

MAKE WAY FOR DIESELS IN TURF CARE EQUIPMENT

By Thomas M. Carter, Manager of Engineering, Turf Products Division, Jacobsen Manufacturing Company

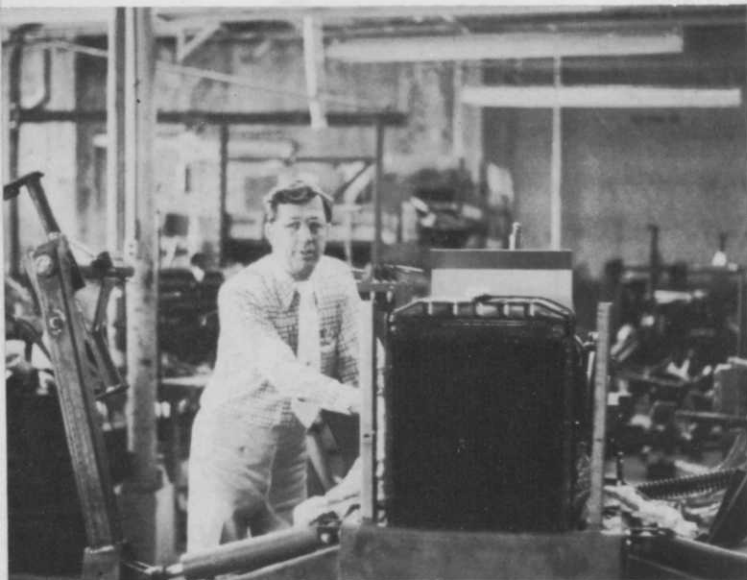
Fuel-thrifty engines that deliver high torque, greater life expectancy, and are easy to maintain are about to make inroads as power units for smaller turf care equipment.

Small displacement diesels, in the 20 horsepower vicinity are on the way, promising highly attractive power alternatives to users who have tougher requirements.

Up to now, these smaller turf machines have been powered by gas engines, traditionally air cooled units but more recently optional water cooled plants which are introduced to provide turf men with the added life that lower rpm's, cooler operating temperatures and higher torque can mean.

Diesel technology has never been very far away. Across the turf over on the highway, diesels

Thomas M. Carter, Manager of Engineering, Turf Product Division, Jacobsen Manufacturing Company, has made a career of engineering turf, agricultural and related equipment. At Jacobsen, he is responsible for the design and development of new turf products, enhancing current equipment, field and in-plant testing, experimental programs, and cost analysis and comparisons.



have long been the accepted power for hauling tons of products and passengers.

Truck and bus diesels generate enormous torque, little horsepower, but extreme longevity. Greyhound gets up to 600,000 miles out of its diesels before major overhaul.

Torque rating, rather than horsepower, is a characteristic worth considering. Torque is sheer twisting force. It comes on at a much lower rpm level than horsepower. High torque rating let the big automotive engines of the 1920's and 30's accelerate from a crawl to 80 mph in high gear without hesitation. It's the performance measurement that for years has been overshadowed by horsepower ratings.

In recent years, diesel technology has advanced considerably, particularly engine speed. Older diesels could produce great amounts of power within a narrow rpm range. This left truckers and busses doing a lot of shifting to get their rigs up to speed. But this somewhat constant rpm characteristic was hardly suitable to automotive use. Thus came the very recent development of small diesels that rev from idle all the way to 5500 rpm, such as used in the Volkswagen Rabbit, GM's Oldsmobile, etc.

The small turf diesels, however, rev lower than the new automotive units. The turf power plants are designed to produce ample power within a lower and narrower speed range, with torque coming on strong at about 1600 rpm (compared to about 3000 rpm for peak horse power in a similar gas engine).

Plenty of power at lower engine rpm's is an important diesel feature for turf applications, since these machines are operated at a fairly constant speed anyway. In addition to longer engine life, the lower speed means less fuel is consumed.

Diesels are different from gas powered engines in other respects. For one, there is the method of ignition. While gas units use a spark to ignite fuel, diesels rely on very high compression (encouraged by a heat plug for starting) to generate heat to ignite the fuel. Typical diesel compression ratio is about 19 or 20 to 1, compared to about 8 to 1 for a gas engine. The high compression necessitates a huskier engine design, from the crankshaft and its bearings right up through combustion chambers, cam shaft, valving, etc. This method of ignition also means diesel uses no spark plugs, points, coil, condenser or other elements needed to fire a gas engine.

The simplicity of diesel ignition obviously translates to simpler maintenance procedures and none of the costs encountered in replacing gas ignition system components. It's a safer engine, too, having no wiring, etc., that might short out and cause a fire.

Fuel delivery is different, too. Thicker in consistency than gas, diesel fuel is injected into the combustion chambers rather than sucked in by the

Diesels

down stroke of a piston via a carburetor. In terms of routine maintenance, these injector systems are considerably more simple than carburetors, requiring little or no adjustments. Normally, only fuel and air filters require periodic replacement. The fact that diesel fuel can't be bought at every filling station should not present a problem for turf people, since they usually obtain fuel in bulk for storage.

Other drive line components, clutch transmission, etc., are much the same as they are for a similar gas unit. Likewise for the cooling system. The generator, really needed only for lighting and to keep the battery charged for heat plug starting, would be a lower capacity unit.

Translating these benefits to actual applications, it's easy to see why diesel power will gain favor.

Take, for example, the landscape maintenance field. This is a high-growth industry that has become quite sophisticated over the past decade. Contrary to the image of a pickup truck, a couple of mowers and laborers to push them, the commercial landscape maintenance operation contracts with municipalities, utilities and industrial parks to keep the grounds in prime shape year after year.

To these entrepreneurs, time is money. They're in the business of maintaining attractive settings,

on a contract basis, and this means machines must be reliable, simple, economical, and have a long life — in addition to doing their primary job well. Just as in a production plant, when equipment is down, manpower is wasted and production is lost.

Landscapers represent the production-oriented end of applications. But other segments are changing, too. As budgets tighten, a greater emphasis is placed on performance by golf superintendents, park district supervisors, cemetery maintenance people, and others. And this calls for equipment that measures up to the same performance criteria.

Another change among users generally is the tendency toward less equipment maintenance. Certainly, many have well-qualified mechanics on hand to undertake routine work, and some distributors maintain facilities and staffs. But, in the interest of keeping the machine going, maintenance is sometimes overlooked — changing plugs and points, replacing the air cleaner, redoing the head, and so forth.

Longevity is an important adjunct to performance. Users need equipment that will go well beyond the traditional one season of extensive use before valves may need attention after 500 to 750 hours of heavy use. After all, these machines run for many hours, often operated by personnel who are not mechanically inclined.

Seasonality plays an important role, too, with year-around use for some regions and six months for others.

Diverse operating conditions call for engineering a very high degree of self-preservation and long life into equipment. This is why Jacobsen introduced its four-cylinder water cooled gas engine as an option to the Out Front Commercial — to extend life through cooler operating temperatures — and why the next step to diesel power for smaller turf equipment is being taken to multiply engine life another three to four times.

Generally, the diesel will cost users more at the outset, but deliver healthy returns on investment during a more rigorous operating life. By present and foreseeable standards, emissions are less of a problem.

Not that diesels have been unknown to the industry. Diesel power has been an alternative to gas engines in the larger turf tractors for about the past decade. These machines, almost agricultural in size, are used for such heavy duty work as pulling large gang mowers that cut swaths up to nearly 20 feet, or pulling large aerifiers, seeders and the like. They ply the turf at golf courses, recreational and other large areas where using smaller units would be impractical.

Jacobsen now offers diesel power in five turf tractors. They use 192 cubic inch displacement (CID) engines that produce 65 hp at 2400 rpm, and 160 ft. lbs. torque at 1600 rpm. Running with 16.5 to 1 compression, these four cylinder power plants are manufactured to our specifications by Ford.

Just as in the automotive industry, we see diesel engines gaining wider use in the turf care industry. With the availability of the small diesel, the trend can only accelerate over the coming years.



DERBY

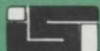
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