Consilium

When Safety Matters
Consilium – When Safety Matters

- Protecting lives, investments and the environment
- Consilium products on every 2nd ship sailing in the world
- Global market leader in marine fire and gas detection
- Leading supplier of navigation products and sensors
- 96% of our sales are export
- 35 sales and service offices in 20 countries worldwide
- 100 years in business 2012
Consilium AB
500 employees

Group central functions

Group management

Product companies
250 employees

Business Area
Marine & Safety
150 employees

Other central functions

Finance, Personne, Quality

R&D
Production
F&G Marine
Navigation
Transport Safety
Building

Market companies
250 employees

Business Area
Automation
100 employees

Global Sales and Service organisation
250 employees

Other central functions

Finance, Personne, Quality

Oil & Gas
- Automation
- Fire safety

Building Automation
Power

2014-02-14
Opsis M800 System
Market segments

Consilium Marine & Safety AB

- OEM Solutions
- Offshore Solutions
- Cargo Solutions
- Cruise & RoPax Solutions
- Navy Solutions
- Retrofit Solutions
Fire & Gas Marine Product range

Fire & Gas Marine Division

Gas Detection

Emission Monitoring

Fire Detection
Consilium navigation products

Navigation Division

- Speed Log
- AIS
- Radar
- ECDIS
- Echo Sounder
- Components
- Special Radar
- VDR
Consilium segments

Onshore Safety

Building Safety
Refinery Safety
Consilium Global Organization

Consilium Group companies in 20 countries and 36 locations

More than 50 sales and service representatives world wide

Consilium Group companies

Europe
Stockholm, Gothenburg - Sweden
Oslo – Norway
Helsinki - Finland
Hamburg - Germany
Rotterdam – Holland
Zeebrugge - Belgium
Folkstone, Glasgow – UK
Bilbao, Barcelona - Spain
Florens, Genua, Naples – Italy
Pireus - Greece

Asia
Shanghai, Dalian, Qingdao, Hong Kong – China
Pusan, Cink - Korea
Singapore
Tokyo - Japan
Hanoi, Ho Chi Minh – Vietnam
Mumbai, Vizhakapattana, Cochin – India

Middle East
Abu Dhabi, Sharja - UAE
Doha – Qatar
Dammam - Saudi Arabia

North America
Fort Lauderdale, Huston, New York, Long Beach – USA
OPSIS M800 System
Continuous emission monitoring (CEM) for scrubber applications
## Tiers

**Table 1. MARPOL Annex VI NOx Emission Limits**

<table>
<thead>
<tr>
<th>Tier</th>
<th>Date</th>
<th>$\text{NOx Limit, g/\text{kWh}}$</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>$n \leq 130$</td>
</tr>
<tr>
<td>Tier I</td>
<td>2000</td>
<td>17.0</td>
</tr>
<tr>
<td>Tier II</td>
<td>2011</td>
<td>14.4</td>
</tr>
<tr>
<td>Tier III</td>
<td>2016†</td>
<td>3.4</td>
</tr>
</tbody>
</table>

† In NOx Emission Control Areas (Tier II standards apply outside ECAs).

**Table 2. MARPOL Annex VI Fuel Sulfur Limits**

<table>
<thead>
<tr>
<th>Date</th>
<th>Sulfur Limit in Fuel (% m/m)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>SOx ECA</td>
</tr>
<tr>
<td>2000</td>
<td>1.5%</td>
</tr>
<tr>
<td>2010.07</td>
<td>1.0%</td>
</tr>
<tr>
<td>2012</td>
<td></td>
</tr>
<tr>
<td>2015</td>
<td>0.1%</td>
</tr>
<tr>
<td>2020*</td>
<td></td>
</tr>
</tbody>
</table>

* Alternative date is 2025, to be decided by a review in 2018.

**Figure 1. MARPOL Annex VI NOx Emission Limits**

**Figure 2. MARPOL Annex VI Fuel Sulfur Limits**
Upcoming regulations

- North Sea and English Channel
- North America (200nm off coast line)
- Puerto Rico and US Virgin Island
- More to come.....
Class Notations

- BV – Clean ship & Clean ship Super
- DNV – Clean & Clean Design
- Lloyds – EP Notation (Environmental Protection)
- RINA – Green Star
- GL – EP Notation (Environmental Passport)
- ABS – ENVIRO & ENVIRO+
- RMRS – ECO & ECO-S
Class Notations

- Common for all these Class notations is that is often one “light” class and one “super” class.
- All of them wants to reduce emissions to air and to sea.
- Requirements is open for interpretations but if you ask the classes monitoring is always a good thing.
- Some of them demands CEM
- All of them is amended on annual basis or when new rules enters in to force
- More ship owners gets the notations in order to get charters from the cargo holders, EP Notation will make it easier to compete for charters!
How to achieve new sulphur regulations?

• LNG Conversion
• Methanol Conversion
• Exhaust Gas Cleaning Systems (Scrubbers)
• Marine Gas Oil
Pre/After treatment devices

- Scrubbers – removal of sulphur in fuel
- **SCR** Selective **Catalytic Reduction** – Removal of NOx
- **EGR** Exhaust Gas Recirculation – Reduce NOx

+ many other things that can be made to meet regulations...

Consilium Salwico EMS will verify that you show compliance
CEMS Methods/Techniques

• **Methods:**
  • In Situ
  • Dilution extractive
  • Wet-hot extractive
  • Dry extractive

• **Techniques:**
  • DOAS
  • FTIR
  • IR absorption
  • UV absorption
  • Chemiluminescence
  • UV-fluorescence
  • and more
Challenges with extractive systems.

- Owner/crew complaining about high maintanance.
- Complicated system, hard to learn.
- How to measure all stacks within 286 seconds (when installing scrubbers)?
- Different analyzers for different gases.
- Extractive gas is currosive and highly reactive, lower lifetime.
OPSIS M800 System
Non contact gas monitoring solution

Opsis M800
Used for monitoring industrial emissions for more than 25 years!
Cross Stack In Situ Methods

+ No sampling system
+ Non-contact system
+ Normally multi-gas analysers
+ Fast Response time
+ Low maintenance
+ Low operational costs
+ Long lifetime
+ Fast Response

Extractive Methods

– High maintenance
– High operational costs
– Short lifetime
+ Cheaper Initial cost ???
OPSIS M800 System
for SO$_2$ scrubbers on ships

- No contact with gases (sample free)
- One Analyzer for multiple ducts
- Long life time
- No heated cable needed
- Low maintenance
- Easy installation
Light source/Emitter

Purge air

Flue gas

Fibre optic cable to analyser

Receiever

Purge air
Scalable - Multiple ducts

- One analyser
- Fast response
- No heated cable
- No cooling
- Only fiber optic cable needed
No sampling = Low lifetime cost

- No pumps, filters, scrubbers, valves/heated lines
- No chemical reactions in the sample line
- Easy to install
- Low energy consumption
- Low maintenance
- Low lifetime cost
Specifications

- Dimensions (W x D x L): 600 x 800 x 2140 mm
- Weight: 250 kg
- Power consumption: 1,5 kW (standard setup)
- Voltage supply: 230 V (+6% -10%)/ 115 V (±10%) 50/60Hz
- Ambient temperature: 0 to +55 C°
Reports

- g/kWh
- ppm
- kg
- %
- % m/m
- **SO2/CO2 ratio (ppm/%)**
- Other reporting available
Consilium OPSIS M800 System for use in seawater scrubber systems on RCCL Liberty of the Seas.
OPSIS M800 analyser for SO2/CO2 installed at Hamworthy/Wärtsilä full scale test scrubber system in Norway, 2012.

The OPSIS M800 system with its non-contact measurement solution has been proven reliable and accurate in comparison with other monitoring systems.

Approved for marine use
Why Consilium’s OPSIS M800 System?

- High-performance, cross-duct monitoring using DOAS
- Cost effective multi-gas and multi-path capability (combined CEM and process control)
- Fast response time for control of scrubber function (dry and semi dry systems)
- Can operate in high dust and high temperature conditions
- No sampling!
- Low energy consumption
- Low maintenance
- Upgrade capability for meeting future demands (NO\textsubscript{X} etc)
- Hundreds of systems installed worldwide (onshore)
- High reliability, with many systems operating for more than 15 years
- DNV approved and certified for the new EC regulations (AR600/650) Cross stack, non-contact design for use in salt water scrubbers