The International Maritime Organization (IMO) has designated significant portions of U.S., Canadian and French waters as an Emission Control Area (ECA). The proposal for ECA designation was introduced to curb pollution from Ships (MARPOL) extending 200 nautical miles within these territories.

Diesel engines that power ships are considerable contributors to mobile-source emissions, though most vessels are registered outside the standard jurisdiction of the EPA and similar regulatory agencies. Ships complying with ECA standards will reduce their emissions of nitrogen oxides (NOx), sulfur oxides (SOx), and fine particulate matter (PM2.5). In 2020, emissions from these ships operating in the ECA are expected to be reduced annually. Maritime operations are continually pressured to meet the continuous emissions monitoring requirements of global regulations and emissions trading programs. These requirements include periodic accuracy verification as well as near 100% monitor uptime.

When a monitoring system is implemented, the challenge for shipbuilders is that the system must meet these various regulatory demands yet be cost-effective to operate and maintain.

Rockwell Software recognizes these challenges and offers an application that delivers valuable emissions and compliance information to meet regulation requirements at a reduced cost.
SeaPEM Application

SeaPEM™ is a patented, model-based Predictive Emissions Monitoring System (PEMS) that provides a certifiable, cost-effective solution and alternative to hardware-based Continuous Emissions Monitoring Systems (CEMS) for the maritime industry. SeaPEM provides a reliable emissions monitoring solution that meets worldwide regulatory requirements through a software-based application. This application combines powerful process analytical models with real-time sensor validation to provide predictive emissions values with unsurpassed accuracy.

Model-based Approach

The SeaPEM application continuously monitors emissions by means of an online model using historical and real-time data. Hybrid modeling technology incorporates non-linear empirical models as well as first principles knowledge to provide the most accurate prediction models available in the industry. These models are executed online, providing real-time predictions of emissions from diesel powered vessels. The effects of the process and ambient conditions on emissions are incorporated to offer a robust compliance monitoring system.

Patented Sensor Validation

In order to achieve the regulatory agency-mandated up-time for continuous compliance, the PEMS is required to operate in the event of sensor failure. This requires a methodology for detecting sensor failures, and if possible, compensate for those failures. This requirement is easily achieved with SeaPEM’s patented sensor validations modeling capability.

Market and Industry Leadership

Based on the Rockwell Software first-to-market introduction of Software CEM® in 1992, SeaPEM is a prime example of our commitment to innovation. With more than 1000 licenses of environmental compliance and reporting across many fuel sources, each requiring yearly certification, Rockwell Software has achieved a track record of 100% compliance. Our company maintains a leadership position in mandated emissions monitoring through exceptional experience, knowledge and value-based environmental solutions. Real-time emissions monitoring can also be an input to the Rockwell Software Model Predictive Control and Optimization applications as an additional dynamic process constraint.

Sources

- Boilers
- Turbines
- Duct Burners
- Dryers
- Thermal Oxidizers
- Diesel Engines
- Process Heaters
- Olefin Furnaces
- Crude Heaters

Fuel Types

- Natural Gas
- No. 2 Fuel Oil
- Other Fuel Oils
- Refinery Gas
- Process Gas
- Combined Fuels