

## ***Application note 110: custom diecast motor/encoder/inertiawheel sub-assembly***

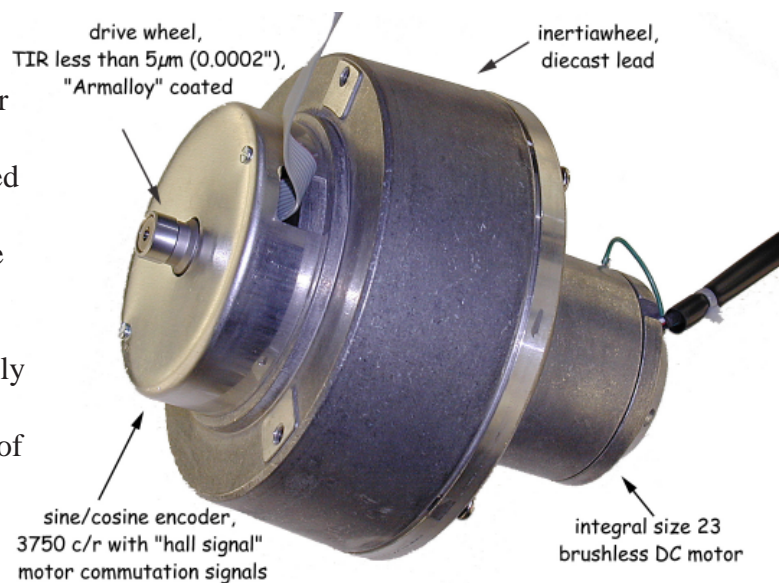
*This note describes the actuator solution provided by Allied Motion for a linear drive unit used in a high resolution (3000+ dpi) direct-to-plate printer.*

This assembly presented very specific mechanical constraints that were met by designing a custom aluminum diecast housing containing the various elements. Part of the required features were:

- large dynamic range, from a few RPM's to a high slew rate
- low runout ( $5\mu\text{m}$ ) chrome coated drive interface surface
- high torsional resonant frequency

At low and ultra low speed, the motor 'Hall' switches proved to be noisy due to PWM drive current pickup when in the rotor passed the magnetic neutral zone'. For this reason, the Hall signal generation was moved to the encoder providing clean switching signals that could be used as feedback in the slew rate mode.

The  $5\mu\text{m}$  runout requirement would normally dictate post-grinding of the drive interface. The yield without some kind of adjustment of the runout, even when using prime grade bearings, would have been not better than 60%. The chrome coating prohibited post grinding - the runout constraint would be met but the coating would disappear. To preserve the yield, a process was developed where the runout could be adjusted to an arbitrarily small number and bonding the drive wheel in place.



The high torsional resonant frequency was realized by a careful design of the shaft assembly and placing the encoder between the drive load and the integral inertiawheel.

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