BOOST SAFETY AND INCREASE MACHINE UTILIZATION
THROUGH AUTOMATION

Deeper ore bodies often mean less effective utilization of assets at depth. What if you could continue to operate through long shift changes and blast windows while also providing an effective safe mode of operation? Cat® MineStar™ Command makes it possible.

Command for underground applications enables remote operation of load-haul-dump machines — providing immediate productivity and efficiency gains while improving safety by removing operators from hazardous environments. Options range from simple line-of-sight to semi-autonomous operations. This building block approach allows you to capture value at an economic entry point while providing scalability as your site matures in technology adoption.

Command provides control of all operational functions utilized in the cab through seat-mounted joysticks in the remote operator station. It provides a real-time view of machine location and status through onboard cameras, along with guidance systems.

Command for underground combines machine guidance capabilities with mine infrastructure to enable automated tramming through mine drives and provides **three levels of operation.**

Guide Assist is the first building block of an automation journey. By adding teleremote capabilities combined with LADAR guidance and radio network infrastructure, operators can navigate unmapped areas while keeping the machine centered in the drive.

Copilot leverages Guide Assist onboard hardware and the use of an uploaded site map to provide situational awareness to operators.

Autopilot enables semi-autonomous machine operation (tramming and dump cycle), including Autodig, an autonomous digging and bucket loading function on select machines. Command allows the machine to auto tram, dump into fixed infrastructure, and return for the loading process. These advanced features allow for multi-machine control with a single operator.

Greater Safety

Command for underground allows mines to relocate operators to a safe, comfortable location underground or on the surface, increasing safety and reducing fatigue. It eliminates exposure to noise, dust, seismic activity and other underground hazards— and reduces the need for air delivery and cooling.

Increased comfort and safety can lead to improved employee retention and recruitment, helping to address challenges in finding a skilled workforce.

Dynamic Isolation

Command for underground leverages a dynamic isolation system to make it possible for autonomous, remote and manual work to happen within the same environment—boosting productivity by allowing multiple activities to continue without impacting autonomous operations.

Dynamic isolation allows the site to mark out certain areas on a level, and then continuously monitors the status of electronic barriers between these zones. The system uses exact machine positioning to determine which machines are entering, leaving or actively working in each zone. The system can be used to arm these smaller zones for autonomous operations and designate smaller areas as hold zones for autonomous machines— enabling personnel or staffed equipment to safely traverse other nearby zones and lock out other areas for staffed operations or maintenance — all without shutting down nearby autonomous operations.

Improved Asset Efficiency and Productivity

In addition to dynamic isolation, Command for underground improves the efficiency and productivity of the mining operation in a multitude of ways.

- Increases machine utilization by reducing the downtime required for shift changes, blast times, and other conditions that can remove operators from the face.
- Boosts productivity by allowing one operator to control multiple machines.
- Improves accuracy of tunnel navigation, boosting productivity and reducing machine damage caused by contact with drive walls for a reduction in machine downtime.
- Enables second-gear tramming for increased efficiency.
- Enables reduced fleet size by making it possible for a single machine to pull from the draw point and tram in second gear to the ore pass, eliminating rehandling and the need for another machine.

Quality User Experience

Remote operators benefit from three screens that combine to create a high-quality user experience. A primary display screen gives operators access to critical machine health and performance data. Another displays high-definition camera views that immerse operators into the environment where their machines are working. And the customizable strategic display allows quick map configurations that enable high productivity— from creating walls and identifying no-travel zones to making adjustments on the fly to keep production moving.

Reliability and Durability

We understand the physical challenges inherent in mining operations, and Command for underground is built to withstand them. Individual components are heavily validated, and systems are integrated to ensure reliability in the challenging underground conditions where mining machines operate.

Command for hauling also boosts the reliability of underground mining machines. It improves the accuracy of tunnel navigation, reducing machine damage caused by contact with drive walls. It also improves machine longevity, with the machine consistently operating to optimum parameters.

All Command solutions are supported by the Cat dealer network, a one-of-a-kind, on-the-ground support network that delivers expert service, integrated solutions, after-sales support, fast and efficient parts fulfilment, and more.

For more information, go to *cat.com/minestar* or contact your local dealer.