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Zip it up

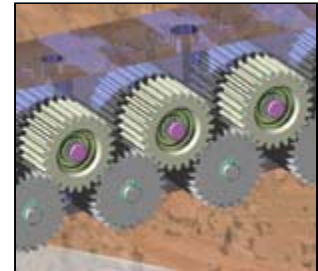
New gear design helps packaging manufacturer speed zipper-pouch packages to market.

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Engineers at the Hayssen division of Barry-Wehmler Companies Inc., Greenville, S.C., used a nonlubricated gear drive to head off potential problems from belt drives.

Hayssen employed the gear drive in a new transverse zipper applicator, part of a vertical/form/fill/seal (VFFS) machine used to make resealable zipper-style packages that are increasingly popular for food, retail, and institutional markets. The gear-train approach got the nod after Hayssen engineers studied existing designs and noticed some serious problems. Timing belts, for example, often had to stretch around tight radii, making them prone to break and subject to frequent maintenance. Also, it was hard to reach the belts and pulleys for servicing, forcing long shutdown periods for maintenance.

Concerns about such difficulties led Hayssen to explore the nonlubricated gear drive approach with Intech Corp., Closter, N.J. When forming a pouch/pillow bag on



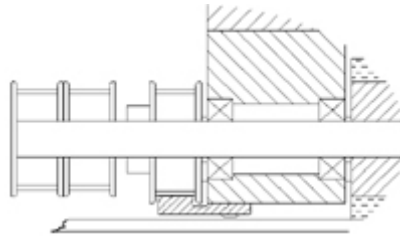
Hayssen geared-roller assembly with an Intech nonlubricated drive uses stainless-steel drive gears and Power-Core idlers. Face width and tooth modifications are said to yield four years of gear life.

Thermal-fit technology

Thermal fit is a controlled shrink method for installing bearings into Power-Core roller and idler gear blanks to determine radial pressure on the installed bearing. Taking into account bearing size and thermal expansion of the machined plastic part, the overlap dimensions for the shrink fit are calculated, as is oven temperature and length of time in the oven. The method of calculating the radial pressure optimizes operating loads, temperature, and bearing size to ensure secure contact between the plastic tire or gear during operation without excessive pressure on the bearing.

Power-Core can be thermally expanded to 325iF, cooled down, and shrunk around a bearing without cracking. For

a VFFS machine with an integrated zipper, a precise amount of ITW zipper material is applied to the film before it is formed into the finished bag. Mechanical-related design issues, such as clearance and tight-quarters of the zipper tape pathway required the gear train to have small-pitch diameters and minimal backlash.



Zipper-pouch sealing machines often use a belt drive in a triple-pulley arrangement. The small pulley diameter and poor belt contact incur frequent belt breakage.

Also, tight-center distances and frequent stop-and-go requirements eliminated the possibility of using the traditional composite material with metal-core gear structure as a drive gear, mostly because of the relatively large driveshaft OD. Instead, engineers chose Intech power-core material for idler gears, which use thermal-fit technology. In this method, bearings install into idler gear blanks prior to hobbing the gear teeth for minimum runout on the finished gear. The design involves a proprietary gear-life calculation and gear-tooth modification to accommodate the set center distances in the speed ratios of the rubber rollers. According to Intech, the gear is calculated to last a minimum of four years in continuous operation without lubrication.

by Staff MD

example, a tire is installed around a ball bearing, having expanded from an undersized ID in relation to the bearing's OD, to develop a considerable radical force upon cooling. The underlying reason for the material's suitability for thermal-shrink fit is its high degree of crystallinity and the absence of internal stresses. Also, the material retains its fit around the bearing in wet environments as it does not swell in moisture.

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