

THE DIRTY OIL VS. VILLAIN KHASH

TURBINE OIL ANALYSIS & FILTRATION



Relax,
Captain Turbine.
I brought oil
analysis.

Oh no...
not this fussy
lubrication guy
again!

**CAPTAIN
TURBINE**

**K
KHASH**

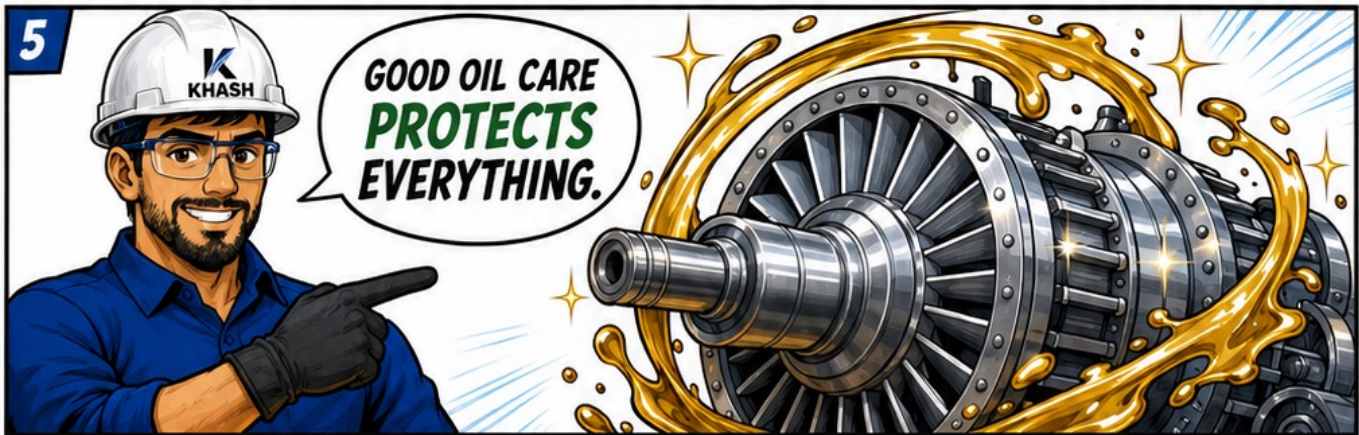
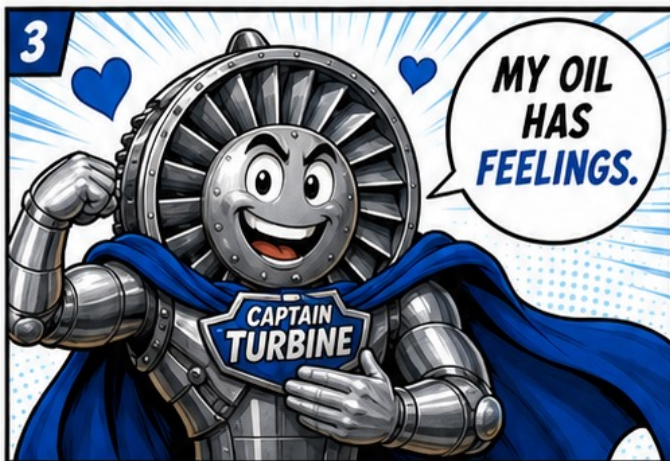
**MR.
DIRTY OIL**

ANALYZE RIGHT. FILTER SMART. PROTECT LONGER.

Khash, MLE, CLS, MLA III, MLT II, VIM, VPR

OIL IS NOT TEA!

OIL IS A RELIABILITY ASSET.

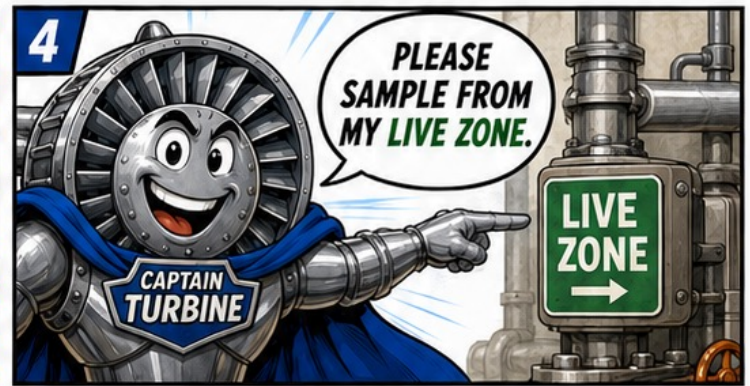


LESS WEAR. FEWER FAILURES. LONGER OIL LIFE.

Khash, MLE, CLS, MLA III, MLT II, VIM, VPR

BAD SAMPLE = BAD DECISION

SAMPLING: WHERE THE TRUTH STARTS.

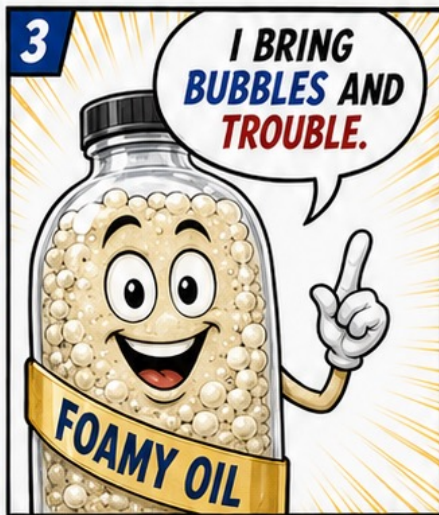


RIGHT SAMPLE. RIGHT DATA. RIGHT ACTION.

Khash, MLE, CLS, MLA III, MLT II, VIM, VPR

THE OIL BEAUTY CONTEST

LOOK FIRST.

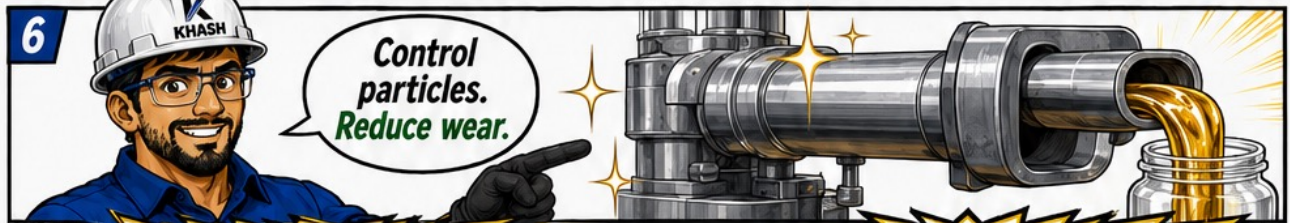
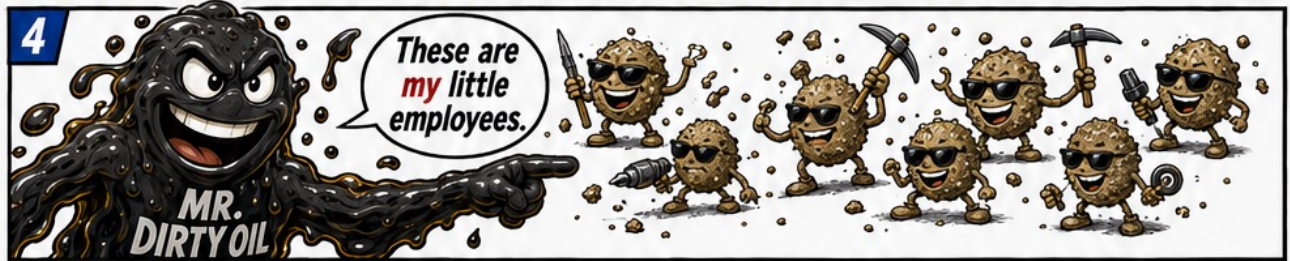
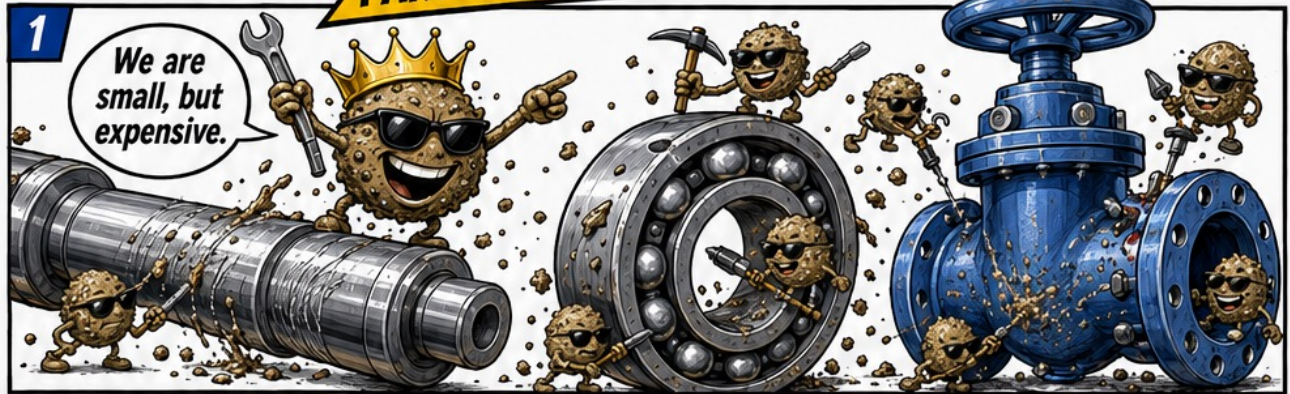


EYES FIRST. LAB NEXT. JUDGMENT ALWAYS.

Khash, MLE, CLS, MLA III, MLT II, VIM, VPR

THE SANDPAPER GANG

PARTICLES ATTACK PRECISION.



DIRT DESTROYS PRECISION.

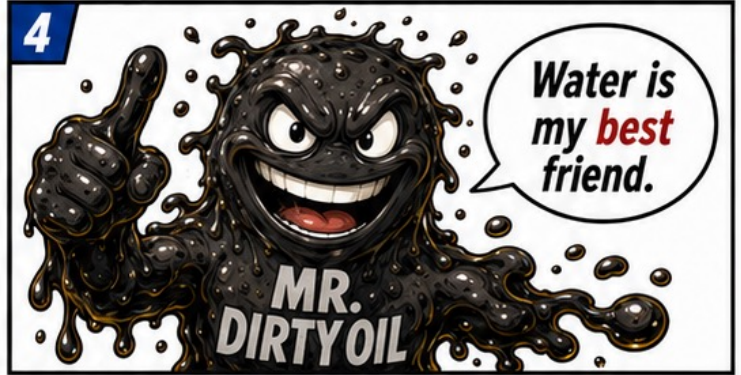
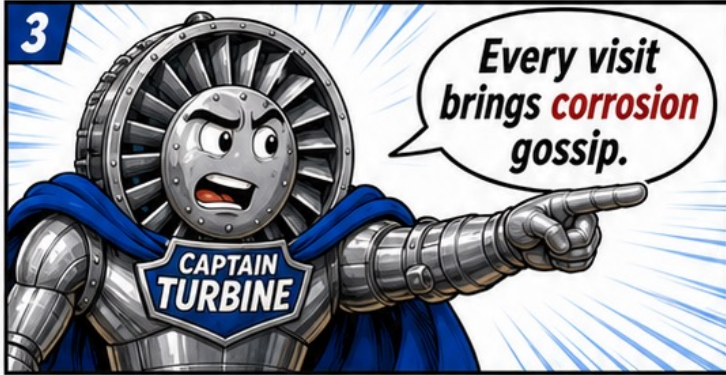
CLEAN OIL = LONGER LIFE

LOWER COSTS = HIGHER RELIABILITY

Khash, MLE, CLS, MLA III, MLT II, VIM, VPR

WATER JOINS THE PARTY

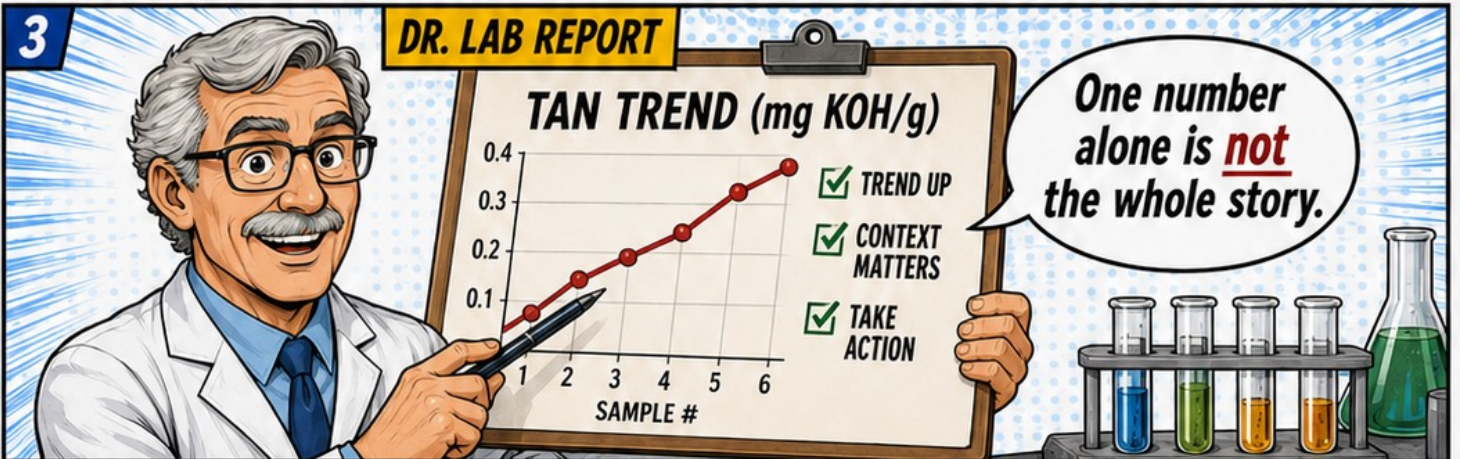
WATER IS NOT INNOCENT.



Khash, MLE, CLS, MLA III, MLT II, VIM, VPR

ACID NUMBER WITH ATTITUDE

TAN tells a story.

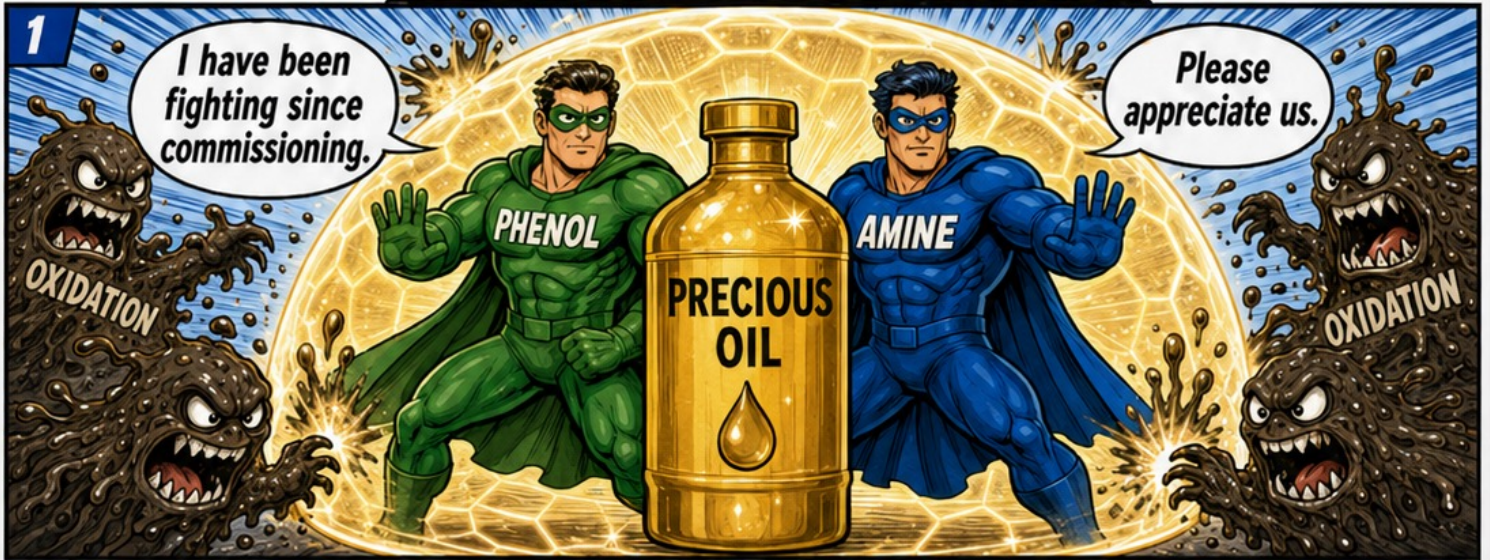


TREND IT. INTERPRET IT. ACT ON IT.

Khash, MLE, CLS, MLA III, MLT II, VIM, VPR

THE ANTIOXIDANT BODYGUARDS

RULER checks the shield.



WHEN ANTIOXIDANTS FALL, OXIDATION RISES.

Khash, MLE, CLS, MLA III, MLT II, VIM, VPR

THE VARNISH SELFIE

MPC SEES THE RISK.

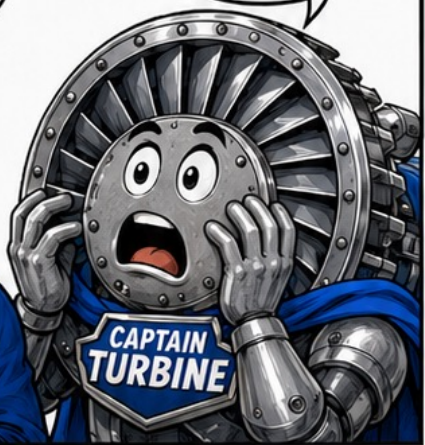
FLASH!



DO I LOOK CONTAMINATED?

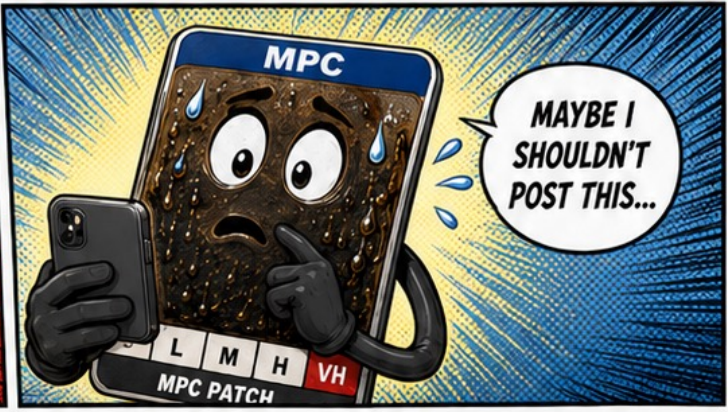
YOU LOOK LIKE A **WARNING SIGN.**

SOMETHING **STICKY** IS HAPPENING.



DELETE THAT PATCH PHOTO!

MR. DIRTY OIL



MAYBE I SHOULDN'T POST THIS...



HIGH MPC MEANS VARNISH RISK.



SEE THE RISK. STAY AHEAD.

SEE THE RISK BEFORE THE DEPOSIT.

Khash, MLE, CLS, MLA III, MLT II, VIM, VPR

THE OIL GYM TEST

RPVOT under stress.

1

OXIDATION TRAINING PLAN

- ✓ HEAT
- ✓ OXYGEN
- ✓ TIME
- ✓ SHEAR
- ✓ STRESS

OIL

RPVOT COACH

Let us test your oxidation stamina!

CONDITIONS

TEMP: 150°C
TIME: 6:00 hrs

OXIDATION TREADMILL

I did not sign up for this.

2

KHASH

RPVOT is useful—but never alone.

3

MR. DIRTY OIL

I also fail under stress.

4

CAPTAIN TURBINE

Stress reveals weakness. Data reveals truth.

5

KHASH

RPVOT measures oxidation stability.

RPVOT = ROTATING PRESSURE VESSEL OXIDATION TEST

OIL + OXYGEN + HEAT

+ O₂ +

TIME UNDER PRESSURE

MEASURE STABILITY

RPVOT SCORE

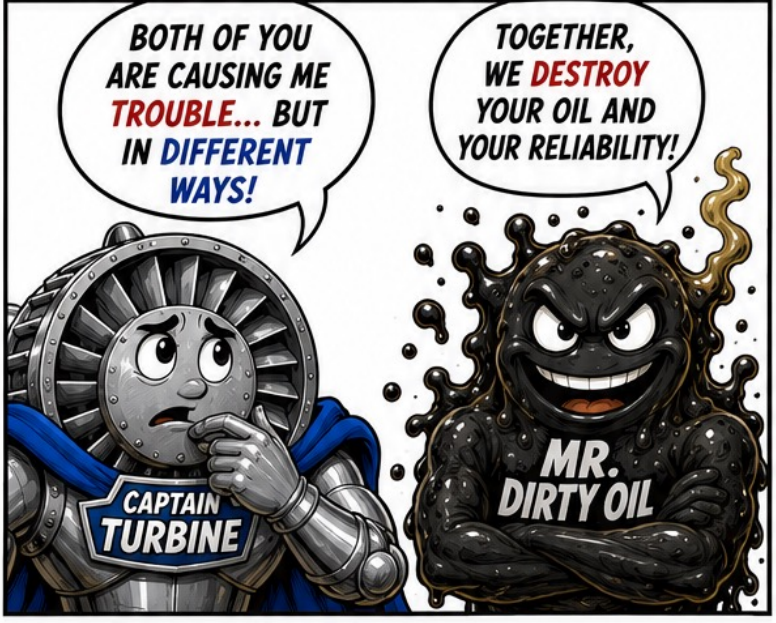
87
/ 100

Higher score = better stability

ONE NUMBER IS NOT A STRATEGY.

Khash, MLE, CLS, MLA III, MLT II, VIM, VPR

THE INVISIBLE VILLAIN



SOLUBLE VARNISH NEEDS THE RIGHT TECHNOLOGY.



Khash, MLE, CLS, MLA III, MLT II, VIM, VPR

THE **FOUR** HORSEMEN OF OIL TROUBLE!

THEY ATTACK TOGETHER.



INDIVIDUALLY BAD...
TOGETHER,
DISASTROUS!



1. WATER OPENS THE DOOR.

I GET IN EASILY!



2. ACID SPEEDS UP THE DAMAGE.

I BREAK THINGS DOWN!



3. PARTICLES DO THE SCRATCHING.

I WEAR EVERYTHING OUT!



4. VARNISH STICKS AND CHOKES.

I STICK, I BLOCK, I BURN!



CONTROL ONE,
OR THEY ALL
WIN TOGETHER!



ONE PROBLEM. MANY PATHS. BIG DAMAGE.

Khash, MLE, CLS, MLA III, MLT II, VIM, VPR

PROFESSOR FILTER KNOWS - **DIFFERENT DIRT, DIFFERENT WEAPON!**

FILTRATION IS THE FIRST LINE OF DEFENSE.



KNOW YOUR ENEMY.
CHOOSE YOUR WEAPON.



PARTICLES
(WEAR)



WATER
(CORROSION)



ACID
(BREAKDOWN)



VARNISH
(DEPOSITS)



THERE IS NO **ONE SIZE FITS ALL.**
UNDERSTAND THE DIRT.
APPLY THE RIGHT FILTRATION.

1 PARTICLE FILTRATION

REMOVES SOLID PARTICLES THAT CAUSE **WEAR.**



- ✓ DEPTH & SURFACE FILTERS
- ✓ MICRON RATING MATTERS
- ✓ KEEP IT CLEAN, KEEP IT SAFE

2 WATER REMOVAL

REMOVES FREE AND DISSOLVED **WATER.**



- ✓ VACUUM DEHYDRATION
- ✓ COALESCING FILTERS
- ✓ BREATHERS & SEALS

3 ACID CONTROL

SLOWS DOWN OIL **BREAKDOWN.**



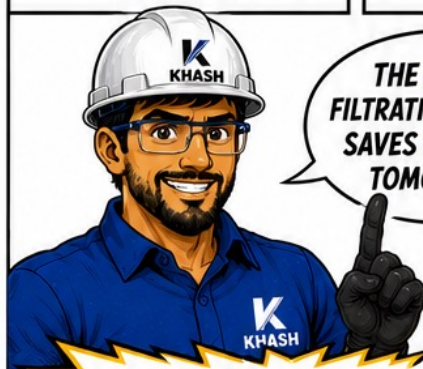
- ✓ CHEMICAL FILTRATION
- ✓ ADSORB ACID & POLAR
- ✓ EXTEND OIL LIFE

4 VARNISH CONTROL

PREVENTS DEPOSITS THAT CAUSE **STICKING.**



- ✓ VARNISH ADSORBERS
- ✓ KEEP SURFACES CLEAN
- ✓ IMPROVE RELIABILITY



THE RIGHT FILTRATION TODAY...
SAVES **MILLIONS** TOMORROW!



FILTER SMART. PROTECT HARD. RUN RELIABLY.

Khash, MLE, CLS, MLA III, MLT II, VIM, VPR

DATA NOT DRAMA!

TRENDS TELL THE TRUTH.

ONE RESULT IS AN OPINION. A TREND IS THE TRUTH!

NUMBERS TALK. WE JUST NEED TO LISTEN.

SAMPLE #	TAN (mg KOH/g)
1	0.05
2	0.08
3	0.11
4	0.14
5	0.17
6	0.20
7	0.23
8	0.26
9	0.30

DON'T BE FOOLED BY SINGLE DATA!

ALL GOOD!

JUST ONE GOOD RESULT AND THEY RELAX!

MR. DIRTY OIL

CONTEXT IS EVERYTHING!

USE MULTIPLE TESTS. CHECK CONDITIONS. UNDERSTAND THE SYSTEM.

- TAN
- RULER
- RPVOT
- MPC
- ISO
- WATER

DATA UNCOVERED... VILLAINS EXPOSED!

NOOOO!

WE SEE YOU. WE MEASURE YOU. WE CONTROL YOU!

PARTICLES WATER ACID VARNISH

GOOD DATA

BETTER DECISIONS

BETTER DECISIONS

STRONGER EQUIPMENT

CAPTAIN TURBINE

STRONGER EQUIPMENT

RELIABLE OPERATION

LOWER COSTS • HIGHER RELIABILITY

MEASURE. INTERPRET. ACT. IMPROVE.

THAT'S HOW HEROES PROTECT OIL AND EQUIPMENT!

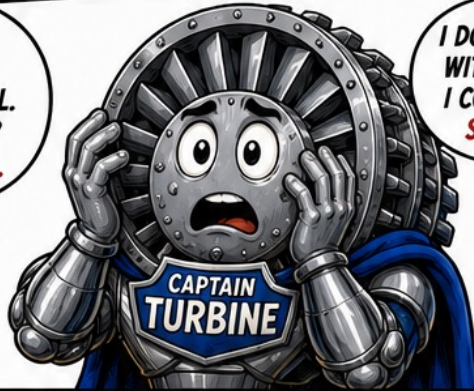
Khash, MLE, CLS, MLA III, MLT II, VIM, VPR

SAVES MILLIONS!

SMALL SIGNS. BIG CONSEQUENCES.



CATCH IT SMALL,
FIX IT SMALL.
IGNORE IT?
PAY IT ALL.



I DON'T COME WITH SIRENS.
I COME WITH SILENCE.



MR. DIRTY OIL

WATCH THESE WARNING SIGNALS!

TAN RISING

ACID BUILDUP IS HAPPENING.

RULER FALLING

PROTECTION IS DISAPPEARING.

WATER INCREASING

CORROSION IS STARTING.

ISO GETTING WORSE

WEAR IS ACCELERATING.

MPC DARKENING

VARNISH RISK IS GROWING.

RPVOT DROPPING

STABILITY IS WEAKENING.

THE MAINTENANCE MANAGER...

THE REPORT LOOKS OKAY... I GUESS WE CAN WAIT.

LAB REPORT

- TAN
- WATER
- ISO
- RULER
- MPC
- RPVOT

SIX MONTHS LATER...

WHY DID NOBODY LISTEN?!

KHASH ALWAYS SAYS...

DATA TALKS. TRENDS SHOUT. ACTIONS SAVE!



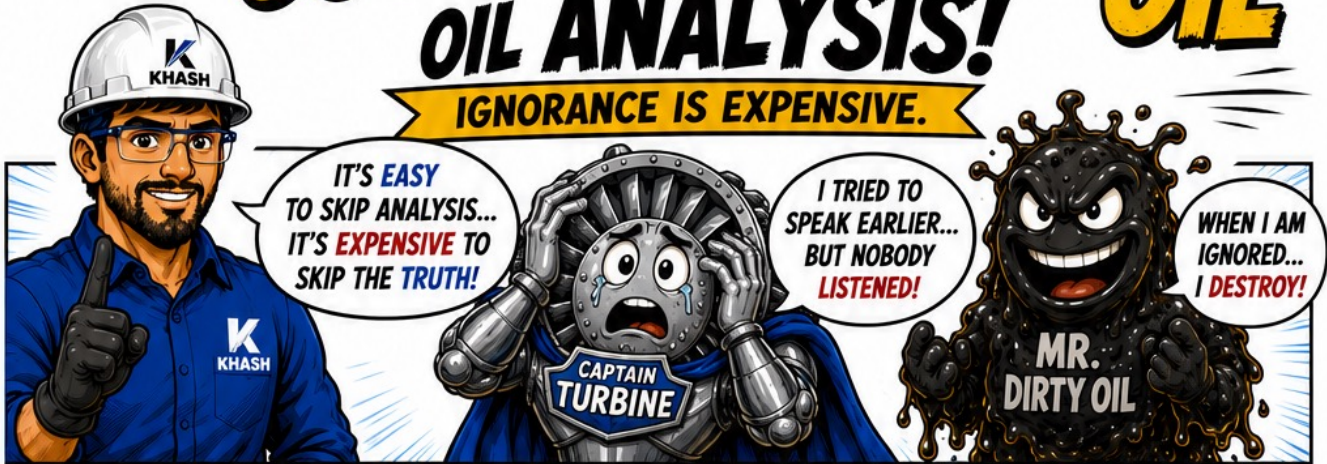
**SEE THE SIGNS.
READ THE STORY.
TAKE THE ACTION.
PROTECT THE RELIABILITY.**



**PROACTIVE TODAY,
PROFITABLE TOMORROW!**

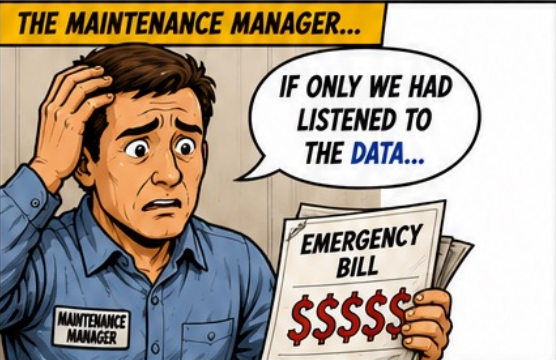
THE COST OF IGNORING OIL ANALYSIS!

IGNORANCE IS EXPENSIVE.



WHAT HAPPENS WHEN YOU IGNORE OIL ANALYSIS?

1 WEAR ACCELERATES PARTICLES SCRATCH. CLEARANCES GROW.	2 CORROSION STARTS WATER + ACID = RUST & CORROSION.	3 VARNISH BUILDS UP STICKY DEPOSITS CLOG & RESTRICT.	4 EFFICIENCY DROPS MORE ENERGY. LOWER OUTPUT.	5 COSTS EXPLODE DOWNTIME, REPAIRS, LOSING MONEY.
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DON'T IGNORE DATA. DON'T PAY FOR IT.

Khash, MLE, CLS, MLA III, MLT II, VIM, VPR

THE BATTLE PLAN - RIGHT OIL. RIGHT FILTRATION. RIGHT RESULTS!

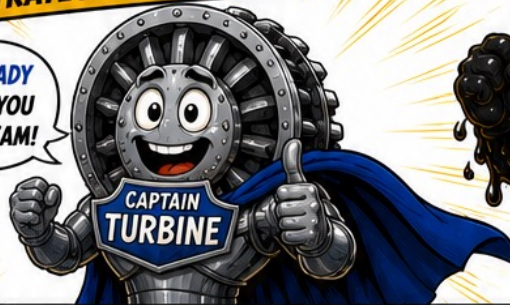


WINNING THE WAR ON DIRTY OIL REQUIRES A SMART PLAN!

STRATEGY BEATS CONTAMINATION!

YOU MAY HAVE A PLAN, KHASH... BUT I HAVE TIME!

I'M READY WHEN YOU ARE, TEAM!



5-STEP VICTORY PLAN!

1 DETECT EARLY



SAMPLE RIGHT.
TEST SMART.
TREND EVERYTHING.

2 UNDERSTAND THE CAUSE



DON'T GUESS.
FIND THE ROOT.
FIX THE SOURCE.

3 CHOOSE THE RIGHT FILTRATION



RIGHT TECHNOLOGY.
RIGHT LOCATION.
RIGHT MICRON.

4 CONTROL CONTAMINATION



KEEP PARTICLES OUT.
REMOVE WATER.
STOP ACID.
ELIMINATE VARNISH.

5 VERIFY & IMPROVE CONTINUOUSLY



DATA CONFIRMS.
TRENDS IMPROVE.
RELIABILITY GROWS.

MR. DIRTY OIL IS LOSING POWER!



NOOOO!
MY PARTICLES,
WATER, ACID AND
VARNISH.... THEY
ARE DISAPPEARING!

CLEAN OIL.
HAPPY TURBINE.
LOWER COSTS.
HIGHER RELIABILITY!

CAPTAIN TURBINE THANKS THE TEAM!



SMOOTH RUNNING,
LONG LIFE AND
LOWER COST!
THAT'S WHAT
I CALL A DREAM
TEAM!

THE RELIABILITY DREAM TEAM!



OIL NEVER LIES... BUT GOOD DATA NEVER HURTS!



RIGHT FILTRATION IS EVERY MACHINE'S BEST FRIEND!



TEST. TREND. TRUST THE SCIENCE!



WE ACT EARLY, NOT AFTER THE DAMAGE!



TOGETHER, WE KEEP MACHINES RUNNING AND BUSINESSES WINNING!

PLAN SMART. FILTER RIGHT. STAY AHEAD. WIN EVERY TIME!

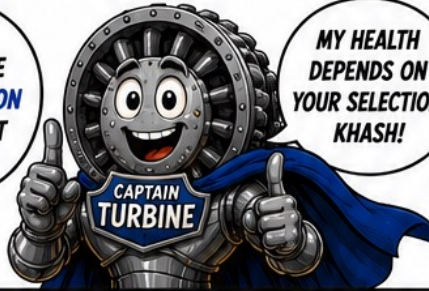
Khash, MLE, CLS, MLA III, MLT II, VIM, VPR

ONE SIZE FITS ALL!

DIFFERENT DIRT. DIFFERENT WEAPON.



TO WIN, YOU NEED THE RIGHT FILTRATION FOR THE RIGHT PROBLEM!













MY HEALTH DEPENDS ON YOUR SELECTION, KHASH!



CONFUSE THEM, AND I WIN! HAAAA!

MATCH THE CONTAMINATION TO THE FILTRATION TECHNOLOGY!

CONTAMINATION		BEST WEAPON	
	SOLID PARTICLES (WEAR & ABRASION)		HIGH EFFICIENCY PARTICLE FILTER (MICRON LEVEL CONTROL)
	WATER (RUST, OXIDATION & ADDITIVE LOSS)		COALESCING FILTER (WATER REMOVAL)
	ACID & OXIDATION (OIL BREAKDOWN)		VARNISH & OXIDATION CONTROL TECHNOLOGY (ADSORB, NEUTRALIZE, PROTECT)
	SOLUBLE VARNISH (INVISIBLE THREAT)		ADVANCED OIL CONDITIONING SYSTEM (REMOVES DISSOLVED VARNISH)
	FOAM & AIR (POOR LUBRICATION, CAVITATION RISK)		VACUUM DEHYDRATION / DEGASSING (REMOVE AIR & MOISTURE)

THE OLD WAY (GUESSWORK)



LET'S JUST CHANGE THE OIL AND HOPE FOR THE BEST!

- NO DATA
- NO TREND
- NO PLAN
- HIGH COST
- LOW RELIABILITY

THE NEW WAY (SMARTWORK)



RIGHT DATA. RIGHT FILTRATION. RIGHT DECISIONS. RIGHT RESULTS!

- GOOD DATA
- SMART FILTRATION
- TREND CONTROL
- LOW COST
- HIGH RELIABILITY

CAPTAIN TURBINE IS PROUD!



SMOOTH RUNNING. COOL OPERATING. HAPPY TURBINE!

MISSION RELIABILITY COMPLETE!

RIGHT FILTRATION. RIGHT TIME. RIGHT RESULT!

Khash, MLE, CLS, MLA III, MLT II, VIM, VPR

**REAL DATA.
REAL ACTION.
REAL IMPACT!**

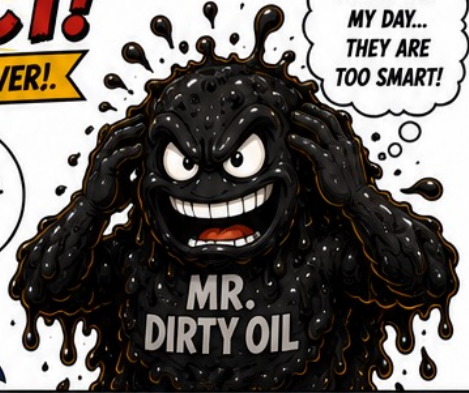


OIL ANALYSIS TOLD THE STORY... WE JUST HAD TO LISTEN!

A TRUE STORY (MANY TIMES OVER!).



GOOD PLAN. RIGHT ACTION. HAPPY TURBINE!



THIS IS NOT MY DAY... THEY ARE TOO SMART!

REAL LIFE CASE – THE STORY OF CAPTAIN TURBINE

1. THE PROBLEM

VIBRATION INCREASED. TRIPS STARTED. THE TEAM PANICKED.

WE NEED A NEW BEARING! MAYBE A NEW TURBINE!

EXPENSIVE REACTION!

2. OIL ANALYSIS DONE

WE TOOK SAMPLES. THE LAB FOUND THE REAL CLUES.

KEY FINDINGS:

- ✓ HIGH ISO PARTICLES
- ✓ WATER PRESENT
- ✓ RISING TAN
- ✓ LOW RULER
- ✓ HIGH MPC

3. ROOT CAUSE FOUND

DIRTY OIL INGRESS FROM A LEAKY BREATHER AND POOR FILTRATION.

LEAKY BREATHER

BYPASSING OLD FILTER

4. RIGHT ACTION TAKEN

BREATHER FIXED. RIGHT FILTRATION INSTALLED. OIL CONDITION IMPROVED.

NEW DESICCANT BREATHER

SMART FILTRATION SYSTEM ONLINE

5. RESULTS ACHIEVED

CLEAN OIL. STABLE TURBINE. HAPPY OPERATIONS.

THAT'S WHAT I CALL RELIABILITY COMEBACK!

THE COST OF IGNORING DATA WAS HUGE. THE VALUE OF USING DATA WAS HUGE!

THE RELIABILITY DREAM TEAM!

- KHASH LUBRICATION DETECTIVE**
- DR. LAB REPORT DATA DOCTOR**
- DATA ANALYST TREND HUNTER**
- MAINTENANCE EXECUTION HERO**

DATA + ANALYSIS + ACTION + DISCIPLINE = RELIABILITY EXCELLENCE

KHASH'S TOP 5 TAKEAWAYS!

- 1 OIL NEVER LIES.**
- 2 TREND IS YOUR BEST FRIEND.**
- 3 ONE TEST IS A CLUE. MULTIPLE TESTS TELL THE TRUTH.**
- 4 RIGHT FILTRATION FIXES TODAY AND PROTECTS TOMORROW.**
- 5 RELIABILITY IS A TEAM SPORT.**

ONE DAY... I WILL WIN AGAIN...

NOT TODAY, MR. DIRTY OIL!
WE HAVE DATA. WE HAVE A PLAN. WE HAVE DISCIPLINE.
WE WIN!

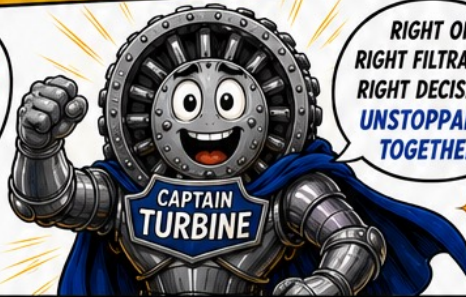
KEEP LEARNING. KEEP ANALYZING. KEEP IMPROVING. KEEP WINNING!

THE FINAL MISSION - PROTECT TODAY. PROSPER TOMORROW!

DATA-DRIVEN. ACTION-FOCUSED. RELIABILITY-POWERED.



WE STARTED WITH A PROBLEM. WE CHOSE TO LISTEN. WE WON!



RIGHT OIL. RIGHT FILTRATION. RIGHT DECISIONS. UNSTOPPABLE TOGETHER!



I WAS A PROBLEM... NOW I'M UNDER CONTROL!

WHAT WE LEARNED. WHAT WE ACHIEVED.

RELIABILITY



PROTECT EQUIPMENT. PREVENT BREAKDOWNS. ✓

PERFORMANCE



SMOOTH OPERATIONS. HIGHER EFFICIENCY. ✓

SAVINGS



LOWER COSTS. LESS DOWNTIME. MORE PROFIT. ✓

SAFETY



SAFER PLANTS. CLEANER ENVIRONMENT. ✓

KNOWLEDGE



DATA TELLS THE STORY. WE LEARN. WE IMPROVE. ✓

TEAMWORK



ONE TEAM. ONE GOAL. ONE WIN! ✓

FROM PROBLEM TO VICTORY - TOGETHER!

WE SAW THE SIGNS



WE ANALYZED THE DATA



WE TOOK THE RIGHT ACTION



WE PROTECTED THE PLANT



CAPTAIN TURBINE'S SALUTE!

TO THE TEAM. TO THE PLAN. TO THE POWER OF GOOD DATA! YOU ARE AWESOME!



KHASH'S FINAL WORD...



DON'T IGNORE DATA. DON'T GUESS. DON'T WAIT. LISTEN. ANALYZE. ACT. PROTECT. WIN. EVERY SINGLE TIME!



RELIABILITY IS NOT LUCK. IT'S A CHOICE.

EVEN MR. DIRTY OIL AGREES!



OKAY, I ACCEPT IT... FILTERS, DATA AND ACTION ARE MY NEW BOSS!



THE END
BUT THE JOURNEY CONTINUES!

THANK YOU FOR READING!
STAY RELIABLE. STAY AHEAD. ALWAYS WIN!
SEE YOU IN THE NEXT MISSION! ★★★★★★★★★★