How Car Industry Has All But Won War On Rust

Improved body metals, rust-discouraging designs, and better paints are big reasons cars last longer.

By Frank Greve: *Philadelphia Inquirer; Washington Bureau*

WASHINGTON - Victory is at hand in the auto industry's 30-year war against rust.

No more Ford trucks with tailgates that look like decayed teeth. No more Toyota Celicas with see-through wheel wells. No more VWs with college cafeteria trays covering rusted-out floor pans.

"Rust has virtually gone away," declared David Champion, director of automotive testing for Consumers Union, publisher of Consumer Reports, the leading U.S. car-buying guide.

Tell it to Mike Duran, manager of the Fairfax, Va., franchise for Ziebart, once the nation's busiest rust-proofer. "If you bought a car in the '70s, you'd have holes in your fenders three years later unless you went straight from the showroom to someone like us," said Duran, 49. Today, his once-numerous competitors are all but extinct, and rust-proofing is down to less than a sixth of his business.

Improved body metals that resist rust are the big reason, plus rust-discouraging vehicle designs and better primers, paints and sealants. They add roughly $200 to new-car costs, but enhanced rust resistance, along with improved corrosion-fighting in cooling and exhaust systems, is a big reason cars last longer, said L. Lee Piepho, 59, of Howell, Mich., who was General Motor's top rust-fighter.

The improvements are helping cars' longevity. In 1977, half of all U.S. passenger cars lasted until they were 10.5 years old, according to National Highway Traffic Safety Administration estimates. Their travel lifetime was 107,000 miles. By 2001 - the latest year tallied - median longevity was 13 years for passenger cars, and their travel lifetime was up to 152,000 miles.

For light trucks, the mileage rose from 128,000 to 180,000, according to the safety agency, but longevity remained 14 years, largely because more trucks were substituting for cars.

Better rust resistance also slows depreciation and keeps resale values up. That hurts new-car sales, Piepho said, but the gleaming beige 2002 GMC pickup in his driveway is a trade-off he is happy to make. "It looks as new as the day I bought it, and it has 100,000 miles on it," he said.

Until the 1960s, rust mainly afflicted cars along the Atlantic and Pacific Coasts and the Gulf of Mexico, according to Robert Baboian of Greenville, R.I., a leading auto-industry corrosion consultant. Then, increased use of road salt as a winter deicer

spread the rust problem throughout snowy areas of North America as far inland as Minnesota and Iowa.

Accompanying the road salt, whose use went from less than a million tons in 1950 to nearly 19 million in 1994, was an increase in acid rain in the Northeast, Ontario and Atlantic Canada. Where salt air, deicer and acid rain combined to eat cars - in places such as St. John's, Newfoundland; Boston; Montreal; and snow-buried Buffalo - classic rust buckets such as Fiats, Chevy Vegas and Land Rovers sometimes ran red before they left dealers' lots.

According to Jeffrey Helms, a top rust-fighter at Ford Motor Co., the rust rate in those cities is about five times that in favorable climates, such as in inland Texas.

Rust forms when iron combines with oxygen to produce iron oxide, a molecule that takes up more space than iron. That is why rust puffs up or flakes on a car's surface. The corrosion accelerates in joints with dissimilar metals due to electrolysis.

To reduce rust, automakers began coating their steel with metals such as aluminum and zinc or their alloys. Those metals oxidize, too, but their corrosion products are white, not rust-colored, and less noticeable. When they are present, they oxidize, and the steel does not.

So automakers turned to zinc alloys or coatings for structural parts, and aluminum-steel alloys for body panels, primarily hoods and trunk lids. Surfaces of the new metals, especially those containing zinc, proved hard to paint, however, and automakers discovered that the paint tended to flake off. Dunking the car's body in a phosphate bath solved that problem by creating a thin clean paintable layer of phosphate crystals on the metal's surface.

Another key strategy was guaranteeing that primers and anti-rust waxes got into hard-to-reach crevices and inner surfaces, such as rocker panels below a vehicle's doors, lower-door cavities, and hidden surfaces between the inner and outer metal on hoods and trunk lids. Robots helped, because they proved more reliable painters than people. So did improved sealants and high-temperature waxes and spraying gear that got them deeper into rust-prone voids.

Design also was a big concern. Many cars, including early Toyota Corollas, Datsuns and Chevy Caprices, tended to rust fore and aft of their wheels. That was because the tires kicked up stones that chipped paint. They also kicked up muddy wads of leaves and debris soaked with road salt, which attacked the exposed metal.

The design solutions, according to Piepho, included eliminating joints and pockets in which the wet wads could collect, adding chip-resistant shielding, and providing more holes in the vehicles' frames through which corrosion-fighting wax could be sprayed.