



Torture Testing

This specially designed ramp, with 50 per cent grade, was used to test hill climbing ability of prototype 1965 Cushman models. This test indicated need for improved drive unit.

Here is how a golf car builder imitated the automobile industry in an effort to develop models that will hold up under the slam bang driving of some golfers

The most direct — and costliest — way for a golf course operator to determine how well and how long a golf car can survive the bruising pace of daily use is to drive it to death.

It's imperative to know the survival factor because paramount among economy considerations in selecting and operating a fleet of golf cars are longevity and freedom from downtime and maintenance.

Major manufacturers have long relied on laboratory testing of parts, materials and components to determine life potential and ruggedness of their cars. Course operators know from costly experience that there's a tremendous difference between examining parts and components under controlled lab conditions and subjecting a vehicle to the grueling, day-to-day punishment administered by drivers with widely divergent skills and sense of responsibility.

Design Improvements Indicated

One manufacturer, Cushman Motors of Lincoln, Neb., has taken the golf car out of the lab and into the field for exhaustive, multi-stage testing under actual "combat" conditions. In just a few months of accelerated, "time-lapse" testing, it has obtained scientific data that accurately charts the wearability of its golf cars over several years of normal use on a golf course. Equally important, the tests have indicated invaluable design improvements which have been engineered into the 1965 line.

"Our program is a new and significant step in the golf car field," says Curtis T. Morris, vp and division manager of Cushman. "The automotive industry has established the validity and importance of road testing. Since the average golf car is subjected to more abuse than an automobile, we regard it an essential responsibility to prove our vehicles' performance under the most trying field conditions."



This is how the hill testing unit, which is higher than adjoining one-story building, looks from the side. (Inset) Test drivers always wore crash helmets while they were putting prototype models through paces in and out of ditches and over the roughest kind of terrain.

After both laboratory and field stress analysis by the OMC Research Center in Milwaukee, Wisc., Cushman initiated its road-test program in the spring of 1964, using eight gasoline and six electric 1965 prototype models. They were hand built, with production drawings used to assure

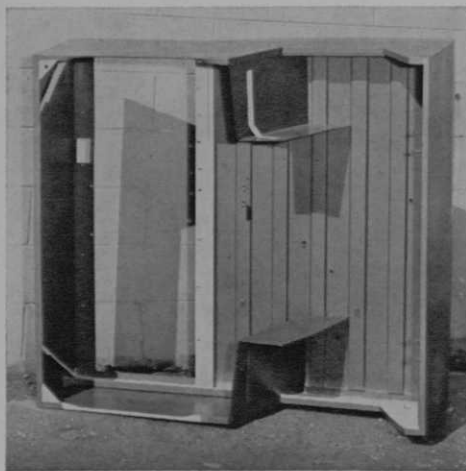
that the test vehicles would be identical with 1965 production models.

The "torture" course was a mile-square uncultivated lot dotted with ditches, embankments and inclines.

It was worse by far than the most poorly maintained golf course, but was exactly what was wanted for concentrated testing under extreme conditions.

In Phase 1, each of the 14 golf cars was driven incessantly for eight hours daily — literally pushed to the breakdown point. A complete history was recorded via meters and charts to determine the punishment limits of components, consumption of oil and fuel, durability of batteries, tires, drive belts.

Within two months, definitive performance patterns were established. When, how and why failures occurred were analyzed. (Continued on page 98)



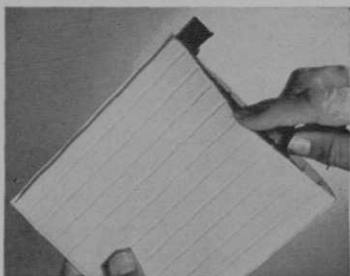
White paint was used to indicate stress areas in car bodies after various tests were made. As a result, 1965 models were beefed up in key areas to withstand strain under extreme abuse.

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whelm the practical approach. His teaching tenets were not based on the understanding and application of cultural turf practices alone. He emphasized that business management of fine turf is just as important as cultural management.

Great Asset

"It is good practice," he once said, "to lay away a bank account of healthy turf. This is the greatest asset in times of depression. To determine whether this account is growing or shrinking, all turf on the course should be inventoried regularly."

Prof Dickinson received many honors and citations during his life, but according to those who knew him best, the one he treasured most came in 1958 after he had retired from 45 years of teaching. The Northeastern Section of the CCSA, which he helped to organize in 1932, held a "Dickinson Day" in his honor at Mohawk GC in Schenectady. Toasts were lifted, gifts were presented, but what pleased the Prof most was that many of the old U of M turf grads were able to get back to see him.

Torture Testing

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lyzed. Indicated improvements were made in seven new prototype golf cars manufactured with actual production parts.

The improved vehicles then underwent Phase 2 testing. This included continuous operation for 16 hours a day and even more grueling punishment than was inflicted on their predecessors.

Gave Them the Works

Deliberately, the test drivers banged their golf cars into ditches, threw them into sharp turns, gunned them at maximum speed over long distances, and did all the necessary wrong things in an effort to twist frames and axles and figuratively drive the vehicles into the ground.

The dawn-to-dusk battering continued for two months. The test program racked up more than 6,000 hours and 40,000 miles of driving — equivalent to 20 years of normal driving, based on average use on a course.

Again, throughout Phase 2 testing, ex-

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haustive performance records were compiled. As new information indicated stress points and potential frame or component weakness, improvements were designed into the new 1965 line.

Phase 3 of the program tested the vehicles' climbing ability. A special 35-foot ramp with a 50 per cent grade was built. At its highest point it topped a one-story building.

This test indicated that a more powerful drive unit would enable Cushman cars to take 50 per cent grades without strain. Although such extreme inclines are non-existent on courses, the 1965 models feature an improved drive gear that thrives on hills.

Still Not Satisfied

Still the manufacturer wasn't satisfied. It had tested its vehicles to their limits but now it undertook Phase 4 to assure complete objectivity. The complete 6-model 1965 line — from the deluxe 4-wheel electric Trophy to the low-price gasoline Scotsman — was turned over to a golf course for testing by actual golfers in actual rental operation. However, the

golfers didn't know they were doing any testing.

Performed as Expected

"We were convinced that careless, inexperienced, even irresponsible golfers couldn't be any tougher on our golf cars than the professional 'hot rodders' on our payroll," Robert Bottum, senior project engineer, points out, "but we wanted to be absolutely certain. We were right. Under actual car rental operation, in the hands of a wide variety of drivers with all types of damaging driving habits, the 1965 models performed exactly as our test data indicated they would."

Cushman's road-test program has been costly in time and dollars. Field testing is now a standard, continuing procedure. It already has enabled the company to introduce a 1965 line with what is said to be unprecedented resistance to abuse.

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