



LubMat| Cooling System Predictive Maintenance| 2018

Move Forward with Confidence



- **Today's Modern Engines**
- **Cooling System Criticality**
- **Coolant Formulations**
- **Benefits of Coolant Analysis**

The Rest of the Story:

Preventive & Predictive Maintenance Program



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Bureau Veritas Fluid Analysis

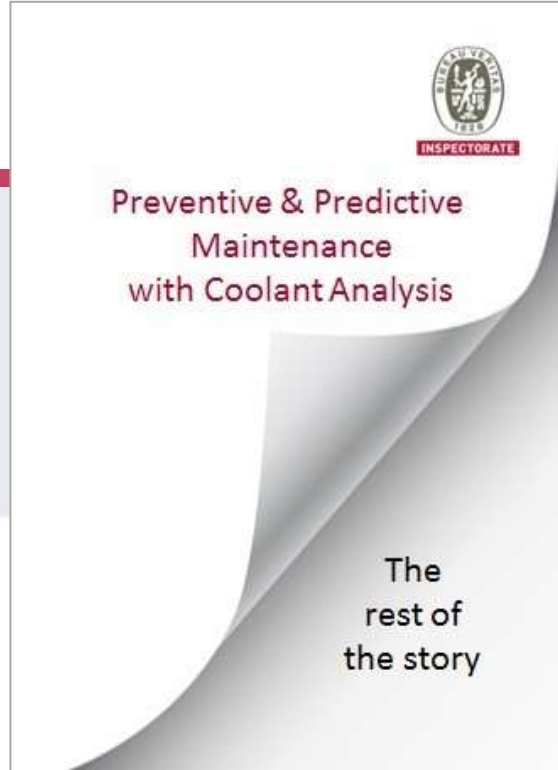
Routine oil analysis is an effective way of gauging the condition of a lubricant and determining optimum change intervals — to get the most life out of the oil in use as well as provide maximum continuous protection of equipment.

Oil Analysis
Invaluable Tool



Bureau Veritas Fluid Analysis

While oil analysis is an invaluable condition monitoring tool, it tells you very little about what is happening inside the cooling system. Coolant analysis provides the rest of the story by pinpointing coolant and cooling system issues that can lead to premature engine failure.

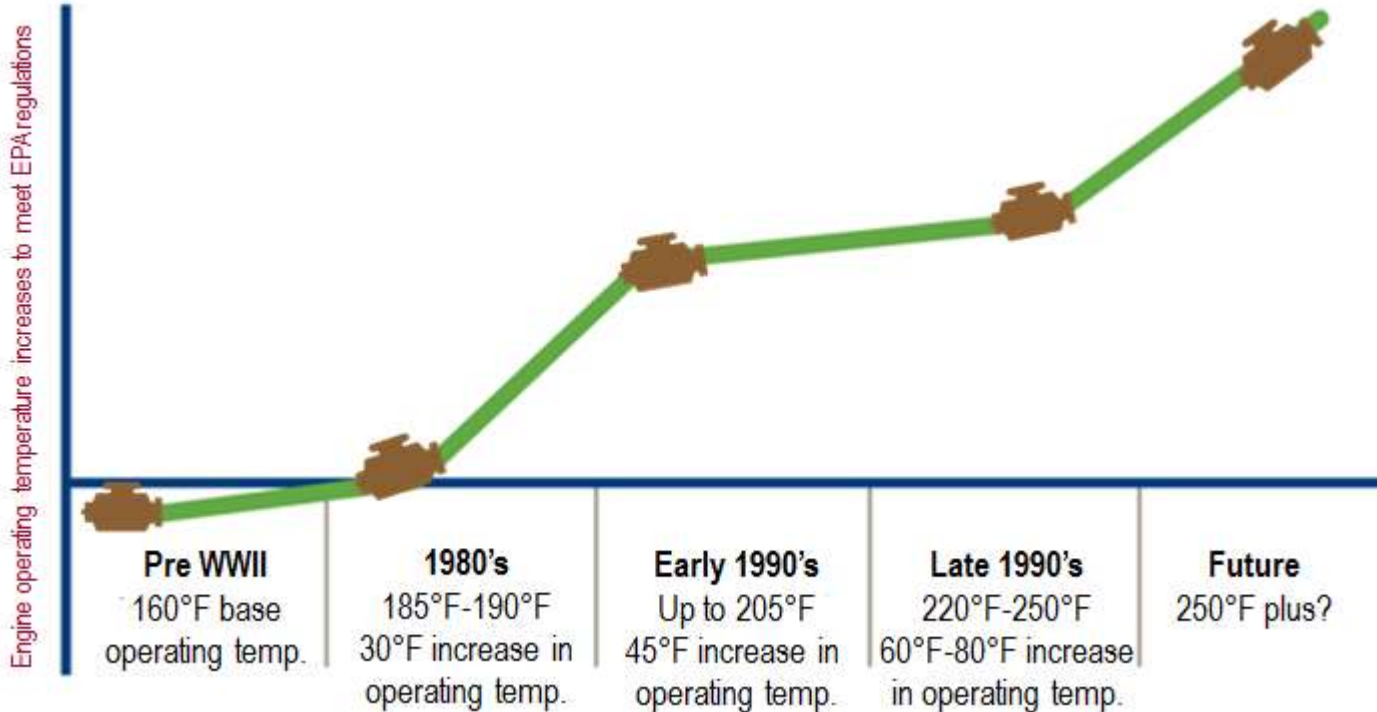


Today's Modern Engines



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Ever Increasing Temperatures



Cooling System Criticality

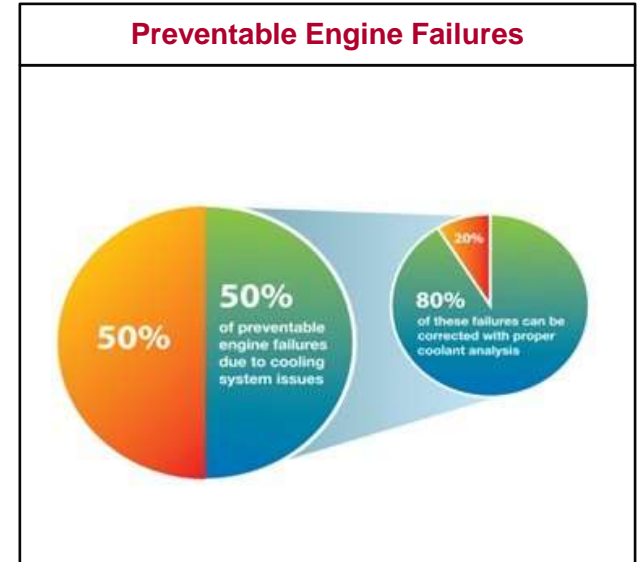


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Industry Research

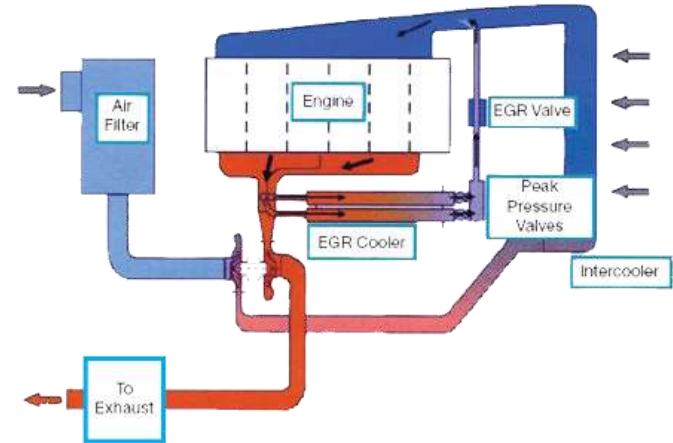
➤ 80% of preventable engine failures caused by cooling system problems are due to:

- Water used to mix concentrate coolant
- Coolant design
- Internal/external air leaks
- Low pH
- Coolant mixing



Cooling System Issues Affects

- Life and efficiency of liquid cooled brakes
 - Can cause them to fade and burn up
- Emission control
 - Cooled EGR



Cooling System Issues Affects

➤ Engines

- High coolant temperatures cause high oil temperatures
 - Reduces oil's operating viscosity
 - Leads to oil oxidation and eventual engine wear
 - Evident in ring sticking, piston glazing or varnishing, valve wear
 - Often masks the fact cooling system issue was contributing factor



Cooling System Issues Affects

➤ Transmissions

- Overheated cooling system can:
 - Shorten transmission life
 - Transmission disc slippage may occur due to reduced oil viscosity
 - Creates more heat
 - Causes oil oxidation



Cooling System Issues Affects

➤ Hydraulics

- Overheated cooling system can:
 - Cause motors and pumps less efficient
 - Cause reduced oil viscosity and oil oxidation
 - May reduce life of valves, pump slippers, barrels and seals



Affects of Improper Cooling System Maintenance

➤ Lubrication

- Excessive heat can degrade lubricants to a point where they no longer protect
- Transmission life
- High fluid temperature
 - Reduces life
 - Lowers lubricity
 - Increases internal component temperatures



Affects of Improper Cooling System Maintenance

- Computer systems
 - Scale or sludge formation on sensors



Where Does Cooling System Maintenance Start?

- A thorough knowledge of the cooling system requires:
 - Understanding system's physical parts
 - Understanding system maintenance procedures
 - Understanding source water
 - Understanding inhibitors
 - Conventional, OAT, NOAT, HOAT, NAP-Free, P-OAT
 - Understanding coolant analysis



Coolant Formulations



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Importance of Proper Coolant Formulations

➤ Coolant must

- Meet OEM specifications
- Must meet ASTM and TMC specifications
- Duty cycle
- Fluid must be able to handle increase in temperatures and flow rates
- Environmental operating conditions

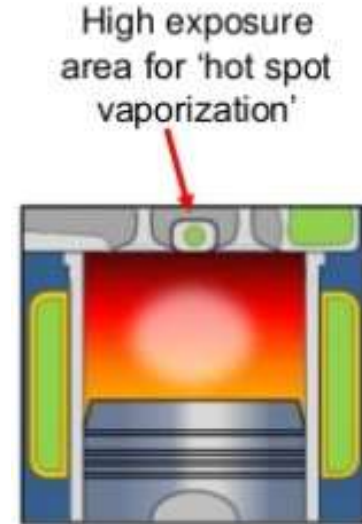


Note: Price per gallon alone can not be the only deciding factor...how many millions of dollars are you trying to protect?



Why Test Extended Life Coolant?

- Fluid design can't correct
 - Mechanical issues
 - Contamination from poor maintenance practices
 - Coolant Mixing
 - Mixed fleets are more vulnerable to coolant mixing



Benefits of Coolant Analysis

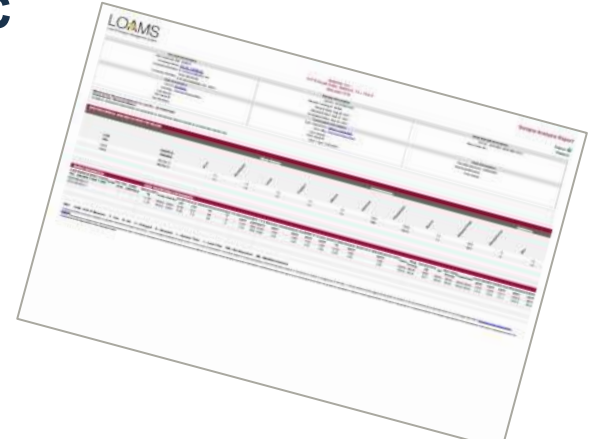


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Coolant Analysis

➤ **Coolant Analysis can identify cooling system maintenance problems before catastrophic failure occurs.**

- Less downtime
- Fewer repairs
- Proper drain intervals established
- Reduced costs



Primary Goals of Coolant Analysis

➤ Preventive Maintenance

- Determine if coolant is suitable for continued use
- Coolant mixing has occurred
- Contaminants present that can form scale or acid
- Additive depletion is compromising metal protection



Primary Goals of Coolant Analysis

➤ Predictive Maintenance

- Predict impending failures by noting abnormalities and trends
 - Trends can pinpoint mechanical or formulation concerns
 - Formation of acids or scale
 - Contamination ingress
 - Electrolysis
 - Localized overheating or hot spots



Primary Goals of Coolant Analysis

➤ Root Cause Analysis

- Failure has occurred coolant analysis can determine root cause of issue
 - Experienced data analysts can
 - Make informed recommendations for correcting issue
 - Assist in establishing fluid maintenance procedures to prevent recurrence



Primary Goals of Coolant Analysis

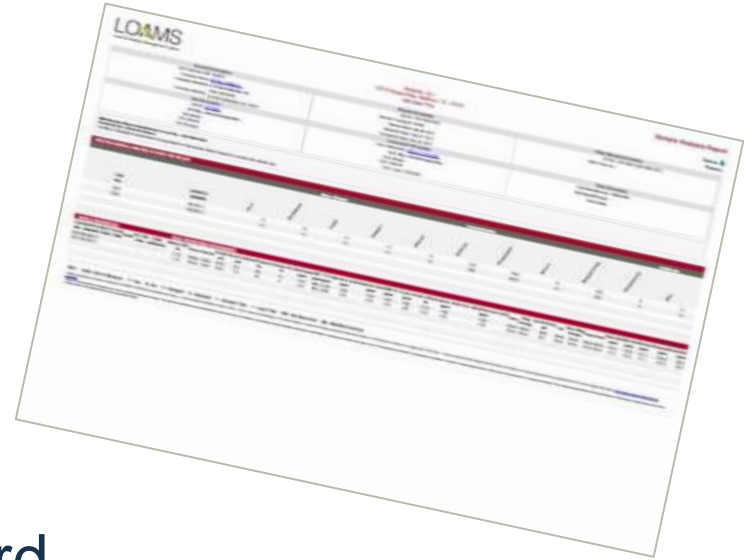
➤ Life-Cycle Management

- Detect deficient maintenance practices
- Assist in implementing actions to ward off issues within the cooling and lubrication system
- Provide indications of shortcomings in operational practices and maintenance procedures



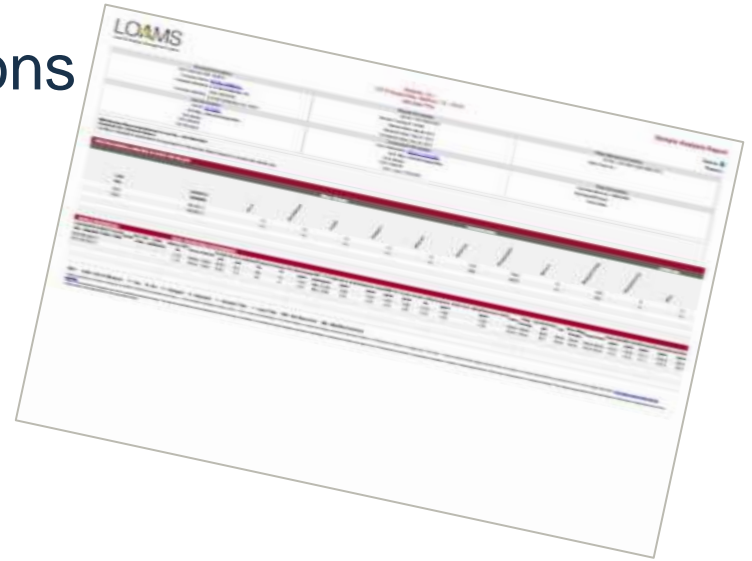
Steps To A Successful Program

- Determine program goals
- Discuss current equipment issues
- Determine bulk coolants in use
- Formulate a workable plan
- Determine program moving forward
- Reading and responding to the report



Steps To A Successful Program

- Implementation of recommendations
- Following up



Bottom Line

Coolant analysis can dramatically improve machine performance, reduce unnecessary repair and maintenance costs, and extend the life of equipment by optimizing the condition of the mechanical systems involved and the fluids that keep them running.

Oil Analysis
Invaluable Tool



MOVE FORWARD WITH CONFIDENCE

Our network of professional Oil, Coolant & Petrochemical experts are dedicated to providing our leading services to customers nationwide and across the globe.

Contact us today so we can tailor a solution to meet your needs.



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