BLADE SECTION

Mumbo Jumbo # 132 by the Glue Guru

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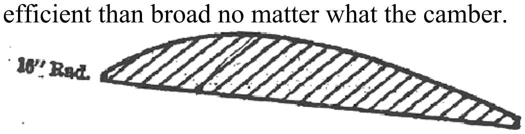
Which blade section is best? Rubber powered models mostly use some sort of under cambered section, as below. The gas engine people tend to go with the flat bottomed section. Does the difference reflect production cost or what? For that matter, is there a difference?

Good old NACA ran some tests on this issue way back in 1917, when propeller design was still, let us say, up in the air. Yes, their model tests used too big a model to be really satisfactory (about half of full scale) but there is still something to be learned from the results.

Their summary was: "The plain sectioned propellers are markedly more efficient than those of cambered sections... The difference is more marked for narrow blades than for wide ones."

Their standard was the ability to convert power supplied the propeller into thrust, and in general the zero undercamber prop section did a better job. However, there were grey areas where the difference was negligible. One such occurs as the blade becomes very broad. For that matter, narrow blades proved more efficient than broad no matter what the camber.



In a perfect world, all rubber modelers would have narrow, noncambered props. Why don't we?

I think the catch is the efficient prop's inability to absorb power, other than by running away. Given too much power, the narrow, efficient prop lends itself to being spun too quickly. This leads to excess RPM, a high climb rate, and a short motor run. Thus, given the usual unstable model, too much prop efficiency leads to trouble.

In contrast, the wide bladed, low efficiency type of prop that most of us use has a peaceful disposition, and offers a long cruise as the motor unwinds slowly.

Somewhere along the line, we have decided that it's better to have a friendly prop than a too efficient one. For those rebels seeking more efficiency, the same NACA source suggests: (I) use of a low pitch, (2) carving the contour form into the conventional elliptical outline as compared to a simpler rectangular form, (3) using a constant pitch.

Given our topsy-turvy world, perhaps these are things to avoid. Consider the indoor duration flyer. He employs a blade angle, i.e. pitch, set very high to deliberately hold down the RPM and thrust, thereby preventing striking the arena ceiling and also greatly extending duration. As for the extremely low resulting thrust, he makes it suffice by holding down the total model weight. There is something useful for us outdoor types here: hold down the weight and nuts to too much prop efficiency!

Source quoted:

NACA; Third Annual Report; 1917; by William Durand; Report # 14; p87-129.