The Barn Raiser

Mid-South Engineering Company

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The Cheapest Parts You Can Buy (Part 2)

By: Wayne Horman/Mark Culpepper

As we were discussing last quarter, good preventive maintenance can represent some significant savings. Continuing our train of thought… another problem is water in the fuel. Water can be quite detrimental to the efficiency and life of an engine. Water in the filter blocks any fuel from getting through to the injector pump. Water can freeze in the winter and prevent the engine from starting. Water present in the fuel system can also results in:

- Fuel injector pump failure
- Fuel injector failure (water reaching the injector tip turns to steam and "blows" the tip off the injector)
- Injector damage results in poor fuel economy
- Possible piston damage

"Dirty Fuel" problems can be reduced or eliminated by placing a good fuel filtration system on the fuel delivery pump prior to introducing the fuel into the rolling stock fuel tank. Second, change the rolling stock on-board fuel filter regularly through a PM program. Third, drain moisture from the fuel system at the sump in the tank and separation bowls if provided on the equipment.

Try this simple trick to eliminate the water in the fuel tank. Most water in the fuel tank is the result of condensation from the warm fuel return from hot engine and the cooler sides of the tank. **Fill the fuel tank at the end of each shift.** This eliminates the condition for the water to condense in the air space in the tank…simple, but effective.

DIRTY OIL

Dirty oil is a death warrant for your rolling stock engine. Of all of the items mentioned above, as critical as they each are, this is the most important. The oil is the life of your engine and should be treated as such.

Oil filters, by design, capture and hold suspended contaminates found in the motor oil. Oil filters can become so contaminated that holes can be torn in the filter as a result of internal oil pump pressures. Holes allow oil through the motor unfiltered.

Some filters have a built-in bypass that allows the oil to "bypass" the filter when it becomes too contaminated to provide sufficient oil to the engine. Contaminated oil will lead to:

- Excessive piston ring wear resulting in premature oil consumption and power loss
- Excessive rod and crankshaft bearing wear
- Excessive internal timing gearing wear
- Excessive cam and cam bearing wear
- Excessive valve guide wear
- Excessive oil pump wear resulting in reduced oil supply to the engine parts

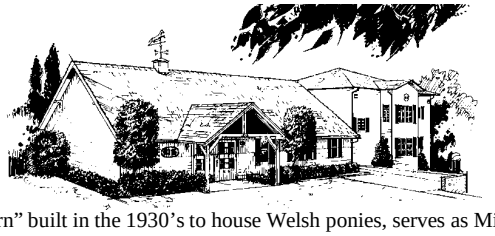
Contaminates can be introduced into the engine system simply by using "dirty" pouring spouts and not cleaning the tops of containers before transferring the oils to the engine. Dust collected on the inside of the oil transfer hose where a manual or electric pump is used is a place seldom checked before adding oil to the motor.

Collectively all of the "dirty" problems can and will result in premature death to a perfectly good engine. All of the replacement parts affected by the dirty air, fuel and oil are expensive and time consuming to replace.

The last of the list, but by no means any less important, is general machine lubrication. The grease fittings are placed on the equipment to prevent wear and failure at pins, joints, slides and swivels. Fold lubrication into the program of maintenance also. It is cheap compared to the parts grease protects.

The cheapest parts you can buy are found in a GOOD PREVENTATIVE MAINTENANCE PROGRAM

You can live for years next door to a big pine tree, honored to have so venerable a neighbor, even when it sheds needles all over your flowers or wakes you, dropping big cones onto your deck at still of night. ~Denise Levertov



"The Barn" built in the 1930's to house Welsh ponies, serves as Mid-South's offices.

Machine Shop Practice – Finish Marks

By: Frank Jennings

Finish marks for machined parts tell the machinist what surface texture he has to create for a given piece of work. In past & present practice “Ra” (roughness average) has been used to designate machined surface texture. This number is usually given in micro inches, (1/1,000,000 in.) or can be in micrometers. One micrometer is equal to 40 micro inches.

Another method that is often used to designate surface finishes is with the ISO “N” number. The chart below shows the relationship of these numbers, and the machine shop practices required to obtain them. Commercial quality cold drawn shafting usually has an Ra of about 32, while TG&P shafting surface can be in the range of 8-16. Turned down shafts are the most common machined part that we designate on our design drawings and in general the finish on the machined portions of a shaft should be at least equal to the original surface finish. Special consideration should always be given to the fillets on shafts. Fillet radii should be generous at changes in diameter. For heavily loaded shafts, finishes at diameter changes are important. A coarse finish at a fillet point (heavier/deeper machining tool marks) is more apt to cause fracture under fatigue load than a finer finish.

Finishes for rotating shafts are directly related to seal life. Finish is also closely related to fit. Generally, the closer the fit between parts, the smaller the “Ra” or ISO “N” number will be. Finish marks for drawings do not need to be complex. Refer to “Machinery’s Handbook”. Finish marks on drawings are basically a check mark with a number. Several online sources are great for additional information. Modern machine shop online (mmsonline.com), Virtual machine shop, finishing.com, icrank.com are all excellent sources for machining information.

surfaces *made by FJennings/06/07/2007* ROUGHNESS AVERAGE (1 MICROMETER = 40 MICROINCHES, 1 MICROINCH = 1/ millionth of an inch)

Ra MICROMETERS	50	25	12.5	8.3	3.2	1.6	0.8	0.4	0.2	0.1	0.05	0.025
Ra MIICROINCHES	2000	1000	500	250	125	63	32	16	8	4	2	1
ISO FINISH NUMBER	N12	N11	N10	N9	N8	N7	N6	N5	N4	N3	N2	N1
PROCESSES												
FLAME CUTTING												
SNAGGING												
SAWING												
PLANING,SHAPING												
DRILLING												
CHEMICAL MILLING												
ELEC. DISCH. MACH.												
MILLING												
BROACHING												
REAMING												
ELECTRON BEAM												
LASER												
ELECTRO CHEMICAL												
BORING, TURNING												
BARREL FINISHING												
ELECTROLYTIC GRINDING												
ROLLER BURNISHING												
GRINDING												
HONING												
ELECTRO POLISH												
POLISHING												
LAPPING												
SUPERFINISHING												
SAND CASTING												
HOT ROLLING												
FORGING												
PERM MOLD CASTING												
INVESTMENT CASTING												
EXTRUDING												
COLD ROLLING, DRAWING												
DIE CASTING												

KEY LEGEND

AVERAGE APPLICATION	
LESS FREQUENT	