

TITLE: Wire Wrapping Head Redesign / Concentric Taping Head Redesign

SPONSOR: Alconex Specialty Products

Proposal/Scope

Alconex wraps magnet wire with paper and film insulation using concentric taping heads on 1970s-era taping machines. The wire passes through the main hollow rotating tube, and that tube spins the head. Insulation is pulled from a tape package, also called a cop, and applied around the conductor. Current widths include 3/8 in., 1/2 in., 5/8 in., and 3/4 in.; some wire sizes call for 1 in. tape, but the current head is not reliable with that width because it flips and folds.

History and current problem:

The original 1970s tape path could run at full speed without the flip/fold issue because it did not force a 90-degree twist. Its weakness was quality consistency: left-to-right motion of the tape package/cop transferred into the wire, so visible wrap differences appeared at each channel/traverse change.

In 2021, Alconex moved to a newer head design that adds a 90-degree twist feeding into a roller. That roller absorbs package wander better and has produced the best small-tape quality and output Alconex has seen. The suspected tradeoff is that the twist/roller geometry may not give wider insulation enough transition distance, so wider tapes now suffer from flips, folds, bare spots, and speed reductions.

Project objective:

Evaluate the physics and geometry of the wrapping head and redesign one individual head that preserves the quality benefit of the 2021 concept while restoring stability on wider tapes. The design must be machinable, balanced for high-speed rotation, repeatably adjustable, and compatible with both existing machine mounting styles described below.

Budget: \$5,000 for one individual prototype/redesigned head. This budget target should include all parts machined or purchased and installed/ready to install, with no Alconex on-site fabrication required.