FILTER PERFORMANCE TESTING: STEADY VS. DYNAMIC FLOW CONDITIONS

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Any laboratory filter test must satisfy the requirement of maximum information in the minimum amount of bench time. Test procedures that help to separate the performance of automotive, lubrication, hydraulic, or fuel filters into distinct performance classes are preferred.

The multiple-pass steady-state filtration test techniques used worldwide (e.g. ISO 16889, ISO 4548-12, ISO 19438) may have a tendency to 'compress' items of interest into a narrow band where delineation of filter performance is more difficult. Downstream cleanliness is the primary purpose of filtration or separation. The steady-state procedures in wide use tend to "over reward" filter performance where efficiency at a particular micron size is most important.

When filters that have been qualified with steady-state flow are subjected to "real world" flow variations and stop/start conditions, the downstream cleanliness can suffer. Recent improvements in testing procedures (ISO CD 23369, SAE ARP 4205, for example) attempt to simulate rapid flow rate changes that can degrade actual filter performance in maintaining system cleanliness. Test rigs that can test filters under these challenging conditions help to determine the best filters for downstream cleanliness.

The challenge for test rig designers is to build a reliable and rugged test system where there is great confidence in the test results. Rapidly changing flows tend to challenge test rig hardware along with test filters. This presentation will explore the design considerations and trade-offs that must be made to produce reliable test rigs.