Interagency Aviation TECH BULLETIN

Subject: Malfunctioning Matrice 600 propellers

Area of Concern: Two different styles of propellers, each with a different result when malfunction occurs.

Distribution: All UAS operators

Discussion:

We have experienced an increasing number of Matrice 600 prop shears in flight. There are two versions of props within the Matrice 600 fleet. The "new style" props have a rounded T-head and a nut on the bottom (Figure 1). The second version, "old style" (Figure 2) props have a hex-screw head on the top that threads into the bottom prop plate.

The "old style" props experience problems with bolt heads shearing off, caused by the head of the screw being very thin and breaking (Figure 3). Typically, this was not a catastrophic failure; props would be noticeably loose and fixed by replacement. Aircraft were still able to complete the mission and return to launch area without the operator noticing the issue in flight. Fixing the "old style" props is a simple fix: replace the thin-head screws with a new screw with a thicker head.

Prop shears occurring with the "new style" props are more problematic and are causing the aircraft to crash. Fixing the "new style" props is more challenging because the part holding the prop on is an atypical threaded fastener with a T-head. Reports indicate the T-head fastener is shearing off at the bottom, where the nut holds it in place (Figure 4). This has resulted in a total loss of one prop and motor, causing aircraft to lose altitude until impact.

There are numerous factors that could contribute to this occurrence:

- High use aircraft
- Aggressive Flying
- Max Payload strain
- Manufacturer Defect
- Environment

Corrective actions:

- After every flight RPIC shall check the tension of each prop, both horizontal and vertical. Any irregularities require further inspection and/or replacement. Remove the prop from the motor housing and inspect the T-head and nut for loosening and cracking.
- Do not use the aircraft in adverse weather conditions including wind speeds exceeding 18 mph.
- Use High Altitude props when operating above 8,200 ft.
- Payload not to exceed 11 lbs. and only fly with number of ignition spheres and glycol needed to complete the mission.

Reference Photos:

Figure 1 – New style T-head.

Figure 2 – Old style hex head.

Figure 4 – Old prop style sheer.

Figure 3 – New style prop sheer.

/s/ Brad Koeckeritz	/s/ Jason Baldwin
Brad Koeckeritz Chief, Division of Unmanned Aircraft Systems DOI, Office of Aviation Services	Jason Baldwin Branch Chief – Aviation Operations USDA, Forest Service