BTU Content of Gasoline

Summary: High BTU content in a gasoline does not necessarily mean the engine will make the most horsepower on that particular gasoline.

Many racers and car enthusiasts ask about the BTU content of racing gasolines. They always want the gasoline with the highest BTU content per gallon since the subject was addressed in an article in Circle Track Magazine some years ago. Unfortunately, this has become a situation where a little knowledge is dangerous.

First, we need to ask, " What is a BTU?". A BTU is a British Thermal Unit. Since that doesn't mean much to most of us, see if this will tell you a little more. A BTU is the amount of heat (energy) required to raise the temperature of one pound of water one degree Fahrenheit at or near the point of maximum density. This still may not mean much, so how does it relate to gasoline?

A gallon of gasoline will usually contain from 115,000 to 125,000 BTUs. Most enthusiasts want the gasoline with the most BTUs, and that can be misleading. The BTU content is of little value if some of the gasoline is still burning when the exhaust valve opens and all of that energy escapes out the exhaust as heat and unburned hydrocarbons. Most engines that exceed 7,000 RPM can benefit more from a 115,000 BTU per gallon gasoline than a heavier gasoline that may contain 125,000 BTUs per gallon, but does not have time to completely burn in the combustion chamber. Think about this: One gasoline has 115,000 BTUs and is 95% burned before the exhaust valve opens; the other contains 125,000 BTUs but is only 85% burned before the exhaust valve opens. Simple math tells us that the first gasoline gave up 109,250 BTUs. The other gave up 106,250 BTUs. Which would you prefer? I would take the 109,250 BTUs from the 115,000 BTU per gallon gasoline.

Does this actually happen? The answer is "Yes". Although some heat energy does go out the exhaust, some goes to the cooling system, some goes to pumping losses, etc. some of it goes into making horsepower at the rear wheels. The bottom line is that the greater the percentage of the gasoline that is burned in the combustion chamber, the better off you are since those BTUs contribute to more horsepower.

A slow burning fuel that is still burning when the exhaust valve opens will put a flame out the pipe that can scare the bejesus out of the guy next to you. In roundy-round racing or road course racing this may gain you a position by making the other guy stay at "flame length, but you could get better results by using a gasoline that burns faster, providing a higher level of thermal efficiency and therefore, more horsepower.

It may look spectacular with three feet of flame coming out of your race car pipes that singes the paint on the car next to you, but those flames are energy being released in the exhaust rather than in your combution chamber. The same thing can happen to a good gasoline if the spark is retarded. Gives high exhaust temperatures also and contributes to overheating the engine. Think about it.

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Some people complain about reformulated gasolines (RFG) but these products have been developed to improve combustion efficiency and catalytic converter efficiency. As amazing as it may seem, some of the same racing gasoline improvements that improve horsepower in a racing engine can also lead to reduced exhaust emission in a street engine. In both cases we want to improve combustion efficiency; in one with more horsepower, and in the other with reduced exhaust emissions.

In testing conducted using a 740 horsepower 358 cubic inch racing engine with 14:1 compression ratio, the engine made 5 more horsepower on a 100 octane unleaded RFG than on 110 octane leaded racing gasoline. "How so" you ask? It is because the RFG contains an oxygenate that allows for more complete combustion and the fact that the gasolines have similar vaporization characteristics.

Incidentally, ***Rockett Brand***™ 100 Octane RFG is legal in all states including California. We have blending charts available to help you blend to a specific octane number. Check out our toll free number below.

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