

Proximity Detection Powered Roof Supports

Over many years, as additional technologies have been introduced into longwall mining, the number of required longwall operators has been reduced. These longwall system technologies benefit the mines by allowing the mines to continue producing cost-effectively in an increasingly competitive environment.

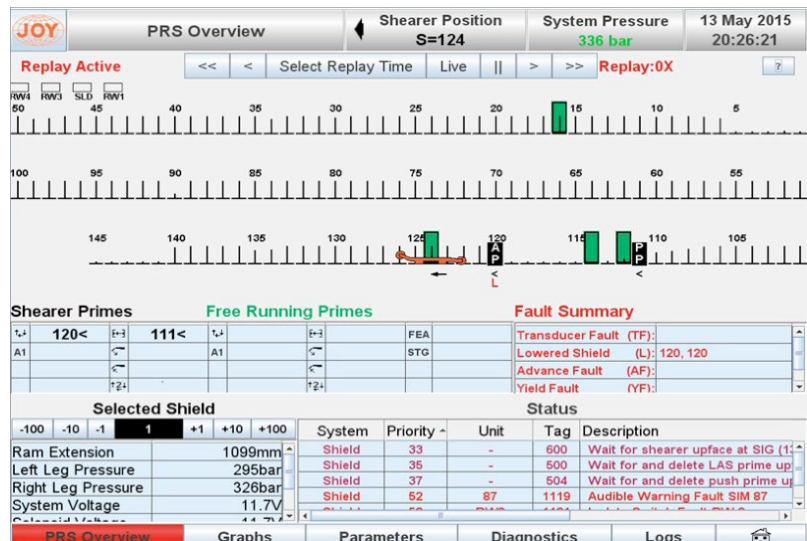
As automation took a larger role in the longwall mining process, operators could be moved farther away from the face, and farther away from the associated risks. However, fewer operators also means that an operator is not always visible to other mine personnel. This lack of visibility is of particular concern if an operator is injured by moving longwall equipment. Komatsu, a leader in longwall automation, recognized this risk and has created a technology designed to reduce injuries to longwall equipment operators - the personal proximity detection system.



Description of the system

Existing RS20s systems can operate personal proximity detection by having the mimic upgraded to the latest Faceboss version. All existing Faceboss PRS installations are personal proximity detection - enabled as the receiver which acts as the tracking tool is built in and no extra components are required on the roof support controls.

Komatsu's proprietary web-based user interface Longwall Information System (LIS) is utilized to set up the system and display live tracking information. Backed up with an archive server, historical tracking information is available for incident investigation and diagnosis.



Longwall Information System shows operators at 16, 112, 114, and 124 Supports

Operation of the system

An individually identified tag is worn by all personnel on the longwall face. As the tag is uniquely registered to the user, the system can track a person by name or specific job function. The tag, which is worn on the user’s belt, transmits radio signals and uses relative RF signal strength, as well as an accelerometer, to accurately locate the operator’s position, which position is then communicated over a dedicated Wi-Fi network to the Faceboss control system for the powered roof supports.

The radio signals transmitted by the individually identified tag are detected by the PRS mimic giving the wearer protection against automated advancing shields. Halt and warning zone parameters give the mine the ability and flexibility to configure the proximity detection feature to best suit their operators and cutting sequences. The personal proximity detection feature is designed to give the mine the reassurance that if an operator is detected within the halt headway of an advancing shield, the shield will be stopped and set to the roof. The Faceboss system already allows operators to pause and restart primes in order to safely pass a hazardous area. The same well-tested feature is utilized with the personal proximity detection system.

Safety standards and accreditation overview

The system which has been developed to a Safety Integrity Level (SIL) 1 standard, is designed to prevent powered roof supports from lowering and advancing if an operator is detected within the automation halt zone. As an additional feature, the operator is alerted by the Faceboss control system when the battery life of a tag is detected below 20% and then again at 5%.

IEC61508 SIL 1 Certified safety system
 Sira 13 ATEX Europe
 IECEx SIR International
 MSHA Approval United States

The PPD system is not PA approved.

Tag

The individually identified tag, also known as the personal wearable device (PWD) is supplied in a leather pouch for easy attachment to an operator’s belt. It is recommended that the operator fit the PWD to the front of the waist, as this will provide easy access to the PWD for quick visual checks, and personal comfort.



The PWD is powered by a rechargeable battery. Dedicated recharging facilities are provided on the surface of the mine. To reassure the operator that the operator’s PWD is fully-charged and operating properly the test station is used to both register the PWDs to the user and test their functionality. The large screen displays the status of the PWD, with any deficiencies found with the hardware or battery life being highlighted. The administrator also uses this surface test station to update personal information or specific job functions.

Tag ID	Name	Role	Battery %	Software	Status
AA182F	Imke	Maintenance Operator	100	Tip	X
AA2473	Timu_2473	Production Operator	100	Tip	✓
AA487F	DeanWood	Production Operator	100	Tip	✓
AA107B	AA107B	Unknown	100	Tip	X
AA1E0F	Mark2	Visitor	100	Tip	✓
AA302F	Marr	Staff	100	Tip	X

Surface tag set-up and test station: the operator’s name will be displayed in either the pass or fail columns on a large screen located on the surface.

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