects are removed by hand. The final stage before cutting is pre-heating, where the potatoes are slightly softened by heating them in water. This vital step

prevents the potatoes from shattering during the cutting process. The potatoes are sent through a set of knives and are cut into fries of the desired dimension. Defects are removed from the freshly cut fries using a sophisticated electronic system that detects dark spots and triggers a series of knives that slice away the defective spots. The fries are then graded by length before moving to the blanching process where they are dipped in warm water to deactivate enzymes that can cause discoloration. The fries then move through a dryer, where warm air is circulated to quickly dry the surface of each fry, before they are deep-fried by the fryer. Pre-cooling and freezing come next followed by length grading and final inspection. The finished fries are ready for packaging and are then placed in cold storage in preparation for shipping.

This entire process is monitored and controlled with a distributed PLC/HMI system. This control system also operates the utility systems for steam generation, refrigeration and waste water treatment as well as facility subsystems including HVAC and lighting.

The Design Solution:

McCain Foods is a strong supporter of Rockwell/Allen-Bradley motor control products, variable speed drives, PLCs and HMI systems. The Coaldale plant control system has more than 50 PLCs in total including all machine controllers. The PLCs are distributed over 8 ControlNet, 5 Data Highway and 2 Modbus control networks that also connect to variable speed drives, digital power meters, Multilin motor relays and smart instruments such as weigh scales. These control networks are bridged to a plant wide Ethernet LAN that links all plant data to 2 RSView Active Display Servers and allows the distributed RSView Client PC's throughout the facility to access the data that they require.

Control system functionality is broken down by processes and machines. Nine PLC 5/40C processors supervise the French fry production processes and coordinate the product flow through the plant. The overall process is a continuous production line and the speed of conveyors is coordinated for smooth operation. Individual machines typically utilize PID controllers to maintain optimal set points for temperature, flow or speed. Alarm management is critical in the highly automated process to alert operators of a problem before it

stops the line.

The main utility systems for steam generation, refrigeration and water treatment also have PLC 5/40C processors to automatically control these processes and equipment the associated equipment. Building management functions are also implemented in the PLC systems. Four SLC5/04 processors in the plant electrical rooms control the plant building HVAC and lighting systems

The system utilizes a mixture of Allen-Bradley I/O systems: 1771 for MCC I/O, Flex I/O for machine I/O and 1746 for machine and utilities. DeviceNet is used for some conveyor line control. Data interfaces were required for Rockwell VSDs and digital power meters and foreign Modbus, LOMA and ARCNET devices. The facility Ethernet LAN uses a fiber optic backbone with 7 major switches distributed throughout the factory building and outbuildings. The network supports VLAN (virtual LAN) capability allowing the control LAN and the office LAN to share the backbone. In combination the network has 178 drops.



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System Specifications:

- 2 Allen-Bradley RSView Active Display Servers
- 11 Allen-Bradley RSView Clients
- 51 Allen-Bradley PLCs
- 3150 hardwired I/O
- 120 Allen-Bradley VSDs on ControlNet
- 17 Digital power meters on RIO and Modbus
- 6 Multilin motor protection relays on Modbus
- 19 scales on RIO, LOMA, ACRNET
- 8 Allen-Bradley PanelView HMIs on Data Highway
- Fiber Ethernet LAN with 178 drops

For further information or to contact a Hinz office near you, please check our website at:

www.hinz.com