

INTRO BY SUPERMOTO RACER MAGAZINE
STORY BY DAVID PODOLSKY OF
CHICKEN HAWK RACING TIRE WARMERS

warm thy rubbers



It doesn't matter if you're a slow-mo-Joe or a hot-shoe-go-faster, warm tires are your friend.

If you think that one warm-up lap at half speed is enough to heat up them black donuts, you really need to put down the modeling glue. It even took *SMR* a year of racing to realize the guys with tire warmers weren't just trying to look all pro. They knew something we didn't. The first time we toasted our "meats" before a race, it was an eye-opening experience—consistent grip from the first turn to the checkered flag. Believe it or not, when you run cold tires during a five- or seven-lap qualifier, it's not enough time to bring them up to full operating temperature.

We hooked up with Chicken Hawk Racing Tire Warmers' guru, David Podolsky, for some insight on tire warmers and why every supermoto racer should have a set and know how to use them. No, the story isn't littered with *SMR* puns and witless banter but this is a must-read story for any racer with tons of useful information. Here is what David has to say:

Chicken Hawk receives dozen of calls each week to talk about tire warmers, but that's not what the callers really want to talk about. They want to understand how tire warmers can influence their race tires and why do they need them?

Horsepower is a wonderful thing but if you can't put it to the ground, it's useless. This is why I think that most supermoto riders are after the optimal set-up and tire performance over a few extra ponies at the rear wheel. Set-up and grip allow the motorcycle to be ridden with confidence and remain stable throughout the turn with a good drive down the next straight. This makes for fast laps and happy racers.

Some riders get caught up in simply getting more power as a solution to winning. Others focus on the myriad of options available such as rake, trail and suspension settings. Riders and teams tend to focus on these hard numbers and feel that the tires are what they are. When it comes to working with tires, there are usually only a few compound choices available from the supplier suitable for the track and conditions, along with selecting a tire pressure. Don't despair, there may be a few things you can do to influence your tires' performance.

One way to "manage" tires and get better use of your available track time is to utilize tire warmers to their full ability. The following will be a review of the ways to work with tire warmers in assisting your racing efforts.

GOING QUICK FROM THE OUT LAP

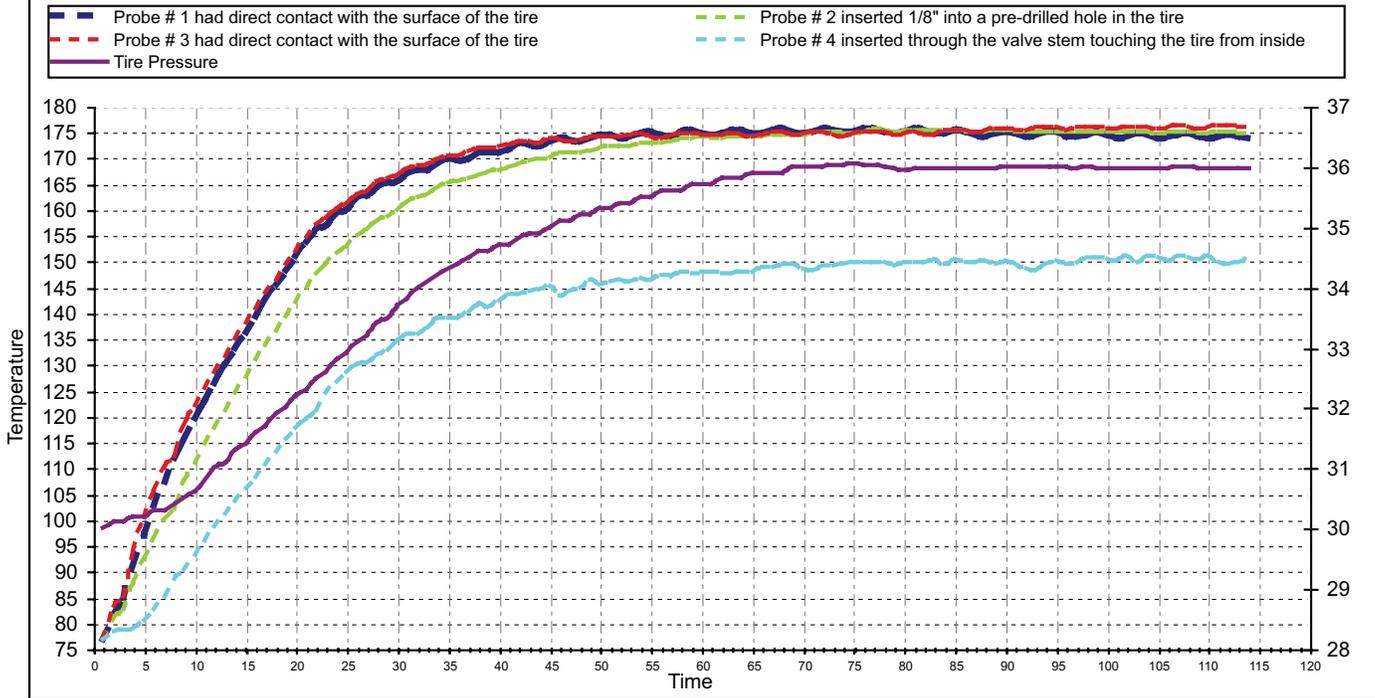
A tire warmer's first and most obvious use is getting the tire up to operating temperature prior to heading onto the track. Even on hot days, tires are far below the temperature required for optimum grip and it will take some time circulating on the track to get the tires into operating range. Most race tires work best at carcass temperatures between 75°-100° C (167°-212° F) depending on the compound. Most supermoto tires run on the low side of the scale. Certainly when the weather is less than balmy and track surfaces are cold, the amount of time to get the tire "up to temperature" can take additional laps.

Sometimes riders think of this function as the only benefit a tire warmer affords, but there are more subtle and equally important gains to be had.

HOT PRESSURE

All the top tire manufacturers for supermoto are concerned with their product being used with the proper hot tire pressure on the track. As the tire heats up to operating temperature, the pressure of the tire increases as well. This increase can be from 15%-35% of cold settings, which is quite significant in the performance and handling. The tire is the first "damper" or suspension component to begin working, as it is in contact

TEST OF THE CHICKEN HAWK PRO-LINE MODEL SET AT 175°F



with the track surface. A tire at its proper hot pressure will work the suspension properly. It'll be stiffer as the cords and belts are now under more tension. When the tire is loaded, this results in additional grip. We all know how swishy an under-inflated tire feels. For the tire to perform as desired under braking, cornering and acceleration, having the hot pressure correct is essential.

Utilizing tire warmers in the pits is one way to assist in this setup. A properly designed tire warmer not only heats the surface of the tire, but "heat soaks" the entire carcass. This results in a stable and consistent tire on the track. I'll state that again for clarity—if a tire warmer is used properly to set the carcass temperature to match the temperature which will be achieved on the racetrack, there will be no pressure rise once the bike goes out onto the track.

The proper method is to log tire temperatures using a probe (infrared devices only check superficial tire temperatures) after each track session and note the hot pressures as well. Certainly ambient air and track surface temperatures will affect this so you need to realize that early morning practice will not create the same increase as in the warmer afternoon session or race. If for example, the tire is working well at 80° C (176° F) and a hot pressure of 24 PSI, you'd want to recreate that in the pits prior to heading out onto the

track. The graph above shows that not only has the surface temperature come up to optimal but also the carcass is "heat soaked" duplicating the difference in surface and carcass temperatures seen when the tire comes off the track (realize that this graph depicts a road race slick with 36 PSI desired). In this way the tire is stable. Be it three laps or 30, the temperature and pressure remain constant if you've predicted the hot temperature the tire will achieve during the event.

SAVING HEAT CYCLES

From a seat-of-the-pants experience, riders know that after heating a tire on the track and then allowing it to cool in the pits, it'll lose grip. Not unlike cookies removed from the oven

to cool, it's during this cooling process that the tire hardens up. Tires are amazingly complex both mechanically and chemically, so I'll try not to take the position of the tire engineer and will simply describe the effect and the benefits to be had. As tires cool, a change occurs that can be seen, measured and felt. On some tires you can actually see a blue haze form over it as some "oils" migrate to the surface and oxidation occurs. Putting the tire through these hot to cold cycles reduces the tire's grip, hardens the rubber and reduces its useful life.

A tire warmer can keep tires hot or simply warm between track sessions and reduce the amount of heat cycles a tire goes through. If the tire is to see more than one track session, it makes sense not to allow that tire to cool all the way to ambient. This can extend how many sessions the tire can perform at near maximum grip. By operating in this manner, the tire's grip life can be increased.

Many professional teams utilizing tire warmers change the temperature set-point to about 55° C (131° F) when there will be an extended period of time between track sessions (over an hour). Then 30 minutes prior to the track session, the tire can be brought back up to operating temperature again.

This process can also save a racer hard-earned cash in the long run. The better you treat your tires, the longer they'll last and the quality will hold up better as well.



EXTENDING GRIP LIFE

When the tire hardens from going through “heat cycles,” some changes are happening to the tire on a molecular level. The same is true of heating the tire. Depending on the circuit, rider, conditions and type of tire, the surface can be at extremely high temperatures upwards of 175° C (347° F) due to abrasion. The tire will be heated due to the abrasion, deformation and hysteresis of the tire from actually driving the motorcycle and can be at operating temperature in only a few laps, many times in 3-5 minutes.

This rapid heating seems to “heat shock” the tire. During this process, molecular changes occur within the chemical composition of the tire. These chemicals which are the “lifblood*” of the tire are being released quickly. This “lifblood” is being wasted by being spent too quickly while heating up the tire on the track too rapidly. This can create a seat-of-the-pants sensation that’s felt by many riders each time they heat their tires on the track. The rider feels that the tire has come in, only to realize for a few more corners that it’s not quite ready as this rapidly heated high-temperature rubber is scrubbed off. Taking the time to think it through, you can realize that the carcass deep down will take longer to get to its stable or “heat soaked” temperature, and this is why getting the tire to full hot pressure takes longer than just getting the surface hot.

When tires are heated with tire warmers, this sensation is not present and testing has found the “grip life” of the tire is extended. The result is that by heating the tire slowly this “lifblood” of the tire is not spent so quickly and “grip life” is improved. For example, a particular tire that wasn’t preheated with a tire warmer may

fall off in performance after 10-12 laps while maximum grip might have been achieved for 16-18 laps had a tire warmer been used.

SAFETY

Experienced riders know enough to take a few laps with caution before “putting the hammer down” and can get tires to operating temperature on the track safely. However, there are those situations where a lapse of concentration or excessive emotion can cause an off-track incident, due to cold tires. This can be dangerous to both the rider and his machine. It’s necessary to “work the tires” to generate heat and this presents an opportunity for error. The use of tire warmers not only gives you confidence in the tires right away, but reduces the chances of a cold tire incident.

TUNING WITH COMPOUNDS

Should a team have a choice of compounds or has to race in the rain, tire warmers can be set for the varying conditions. Rain tires, even though engineered to work well at low temperatures, do experience an increase of both temperature and pressure from use. I’ve seen MotoGP racing teams use the standard dry tire temperature of 80° C (176° F) on rain tires, however, their own tire engineer and our experience shows that 55° C (131° F) is enough to get the tire in the area of operating temperature and pressure. This provides first lap confidence and grip even in the wet. As for dry compound choices, the tire warmers can open up some options. For example, a rider is torn between two compounds; tempted to use the softer one for the grip in the early laps, but concerned it may not make it race distance. By using the tire warmers (perhaps even at a slightly higher than standard temperature i.e.: 90° C or 194° F) the harder of the two choices can be used so that less of a disadvantage is present during the opening laps and the tire will last the entire track session.

If you’re experienced with tire warmers, these issues probably seem like a review of the obvious. For many, we hope that this overview will open up the possibilities of how to manage your race tires better. Please don’t feel that tires once sold to the team cannot be influenced by your use and misuse of them. If you’re not currently paying attention to cold and hot pressures, hot tire temperatures, tire graining or wear patterns in addition to the standard information of compound and lap times, start now. A new tire, if made without defects, is ready for your input. Once delivered, it’s up to you how to store it, preheat it, inflate it, ride on it and decide when to allow it to cool down. Moving forward during practice sessions and races really begins in the paddock. 

*The mention of the tire’s “lifblood” is an effort to describe the various chemicals, additives, elastomers, long-link carbon molecules and other components tire companies use in their manufacture of racing rubber.

David Podolsky founded Chicken Hawk Racing Tire Warmers based in New York, USA in 1993. As a competitor in motorcycle road racing, he’s won 9 National Championships. Chicken Hawk Racing Inc. manufactures Tire Warmers for all forms of motorsports. Visit their Web site at: chickenhawkracing.com

