

TurboNews

A Publication of BorgWarner Turbo Systems #1/00

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Editorial

A New Look

TurboNews becomes the customer magazine for the entire BorgWarner Turbo Systems Group

Dear Readers,

Hold onto your hats! With just two issues of 3K-Warner TurboNews under our belt, we're changing already. That's why you haven't heard from us in a while — we've left the old newsletter behind to work on this new magazine. We hope you'll excuse the delay, and we're confident that you'll agree it was worth the wait!

Welcome to the edition of TurboNews in the new millennium. As part of the expansion of BorgWarner's turbocharger division resulting from the 1999 acquisition of Schwitzer, a prominent turbocharger manufacturer, TurboNews has been redesigned as the customer magazine for BorgWarner Turbo Systems. Your revamped TurboNews will tell you everything you need to know about 3K-Warner, and report on our company's sites and markets around the world. Read all about the newest global player in the turbocharger business on page 6, and in our interview with F. Lee Wilson, president and general manager of BorgWarner Turbo Systems.

Future issues of TurboNews will be dedicated to specific company sites around the world, to acquaint you with the BorgWarner Turbo Systems Group's projects and strategies for success. In this inaugural issue, we'll introduce you to our plant in Brazil.

We hope you'll enjoy the broader scope of our new magazine and find this issue of TurboNews informative — and hard to put down.

With best regards,

The TurboNews editorial team

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ultramodern turbocharger technology



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debut with BorgWarner's
biggest customer, the Ford
Motor Company (U.S.)

BW TS Inside

EMPLOYEES HELP PURCHASE EQUIPMENT TO
MONITOR PREMATURE INFANTS

A Soft Spot for Babies

The PC Diesel and Gasoline Engine Sales departments of 3K-Warner Turbo Systems collected DM1,200 (about \$600) in change at their coffee stations and donated it to the City Hospital of Worms, Germany, to help purchase a special device that increases premature infants' chances of survival. This device includes a probe that measures oxygen saturation and carbon dioxide levels in the blood directly on the surface of the skin, which enables physicians to perform noninvasive blood tests in the infants without causing them any pain or stress.



www.herzessache.de

BORGWARNER TURBO SYSTEMS LAUNCHES
PRESENTATION SERIES

From Opinion Leader to Product Leader

To bolster its worldwide product leadership, BorgWarner Turbo Systems will take a more active role in delivering important presentations. Our company will present technical talks at the following events:

June 26-27, 2000

Conference: Downsizing Concepts for Gasoline and Diesel Engines, Munich Polytechnic, chaired by Prof. Werner Bauer, Ph.D. Engineering

Presentation: Downsizing: Boosting Concepts for Gasoline Engines, by Frank Pflüger and Gerhard Oberholz, engineers

September 28-29, 2000

Conference on Boosting Technology Dresden Technical University, Prof. H. Zellbeck, PhD. Engineering

Presentation: Modern Boosting Concepts for Automotive Diesel Engines, by Patric Hoecker, Frank Pflüger, and Stefan Münz, engineers

Presentation: Exhaust Temperature 1050° C – A Design Challenge for the Exhaust Turbocharger, by Michael Mayer, Volker Simon, and Gerhard Oberholz, engineers

SMART PART: TURBOCHARGERS FROM 3K

Smart & Small

Reduce to the max! This ad slogan hits the nail on the head when it comes to the revolutionary concept behind DaimlerChrysler's compact Smart car, which has already made quite a splash in Germany. Now it applies to the Smart's engine design, as well.

In November 1999, production of the Smart CDI engine began at the DaimlerChrysler plant in Berlin. The CDI is an ultramodern 3-cylinder engine with 0.8-liter displacement, two valves per cylinder, and Common-Rail direct injection. It is boosted by the exceptional KP31 turbocharger from BW TS, with a waste gate and an integrated exhaust manifold. Thanks to the turbocharger, this puny power plant produces a maximum torque of 80 Nm and 30kW (41 HP) of power.

3K-Warner joined forces with DaimlerChrysler in the pre-development phase of the CDI project. This collaboration resulted in the KP31, the world's smallest series-production turbocharger for automotive diesel engines. The KP31 has excellent thermodynamics, and can spin

at up to 290,000 rpm. To fit in the tight space under the hood, a new type of exhaust manifold module was developed that includes a pre-inlet.

The Smart diesel project is an important milestone for 3K-Warner as it continues its successful collaboration with DaimlerChrysler. The new CDI engine consumes an average of just 3.4 liters (.884 gallons) of fuel per 100 kilometers (62 miles). Its carbon dioxide emissions are well within the top limit for tax exemption in Germany (90g of CO₂). The European auto industry press has been excited about the Smart CDI, praising its excellent driving characteristics.

The start of series production of the CDI engine coincided with the launch of initial series production of the new KP turbocharger series. Additional projects using new, innovative KP turbochargers will be announced in the coming weeks and months, as BorgWarner Turbo Systems continues to expand its product line for modern PC engines.



Tight space under the hood led to the development of the world's smallest series-production turbocharger for automotive diesel engines.





Less fuel, more fun — the philosophy behind the new Smart CDI



"RESIDENT ENGINEER" PROGRAM EXPANDS TO INCLUDE AUDI IN INGOLSTADT

Working Together to Get Ahead

Support for the resident engineer concept from 3K-Warner is growing within the automotive industry. Engineer Andreas Lakämper joined the Audi development team in Ingolstadt on June 1, 2000 as a 3K-Warner resident engineer. Thanks to many years of excellent collaboration between the two companies, Audi is now one of BorgWarner Turbo Systems' most important customers. In fact, BorgWarner Turbo Systems is the sole supplier for all turbocharged CI engines built by Audi.



Andreas Lakämper joined the Audi development team on June 1, 2000 as a resident engineer.

Lakämper, who previously worked in development for a prominent manufacturer of radial compressors and expansion turbines, joined 3K-Warner on Jan. 1, 2000, and spent the next five months in training. Since June, his colleagues in the Audi project group — especially Hartmut Claus, the project group leader — have taught him the ins and outs of the carmaker's customer-service and project-management operations.

Sending a resident engineer to Ingolstadt is part of BorgWarner Turbo Systems' larger investment in joint development work with Audi. A growing number of ever-more-complex projects must be completed successfully in shorter and shorter time frames, and Lakämper will help 3K-Warner meet these emerging demands and further strengthen collaboration between the two companies.



SIX QUESTIONS FOR F. LEE WILSON,
PRESIDENT OF BW TS

driven by visions

TurboNews spoke with F. Lee Wilson, president of BorgWarner Turbo Systems in Indianapolis, U.S., about the current state of affairs at BW TS and future plans for the Group.

TN: *What is your vision for our global turbocharger business?*

F. Lee Wilson: As we discussed during our meeting in Ithaca, we want BW TS to be our customers' first choice for all engine-boost solutions. Right now we have a lot of opportunities because our competitors are failing to meet expectations, and we need to respond quickly and well to bolster our customers' faith in our abilities.

I also see us as a service-oriented after-market company. Several of our customers have had tremendous success in this segment, based on their ability to deliver and their remanufacturing technology, and we also need to explore this market.

TN: *What has impressed you most at BW TS?*

F. Lee Wilson: The energy and dedication of all the people at every location, as well as the obvious improvements that each facility has made over the past year. There is no question that we are well-positioned, both internally and with our customers, to gain a leadership position in the industry.

TN: *What challenges will BW TS be facing in the near and long term?*

F. Lee Wilson: As I already mentioned, our company has made substantial progress in recent years. And as we proceed to the next level of success, our most difficult short-term challenges will be to develop and produce the technology we need to become the market leader. We're currently behind in terms of low-cycle fatigue and EGR solutions for CD, and in VGT production for PC.

Just so you don't think I'm overlooking the need to complete our internal integration, let me say that we can only achieve this by focussing on our most important projects. It's vital for every individual to work according to an overall TS priority list, and we need to communicate our global priorities so that everyone clearly understands how their particular activity fits in.

Looking farther ahead, we need to get additional business to keep our factories around the world working to capacity, while at the same time reducing costs much faster than is now the case. To keep up both with other units within BW and with our biggest competitors, while satisfying our shareholder's expectations, we have to significantly improve our overall profitability and improve our asset utilization. We've invested heavily in the capital side of our business, and now it's imperative for us to deliver the goods to achieve the anticipated return on these investments.



F. Lee Wilson will continue his stewardship of BorgWarner Turbo Systems from the Group's new headquarters in Kirchheimbolanden, Germany.

TN: *What is the current status of the integration of Schwitzer and 3K?*

F. Lee Wilson: Although remnants of the various companies haven't been fully integrated yet (a situation that will persist for some time), I think we are much closer to acting as one company than a lot of peo-

Indianapolis,
Indiana (USA) facility



Current headquarters of BorgWarner Turbo Systems, our sales and application engineering for North America, development and test benches.

Asheville,
N.C. (USA) facility



Production facility for CD turbochargers and dampers.

Campinas,
Brazil



Production facility for CD turbochargers, sales and application engineering for South America.

ple think. The gap is largely bridged by our common turbocharger language, as well as shared acquaintances and contacts throughout the industry. We're introducing more common processes every day, and we have initiated monthly meetings with staff from different countries. I don't want to play down the issues, but I think that the remaining problems are due more to cultural differences than to the fact that we were once separate companies.

TN: How do you view the synergies that our PC and CD business activities are achieving?

F. Lee Wilson: While the applications are obviously different, the underlying technology is basically the same. This includes aerodynamic design tools, stress-analysis techniques, etc. Because we have small turbos used in CD (like small agricultural engines), as well as the possibility of using larger turbos in high-volume applications such as NA pickup trucks,

I tend to think of our products more in terms of big vs. small and high vs. low volume, rather than distinguishing between PC and CD. I do recognize, however, that our sales, marketing, and application engineering activities are unique to each segment.

TN: What may we expect from BW TS in the future?

F. Lee Wilson: It is my sincerest wish for every BW TS employee to have the

▶
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Company profile

Background:	1998/99 3K-Warner Turbosystems and Schwitzer were incorporated into the BorgWarner Turbo Systems Group.
	2000 BorgWarner Turbo Systems opens the World Development Center for Turbochargers in Kirchheimbolanden.
Products:	Turbochargers for passenger cars, commercial vehicles, and industrial, locomotive, and marine engines, with an output range of 20-1200 kW
Employees:	2,200 worldwide
Annual Sales:	\$382 million
Customers:	Audi, Caterpillar, DaimlerChrysler, DDC, Iveco, MAN, Navistar, PSA, Renault, RVI/Mack, Volkswagen, Volvo

Bradford,
United Kingdom facility



Production facility for CD turbochargers, sales and application engineering for CD turbochargers.

Kirchheimbolanden,
Germany facility



BorgWarner Turbo Systems' World Development Center includes extensive test-bench and production facilities for PC and CD turbochargers, the company's main sales department, and our application engineering center for PC and CD turbochargers.

Continued from Page 7

feeling that they're with a dynamic, savvy company that is an enjoyable place to work. You can expect to see us invest in technology to ensure our product leadership, while maintaining a relentless focus on meeting our commitments to our customers and shareholders.

BORGWARNER TURBO SYSTEMS MOVES ITS HEADQUARTERS TO GERMANY

New Headquarters

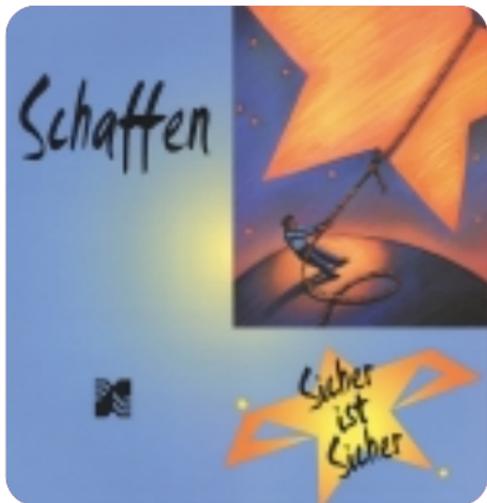
The European motor-vehicle industry is marked by high fuel prices and strict emissions standards. These conditions have made Europe the largest market for turbochargers in the world. In light of this fact, BorgWarner Turbo Systems decided to move its headquarters from Indianapolis, Indiana (USA), to Kirchheimbolanden, Germany.

The decision to move to Germany was driven by BW TS's commitment to its automotive customers, as they strive to meet the growing challenges in engine development. This is an important step toward ensuring our company's continued growth and success, and reaching our goal of global technology leadership.

The move will coincide with the opening of BW TS's World Development Center for turbochargers in Kirchheimbolanden. At this new facility, over 100 engineers and technicians will apply advanced technologies to implement the company's global development strategy.

Transferring headquarters to Germany is an important milestone for BorgWarner, which is on its way to becoming a globally active partner in the motor-vehicle industry. BorgWarner Turbo Systems is the first corporate unit in the BorgWarner group of companies to be headquartered outside the U.S.

Company Safety



Be a Safety Star: Banners and posters remind employees about BorgWarner's new safety-awareness campaign.

Responsible companies are committed to protecting the health and safety of their employees. New production technologies and modern, safer equipment have contributed to a decline in the number of work-related accidents in recent years.

Unfortunately, this trend does not apply to accidents that take place as employees drive to or from work. In Germany, for example, accidents caused by aggressive or inattentive driving costs companies twice: not only do employees miss work, but the country's social insurance laws require employers to pay health and other costs if workers get into an accident traveling to or from their job.

As with driving habits, employee behavior also plays a large role in accidents that occur in the workplace. That's why BorgWarner's worldwide safety program, implemented by management at the Kirchheimbolanden facility, focuses on increasing employees' safety awareness

from the minute they leave the house until they get home at the end of the work day.

1. To foster greater safety awareness at work
2. To reduce traffic accidents

To increase employee awareness of safety, and to encourage workers to take charge of their health, BorgWarner designed large banners dotted with

stars and emblazoned with the slogan "Be a Safety Star" to hang in building lobbies and the company cafeteria. The posters will remain for the rest of the year to remind employees of the campaign. Banners with catchy reminders about different safety topics will also be hung throughout the facility and rotated on a regular basis.

Action items to increase safety awareness ...

... in the workplace:

- Post monthly safety index updates for every work area.
- Thoroughly investigate every accident that results in missed work hours, involving the employee and his supervisor.
- Require that protective eyewear and ear protection be worn at all workstations where employees use compressed air to work on parts.
- Praise the working groups in which all employees wear exemplary physical protection.
- Develop a system for providing regular updates of work group safety status.
- Install information signs about workplace safety and health protection throughout the facility.

... while driving

- Safety training in conjunction with ADAC (the German "AAA") and the accident-prevention associations

THE NEW KP39 VTG TURBOCHARGER CELEBRATES ITS PREMIERE
IN THE ŠKODA FABIA

Maiden Voyage





The new KP39 VTG turbocharger represents the first member of a new generation of turbochargers that feature variable turbine geometry.



Ultramodern engine technology under a brand new hood: the Škoda Fabia represents a dynamic breakthrough in low fuel consumption.

Pop the cork! After many months of intensive development and preparation, the first KP39 VTG turbochargers were shipped to the Volkswagen production plant in Salzgitter, Germany on Feb. 22, 2000. The KP39 VTG features an integrated exhaust manifold for the 1.9 liter TDI 4-cylinder diesel engine, with pump-nozzle injection and an output of 74 kW (101 HP). This new engine meets the EURO3 emission standards, and is highly fuel-efficient. It is celebrating its premiere in the Škoda Fabia.

gen — which builds the Škoda — to meet the specifications of the automaker's new TDI engine. The result is an extremely efficient, compact turbocharger. The KP39 VTG for the Škoda Fabia is the first of a number of new BorgWarner turbochargers to hit the market with this innovative technology.

To accommodate the unusual production requirements for turbochargers with variable turbine geometry, special, state-of-the-art assembly stations were developed



The KP39 VTG combines the advantages of the new KP series with the benefits of variable turbine geometry. It was developed in close cooperation with Volkswa-

in BorgWarner's Kirchheimbolanden, Germany plant for production of the KP39 VTG.

BORGWARNER TURBO SYSTEMS MAKES ITS DEBUT
AT THE FORD TECHNOLOGY REVIEW

Debut at Ford



Turbochargers with variable turbine geometry and two-stage, regulated turbocharging gave Ford engineers and BW TS a lot to talk about.

BorgWarner participated in the Ford Technology Review in Dearborn, Michigan (USA), on April 4-6, 2000. In an exhibition hall on the Ford Motor Company campus, Ford suppliers were able to showcase their latest technologies and innovations. Ford is the largest customer of BorgWarner Automotive, and this event was the first in a series of presentations that BorgWarner will be delivering to its customers in the U.S.

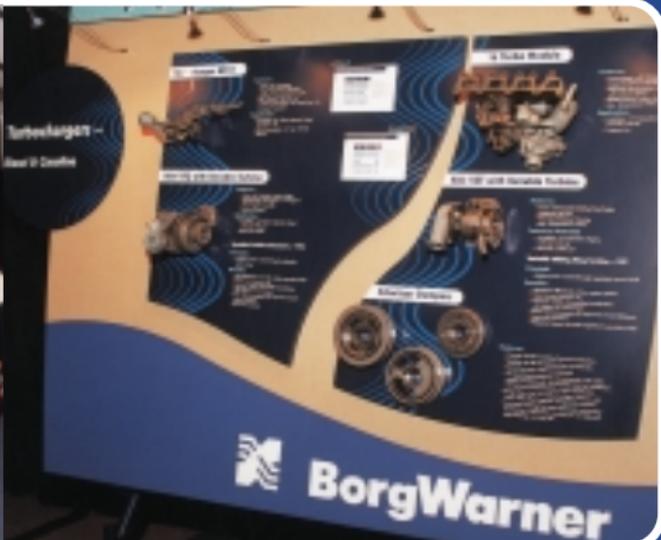
BorgWarner's entire product line was on display at the show, including those used in co-project work with Ford's Morse Tec, TorqTransfer Systems,

Transmission Systems, Air/Fluid Systems and Cooling Systems. BorgWarner Automotive used the in-house trade show to demonstrate its product leadership in the fields of engines, four-wheel drive systems, and gearboxes. To showcase our forward-looking innovations, BorgWarner made numerous presentations about the products and technologies of tomorrow.

BorgWarner welcomed an impressive number of interested Ford engineers to its booth, and received very positive

feedback. The Ford representatives were particularly excited about the addition of the BorgWarner Turbo Systems Group to the Engines Business Unit. This was the first time the Turbocharger Business Unit attended this important event. The unit exhibited turbocharger systems for gasoline and diesel engines for automobiles, light commercial vehicles, and pick-up trucks. Ford was quite interested in both





PC and CD turbochargers. Turbochargers with variable turbine geometry (VTG/VST) and boosting systems such as the two-stage, regulated turbocharger received a lot of attention, too.

The new-products presentation and strong presence of qualified experts made turbocharging a hot topic of conversation at the show. Without a doubt, this positive atmosphere was fueled by the professional and confident debut of BorgWarner Group's nascent Turbo Systems product division. The company rolled out a new image brochure that describes our vision, products and

services, and highlights our dedication to customer focus. All in all, BorgWarner Turbo Systems positioned itself at the Ford Technology Review as an expert partner for future generations of engines from the Ford Motor Company.



driven by vision: Visitors were "wowed" by BorgWarner Turbo System's philosophy and vision.

BORGWARNER BRAZIL DEVELOPS INTO A CENTER OF EXPERTISE
IN SOUTH AMERICA

Brazil Shifts into High Gear



About 850,000 turbochargers have
been manufactured in Campinas near

São Paulo, Brazil since 1975.

BeSince 1975, turbochargers have been matched and manufactured in the former Schwitzer plant in Brazil. When 3K-Warner and Schwitzer merged to form the Turbo Systems unit of BorgWarner, the facility in Campinas near São Paulo became even more important.

To satisfy the growing demand for innovative PC and CD turbochargers and maintain a high standard of service in South America, Campinas will play an important role in the BWTS' objectives for growth. Large parts of the facility

have already been modernized and redesigned to optimize workstations and reduce energy costs. For 2000, the bulk of planned investments will focus on environmental protection.

BW TS provides on-site support for all of its South American customers, such as Mercedes-Benz Brazil and Valta (Sisu), in developing and applying new engines. With its Brazilian production facility, BW TS ensures that customers will receive high-quality turbochargers at competitive prices as quickly as possible. In keeping with BorgWarner's

global quality standards, the facility received ISO 9001 certification in July 1999. Certification in compliance with QS9000 is expected soon.

Reliably on the go with turbochargers
from BorgWarner Turbo Systems.



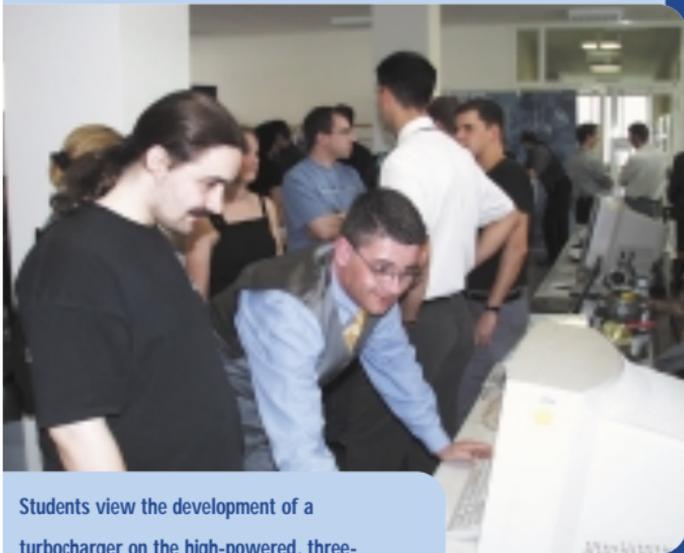
3K-WARNER PARTICIPATES IN OPEN HOUSE
AT KAISERSLAUTERN POLYTECHNIC

Fresh Ideas

The Campinas plant
by the numbers:

Campus size: 38 acres
Buildings: 60,600
square feet
Employees: 113

Only CD turbochargers are manufactured in Campinas at this time. Production for the service market is a key function here. Joining the established S-Series turbos, the first series in the K family of turbochargers is planned to roll off the Brazilian production line later this year. Production volume is expected to increase further from the number of roughly 54,000 turbochargers built in 1999 as demand rises. The Campinas plant is set to play a key — and growing — role in BWTS' worldwide production strategy.



Students view the development of a turbocharger on the high-powered, three-dimensional CAD software Pro/ENGINEER.

The 3K-Warner Turbosystems information booth once again drew a steady stream of visitors at this year's open house at Kaiserslautern Polytechnic. Especially mechanical engineering students specializing in engines and machines sought audiences with our developers, who were available to answer technical questions about turbocharger design and our company. Rounding out the event was a presentation on "Turbocharger Design Using 3-D CAD and Collaboration Between Industry and Academia."

Such collaboration has been a tradition since 1998, when the successful partnership between 3K-Warner and Kaiserslautern Polytechnic began with the idea of developing a CAD pool. This alliance

made it possible to conduct inexpensive tests of new software components for Pro/ENGINEER and integrate them into the design process — from simulation add-on tools all the way to new functionality for the Pro/ENGINEER software.

The partners regularly share their expertise with one another. As a result, 3K-Warner enriches student education by holding regular, valuable presentations at the university, and in return has benefited by hiring five newly graduated engineers already familiar with the Pro/ENGINEER design system.

take a look at our visions

Learn more about BorgWarner Turbo Systems, what we do, our goals and vision. Request your copy of our image brochure **driven by visions**



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Name:

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Address:

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Fax: Germany +49 63 52/403-22 03

U.S. +1 (317) 328-32 92 Brazil +55 19 787 57 01



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