



# VTOL Aircraft Clutch & Brake Solutions

Formsprag provides advanced clutch and brake technologies for VTOL air taxi and cargo vehicles



The rapidly growing interest in various types of VTOL aircraft has created a highly competitive market environment for vehicle OEMs. Formsprag Clutch, a global leader in clutch and brake technologies, is uniquely positioned to support VTOL aircraft design engineers as they meet these application challenges.

## Decades of Aerospace Experience

Formsprag has been serving the aerospace industry since 1943. Since that time, major aircraft OEMs have come to rely on Formsprag's creativity and vision to meet their power transmission challenges. Experience matters – we now have over 500 years of combined engineering experience under one roof.

## Responsive Engineering Support

Whether a modified standard product or a completely new custom solution is required, Formsprag provides complete engineering and sales support to customers around the world, from the very first concept to the detailed planning, design variation phase and commissioning. To help improve speed-to-market, custom prototypes are often delivered in weeks, not months.

## Precision Manufacturing & Certifications

Our state-of-the-art facility utilizes that latest manufacturing technologies and equipment, as well as in-house heat treating and metallurgical test lab.

Because aerospace applications are considered flight safety and mission critical, we know and have established the systems and procedures necessary to support success, including AS9100D & ISO9001:2015 certifications.



## Formsprag products provide exceptional performance and reliability

Formsprag clutches and brakes can be utilized on all types of VTOL vehicle designs, including aircraft that...

- are electric battery, electric hybrid, electric hydrogen or turbine engine powered
- utilize multirotor, tilt-rotor or decoupled-propulsive drive systems
- are driven by 3, 4, 6, 8, 10 or more vertical thrust tilt rotors/fans
- incorporate pusher/lateral rotors/fans
- are piloted or optionally piloted
- utilize tilt and/or foldable wings
- are designed to carry passengers, cargo or both
- feature redundant electric motors on all rotors/fans



### Overrunning Sprag Clutches

Although they're seldom larger than a few inches in diameter and a couple inches in length, Formsprag overrunning clutches, also known as sprag retainer assemblies, one-way clutches, or freewheels, perform some of the most critical functions on many types of aircraft.

Formsprag sprag clutches permit drive during normal operations and autorotation during emergency situations. To allow for power redundancy, these clutches can be installed on all rotor/fan drive motors to enable backup drives to engage as needed.

Formsprag's unique Formchrome® process diffuses chromium into the surface of the sprags in the clutch creating a surface hardness that translates into extended wear life of 180% over Non-Formchrome sprags.



### Electromagnetic Clutches & Brakes

Formsprag offers a wide selection of energy-efficient electric clutches and brakes designed to reduce power consumption.

Formsprag is the preferred choice when an electric or hydraulic clutch or brake is the favored technology for VTOL aircraft applications. Virtually any application can be solved with a custom clutch or brake solution from Formsprag.

Standard products are just the starting point. Let Formsprag, backed by Altra's industry-leading Electric Clutch/Brake team, work to engineer the best solution optimizing the relationship between performance, weight, and cost.

