



**Project: On-line TOC-analyzer for monitoring condensate return water quality**

**Project** : TOC-analysis of Condensate Return Water  
**Type of Industry** : Chemical factory of Aramids  
**Delivery** : Q4 2008

General description of the TOC-analyser application:

This industry is producing monomer and polymer. The end product, twaron, is used to reinforce Ignition cables, Communication cables, Heat-protection products, Cut-protection products, Ballistic-protection products, Tires, Hoses, Transmission belts etc.. The factory uses steam and hot water, generated from the close-by power plant. After passing heat exchangers the condensate water is returned to the power plant where it is prepared as boiler feed water. The TOC-analyser system is used to monitor the potential contamination of this condensate return water and alarms when it exceeds certain TOC-limits. The range of the TOC-analyser is 1 [mg/litre] C. The factory is located a few miles away from the sea. The environment is corrosive due to air salinity, exhaust gasses of close-by industries and foggy weather.

Process conditions:

The condensate return waste water temperature is from 120 to 200 degrees Celsius. The pressure is about 10 barg. The normal TOC value is about 0,15 [mg/litre C.] (about 150 microgram/litre C or ppb), so extremely pure. Due to heat exchanger leaks, the water accidentally may be contaminated. The TOC-alarm limit is set to 0,2 mg/litre C.

The main projects parts are:

- Analyser walk in shelter: industrial quality; ambient temperature -20 to + 45 degrees C.; Material: GRP-sandwich with PU-foam insulaion. Including flat sun roof with overhang; Dimensions: (wxdxh) 1750 x 1350 x 2640 mm; 1 single door with panic bar, grounding bolts, interconnection of metal parts, 4 lifting lugs;
- Dedicated electrical power distribution panel: with several sections, 1-phase 230 volts, fuses, circuit breakers, special group 3-phase 400 volt for the air conditioner and heater; Tube lightning with on-off switch, wall plug sockets, interconnection boxes.
- Climate control air conditioning split unit. Heat exchanger mounted on the shelter roof. Withstands corrosive environment
- 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.
- Low range TOC analyzer; TC-loop injection method: Range: 0 - 1 [mg/l C.], sensitivity 0,02 [mg/litre C.]; Discontinuous; multi loop injection, thermal 1200 degrees C. 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 and oven, etc..



The analyser shelter is suitable for all weather types



Complete analyser package shipped by ODS



Commissioning and start up of the TOC-analyser by ODS engineers



The sample line is only 1/4 " OD and is supported via a duct



A pre-filter unit to take out big particles and keep sample lines clean



Sample extraction and sample conditioning



Hot condensate return water is pumped to the boiler



## Project: On-line TOC-analyzer for monitoring condensate return water quality

- Drain header: including support material.
- PSA; zero air unit based on pressure swing adsorption; treats instrument air to CO<sub>2</sub>-free carrier gas. The analyser does not use any other gasses or fluids.
- Primary filter unit; located close near sample take-of point. This stainless steel pre-filter removes particles to avoid fouling of the sample transport line. Fouling causes absorption.
- Sample conditioning panel:  
The sample conditioning consists of: a pre-filter, a sample cooler by use of (tap)water, high temperature shut-off valve, by-pass with needle valve, pressure reducer, manometer, temperature meter, fine particle filter to avoid TOC freak peaks, flowmeter with sample flow limit alarm.
- Sample transportation via stainless steel tube; 4/6 mm ID/OD. Velocity at least 0,5 m/s to avoid absorption of hydrocarbons and speed up analyser response time.

### Project engineering & management:

- Documentation package; Hard copy and CDROM;  
Quick start-up guide (in the local language). Full size manual in the English language;  
Drawings, calculations, technical descriptions.
- Hands-on and maintenance manuals;  
CE-conformity and CE-certification for the complete installation; including risk analyses.  
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 workshop;  
Site Acceptance Document: the SAT-document describes the acceptance procedure on site.
- Training at analyser manufacturers location.
- In house tests prior to shipment.

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

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

### System start-up:

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



Pressure Swing Absorption is used to remove CO<sub>2</sub> from instrument air



Sample conditioning panel to reduce temperature and pressure



TOC-analyser with loop injection principle; range 0 -1 ppm TC



An air conditioner split unit is part of the analyser house package



Hands-on training of maintenance personal in the analyser factory



A flat roof with overhang (sun roof) reduces heat irradiation



Nice and handy. A SS sink for cleaning purposes