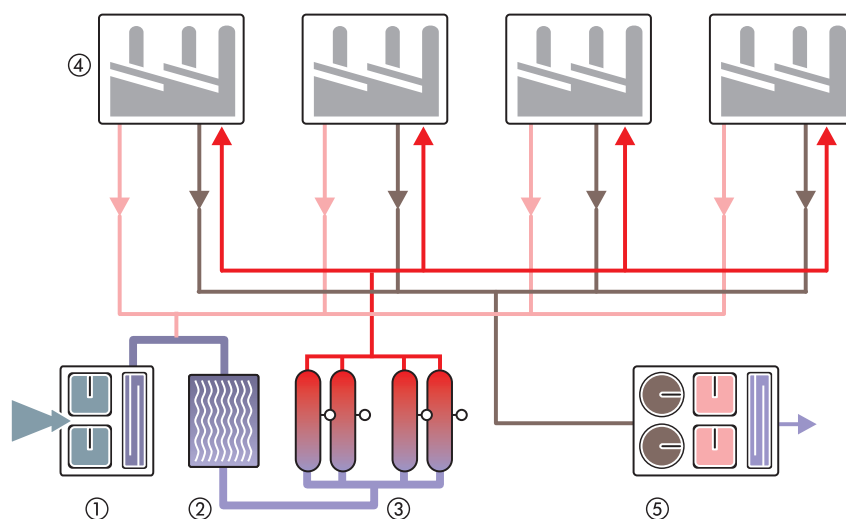


TOC water/wastewater treatment applications in chem/petrochem

application note

Chemical and petrochemical plants consume large amounts of steam and consequently large amounts of power to generate steam. The steam is used for power generation, and for cracking hydrocarbons in preparation for further processing.

Typically, a large plant (owned by a company like Hoechst, Ciba-Geigy, DuPont, BASF, Henkel, Rhone-Poulenc, Union Carbide, Exxon, etc.) is divided into business units, which are responsible for the fabrication of a particular raw material (polypropylene, polyethylene, acids and caustics), or for refinement of product (Teflon, Kynar, fertilizers, cleaning agents and specialty chemicals). The business units are individually responsible for their own productivity and efficiency, based in part on steam consumption. A central steam plant feeds all of the business units at a particular site, and charges the business units according to their usage. See Fig. 1.



Typical business unit configuration: municipal or ground water is treated (1), then polished (2). Steam is generated (3) and distributed to each business unit at the site (4). After use, steam is returned for repolishing or waste treatment (5).

Steam condensate recirculation

It is much more expensive to do the initial cleanup than the polishing. Therefore, water is repolished and recirculated as much as possible. After use, if the steam is sent to the wastewater plant, it is considered consumed, and the business unit is charged the complete cost for it. If the steam can be

reused, the business unit receives a credit for the returned steam. In many plants, the business unit receives a higher credit if the steam is monitored for TOC. This not only makes the use/reuse decision automatic, it provides a gauge for the amount of cleanup that will be necessary. Therefore, it is in the best interest of all concerned that the return steam be monitored.

To be repolished, the water must be relatively clean; a low-level monitor is required. We recommend the autoTOC 1950plus in low-level (0–5 mg/l or 0–10 mg/l) configuration, installed between the condenser or cooling tower and the return line.

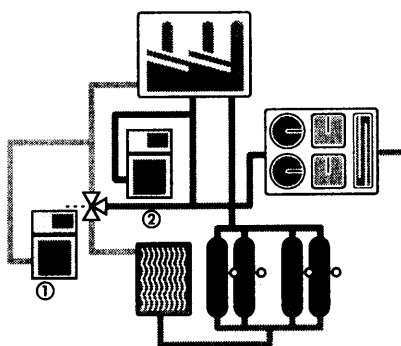


Fig. 2 Typical installations for business unit applications. The 1950plus (1) controls the decision to repolish or waste; it also serves as a leak detector. The 1950plus (2) is employed as a separate measurement for business unit auditing.

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Leak detection

Although it is expected that the steam will accumulate some organic material as a result of exposure to the process, an excess of organics in the used steam is evidence of a leak in the heat exchangers used in some processes.

Wastewater assessments

The main contaminant to the steam is likely to be organic material, so the business unit pays for the removal of organics from the waste stream. Water that is sent to the treatment plant is measured for TOC so that the business unit is charged fairly for cleanup. This measurement is typically performed by the autoTOC 1950plus, installed in the water line between the business unit and the waste stream.

Remember that each business unit is judged on its own profitability. Therefore, it is in the best interest of each business unit manager to make sure that his steam is measured separately, and that he is not charged for cleaning up someone else's mess. This means there are opportunities at each business unit, not just a single wastewater monitor for the whole plant.

Additional measurements

- Pretreatment of the source water also means abundant Polymetron applications prior to steam generation.
- The steam generation plant often supplies electrical power to the plant by means of turbines; Polymetron applications for power generation apply.
- Wastewater treatment means suspended solids and blanket level measurements, as well as DO, pH, nitrate, ammonia and phosphate. And don't forget TOC at the plant outlet.

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