

Production Methods In Glider Manufacture

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IF there is sufficient demand for gliders in the post-war market they can be manufactured on a production basis so that the public will receive the same amount of aircraft per dollar as compared to a light airplane, less the motor and related accessory costs.

Before the war practically all the gliders built in this country were hand-made on a one-ship or a very small production basis. Service and maintenance were expensive and difficult to obtain due to the fact that the volume of business was very small and interchangeable replacement parts were not available. A large percentage of the glider owners were either home-builders or home-mechanics who took care of their own service and maintenance work. Gliding and soaring were also given a black eye during this period because of some very serious accidents which were widely publicized. Many of these accidents were due to poor equipment and lack of instruction. These facts resulted in a general condition which made gliders scarce and expensive to own and operate.

It was encouraging, however, to note the amount of interest the pre-war public showed in gliding and soaring every time it was given a taste of it. This sport, being an expensive luxury, resulted in a small pre-war market for the manufacturer and he was not in a position to do much about it due to a lack of either capital or "know how." The post-war glider manufacturer can do a great deal to stimulate the market by producing inexpensive licensed gliders, offering service and maintenance, and by providing a sound advertising and publicity program. The over-all glider market is dependent upon the following factors, some of which are beyond the control of the manufacturers:

1. Ease in which people can participate in gliding and soaring.
2. Education of the public to the value of gliding and soaring.
3. Bring gliding and soaring within the means of the public.

Glider manufacturers must admit that their part in building the market is the most basic and tangible one. If there are no gliders on the market ready to be sold, the sport will be dormant except in conversation. There is no reason why manufacturers can not build the market if the gliding and soaring organizations in this country give them the assurance that they will do their part to promote the movement in a progressive manner.

A glider really is nothing more than an airplane without a motor. Problems of design, construction, and manufacturing are quite similar. War contractors have found that the pound costs for gliders and airplanes of similar construction are about the same. In the post-war era we can assume that the simple low-price airplane and the simple low-price training glider will have about the same cost per pound if they are both built on a production basis. As the performance

of the airframe is increased by design refinements and accessories, the pound cost is also increased. Sailplanes should compare favorably with deluxe aircraft as to their cost per pound. It might be noted that government surplus gliders are now being sold for much less than their actual manufacturing costs.

During the pre-war period, before the light airplane market was subsidized by the war training program and when the civilian light plane production was at its peak, approximately 80% of the airplanes sold in the United States were the lowest priced light training airplanes. There were a few light planes on the market that sold for around a thousand dollars each but they were "loss leaders" and did not represent a stable, profitable business for the manufacturer. The average price for a light training plane during this period was \$1350. The airplane minus the motor weighs 425 pounds and costs \$915, which results in a \$2.15 pound cost for the airframe. The airframe pound cost of the light airplane and training glider should be about the same if both are built on a production basis. Therefore the pre-war training glider would have cost about \$2.15 per pound. Light aircraft manufacturers estimate that the pound cost for training airplanes will run about \$3.00 and the post-war training glider should have about the same cost per pound, provided a manufacturer can produce trainers on a production basis of at least one per day. It is important to keep the total weight of the simple training airframe as low as possible from the cost angle. However, it is also necessary to compromise and add a little additional weight so the labor costs can be decreased by simplifying the structure and material costs decreased by the use of less expensive, lower strength material. Because of these two facts and due to CAA licensing requirements, the post-war training glider probably will be slightly heavier than some of the pre-war trainers.

When the performance of an airplane is increased it generally results in an increased aircraft pound cost because higher performance usually means more power, additional strength, design refinements and accessory equipment. The volume of sales of the high performance airplane is also less due to higher initial investments and operational costs. The small volume in production also results in an increasing pound cost.

Step-up performance of a glider generally means increasing the aspect ratio of the wings and streamlining the air flow of the ship. These refinements usually lead to tapered wings, full cantilever wings and tail surfaces, stress skin D tubes, faired-in cockpit enclosures, etc. For example: In order to increase the aspect ratio, the straight wing is frequently replaced by the tapered wing. In the straight wing all the ribs are similar and one jig will take care of all, while in a tapered wing each rib is a different size which requires a special jig for each rib.