SENSENICH PROPELLER MANUFACTURING COMPANY, INC.

Forgings

The Quality Assurance Manager receives the aluminum forgings from pre-approved Sensenich vendors. Before releasing the forgings into production the forgings are inspected to a Sensenich Propeller quality specification. The forged material we use to manufacture our propellers is 2025-T6 Aluminum, 2025 is the aluminum alloy and the T6 is the Temper (*heat treat*).

Rockwell hardness of T6 Aluminum has a minimum hardness value of 63.5 HRB. This measurement is performed in Rockwell "B" scale 1/16" ball, 100KG load. Second most prominent chemical other Aluminum is Copper.

We currently have two suppliers of forgings, ALCOA Forged Products Division, located in Cleveland Ohio, and Weber Metals, located in Paramount, California.

Forgings are manufactured in batches of like heat treat numbers stamped on the forging hub face. This number is transferred to the blade and later recorded on the propeller traveler card. This heat treat number is then recorded in a permanent database that can be retrieved if a problem should arise.

CNC, hub faces, boring 2.2505 hub bore and drill bolt holes

The hub CNC machine is an automated computer driven machine that can mill the face side hub dimension on one propeller, and the camber side face hub dimension on a second propeller within in one run cycle. This operation mills the propeller hub to the correct thickness, bores the main hub pilot bore and drills the required bolt hole scheme.

Rough Track

Each propeller is rough tracked, six blade stations are checked with height measurements to insure the propeller will fit into the CNC cut envelope

CNC, blade profile and blade outline

Tail stocks are installed on both blade tips, and aligned with the propeller's center line. The tail stocks installed on the propeller fits into the CNC tail stock. The CNC cutter follows a numerical path determined by the cut files. The propeller outline and profiles are cut leaving approximately .040" of material left for disking/polishing and balance. At this time a traveler card is assign to the propeller. The card states

all the pertinent information to manufacture the propeller. This card will stay with the propeller until the unit is packed for shipping or placed into stock.

Propeller Disking

The disking operation removes any cutting marking left by the CNC machine. To accomplish this, an 80 grit disk is used to remove approximately .030" to 0.40" of material over the entire blade surface. Blade radius stations are marked on the propeller blades, the station marks are checked with dial calipers and profiling templates to insure the propeller thickness and blade contours meet the drawing specifications. Before the propeller leaves the disking area the propeller must be balanced both vertically and horizontally.

Twisting of Blade Angles

Every Sensenich propeller basic model (e.g. 74DM) comes off the CNC machine with the same median pitch. Depending on the specific aircraft the pitch can be raised or lowered. This is accomplished by placing a twisting bar on the blade around the 45% blade station and twisting the blade by activating the hydraulic jacks attached to the blade fixture. Station lines are drawn on the face of the propeller at set percentage distance from the center of the hub. The angles are checked at these stations and compared to the propeller's design blade angles. The angle tolerance is 0.10 degrees. Due to the airfoil shape of most Sensenich blades, special blade template must be used to hold the protractor level on the blade surface.

Polishing

The polishing operation uses finer grit sandpaper to produce a smooth finish. The thrust side is finished with a surface-conditioning disc. The camber side of the propeller is polished using an air filled drum with 80 grit sanding sleeve followed by a 150 grit sanding sleeve leaving a smooth even finish. The propeller is balanced vertically and horizontally before leaving the polished areas.

Conformity Inspection

Sensenich Quality Assurance inspects every propeller for conformity to drawing specifications. The propeller is bathed in an etch solution for an allotted time, then rinsed in a neutralizing agent. This process degreases and cleans the propeller for a quality inspector to examine the material for any defects. If there is a crack or defect in the material the black etch would remain in the defect making the defect visible. When the conformity inspection is complete, and conforms to the drawing specification, the quality assurance department stamps the traveler card accepting the propeller.

Buffing

The buffing operation uses a buffing compound applied to a rag wheel for conditioning the metal blade surfaces for finishing.

Finishing

The propeller is bathed in an Alodine solution to prevent corrosion and to help the paint adhere to the metal. The Sensenich paint scheme is a gray finish with 2" white strips on the tips for safety. Flat black paint is applied to the thrust side of the propeller blades to hinder reflection. After the propeller is dried the final balance is checked.

Final Inspection and Packaging

The final inspection is one last look at the propeller to verify the hub stampings are correct with the traveler card, the applicable torque decal has been applied, and the propeller is free of any surface damage. The Quality Assurance person will approve the final acceptance of the propeller by placing an acceptance stamp on the propeller blade.

Processing of the Traveler Cards

After the propellers are packaged, the traveler card is forwarded to the Quality Assurance office. The information from the traveler card is entered into a database and approved for shipment. The records can be accessed by the propeller serial number.

If the propeller is being shipped domestically an airworthiness approval tag, FAA form 8130-3 is issued and sent with the propeller.

If the propeller is being exported a Sensenich propeller DMIR (Designated Manufacturing Inspection Representative) will furnish FAA documentation per current FAR's