

Even Tough Ones Do Better With Care

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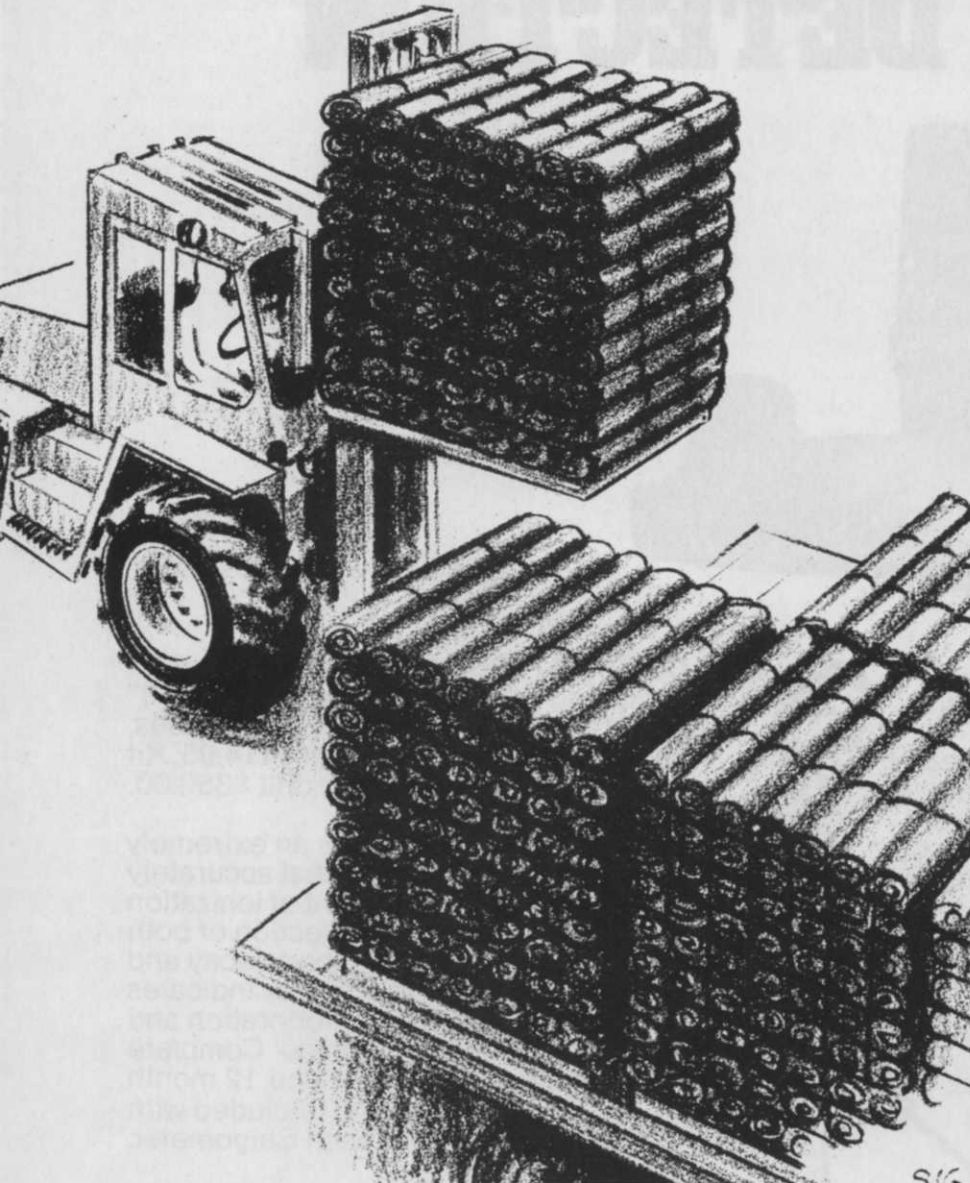
YOU'VE BOUGHT your first rough terrain forklift. Tied up is a purchase price of at least \$12,000, possibly as much as \$30,000. For that price you expect to get a full day's use on the job site, at the lumber yard, saw mill, orchard, or sod farm.

You can get this full use and you can conserve operating costs through a variety of means. Operator training is one, preventive maintenance — regularly performed — is another. These means are related.

Preventive maintenance is particularly helpful in budgeting and forecasting of operating expenses, because the problem with rough terrain forklifts, historically, is operating costs. One reason is operation: light construction users go to considerable effort to hire experienced dozer, loader and backhoe operators, but often anybody who can start a forklift is allowed to use it. Another reason is improper service: owners send their mechanics to manufacturers' schools, learning how to take care of big construction machinery. In contrast, almost no one trains a forklift mechanic. Unskillful operators and mechanics really can create excessive operating costs, primarily in the form of excessive machine downtime.

Why people are so casual about caring for this equipment isn't certain, other than rough terrain forklifts are basically similar to the common tractor. Therefore, many owners may feel "everybody knows how they operate."

A second possible reason is related to the intense use of these machines: unloading materials. A truck
(continued on page 29)



**Modern designs build more reliability
into these big-tire vehicles;
Maintenance delivers goods.**

TOUGH ONES (from page 18)

arrives with a load, so a worker is directed to use a forklift to unload. To get what he needs he looks for a forklift. Under such an arrangement, who's responsible for getting best service from the forklift at best possible cost, or even keeping it running?

A careful preventive maintenance (PM) program for rough terrain forklifts can pay off with a surprising improvement in equipment reliability, a significant extension of useful and economical service life, a means of forecasting replacement, a reduction in service costs and a marked gain in productivity. Here's why.

Today's rough terrain forklift is designed as an all-purpose machine with use objectives keyed to creating a high productivity machine which is economical, serviceable, safe and easy to operate. Forklifts are now being designed with power trains, hydraulics systems and increased load stability which are unique to this equipment. These are designed as integral units and not as add-on attachments to existing tractors. This means they are, first of all, more expensive. Yet, because they are unit-designed for specific applications, they are also more suited to the required jobs. If maintained properly, these machines will surely give maximum return on investment, through reduced downtime and increased service life.

Start with Discipline

There's no magic formula to preventive maintenance programs. You simply must follow procedures outlined in the operator's manual at the intervals designated by the manufacturer. These recommendations are based on years of experience — both good and bad. Localized or special conditions may sometimes require a reduction of service intervals from factory recommendations, however, it is poor economy to extend service intervals beyond the manufacturers recommendations.

There are 11 major areas where forklift PM is often times neglected. Yet, all have specific means of contributing to lower operating costs.

1. **Engine lubrication neglect is disastrous.** Although today's oils are marvels of efficiency compared with

those in the past, they are still affected by heat, cold, dust, fuel contamination and oxidation due to extended service intervals.

Recommended lubricant levels must be maintained and the lubricant changed at designated intervals. There's an old cliché that lubricating oils don't wear out, but very few people in the service business believe it. High temperatures cause oxidation, piston ring blow by causes fuel contamination, and dirt, which escapes the filters, adds to the lubricant contamination. All this means engine oil and the filter must be changed regularly.

In many situations, lubricant, fuel and air inlets also need protection from foreign material introduction due to vandalism. This last item is especially true around the big city job sites.

2. **Oil must be chosen with care.** Manufacturers of machinery specify both the API service grade of oil and SAE oil viscosities for various temperature ranges. Their recommendations are based on experience with the products. Depart from these recommendations and you have a cost stimulant. You can't choose lubricants by hunch. A low viscosity engine oil used during high ambient temperatures, or a viscous hydraulic fluid used during cold weather is a misapplication and can create major breakdowns.

3. **Electric starter motors, especially on diesel engines can be a source of high costs.** Many starters are ruined in this way: an operator will attempt to start a machine which is out of fuel. A machine, which has run out of diesel fuel, is refueled without having the entrained air bled out of its injection system. Of course, the engine won't start. Engine starters may draw in excess of 100 amps of battery current. The heat resulting from extended efforts to start can be extremely destructive to internal connections and wire insulation. This is why many operating manuals specify: "Do not crank an electric starter more than 30 seconds without allowing a two-minute cool down period."

Starting problems are often created by improper fuels. For example, a No. 2 diesel fuel in sub-zero temperatures can clog the injection pump and filters.

4. **Hydraulic systems can be**

harmed with costly results. A. Probably the worst enemy of hydraulic systems is dirt in areas of close tolerance. In modern valves, clearances of 0.0005 inch between valve spool and valve body are not uncommon. While modern filters are capable of removing some contaminants of this particle size range, they can't remove them all. When hydraulic filters are not changed as recommended, the filters may load up. Then the filter bypass permits contaminants to go through the hydraulic system and the resulting action increases critical clearances.

A sticking valve spool is often an indication of severe oil contamination. A service mechanic can recognize this problem, because if he cleans or changes a valve without changing the contaminated oil, the valve spools will stick again.

In hydraulic pumps, contamination tends to increase the clearances, allowing oil to slip by the internal parts, thus creating heat.

B. Heat is probably the second

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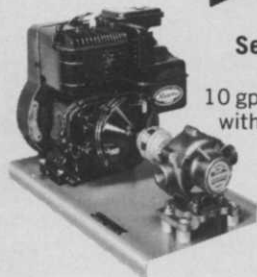
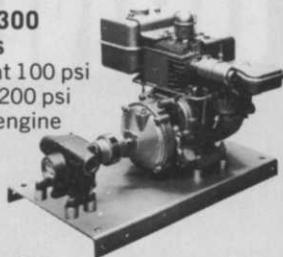
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most destructive thing in the hydraulic system because high temperatures tend to oxidize hydraulic oils, thus breaking down lubricity. Hot oil becomes thinner, thus increasing "slippage" through pumps which heats the oil even more, at high working pressures.

Hydraulic preventive maintenance, however, is simple, consisting of regular filter changes at specified intervals, the use of the proper hydraulic oil, keeping oil coolers and the outer surfaces of reservoirs clean. In all cases, oil must be stable throughout the recommended temperature range and have a high resistance to oxidation and foaming. Since hydraulic oils also deteriorate they should be replaced at recommended intervals.

C. Water or air in a modern hydraulic system is easily recognized as the oil will generally have a "milky" appearance. To determine whether the culprit is water or air, drop a couple of drops on a red hot metal surface; if it spatters then it's water, if it just smokes then it's air. Water may clog the filter, causing some unique problems which vary depending on the system. Most hydraulic filters have a low pressure bypass valve. When the filter becomes clogged, this valve opens and the oil goes around the filter, thus causing loss of filtration.

5. **Tampering with hydraulic relief valves can cause problems.** Hydraulic system relief valves have several functions. Primary of these is to limit the pressures in the circuit to a nondestructive level. Raising the relief valve pressures above the manufacturer's designated level may temporarily give increased lift capacity, but this often proves to be false economy in terms of increased maintenance and major breakdowns. A broken pump center ring is a sure indication of excessive operating pressures. This may be due to a readjusted or stuck relief valve, or it may be due to the wrong viscosity oil used in cold temperatures.

6. **Tires don't just run and run;** planned tire care helps conserve equipment costs and get better equipment use. Modern tires are excellent in terms of puncture-proofing and resistance to abrasion and cuts, but they can be damaged on cluttered worksites. The best preventive tire maintenance in-

volves an operator who looks where he's going before he gets there. Replacement tires of lower ply rating are often times costly due to increased downtime from flats or failures.

7. **Electrical maintenance — a field of its own — starts with batteries.** Today's batteries have excellent service life if properly installed and serviced at regular intervals thereafter. A new dry charge battery should be slow charged until the specific gravity doesn't change over an hour period, after adding electrolyte. It is false economy to use a new dry charged battery without this procedure, because at installation the battery is probably not fully charged. It possibly never will be fully charged, considering that intermittent use of a forklift will not provide the additional charge needed.

Fast charging a new battery is risky, because resulting high temperatures can easily damage the cell structure.

Batteries need regular maintenance. The electrolyte level must be kept above the top of the cells to prevent sulfating of cells, which reduces the output capacity. Water, too, must be chosen with care. Many factory service people believe distilled water is still the best additive to put in a battery.

Excessive need to add water to batteries indicates overcharging, suggesting a voltage regulator problem. A charge voltage in excess of approximately 15 volts will cause water loss, however, this varies with ambient temperature. While you can't adjust many of the new solid state regulators, there may be a loose or corroded connection causing a voltage drop between the alternator or battery and the regulator.

An often neglected electrical maintenance item is keeping the alternator drive belt tensioned properly. If this belt is loose, the alternator may not be delivering enough output to a partially discharged battery to recharge it.

8. **General cleanliness pays off** by preventing hydraulic, fuel, or transmission contamination. By wiping off the filler cap and the filler neck before lubricants or fuel are added, you avoid adding external dirt.

Hydraulic reservoirs are also heat exchangers. An oil-coated reservoir attracts dirt, creating an insulated coating and so loses its

efficiency. If a forklift has a separate heat exchanger or oil cooler, they also must be kept clean, but not by means of a water hose. Steam cleaning or air-pressurized solvent will cut any oil film and clean away the dirt.

9. **Fuel choice and fuel storage are important** in forklift operation and maintenance. Even in view of current fuel costs, a few precautions can pay off in terms of decreased maintenance costs on your forklift. Keep your fuel storage tanks full, if at all possible. A full tank does not allow condensation — a cause of water contamination. Recognize that during fuel shortages, the available fuel may be less than premium quality, so use an inlet filter to prevent vehicle tank contamination. In addition, change fuel filters or drain the sediment bowl at more frequent intervals, particularly if you do get some low grade fuel. Because a given fuel supplier may be low on fuel, levels in storage tanks may be drawn down lower than usual. Therefore, any rust particles or any kind of contamination in the bottom of the tank, may be passed into the tank truck, bringing fuel out to the job site.

By changing engine fuel filters at more frequent intervals you save the heart of your diesel engine: the injection pump. It is worth the small additional expense to keep an adequate supply of fuel filters on hand especially in view of current service parts shortages.

10. **Engine radiators can't handle much exterior dirt.** If outside fins or tubes become coated with oil, dirt,



A rough terrain forklift needs its own brand of tender loving care. Some of this care includes frequent cleaning and lubricating of the mast chain.

or anything which reduces cooling efficiency, engine temperatures will go up, leading to reduction in power and possibly complete failure if not corrected. Steam clean the radiator, or blow off with pressurized air solvent if there is oil involved. Simple dirt can be cleaned with hot water on an air hose.

11. **Forklift masts need their own brand of care.** Lack of lubrication will reduce service life on rollers and rails. However, mast rails used in an abrasive environment should be kept clean and dry to prevent accelerated heat due to grit entering the rail lubricant.

Don't Neglect The Operators

Operators need to recognize several major differences between a forklift and other equipment that they may have been operating.

1. They may have a 1500 lb load 30 ft in the air. At this time, the forklift must not be driven. Sudden movements under these kind of conditions could cause undue stress or strain on the mast structure.

2. With a mast at full extension, a forklift is an unstable structure. Therefore, an operator must have his load properly centered on the forks so there will be no load shifting.

The operator of a forklift can prevent major breakdowns in three ways: 1. He avoids the need for unnecessary maintenance through proper operation. 2. He is the eyes and ears for those who perform maintenance or repairs he cannot do himself. 3. He can also do a few simple things on the spot such as checking lubricant and coolant levels, tightening loose bolts or hydraulic connections, etc.

The skilled operator notices and reports unusual operating conditions, such as changes in engine sounds, a jerky motion of the mast, the forklift may not advance or back up as easily as previously. These problems are often times not recognized by maintenance personnel.

In summary, forklifts should not be neglected. They're not an expendable device, but an important tool and it costs money to buy and maintain them. How much forklifts cost to operate is variable. However, these costs can be minimized in the hands of thoughtful owners, operators and knowledgeable service personnel.

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