

Vane Preparation Protocol for Bonding Vanes to Arrow Shafts

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This protocol was developed to ensure satisfactory bonding between arrow shafts and their vanes. It is assumed that the shafts have already been properly cleaned and prepared for bonding, and that a good quality adhesive (made specifically for this application) is being used.

Why adhesives sometimes don't stick...

Adhesives may fail to bond to a surface if the surface has not been properly prepared. Prior to bonding, surfaces must be free of contamination, including foreign particles (dirt), oils and greases, surfactants (soaps and silicone lubricants), and water. Unless such contaminants are removed, the adhesive will bond to the contaminants instead of the molecules of the vane. Surfactants, such as silicone mold release, are often used in the fabrication process of vanes. In addition, some plastics and rubbers have a tendency to "bloom" when exposed to the environment (warmer temperatures, UV light, oxygen, and ozone). Blooming is a separation of the solid and plasticizer components of the material at its surface. It usually appears as a powdery residue. Although bloom is generally harmless to health and to the overall material properties of a vane, this layer of powder or plasticizer may prevent the vane from bonding to some adhesives. Most vanes come pre-cleaned and ready-to-install from the manufacturer. However, improper cleaning by the manufacturer, extended storage, or improper storage and handling, may make it necessary to clean the vanes again. The primary purpose of surface preparation is to remove surface contamination.

Materials:

- 100% denatured alcohol (not rubbing alcohol, which is usually only 70%, and may contain oils)
- 100% acetone (not finger nail polish remover, which usually contains oil)
- Vanes
- Cotton or foam swabs
- Powder-free gloves (must be clean, free of contaminants)
- Eye protection

Steps:

1. Wash your hands with soap and water to remove dirt, oils, and other contamination. Use eye protection and gloves to protect yourself during the entire cleaning process. Work in a well-ventilated area, because alcohol and acetone fumes are hazardous to health. Alcohol and acetone are extremely flammable, so the work area must be free of open flames and other possible ignition sources.
2. If the vanes are visibly dirty, they must be pre-cleaned with water, to prevent cross-contamination as they are being handled. This can be done by placing them in a container of clean water, and agitating

vigorously. If the vanes are oily or heavily soiled, use soap, and rinse thoroughly afterward. After washing the vanes, allow them to dry completely.

3. Continue to pre-clean the vanes by placing them in a small container of denatured alcohol, and agitating. Remove the vanes from the alcohol bath and allow them to dry completely.

Note: Be careful not to touch contaminated surfaces, especially your face, with your gloved hands once you begin the cleaning operation. Contaminants can easily be picked-up and transferred to the parts.

4. Holding the vane in your hand, or with a clamp, thoroughly scrub the base of the vane (where it will be bonded to the shaft), using a swab soaked with denatured alcohol. Finish with one quick wipe with an acetone moistened swab. Do not soak the entire vane in acetone, as this may degrade the material. Be aware that acetone will remove many types of ink. Allow to dry thoroughly. Do not touch the base of the vane, once it has been cleaned. Cleaned vanes may be stored in a clean bag for about a month (in a cool, dry location) before re-cleaning becomes necessary.

Note: Acetone may be incompatible with some vane materials, causing those materials to swell, and the vanes to curl. Always test a sample vane with acetone. If the acetone causes the vane to deform in any way, skip the acetone wipe.

5. The shaft and vanes must be gently warmed above air temperature before the bonding operation. Cold surfaces attract a layer of water condensation, which prevents effective bonding. The shafts and vanes may be warmed by placing them in direct sunlight for a few minutes, or heating them gently with a hairdryer or incandescent lamp.
6. Before the shaft and vanes cool, apply a small, even bead (approx. 1 mm in diameter) of adhesive to the base of the vane, and then place the vane on the shaft in the correct location using a fletching jig. There should be sufficient adhesive so that a small amount squeezes out from the base around the entire vane. If using an air-drying adhesive, wait at least 10 minutes, or until the adhesive is cured, before removing the arrow from the jig. For cyanoacrylate “instant” glues, the arrow may be removed from the jig after 30 seconds. If using a cyanoacrylate adhesive, be sure it is the thicker, toughened, impact resistant variety. Wait 24 hours before shooting the arrow, to allow the adhesive to cure completely.

Note: Bonding must be done immediately after the shafts have been prepared, otherwise oxidation will start to reform on the surface, or contaminants will start to redeposit on the surfaces.

7. After removing the arrow from the jig, place a small drop of adhesive on the leading and trailing ends of the vane at its base. This will prevent failure initiation at those points.