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ENGINE TECHNOLOGY



The Switchblade Turbo System is a self-contained, electronically controlled turbo capable of adjusting operational parameters to reduce turbo lag under low flow conditions without compromising top end performance.

A SWITCH FOR TURBOCHARGERS

Blaylock's Switchblade Turbo System uses single moveable blade to increase turbine speed

BY KYLE KOPPLIN

Blaylock Turbochargers, Baxter Springs, Kan., is a company that has carved out a niche as a remanufacturer of turbochargers and turbo components. Established in 1980 with a single employee, the company has grown to 13 employees housed in a 17,500 sq.ft. facility.

"We remanufacture turbocharger turbine wheels, bearing housings, compressor housings, turbocharger compressor wheels and turbocharger turbine housings," said Jim Blaylock, president and owner. "We can remanufacture just about any turbocharger made to date, but our specialty is heavy equipment turbochargers. One segment that is growing particularly fast is vehicles with variable geometry turbochargers (VGT), due to the issues associated with the number of moving components."

While working with the VGTs, Blaylock noticed what he called a high failure rate in the components. So he began researching alternative methods of increasing turbine speed at low engine speeds without impacting turbo performance on the high end. While cleaning a VGT with a compressed air hose, he discovered that he could speed up or slow down the turbine wheel by directing the airflow over the turbine tips. This became the founding concept behind the company's first foray into new turbochargers, the new Switchblade Turbo System.

The Switchblade Turbo System was developed for a range of applications, though Blaylock said it could be used for new turbo installations as well. It is a self-contained, electronically controlled turbo designed

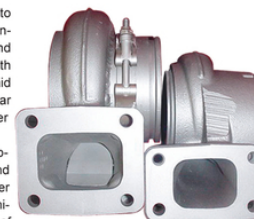
to adjust operational parameters to reduce turbo lag under low flow conditions without compromising top end performance. When compared with a conventional VGT, Blaylock said the Switchblade turbo offers similar performance with significantly fewer moving components.

"Turbo lag has been a major problem affecting both performance and emissions," Blaylock said. "Smaller turbo housings would help to eliminate lag, however, performance of the overall system was limited. Turbo manufacturers attempted to address this issue with VGTs, which helped to reduce turbo lag, but significantly increased cost and failure rates due to the number of additional parts."

"The Switchblade design incorporates a blade in the throat of the turbo, which is controlled by an electric actuator. During idle or low flow conditions the controller actuates the blade, closing off a portion of the turbo housing and forcing the exhaust stream directly onto the turbine tips at an increased velocity by increasing drive pressure."

According to Blaylock, testing on the Switchblade has demonstrated that by closing the blade, the turbine wheel spools more quickly, producing the first psi of boost in 0.3 seconds. As the pressure continues to increase, the blade opens up, allowing the entire housing to be utilized and cross over (higher boost pressure than backpressure) and more complete fuel combustion to be achieved. He also said the Switchblade's performance has been mapped by several large turbo manufacturers and testing has indicated that the system is capable of adjusting A/R ratios with a single moving component.

Blaylock said the company has conducted initial testing on the turbos used on a 2002 Dodge 3500 and a 2006 Dodge 2500 pickup, each powered by a 5.9 L Cummins engine, as well as on a 1997 Ford F series truck with a 7.3 L PowerStroke diesel engine. According to its findings,



According to Blaylock, the Switchblade's 18 cm housing (left) — designed for an 8.3 L engine — is capable of generating boost as quickly as a stock 9 cm housing.

Blaylock said the Switchblade's 18 cm housing — designed for an 8.3 L engine — is capable of generating boost as quickly as the stock 9 cm housing. Other than lowering drive pressure, the testing

ENGINE TECHNOLOGY

showed fuel savings up to 3 mpg, as well as reduced visible smoke, Blaylock said.

Blaylock has been working to develop the Switchblade initially for the performance aftermarket sector, but believes it will also provide a benefit to those applications where VGT performance is required, but cost and durability are concerns. The company's goal is to develop relationships with fleets looking to increase fuel efficiency while at the same time reduce particulate emissions, as well as establish a relationship with an engine manufacturer looking for an alternative to current VGT technology. **dp**

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