

"Time Sharing Analyzers"



Time sharing analyzers are common practice in water chemistry instrumentation. The term, "time sharing analyzers", refers to using one analyzer among multiple sample streams on a time share basis, in lieu of dedicating one analyzer to one sample stream. Time sharing of analyzers affords the user significant cost savings and performance advantages. This article describes the types, cost and performance advantages, proper applications, typical system arrangements, and field experiences of automated analyzer time sharing.

There are two methods of time sharing any analyzer. The first and most common method is switching (or "sequencing") sample streams one at a time to an analyzer. Stream switching is the least expensive and may be performed in most applications where a moderate sequencing frequency (i.e. more than approximately one minute cycle time) is acceptable. The second method is to switch the electronic signals from sensors one at a time to an analyzer. Sensor switching may be performed at higher speeds than stream switching and requires a separate sensor for each sample stream. Stream and sensor switching may be performed manually or automatically.

Sequencing may be performed with most continuous and batch-type analyzers. Continuous-type analyzers measure the respective property, and output a real-time signal continuously (e.g. conductivity). Batch-type analyzers retain a small sample volume, perform the analysis, and then output a fixed signal (e.g. silica). The sequencing frequency, or cycle time, depends upon analyzer response time. The cycle time for stream switching also depends upon the sample valve and tube arrangement.

Time sharing analyzers offers significant cost advantages. The initial analyzer investment and associated installation costs are reduced significantly since less analyzers are required. Laboratory space requirements are also reduced when fewer analyzers are used. Customers realize a cost savings in reduced labor and material costs for analyzer maintenance, upkeep and repair. The costs of analyzer consumables, i.e. reagents and electrodes, are reduced significantly. A Midwestern fossil power generation plant determined the annual labor and consumable costs for one sodium

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analyzer totaled \$1,600. The plant had nine of these analyzers. By time sharing four sample streams with one new sodium analyzer and a Sentry Sample Sequencer, the plant reported \$5,800 annual cost savings. The plant intends to sequence the remaining five sample lines shortly.

Performance advantages are also achieved by time sharing analyzers. The use of one analyzer eliminates possible error between analyzers, and provides a precise comparison of relative values between two or more streams. For example, a single sodium analyzer, alternating between condensate polisher inlet and outlet, can resolve the onset of exhaustion with fractional ppb precision. The onset may otherwise be masked by the normal range of variation with independent analyzers. Colorimetric analyzers are subject to upscale zero drift due to cell fouling. Time sharing samples permits visual inspection by identifying relative zero and exposing zero shift when both values migrate upscale by equivalent amounts. Relative zero can be reestablished without servicing the analyzer. For example, a silica analyzer which monitors boiler water can be rinsed down regularly with feedwater to provide visual indication of relative zero.

An important factor in stream switching is the sample piping design and hardware. First, the manifolded sampling valve used to switch the sample streams to the analyzer should incorporate a design which prevents cross-contamination due to dead-legs and crevices. EPRI guidelines recommend that representative samples are obtained when sample flow is constant and continuous. Constant and continuous flow at 6 feet per second minimize errors from sample deposition inside sample tubes and deposit reentrance into the sample stream. The analyzers will also perform more accurately when provided a constant sample flow rate.

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