



## Project: On-line TOC-analyser system for oil contaminated waste water

**Project** : TOC-analysis of Waste Water  
**Type of Industry** : Petrochemical / refinery  
**Delivery** : Q3 2007

General description of this TOC-analyser system:

The analyser system continuously measures the Total Organic Carbon content in the process waste water. The cycle time is less than 5 minutes in which it alarms as soon as the water gets contaminated by oils or/and hydrocarbons. The waste water is discharged via a big sewer system. Via a rugged submersible pump system water is transported with high velocity to the analyser system. Via an insertion probe and using an anti-isometric method the analyser sample is extracted and, at the same time, big particles are separated. If accidentally oils or hydrocarbons leak into the sewer system, this "spill detector" will alarm immediately.

Process conditions:

The waste water temperature is between 10 and 30 degrees Celsius. The waste water can contain dissolved oils, acids, caustics, carbonates and also free (floating) oil.

The main project parts are:

- Analyser walk-in shelter: industrial quality; ambient temperature -20 to + 45 degrees C.; Material: GRP-sandwich with PU-foam insulation; Dimensions: (wxdxh) 2000 x 2000 x 2500 mm; including flat sun roof with overhang; 1 single door with panic bar, grounding bolts, interconnection of metal parts; 4 lifting lugs.
- Electrical power distribution panel: Main power isolation switch, located outside and near the entrance; Distribution panel; with several sections, 3-phase 400 volts and 1-phase system 230 volts sections, fuses, circuit breakers, special group for the waste water pump; Tube lightning Ex with on-off switch, wall plug sockets, interconnection boxes.
- Climate control air conditioning split unit. Heat exchanger mounted on the shelter roof.
- Fresh air inlet with adjustable grid / air outlet.
- Signals: 1 junction box with screw type terminals. Connected via signal cables to analyser analogue outputs, relay outputs, alarm of the air conditioning split unit temp. control.
- Quick-TOC analyzer; TOC-direct method: Range: 0 - 500 [mg/l C.] ; Discontinuous; injection principle with selectable injection volume, thermal oxidation. Calibration routine; 2 each 4-20 mA signal outputs, isolated, free programmable; Memory for TOC data, calibration settings, menu settings, alarms and program; Extra sensors for diagnostic tools such as: pressure sensor, mass flow meters for carrier gas inlet and outlet, humidity sensor, temperature sensors for cooler & oven etc..
- PSA; zero air unit; treats instrument air to CO<sub>2</sub>-free carrier gas.



Quick-TOC fast process TOC-analyzer



TOC-analyzer and reagent box



The Zero Air Generator delivers CO<sub>2</sub>-free instrument air



Air conditioning



Junction Box with 24 V DC power supply and terminals



The power distribution panel is built to customers specifications



The illuminance level is > 800 lux, enough to work safely





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- Reagent cabinet: safe and separate storing of additional containers with rinse water and acid solution.
- Submersible waste water pump; 3-phase - 400 volt; Ex proof, reduced impeller, a capacity of 7 m<sup>3</sup>/hour ( $V_{loop} = > 1,5$  m/s); including a SS-frame, suitable for years of service-free continuous operation, 2900 RPM. Including hardware to be able to service the pump without emptying the sewer. A lifting tool (davit) for hoisting the pump.
- Sample conditioning:  
Fast sample loop; SS O.D. 1 1/2 inch. Including piping, flanges, bows, ball valve with insertion sample probe, T-connection with grab sample outlet with ball valve. All mounted slope down and self emptying.
- Sample tube and on-off valve 6 mm O.D..
- Pump control and %-gas detector. As soon as a 10% LEL condition in the analyser house is exceeded, the waste water pump will be shut down and a beacon (flashing type) will be activated.
- Drain header: including support material.
- Junction box with screw type terminals, 24 volts DC power supply and relays.

### Project engineering & management:

- Documentation package; meets the Jacobs Engineering standards:  
Hard copy and CDROM;  
Full size manual in the English language and Quick Guide in the local language.  
Drawings, calculations, technical descriptions.
- Hands-on and maintenance manuals;  
CE-conformity and CE-certification for the complete installation;  
Drawings of sample conditioning, electrical installation and signal installation;  
Factory Acceptance Document. The FAT-document describes the acceptance procedure of the complete analyser installation at suppliers location;  
Site Acceptance Document: describes the acceptance procedure on site.
- FAT and training; on manufacturers location.
- 72-hour QMI analyser testing; the analyzer data is collected during 72 hours followed by the calculation of analyser repeatability and reproducibility;
- In-house tests prior to FAT.

### Installation and commissioning & start-up on location:

- Checking all connections of piping, tubing, electrical cables, signal cables;
- Mounting of analyser parts such as reactor tube;
- Start-up of the analyser.

### System start-up:

- Site Acceptance Procedure / On-site;
- Hands-on training; ODS will instruct QMI-operators how to operate the analyzer and the system.



Beacon (flashing type)



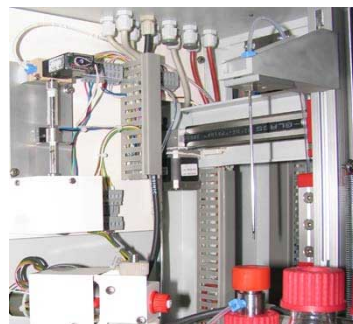
%LEL (Lower Explosive Limit) gas detector



Main switch with alarm reset button outside near door entrance



Submersible heavy duty waste water pump



TOC analyser with a XY-robot and thick needle for sample injection



Spare Parts are delivered in a special service kit



A laminated list with parts description and part order numbers.