

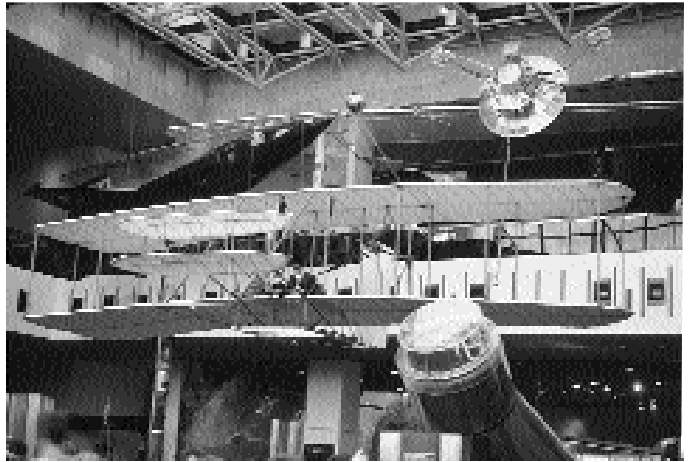
Aircraft Restoration Practice and Philosophy

Edward McManus

The spirited debate concerning aircraft restoration practice and philosophy vacillates between the poles of historic preservation and self-serving interests—at stake is the future of historic aircraft preservation.

The first American aircraft restoration was conducted by Orville Wright on the 1903 Wright Flyer, during the summer of 1916, for an exhibition at the Massachusetts Institute of Technology. The forward elevator and the rudder were rebuilt, broken ribs and spars were repaired, and the center sections of both wings were recovered. The original propellers were not used because they were badly damaged in 1913. In 1928, the machine was sent to the Science Museum in London for exhibition. Prior to shipping the Flyer to London, Orville refurbished it once more, this time recovering the entire machine with new fabric. The aircraft was returned to the United States in 1948 and placed on exhibit at the Smithsonian Institution.¹

In 1947, Orville Wright directed the restoration of the 1905 Wright Flyer. The 1905 Flyer is important because of significant design modifications that resulted in enhanced flight performance. This was the machine that demonstrated the practicality of flight. The 1905 Flyer was abandoned at Kill Devil Hills in 1908, after a period of flight testing and modification. In 1911 Wilbur and Orville returned to the ruins of their former camp and surveyed what was left of the 1905 Flyer. The aircraft was badly damaged by the weather and by field mice. The brothers rejected any notion of preserving what was left. Fortunately, soon after, the Wrights received a letter from Zenas Crane, a wealthy Massachusetts paper manufacturer, requesting that they donate one of their aeroplanes or gliders to the museum which he had established in Pittsfield, MA. Crane obtained the parts of the 1905 air-



The 1903 Wright Flyer at the National Air and Space Museum, Washington, DC. Photo by the author.

craft and related parts for a \$25.00 crating and shipping fee. But without Orville's advice, an accurate restoration of the 1905 craft was impossible. For three decades, the parts remained in storage. In 1946, Colonel Edward A. Deeds, Chairman of the Board of the National Cash Register Company, decided to construct a park commemorating the role that the city of Dayton, OH, had played in the development of industry and transportation. The parts were obtained from the Berkshire Museum and the aircraft was restored by an experienced aircraft mechanic, under Orville's direction. The 1905 Wright Flyer was placed on exhibit in Carillon Park, Dayton, OH, in June 1950, where it remains.² According to Tom Crouch, Chairman of the Aeronautics Department of the National Air and Space Museum (NASM), the aircraft is 60% original.

The techniques and the rationale used by Orville Wright in the restoration of the 1903 and the 1905 Flyers meet today's conservation standards. The aircraft were restored to a period of historic importance, with minimal conjecture, and no enhancement. There was no intent to fly these aircraft—but to exhibit them in order to demonstrate their technical qualities. However, according to the standards of some modern restorers, these early restorations would be considered deficient.

Few aircraft restorers are aware of the American Institute for Conservation Code of Ethics and Standards of Practice. Many who are, do not believe that they are relevant to aircraft restoration. Further, restorers who return vintage aircraft to flying status have grown increasingly critical of established museums, in general, and the way they treat and interpret historic aircraft. They contend that museums are too concerned about social history. How and why has the simple honest approach to aircraft restoration, exemplified by Orville's restoration of the 1903 and the 1905 Flyers, been altered or forsaken?

One important difference between then and now is that individuals and groups purchase or recover abandoned aircraft and restore them to flying condition. This is particularly true for World War II aircraft. There is nothing intrinsically wrong with this practice, and, indeed, the sight of a period aircraft flying is, for me, a thrilling experience. Many restorers argue that this is a truer form of preservation than restoring an aircraft for static display.



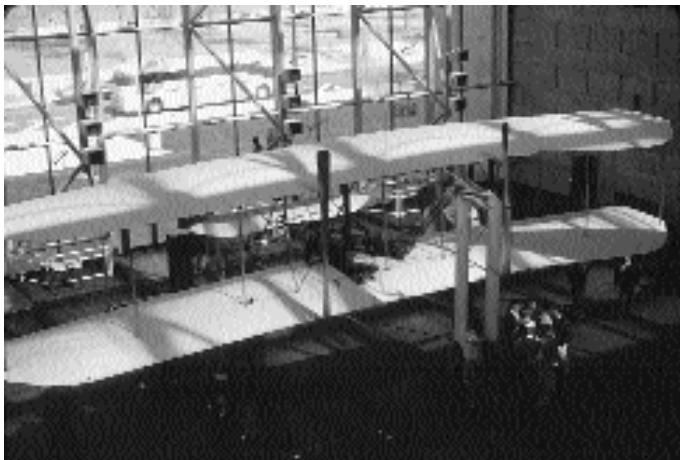
Spirit of St. Louis. Photo by the author.

Nevertheless, the fun inherent in flying such aircraft is a strong incentive for taking a restoration to this point.

Another important change is the emergence of an aesthetic among aircraft restorers that belies the true appearance and use of a historic aircraft. This is true for many museum aircraft, as well as flying aircraft. Some of the World War II fighter aircraft on exhibit at NASM exemplify this pristine look. I have heard one critic of this practice compare it to “tarting-up” one’s grandmother.

A similar restoration practice is to reconfigure and repaint historic aircraft to represent famous fighters or squadrons. This has been the fate of a few humble training aircraft that never flew in battle.

An alternative to restoration is to preserve and exhibit historic aircraft in the state in which they were found. The Brookland Museum, outside of London, exhibits the



Milestones Gallery, National Air and Space Museum. Photo by the author.

wreckage of a Lancaster bomber, which crashed into the sea. The R.A.F. Museum in Hendon exhibits the wreck of the Gloucester Gladiator, *Faith*, an aircraft used in the defense of Crete during World War II.³ The R.A.F. Museum has also restored some of its other aircraft to flying condition and does fly those aircraft. Obviously, the R.A.F. Museum has made a distinction between planes that should be restored to flying condition and planes that should be preserved as is.

For many years now, restoration has reigned as the dominant treatment option. Aircraft restorations are generally accomplished by experienced aircraft mechanics and others with an interest or background in aviation. Conservators have had little involvement until recently. In the absence of recognized standards and because of multiple objectives, assumptions have emerged to justify the various restoration philosophies that now exist. I call them restoration myths. They include:

- It isn’t an airplane unless it flies;
- Restoration is preservation (or conservation);
- Restoration preserves technology;
- Restoration is like zeroing the clock;
- Once restored, an airplane is good for another 100 years at which time it can be re-restored;
- Each restorer has his/her own style;
- Restored aircraft do not have to be treated like museum objects;
- Restorations should be accomplished according to flight worthy standards;

- Restoration is the only treatment option;
- Always use original parts, materials, and techniques.

Not surprising, this conservator has won very few converts to conservation methodology with this list. Many restorers are quite sympathetic to the historic integrity of the aircraft they restore and they are amenable to the worthwhile suggestions of a conservator. To them, I apologize.

Some Aircraft Restoration Guidelines

The distinction between conservation and restoration becomes clearer when we consider the primary objective of each. Conservation treatments are done in accordance with specific preservation ethics and standards that are intended to protect the history and integrity of any object, be it great or small, complex or simple. Often, the successful treatment results in no perceptible change in appearance. In other instances, a change in appearance results when later accretions, such as green corrosion on bronze sculpture, is removed. Many aircraft restorations are focused on the final appearance and the function of the machine. For example, a respectable World War II trainer may be reconfigured to represent a famous fighter aircraft. NASM’s Vought F4U Corsair, *Sun Setter*, exemplifies this type of restoration. Restoration treatments are generally more extensive and intrusive than conservation treatments. Risks include the misinterpretation of the object and the loss of historically significant information. In order to mitigate the inherent risks of restoration, the following guidelines are suggested.

- **Thorough Technical Examination Prior to Treatment**
An assessment of the condition of the aircraft and basic historic research will enable the restorer to have a better understanding of the project and to proceed in a methodical manner.
- **Clearly Stated Objective of Treatment**
The restorer should have a clear understanding of how the aircraft will look following treatment and what modifications will be necessary to achieve that end.
- **Documentation**
The restoration process should be documented with before-and-after 35mm photographs, as well as during-treatment photography and a written account that describes how and why things were done.
- **Original Material, Historic Modifications, and Repairs**
Every effort should be made to retain original materials and modifications or repairs that are historically significant.
- **Differentiation between Original Construction and Restoration**
It is important to be able to identify the restored areas from original fabric.
- **Modern Materials and Salvaged Parts**
There is nothing inherently wrong with the use of modern materials and parts salvaged from wrecks. Discretion is required. Treatment materials and the sources for replacement parts should be identified in the written report.
- **Respect for the Integrity of the Object**
The tendency to make a historic feature better or stronger is to be avoided. In my opinion, restored aircraft should never look better than they did when they were in operation (or better than new).

- **Limitations**

An honest evaluation of what can and cannot be accomplished with the available funding, time constraints, and the skill level of the restorer is advised. An important object should never be used for experimentation or practice.

- **The A.I.C. Code of Ethics and Standards of Practice**

I believe that it is possible to restore an aircraft according to these standards; many have been, intentionally or unintentionally. More specific standards, similar to those outlined in the Secretary of the Interior's *Standards for Historic Vessel Preservation Projects*, need to be developed for aircraft.

Restoration will continue to be the primary treatment for historic aircraft for many years to come. However, several steps can be taken to achieve agreement between aircraft restorers and preservationists, as well as conservators.

Build Consensus

Several organizations are involved with the preservation and restoration of aircraft. These include the International Association of Transport Museums (IATM), the AAM Mutual Concerns of Air and Space Museums Group, The International Group for Historic Aircraft Recovery (TIGHAR), The EAA Aviation Foundation, The Confederate Air Force, and War Birds of America. These and other groups need to be brought together in order to adopt standards that we can all agree upon.

Establish Categories of Significance

Flying a P-51 Mustang and the *Spirit of St. Louis* are not the same thing. There is only one *Spirit of St. Louis*. The same is true for the *Spruce Goose*. However, military aircraft were generally mass produced and many have survived; therefore, the risks inherent in flying them may be acceptable. Or, if you are interested, companies such as the Texas Airplane Factory near Ft. Worth, TX, will build you a new old airplane. The company is now building five Messerschmitt ME 262s.⁴

Adopt Standard Terminology

TIGHAR has published *The Guide to Aviation Historic Preservation Terminology*, which is a good beginning.

Recognize Dissimilar Missions

The primary mission of a museum is to preserve what is collected. The collection process is deliberate. Museums such as NASM do not fly historic aircraft because of the inherent risk. Further, it would be extremely expensive and impractical to operate such an air force. In most museums, the emphasis is on preservation; full scale restorations are accomplished in support of the exhibit schedule. It is not necessary to restore everything in the collection. Aircraft are treated as artifacts. Unfortunately, some organizations that fly historic aircraft have usurped the term museum to describe a mission that is more closely related to that of an aero club or a flying circus. I believe that their commitment to preservation and education is secondary.

Mutual Respect

The common interests shared among airplane enthusiasts can serve as the glue to unite dissimilar objectives if we develop a mutual respect for each other. There is an important place for private collectors and organizations who fly historic aircraft.

Conclusion

The polarity that has developed over the treatment of historic aircraft has been unproductive and troublesome. This is one conservator's characterization of the problem. I hope that these remarks are informative and that the recommendations prove to be productive. It is important that we recognize the validity and the quality of good aircraft restoration.

Notes

¹ Jakab, Peter L., *Visions of a Flying Machine*, Pg. 220, Smithsonian Institution Press, Washington, D.C., 1990.

² Crouch, Tom D., "The 1905 Wright Flyer, a Machine of Practical Utility," *Timeline*, The Ohio Historical Society, pp. 24 - 37, August - September 1985.

³ Schneide, Karl S., NASM Aeronautics Department, verbal communication, February 14, 1994.

⁴ "The Role of the Replica," *TIGHAR Tracks*, September 15, 1993, Volume 9, Number 3.

Edward McManus has been Chief Conservator for the National Air and Space Museum since 1989. He was previously the regional conservator in the North Atlantic Regional Office of the National Park Service. He is a fellow of the AIC.

For additional reading, see *CRM*, Vol. 15, No. 2; *CRM*, Vol. 16, No. 10; and *Viewpoint*, this issue.