

PLANNED INDICATORS

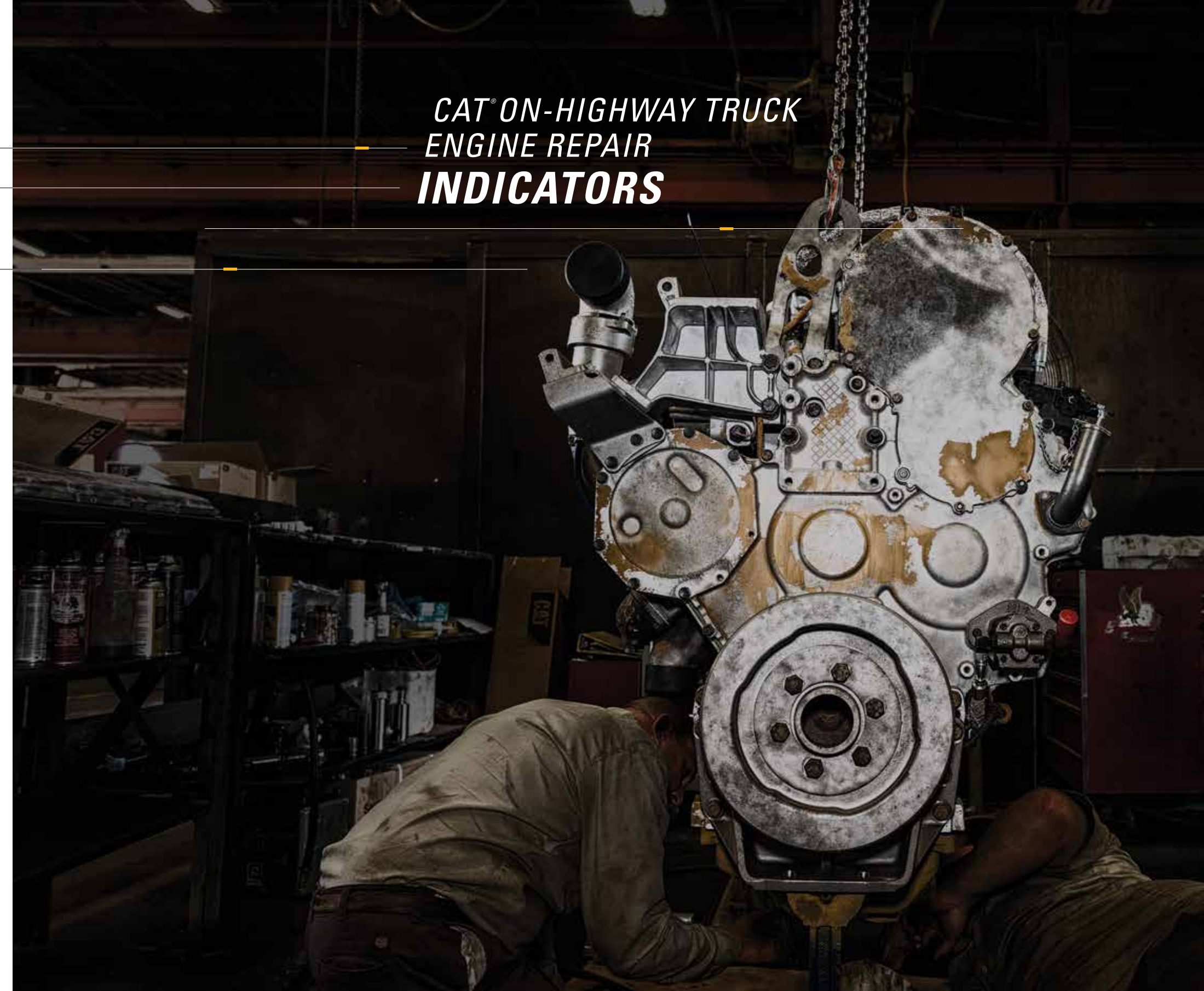
THERE ARE A VARIETY OF PLANNED INDICATORS THAT CAN HELP YOU PROTECT YOUR ENGINE, REDUCE PRODUCTIVITY LOSSES, AND KEEP COSTS LOW.

Planned Indicator	Description
S•O•S™ Services	S•O•S Services provide insight into internal component wear and potential failure.
Service Meter Miles/Hours	Operating and Maintenance Manual gives general guidelines for servicing based on service meter miles.
Service History	Service history indicates how frequently routine maintenance is performed.
Fuel Consumption	Fuel consumption indicates when a piece of equipment on your truck is operating at less than optimum efficiency.

YOUR DEALER IS STANDING BY

The Cat dealer network stocks a broad line of new and Cat Reman parts and components, supported by the Caterpillar worldwide inventory and distribution system. With over 30 authorized Cat dealers in North America who manage a combined network of 2,000+ sales and service locations, most components are available and ready to install, reducing your downtime and maintaining productivity. Contact your local authorized Cat dealer today.

CAT® ON-HIGHWAY TRUCK ENGINE REPAIR INDICATORS



90% OF FAILURES ARE PREVENTABLE

UNDERSTAND ENGINE INDICATORS FOR PERFORMANCE

REGULAR MAINTENANCE INTERVALS AND PROPER INSPECTIONS ARE CRITICAL TO PREDICTING THE RIGHT TIME FOR A REPAIR. THERE ARE BOTH **PLANNED** AND **PROBLEM INDICATORS** THAT MAY BE CAUSING A LOSS IN PRODUCTIVITY AND RESULTING IN A HIGHER COST.

PROBLEM INDICATORS

THERE IS A WIDE RANGE OF PROBLEM INDICATORS THAT CAN ALERT YOU TO ENGINE PROBLEMS AND THEIR CAUSES BEFORE THEY TURN INTO COSTLY REPAIRS.

Problem Indicator	Possible Causes	Options	S•O•S™ Indicator	Possible Causes
EXCESS BLACK SMOKE AT FULL LOAD (hot, unburned fuel)	<ul style="list-style-type: none"> » Dirty primary/secondary air cleaner » Operating in too high a gear » Overfueling » Overloading 	<ul style="list-style-type: none"> » Faulty turbocharger » Technical analysis inspection » Customer/dealer discussion 	Soot, Fe, Cr, Al	<ul style="list-style-type: none"> » Dirty air filter » Piston rings » Liners
INCREASED FUEL CONSUMPTION	<ul style="list-style-type: none"> » Malfunctioning fuel nozzles/injectors » Malfunctioning turbocharger » Dirty air cleaner » Improper set point » Fuel leak 	<ul style="list-style-type: none"> » Technical analysis inspection » Customer/dealer discussion » Tune-up 	Positive fuel contamination, decreased viscosity	<ul style="list-style-type: none"> » Fuel leaking into oil from injectors » Shearing of the oil additives
BLUE SMOKE (oil consumption)	<ul style="list-style-type: none"> » Worn turbocharger seals » Worn rings/liners » Worn valve guides » Miles on engine 	<ul style="list-style-type: none"> » S•O•S fluid analysis » Component inspection/repair » Repair determination inspection » Customer/dealer discussion 	Fe, Cr	<ul style="list-style-type: none"> » Broken or stuck piston rings » Ether start-up » Running too cold or hot » Oil jet broken
WHITE SMOKE (steam: water in combustion chamber)	<ul style="list-style-type: none"> » Cracked head and/or liners » Leaking head gasket 	<ul style="list-style-type: none"> » Technical analysis inspection 	Positive coolant contamination, Na, K, Si, Cu	<ul style="list-style-type: none"> » Coolant entry
WHITE SMOKE (on start-up: unburned fuel)	<ul style="list-style-type: none"> » Incorrect starting procedure » Incorrect fuel injector timing » Faulty injector 	<ul style="list-style-type: none"> » Customer/dealer discussion » Tune-up 	Positive fuel contamination, decreased viscosity	<ul style="list-style-type: none"> » Fuel leaking into oil from injectors » Shearing of the oil additives
INCREASED OIL CONSUMPTION (excess blow-by)	<ul style="list-style-type: none"> » Worn or broken rings/liners » Worn turbocharger seals » Worn valve guides » Miles on engine 	<ul style="list-style-type: none"> » S•O•S fluid analysis » Component inspection/repair » Repair determination inspection » Technical analysis inspection » Customer/dealer discussion 	Fe, Cr	<ul style="list-style-type: none"> » Broken or stuck piston rings » Ether start-up » Running too cold or hot » Oil jet broken
UNUSUAL NOISES	<ul style="list-style-type: none"> » Malfunctioning fuel nozzles/injectors » Malfunctioning turbocharger » Worn piston pin bushings » Worn rod/main bearings » Too much valve lash 	<ul style="list-style-type: none"> » Technical analysis inspection » Repair determination discussion » Customer/dealer discussion » Tune-up » Component inspection repair 	Positive fuel contamination, decreased viscosity, Cu, Pb, Al	<ul style="list-style-type: none"> » Fuel leaking into oil from injectors » Shearing of the oil additives » Rod eye bushing » Piston pin bushing » Lower rod bearings
LACK OF POWER	<ul style="list-style-type: none"> » Incorrect adjustment of governor linkage » Malfunctioning fuel nozzles/injectors » Slipping torque converter » Improper set point » Dirty fuel filter » Dirty air cleaner » Low-quality fuel 	<ul style="list-style-type: none"> » Technical analysis inspection » Customer/dealer discussion » Tune-up 	Soot, Fe, Cr	<ul style="list-style-type: none"> » Dirty air filter » Low-quality fuel » Piston rings and liners
OVERHEATING	<ul style="list-style-type: none"> » Malfunctioning temperature regulator » Incorrect adjustment or worn belts/pulleys » Incorrect operator technique » Plugged radiator core (external and internal) » Low coolant level » Dirty air cleaner 	<ul style="list-style-type: none"> » Technical analysis inspection » Customer/dealer discussion » Cooling system maintenance 	Oxidation increases, Fe, Pb, Al, Cu, soot	<ul style="list-style-type: none"> » Liner » Gears » Valve train wear
HARD STARTING (engine missing)	<ul style="list-style-type: none"> » Malfunctioning fuel nozzles/injectors » Improper starting technique » Worn fuel injector pump » Low cranking speed » Low-quality fuel (low cetane rating or water in fuel) 	<ul style="list-style-type: none"> » Customer/dealer discussion » Tune-up 	Soot, Fe, Cr	<ul style="list-style-type: none"> » Dirty air filter » Low-quality fuel » Piston rings and liners
OIL LEVEL OVER FULL	<ul style="list-style-type: none"> » Coolant/fuel leak into crankcase » Improper oil fills 	<ul style="list-style-type: none"> » S•O•S fluid analysis » Customer/dealer discussion 	Positive coolant contamination, Na, K, Si, Cu	<ul style="list-style-type: none"> » Coolant entry
DEBRIS IN OIL FILTER	<ul style="list-style-type: none"> » Coolant/fuel leakage into crankcase » Extended oil change period » Damaged bearings » Wrong oil used » Dirt entry 	<ul style="list-style-type: none"> » S•O•S fluid analysis » Customer/dealer discussion 	Positive coolant contamination, positive fuel contamination, oxidation increases, Si, Al	<ul style="list-style-type: none"> » Coolant entry » Fuel leaking into oil from injectors » Overheating » Dirt contamination