APRIL 1985

AVGAS/MOGAS

AND

RUTAN COMPOSITES

A POSITION PAPER

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PREFACE

As a result of ACT's development of a fuel gauge for
the Rutan LONG EZ and VARI EZE, the author has been thrown
into the arena of mogas use. This paper is a brief report
which outlines the current situation as understood by him.
No presumption is made to speak for RAF or for PRC.

I   AIRFRAME/GASOLINE COMPATIBILITY

    A. AVGAS

Avgas and Rutan composite airframes have been
demonstrated to be compatible.

    B. MOGAS

The manufacturer of SAFE-T-POXY will <u>not</u> approve
their product's use where long-term exposure to mogas is
anticipated. Therefore, it follows that Rutan Aircraft
Factory (RAF) cannot approve the use of mogas in their
airframes. There are two reasons behind this non-approv-
al as understood with discussions with RAF. They are:

(1) Products of the chemical reaction which
occurs between the aromatics in mogas (as much as 32%)
and off-mixtured epoxy can contaminate the fuel to the
point of causing fuel stoppage to the carburetor. Even
knowing this potential condition some builders assume
the risk of power failure by continuing to use mogas.
In addition, they may be opting for other materials
risks such as O-rings, flex lines, etc. If they are
willing to take such risks then certainly it should be of
concern to no one else. However:

(2) What <u>is</u> of concern to RAF (and should be
to the builder) is the fact that any chemical reaction

on the front face of the main spar (which constitutes the
aft face of the fuel tank) could, in time, have catastrophic
structural consequences. The spar face is PRIMARY structure.

<div align="center">CAVEAT ERECTOR!</div>

C. TANK PROTECTION

The answer to the non-compatibility problem between
mogas and the composite airframe (tank) lies in developing
a suitable coating which will absolutely adhere, remain non-
porous and be unaffected by avgas or mogas. Such a coating
would provide two additional benefits:

(1) Lighter weight. The weight of such a coating
would be less than the weight of the "wet" layup recommended
for the tanks.

(2) Layup porosity would be sealed, eliminating
the pesky incipient leakage problems encountered by so many
builders.

D. TANK COATING DEVELOPMENT

At the author's suggestion, the highly-respected
specialists in the field, Products Research Corporation
(PRC), has developed a coating meeting all the requirements.
The coating (sealant) has been under intensive testing and
evaluation. The results are positive. RAF has been supplied
this same coating material for their own evaluation testing.
At our last meeting RAF reported positive results. Avail-
ability of the coating is awaiting a product-liability
study being conducted by PRC's legal staff. Parenthetically,
Aircraft Component Technology is on the threshold of per-
fecting a fuel gauge compatible with both avgas and mogas.
Announcement of availability of both PRC's coating and the
new ACT gauge will be made in RAF's Canard Pusher bulletin
when and as each is judged ready. Do NOT call RAF!
Builders who have not yet closed their strakes might want to
consider delaying closing pending release of the PRC coat-
ing even if they are not contemplating using mogas because
of the two benefits discussed above.

For the fuel gauge installation there is no real advantage
in delaying closing your strakes. Retrofit is quite simple.

II   ECONOMICS

How much money will be saved if mogas is used instead
of avgas? Setting aside the obvious, but unpredictable,
savings such as longer spark-plug life, longer TBO's and
fewer TOH's, the savings border on phenomenal

Let's make four realistic assumptions:

(1) Engine TBO = 2000 hrs.

(2) Average GPH = 6

(3) Avgas cost = $1.85/gal.

(4) Mogas cost = $1.20/gal

Then:

2000 hrs X 6 GPH = 12000 gallons consumed between
overhauls.

Now, for each cent difference in price between avgas
and mogas a savings of $120 will result, thus:

12000 gallons X 1¢/gallon = $120

Taking assumptions 3 and 4 we find a difference in
cost of 65¢/gallon. Are you ready for this?

$120 for each cent difference X 65¢ = $7,800

A $7,800 SAVINGS BETWEEN OVERHAULS!

Think of the options! You wouldn't need to overhaul
your engine. You could sell it for core value, buy a
new engine and pocket the difference! You could overhaul
your engine and apply the difference to a Solitaire! etc, etc, etc, etc, etc, etc.

III   AVAILABILITY

A.   AVGAS

Availability is great today as long as it is
100 or 130 octane. Try finding 80/87 octane. It would
come as no surprise that, within the next decade or so,
avgas would be put on the endangered-species list. For
the refineries there just does not seem to be the fin-
ancial incentive present in avgas that there is in mogas
because of avgas's comparitively small market.

B.   MOGAS

Mogas is available everywhere except at airports.
For a list of airports where mogas is available send $3.50
to:

Harry Zeisloft, Technical Director

E A A Foundation

Wittman Airfield

Oshkosh, WI 54903-3065

Since mogas is not available at most airports, if you are
a user you will probably have to fuel your own plane.
Not a few airport managers and FBO's have taken a very dim
view of this practice. There is, however, legal precedent
in favor of the aircraft owner who wants to fuel his own
plane. According to an article on page 6 of the April
1985 edition of Sport Aviation, Dan Skarperud won a court
decision against Boeing Field authorities in Seattle who
had taken him to court. The basis for the decision in
favor of Skarperud was FAA Advisory Circular 150/5190-2A
(April 1972). For the text of that Circular see the ref-
erenced Sport Aviation or contact your local GADO.

It is incumbent upon an owner who fuels his own
airplane to observe all safety and fire regulations.
For a general run-down on this see column 2, page 4,
April 1985 edition of Sport Aviation. Since fire and
safety regulations may be different in various locations
you should determine what they are in your particular
case and observe them.

FOOTNOTE: Keep in mind that EAA's STC's for mogas
are for unleaded fuel only..and fuel that is 100%
petroleum based. (No ethanol.)