

# What Are Tire Warmers Supposed To Do Anyway?

By David Podolsky

The idea behind using a tire warmer is a little more complex than meets the eye. Not so much because the warmer is a confusing piece of equipment, but because the tires they heat are. Obviously, a tire warmer is beneficial to have so the surface rubber of the tire is hot (160-205 degrees F depending on tire brand and compound) so that the rubber can fill the little crevices of the track better, providing better grip in the early stages of the race. Having the surface rubber hot increases the co-efficient of friction of the rubber, adding to its ability to grip the track surface.

More subtle issues become apparent with time and usage of the tire warmers.

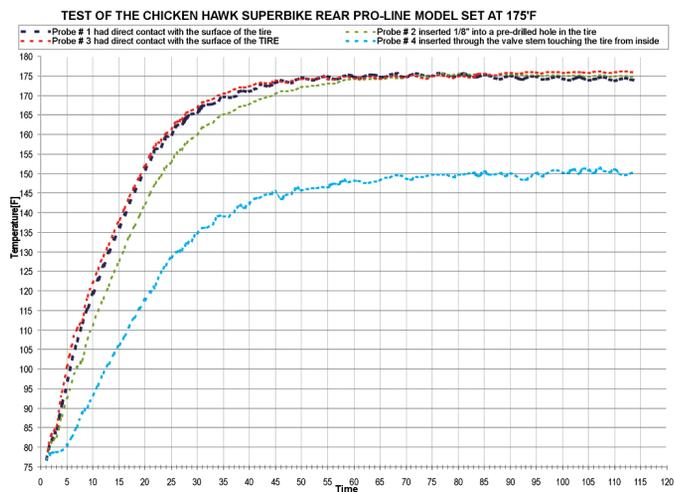
"Heat Soaking" the carcass is almost an equally important a concept as getting heat into the surface rubber. This means the tire is hot and stable throughout the carcass and inside the tire. Through the use of Data Acquisition equipment we have found that a tire which has 175 degrees of surface temperature has about 150 degrees of heat inside the tire's air-space. This is measured by a Thermo-Couple passed through the rim and measuring the inside surface of the tire,

actually touching the tire.

A tire's carcass will be more flexible when heated to race temperature. During actual use a tire is severely deformed under heavy braking, hard-cornering and accelerating due to the high forces being applied. Of course, the tire is also part of the suspension of the motorcycle and having the tire work at the beginning of the race as it will during the middle is an advantage so you can go fast and avoid a "cold tire" incident. Realize that we motorcycle racers always check "Cold Pressures" on our tires; car guys only



Ducati Austin crew members install Chickenhawk tire warmers as Ducati men debrief Eric Bostrom during testing at Daytona.



This chart plots temperature on the surface of the tire tread, 1/8-inch into the tread, and on the casing liner inside the tire using Chickenhawk warmers set at 175 degrees F. It took 50 minutes for the tread surface to reach 175 degrees and 60 minutes for a point 1/8-inch into the tread to reach 175 degrees. Chart courtesy David Podolsky.

care about "Hot Pressures." In fact, your pressure will definitely rise when the tire gets hot from use on the track or in the pits with the use of a warmer. This pressure rise is also getting the tire into the condition of mid-race before the race the best we can. The issue of heat-soaking is why the quality of insulation a warmer uses is important; you want to drive the heat into the tire—not heat up your garage.

The "Cold Tire" accident is certainly more common on those sub-50-degree days, but an over-zealous throttle hand can illustrate that an 80-degree tire is still "cold." The cost of a single low-side can more than pay for a set of warmers even if you're not destined to be the class Champion. Having a consistent tire on all days in all conditions takes one more variable out of the program. In the words of one famous tuner on the use of tire warmers during the summer, "Hey, 90 isn't 190." Have you ever seen the sweltering hot races in Sugo Japan? The crew is applying dry ice to the gas tanks to keep fuel cool, blowers are cooling off sweaty rider's leathers and the warmers are always on the tires. In other words, just because you're sweating doesn't mean your tires are hot.

**Saving Heat Cycles:** Each time a tire is heated and then cooled, it hardens up. One racer used to say "tires harden up when they cool off, just like cookies that come out of the oven and get placed on the counter." A warmer can help avoid this by keeping the tire warm between sessions on the track. A single-temperature-setting warmer can be used, but only if the time between track sessions isn't too great, perhaps 45 minutes (this is and can be widely debated so take my opinion as exactly that, my opinion). A temperature-adjustable warmer works better here because you can turn the heat down to about 130 F and just keep the tire warm enough to prevent it from going through a heat cycle without overheating it. For example, my own team turns the Friday practice days into one heat cycle—the tire goes from warmer to track and right back to the warmer on a low setting. In this way, six track sessions still only put the tire through one heat cycle. We also keep the tire "warm" between the two races we run on Sunday, which normally has about 2 1/2 hours between them. This really does help get the most life out of a tire.

**Tuning the tires with the warmers:** This is another situation where Temperature Adjustability is used. Different tire brands and different compounds work best at different temperature settings. For example, Pirelli vs. Dunlop vs. Michelin work

better in different temperature ranges. These are all good brands, each with their own personalities and strong points, but they do work better in a specific range of temperature. Our team runs Michelins and we feel they give more side grip than the others, but they must be hot to get it, or you can end up on your butt. Some other tires won't put you on your butt as easily when they're cold, however, they will "cold tear." This results in shredded little tears usually on the edges of the tires that run almost parallel to the rotation of the tire. Cold-tearing definitely takes away the longevity of a tire due to its being physically destroyed sooner.

Dry-compound tires need much more heat than rain-compound tires, but rain tires definitely benefit from heat. It is typical to see 115-125 degrees on a rain tire after use. Before temperature-adjustable tire warmers, many crew chiefs were in the practice of putting a warmer on a rain tire for a few minutes. "Just to get a little heat in it," I would hear from them. This is an example of where the goal is to get heat into the carcass, not so much for the surface, so it is better to heat for a longer time at a lower temperature rather than a short time at a high temperature. We typically recommend heating rain tires for 20-30 minutes at 130 degrees.

It should be mentioned that a slow heat-up of all tires is desired. Imagine taking a 200-degree clothing iron to your tire, that doesn't sound good for it. The tire has moisture in it (I'm not speaking of the air space, but the tire itself) and by heating it too rapidly, the moisture is drawn out of the tire. This is similar to when the tire "blues" over after a hot track session. The tire will not work well right away, but will come back after the bluing has been scrubbed off.

We realize this may seem like a lot to think about. If you're a new club racer, it is better to pay attention to your bike's suspension set-up, tires and your ability to ride it, rather than extracting extra horsepower from the engine. If you're a seasoned racer, getting the last bit of performance from your tires is just about the best place you can put attention. After that you've got a lot of the other bases covered. **RW**

David Podolsky is the founder of Chicken Hawk Racing Tire Warmers. The company's tire warmers can be found on machines sponsored by every tire manufacturer. Podolsky has also won four National Championships in the AHRMA Battle of Twins Series.