

CC-Link In Action

OPEN NETWORKS

BP-Castrol tunes in to CC-Link for effective tank monitoring

When BP-Castrol looked at means of improving its tank monitoring systems as part of an upgrade to help eliminate the possibility of environmental hazards, it turned to CC-Link for an effective networked solution.

Across the world, companies working with potentially hazardous chemicals and substances are coming under increased public and governmental scrutiny, with growing pressures on them to make their environmental responsibilities an absolute priority. Petro-chemical companies are among those in the spotlight, and are taking steps to prevent environmental hazards.

Among them is BP-Castrol, which saw an opportunity for a significant upgrade of the tank monitoring systems at its facility in Rio de Janeiro, Brazil. There are many tanks at the facility, containing petroleum and numerous types of petroleum by-products, used to create different combinations of Castrol lubricants. The tanks range in size from 6,000 litres to more than 600,000 litres.



BP-Castrol engineers wanted to upgrade the overflow monitoring system at the facility to provide a greater degree of reliability. Overflow monitoring a manual process, with inspections requiring engineers to climb ladders up to 13m high and visually examine the status of the 98 tanks located throughout the facility – every working day, regardless of the weather.

Although those inspections were thorough, the inability to monitor all tank levels on a continuous basis meant the facility was still susceptible to product overflows and other supply issues. So BP-Castrol looked to migrate to an automated monitoring solution that would provide continuous rather than intermittent monitoring of the tanks.

System integrators CETEM and Elsitec 17 recommended a system built around CC-Link, the open networking technology managed by CLPA. With over 3 million installed nodes around the world, CC-Link is a proven, field network that processes both control and information data at high speed, to provide efficient, integrated automation. I/O response time is fast, reliable and deterministic, and communication speeds of up to 10Mbps are readily achievable, making the technology ideal for critical environments, and I/O response.

BP-Castrol and recommended a CC-Link solution to automate the tank monitoring process. This initial solution included a single Mitsubishi FX controller and Input/Output modules connected via a CC-Link network to automatically monitor one set of tanks.

The first stage was to develop a test system to establish the viability of the automatic overflow monitoring concept. This consisted a single Mitsubishi FX PLC and I/O modules connected via CC-Link to automatically monitor one particular set of tanks for any overflow. Upon detecting a potential overflow condition the system would generate an alarm to alert operating personnel.

The viability and benefits of the system were quickly proven, with the BP-engineers realising a number of advantages of the networked solution. Not only would the continuous monitoring prevent overflows, but in addition the system provided the operators with accurate, up to date tank level information which allowed them to better utilise tank capacity for greater productivity. The system was duly expanded to include monitoring all of the tanks within the facility for potential overflow conditions, and to provide added control and monitoring functionality.

The heart of the system is a Mitsubishi Q Series controller equipped as a CC-Link master, providing high speed communications to five Mitsubishi FX controllers acting as local stations on the CC-Link network, with level sensors measuring the fill level within each tank.

The early success of the system provided the impetus for further expansion, adding dual level sensing capability and networking various pumps and valves on the CC-Link system. This gives operators control over the flow of products and the ability, if necessary, to shut the filling process down. The dual-level sensor information allows the CC-Link system to provide multiple alerts. The first level alerts the operators to a potential overflow problem, where the operator can manage the situation by manually changing fluid flow.

This enables action to avoid an overflow even before the CC-Link system automatically deactivates the filling pumps. However, if fluid in the tank reaches the second level, the system automatically deactivates the filling pumps (preventing an overflow), stops the mixing process, and activates visual and audible alarms. Once a second-level alert is activated the operator must reset and restart the process after correcting the problem.

A further enhancement has been the networking of the valve control system used to open/close the valves to transport additives between tanks to produce different lubricant blends. This has improved productivity by allowing the operator to remotely monitor and control the blending process.

With this most recent expansion, the CC-Link network now consists of over 400 discrete points and more than 98 analogue sensors.

BP-Castrol reports that the CC-Link installation – providing the ability to automatically turn off tank pumps to reduce and potentially eliminate any hazardous overflows – has been instrumental in enabling it to obtain the all-important ISO 14000 environmental certification. But in addition, the CC-Link system has also proved key to the company in obtaining ISO 9000 certification. With the ability to monitor the level of products in its facility, BP-Castrol is better able to document its inventory. This helped the facility to meet general ISO 9000 requirements for paperwork traceability for product manufacture. And as a further benefit, BP-Castrol is also reaping the benefits of improved productivity through more effective control of its processes.

