CAUSE AND EFFECT

Mandrel Drives Are Not All Created Equal

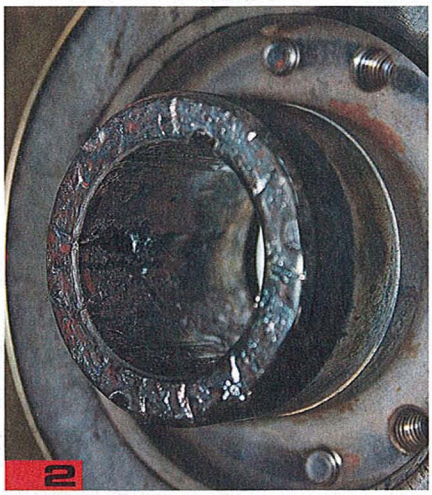
Things used to be so easy years ago. It was a time when we removed every extra pulley and drive from the front of our engine's harmonic damper in an effort to eliminate any horsepower drain. But cause and effect will always rear its ugly head.

We've now added devices such as vacuum pumps, alternators, mechanical fuel pumps, oil pumps, etc., all of which take their drive from the front of the damper. Simple mandrel drives enable this all to be done but they can cause a problem.

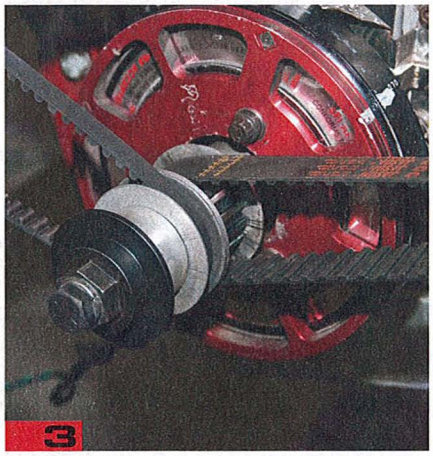
The most common drive is a one-inch diameter mandrel that fits inside the front recess of the damper and held in place with a single extra-long stud or bolt through its center to the threaded hole in the crankshaft. Commonly used on most small and big block Chevrolets, this arrangement has worked well for years. However, the additional drive pulleys can place a strain on that set-up causing all sorts of headaches.

During a recent rebuild on one of our Project Engines, we learned the hard way the damage

This is the arrangement we previously used to drive the vacuum pump, alternator and mechanical fuel pump on one of our Project Engines.



...And this is the damage it caused to the harmonic damper hub alone, let alone the damage to the crankshaft snout.



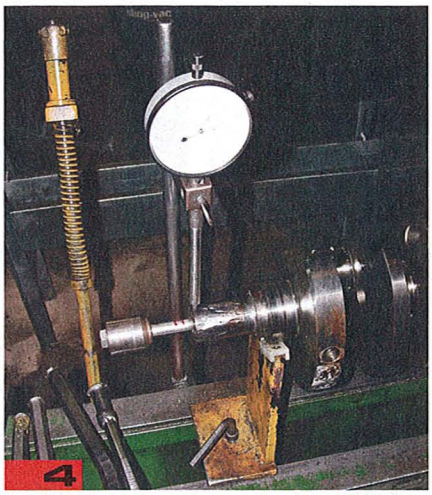
Typical of this type of drive arrangement is a single center damper bolt attempting to hold the damper and drive mandrel in place. Not the best set-up.

type of set-up can impart on the damper hub and crankshaft snout. It took quite a bit of heat and two broken damper pullers just to get the damper removed from the crankshaft. The end result was both a damaged damper and crankshaft with those components requiring return to their respective manufacturers for proper repair.

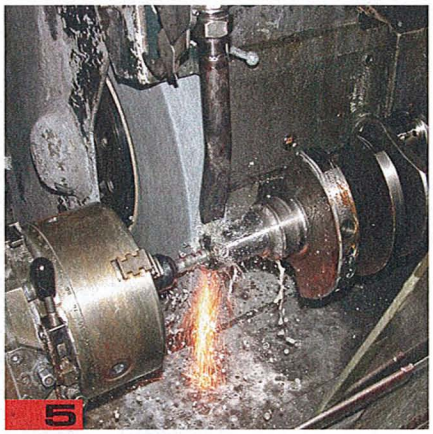
J.C. Beattie of ATI Performance Products said, "The center damper bolt was only intended to hold the damper in place, not to be the basis for driving extra pulleys. That long stud will stretch when torqued and loosen up which causes the damper to move around on the crankshaft snout regardless of how tight the press fit was to start with."

Fortunately, we discovered the problem before any real damage was done, such as the damper or the entire pulley system flying off.

Beattie said, "A better system is one of our drive mandrels which register to the inside recess of the front of the damper and bolt to the three threaded holes in the damper's hub. We also feel it's better to utilize our damper shell that has the ignition crank trigger magnets mounted right inside it which eliminates having to mount another thing to the front of the damper."



With the crankshaft back at Lunati for repair, the first step involves straightening the crank before any repair can be done. This step is repeated often during the repair process.

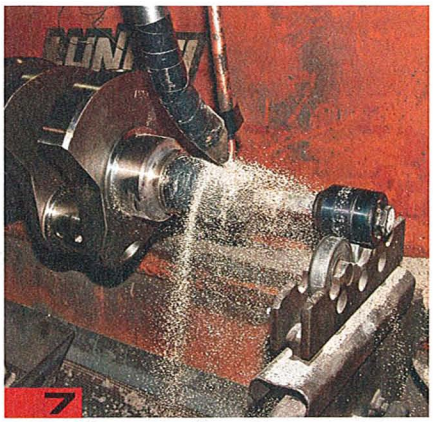


With the crankshaft centered and mounted in a lathe, the damaged snout is ground down to remove any impurities to assure a clean surface to build back up with weld.

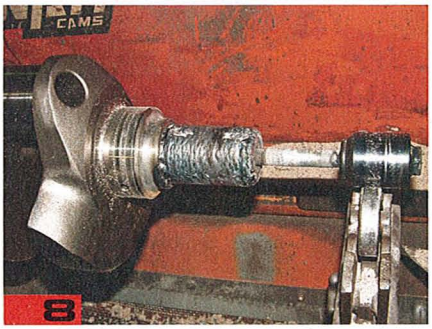
Rather than grind the snout down all the way to remove any impurities which would make the snout too small and not necessary, a die grinder is used to clean up any deeper gashes. It's all necessary to assure a good clean surface to weld onto.

With the crankshaft on its way back to Lunati, we spoke with Shane Pochon of Lunati, who said, "This isn't a common problem, but we do see the crankshaft snout getting ruined from time to time. It certainly doesn't mean the end of the crank's life, but it does require certain steps to properly repair the unit."

Follow along as we detail the steps both ATI and Lunati took to get us back to an arrangement that would eliminate the problem forever. DRA

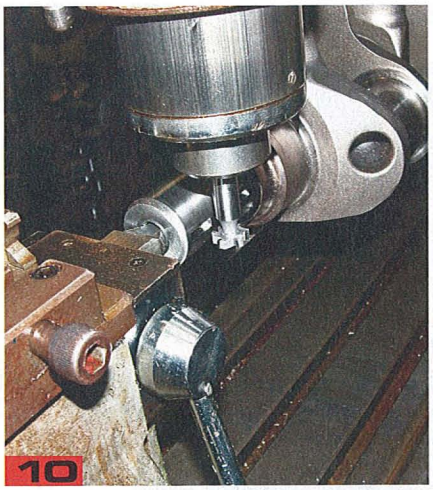


Using a submerged arc welding process, the crank snout is welded up to a size larger than necessary. In submerged welding, the molten weld pool is protected from atmospheric contamination by being "submerged" under a blanket of granular flux. This process is used due to its deep weld penetration and minimal heat distortion.



With the snout all welded up, it's time to once again straighten the crank before it's reinstalled in the lathe to grind the snout back down to its finished size.

With the snout finish ground to size, Lunati deep drilled the snout to allow the damper bolt to distribute the load between the first main and the snout. This requires an extra long damper bolt but is a move in the right direction.



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The final step to the crankshaft is to cut the grooves for the woodruff keys that locate the crank timing gear and damper, again check for straightness and finally polish the journals.

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While the crankshaft was at Lunati for its repair, ATI Performance Products was repairing our damper which included the addition of an outer damper ring with the ignition magnets built right into the shell. In addition their drive mandrel mounts to the three tapped holes in the damper hub for a more precise mounting arrangement for our drive pulleys.

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The finished mandrel and pulley system on the right will do a much better job of driving our accessories run after run without the concern of damaging a crankshaft and/or the harmonic damper.

SOURCES

ATI PERFORMANCE PRODUCTS
6747 Whitestone Rd. Dept. DRA
Baltimore, MD 21207
877-298-4591
www.atiracing.com

LUNATI
11126 Willow Ridge Dr. Dept. DRA
Olive Branch, MS 38654
662-892-1500
www.lunatipower.com