

WHAT YOU CAN EXPECT FROM A DIESEL TRUCK & HOW THEY TURN

DIESEL **BUILDER**

REAL-WORLD

DIESEL TUNER SHOOTOUT

• On The Dyno • At The Track • Down The Road

**DIESEL
READY**

Get Your Truck In Top Shape

**WHAT YOU
CAN EXPECT**

**FROM A DIESEL
TRUCK**

HOW TO INSTALL

**CUSTOM
DIESEL TRUCKS**

Get The Parts To Accessory
Your Turbo Diesel Pickup

**PREMIERE
ISSUE!**



PREACHING TO THE CONVERTED

NEW TECHNOLOGIES HARNESS DIESEL PERFORMANCE

Words: Stephen K. Anderson
Photography: Precision Industries

As automotive technology becomes ever more intricate, it's not surprising that it becomes more and more difficult to explain, let alone comprehend. While many of us have at least a basic understanding of how internal combustion engines work in both diesel and gasoline iterations, getting a handle on the transference of that power is becoming ever more complex, and therefore baffling.

Nowhere is this more evident than in describing and comprehending how torque converters work, as this marvel of engineering genius is one of the more involved elements of any modern drivetrain, second only to the transmission itself. Originally

reached its pinnacle in the mid-'80s. But as vehicle efficiency has become a far greater concern in recent times, efforts have expanded in refining every aspect of the drivetrain, from the cooling system to the axle bearings, and nowhere has it had more of an impact than in the electronically controlled lockup converters of today. That's now giving way to variable-speed transmissions.

But before all the new technology comes about from the OEs, we either have to deal with the raw components that are

created a torque converter like no other. His multidisc lockup converter designs have become the standard by which others are measured.

Unlike the conventional converter, which incorporates stamped steel components crimped together into one assembly, Precision Industries has the various converter units

Precision Industries has reinvented the torque converter with innovative technologies designed from the start to withstand the ever-higher torque and horsepower levels available in today's most powerful diesel engines. There are no other products quite like these on the market today.

minimum for maximum durability. From there, the different elements are checked, assembled, tested and made ready for shipment.

Beyond the assembly process, the PI converters designed for diesel applications offer the benefits of a multidisc design that increases the surface area several times, which better increases the ability to transfer power and extends the life expectancy of the converter.

Beyond durability, PI diesel converters make the most of the power they apply. While more conventional converter designs build on the existing engine



devised by General Motors, the fluid coupling first appeared in 1938, while the torque converter as we know it today saw its first application in the late '40s. In the years that followed, GM, Ford, Chrysler and other companies added their own refinements to the basic concept, which



available or create something new to fit what's already out there. Enter Precision Industries (PI) in Oakland, Tennessee, where the conversion of torque has been elevated to a new level through the applied genius of Terry Hedrick, a life-long performance enthusiasts who has



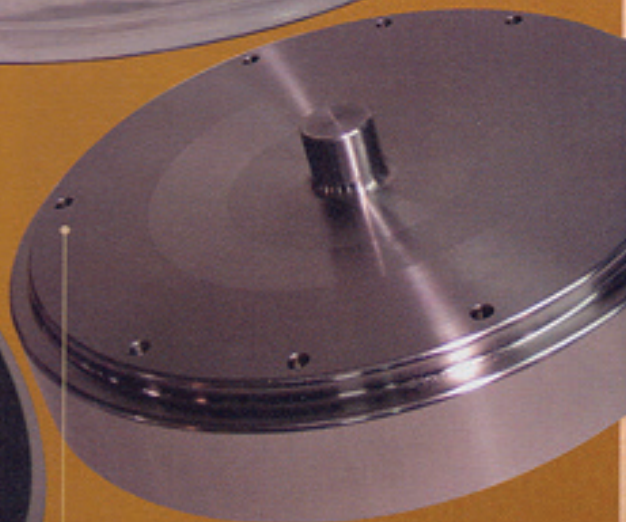
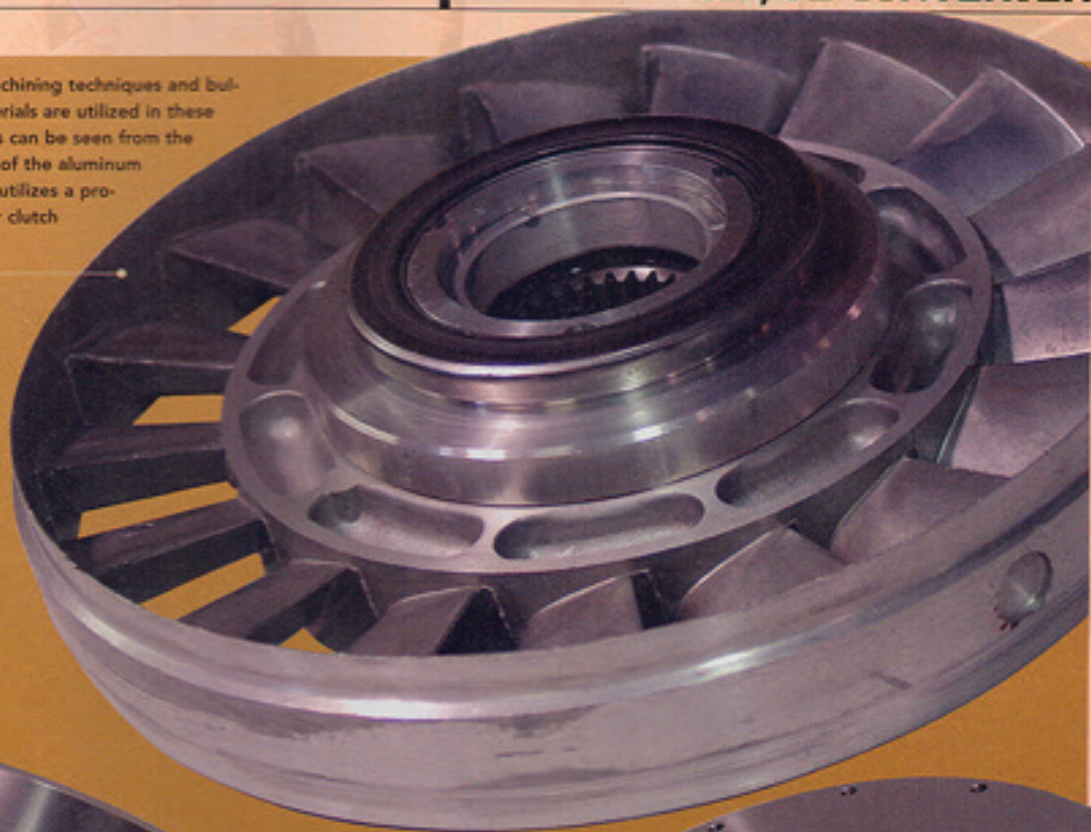
furnace brazed into one assembly to ensure that they hold up in the most rigorous applications. That in and of itself is not revolutionary, but PI also utilizes advanced three- and four-axis machining and turning centers to shape the various components from billet steel and alu-

01

The latest machining techniques and bulletproof materials are utilized in these converters, as can be seen from the impeller side of the aluminum stator, which utilizes a proprietary roller clutch assembly.

02

Check out the brilliant surfaces of the precision-machined 1045 billet front cover, which has taken the concept to new levels of durability.



Seen from the opposite side, the billet front cover leaves no doubt as to the quality of the workmanship employed here. As with every component in the converter, nothing has been left to chance to ensure that it will stand up to the most rigorous challenges.

03

torque with a stall torque ratio of around 1.94:1—depending on the design—PI converters increase that ratio to something around 2.30:1, for an increase of about 18.5 percent. Considering the substantial horsepower figures produced by today's

enhanced diesel engines, this is quite an improvement.

Compared to other converters on the market, the PI units are more expensive, but this is not about lesser designs; this is about brute torque capability, performance and dependability.

When you consider the loads that modified diesel engines can now apply to the torque converter, what is the cost of failure, vs. the price of vehicle recovery and repair—not to mention the inconvenience of breaking down by the side of the road?

When you factor these in that PI converters are covered by a two-year unconditional warranty, it's likely that you will find the price of a well-engineered converter more in line with an engine mod. Choose the right parts the first time. **DB**

04

Unlike OE and some other converter designs on the market today, the Precision Industries turbine is fully furnace brazed for incredible longevity, while a special 4140 alloy, heat-treated turbine hub adds to its durability.

05

As impressive as its interior, the heat-treated hub exposed on the outside of the furnace-brazed turbine leaves little doubt as to its capability—even at the absolute limit.

06

Similar in appearance to the impeller on a hydroelectric generator, the turbine side of the aluminum stator features a special bearing mount and a proprietary roller clutch assembly that allows it to freewheel in one direction to increase efficiency.

07

The main clutch is precision machined from an extremely durable 1045 steel alloy, as this is where a great deal of force is created with the multi-clutch assembly.

08

Here you can see how the notches in the main clutch assembly and the fingers of the laser-cut clutch plates, with a proprietary friction material, work in conjunction with one another.

09

Decked out in Precision Industries' trademark purple coating, the outside of the impeller features a specially heat-treated 4140 one-piece impeller hub that can handle incredible torque loads.

10

As we've already seen in the turbine hub, the impeller utilizes furnace-brazed vanes, unlike the more conventional stamped-steel components that are simply crimped together into one assembly. As a result, the Precision Industries diesel converter can withstand the most hostile high-performance environment.

CONVERTER SHORTHAND

A REFERENCE FOR THE REST OF US

While describing a torque converter can be equated with explaining applied physics, the basic overview is within the grasp of most car enthusiasts. After all, it's no more than a hydrodynamic device that allows an automatic transmission to be engaged, much like a clutch acts on a manual transmission. When at idle a torque converter, which is bolted to the flywheel, allows the transmission to disengage itself from the engine. Then, as engine speed increases, the fins that make up the pump within the converter increase fluid flow from the center of the converter to the outer edge, where it enters the blades of the turbine, which connects to the transmission input shaft. The turbine sends the transmission spinning, which, motivates the car as hydraulic energy is converted to mechanical.

This pumping process causes the fluid to change from its entry point at the outside of the converter to near the center of the turbine. From there the fluid enters the stator and is redirected to the center of the pump by the use of a one-way clutch within the stator, which connects to the transmission. This redirecting of the fluid flow is where the converter is able to multiply the engine torque. As turbine speed increases, the exiting fluid hits the backside of the stator blades, allowing the stator to freewheel on its one-way clutch, thereby having no contrary effect on the fluid moving through the converter. In short, in addition to allowing the engine to disengage from the engine at idle, torque is increased through the change in direction of the fluid, an effect that diminishes as the transmission eventually matches engine speed.