Optimization of the road surface quality made by asphalt pavers

- Application note for FLEETlog2 with android display
Main customer requirements for the DAQ system:

- Data logging system with access to engine ECU based J1939 protocol
- Analog and digital measurement inputs to measure asphalt flatness, feeder speed, and temperature profiles of gas- and electric-powered heating systems
- Ruggedized equipment for outdoor operation
- Small, compact, ruggedized and modular hardware
- Wireless data transfer – 3G modem
- Portable display system for online monitoring of equipment operators

The initial situation

Manufacturers of construction equipment for asphalt paving – like Caterpillar, Vögele, Volvo CE, Bomag, Eurova, and many others – are faced with similar customer requirements: an optimal road surface in terms of smoothness, hardness, noise, and long-term durability. If those requirements are not met by the construction company, high penalties may be the consequence.

The challenge

The development departments are continuously improving the performance of asphalt pavers. Customer requirements range from increased street output rates, lower fuel consumption, CO2 emission and asphalt processing temperatures to smoother road quality. The necessary features for perfect asphalt paving results are implemented with intelligent control software embedded in the equipment ECU (Electronic Control Unit). To validate and optimize the ECU control mechanisms and the overall equipment performance, IPETRONIK’s ruggedized data acquisition systems are the ideal solution.
The solution

Construction machine manufacturers measures the main parameters influencing the asphalt surface quality. IPETRONIK’s FLEETlog2 data logger was a perfect fit as the logger supports the protocol J1939, which has been widely adopted by diesel engine manufacturers. The combination with small digital and analog modules – e.g. the thermocouple sensor for temperature measurement, feeder and distribution systems for RPM and speed measurement as well as optical lasers and ultrasonic sensors – enables efficient surface smoothness measurement. With the integrated 3G modem, wireless data transfer is possible. GPS position and vehicle speed can be tracked with the NMEA protocol. On top of that, the system provides an operator tablet display solution to monitor the online measurements.

System sketch

![System sketch diagram]
The advantages

With this data acquisition system, the customer was able to validate and improve the machine performance. The asphalt output quality in terms of surface flatness and smoothness was significantly enhanced including optimized heating cycles and regulated feeder speed.

These are further optimizations:
- Significant improvement of asphalt surface flatness
- Optimized heating control for the screed
- Regulated asphalt feeder speed
- Optimized ECU control loops and system parameters for different paving programs
- Substantial financial savings due to better street quality