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NASA TECH BRIEF

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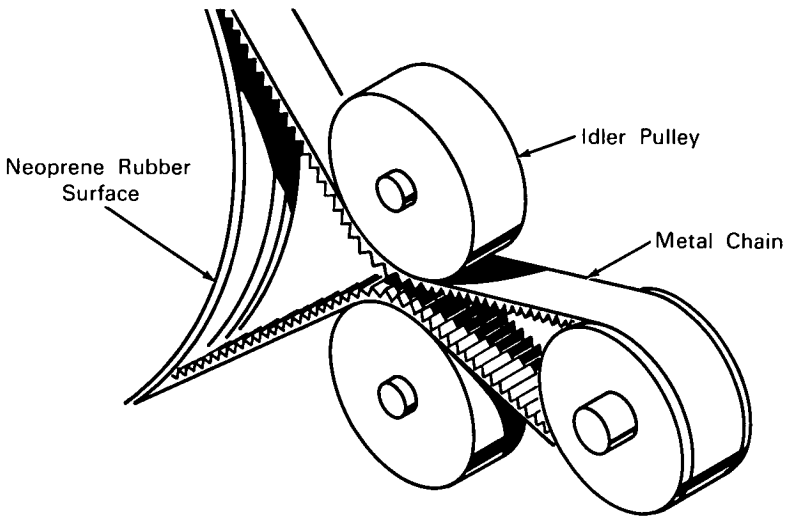
Chain Friction System Gives Positive, Reversible Drive



The problem: With large reduction ratios in a chain drive, the bigger gear is costly to buy or machine. Being relatively heavy, it also introduces inertial problems in service that requires rapid acceleration or reversal. Ordinary belt drives, though lighter and quieter than chain drives, are of course less positive.

The solution: Use of a conventional metal silent chain with its teeth bearing against a rubber-covered, flat-faced aluminum pulley. The result is a positive, reversible drive that operates with minimum noise and vibration. With a suitable idler tensioning device, the drive has negligible backlash.

How it's done: A strip of an elastomer (e.g., neoprene 3/16-in thick) is cemented to the smooth metal rim of the pulley. Standard commercial chain is wrapped around the pulley and kept under suitable tension by neoprene covered idlers. The drive gear is a standard steel pinion.

Notes:

1. This inexpensive, light, low-inertia drive appears especially adapted for large reduction ratios, and for rapid accelerations. It is well suited to mechanical servos because it can have virtually no backlash.
2. The drive was originally constructed at the Ames Research Center for a motion simulator having two large driven pulleys, one 10 and the other 15 feet in diameter. Commercial chain having 3/8 inch pitch and 2 inches wide is employed. One drive motor is of 15 horsepower, intermittently subjected to substantial overloads; and accelerations up to 18 radians per second per second are achieved.

Patent status: NASA encourages commercial use of this innovation. No patent action is contemplated.

Source: Jess S. Davidsen
Ames Research Center (ARC-8)

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