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Plastic Gears with Steel Cores

Applications requiring the self-lubrication, wear resistance and quiet operation of nylon gears, but which are too demanding for solid plastic, might benefit from the use of plastic gears with steel cores.

One company offering a solution in this area is DSM Engineering Plastics, which specializes in the manufacture of plastics suitable for machining. Their Nylasteel™ product is designed for manufacturers of gears, rollers, pulleys, wheels and sprockets. The composite stock shapes are available in standard configurations or with custom-designed steel cores. The steel core allows Nylasteel™ gears to be attached to a steel shaft the same way as steel gears are, including press-fit, bolt-circle or keyway.

Nylasteel™ billets come in diameters up to 10.5" and lengths up to 24", with steel core diameters from 1.5" to 4.5". The billets can be saw-cut and machined on a gear hobber.

DSM can also manufacture custom-designed hubs, including those that extend beyond the face width.

Nylasteel™ blanks and billets are available with several nylon varieties and either cold-rolled 1117 steel or stainless cores.

Circle 250

Profile Cutting

You wouldn't think that the technology used for making hand tools would be of much use to a gear manufacturer. But Wera Werk GmbH, a fifty-year-old German company that has developed an expertise in manufacturing screwdrivers, screwdriver bits and other geometrically profiled components, produces and sells a machine tool called the Profilator, which can be used to generate a variety of profiles, including involute tooth forms, face couplings and other forms that may be useful to gear manufacturers.

The Profilator uses electronically synchronized rotation of the workpiece and cutting tool to produce geometric forms ranging from front serrations, squares, hexagons and other polygonal shapes to hand-tool profiles such as Phillips or Torx®.

Harley-Davidson uses Profilator machines to produce the drive lugs on their motorcycles' transmission gears. The lugs are a coupling device similar to a Curvic® coupling, according to Jim Eaton, Vice President of Sales for American Wera, Inc., which handles sales of the Wera machines. The lugs are manufactured using carbide inserts in a



Spline on differential case generated by Profilator.

generating process where the workpiece and cutter are positioned 180 degrees from each other, Eaton says.

"Of the 10 gears we use in a transmission, six of them have lugs on them," says Denny Digman, senior manufacturing engineer at Harley's Pilgrim Road facility in Menomonee Falls, WI, where the transmissions for the Cruiser and Touring motorcycle powertrains are manufactured. "There are two gear/shaft assemblies in a transmission. When the gears shift on the shaft of the transmission, the lugs engage either to other lugged gears or to a pocket gear."



The Profilator machines at Harley-Davidson are all fully automated. The workpieces are picked up from a conveyor, machined, and dropped back on another conveyor, and double-sided parts are accommodated with an internal turn-around device.

Another example of these machines in action is at the Ford Motor Company's ZF-Batavia plant in Batavia, OH, where the company uses the machines to produce a 30-tooth involute spline for sport utility transmissions.

Normally, the manufacturer would employ blind spline broaching to manufacture this type of part, says Gerald Houchell, division process engineer at the ZF-Batavia plant. "With blind spline,



Forms generated by Profilator.