TurboNews

TurboNews

Magazine for Friends and Customers of BorgWarner Turbo Systems 1/01

Zippy and Turbocharged

The New Opel Coupé with BW TS Turbocharger

Editorial

TURBONEWS PROVIDES INSIGHTS INTO MARKETS, STRATEGIES, AND GOALS

The Big Picture

Dear Reader,

2000 was a tremendous success for TurboNews. We welcomed many new readers—especially in North and South America. The positive feedback we've received on this customer magazine tells us how important it is for ensuring a strong dialog with our customers. It inspires us to continue our in-depth reporting on developments at BorgWarner Turbo Systems — and on our progress toward becoming our customers' supplier of choice for engine boosting systems.

In this edition we present for the first time a contribution from our president. From now on, page 3 of TurboNews will be dedicated to the president's commentary. You will also find the first in a series of interviews with vice presidents at BW TS. The ice will be broken by James Verrier, vice president at BW TS North America. TurboNews is publishing these interviews to acquaint you in greater depth with the markets, strategies, and goals of the individual business units.

In addition to presenting examples of our products in action, this issue also unveils a completely new product innovation—which goes to show once again that product leadership isn't marketing hype, but everyday reality at BW TS. You will also find a profile of our plant in Bradford, England. Then we travel below the equator to tell you about some recent notable achievements chalked up by our facility in Campinas, Brazil.

We hope you enjoy this issue of TurboNews. Do you have any suggestions or comments to share with us? If so, please drop us a line!

The Editorial Team

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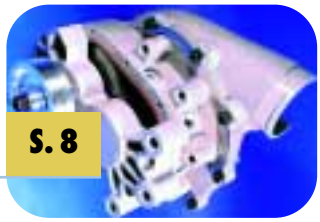

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LEE WILSON DISCUSSES THE REORGANIZATION OF BORGWARNER TURBO SYSTEMS

Growth Through Change

BW TS President Lee Wilson wants to make our company the manufakturer of choice for turbocharger systems.

No sector of the automotive industry will experience such strong, continued growth as the turbocharger business. To ensure that our customers — as well as BorgWarner itself — keep pace with this growth, we must continually change and evolve.

2000 was a very successful year for us, having delivered on our customer commitments and our own growth plans, while achieving significant progress toward becoming a single, seamless global organization. 2001 represents an opportunity for even more turbocharger business growth, despite the economic pressures that we and our customers face. A very difficult year in both the car and truck markets is forecast in North America, and overall car sales in Europe are projected to be level with 2000 at best. Fortunately, we offer technology and products that provide improved fuel consumption and air quality, and continue to enjoy increasing usage on all types of engines. We are projecting that the need for our products will grow in excess of 30 percent over the next 5 years, and I simply can't imagine a more interesting or exciting segment of the automotive industry!

The changes to our company up to now have been dramatic, and will continue in 2001. Having successfully opened our new Technology Center in Kirchheimbolanden and relocated our worldwide headquarters, we will maintain this pace of change in 2001 as we begin the co-location of our North American engineers to our Asheville facility, and break ground on a new assembly plant in Oroszlany, Hungary. From a technology standpoint, we will significantly increase our production of variable geometry turbos in 2001, and will become the first turbocharger manufacturer to offer series-produced titanium compressor wheels.

We've gotten off to a great start into 2001, and by cooperating closely with our customers will certainly realize our vision: to be the supplier of choice worldwide for customer-focused solutions and turbocharging systems.

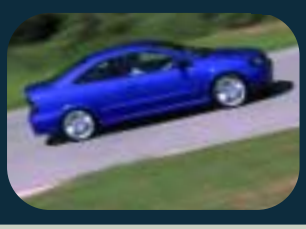
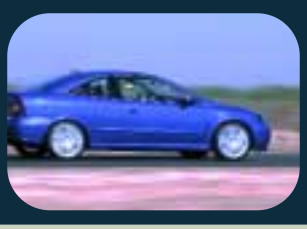
THE NEW OPEL COUPÉ BOATS TOP
ENGINE PERFORMANCE AND A BW TS TURBOCHERGER

ZIPPY AND TURBOCHARGED

The introduction of the new Opel Coupé with a 2.0 l turbocharged gasoline engine marks yet another milestone in the success story of turbocharging at Opel. In 1991, the company first introduced an integrated turbocharging system in the Opel Calibra 2.0, in which the manifold and turbine

Dynamic and sporty — compliments for the driving performance and the design of the new Opel Coupé.

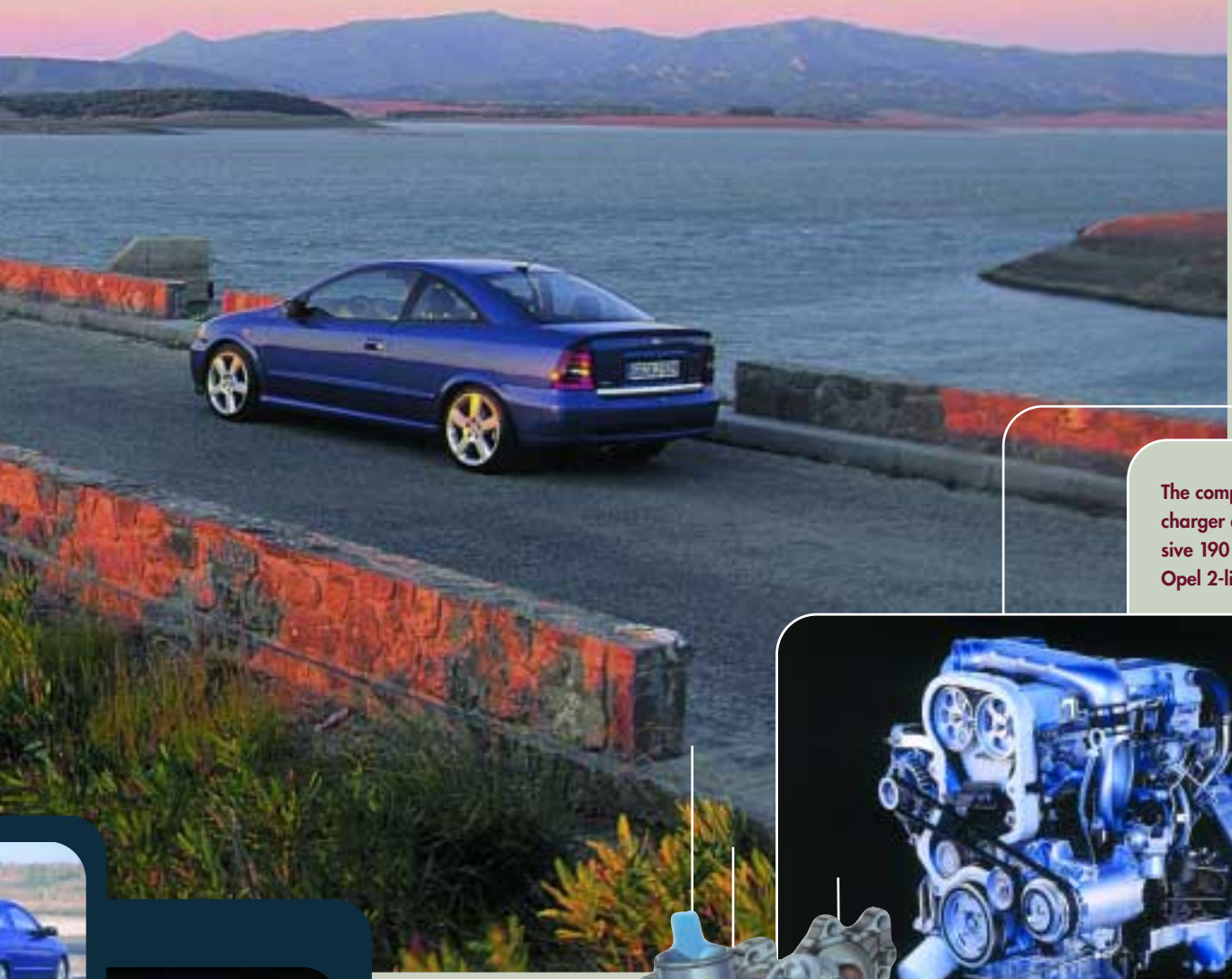


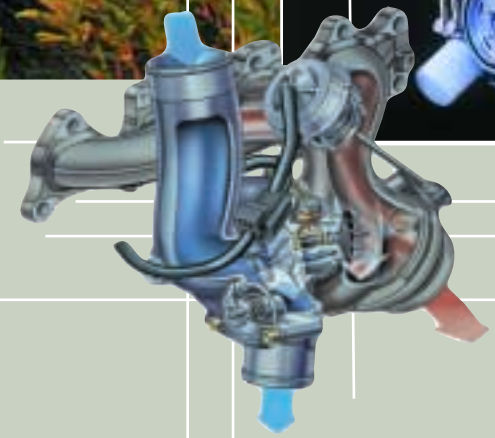
housing were designed as a single cast-iron part. The compact size, weight, and system integration of this boosting concept was improved even further for the new engine. In the early 1990s, Opel and BorgWarner Turbo Systems broke new ground with this system. Today it is finding increasing use in many other engine applications as well.

The engineers' goal was to achieve top motorization with excellent, smooth-running performance and thereby set new standards in this vehicle class. A smaller K04 turbocharger with a water-cooled bearing housing was used in the new 2.0 l turbocharged gasoline engine to improve its performance. Combined with the integrated manifold module, this change eliminated the infamous turbo lag. The engine outputs 190 hp (140 kW) at 5400 rpm and achieves a constant torque of 250 Nm between 1950 and 5300 rpm. An improved design based on available installation space reduced the weight of the complete module by another 1.3 kg. And, as another first, BorgWarner Turbo Systems assumed responsibility for assembling the timing valve for electronically regulating the boost pressure. This makes the new K04 with integrated exhaust manifold, circulating air valve, and electronic change-over valve the product of focused development work and heralds the arrival of a groundbreaking new boosting system.

The close cooperation between Opel and BorgWarner Turbo Systems has created a modern engine with very good driving performance and excellent fuel economy — in just two short years! Not only that, but this product is one of the first turbocharged engines to qualify for the stringent EURO4 air quality rating



The compact K04 turbocharger draws an impressive 190 HP out of the Opel 2-liter engine.



BW TS FACILITY IN ENGLAND IS ONE OF THE LARGEST COMMERCIAL DIESEL TURBOCHARGER PLANTS IN THE WORLD

T-Time in Bradford

Bradford is an important European location for BorgWarner Turbo Systems. It is situated in the county of Yorkshire in the North of England. In the past this area was well-known for its textile industry. Today the region has a diverse manufacturing and commercial base.

The Bradford plant specialises in producing commercial diesel turbochargers, turning out the S series range of products from the S100, primarily for agricultural and industrial equipment up to the S500 for generator sets and marine applications. The facility machines all the major components, and also performs final assembly and testing. The customers of Bradford-produced turbochargers include industry leaders such as DaimlerChrysler, Renault VI, Caterpillar and Deutz. The plant is QS9000-certified and uses modern manufacturing equipment and methods. Increasingly, production is carried out by teams, where continuous improvement at the Bradford plant is part of its everyday activities — consistant with the philosophy of BorgWarner Turbo Systems. Top priority is given to constantly optimizing processes and product quality at the Bradford plant.

Last year, a modern turbine housing manufacturing cell for passenger car turbochargers was installed in the plant. The K0 turbine housings are completely machined and then shipped to the Kirchheimbolanden facility for final assembly. This is the first step toward achieving broader cooperation in production between Bradford and Kirchheimbolanden.

Sales and application groups for several European customers as well as an engineering group for the S series turbochargers are located in Bradford, making it a center of expertise on all aspects of engine boosting. In close cooperation with colleagues in Kirchheimbolanden, they support and advise European customers in connection with commercial diesel turbocharging.

Last year the plant received the Investors in People award, a prestigious U.K. national honour that recognises a company's commitment to conscientiously appraising, training, and openly communicating with all the workforce.

In 2000, the Bradford plant supported its customers by increasing its shipments by 20 percent above the level of 1999. The Bradford operation is one of the largest commercial diesel turbocharger plants in the world.

Founded in 1978, the Bradford plant was expanded in 1980 and 1985. Over 350,000 turbochargers were manufactured here in 2000.

The Bradford plant in figures:

Built:	1978
Total floorspace:	70,000 sq ft (6,500 m²)
Employees:	over 400
Output:	About 350,000 commercial diesel turbocharges

BW TS UNVEILS A COMPLETELY NEW TYPE OF A ENGINE BOOSTING TECHNOLOGY

More Power on Demand

ABOD stands for Air Boost on Demand. It augments the already-high performance of today's engines.

BorgWarner's ABOD project will be ushering in a new era of engine boosting technology before the year is out. ABOD stands for "Air Boost On Demand" and will be the first new boosting system launched that BorgWarner Turbo Systems has developed from the ground up.

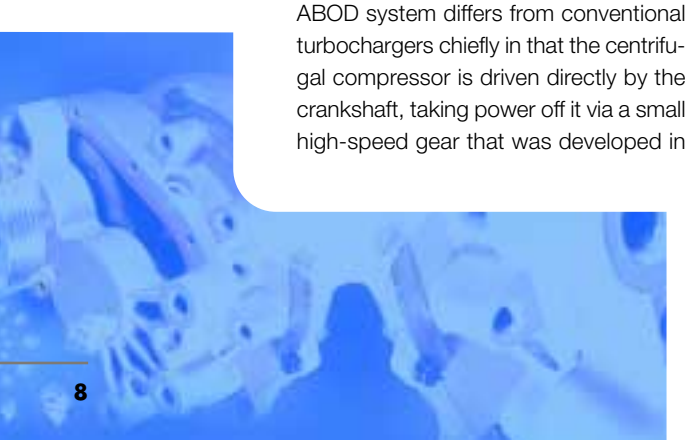
On December 13, the ABOD development team (Dave White, Steve O'Hara, Brady Ericson, Ulli Froehn, Karl Walther, Lee Wilson and Jutta Brueckner) introduced the new ABOD project to John F. Fiedler and the Board of Directors in Chicago.

Project engineer Steve O'Hara explained the technical details of the system. The ABOD system differs from conventional turbochargers chiefly in that the centrifugal compressor is driven directly by the crankshaft, taking power off it via a small high-speed gear that was developed in close cooperation with BorgWarner Morse TEC. Conventional turbochargers are powered by the exhaust gases. The advantage of the ABOD system is that it permits the boost pressure to be controlled independently of the available exhaust gas volumes. The net effect is to significantly improve engine performance.

Brady Ericson, director of sales and application engineering, described the project from the perspective of sales. With ABOD, the technology portfolio of BorgWarner Turbo Systems gains a boosting device that expands further the broad selection of turbochargers already offered to customers. In the North American market in particular, mechanical boosting has long been considered a good—and preferable—alternative to turbocharging. This new technology was basically developed for all BW TS customers, but particularly for North American manufacturers who are increasingly focusing on the advantages of engine boosting but still tend to prefer mechanical boosting technology. Having developed the ABOD technology, BW TS can now offer these customers yet another high-performance solution.

The development team proudly presents the ABOD project to John F. Fiedler and the Board of Directors in Chicago.

John F. Fiedler thanked the team for a job well done and expressed his optimism that the ABOD project, launched in March 2000, will be a continuing success. Prototypes are already ready for customer engine tests. The first applications will be available for the market by the end of this year.



BORGWARNER TURBO SYSTEMS
HOLDS A SERIES OF CUSTOMER WORKSHOPS

An Enticing Offer

Sergio Veinert and his colleagues designed an interesting program that was well-received by customers.

In September 2000, BorgWarner Turbo Systems held various workshops on "Engine Boosting Technology—Today and in the Future" in Brazil. Participants in this information bazaar included executives from notable companies such as General Motors, MWM do Brasil, and Volkswagen. BW TS arranged this workshop series to provide manufacturers with a comprehensive look at the latest developments in engine boosting technology, and to demonstrate its expertise and innovativeness as a turbocharger vendor.

Sergio Veinert, Campinas plant manager, explained the worldwide organization of BorgWarner Turbo Systems and why the company is the international market leader. He also outlined the production capacity of the Campinas facility, which was increased substantially in 2000 by modernizing the plant.

The workshops focused on the products and technologies that BW TS offers its customers for boosting the performance of diesel and gasoline engines. Ulli Froehn, vice president of technology and marketing, Lauro Takabatake, sales manager for South America, and Werner Erlewein, sales and applications manager at 3K-Warner, told the audience about the current product selection and the latest new product ideas. The variable turbines for diesel and gasoline engines attracted particularly great interest. Lively discussions ensued about solutions for integrated boosting systems and high-temperature applications for spark-ignition engines.

The participants, who lavished praise on the workshops, gave BorgWarner Turbo Systems another opportunity to cement its reputation as an engaged, innovative development partner to South American engine manufacturers.

The Campinas facility, expanded further in 2000, is the center of expertise for South America.

JAMES VERRIER DISCUSSES THE DEVELOPMENT OF THE NORTH AMERICAN TURBOCHARGER MARKET

The American Way to Drive

James Verrier is convinced that turbocharged engines will also dominate the North American market for passenger cars and SUVs within three to five years.

For this edition of TurboNews, we asked James Verrier about current happenings and future trends in the North American market. Since 1996, James Verrier has held various top management spots at BorgWarner. In April 2000 he was promoted to general manager of BW TS North America.

TN: Looking back at the year 2000, in your view what were the highlights?

James Verrier: It was a very good year for us in North America. Sales increased over 1999 by three percent, and our operational performance was good. We also secured new business at Detroit Diesel and John Deere. We made good progress on technology development, particularly on compressor wheel solutions for both current and future needs. At the operational level we saw progress on quality, delivery and safety, although we recognize that we have to develop further to reach world-class standards. Finally, the year 2000 saw us announce the transition from Indianapolis to Asheville and relocate our headquarters to Kirchheimbolanden. These moves will help give us a substantial competitive advantage.

TN: What are the objectives of BorgWarner Turbo Systems, and what challenges do you see for the year 2001?

James Verrier: We face several important challenges in 2001, I think the key ones are as follows:

We need to manage the transition from Indy to Asheville well to ensure that customers needs, as well as cost and timing targets, are met. We must also position ourselves to cope with the downturn in the heavy and medium truck markets—this will include placing a strong emphasis on costs and, particularly, on working capital. And we must raise our operational effectiveness to a high level, particularly in the areas of delivery and safety.

Launching our new business will be key to our success in 2001, particularly for DDC and John Deere. Gaining major new business to secure our future growth will be a prime focus. We are now working with many big customers to achieve this. Finally, we want to consolidate our current business through long-term agreements and partnerships, which we are well on our way toward achieving.

TN: How will customers benefit when our employees move from Indy to Asheville?

James Verrier: The major benefit for our customers will be our enhanced ability to support them with "rapid time to market" solutions. We will achieve this by co-locating our engineering talent on the same campus as our operational talent. By setting up concurrent engineering process-

es, we will forge a single North American team. This will improve both the designs and the manufacture of our products. We will also deploy cross-functional customer teams to focus on the specific needs of each of our customers. The co-locating approach helps drive continuous improvements in the design and manufacture of current products, which we need to do to continue our partnerships with customers.

TN: Which requirements must BorgWarner meet to satisfy our North American customers?

James Verrier: We need to do several things to meet our customers' needs:

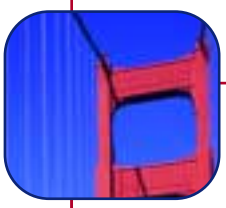
Quality product shipped on time is still an absolute must—we have done this well in the past, and must continue to do so. Offering new technology to customers is key. We need to be proactive and the first to arrive with the best technology for these applications. We'll be working with customers to drive costs down by implementing design and manufacturing changes. This encompasses the entire supply chain.

Finally, customer service is a general statement that I feel embraces "how we behave" toward our customers. It's what differentiates us from our competitors—things like being first with technology, rapid prototyping, immediate resolution of quality and delivery issues, partnering with them on cost reduction opportunities with suppliers, sharing in training initiatives—the list is endless, but is critical to our success.

TN: What current technical developments address the 2002 emissions regulations?

James Verrier: We are working on several technology developments. This is because our customers have different views on how to meet the standards. Our approach will be to work closely with them to make sure that we have the right solutions. VTG turbos, which will require additional design solutions, will be key for us. EGR systems of some kind will be necessary. Turbine and compressor wheel technology is also critical.

Overall, we are already well positioned to use the 2002 emissions issue as another way to show how we are successfully applying our strategy of product leadership.



TN: How are the markets for construction equipment, agricultural machinery, and trucks developing?

James Verrier: Each of the markets we compete in is slightly different, so I'll briefly cover each one. Let's start with the heavy-duty truck market: This market is still contracting in 2001, having rapidly declined in 2000 because far too many trucks had been built in 1999. We expect a slight recovery in late 2001, with a positive outlook for 2002 and beyond. This concerns BWTS business at Mack Truck, DDC, and CAT. Its impact on our CAT business is minor.

The market for medium-duty trucks is down from 2000 levels, and this segment accounts for a significant share of our business, mainly at CAT.

With regard to the off-highway equipment market, agricultural business continues to look bright after a good year in 2001—this is excellent news for us, since we do a significant volume of business with John Deere in this sector. Marine and construction business is flat, and this is also important for us, primarily at CAT.

The market for light-duty vehicles and SUVs continues to grow, although BW is not yet participating in it. We are actively pursuing strategies to enter this market.

TN: BorgWarner Turbo Systems is the second-largest manufacturer of passenger car turbochargers. Do you think a trend toward turbocharged engines will develop in the United States?

James Verrier: This is a frequently asked question; and I think the answer is that we will see passenger car engines in North America boosted by either turbocharging or supercharging, depending on the application.

The goals of reduced fuel consumption and reduced engine emissions will lead to downsized passenger car and light truck engines. The U.S. market will expect these smaller engines to retain the performance of their naturally aspirated predecessors.

For gasoline-fueled passenger car engines, the Big Three are evaluating both boosting options. Borg Warner Turbo Systems will be ready with the required technology—either turbocharging or supercharging. We expect large-scale production of such engines to begin in three to five years. Turbocharged diesel engines will follow within five years after that.

Turbocharged diesels will become the preferred option for light truck engines. It is now available for some light trucks, and continued steady growth is expected.

CAMPINAS MEETS HIGHEST QUALITY STANDARDS AFTER MODERNIZATION

Modern Times

Since the Campinas plant passed inspection in October 2000, all BW TS production facilities have been QS 9000-certified.

A celebration was held to launch production of the first K27 turbochargers for DaimlerChrysler in Brazil.

Since completing a thorough modernization process, the Campinas plant has joined the ranks of BW TS locations that live up to the highest international standards and offer certifiably premium products to customers. With manufacturing manager José Rubens Roque coordinating activities, the site optimized its production layout, brought its fleet of machines up to speed, and introduced team-based work and state-of-the-art assembly cells. The buildings were also modified to meet anticipated future requirements. Also new: Campinas now has its own aftersales market distribution center. To accomplish this overhaul of its facilities, Campinas availed itself of the BW TS Group's broad expertise and advanced quality system.

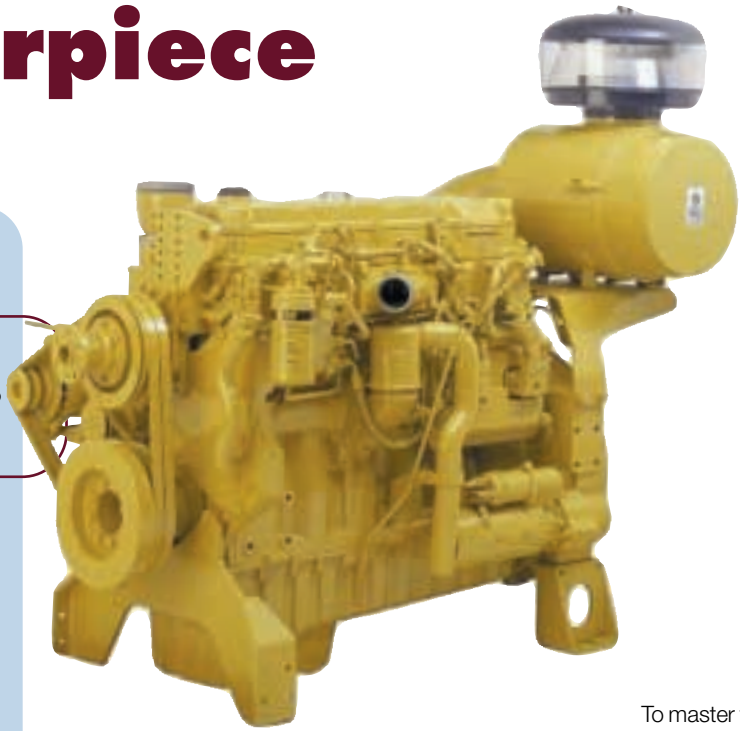
In 2000 the plant started manufacturing K series products, such as the K16 and K27 turbochargers. It also began supplying components to Kirchheimbolanden. To fittingly celebrate the first K27 turbochargers delivered to DaimlerChrysler in Brazil, employees of both companies got together for a party — thus helping to cement the working relationship between BW TS and DaimlerChrysler in South America.

Gaining certification under QS 9000 was an important step for ensuring continued market success in the face of increasingly fierce competition. The Campinas site passed the audit last October. This accreditation will also be a valuable credential supporting our efforts to develop new markets. Paulo Batista, in charge of quality management, stresses that Campinas meticulously adheres to the stipulated production processes and is now gearing up to win certification under the ISO 14001 environmental protection standard as well.

Now all BorgWarner Turbo Systems locations are QS 9000-certified — proof that BW TS meets the highest quality standards worldwide. No matter where BW TS products are manufactured, our customers can count on getting blue-ribbon quality.

CATERPILLAR ROLLS OUT A NEW PLATFORM WITH IMPRESSIVE PERFORMANCE

Masterpiece



Compact and powerful: the new C-9 with 275 to 335 HP.

In December, Caterpillar unveiled its newest motor, the C-9. An 8.8-liter, six-cylinder in-line diesel engine, the C-9 covers a wide range of applications to close the gap between the highly successful 3126 and C-10 models.

The release of the C-9 marks the latest highpoint of an ambitious development program that has seen a whole slew of firsts: the first engine designed entirely with in ProE, for instance, as well as the first application of the HEUI B fuel system and the smallest Caterpillar offering with a four-valve head and advanced cylinder block and head assembly. In many respects, this new engine takes strong cues from its larger, heavy-duty cousins.

The first models are slated to hit the market in the third quarter of 2001, and will cover the output range between 275 and 335 HP. The development of these engines was critical for keeping below the ceilings imposed by new, even more stringent rules on off-highway emissions.

Throughout the development phase, Caterpillar engineers worked with BorgWarner Turbo Systems engineers, who contributed their state-of-the-tech turbocharger know-how to help achieve the highest performance and durability goals ever defined for engines in this range.

To master this formidable challenge, BW leveraged its extensive experience with the proven S200 and S310 turbochargers.

The results are impressive. This engine boasts one of the highest power densities in its field, and promises to provide a solid platform for building models for an even broader range of applications in this sector. BorgWarner Turbo Systems has committed itself to contributing the latest in turbocharging technology to enhance the performance of the C-9.

ORIENTATION SEMINARS HELP APPRENTICES EASE INTO THE WORLD OF FULL-TIME EMPLOYMENT

Off to a Great Start

The seminars forged them into a committed team: BW TS apprentices, Class of 2000.

Committed employees with above-average qualifications are the pillars of any company that wants to expand its market leadership in technology and customer service. But that's not all. BorgWarner Turbo Systems also insists on — and promotes — team spirit and interpersonal skills among its employees. To help apprentices successfully transition to working life, BW TS holds two orientation seminars at the beginning of their training.

New apprentices in 2000 were invited to attend the first such seminar right at the beginning of their training period on July 31 through August 4 in the Youth House in Neustadt, a pictoresque town in southern Germany's wine-growing Palatinate region west of the Rhine. For the first time, BW TS planned and conducted this seminar completely on its own.

The main topics covered during this first week-long seminar were:

- The importance of getting to know, understanding, tolerating, and accepting all coworkers
- The expectations and concerns of the individual participants
- What is BorgWarner Turbo Systems, and what does it make?
- How does a turbocharger work, and what are its components?
- What ground will the apprenticeship cover, and what do the jobs taught entail?
- What rights and obligations does an apprentice assume by signing an employment agreement?
- How much importance does the company attach to environmental protection?
- What does "group work" mean?
- How can I reach my goal of successfully completing my apprenticeship?

Most of the topics were covered in small groups. The 13 apprentices then got a chance to put what they had learned to practical use: they were given the fun assignment of organizing and holding a barbecue for everyone present, working completely on their own. For this purpose, they were provided with a small budget and a tight deadline. To accomplish their task as specified, they had to plan everything very carefully.

In a subsequent feedback session, the young future employees reported that they had learned a great deal at the seminar, and that they had fully met the goal of getting to know each other better and having fun at the same time.

The second orientation seminar was held on October 9-13, 2000 at the Youth House in Speyer. The agenda items for this week were:

- Experiences at vocational school
- What learning methods can I apply?
- Automotive technology; what do VST and VTG mean?
- What does group work involve in practice?
- What is TPM?
- A visit to the Speyer Technology Museum
- An outdoor exercise in "teamwork"

The absolute highlight of the second seminar was the outdoor exercise. It took place at Trifels Castle, a restored medieval fortress on the top of a mountain, under the supervision of experts. Their assignment was to climb a 75-foot vertical wall. At the top, the apprentices had to hunt for „eggs" and, working as a team, bring them back down intact. They were offered a choice of two methods for bringing the eggs back down: by walking or rappelling. But all team members had to arrive at their destination together to successfully complete their mission.

Despite some trepidation, the group pulled it off. But only because they all took responsibility for and supported each other, and everyone stretched himself to the limit. The instructors concluded that the apprentices had been molded into a team over these two weeks of training, showing themselves to be tolerant people who are there when others need them. They learned a lot, and are now proud to be contributing to the success of BorgWarner Turbo Systems.

BW TS FACILITY COMPLETES 2000 WITHOUT ANY REPORTABLE ACCIDENTS

Indianapolis Earns a Safety Star

The BW TS Indianapolis facility held a special luncheon on February 2 for all employees to recognize their perfect safety record. Indianapolis had no OSHA-reportable incidents in the year 2000 and therefore achieved a BW safety score of 100.

Karl Walther, Brian Hogan, and Jerry Simon reviewed the record and expressed their thanks to the safety committee, the safety team, and all employees for contributing to this achievement. It was truly a team effort. In recognition of this accomplishment, each employee received a first-aid kit and a smoke alarm from the company. BorgWarner attaches very great importance to safety in the workplace.

BW TS presented its employees with a giant Safety Star cake to thank them for their contributions to workplace safety.

About This Publication

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