



## **BENDIX ADVANCES COMMITMENT TO ENVIRONMENTAL LEADERSHIP**

*A focus on technology, facilities reduces the environmental impact of the company and its customers*

Bendix Commercial Vehicle Systems LLC has been setting the industry standard for more than 80 years in the development and manufacture of advanced active safety and braking system technologies. The company is equally committed to industry leadership in preserving and protecting our planet.

Together with its joint venture, Bendix Spicer Foundation Brake LLC, Bendix CVS continues to develop technology solutions that promote cleaner air, reduce fuel usage, and ensure progress toward a new generation of cleaner vehicles. The company also fully supports the intent of the final rule issued jointly by the National Highway Traffic Safety Administration (NHTSA) and the Environmental Protection Agency (EPA) establishing a comprehensive Heavy-Duty National Program. The HD National Program is intended to reduce greenhouse gas emissions and increase fuel efficiency in commercial medium- and heavy-duty vehicles manufactured between 2014 and 2018. In addition to that proposed national program, Bendix stands ready to respond to legislation at the state level that reduces the amount of copper allowed in brake friction materials beginning in 2021. At the same time, Bendix continues to make green initiatives a priority in its facilities and operations.

### **HD National Program – Bendix Technology Solutions**

Bendix is driven to deliver environmentally friendly solutions that optimize vehicle performance, energy efficiency, and emission reduction. Among the solutions are an air management system, advanced active safety technology, and a tire management system. When integrating all Bendix technology solutions, a total fuel reduction of as much as 20 percent can be achieved, depending on vehicle configuration and fleet operations. These technologies support OEMs in their goals to meet the requirements of the HD National program

- **Air management system**

Bendix has developed a cost-effective air management package that offers significant environmental benefits to all engine types and OEMs. The package, consisting of the Bendix® PBS® Air Injection Booster, Bendix® Electronic Air Control (EAC) Dryer, and Bendix® Turbo-Clutch Air Compressor, enhances vehicle performance, reduces fuel consumption, and improves emissions. The technologies optimize the performance of all engine types, including those using Selective Catalytic Reduction (SCR), Advanced Exhaust Gas Recirculation (EGR), and other technologies developed to meet the federal EPA emission standards implemented in 2007 and 2010.

The groundbreaking **PBS air injection booster technology**, which Bendix introduced in 2009, is unique in the commercial vehicle industry today. The “smart” system is placed near the engine’s air intake system. It communicates with the Controller Area Network (CAN) and injects precise amounts of air from an auxiliary tank directly into the engine air intake system during certain acceleration events.

Bendix PBS technology enables vehicles to reach optimum engine speed faster – and remain there longer – than those without the PBS booster, yielding fuel savings. Vehicle testing shows that fleets can save up to 3 percent per vehicle in fuel with the addition of the PBS system.

In addition, engines equipped with the PBS engine booster can be tuned to produce less diesel particulate matter (PM) and nitrogen oxides (NOx). Lower PM can lead to fewer Diesel Particulate Filter (DPF) regenerations and potentially smaller DPFs – helping lower vehicle weight and

improving fuel economy. Lower NOx levels can lead to less DEF (Diesel Emission Fluid) usage in SCR systems and can also assist with meeting emission levels in EGR-based engine technologies. The Bendix solution is designed specifically to help all vehicle manufacturers reduce emissions, while improving engine performance and energy efficiency, regardless of the type of engine they produce and the emission-reducing technology they utilize. For fleets and owner-operators, this can mean cleaner running trucks and improved fuel economy.

The **Bendix® EAC Dryer system** is a compact, electronically controlled air treatment system that integrates the air dryer, unloader valve and multi-circuit protection valve. Its four primary functions are air quality assurance, pressure control, air distributions defined according to customer priorities, and information management. The sensors enable optimized system control, plus on-board/off-board prognostics. EAC replaces the governor mechanism in the air brake system, using software algorithms to manage air supply in the most energy-efficient manner. A commercial vehicle equipped with EAC technology can realize up to 1 percent in fuel savings.

The pneumatically operated, single-cylinder **Bendix® Turbo-Clutch Air Compressor** works in tandem with PBS air injection and EAC so that the compressor disengages during the portion of the duty cycle when no air is demanded. This highly reduces power consumption from the engine and increases fuel efficiency. As a result of the reduced overall cycling, the life cycle of the compressor significantly increases, and normal wear and tear is dramatically reduced. By itself, the Turbo-Clutch Air Compressor can bring up to 3 percent in fuel savings.

All three technologies working together can yield a 4-6% fuel economy improvement, depending on vehicle configuration and fleet operations.

- **Advanced active safety technology**

**Bendix® Wingman® Advanced™ – A Collision Mitigation Technology**, introduced in 2011, contributes to reduced fuel consumption. It is designed to deliver driver-friendly, forward collision warning and mitigation using full vehicle and braking system integration – whether or not the vehicle is in cruise control. In addition to the safety benefits, the active cruise with braking system portion of the system can help drivers stay in fuel-efficient cruise control mode longer – while helping drivers maintain a safe following distance behind the vehicle ahead – resulting in fuel savings as high as 10 percent, depending on fleet operations.

- **Tire pressure monitoring system**

The **SmarTire™ tire pressure monitoring system by Bendix CVS** monitors the pressure and temperature of each tire on a commercial vehicle to provide real-time, temperature-compensated tire pressure information to the driver or maintenance technician. Keeping commercial vehicle tires at proper inflation levels can deliver up to an additional 2 percent in fuel savings and maximize tire life.

- **Air disc brakes**

Air disc brakes can increase fuel efficiency by reducing vehicle weight. To meet the new federal reduced stopping distance (RSD) rules that took effect Aug. 1, 2011, trucks using foundation drum brakes require wider and heavier brakes. Trucks equipped with Bendix® ADB22X™ air disc brakes can offer a weight savings – up to 60 pounds per truck – over the wider drum brakes, while meeting RSD standards.

Bendix is committed to policies that enable the introduction of new technologies needed to support sustainable mobility. The company offers product solutions to help OEMs, fleets, and owner-operators meet the HD National Program standards.

## **Meeting State Copper Limitations**

Bendix has been proactively addressing the environmental concerns reflected in recent state laws passed in California and Washington that reduce the amount of copper allowed in brake friction materials beginning in 2021.

In March 2010, Washington became the first state to pass legislation in an effort to protect its waterways from the runoff of toxic copper brake dust. California's bill became law in September 2010. The California law mandates that brakes contain no more than 5 percent copper beginning in 2021. By 2025, the limit will be reduced to 0.5 percent. Washington's law is similar, with a 5 percent limit by 2021, and the establishment of an advisory committee to assess the feasibility of lowering the limit to 0.5 percent in subsequent years.

BSFB's lineup of Bendix® brand foundation drum brakes – available on a full range of OE models today – currently meets the new state mandates. All Bendix foundation drum brake linings contain less than 5 percent copper, making them compliant to the 2021 requirement. The company's drum brake lineup is also nearly 100 percent compliant with the more stringent 2025 copper restrictions. The majority of Bendix® air disc brake solutions contain less than 5 percent copper, making them 2021 compliant as well. Bendix is working to reduce the copper content in the small percentage of its disc brake solutions that would not be compliant to the future 2021 regulation. Disc brakes are semi-metallic and pose a greater compliance challenge for all manufacturers.

## **A Corporate Commitment to Green**

Along with technology development and support of national green policies, Bendix continues to advance environmental initiatives throughout its organization. At present, all Bendix manufacturing sites are ISO14001 certified. Growing scrutiny toward industry's effects on the environment has made conformance with ISO 14001:2004 more important than ever. ISO 14001 drives continual improvement in environmental performance and year-over-year reduction of each site's operational impact. It specifies requirements for establishing an environmental policy, determining environmental aspects and impacts of products/activities/services, planning environmental objectives and measurable targets, implementation and operation of programs to meet objectives and targets, checking and corrective action, and management review.

In addition, a new Knorr-Bremse global initiative – ECCO2 – facilitates constant improvements in our organization's ecological balance sheet. Launched in 2010, it requires every Bendix location throughout North America to 1) carry out a systematic assessment of their processes; 2) to find suitable ways of improving energy and resource efficiency; and 3) to define and implement appropriate measures that will benefit the environment but also contribute to the group's long-term competitive ability. The result has been a reduced environmental footprint, which benefits the communities Bendix calls home.

With an aggressive ongoing agenda for improvement, in 2011 the company reduced its energy rate consumption by 21 percent from the 2009 baseline, surpassing the corporate goal of a 20 percent reduction by the year 2014. As examples of the program's success, motion sensors were installed at the Bendix manufacturing facility in Huntington, Ind., that automatically turn lights on and off as needed in particular areas of the plant. In addition, air compressing equipment is in place at Huntington with ducts to capture the heat generated during normal operation. In summer, the ducts carry the air outside the plant, reducing the demand for air conditioning, while in winter the heat is used to help warm the facility. The company installed a higher-efficiency air compressor at the Bendix Spicer Foundation Brake facility in Bowling Green, Ky., and replaced the high energy usage (propane fueled) wastewater evaporators with a very low energy usage water-filtration system at the Bendix manufacturing campus in Acuña, Mexico.

Already a leader in diverting waste from landfills, Bendix – which had achieved a 71 percent diversion rate in 2010 – improved its effort with a continued focus on finding new ways to prevent plant waste from going into landfills. In 2011, Bendix diverted 5,482 tons of waste. All Bendix plants have instituted recycling of waste such as paper, cardboard, wood, and plastic. In 2011, the company recycled 5,290 tons of material.

Most of the waste diversion by Bendix is achieved through recycling, but the company has found other channels as well. Some waste from the Huntington plant goes to a power generation company that incinerates the waste and transforms it into an energy source. In Acuña, discarded desiccant from recycled Bendix air dryers is sent to a company that reclaims the waste material for use in producing cement.

In 2011, Bendix diverted 97 tons of waste to incineration for power generation, and 95 tons of waste was reclaimed for other purposes.

“From our facilities to our technologies, Bendix is committed to the environment,” said Joe McAleese, Bendix president and CEO. “The company believes in innovations that can lead to a sustainable future for everyone.”

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