

Pit Crews, Race Teams, & Preventive Maintenance

Stock car racing as popularized by NASCAR has given us many insights to the world of competitive motorsports. We have seen the evolution of American stock car racing go from moonshiners' souped-up cars and truly "stock" cars off the showroom floors to totally custom-built high-performing racecars. Some race fans enjoy the sport for what it is: man and machine pushed to the limits. While others wait for the bumping and banging and the big wreck coming out of turn four heading to the finish line. Regardless, race fan or not, we can learn much about planned/preventive maintenance execution from the modern-day race teams and their pit crews.

Stock car racing has always fascinated me. The movies *Thunder Road* from 1958 and *Days of Thunder* from 1990 have a cherished place in my collection. Historic stock car racing films from the 1950s through the 1980s are right next to these Hollywood versions. This fascination spans my childhood days at dirt-track fairground races to more recent times in the pits at the Brickyard 400 in Indianapolis, in modern race shops, and at pit crew training and practice sessions. Over the past 16 years, I have studied numerous NASCAR cup-level teams and spent hundreds of hours behind the scenes learning secrets that we could apply to industrial maintenance and reliability. I have met and learned from a few of racing's legends: Smokey Yunick, Leonard Wood, Donny Allison, Rick Hendrick, Benny Parsons, Ray Evernham, Jeff Hammond and Jeff Gordon, just to name a few.

One thing that really stands out after every meeting, every conversation and every shop visit is their passion for competitiveness and for winning. They know the race they are in, and they strive to do their very best. Even though they all can't be winners, they know they have to be excellent to even qualify for a race. Then, it's the best of the best that usually wins. Well, sometimes it's luck—being in the right place at the right time—that wins the race. But even with luck, it takes a high degree of excellence to be there in the first place.

Pit stops have always been important in auto racing. They were always intended to be routine planned/preventive maintenance stops: changing tires, adding fuel, making adjustments, cleaning and giving the drivers something to drink. Beyond that are the occasional pit stops for repairs and routine work. Since the 1960s, pit stops have become a competitive advantage—if you can have a faster pit stop and gain track position. Gaining positions in this way is much better than driving hard, putting the car and driver at risk to pass others on the track. In the 1960s, the Wood Brothers were the first to choreograph a pit stop. Their lightning-fast (at the time) 20 and 25 second stops were legendary. Eventually, other teams figured out how to make their own pit stops faster and faster. In recent times, pit stops are truly a race on pit road to gain valuable track position. Pit stops of 12 seconds or less are quite common now. The top-performing pit crews have become the rock stars in racing, second only to the top drivers.

Routine pit stops in racing are planned/preventive maintenance downtime for the racecars, which generate revenue for their business. But in pit stops, it's not about speed as much as it is about doing things right the first time. Yes, pit stop speed is not as important as the accuracy of every pit stop task. Errors, rework and omissions can hurt a race team with lost positions, damage, accidents, injuries, financial losses and more. Imagine what would happen if a modern-day auto racing pit crew performed their pit stops the same way that some plants perform their planned/preventive maintenance.

Imagine this: It's the final pit stop of the race, and the driver expertly brings the race car down pit road and slides to a stop, much to everyone's surprise, ten laps sooner than planned. After he stops, he announces that the race car is "handling like a bread truck." He's not sure what's wrong, but it must be fixed fast and fixed now!

The pit crew members, hearing all of the commotion on their radios, interrupt their breaks and hurry back to pit road. When they get to their pit area, they find only three tires and send the tire carrier back to get another tire or two (they are not sure how many tires they might need). Now the tire changers begin looking for the two race guns (air impact wrenches). They find only one that works, but they figure that they could make due with it. Over the wall they go!

The jack man is still hunting for the jack; it's not where he left it after the last pit stop. The gas man finds one full gas can and another leftover from the last pit stop that's still half full. That's all they're able to put into the car because the team owners have put a clamp on the gas budget, with the fuel prices escalating and all. The gas man soon notices that the fuel is going into the fuel cell much slower because the catch can probe is broken off and the fuel cell vent is closed. After a quick search, the jack man finds the jack behind a stack of old tires and sprints to the racecar only to trip going over the pit wall. Ouch! A bit dizzy but not suffering any debilitating injuries, he jacks up the left side of the car and waits.

The tire changers on the right side of the car have successfully removed all of the lug nuts and are waiting for the jack man to jack up the car. Realizing that something is wrong, the jack man tells the "stupid" tire changer to come back to the other side of the car and get the tires off. A brief argument occurs, and the jack man decides it's probably best to do the right side tires first. So, he begrudgingly drops the jack and ambles over to the other side of the car, slams the jack down and jacks up the car. Now that the right side tires are finally off, the tire carrier notices that the new right front tire is flat, tosses it over the wall, and grabs another. The rear changer flawlessly indexes the new rear tire, and the changer tightens five lug nuts in a record 1.2 seconds! They high-five and pass the race gun to the front tire changer.

The front changer finally gets a good tire on the car and drives home the four lug nuts (he knows there should be five, but the inspector doesn't notice that there is one lug nut missing). By this time, the fuel is in the car. The windshield and grille have been cleaned, and they begin the left side tire change to the jack man's lament, "I told you we should have done the left side first!" Just as luck would have it, the second race gun appears from the bottom of the tool box and is in the capable hands of the rear tire changer. Five lug nuts come off both the front and the rear wheels without a hitch. The jack man is struggling with the jack; it won't go up! It's stuck. He yells to someone to toss him the big hammer. He beats the tar out of the jack, and it begins to work, finally. But the racecar is too close to the wall and the jack handle keeps hitting the wall with each pump. After a heated exchange between the jack man and the driver who "put that stupid car too close to the wall," the jack man gets the car raised up enough with 20 to 30 pumps—a record 15 seconds!

Two left side tires off, two new tires on, jack drops the car and the car stalls! In unison, the entire pit crew scowls at the driver who is feverishly trying to start the car. At this instant, the driver, crew chief and engineers decide why the racecar is handling so poorly and announce the plan to make a chassis adjustment. Because the gas man is available, the engineer passes him the wrench and the crew chief announces "two rounds of wedge down on the right side." After the wrenches are

swapped to get the right one, the gas man begins making the adjustment only to hear from the pit box, “No! No! Turn it the other way dummy.”

By now, the pit crew is beat. They’re sitting on the pit wall waiting for instructions on what to do next. The crew chief just happens to look up from his computer to see what’s happening and yells at the pit crew to “drop your tools, get off your rears, and push the car to get it started!” The pit crew pushes the racecar down pit road, and it finally starts and makes it back on the track: a two-minute 45-second pit stop successfully completed. (Successful? “The car’s back on the track, isn’t it?”) They throw their tools, hoses and gloves in a pile and go on break.

One lap later, the driver brings the racecar down pit road again, this time with dangerously loose front wheels. After a faster-than-normal tire change, once the pit crew returned, the car was back in the race. And you probably guessed it—they ran out of gas ten laps before the end of the race and posted a last-place finish. After all the noise of the race died down, someone noticed that the air hose to the front tire changer’s race gun was leaking. Apparently when the flat tire was tossed over the wall, the rim hit the hose causing a deep gash.

Back to reality: Why don’t we see auto racing pit stops that look like this example? Because this team **cannot compete**, no matter how good the racecar, no matter how experienced the driver, no matter how much money they throw at the team. In auto racing, it’s not just about how successful your pit stops are either. What makes a competitive team—a winning team—is when everything works together flawlessly: the racecars, the tools, the team members, the work processes (methods and procedures) and leadership all focused on common goals. As a business, they will win or lose together. They cannot be competitive with a high-performing, reliable racecar and terrible pit stops. It just doesn’t work that way.

The same is true with capital-intensive businesses. We can have the best designed and built equipment, processes and facilities; but if we don’t pay attention to flawless execution of our routine preventive maintenance by **everyone** involved how can we hope to improve our competitive position?

My sincerest apologies to my friends in NASCAR racing, drivers, crew chiefs, pit crew coaches and pit crew members. You and I all know pit stops do not, cannot and will not happen like the one I have just described here. Aren’t you glad? Unfortunately, we see a lot of similarities between this imaginary pit stop and how planned/preventive maintenance is carried out in some of our plants and facilities in America—and we wonder why we are struggling to compete.

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