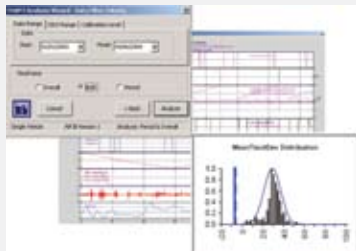




## Engine control analysis

**Mahle** Powertrain's Integrated Data Acquisition and Analysis service uses proprietary software to generate robustness metrics for powertrain controller software



and calibrations. High-resolution real-world customer usage data are recorded and post-processed with custom analysis routines, allowing transient and intermittent faults to be captured and related to instantaneous vehicle usage conditions. Trend analysis methods allow product development engineers to understand how systems behave over the operational life of the vehicle. This is particularly useful for onboard diagnostics monitors and adaptive parameters. Customer usage profiling ensures that durability and sign-off testing can be tailored to match conditions seen in the field. Graphical data presentation methods of key data points allow engineers and managers to determine system behavior quickly. The system has provided early detection of potential recall issues for various automotive OEMs.

## EGR valves

**Pierburg's** exhaust gas recirculation valves include medium-duty truck diesel engine applications. The valves are key components used to reduce environmentally hazardous nitrogen oxides. They do this by allowing some of the carbon dioxide from a vehicle's exhaust system to flow into the intake manifold and cool the combustion chamber that then prevents the formation of nitrogen oxide emissions. The valves feature increased durability, performance, and flow control characteristics. Their unrestricted cross-section is intended for high-throughput exhaust rates. The integration of contactless and thus largely wear-proof position sensors delivers benefits for precision valve positioning over increased life cycles.



## Fuel-injection system

The E1 Diesel Electronic Unit Injector (EUI) from **Delphi** is a lightweight and compact fuel-injection system designed to help heavy-duty vehicles meet Euro III and US02/04 emissions standards—with the potential to meet Euro IV and Euro V as well. A retooled version of Delphi's EUI 200, the E1's increased pressure capabilities, compact size, and reduced weight are among its key features. A smaller spill valve and actuator are incorporated in the body of the injector to improve packaging. Additional features include high-speed operation, electronic pilot injection, individual injector electronic characterization, reduced response time, and reduced noise.



## Advanced filtration

**Donaldson's** Endurance Plus diesel engine lube filter is designed to replenish engine oil additives and extend oil drain intervals. As dirty oil enters the replenishment container, a concentrated burst of additives is reintroduced to the oil. Continuing its normal flow to the



media cartridge, the oil passes through the company's high-performance Synteq filter, which then returns the clean oil to the engine. This process is intended to double oil life and reduce maintenance costs, and is best suited for EGR diesel engines.

## OHC technology

**Subaru's** EX Series Engines include four models with power ranges from 4.5 to 9 hp (3.4 to 6.7 kW) and use high-performance chain-driven overhead cam (OHC) technology in the industrial air-cooled market. They offer in-



creased power, easier starting, and quieter operation than same-class competitive engines. The chain-driven OHC technology allows the intake and exhaust valves to be positioned for optimum engine performance. This offers lower resistance for the air/fuel mixture flow. The engines are designed with an efficient pent-roof-type combustion chamber and can use a high compression ratio, producing higher power and torque while limiting exhaust emissions and fuel consumption. An automatic decompression system aids starts by reducing the required recoil pulling force by 30 to 40% when compared with overhead valve engine designs.



### Rubber sealing boots

Rubber dust boots developed by **Jefferson Rubber Works** offer protection for the continuous velocity (CV) joints that are used on large off-highway construction vehicles and heavy equipment. In off-highway equipment, the CV joint provides consistent driveshaft speeds regardless of the operating angle of the joint and requires proper lubrication to maintain functionality. Jefferson's rubber boots effectively maintain the necessary volume of grease to keep the joint lubricated while protecting against dirt and water in an off-highway environment where dust makes the joint more susceptible to failure.



### Excavator swing drive

The MZ mini-excavator swing drive from **Poclain Hydraulics**, based on the S series motor, integrates the functions required by open-loop circuits with closed centers. A flange-mounted manifold block ensures safety by providing improved braking control and reduced system feedback. The manifold block comes in two versions: for the 2- to 8-ton (1.8- to 7.2-t) excavators, stepped pressure valves smooth off the platform's accelerations and decelerations; for the 8- to 18-ton (7.3- to 16-t) excavators, a shockless function ensures precision at the end of a

swing movement. The MZ enables the operator to position the platform fast and precisely. As the motor's internal leaks are low, the platform does not drift. It generates little noise, which is important for the operator who sits less than a meter away from the motor. Displacements range from 172 to 2518 cm<sup>3</sup>/rev (10.5 to 154 in<sup>3</sup>/rev), and pressure is 250 bar (3626 psi).



### Swing attachment

Mounted between the dipperstick and bucket, **Helac's**

PowerTilt swing attachment provides up to 90° left or right bucket swing capability, dramatically increasing the versatility and productivity of backhoes and excavators. Instead of cylinders and their associated bushing, brackets, and pins, this system has a clean, compact configuration with no moving parts. It uses a sliding-spline technology that consists of a housing and only two moving parts—a central shaft and a piston sleeve. Through the use of sliding helical gearing, hydraulic pressure converts the linear motion of the internal piston sleeve into the shaft rotation that angles the bucket. A narrow configuration enables the use of all attachments normally used with the machine, even in the narrowest trenching buckets. A built-in coupler uses the machine's standard OEM buckets and attachments; an internal cross-port relief valve provides hydraulic overload protection.



### Vibration analysis

**Datastick Systems** upgrades its Datastick Spectrum software for PDA-based vibration analysis. The 1.5 version suits the company's VSA-1212 Vibration Spectrum Analyzer for predictive, conditions-based maintenance by providing vibration alerts, spectrum averaging, and low-frequency performance in vibration collection and analysis. The VSA-1212 hardware module snaps onto the back of a **Palm** OS PDA, while any standard off-the-shelf industrial accelerometer plugs into the module. The software provides a vibration severity alert-level system with color display of alerts. Features include a large, full-color display; peak hold facet that enables users to hold or average two, four, or eight captures; and an optional rugged case.

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### Single-gas detector

The **MSA Altair Pro** single-gas detector features one-button operation, a rugged design, and a replaceable sensor and battery. The unit measures the gas concentration or oxygen percentage; information is displayed on a large, backlit LCD. Alarms are indicated by flashing LEDs, an audible sound of 95 dB, and an internal vibrating system. The detector also offers standard data and event logging, field adjustable alarm points, impact resistance, and water and dust protection rated to IP67.



### Long-life battery

**EnerSys** PC2250 starting, lighting, and ignition battery lasts up to three times as long as conventional batteries, according to the company, and is maintenance-free. The 12-V battery offers a sealed design that requires no addition of water, and the terminals do not need to be cleaned or re-tightened after installation. Features include a six-year service life, two-year storage life at room temperature, 12-year float life design, rugged construction to prevent external corrosion and leakage, deep cycle operation, a reserve capacity of 240 min, mass of 86 lb (39 kg), cold cranking of 1225 A at -18°C (0°F), and a slow loss of power at end of life.

The battery is non-spillable and may be installed in any orientation on buses and RVs as well as in marine, agricultural, and construction vehicles.



### Oil sampling valve

The **Wear Check Oil Sample Valve** from **Fluid Line Products** extracts a sample of oil with the push of a button. The valve extracts samples from engine or transmission fluid and hydraulics fluids during continuous system operation. Double-seal construction and automatic positive closing ensure zero leak performance in return lines and blocks, oil galleries, and pilot circuits. The compact T-shaped design comes with a dust cover and connecting chain. A standard off-the-shelf product line is available.



### Linear positioning

**THK's** GLM20 complete single-axis positioning actuator offers high acceleration/deceleration and reduced noise and is capable of operating at speeds up to 4 m/s (13 ft/s). Type GLM20 provides 3000 N (674 lb-f) of continuously usable linear force and is available in strokes up to 4.4 m (14 ft). Sliders can be individually controlled, and use of a closed control with direct drive and an optic linear encoder achieves high accuracy without motion loss and backlash. Caged technology permits the actuator to operate with low noise levels of 53 dB and with reduced dust generation at high speeds. A water-cooled linear motor on an extruded aluminum base makes the actuator suitable for demanding automated systems applications.



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### Data acquisition

Smart remote CyMOD 7000 data-acquisition modules from **CyberResearch** communicate on ethernet, USB, and RS-232/422/485 networks. The line includes two eight-input models, expanded thermocouple and real-time data ranges, and improved strain-gauge support. Two I/O modules offer programmable power-on values and output slopes, while 12 feature inputs that also can be used as 16-bit counters, outputs, and LEDs. Eight modules are equipped with isolated serial converters and repeaters for mixing and matching RS-232/422/485 signals. Ethernet modules can assign an address to each RS-232 device they serve, enabling PCs to send commands and receive responses.



### Crane tire

The X-CRANE AT **Michelin** Earthmover tire is suitable for use on self-propelled all-terrain cranes used to build highways, bridges, and other heavy-duty projects. The tire is designed for cranes that lift from 35 to 600 tons (32 to 544 t) and travel over 50 mph (80 km/h) on the highway between job sites. Benefits of the X-CRANE tire include reduced machine downtime, minimized operational costs, decreased braking on wet surfaces, and improved handling. The tire also saves fuel by offering 7% less rolling resistance due to developed rubber compounds and tread design, and it features a 20% longer service life than its predecessor because of evenly distributed ground contact pressures that enable regular wear. The asymmetrical tread pattern is designed to decrease vibration and improve ride comfort.



### Variable displacement pump

The KVAA variable displacement pump from **Bosch Rexroth** matches the flow to the requirements of all the attached actuators. Compared to the fixed displacement pump, no excessive flow is generated that must be diverted to the oil reservoir with losses. This results in advantages including lower fuel consumption, smaller oil cooler, and improved fine controllability. Nominal sizes are 55, 80, and 107 cm<sup>3</sup>/rev (3.4, 4.9, and 6.5 in<sup>3</sup>/rev). Nominal pressure is 300 bar (4350 psi), and peak pressure is 350 bar (5076 psi). Controls include pressure control, load-sensing control, and stepless electric proportional control element. The pump is self-priming for open circuits. Flange and drive shaft is suitable for direct mounting onto the truck's auxiliary drive to the relevant European standards.



### Surface microphone

The Vibration Division of **PCB Piezotronics** offers Model 13A40, a 0.25-in (6.4-mm) pressure-type microphone. The prepolarized microphone does not require holders or stands but can be laid flat on its 2-in (51-mm) diameter rubber pad or adhesively mounted for sound pressure level testing. Suitable for drivetrain or NVH testing and measurements with limited space, the 13A40 features a sensitivity rating of 45 mV/Pa and a 20- to 15,000-Hz frequency range. The prepolarized design decreases the use of power supplies and cabling and operates from the same power required for the company's accelerometers, minimizing setup time.



### Position sensor

The TEX series of compact position sensors from **Novotechnik** offers stroke lengths up to 300 mm (11.8 in) and combines a housing size of 18 mm (0.7 in) diameter with pressure equalization. The company's differential pressure compensation technology equalizes the pressure that builds up from rod movement on linear sensors without allowing contaminants. Linearity is  $\pm 0.05\%$  with resolution greater than 0.01 mm. The series is equipped with pivot heads to provide a large angle of free movement that eliminates side-load errors. Designed to withstand harsh environmental conditions including humidity, oil, and dust, the TEX series features an operating life of up to 20 million movements.



### Color monitor for tractors

The **Case IH** AFS200 color monitor serves as the new user interface for AFS AccuGuide autoguidance systems in MX Series Magnum and STX Series Steiger tractors. The monitor has a 7-in diagonal LCD color monitor with an aspect ratio of 16:9 (wide screen). It offers a 64 MB USB Flash drive to download information, and soft keys for easy, functional navigation. The monitor mounts on the right-hand armrest for ease of use and fingertip control.

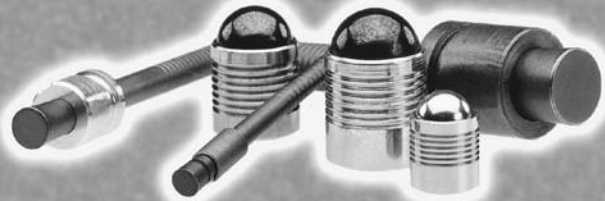
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- Diesel Emissions and Aftertreatment Devices: Designs and Durability
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