Utilities Monitoring

PRODUCT:
- *TeleSAFE Micro16 SCADA Controller*
- *TeleSAFE 5000 Series Modules*

COMMUNICATIONS:

IMPORTANT FACTORS:
- *Dual programming*
- *Large memory*
- *Open Architecture*
- *Strong performance and reliablity*

World's Tallest Buildings uses TeleSAFE Micro16 for Utility Monitoring

The Application

When people speak of Malaysia, lush rainforests, crystal clear waters, powdered sand beaches, misty mountains, and exotic islands come to mind. All of these exist, and provide the perfect description for the Malaysia that most people know.

But there is another side to Malaysia - that of an Asian nation succeeding in its quest to become a major economic force. Its successes are visible in a massive building boom that includes: a $4.8B international airport, the world's biggest hydroelectric dam, and a $17B port and commercial hub. These are just some of the projects that will help Malaysia achieve its goal of being a fully developed nation by 2020.

Probably the most evident symbols of Malaysia's rising status are the Petronas Twin Towers, which are located in Kuala Lumpur. Now the world's tallest buildings at 451.9m - surpassing the Sears Tower in Chicago by seven meters - they form part of the 1,700,000 m^2 Kuala Lumpur City Centre (KLCC) complex. The towers each comprise eighty eight floors of office space and are linked by a 58.4m long, two-level skybridge at the forty-first and forty-second story, 175m above street level.

In addition to the Twin Towers, phase one of the KLCC development comprises the fifty story Ampang Tower, a 140,000 m^2 retail centre, the thirty story Menara Esso Tower, the 645 room Mandarin Oriental Kuala Lumpur Hotel, a 6,000 capacity surau (mosque), a district cooling centre and a fifty acre public park. The entire KLCC project will provide 18,000,000 m^2 of commercial, retail, hotel and recreational facilities, to be developed over fifteen to twenty years.

The Problem

One of the primary constraints in designing a large building - let alone the world's tallest, is that the building requires a constant supply of chilled water for the air conditioning. Not only is the outdoor temperature extremely hot, but the building is filled with heat sources such as computers, office equipment, elevators, electrical transformers, lighting systems, and thousands of people. In a conventional design, the chilled water is supplied via a cooling system and cooling towers on the roof. However, the unique architecture of the Twin Towers (as shown in the photograph) meant that a different solution had to be devised. Hiding or concealing bulky cooling towers on top of these architecturally stunning towers was not an option.

The Solution

To solve the cooling requirements for the Twin Towers, the owner of KLCC contracted a utility company to generate a steady supply of chilled water to the Kuala Lumpur City Centre complex. Using a technology known as "District Cooling", a single plant (much like a power station) provides chilled water to a complex of buildings at competitive rates. In the case of the Petronas Twin Towers, the supply of chilled water does not come from the roof, or anywhere else in the building. It is supplied from outside the building by the third party, which acts as a Utility Provider.

At the chilling plant, the utility uses conventional chilling technology, in conjunction with centralized chilled water storage. At night, when the power rates are lowest, the water is chilled and stored in a 9.1 million liter tank. Throughout the daytime, the cold water is pumped through a six kilometer network of

underground pipes to the users.
The next step for the Utility Provider was to find a way to accurately bill its customers based on consumption of cooling capacity. This is more complex than simple flow accumulation, because the coolant inflow temperature, outflow temperature, and flow rates are variable. The utility relied on its contractor to supply a complete solution, including primary elements, valves, controllers, etc. The contractor in turn, selected an experienced Systems Integrator, Precision Control Sdn. Bhd., to provide the metering stations. Precision Control, which is based in Subang Jaya, evaluated a number of competing products before selecting the Control Microsystems TeleSAFE Micro16 SCADA Controller. One of the main reasons for selecting the Micro16 was its ability to be programmed in both C and Ladder Logic, which allowed them to program special drivers to interface with equipment such as energy meters.

At each of the eight remote metering stations located throughout the KLCC complex, the Micro16 systems, armed with 256K RAM, read process variables such as temperature, pressure, differential pressure, and flow rate. The TeleSAFE Micro16 SCADA Controller uses this raw data to calculate the amount of cooling capacity used at each location. Thanks to the high memory capacity and flexible programming capabilities of the Micro16, the unit is able to do all the necessary calculations internally at each of the eight remote sites. In the unlikely event of a communications failure, the Micro16 logs the data in memory until the communications are restored, so that billing information is not lost.

At the central monitoring location, a personal computer is used to observe the metering station operation, and to collect the coolant usage data. The computer uses an off-the-shelf Operator Workstation Software package called CiTect. Communication between the PC and the Micro16 remote units is via modem, over leased telephone lines. The communication protocol is Modbus, which is well known for its simplicity, reliability and wide availability from multiple vendors. Both CiTect and the TeleSAFE Micro16 support Modbus, which greatly simplified configuration and startup.

Another TeleSAFE Micro16 is also located at the central monitoring location. This Micro16 acts as communication bridge between the CiTect PC, and the Distributed Control System (DCS) which monitors and controls the operation of the KLCC complex. Once again, Modbus is used due to its compatibility with major DCS vendors. The Micro16's open system architecture and industry standard Modbus protocol allowed for a seamless interface with both the DCS system and the PC.

The Results

With its versatile C and ladder logic programming languages, large memory, powerful communications, and small footprint, the TeleSAFE Micro16 was ideally suited to this type of application. Virtually any complex calculation, data acquisition and control system strategy can be implemented.

The TeleSAFE Micro16 also eliminated concerns with respect to environmental conditioning. Although the KLCC installations will never experience extreme cold, the Micro16's ability to operate at 70˚C means that cooling is not required. Likewise, the printed circuit modules are protected from extreme humidity, mold and mildew, by the protective coatings which are standard. Concerns over the effect of thunderstorms (frequently a daily occurrence) were minimized by the Micro16's integrated electrical transient protection. Conventional PLCs would have required a lot of protection.

Since this project is at the beginning of its life cycle, the future expandability of the Micro16 was deemed to be important. Should the utility provider or the KLCC wish to monitor other process variables in the future, I/O modules can be easily added, or the memory can be expanded to 2 MB ROM and 1 MB RAM. Expansion is a simple as plugging in the extra equipment. Unlike PLCs which use a chassis or backplane, Micro16 modules plug together in a daisy chain. There is no fixed limit on the amount of expansion which is possible.

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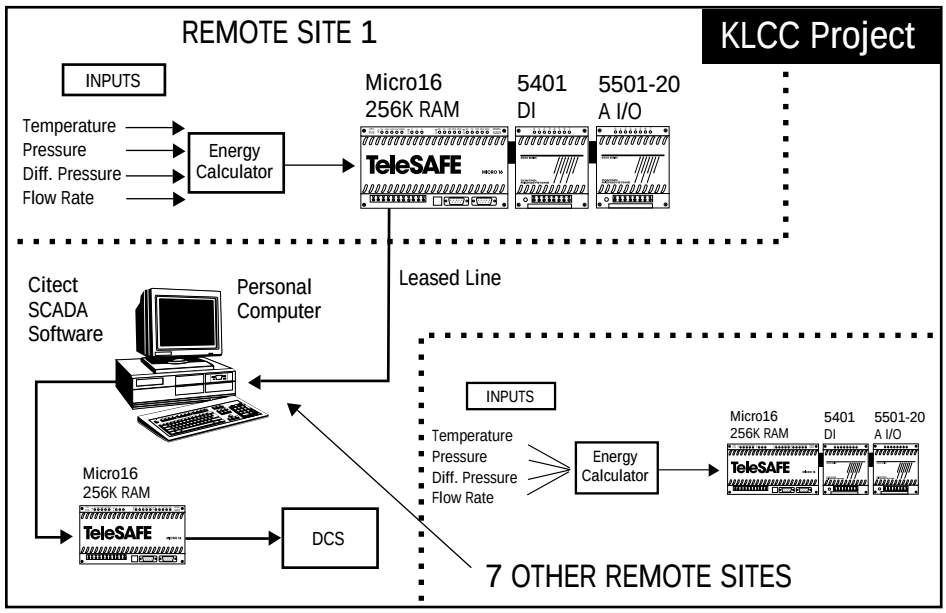

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