Continuous Sulphide (S^{2-}) Monitoring and Control in a Brewery (Italy)

Background

Birrificio San Giorgio (UD), part of Royal Unibrew is a brewery plant in north-east of Italy.
They have a production capability of 100 M Liter per year, with two bottling lines for cans and glass bottles.

The brewery operates in Italy under **strict environmental discharge regulations** for wastewater.
One critical compliance parameter is **sulphide (S^{2-})** due to its impact on:

- **Odor emissions** (H_2S / “rotten egg” smell)
- **Corrosion** of sewer infrastructure and plant equipment
- **Environmental compliance risks** potentially leading to fines and production restrictions

the WWTP configuration combines: anoxic environment, organic matter and yeast. This causes an almost immediate formation and stable persistency of reduced species: S^{2-}

$$SO_4^{2-} + (CH_2O)_n \rightleftarrows H_2S + HCO_3^-$$

During a due diligence phase following an ownership transition, the environmental authority reported **average sulphide concentrations of 6.16 ppm**, exceeding the permitted limit of **5 ppm**.

Origin of Sulphide in Brewery Wastewater

Sulphide formation was traced to multiple brewery-specific sources:

- **Cleaning and sanitization of filters and production lines**, where residual organic matter promotes anaerobic conditions
- **Sulfate-reducing bacteria** activity under low oxygen conditions
- **High TSS and turbidity**, which prevent reliable indirect measurement

Historically, sulphide monitoring relied on manual cuvette tests, which only provided spot measurements and limited process control capability.

Challenges

The brewery faced several operational and compliance challenges:

- **Lack of continuous measurement**, resulting in delayed detection of sulphide peaks
- **Manual testing**, which is labor-intensive and reactive
- **Indirect monitoring attempts**, initially considering only LDO and ORP probes, which could not reliably quantify sulphide
- **No automated control**, leading to inefficient and sometimes excessive chemical dosing

This situation increased compliance risk and operating costs.

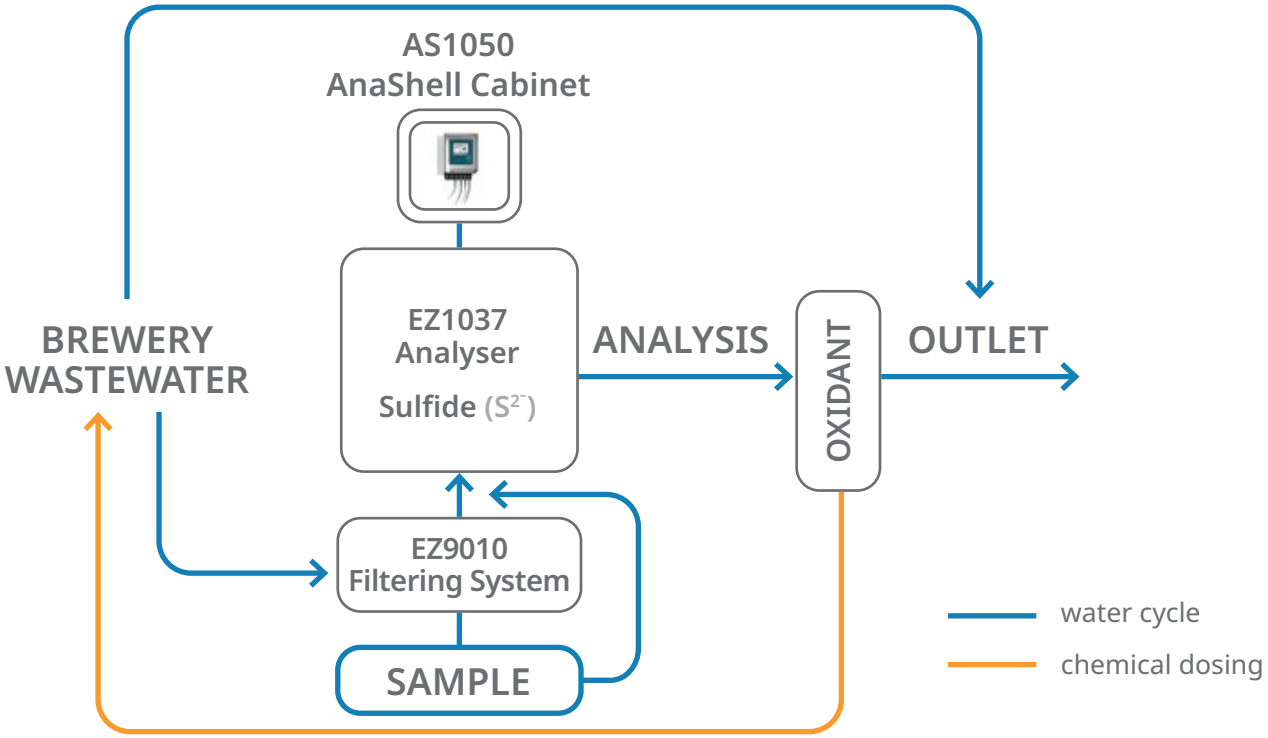
Solution

Following an on-site inspection and process assessment, Hach proposed a fully integrated turnkey solution providing continuous sulphide measurement and automated control.

System Configuration

- **EZ1037sc Online Sulphide Analyser**
  - Direct, continuous measurement of sulphide (S^{2-})
  - Stable performance even with high turbidity and TSS
- **EZ9010 Filtration System**
  - Protects the analyser and ensures representative sampling
- **AS1050 AnaShell Cabinet**
  - Compact and weatherproof enclosure for industrial environments
- **Automated Oxidant Dosing Control**
  - Sulphide values used directly for chemical dosing feedback
- **External pH Sensors**, integrated via HCNB
- **Claros Platform Integration** for visibility and diagnostics

Process Description



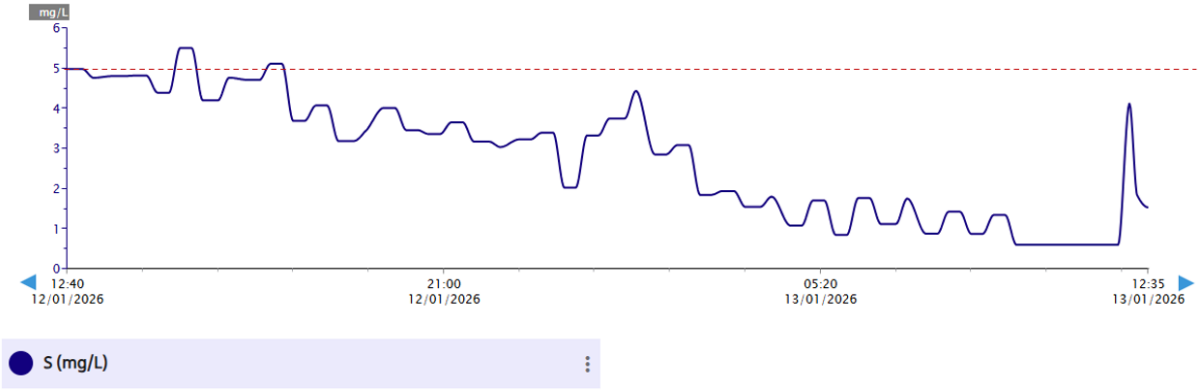
Wastewater flow sequence:

1. Brewery wastewater is extracted from the production line outlet
2. Sample is conditioned via the **EZ9010 filtration system**
3. Sulphide concentration is measured continuously by the **EZ1037sc analyser**
4. Real-time data controls **oxidant dosing** automatically
5. Treated effluent is discharged in compliance with regulatory limits

Process Description

Aspect	*Manual Cuvette Tests*	*EZ1037sc Online Analyser*
Measurement frequency	Periodic	Continuous
Response time	Delayed	Real-time
Labor requirement	High	Minimal
Accuracy	Sampling dependent	Process representative
Process control	Reactive	Proactive & automated
Compliance risk	Elevated	Significantly reduced

Performance Results



- Reliable sulphide measurement **even with high NTU and TSS peaks**
- Strong correlation with:
  - Customer LCK cuvette tests
  - Independent external laboratory analyses
- Stable response during over range conditions

The system consistently maintained sulphide concentrations **below discharge limits.**

Benefits to the Customer

- **Regulatory compliance** through continuous control
- **Reduced odor and corrosion risk**
- **One single supplier** for laboratory and process solutions
- **Lower operational effort** and reduced manual testing
- **Optimised oxidant consumption** through real time feedback
- **Fast installation and flexible system layout**

Business Impact

- Turnkey solution replaced indirect measurement concept
- Strengthened customer trust and long term partnership

Conclusion

Continuous online sulphide monitoring with the **EZ1037sc** enabled the brewery to shift from reactive laboratory testing to **proactive, automated process control**, ensuring compliance, improving operational efficiency, and reducing environmental risk — even under challenging wastewater conditions.