

Application Note

Remote Monitoring of Piping Systems in Power Plant

Piping in nuclear power plants is exposed to severe environmental conditions. For safety rating it is mandatory to inspect the piping systems thoroughly. However, inspection of piping systems in nuclear power plants is not easy in practice because of their length and the radioactive environment.

Status: Performing measurements				KHNP with UEI	KHNP with UEI		oups	
Time	Status [esignation	System message			Value	Value	
12/14/2011 1:	18:51 P OK [Disk Alarm	Disk space ok, no a	sk space ok, no alarm			0 *	
Measuremer	t Hardw.	Connected	Calibration	Self Test	Zero Mea	surement Sig	gnal Configuration	
Connection Se	ver Disk	Warning	Disk Alarm					
Stopped / No	ot released	Started / Ok	message	Alarm / Err	or message	Status	message	
			-				-	
Time Status Cha		Channel	Group Channel message		Limit Unit 🔺			
12/14/2011 1:18:51 P OK Stress 16		itress 16	Right Airfoil Channel within limits			₩ 3U		
Pressure_00	Pressure_01	Pressure_02	Pressure_03	Pressure_04	Pressure_05	Pressure_06	Pressure_07	
Pressure_08	Pressure_09	Pressure_10	Pressure_11	Pressure_12	Pressure_13	Pressure_14	Pressure_15	
Strain_00	Strain_01	Strain_02	Strain_03	Strain_04	Strain_05	Strain_06	Strain_07	
Strain_08	Strain_09	Strain_10	Strain_11	Strain_12	Strain_13	Strain_14	LVDT_00	
LVDT_01	LVDT_02	LVDT_03	LVDT_04	LVDT_05	LVDT_06	LVDT_07	LVDT_08	
LVDT_09	LVDT_10	LVDT_11	LVDT_12	LVDT_13	LVDT_14	LVDT_15	LVDT_16	
Temperature_00	Temperature_01	Temperature_02	Temperature_03	Temperature_04	Temperature_05	Temperature_06	Temperature_07	
Temperature_08	Temperature_09	Temperature_10	Temperature_11	Temperature_12	Temperature_13	Temperature_14	Temperature_15	
Flow_00	Flow_01	Flow_02	Flow_03	Flow_04	Flow_05	Flow_06	Flow_07	
Flow_08	Flow_09	Flow_10	Flow_11	Flow_12	Flow_13	Flow_14	Stress_00	
Stress_01	Stress_02	Stress_03	Stress_04	Stress_05	Stress_06	Stress_07	Stress_08	
Stress_09	Stress_10	Stress_11	Stress_12	Stress_13	Stress_14	Stress_15	Stress_16	
ne 12/14/2011	1:19:03 PN							
		be be			per	E	oflimi	
Channel is no	ot monitored	Channel has	been below lower ala	rm Channel h	as been above upper a	alarm 📃 Excitatio	on voltage was out of li	
		UREMENTS						

Korea Hydro & Nuclear Power selected m+p international's Coda data acquisition system for remote piping monitoring in real-time at their Wolsong Power Plant in Gyeongju, South Korea. The Coda system measures the static and dynamic data of all steel pipes throughout the plant: in the turbine room, in the reactor, etc. The networked monitoring system consists of the Coda acquisition software installed on a standard PC and DAQ instruments which are located directly at the pipes.

Coda supports more than 250 channels to measure the thermal expansion, temperature, pressure, vibration and weight of the pipes at Wolsong Power Plant. These measurements are taken by using thermocouples, LVDT (Linear Variable Differential Transformer) sensors, pressure transducers and strain gauge load cells.



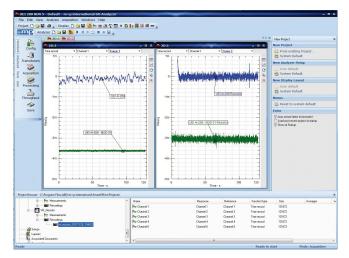


The DAQ instruments at the pipes are Ethernet-based cube I/O chassis from United Electronic Industries. These very compact and rugged instruments are compatible with a wide variety of I/O boards for voltage input, current input, thermocouples, strain gauges, RVDT/LVDT, digital I/O, counter, etc. The boards can be installed in any combination. The seven DAQ instruments used at Wolsong Power Plant have slots for six I/O boards each. They support both ICP[®] signal conditioning and excitation voltage, thus being ideal for signal mixing.

Coda supports compact I/O chassis

The piping data monitored in real-time are exported to analysis packages such as the SO Analyzer e-Reporter from m+p international or Microsoft Excel for comprehensive analysis and reporting. The ultimate step is using the SO Analyzer e-Reporter. It provides test engineers with extensive capabilities for browsing, viewing, editing, analyzing and reporting data as well as with full ActiveX compliance.

Coda is a full-featured turnkey software platform for data acquisition, signal analysis and process monitoring from tens to thousands of input channels. The intuitive graphical user interface facilitates set-up, operation and analysis, thus leading to precise, repeatable results quickly. The



Sophisticated analysis and reporting using m+p's SO Analyzer e-Reporter software

interface queries the DAQ instruments and preloads information regarding specific parameters such as channel count, gain ranges, filter selections and sample rates.

The extensive built-in features and tools offer a functionality that was previously available only in custom packages. These features include intuitive configuration tools, user-definable channel groups, automatic instrument identification, real-time alarm monitoring and limit checking, sophisticated data interpretation and display, online graphical data analysis and comprehensive visualization.

The client/server architecture allows shared use of the acquired data, enabling several test engineers to have concurrent online access for data display and analysis operations.

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