

Kontron and Intel on advanced in-vehicle computing - Mine | Issue 116

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“The key to transforming mining”: Kontron and Intel on advanced in-vehicle computing

Turnkey systems help improve the relationship between humans and machines, interpreting data close to where it is gathered to take action in near real-time, writes Kontron North America’s Jack London and Intel’s Andrea Thomas.

Increased demand for raw materials has mining fleet owners and operators pursuing new paths to increase productivity and yield without compromising safety and cost. At the same time, today’s abundance of data is fuelling innovations that are changing the trajectory of life as we know it, and industrial sectors like mining are no exception.

Robotics, artificial intelligence, deep learning, computer vision and edge computing are enabling more intelligent, connected heavy mobile equipment (HME). These developments, coupled with the bandwidth advancements of 5G networking technology, position the mining industry for a giant leap forward with in-vehicle, near real-time predictive analytics and near-instant communication between operator and machine.

Automation represents a massive shift, particularly in mining environments typified by incredibly diverse, long-lifecycle machines. Here, intelligent and connected aftermarket solutions for existing machinery reduce risk for fleet operators and owners. Turnkey plug-and-play kits are now available to transform standard trucks, dozers and excavators into semi- and even fully-automated vehicles.

It’s an advantage that should accelerate the shift, taking into consideration the cost, natural lifecycle and variation fundamental to HME fleets. It also means owners are investing in long-life systems that are usable for many years, compatible regardless of vehicle type and flexible enough to be re-installed in other vehicles.



Andrea Thomas, project manager of internet of things, cities and transportation. Credit: Intel

Streamlining automation

To work seamlessly across different types of machines and equipment, these systems must offer some key capabilities. Highly compact and rugged, they must tolerate shock and vibration, ingress of dust and water, extreme operating temperatures and overall rough handling. Some are in remote locations, far from the fleet owners, operators or maintenance crews.

Based on industry-standard components, these high-performance systems are backed by long-term product availability as well as flexibility. They feature data security and user safety options, with the potential to accommodate more powerful processors as they come to

market.

Most importantly, these small-footprint systems blend high-performance and rugged characteristics to interpret and analyse data in the vehicle, enabling immediate decisions and actions. The outcomes and records of these decisions are sent to the control centre. Only data that is not time-sensitive is sent, as required, via the cloud to data centres for archiving or further analysis.

This streamlined approach is the future of advanced telematics and automation needed in heavy mobile equipment. The value provided by powerful onboard computer systems means that vehicles no longer need a connection to the cloud at all times.

Computer operations for even the most complex use cases occur at the edge, with the cloud most often coming into play to send data for later analysis or archival. This frees storage space in the vehicle-based device and empowers fleet managers to provide feedback in real-time or near real-time when necessary.

Improving safety and productivity

Automation better connects humans and machines. Predictive analysis, for example, alerts operators to dangerous situations and equipment failures, while predictive maintenance increases and protects uptime. Operating costs benefit from more precise actions and responses, such as just-in-time analysis of engine parts or elimination of unnecessary maintenance rounds.

Workers can also be moved out of the most hazardous environments, aligning with zero-entry mining initiatives where no humans are physically present inside mine premises. Heavy mining equipment can traverse dangerous areas with gas build-up while human operators remain safely above ground.

Onboard automation also frees operators to focus on tasks more valuable than basic equipment operations, putting expertise where it is most needed in an employment landscape plagued by labour shortages.



Jack London, product portfolio and business development manager. Credit: Kontron

Future mining

Mining companies demonstrated early recognition of automation's capacity to mitigate danger and improve operations. One of [the latest Mordor market reports](#) supports the shift to automated mining equipment as a continued trend, predicting a combined annual growth rate of 35.38% from 2021 to 2026.

Autonomous mine vehicles allow the safe extraction of ores at depths inaccessible to humans. Profitability and mine lifespan increase as properties can be more deeply excavated, including steeply sloped walls where lower quality ores are commonly left behind.

Proximity detection, remote machine operation and optimised truck movement handled by above-ground operators at a safe distance are the kinds of operations improve worker safety as well as productivity and yields. Sensor data from longhole drill rigs ensures better depth, location and angle accuracy, driving better blasting outcomes.

These advantages also play a role in emerging economies, empowering faster viability of mines via automated machinery. Paired with smarter automation designs, cost-efficient and deployable across fleets, these factors will ultimately reduce market entry barriers for less-developed countries.

Heavy mobile equipment capable of amassing and applying data in real-time or near real-time can assess information and make decisions that complement the human experience. This evolution toward automation advocates not only leadership for manufacturers of significantly advanced systems but also increased safety, efficiency, economy and ecological compatibility.

Aftermarket automation technologies also play a critical role, offering flexible, reusable options that can be deployed fleetwide and upgraded as automation needs change and expand. It's not just comprehensive and efficient HME task automation that is key to more accurate decision-making by humans and machines, but also the real-world automation strategy capable of spanning the broadest range of costly equipment assets.

// Main image: Caterpillar dump truck. Credit: Masmikha / Shutterstock.com