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Issue 874

cen·pe·co® LUBRICANTS

CENTRAL NEWS©

CENTRAL PETROLEUM COMPANY
Cleveland, OH Walcott, IA

HAPPY HOLIDAYS

The sun is shining and some late crop fields are finally drying. Recent tariff battles are easing with new bean orders from China. America's farmers should soon be receiving government bonus checks based on certain crop outputs… Just another variable year in the "USA bread basket."

In a world of constant changes, consistency and diversity have greater value. That's why we consistently manufacture the highest quality products for a diverse customer base including farmers, truckers, contractors and public accounts.

Each year since 1911 we have had these same goals: make the best products, treat our customer's right, have a diverse customer base and achieve another sales gain.

Of course, it takes "all of us" to achieve these goals and when we do we deserve a "pat on the back." Congratulations to everyone associated with Cen-Pe-Co for another yearly sales gain, and congratulations to our customers who consistently work smart and hard to survive another year.

We are truly blessed for all the help we receive from others. Thanks and Merry Christmas and Happy New Year!

Paul and Dave

DIRT

By: Blaine Ballentine

We all know that dirt in the lubrication system increases wear. Tolerance-size particles are most damaging, causing the majority of mechanical wear. Larger particles cannot get into the tight spaces, and the really tiny particles can flow through without touching the sides. Of course, one of the advantages of CenPeCo Oils is that a thicker oil film can accommodate a larger particle than a thinner oil film.

For engines, the most damaging particles are in the 10 to 20 micron range. Tolerances in high pressure hydraulic systems, between drive gears, and especially high pressure common rail diesel fuel injection systems are much tighter. Therefore, smaller particles can cause damage because the space is smaller.

To put it in perspective, a human hair is usually 50 to 60 microns in diameter. Young eyes can see particles down to 25 microns or so. If you are using bifocals or cheater glasses to read this, the number moves up. The point is, you cannot even see the particles that cause the most wear.

You would think that metal particles would be the most damaging, but dirt is much worse.

Hardness Table

Mineral	Symbol	Mohs Hardness
Diamond	C	10
Alumina	Al_2O_3	8-9
Chromium	Cr	8.5
Silicon	Si	6-7
Steel		4-4.5
Iron	Fe	4
Copper	Cu	3
Bronze		3
Brass		3
Aluminum	Al	2.5-3
Lead	Pb	1.5
Tin	Sn	1.5
Sodium	Na	0.5-0.6

Hardness

Take a look at the adjacent Hardness Table, which shows the relative hardness of several materials using the Mohs scale. The Mohs scales is a ten-point scale that compares relative hardness by observing which mineral visibly scratches the other. Talc is the softest mineral on the scale, and assigned the number one. Diamonds are the hardest, and assigned a ten.

The most abundant mineral in the earth's crust is silicon. Notice that silicon is harder than steel, iron, brass, bronze copper, aluminum, and every other metal used to build machinery with the exception of chromium. In oil analysis, we use silicon to help identify dirt. "Help" identify, because silicon can also come from foam inhibitors, gaskets, and sealant.

The second most abundant mineral in the earth's crust is aluminum, but there is 3 to 4 times more silicon. Aluminum shows up in oil analysis at between 1:4 and 1:6 ratio with silicon.

CenPeCo oils use 8 ppm silicon as form inhibitor, so we subtract that out in identifying dirt. If oil analysis shows 28 ppm silicon, we subtract out the 8 ppm foam inhibitor to get 20 ppm. We would expect to see 5 or 6 ppm of aluminum if the silicon is from dirt and there is no aluminum wear metal.

If iron and chromium are elevated, indicating cylinder and ring wear, dirt is likely entering through the air intake. Perhaps an air filter change is past

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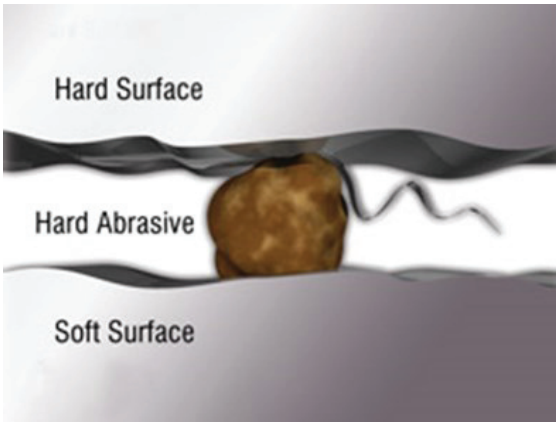


due. If iron and chromium are normal, but lead is high, the dirt has likely found another point of entry.

Let's go back to the aluminum that accompanies silicon in dirt. Pure aluminum is not found in nature, but always in the form of aluminum oxide (alumina). You probably recognize aluminum oxide as the aggregate used in making sand paper. Alumina is 9 on the Mohs hardness scales, which is even harder than silicon and harder than any metal.

In looking at the hardness of silicon and aluminum, it is easy to understand why dirt is so damaging.

Managing Dirt

Although dirt cannot be eliminated, in can be diminished. Store oil in a clean dry place in sealed containers. Consider a breather filter for your oil tote, and maybe your fuel tank. A desiccant filter also blocks the entry of water from humidity, and is best in class.

If oil is purchased in drums, close the dust cover on the CenPeCo Non-Drip Barrel Pump after dispensing. Pump only into clean containers.

Driving a nail into a 5-gallon bucket to serve as a vent is not the way to maximize equipment life. Old fashioned transmission pumps with loose fitting covers should be replaced with a pump that seals out dust.

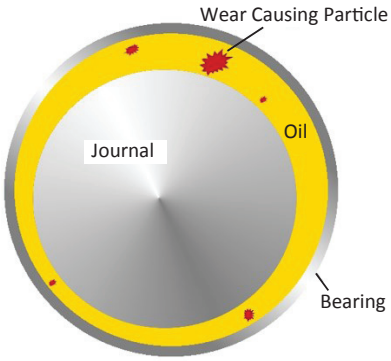
Several of our customers purchase a case of 1 -gallon or 2-gallon jugs with their drum or tote. That way they have a clean container with a cap that is clearly marked to refill and top up that tractor that is 12 miles from the shop.

Keep funnels in Zip-Lock bags. Wiping funnels out with a dusty rag is not a good solution.

Air filters and breather filters should be changed at regular intervals.

Rust is not dirt, but it is similar in that its particles can cause damage. CenPeCo fuel additives can prevent rust from forming, even in the presence of water, thus preventing damaging particles from forming in storage and vehicle tanks.

Just general awareness and effort goes a long way toward keeping dirt out. The decision not to wipe off the dipstick with a dirty rag, not dropping the hydraulic coupler into dirt, cleaning zerks before greasing, pulling into the clean shop and closing the door when changing oil, washing your hands when performing engine work, and capping your fuel nozzle go a long way towards reducing dirt.



Bob Robie, Lab Manager for Eurofins ANA Laboratories, made the following statements during a recent webinar.

"In my business, some of the dirtiest oil is new oil, because it has been handled so many times by the time it gets to a tote in your bay or in your facility." Robert Robie, Eurofins ANA Laboratories

"Most people think of diesel fuel as a propulsion or a power supply. It's also a lubricant, and when you get rid of the sulfur, the lubricant is diminished in the diesel fuel and you need to add lubricity components to help lubricate the components in the fuel system."

Robert Robie, "Fluid Analysis and Understanding Reports" webinar, Eurofins ANA Laboratories 10/23/18

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Roller Bearings Slide

By: Blaine Ballentine

The Tinken Company conducted grease testing to support their bearings used in wind turbines--a low speed, high load, heavy duty application. Some of the conclusions were predictable, and others not as readily apparent.

Taper roller bearing

Higher viscosity base oils, used in making the grease provided a thicker lubricant film to protect bearings. No big surprise there. It is why we use paraffin base bright stock (SAE 140) in CenPeCo SynthoLube, Double Duty, and Mega Moly.

They also found that it is not just the base oil, but the overall formulation. Greases that migrated out of the raceway caused higher temperatures. Sounds like tacky greases are a plus.

Finally, they tested at various slide-to-roll ratios. Taper roller bearings operate at about a 1% slide-to-roll ratio, cylindrical roller bearings at about a 5% slide-to-roll ratio, and spherical roller bearings at about 12%.

Cylindrical roller bearing

Moly excels when there is sliding action. Taper roller bearings do very little sliding, so it is hard to make a case for moly grease there. In fact, we do not recommend CenPeCo Mega Moly Grease in high speed wheel bearings.

Cylindrical rollers slide at 5 times the rate of taper roller bearings. So, Mega Moly starts to make sense in U-joints, although SynthoLube and Double Duty are also good choices.

However, spherical roller bearings exhibit a significant amount of sliding with a slide-to-roll ratio around 12%. It is, no-doubt, why manufacturers require a high moly content in CV joints, where we would recommend Mega Moly with its 5% solids moly content.

Spherical roller bearing

Reference:

Jacobs, Caitlin. “Quality Lubes Find Fair Winds.” *Lubes'N'Greases*, Nov. 2018, pp. 38–42.

Central News

EXTRA!

On the other side of this sheet are two hydraulic oil analyses for an excavator that was received shortly after this months *Central News* article on “Dirt” was written. The report ties in with the article because it shows that when the particle count went down, the wear was cut in half.

Altorfer includes particles counts on hydraulic fluids at no additional charge, where some labs charge nearly three times as much just for a particle count. Keep in mind that the particle counter cannot tell the difference between wear metals, air bubbles, dirt, fiber, water, and additives. They are all part of the count. The adjoining report is on CenPeCo Multi-Purpose Hydraulic & Wet Brake Oil, which has many times the level of additives as an anti-wear hydraulic oil and contributes to the 4µ reading.

Particle counting does not work for the tractor systems because of the fiber and iron particles generated by wet brakes and clutches. It is effective in monitoring straight hydraulic systems in mobile and stationary equipment.

Particle counting is another item for your toolbox, and the analysie on the back side of this sheet helps illustrate the “Dirt” article.

CENTRAL PETROLEUM CO
BLAINE BALLENTINE
201 E LINCOLN ST
WALCOTT, IA 52773

FAX:
PHONE: 563-284-6221

SAMPLE TYPE: OIL
SAMPLE SHIP TIME (days) : 13

COMPANY NAME :
CUSTOMER EQUIP NUM :
COMPARTMENT NAME :
SERIAL NUMBER :
MANUFACTURER : JOHN DEERE
MODEL : 60D_DEERE
JOB SITE :
EXT WARR NUMBER :

SHOP JOB NUM :
COMP SERIAL NUM :
COMPARTMENT MODEL :
COMP MANUFACTURER :
SAMPLE LABEL NUM : PREPAID
FLUID BRAND/WEIGHT : UNKNOWN/UNKNOWN
FLUID TYPE :
EXT WARR EXPIRE DATE :
FUEL CONSUMED :

ALTORFER CAT

sos@altorfer.com
2600 6th St. SW
Cedar Rapids, IA 52404-3504
319-365-0551
sos@altorfer.com

LAB CONTROL NUMBER	SAMPLE DATE	PROCESS DATE	EQUIPMENT METER	METER ON FLUID	FLUID CHANGED	MAKE UP FLUID	MAKE UP FLUID UNITS	FILTER CHANGED
1	20-Nov-2018	03-Dec-2018	6152 HR	1077 HR	No			No

No Action Required

NOTE LENGTH OF TIME SINCE LAST SAMPLE TAKEN. RESULTS OF THE LATEST SAMPLE INDICATE NORMAL WEAR AND TRENDS FOR THIS COMPARTMENT. NO EXCESSIVE WEAR IS INDICATED AT THIS TIME. CONTINUE TO MONITOR COMPARTMENT BY SAMPLING AT RECOMMENDED INTERVALS. RESAMPLE IN 6 MONTHS OR 250 HRS, WHICHEVER COMES FIRST, TO MONITOR TREND.

2	14-Dec-2016	16-Dec-2016	5075 HR		Yes			Yes

Monitor Compartment

WEAR METAL ANALYSIS RESULTS ARE NORMAL. INFRARED/WATER/GLYCOL RESULTS ARE ACCEPTABLE. PARTICLE COUNT IS UNACCEPTABLE. CHANGE FILTER(S) IF YOU HAVE NOT ALREADY. RESAMPLE IN 250 HRS TO CONFIRM/MONITOR. CUT OPEN FILTER(S) AND INSPECT FOR PARTICLES/DEBRIS. MONITOR FOR ANY UNUSUAL PERFORMANCE/NOISES/VIBRATIONS. IF ANY DIAGNOSIS IS RECOMMENDED.

Wear Metals (ppm)	Cu	Fe	Cr	Al	Pb	Sn	Si	Na	K	B	Mo	Ni	Ag	Ti	V	Mn	Cd	Ca	Mg	Zn	P	Ba
1	5	5	0	1	1	0	16	1	3	98	1	0	0	0	0	0	0	3506	15	1419	1170	42
2	10	10	0	2	2	0	12	1	2	72	1	0	0	0	0	0	0	2656	17	1167	1006	29

Oil Condition / Particle Count (ct/ml)	ST	OXI	NIT	SUL	W	A	V100	ISO	4µ	6µ	10µ	14µ	18µ	21µ	38µ	50µ	PVI
1	0	4	4	17	N	N	7.4	23/20/15	65297	6770	583	227	114	76	28	21	3.21
2	0	6	3	15	N	N	7.0	23/21/16	67048	10865	1180	459	232	164	40	20	

Ag = Silver, Al = Aluminum, B = Boron, Ca = Calcium, Cr = Chromium, Cu = Copper, Fe = Iron, P = Phosphorus, K = Potassium, Li = Lithium, Mg = Magnesium, Mo = Molybdenum, Na = Sodium, Ni = Nickel, Pb = Lead, Si = Silicon, Sn = Tin, S = Sulphur, V = Vanadium, Zn = Zinc, A = Antifreeze, F = Fuel, W = Water, P = Positive, N = Negative, T = Trace, E = Excessive, NIT = Nitration, OXI = Oxidation, ST = Soot, SUL = Sulfation, ISO = ISO Rating, PFC = Percent Fuel Content, PQI = Particle Quantifying index , NaW = Salt Water, FL Pt = Flash Point, TAN = Total Acid Number, TBN = Total Base Number, H2O = Karl Fisher result, V100 = Viscosity@100C, V40 = Viscosity@40C, PVI = Particle Volume Indicator