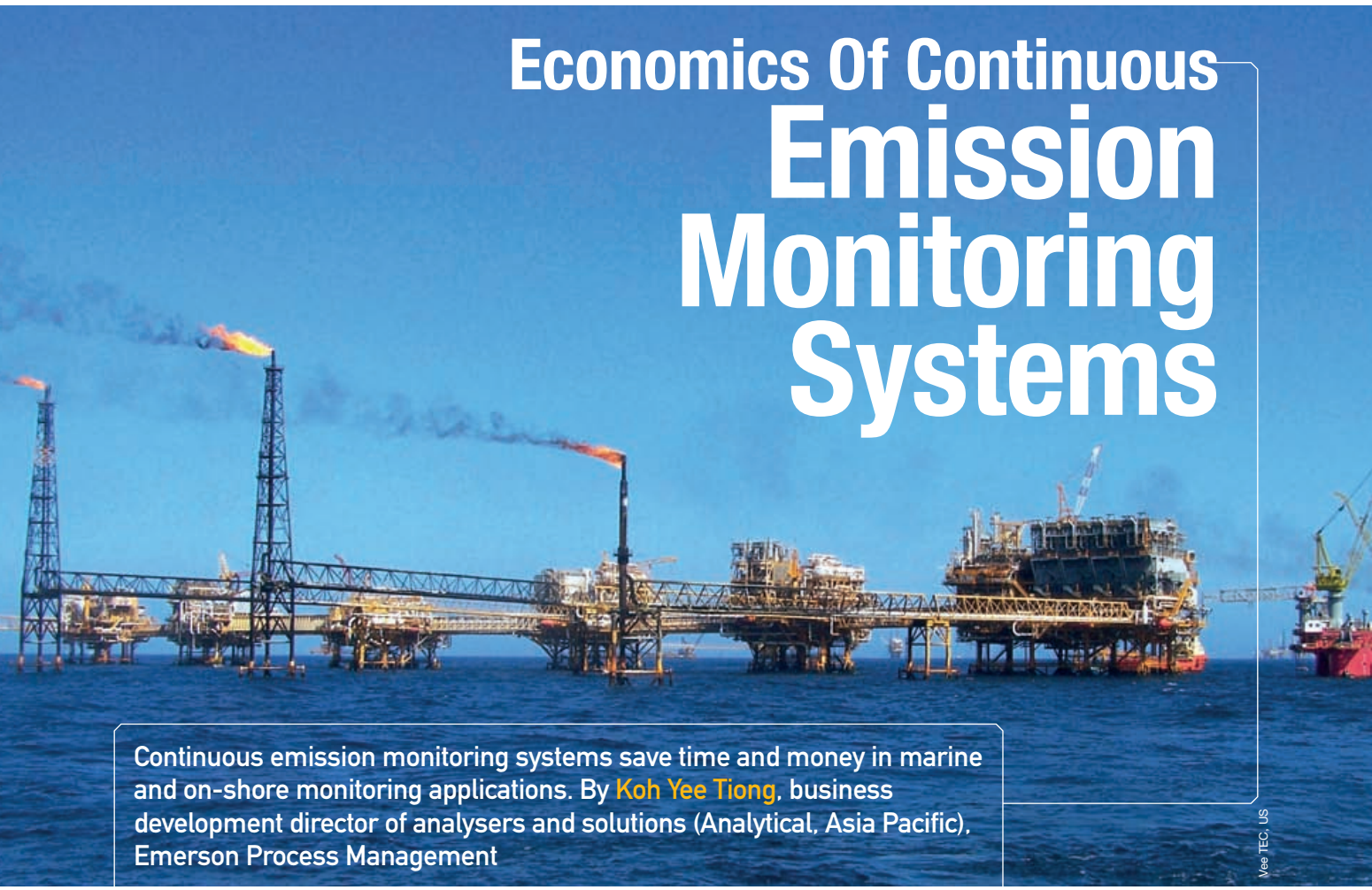
This article is published in Industrial Automation Asia, Sept 2013 issue. (page 40 - 41)

Economics Of Continuous Emission Monitoring Systems



Vee TEC, US

Continuous emission monitoring systems save time and money in marine and on-shore monitoring applications. By Koh Yee Tiong, business development director of analysers and solutions (Analytical, Asia Pacific), Emerson Process Management

The need to monitor fuel burning efficiency and emissions is common to many industries. Large boilers and gas turbines in the power industry, process heaters and sulfur incineration in refining, industrial boilers, cement kilns and cogeneration plants require accurate and regulatory-compliant emissions monitoring.

These requirements are now becoming more critical in marine applications due to stricter and more stringent regulatory requirements by the International Maritime Organisation (IMO).

Maritime companies suffer from rising energy costs requiring precise measurement of the flow of fuel in ships: Floating, Production, Storage and Offloading vessels (FPSOs) and other sea-faring crafts. At the same time, these vessels face challenges to install monitoring systems due to operational requirements and extremely limited space.

Likewise, on-shore maritime facilities need intensive emissions control to meet regional regulations but have challenging environments (eg: corrosion from the sea salt environment) that may require changes of configuration.

Like all industrial facilities in Asia, maritime installations experience high trenching costs which limit the potential for growth and changes to the facility. An suitable monitoring solution for these challenging environments is the simple, cost-effective elegance of a Continuous Emissions Monitoring System (CEMS), and in some cases, the ideal CEM solution may be wireless.

Operational Performance

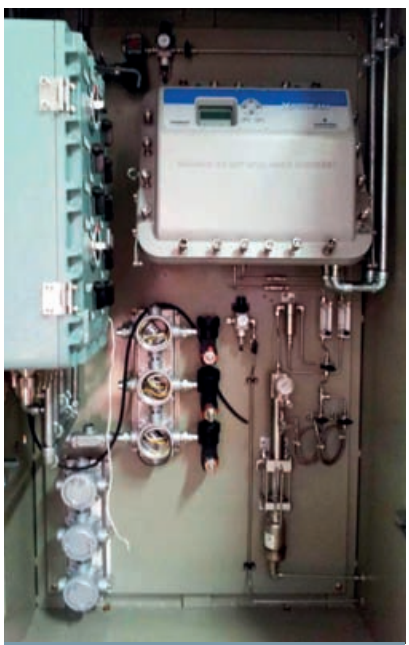
For one shipbuilding and marine engineering company in Asia, CEMS equipment has allowed it to improve the operational performance of its FPSO vessel, meet regulatory requirements and perform real-time emissions monitoring of the gaseous composition emitted from the engines on the FPSO.

The installation of a CEMS allows the operator to monitor the emissions of the fuels being burned by vessels. This information helps determine the need for scrubbers to reduce CO_2, NOx and SO_2, which are required to meet IMO international maritime standards.

The FPSO CEMS that was selected is a system which is custom-engineered for the analysis of samples taken from various different streams. As the samples from these streams are laden with moisture, due consideration has to be taken to ensure all sample stream components are kept in the same gaseous phase.

Hence, all sample streams are heated from the sample take-off points and also kept hot to prevent unwanted condensates within the system using the AISI 904L sample tubings. A sample conditioning system is used to properly condition the sample to suit each separate analysis by different analysers.

The sample system is designed to ensure quick response to the change of samples taken from each sample point. The sample conditioning system and analysers are housed in an IP65 weatherproof CEMS enclosure made of 316SS material. A Programmable Logic Controller (PLC) is used to perform certain functions within the sample conditioning systems.



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An on-demand request to the PLC will activate the pneumatic blowback, typical of CEMS with high particulate content that may clog the sample filters at the respective take-off points. This blowback feature was implemented within the design of the sample conditioning system to clean the respective filters at the sample take-off points. The electrical components of this whole system met the requirements of ATEX Zone 1, Gas Group IIA.

The space limitations in a tightly knitted FPSO do not allow placement of an analyser house, so using an explosion-proof CEMS is most appropriate because it has a small footprint. In addition, the analysers used in CEMS do not require air conditioning since they are designed to be suitable for up to 50 deg C ambient temperature.

Air conditioning takes up space and generates heat, and the need to meet ATEX certification means a more expensive type of air conditioning system is used. The simplicity and reliability of the self-contained CEMS the company selected made it an ideal choice for these demanding marine applications where the FPSO is deployed.

Pollution Reception Facility

Another application for a large on-shore marine pollution reception facility, located in Southeast Asia, for the collection and disposal of hazardous waste highlights how CEMS can also be the go-to technology for these challenging requirements. The regulatory body requires that the emission data from the incinerators be reported daily, so continuous monitoring is required.

At the same time, the facility required a flexible system that could be moved easily, in case future growth requires relocating the control room or other facilities. To install a wired CEM system now and potentially move it later would be an inefficient and wasteful use of budget. The solution for the facility was an innovative wireless configuration.

As with the shipboard CEMS, the system devised for the facility used a sample probe to extract gas from the flue gas stack which was then conditioned using a sample handling system. The CEMS consists of process gas analysers, oxygen/combustible analysers and opacity monitors as required by the application. Wireless adaptors connected to each analyser system transmit data wirelessly to the control room.

The system takes advantage of the IEC 62591 (WirelessHART) international standard for industrial wireless communications. In its self-organising mesh network topology, every device in the network can also pass information for its neighbouring devices, so if something disrupts communications between two devices, the network automatically provides an alternate path.

Therefore, changes to the plant's configuration no longer interfere with transmission paths. As a result of this highly flexible system, the facility would be able to relocate the CEMS and add additional analytical measurements should expansion or application requirements demand.

Maritime applications are just one example of the flexible, cost effectiveness of CEMS at work. Whether wired or wireless, CEMS are an ideal solution for meeting country-specific requirements for emissions reporting throughout Asia. Continuous emissions monitoring systems not only save money in installation and operational costs, but with the addition of wireless, they may greatly reduce project costs over time.