EAA Chapter 63 presents


Nature’s Finest Building Material

Nature's Finest...

* Choices are awesome
* History of building with wood
* Pros and Cons
* Cost
* References

Druine Turbulent

TEAM Minimax

Fisher Flying Products Koala

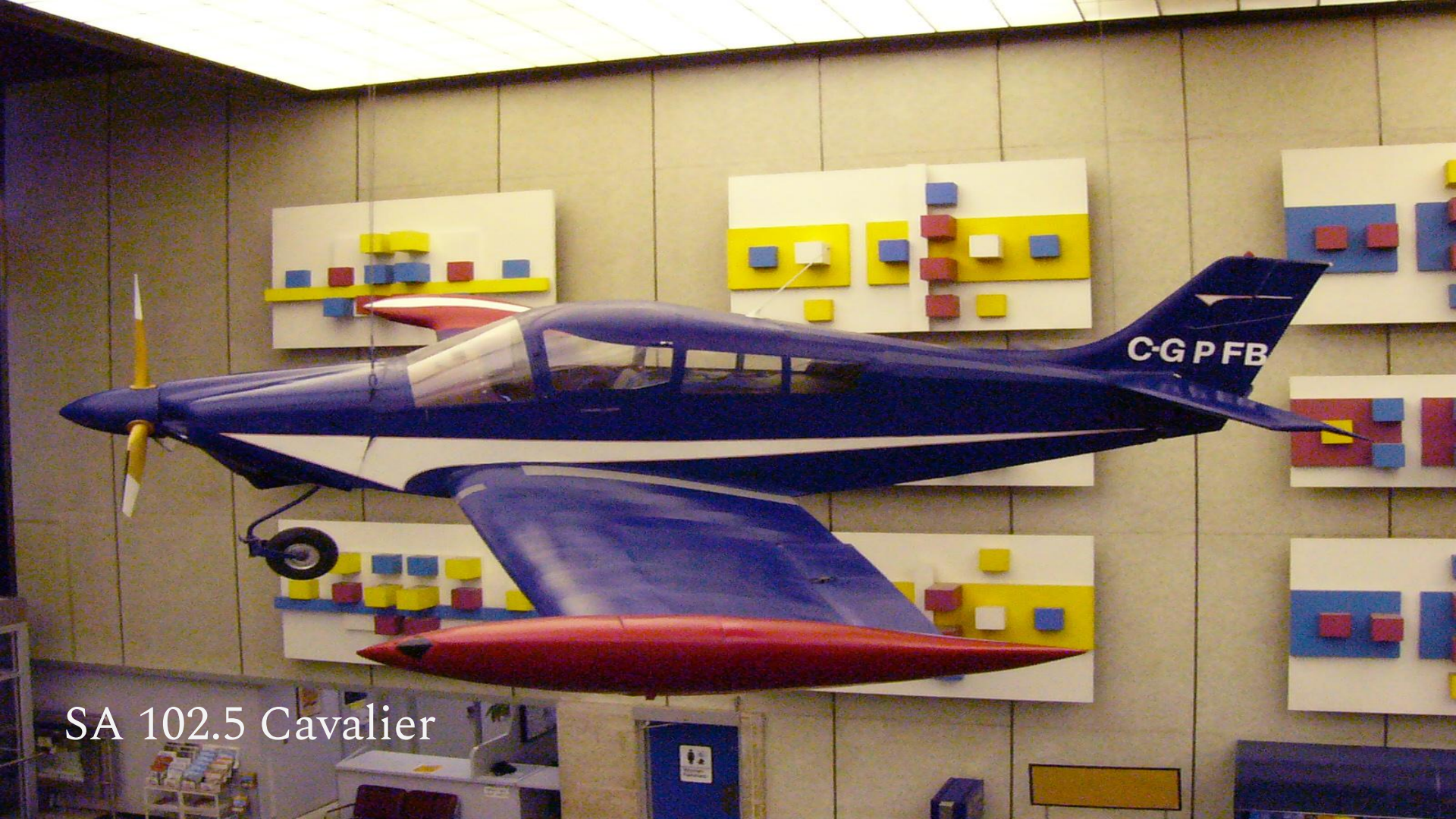
Fisher R80 TIger Moth

Fisher Dakota Hawk

Osprey GP-2

Vidor ASSO 4 Whisky

22-AGO-15



SA 102.5 Cavalier

Osprey GP-4

Vidor ASSO X Jewel


KR-2S

Pitts Special S2S

Junqua Ibis

Nature's Finest Building Material

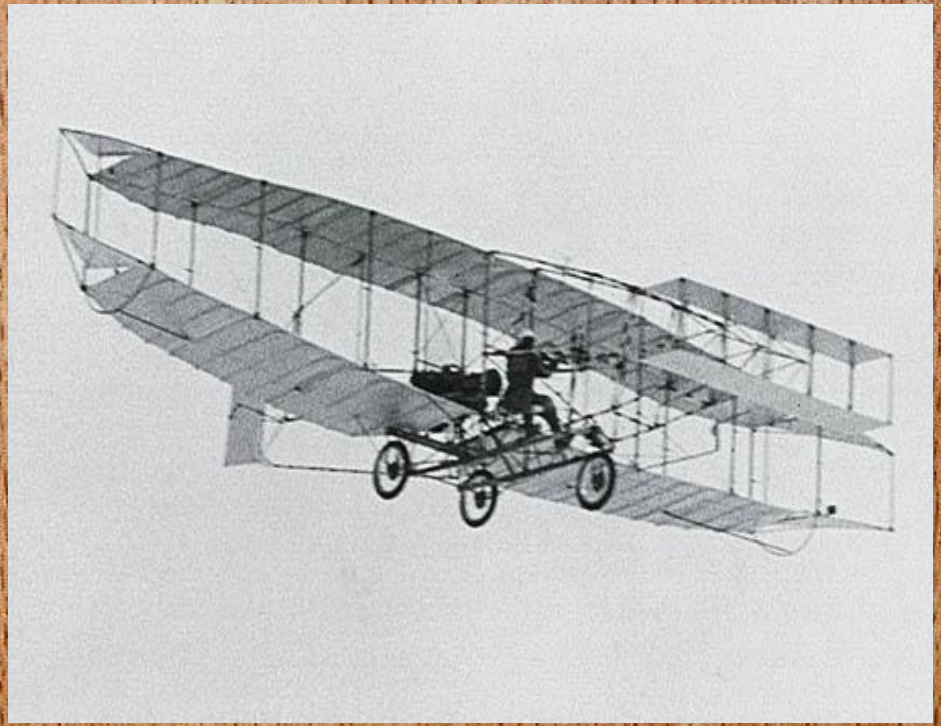
The world's oldest wood building is probably the Horyu-ji Temple in Japan.

Nature’s oldest

The Horyu-ji pagoda stands 5 stories tall, 32.45m. Timbers from the structure were felled in 594 according to the tree ring analysis.

Nature's oldest

Canada's silver dart, like all other aircraft before it, used a wood frame covered with fabric. No other aircraft building material that is still in use today can trace its history back to Otto Lillienthal's flights in 1891.

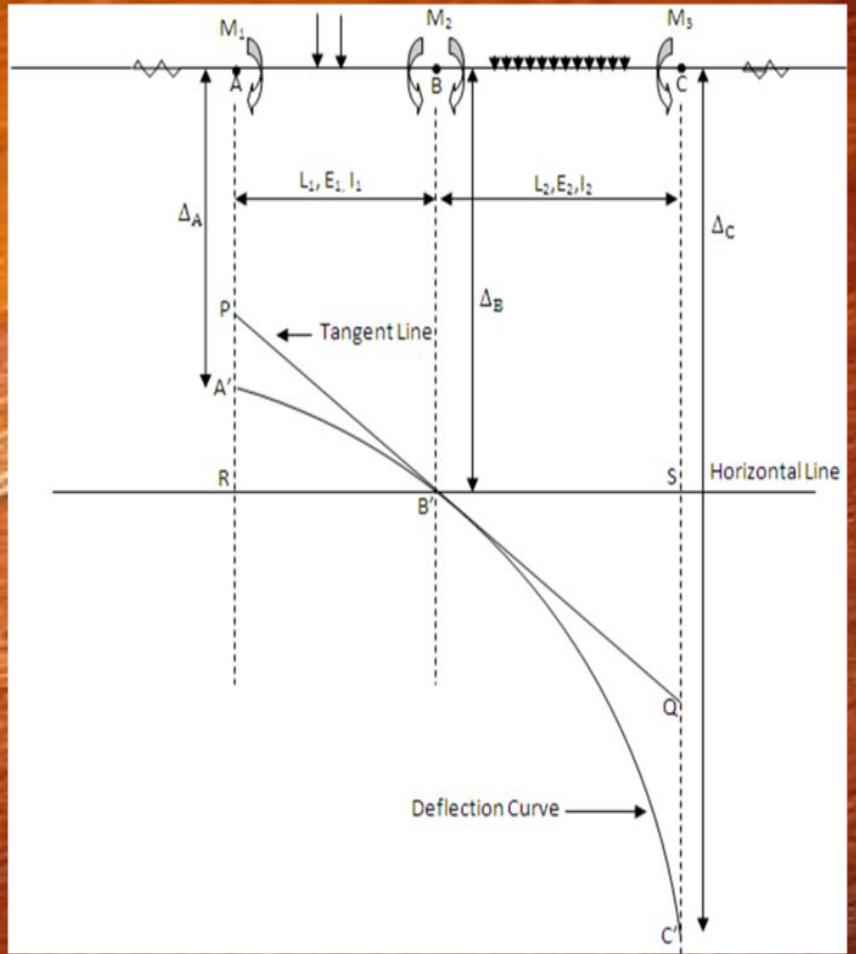


Nature's oldest

This 1909 Berloit XI is probably the oldest airworthy aircraft still on the registry and still flyable. This is one of two examples known.

Nature's strongest

We have seen that no other material has been studied as extensively as wood. Its qualities are well understood, but is it strong?



Nature's strongest

The EAA website notes that by weight, wood is stronger than aluminum. Wood does not fatigue with repeated flexing as metals do. Fighter pilots in WW I and II often noted that wood airframes would warn them gradually as they approached failure. Consequently, they knew when to back off if they wanted to get home.

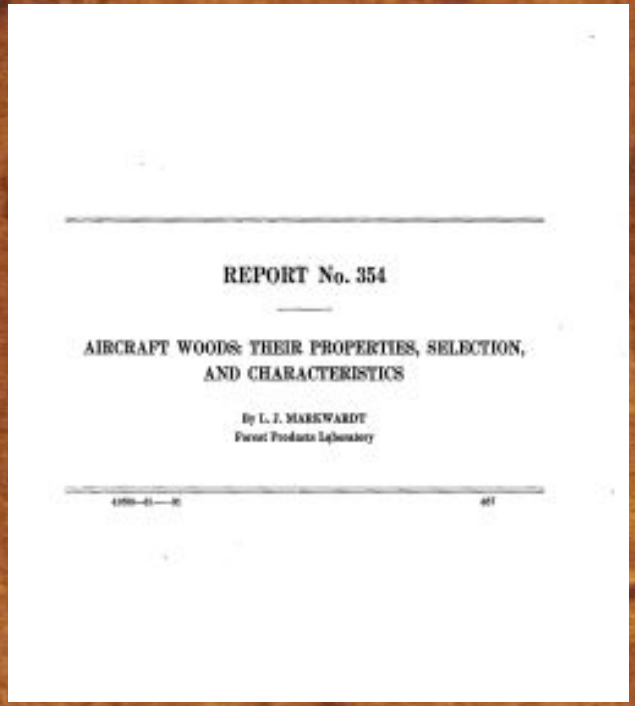
Nature's strongest

How strong is wood? This BX-2 Cherry uses wood for the load bearing members such as the spars, longerons and the main landing gear. Laminations add strength to the mains and to props!

Nature's varieties

The most comprehensive study on woods suitable for aircraft construction is the 1930 NACA Report No. 354.

The NACA had the Forest Products Laboratory study over 140 varieties of wood.



REPORT No. 354

AIRCRAFT WOODS: THEIR PROPERTIES, SELECTION, AND CHARACTERISTICS

By L. J. MARKWARDT
Forest Products Laboratory

Nature's varieties

The report concluded with 27 recommendations for varieties suitable for aircraft construction, both hardwoods and softwoods. Sitka spruce is often cited as the preferred variety and often lamented for its cost, but there are many alternatives available.

What's the worst that could happen?

We have looked at the pros, what are the cons?

Two of the biggest problems with wood stem from the fact that it is a natural product. This means that regardless of the variety, trees vary. This means that only a small percentage of lumber has the necessary characteristics of grain density, grain direction, acceptable size and spacing of knots and lack of compression. Wood is natural.

What's the worst?

The second problem is that wood is biodegradable. This means that wood aircraft parts must be kept at the correct moisture content, protected with varnish or paint and frequently inspected. Still...pagodas!

Costs

Is wood expensive? It's a fair question and certainly building anything with Sitka Spruce is going to break a bank or two. Fortunately, as we saw previously, there are alternatives.

Costs

Species such as Northern Pine, Western Hemlock and White Ash are much cheaper and widely available.

Costs

Fisher Flying Products publishes pricing for their entire catalogue of wood frame aircraft. Here is the FP 303 single place. Airframe complete kit is listed at US $ 7100.00

Costs

The Fisher R80 Tiger Moth lists the complete airframe kit at US $19,520.00. That includes 2 wings. All their airframe kits include hardware, engine mount, fabric, glue, wheels, axles...

Costs

Since the Fisher kits are complete less engine, paint, instruments and upholstery, they don't show the cost of wood only, but we can certainly use them as a guideline. Not everyone has the same opportunity for scrounging or perhaps not the interest, but we can probably guess that the wood itself for a single-seat, basic flyer is going to be less than US$5000 and probably less than US$17000 for a two seat aircraft with reasonable performance. Pretty affordable!

Nature’s finest building material

This has not been an exhaustive search by any means, but regardless of your flying style, from 200 kts cruiser, to a low and slow drifter, from amphibious to aerobatic, wood works!

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- Prepared by J. Slade/2021