



Upgrade Fluid System Filter Element Monitoring to Increase Operational Reliability and Support Condition Based Maintenance Capability

Presented by
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Why the filter element?

Filters are already incorporated in all important systems to provide operational reliability.



Fluid systems such as; Transmission, Lubrication, Hydraulic, Fuel and Electronic Cooling can utilize this effective CBM process.



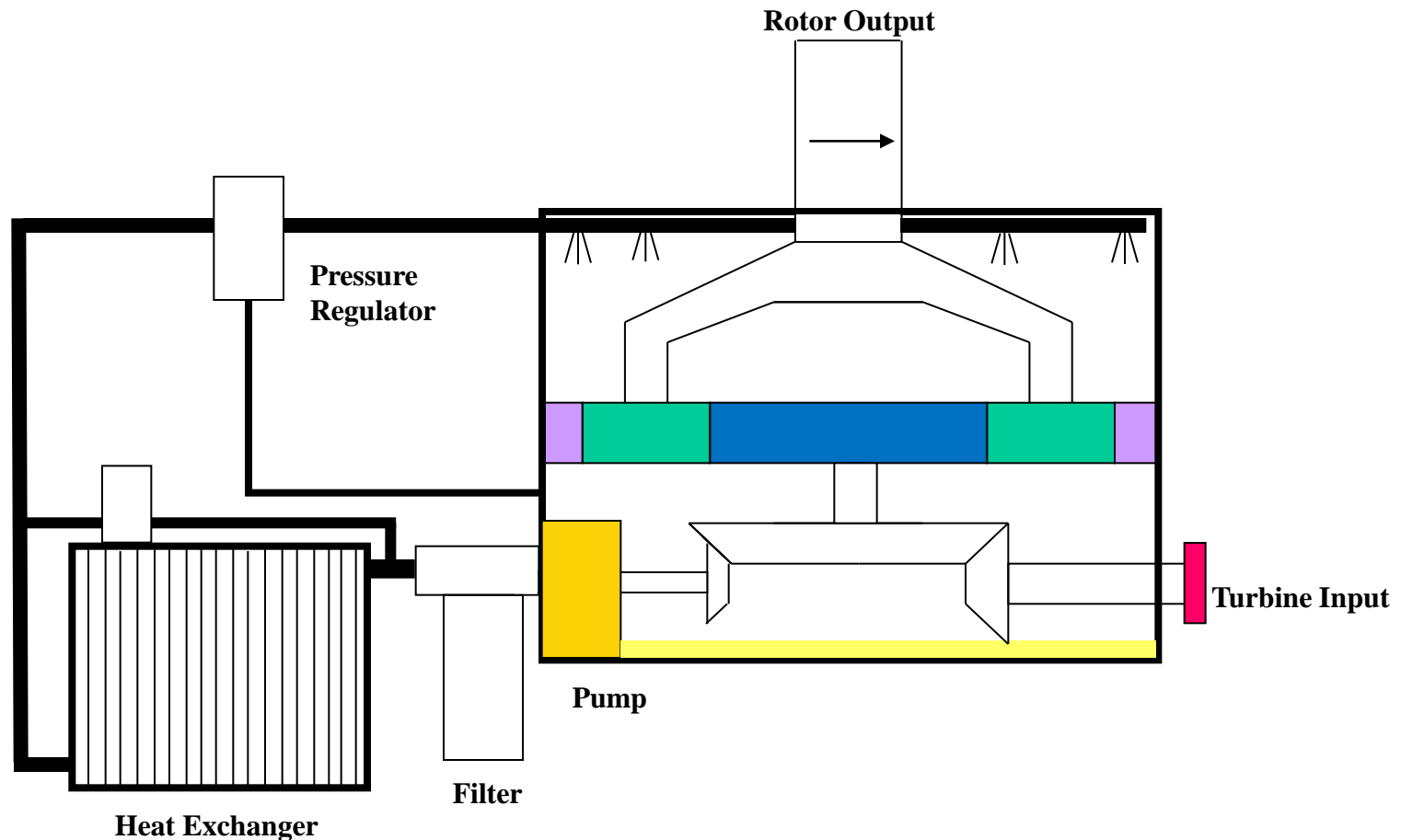
Filter Monitoring Supports CBM

In-System Filter Element Monitoring can support the following major levels of Condition Based Maintenance:

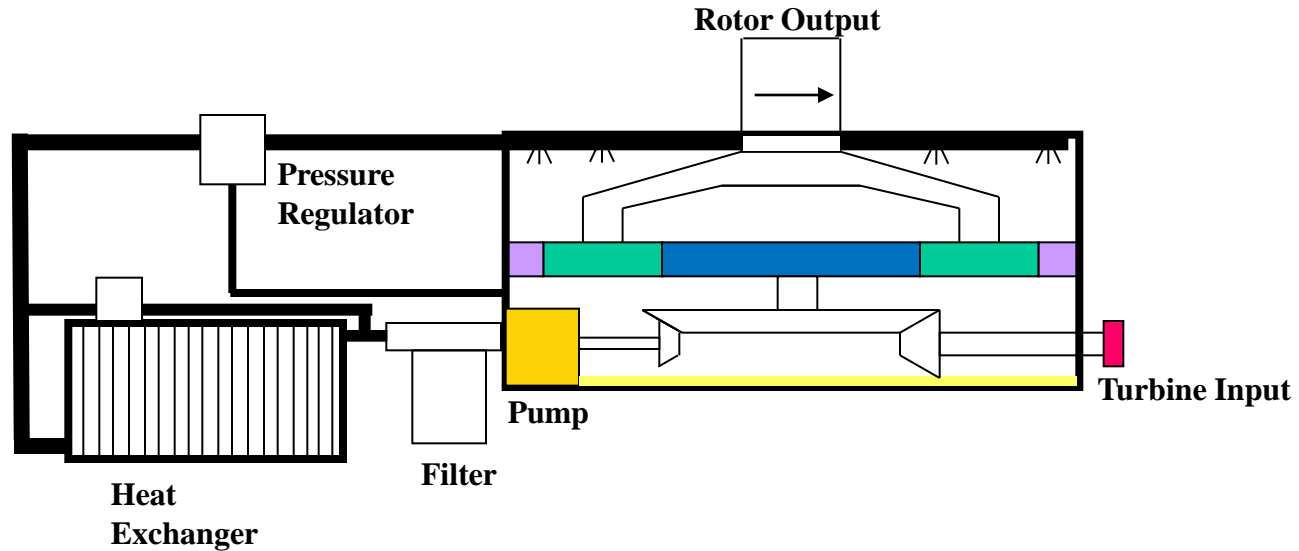
1. Identify when filter element service is required.
2. Determine the remaining filter element service life, the asset's mission availability and establish a schedule for filter element service.
3. Provide an early indication of a system fault.

Filter Monitoring Supports CBM

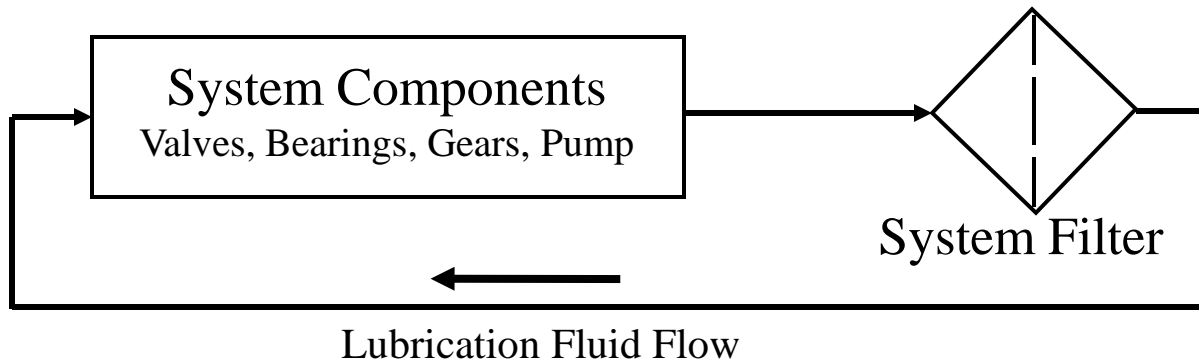
Basic Transmission Lubrication System



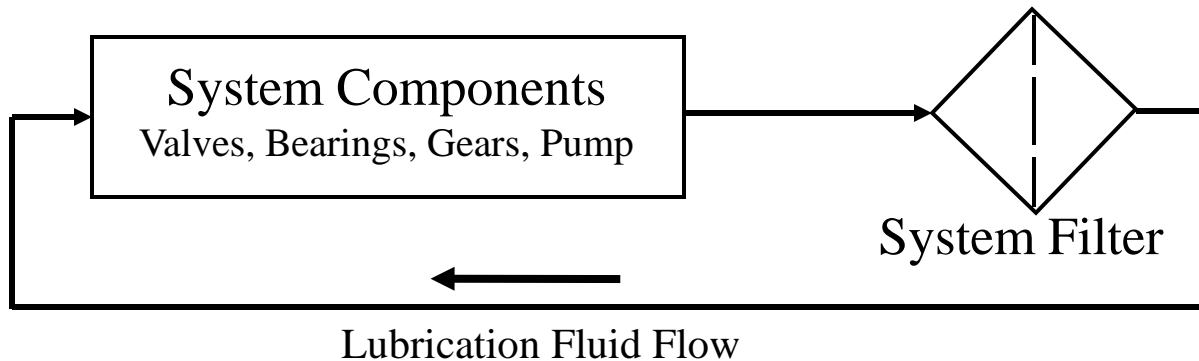
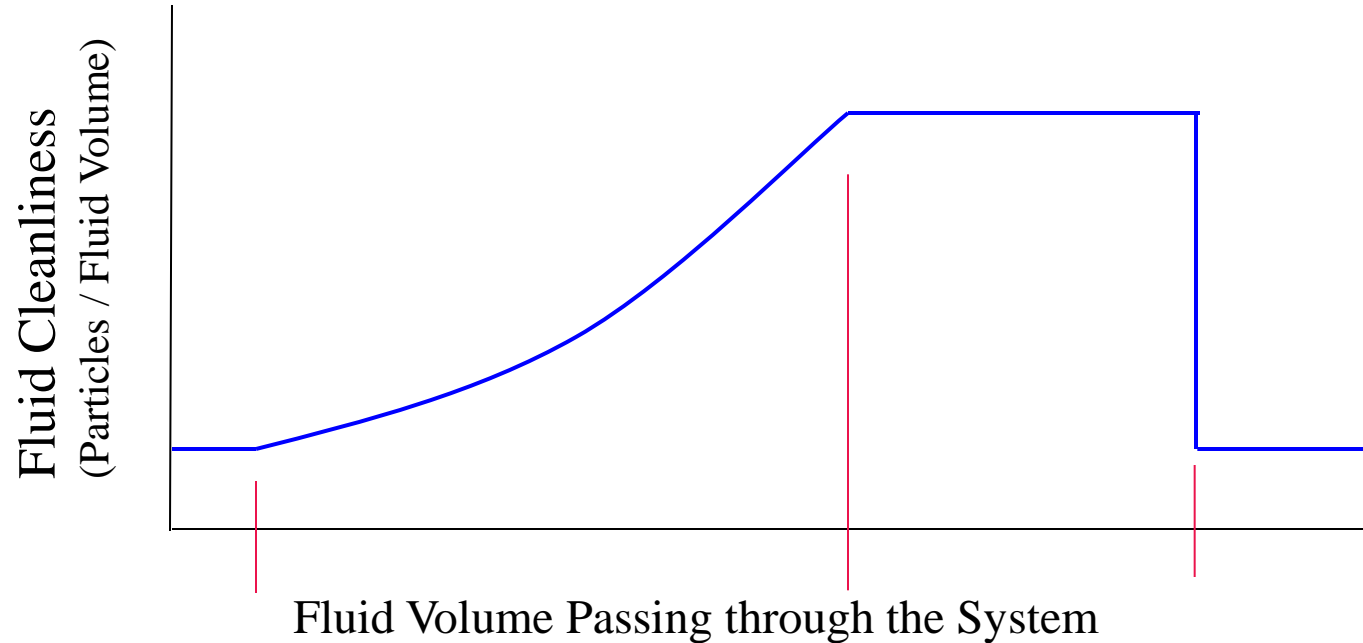
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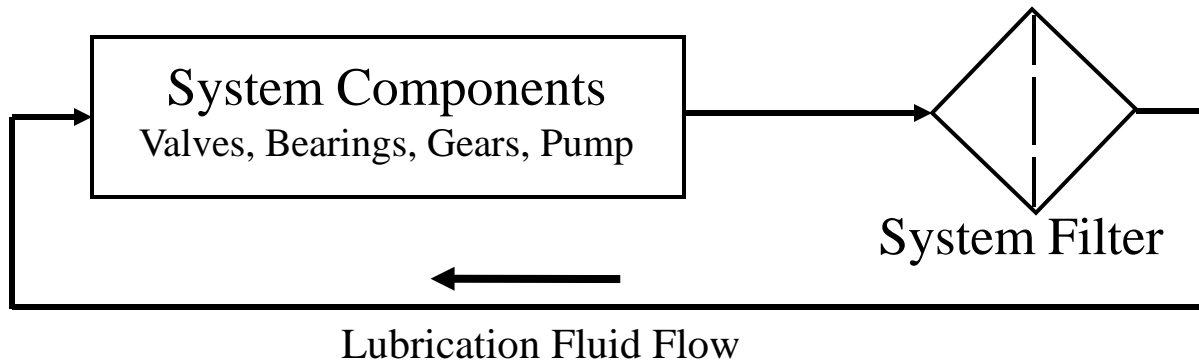
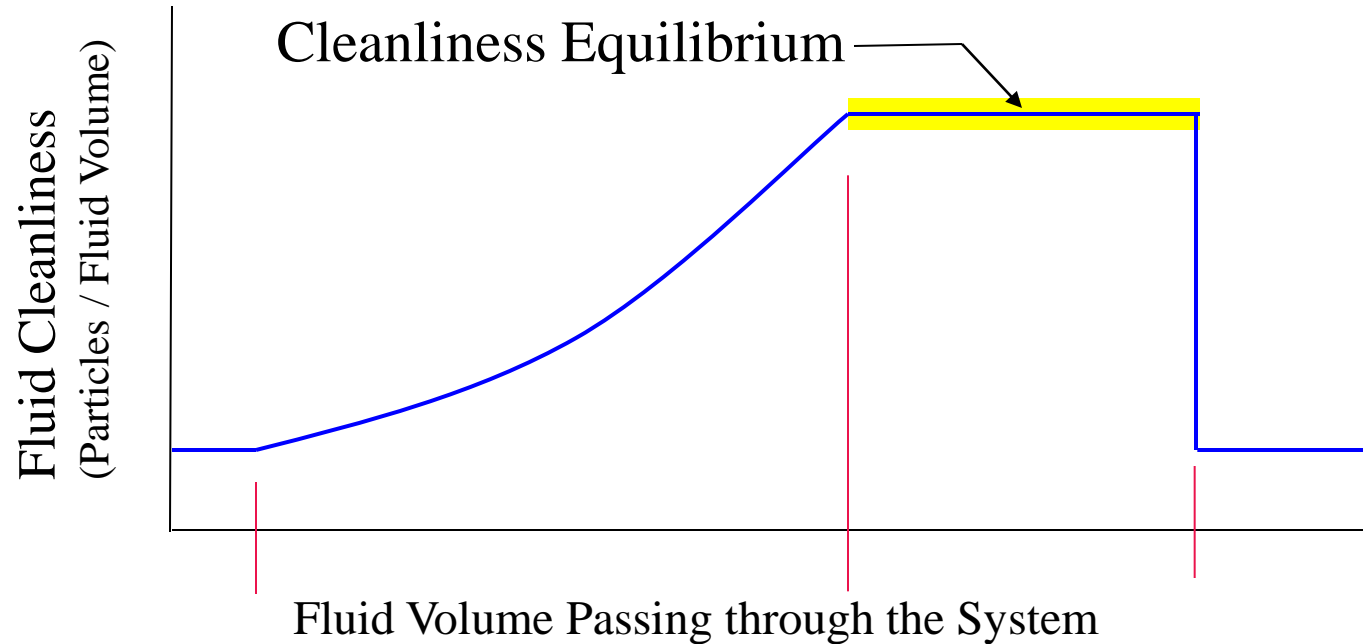
System Simplification



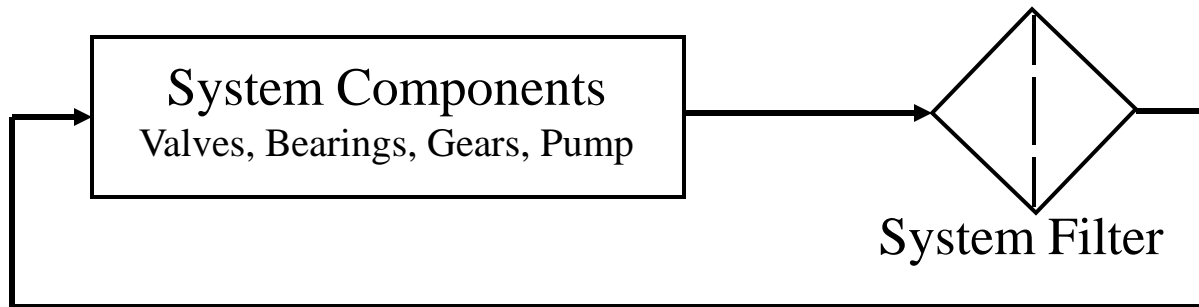
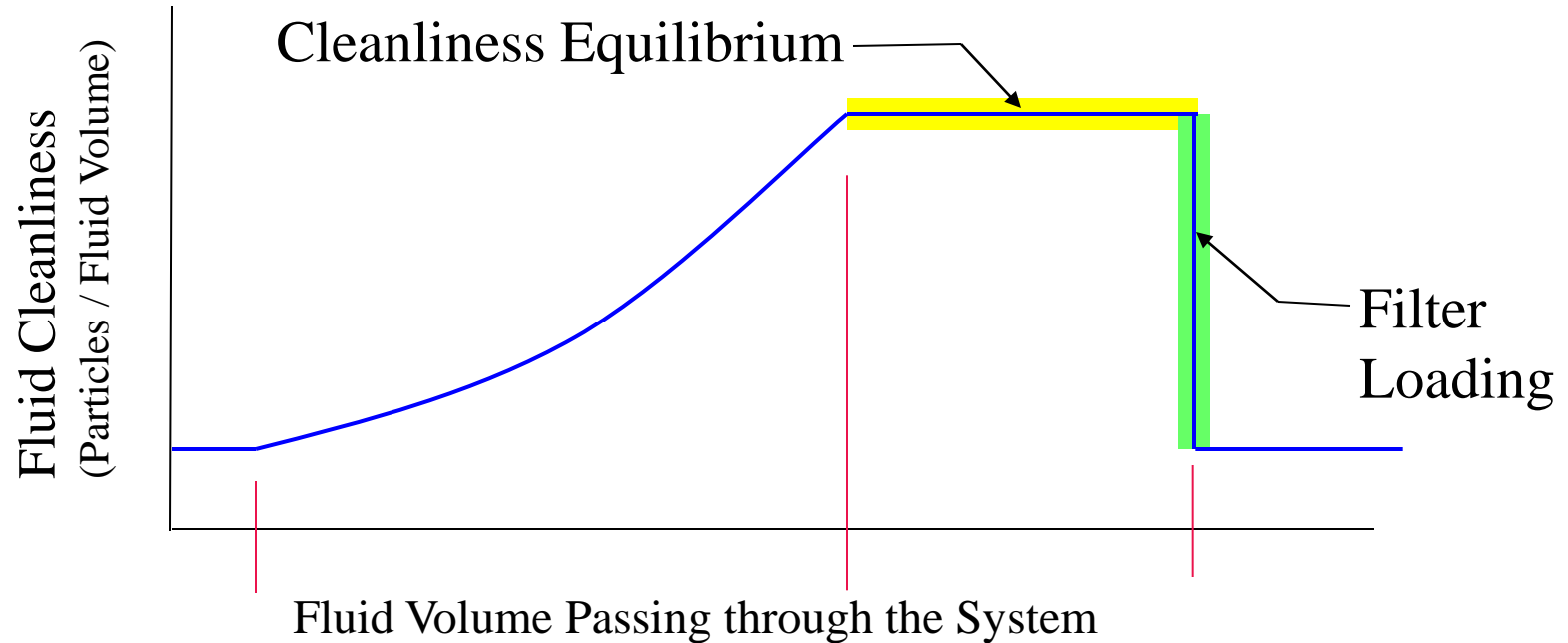
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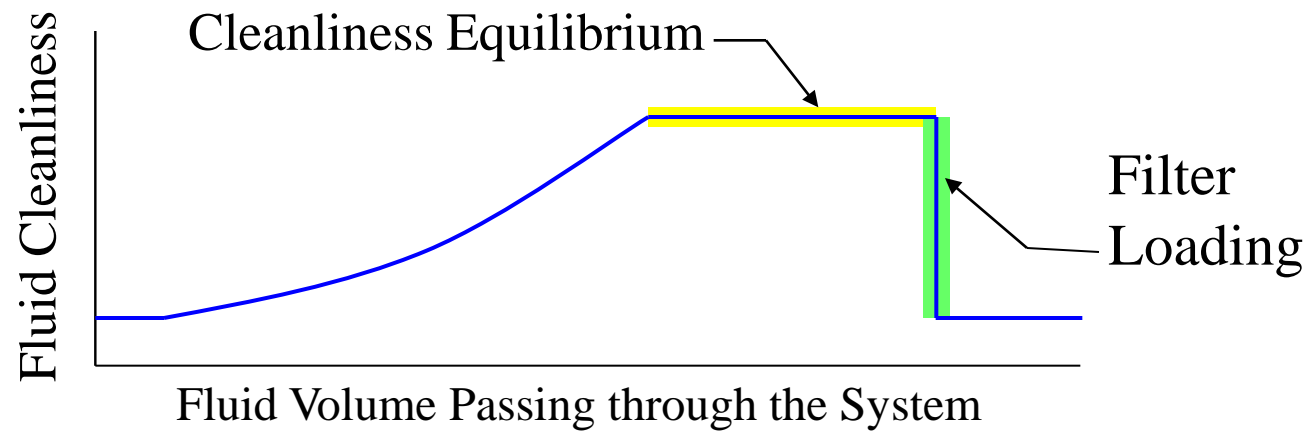


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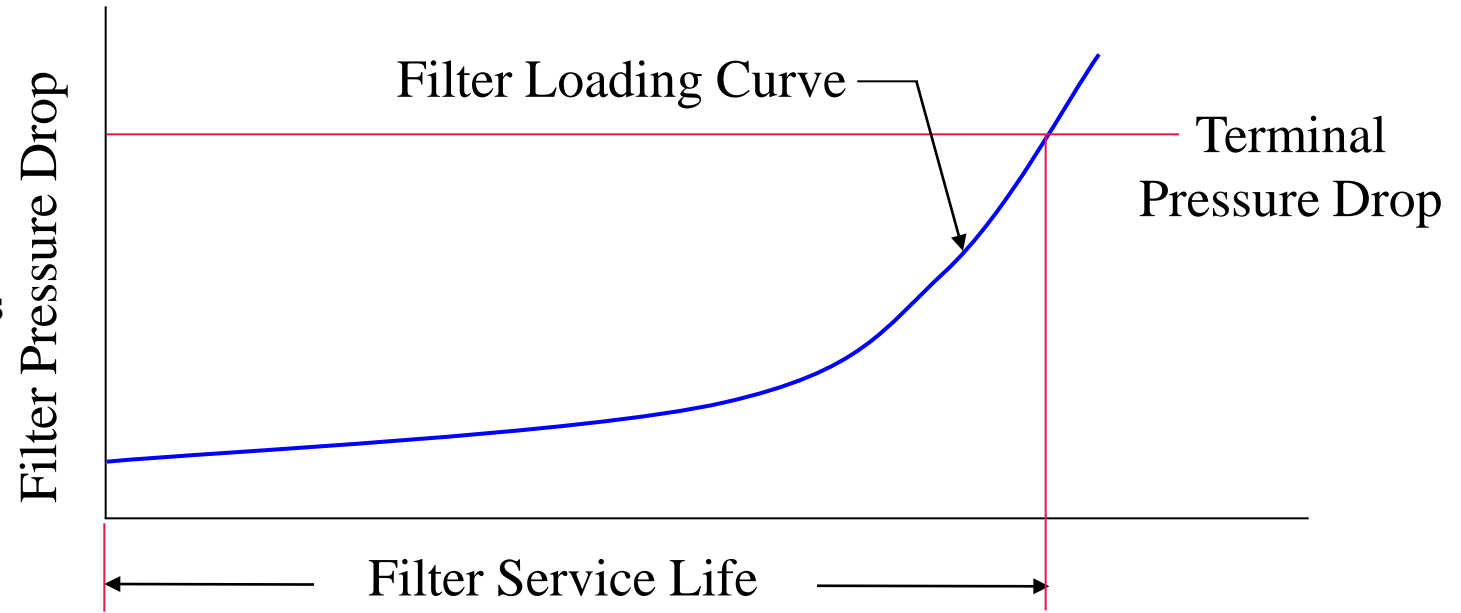


Filter Monitoring Supports CBM

Single Pass of Fluid Through The System

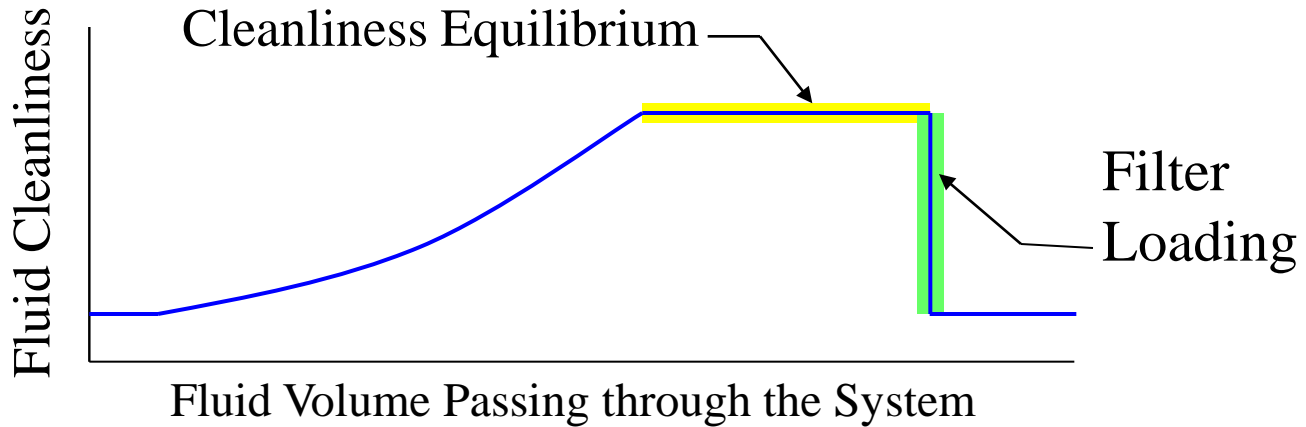


Sum of Filter Element Loadings Over Time

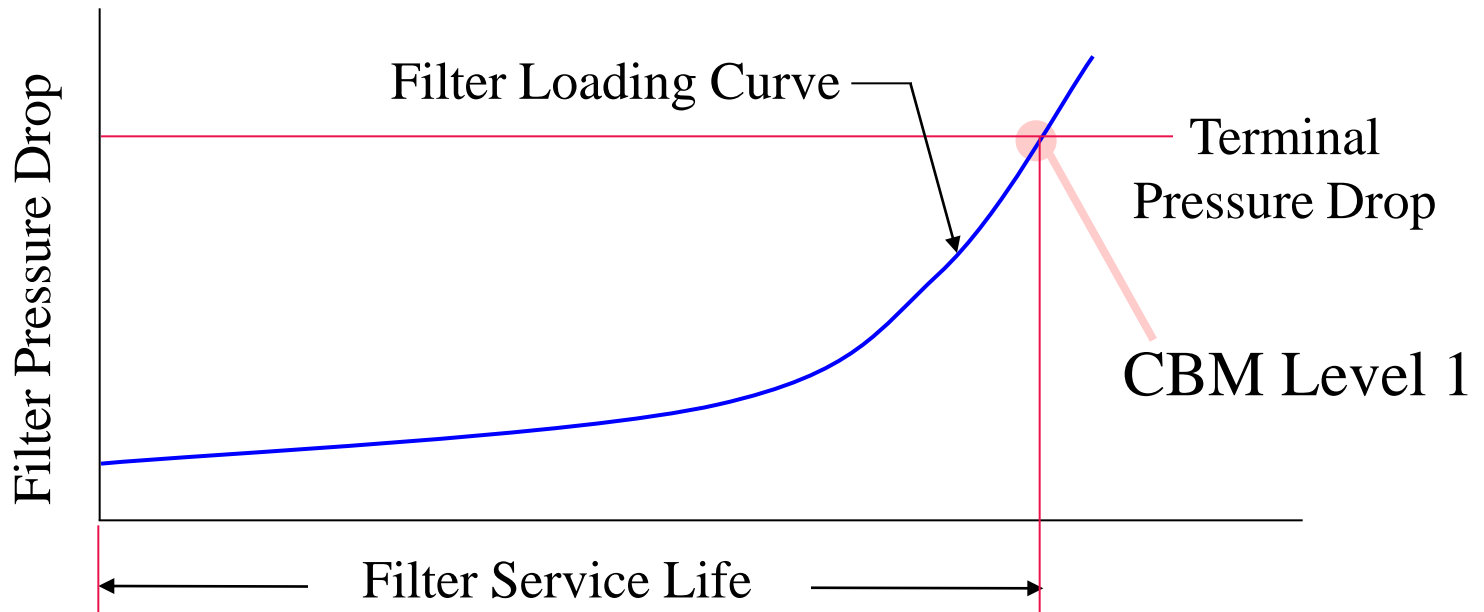


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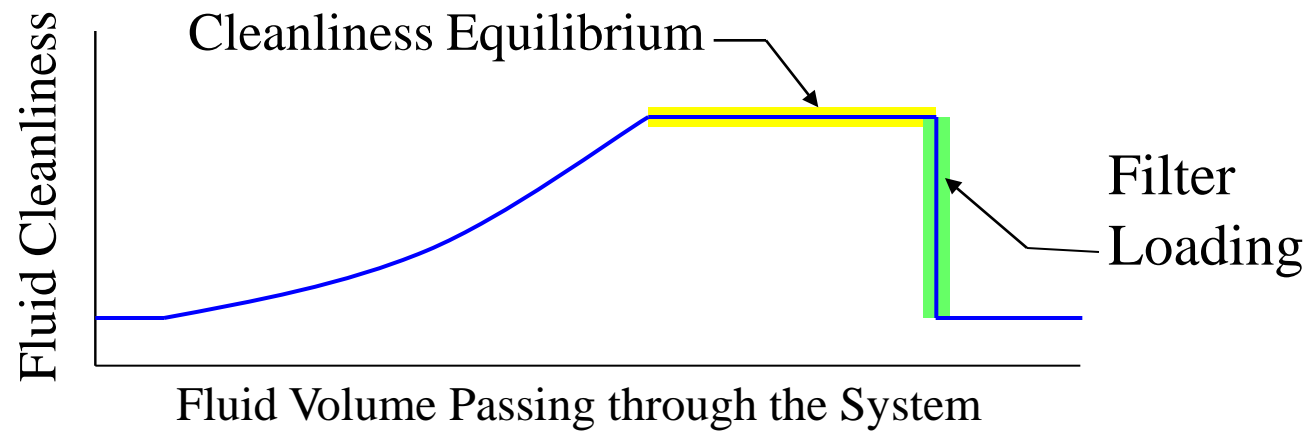


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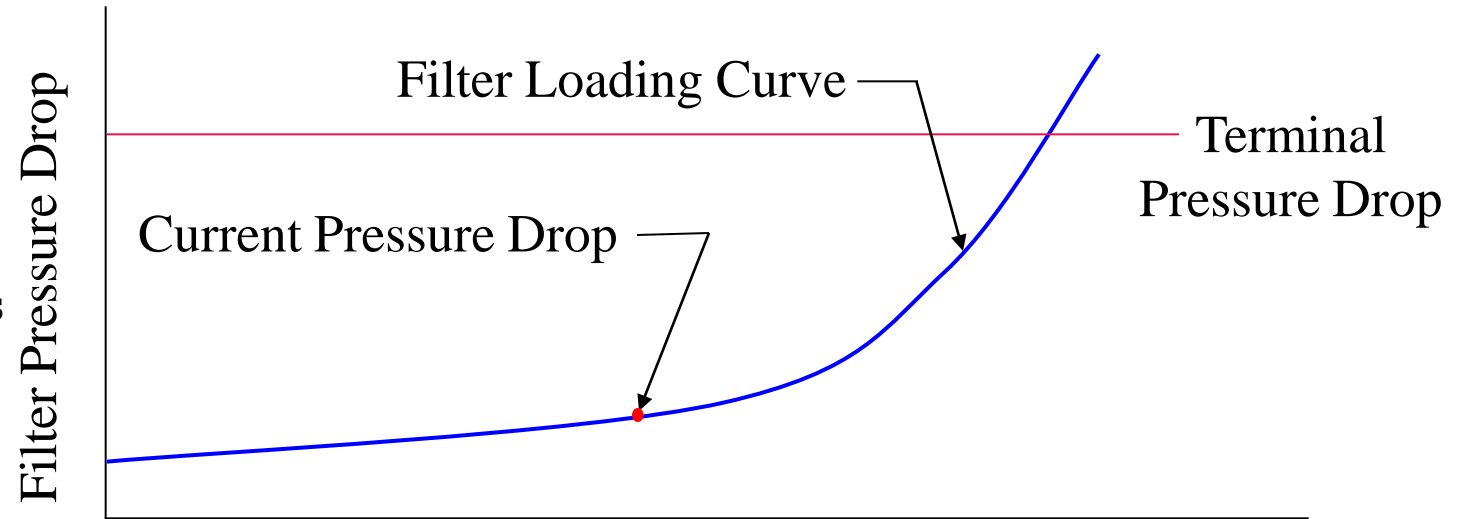


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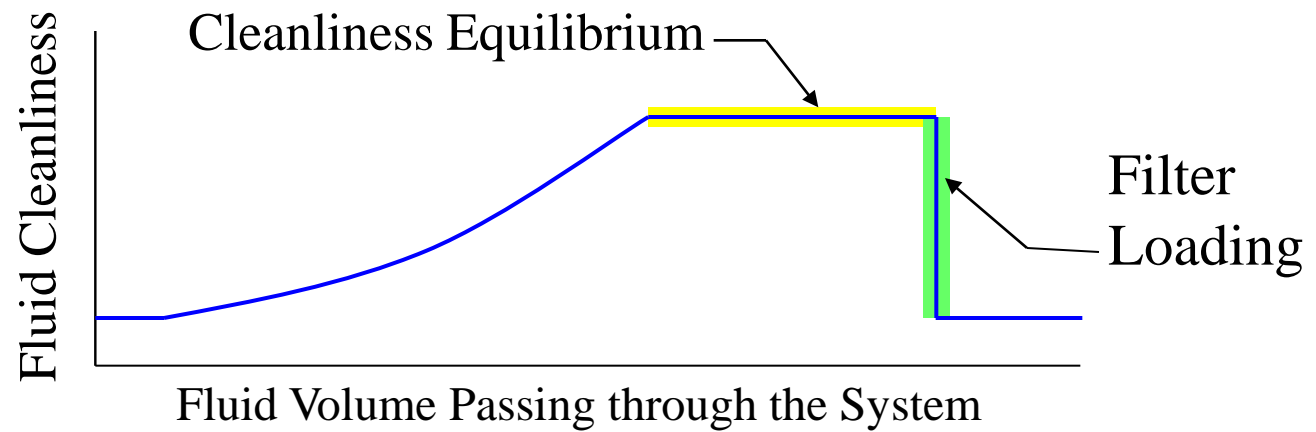


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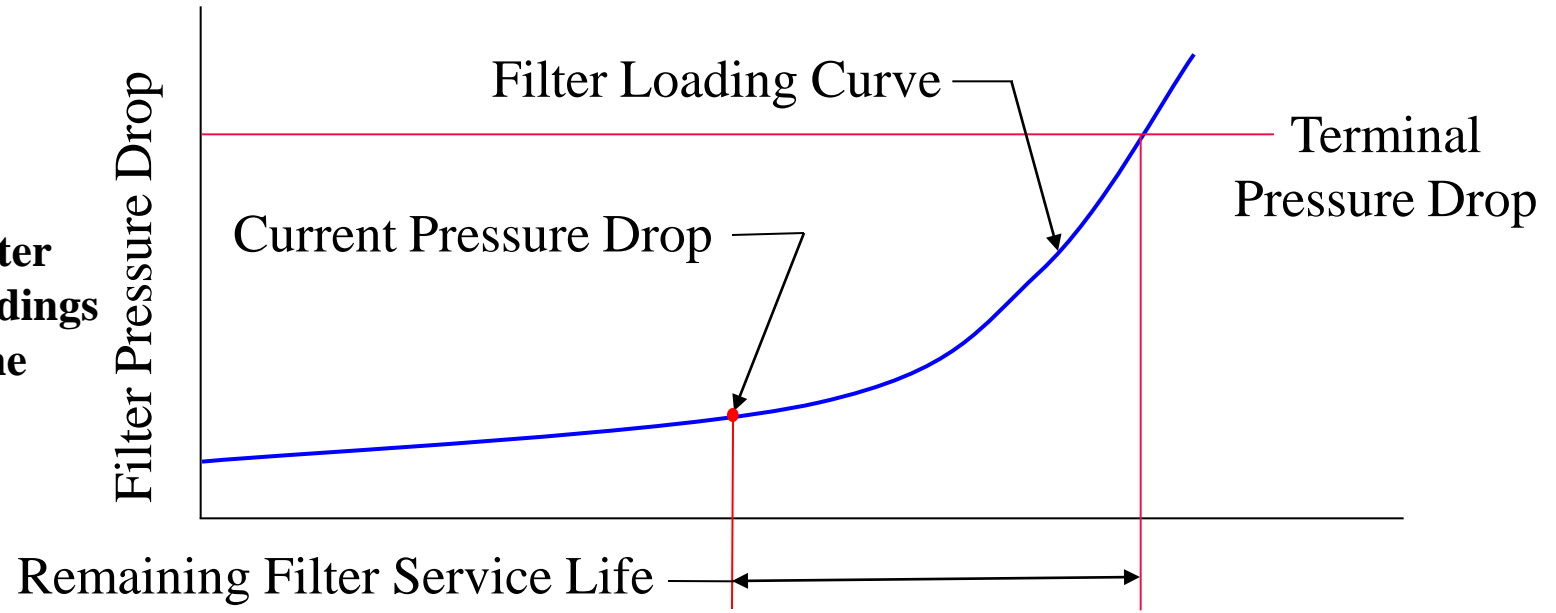


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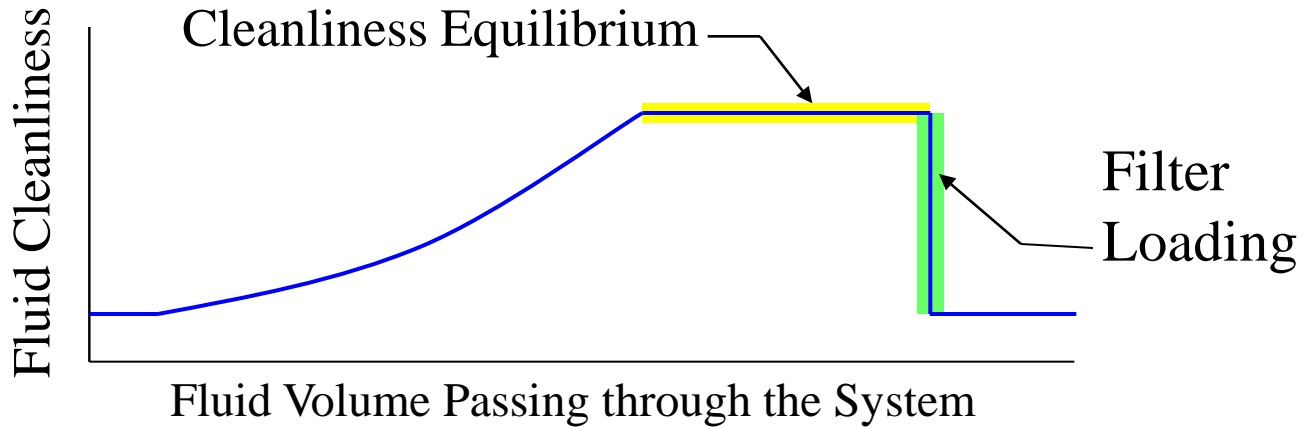


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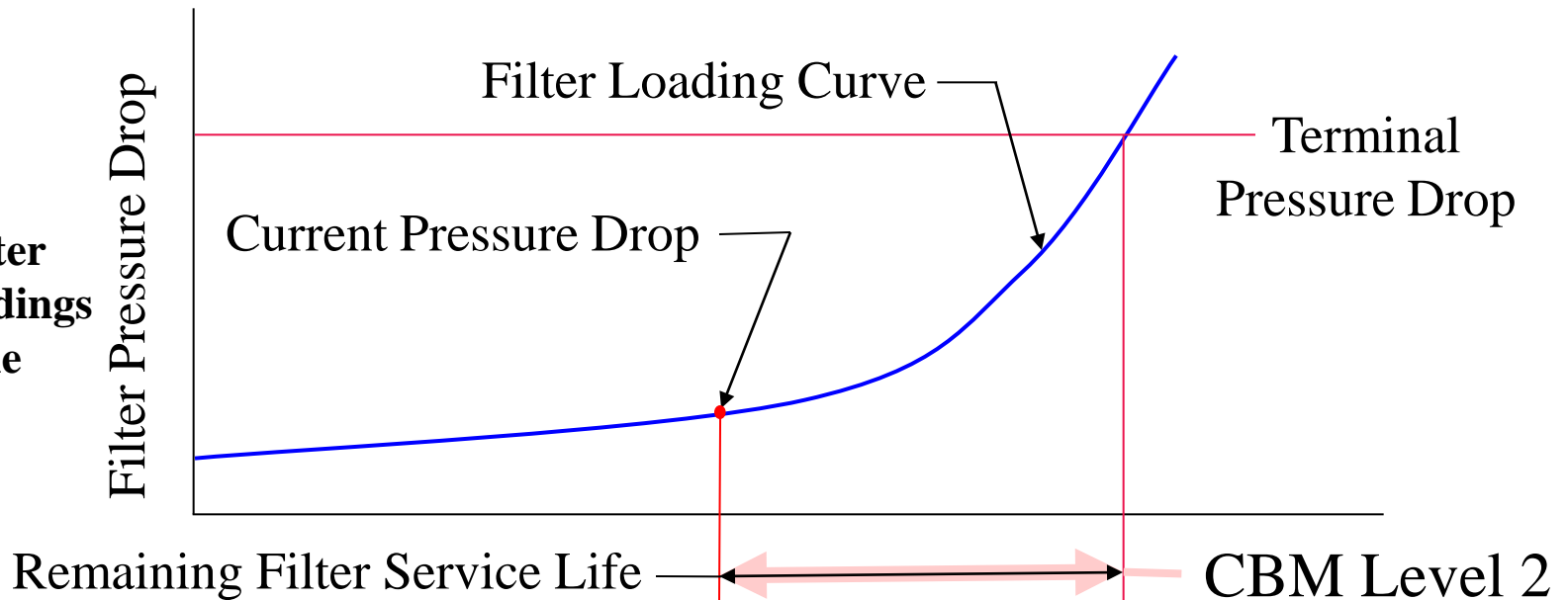


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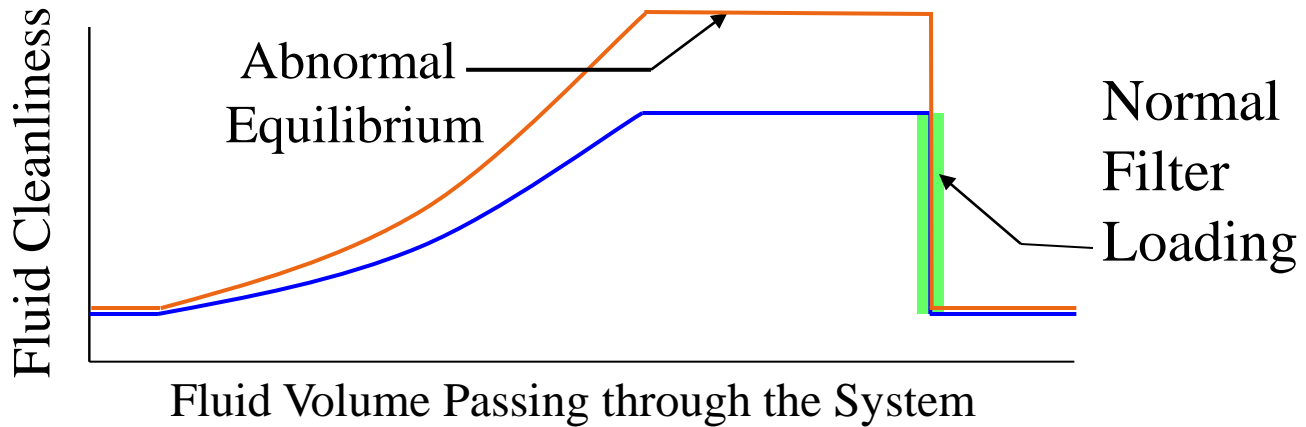


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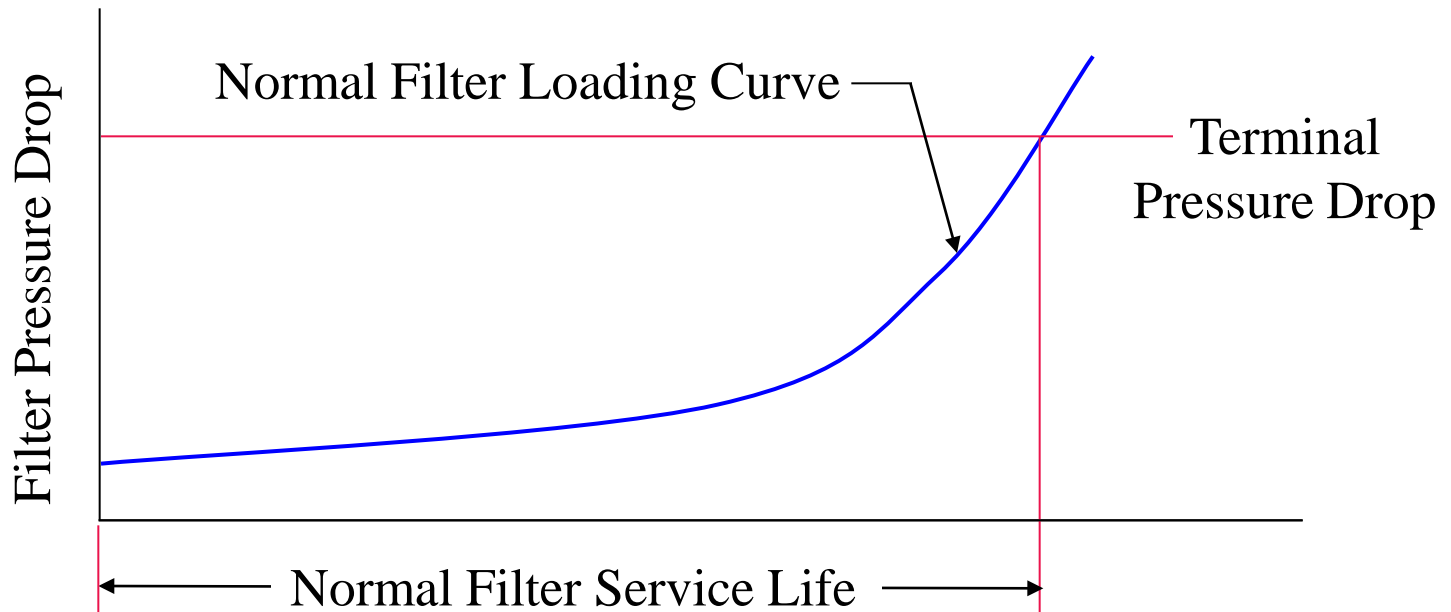


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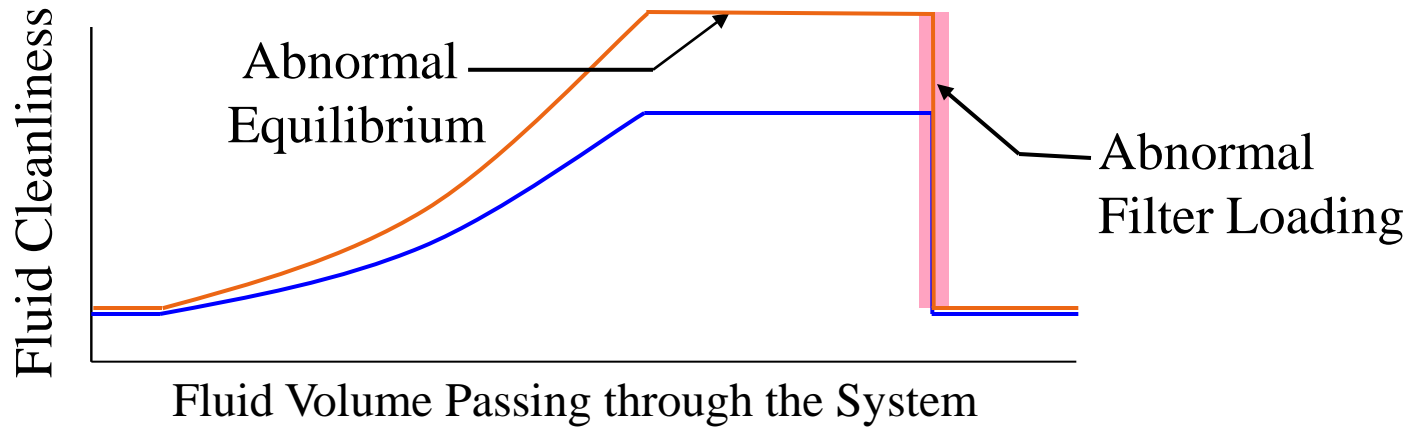


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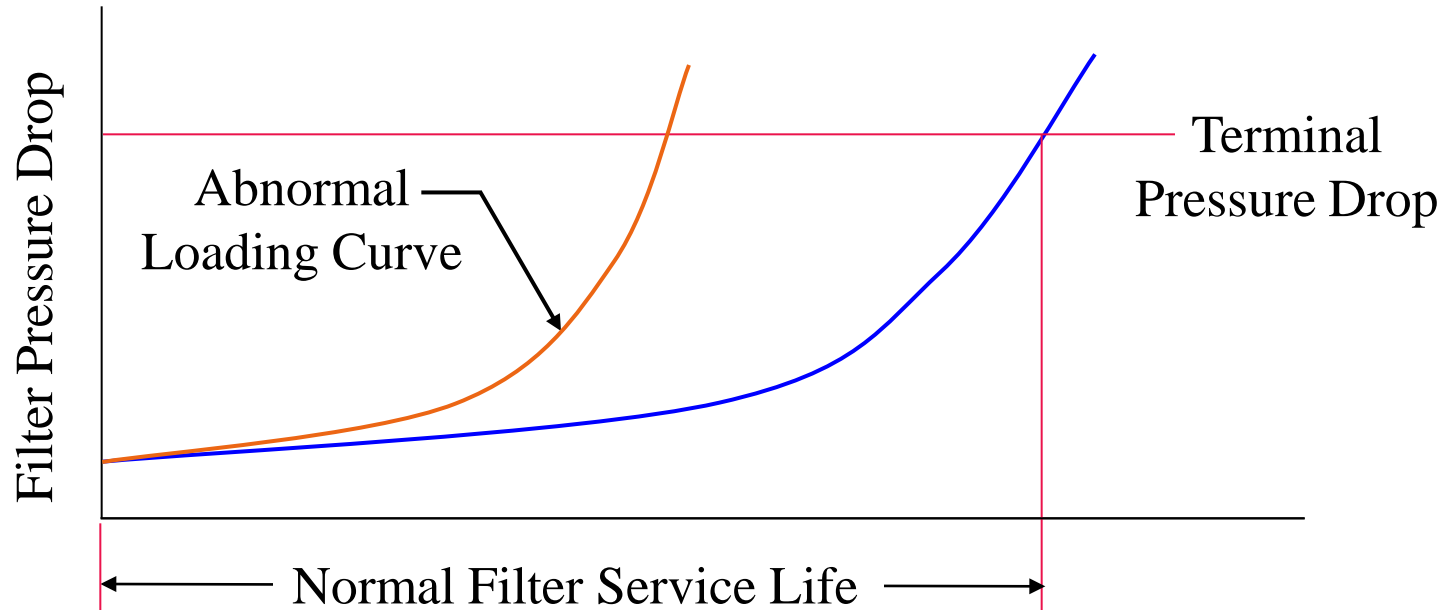


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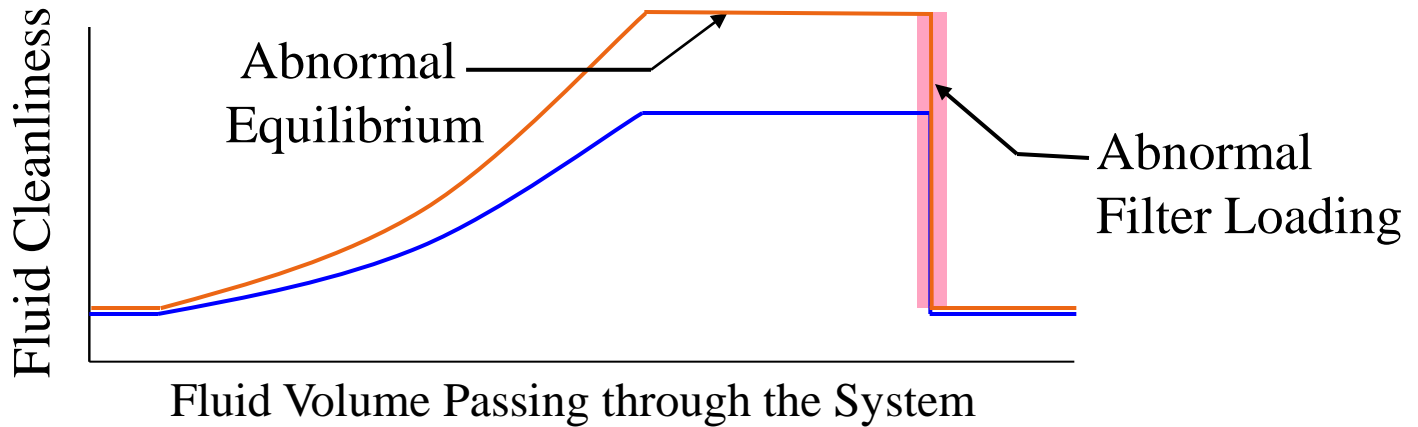


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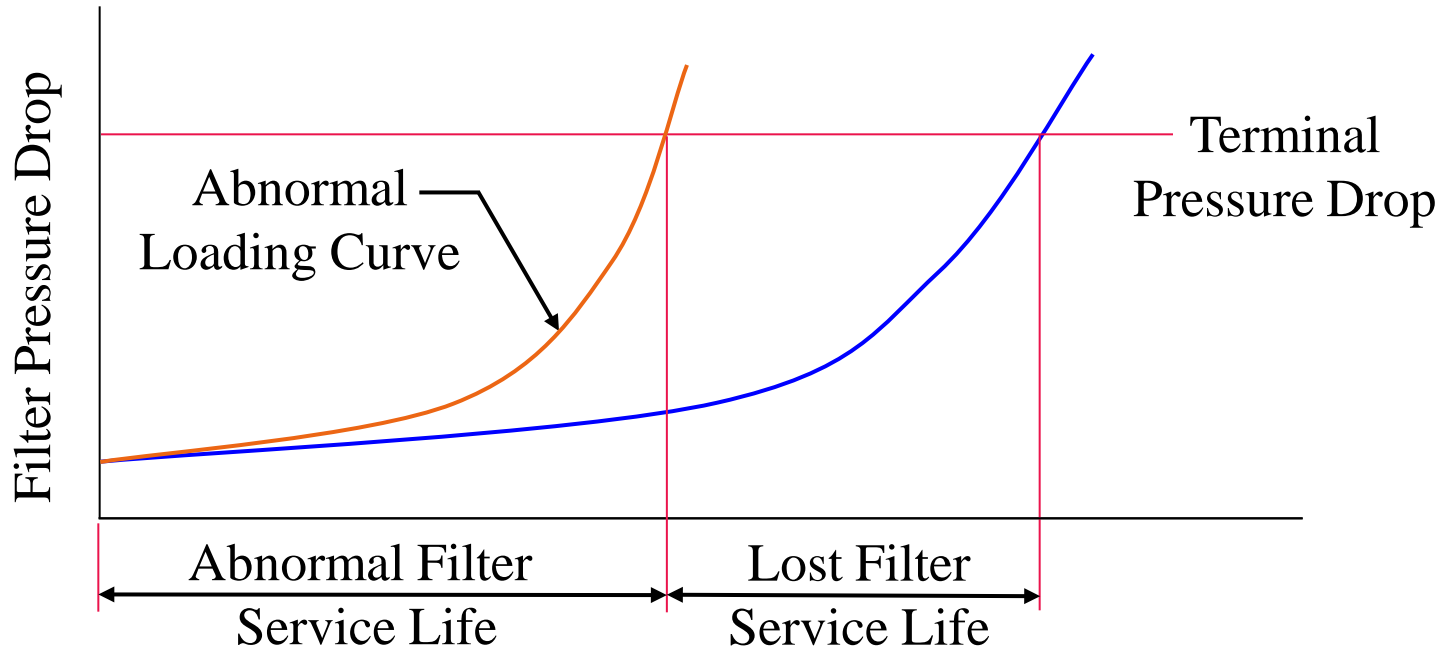


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Single Pass of Fluid Through The System

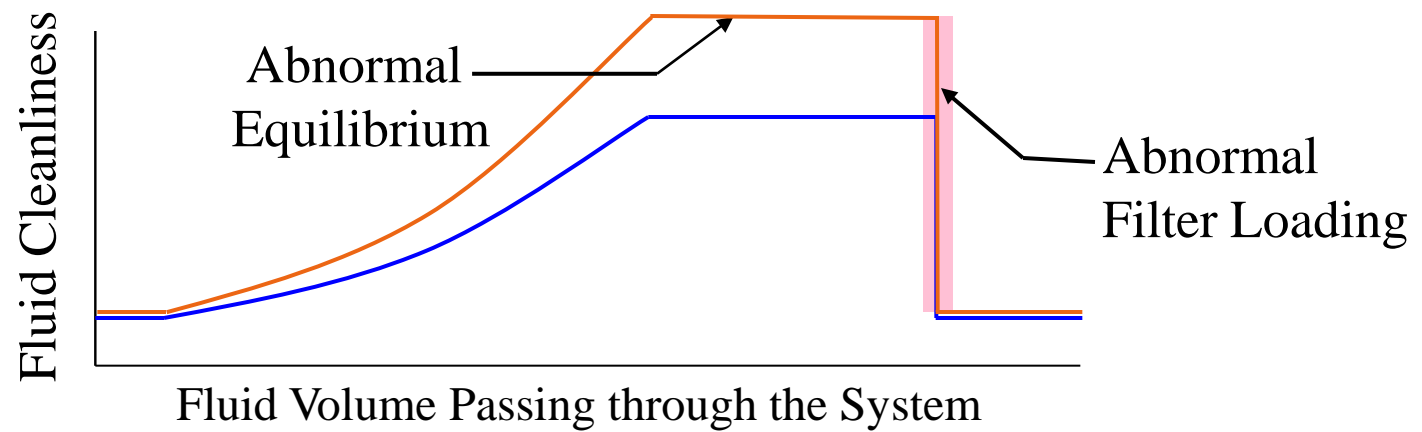


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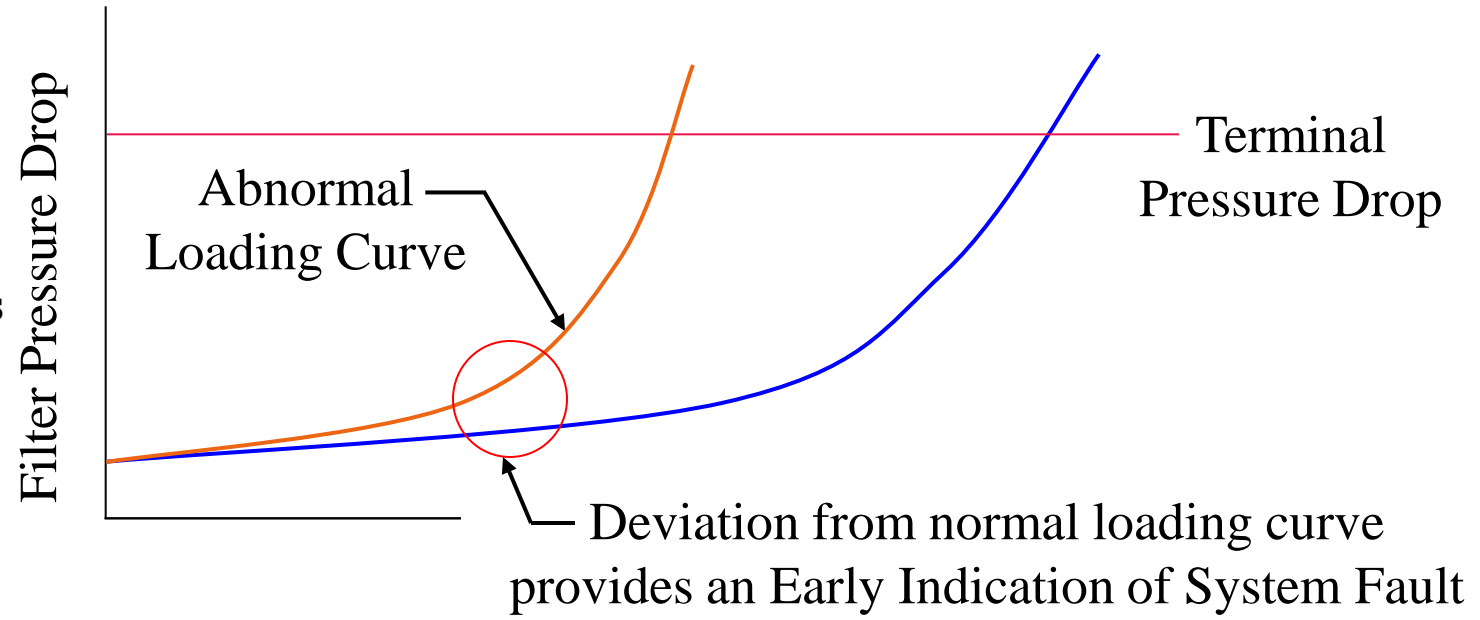


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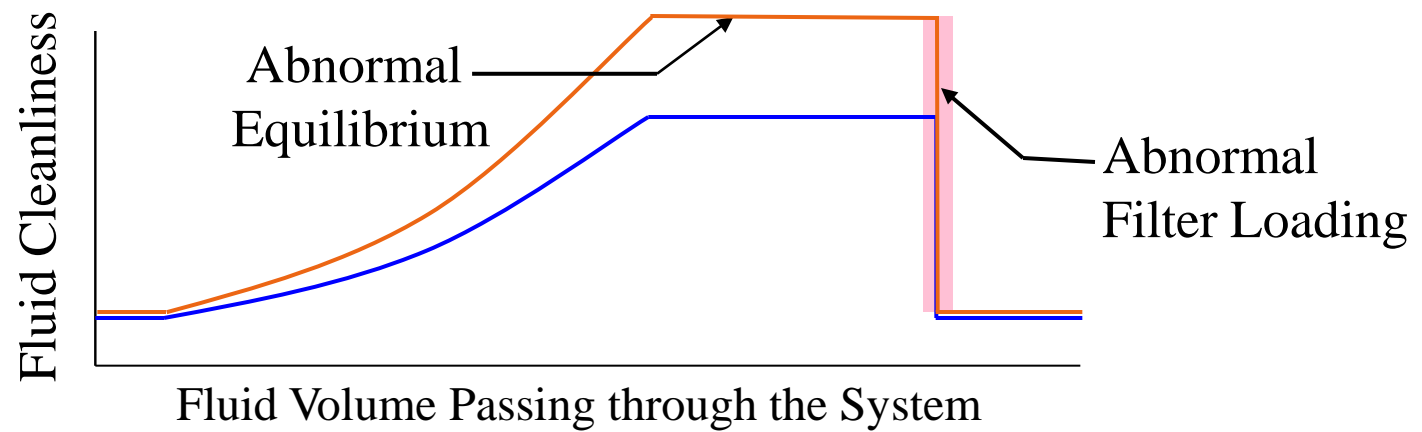


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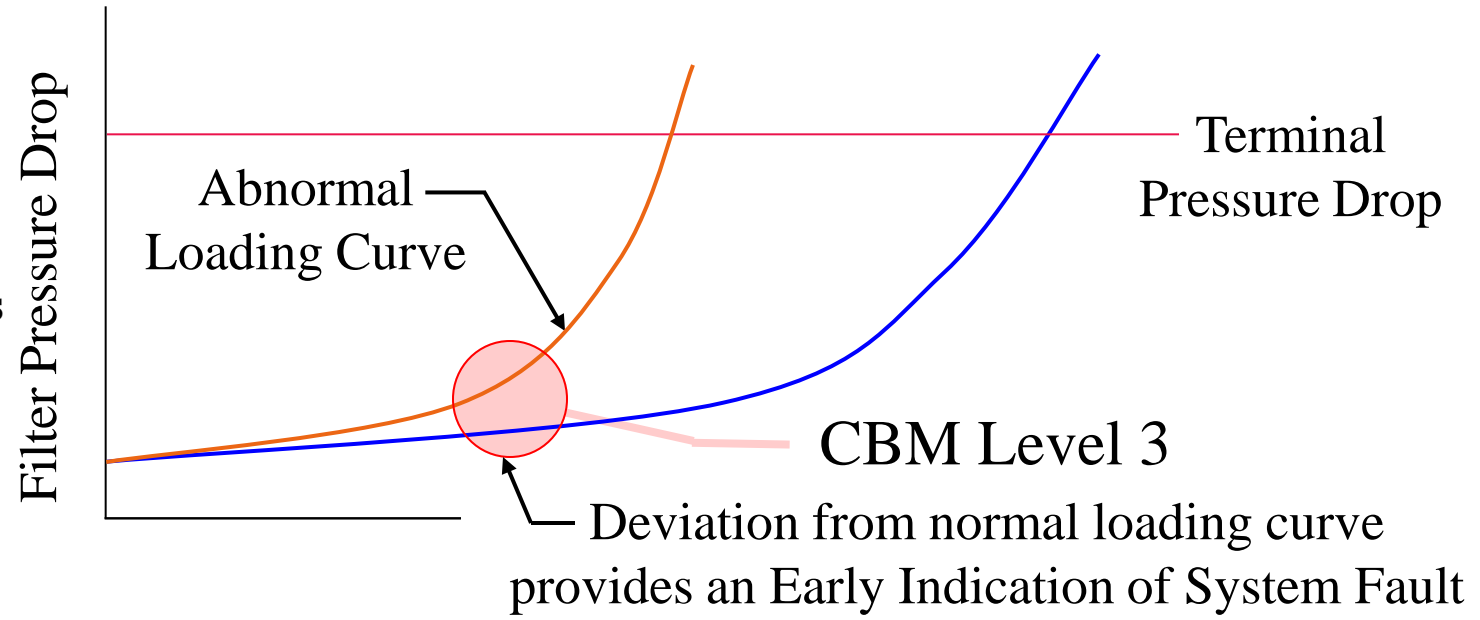


Filter Monitoring Supports CBM

Single Pass of Fluid Through The System



Sum of Filter Element Loadings Over Time





Filter Monitoring Supports CBM

Comparison of Differential Pressure Monitors

Monitor Capability	Indicator	Switch	Indicator/Switch	Sensor
Port Mounting Compatible	yes	yes	yes	yes
Validate Operation	no	yes ¹	no	yes
Continuous output	no	no	no	yes
Remaining Life	no	no	no	yes
Mission Availability	no	no	no	yes
Schedule Service	no	no	no	yes
Service Filter Element	yes ²	yes ³	yes ²	yes
Early Fault Indication	no	no	no	yes
Missing Filter Element	no	no	no	yes
System In Bypass	no	no	no	yes

- 1 Only on systems having high pressure drop during cold start without thermal lockout
- 2 No validation, Poor operational reliability, Possibly system fault
- 3 Possible validation, Poor operational reliability, Possibly system fault

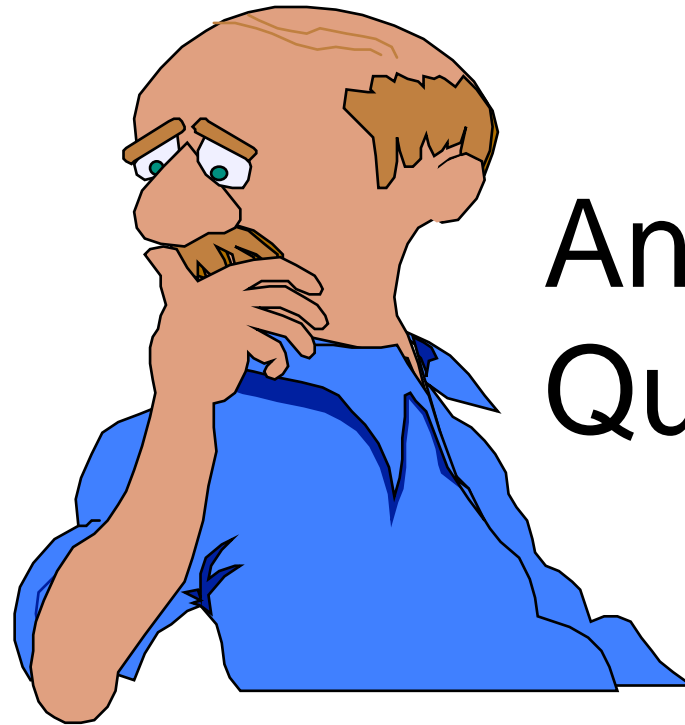
Filter Monitoring Supports CBM

Upgrading to a Differential Pressure Sensor to provide real-time in-system monitoring of the filter element's performance can support CBM in addition to providing:

- Improved indication tolerance
- No moving parts, robust design
- An integrated temperature sensor output
- Full utilization of the filter element
- Reduction of required filter changes
- Improved reliability and operational readiness



Filter Monitoring Supports CBM



Any
Questions?