FACTS ABOUT FUEL - Which Oil is Better - Synthetic or Castor?

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(The following is the second in a series of articles exploring all facets of model engine fuel. The writer is Don Nix, Past owner of Powermaster, Inc.)

Before we get started on the subject heading, I'd like to offer a couple more thoughts on last month's subject, "What's the Oil Content?" - thoughts that have been remembered since writing the original column:

Many modelers who have been involved in the hobby for a long time, including those who've been away for years and recently returned, are very stubbornly remembering when model fuel just about had to contain something in the order of 25% oil - usually all-castor - and have a hard time dealing with the idea that virtually no one runs that much any more in modern engines.

The operative word here, of course, is "modern." The metallurgy in today's engines barely resembles that of a generation ago. The end result, as far as model engines are concerned, is that the engines today simply don't require as much lubricant - not nearly as much. I will be quick to add that those running antique engines in Old Timer events should certainly continue to use the old-time formulas - no doubt about it.

In addition to vastly improved metallurgy, we must remember than manufacturing techniques barely resemble those from years ago, in many ways. Modern CNC machinery has made it possible to routinely and cheaply make 1 or 1 million parts all exactly alike.

Those of you who have come along in later years may be shocked to know that up until the advent of this new technology, every piston was hand fitted to every liner. There was no such thing as simply machining 1,000 pistons and 1,000 sleeves, picking one from each batch and having them fit.

The belief in those days that some engines of the same size and make were markedly hotter than others was no doubt true. We've read that in those days, a .29 for example, might vary from as low as an actual .26 to a .32 - some 23% more displacement! More closely controlled tolerances have resulted in the ability to use much different fuels than a generation ago.

The second thought on the subject of total oil content came from reading the operating instructions included with a new imported 4-stroke engine - the DAMO FS 218 twin. It recommends a fuel containing 94% methanol, 5% nitro and 1% Castor Oil! Clearly, this reinforces my point that "there ain't no such thing as a fixed percentage of oil content." Now....on to this month's subject:

Before we depart the subject of oil in model fuel, let's talk about a point that's argued vehemently all over the land - Which kind of oil is better - synthetic or castor?

Each side has its very strong proponents, and each side is right....to a point. "Old-timers" tend to still favor an all-castor fuel, or at least one containing a liberal amount of castor oil. Modelers who have come to the hobby in the last 15 or 20 years have a strong affection to synthetic oils, or at least want their fuel to have mostly synthetics. Let's take a look at both types statistically:

SYNTHETIC OILS

Strong Points

Good Lubricity (It's "slick") .
Little to no carbon or vanish buildup inside
Leave less oily mess on models
Available in a variety of viscosities
Totally soluble in nitromethane

Weak Points

Most tend to cause corrosion if adequate inhibitors aren't added
Burns off surfaces at about 100 degrees lower temperatures than castor oil
Many types and qualities, making it hard to choose the best one
Expensive - good ones cost almost twice as much as castor oil, increasing the cost of the fuel. When used as the sole lubricant, a greater quantity is required, which increases the cost of the fuel.

CASTOR OIL

Strong Points

Great Lubricity

Reduces the amount required, resulting in more power and better idle.

Will tolerate internal temperatures about 100 degrees higher than any synthetic

Almost 50% cheaper than good synthetics - reduces cost of fuel.

Great natural rust and corrosion inhibitor

Weak Points

Tends to cause carbon and varnish buildup in engine if cheap grade and/or too much is used.

Messier on model than synthetics

Somewhat sensitive to extremely cold temperatures -mild separation in solution, residue on model becomes almost "buttery" in consistency.

Insoluble in nitromethane. In solutions above 40% - 50% nitro, will separate unless some sort of co-solvent is used.

Generally available in only one viscosity

I'd like to insert here that there is a "Chicken Little....The Sky Is Falling" rumor making the rounds on the Internet these days that the manufacturers of castor oil have recently changed their methods of making the product, and the castor oil we are getting now is either wholly or partially incompatible with methanol.

I have talked at some length with the "Head Techie" of one of the largest castor oil importers in the U.S., and I want to go on record as saying that, according to the best information I can find, this is total B.S. The Head Techie actually laughed out loud when I told him what was going around.

He said, "You know, there isn't much we do to the stuff. We press the oil out, filter it, grade it and package it. As far as I know, nothing has changed." It apparently started with one of the fuel manufacturers. For what reason, I have no idea, unless it's to help them promote their proprietary synthetics. (Incidentally, I have read a response on the 'net from SIG, agreeing with the fact that it's nonsense.)

So ..... there you have it. "You pays your money and takes your choice." Actually, it's a little better than that, and the obvious answer is - use a combination of the two, in proportions that will come nearest to enjoying the benefits of each, while minimizing the adverse characteristics.

A few years back, the modeling community was in a "synthetic oil frenzy," and the swing was toward all synthetic fuels. Happily - at least in this writer's opinion, we've seen a very noticeable swing back toward the center, with the majority seeming to prefer a synthetic/ castor blend. We think this makes sense, and many years experience proves it.

The most frequent comment I hear from lovers of all-synthetic fuels is, "Brand XX leaves a lot less oil on my model." My response to that is, "Doesn't that bother you? If you don't see much oil on your model after flying, that tells you one of two things - or both: Either there wasn't enough oil in there in the first place, or the oil is burning off with the methanol. Neither is good.

There's no way oil can burn off and properly lubricate at the same time." This is usually met with a puzzled look, then one of the light dawning, having just realized something they never thought of before.

Oil residue in model engines is a natural as barking is to a dog. We have to learn to live with it.

As an aside, not long back a friend sent me a copy of an article published in a European model magazine. In one part, the writer stated, "The Americans are the only ones rich enough and dumb enough to use synthetic oils." Perhaps overstated just a bit, but it has some validity.

There a couple of types of engines that do require an all-castor fuel, or at least one with a considerably higher castor content than most others. One would be the Fox ringed iron piston type, and the other would be the small Cox engines, because of their rather unique ball-and-socket connecting rod-to-piston design.

Pattern flyers traditionally prefer an all-synthetic fuel, for a couple of reasons, I think. One is the fact that pattern flyers practice a lot - hour after hour after hour. That much use, plus the tuned pipe setup that is almost universal with them probably, tends to cause a greater problem with varnish and carbon buildup than in sport types.

(At the risk of being bombarded, I also think it's largely a state of mind. "Joe Champion uses all-synthetic, so that's what I'm going to use.")

The other area where we have seen all-synthetic fuels gain in popularity in recent years has been with model helicopters, probably for the same reasons. Also, the trend toward 30% nitro fuel for serious competition has led to using a lower viscosity lubricant, and, as shown above, this necessarily dictates using synthetics.