

Tire Aging Tests, Data and Policies Continue to Emerge Copyright © Safety Research & Strategies, 2006

Presentations on tire aging at recent industry conferences indicate that the industry is beginning to accept what only several years ago it claimed was not possible—a scientific basis for tire expiration dates. Foundational to this acceptance is agreement from the tire makers, NHTSA, and Ford Motor Company that static oven aging in a lab can mimic thermo-oxidative aging found in tires removed from the field—an important step toward a regulatory performance standard. Other presentations have addressed specific tire components and properties that affect tire aging degradation. The unspoken message has been loud and clear: tire age matters and regulation appears inevitable.

After initial tire manufacturers obfuscation to a NHTSA tire aging proposal in 2002, there is now consensus that an artificial aging test can be accomplished in the lab to replicate field aging. According to Ford, six years in the worse case environment (i.e., Phoenix, Arizona) can be replicated under the following conditions: oven aging at 65° C for 8 weeks, with inflation media consisting of 50 percent Oxygen, 50 percent Nitrogen, removing and refilling the inflation media every two weeks.

Time and temperature can be adjusted to achieve other time exposures.

While NHTSA, Ford and the tire manufacturers, as members of the ASTM committee, agree on the tire aging protocol, Ford has taken the next step of specifying the Stepped-up-Load (SUL) test protocol (indoor road wheel) as its internal specification. Using the NHTSA FMVSS 139 SUL test, Ford requires tires to survive for 34 hours—the same time minimum required under the rule.

Ford also specifies tire replacement after six years—a recommendation that was derived from the SUL results along with analyses of the peel strength from three tire brands in six vehicles. Using a 25 percent peel retention criterion for 3-sigma Phoenix aging, Ford set a lower bound on tire capability using peel data. Ford's goal in setting a tire replacement criterion was to “determine the approximate time in service requirements for average Phoenix exposures that is consistent with current tire industry capability.”

The combined NHTSA tests (Phoenix tire dataset) and Ford SUL tests include data for 15 tires. (Ford has not publicly released the tire makes and models from its testing.) Using a 34-hour/six years in Phoenix criteria, eight of the tires tested met or exceeded the requirement. Four passenger (P-metric) tires failed and three of the four light truck tires (Load Range E) failed.

The success in moving the tire aging issue stems from an unlikely triumvirate—NHTSA's Vehicle Research and Test Center, Ford Motor Company, and Safety Research & Strategies.

Although as far back as 1990, vehicle manufacturers began adding warnings to their owner's manuals against using tires older than six years. Ford, through Dr. John Baldwin, a former 3M polymer chemist recruited to help Ford with its root cause analysis of the Firestone tires, picked up the issue and began to examine the science behind tire age degradation. While no new science was needed, Baldwin's efforts “outed” the tire industry by demonstrating that thermo-oxidative aging of tires, a causal factor in tire disablements, could indeed be replicated in the lab and meaningful tests could be developed to insure a minimal level of safety in worse case environments.

NHTSA's technical team, led by VRTC engineer James MacIsaac, put together a test program that paid meticulous attention to detail and collected new and field aged tires from Phoenix to measure their performance, material, and chemical properties. Having the benefit of Ford's studies meant the agency had a partner in testing who also wanted to get to the bottom of the issue. And unlike the tire industry, the automaker wouldn't have to face regulatory challenges, since it wasn't in the tire business. In fact, Ford had everything to gain by showing up the tire industry as it had done successfully with Firestone.

The tire manufacturers, who have been left out of regulatory fights for decades while regulators focused on improved crashworthiness, appeared unprepared and seemed content to address the potential rulemaking by firing a few rounds to misdirect regulators. Initially, that strategy slowed the process for the agency, which had virtually no tire experience. But Baldwin's work for Ford neatly disproved the tire industry's claims. NHTSA saved time and expense by monitoring his progress, and turned its focus to testing that mattered.

Meanwhile, Safety Research & Strategies uncovered evidence that the tire industry had a much better understanding of the tire aging than it led on. SRS submitted docket comments citing key studies published in Germany in the late 1980s that suggested the industry begin warning about tire aging after finding disproportionate increases in failures after six

years. SRS also brought attention to vehicle manufacturer warnings that started with German automakers and Toyota in 1990—a little-known fact that resulted from the German studies. Among the important documents SRS submitted to NHTSA was a previously secret British Rubber Manufacturer's guideline that intended to warn consumers about the hidden dangers of aged tires and the need to replace unused tires after six years.

Tapping into the litigation network, SRS identified dozens of crashes that involved aged tires, many of them unused spares that appeared to be brand new. The popular press covered the issue extensively bringing warnings about aged tire dangers into the local, regional, and national news and igniting opposition from trade journal editors.

The next step is moving the technical findings into the policy arena. Proposed rulemaking is expected from NHTSA in August 2007 when the agency is required to brief Congress on its findings.