RIP PREVENT

Analyze

Predictive analytics provides a host of potential benefits to the mining industry – for example, by using the data generated through mining operations alongside machine learning and AI to diagnose equipment failure hours, days, weeks or even months ahead of time.

The mining industry is facing a growing array of challenges, from volatile markets and tougher competition, to regulatory compliance and decarbonization, among many others.
Today many mining companies are already taking advantage of the significant cost, productivity and safety gains from the implementation of emergent technologies like drones, remote operating centers and autonomous trucks.

Technology innovation and artificial intelligence (AI) in particular, is already benefitting the mining industry in a wide variety of ways, from supporting the discovery of more financially viable mineral deposits to optimizing operations. There´s one are that's providing pivotal to providing actionable insights for the mining sector, and that´s predictive analytics.

SHG

SHG is a young, dynamic and innovative Company. From the beginning, our mission was to realize a cost-effective, scalable and industry-ready monitoring of belt conveyors, without the use of sensor elements in the conveyor belt. It is important for us to develop a quality product, build trusting relationships with our customers, and create a sense of community that connects our customers and our team.

We want to build a different kind of company that focuses not only on profits, but also on the satisfaction of our customers and our team, and on our personal growth along the way. Here are the values that guide our decisions and actions:

- Transparency and openness
- Sustainability
- Spirit of innovation
- Joy
- Reliability
- Trust

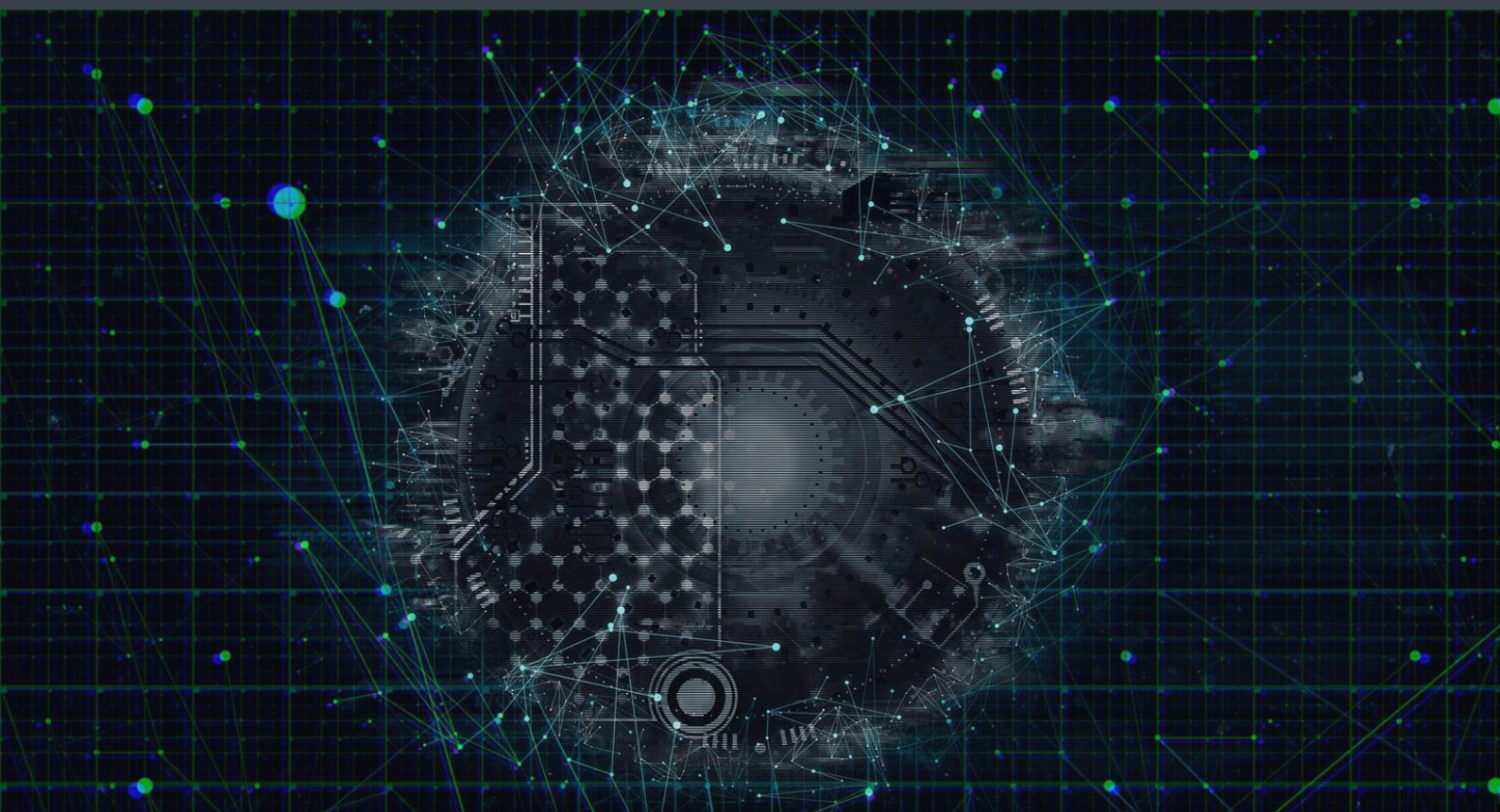
SHG belt monitoring system “Rip Prevent” helps to protect your investment, maximize the efficiency of your conveyor line and prevent a workflow interruption. We offer a new data driven solution to monitor the entire conveyor belt for a rip event detection. The data driven calculation model of the conveyor and the artificial intelligence enables an anomaly detection to detect changes in the production process and to detect rip events of the conveyor belt [1]. SHG supplies you with important data to help keep your operation up and running. SHG belt monitoring system generates a picture of the most critical event – the rip event – and based on the data driven model it is possible to detect the rip event before it even starts.

1: Anomalies and rip events will be detected by thresholds

Data Analytics

A huge amount of data is produced every day across modern mining operations. Much of this information is wasted – either unused or poorly implemented for providing insights to mine operators. With the right tools this data has the potential to help reduce unplanned downtime and setup a predictive analytic solution.
SHG uses data from the conveyor line for it´s AI based calculation model to detect the most critical failure event of a conveyor belt – the rip event.
Mining operators facing a future of dwindling resources and the challenges presented by deeper mines, rising energy costs, infrastructure shortages and skills shortage, there has never been more pressure to improve efficiency and cut costs.
A predictive maintenance approach can offer big savings. Deloitte analyzed that predictive maintenance can reduce mining operations maintenance planning time by 20-50% and overall costs by 5-10%

The Rip Prevent System helps the customer to prevent unplanned shut downs and to improve his conveyor line. Besides the Rip Prevent solutions SHG is still developing solutions to reduce unplanned shutdowns of conveyor lines, increasing the energy efficiency of the conveyor line to reduce operating costs for the customer by analyzing the conveyor data.



Rip Prevent System

Our web-based monitoring technology can be accessed via an Ethernet network connection, making it available to multiple users if necessary. The system is completely offline to provide not a point of attack for hackers, so that the production remains protected from outside access. The user-friendly interface features an easy to understand dashboard.

Functionality

The Rip Prevent System is analyzing the data from the conveyor with an AI based calculation model and it needs the following input data:

- Electrical Power
- Mass flow
- Conveyor Speed
- Idler dimensions
- Belt dimensions
- etc.

In case of a rip event or an anomaly the Rip Prevent system generates based on conveyor specific thresholds an output signal which the customer can implement in his PLC to automatically stops the conveyor line also even before the critical rip event starts. The calculation model is computing the data 50 times per second and it is able to generate a signal to the PLC system in less a second to minimize the rip event as much as possible.

Application Field

SHG Rip Prevent System can be installed in mining and industrial applications to detect anomalies and rip events in every conveyor belt also in special belts. The Rip Prevent System helps the customers to minimize the damage associated with longitudinal rips. By stopping the conveyor belt upon detection of a longitudinal rip event, the system limits the damage associated with these events and can save customers millions of dollars what would be spent on downtime, conveyor belt replacement, conveyor repairs and clean-up efforts.

The data driven calculation model of the Rip Prevent System has a huge advantage over inductive, magnetic and laser based systems, because the data driven calculation model has no risk of wear, is suitable for all conveyor belts, it has low investment costs and based on the AI it is able to

Advantages

- Suitable for all conveyor belts
- No sensor loops or other sensor elements inside the conveyor belt necessary
- No risk of wear
- Suitable for each cover ratio
- Low investment costs
- Extendable through Add Ons

Installation

The installation oft he Rip Prevent System is easy and takes approx. 30min – 1h.The installation procedure is shown below:

1. Determination oft he installation position
2. Mounting the Rip Prevent system at the wall or in the electrical cabinet
3. Connect pre-assembled current transformers
4. Connect PLC inputs and outputs
5. Connect power supply
6. Switch on the system

For installation, the conveyor system must be de-energized for approx. 30 min that the reference voltage and the cable transformers can be installed safely.

Commissioning

After successful installation, commissioning is performed according to the commissioning protocol. The commissioning process is as follows:

1. Input of system parameters
2. Starting the conveyor without loading and entering the parameters
3. sSart the conveyor with full load and enter the parameters
4. Start the conveyor with approx. 50% load and enter the parameters
5. Set threshold values for the individual functions
6. Define IT information such as TCP/IP
7. Performance verification - testing of relays and acknowledgement of switched relays from the control station as well as via the dashboard

Commissioning takes 2h to 5h, depending on the preparatory work and the available system parameters.

Integration into the PLC

The system is designed to provide optimal connectivity to the conveyor PLC. To make this simple, the Rip Prevent system has 3 relay outputs which are used to provide various status information to the PLC. The information to be transmitted can be individually defined by the customer according to a matrix. This gives the customer the maximum possible degree of freedom when integrating the system into the PLC. Following is a small excerpt for the matrix:

Event	Relay 1	Relay 2	Relay 3
Rip Event	-	-	X
Anomaly Detection	-	X	-
Drive failure	-	X	-
Overload	-	X	-
Maintenance Recommendation	X	-	-
Condition Monitoring	X	-	-

The relays can be acknowledged from the control station via digital inputs. Furthermore, the status of the relay can also be acknowledged via the dashboard as soon as the fault has been rectified.

Technical Details

Belt Width:	600 mm – 6000 mm
Belt Velocity:	up to 12 m/s
Belt Type:	EP, ST and special belts
Temperatures:	-20°C to 55°C
Humidity:	20% to 90% RH non-condensing
System Output:	3x Open Relays (max. 250V 6A)
	1x Ethernet TCP/IP
	1x Analog Output 0…10V max.28mA
Input Power:	88 – 264 VAC
	125 – 270 VDC
IP Class:	67
	69K possible on request
Conformity:	CE, UL, RoHS, (ATEX on request)
Dimensions:	300 mm x 330 mm x 120 mm

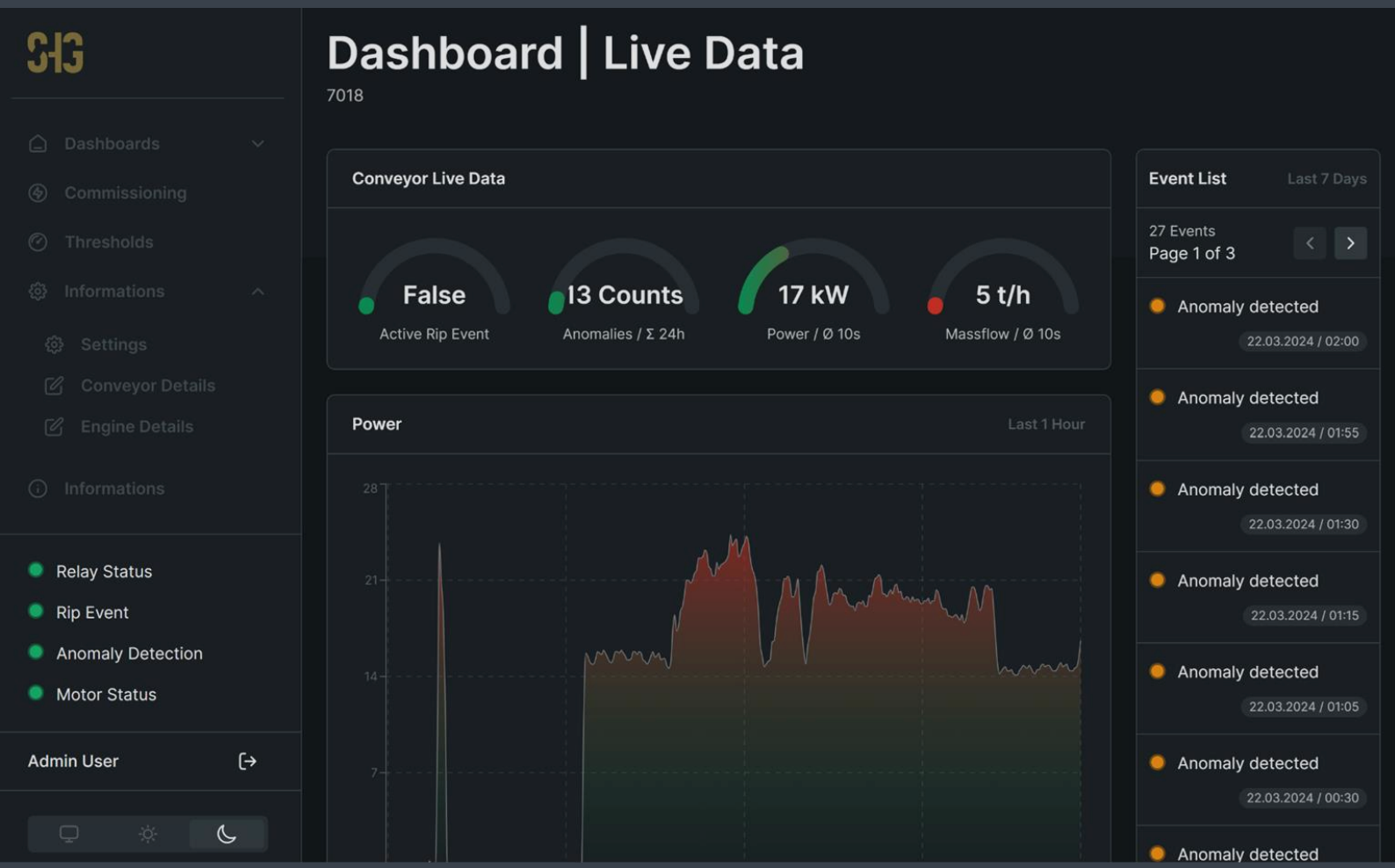
Dashboard

SHG developed a simple and easy to use Dashboard for the customer to have the main information´s at first sight.
On the main screen the customer has the most important information´s of the Rip Prevent system.

- Rip Detection Indicator
- Up and Downtime of the Conveyor
- Anomaly Detection Signal
- Rip Detection Signal
- Event List
- Utilization

The Rip Detection indicator shows the customer in an easy way whether he has to expect a rip event or not. The utilization is an indicator how effective the conveyor is running.

Subpages allow the customer to track selected anomalies or rip events based on the data the system collects and analyses.



Add Ons

Add Ons
Free add-ons are continuously being developed for the Rip Prevent system so that the system monitors your conveyor in an optimized way and fully complies with the Predicitve Maintenance approach.

The add-ons that are available or about to be launched include the following:

Drive Monitoring
Here, the system analyzes high-resolution electrical parameters through the installed sensor technology and performs complex calculations in the background so that a motor failure can be detected at an early stage. This also includes, for example, untypical heat development of the motor.

Massflow Calculation
Based on the data analysis, it is possible to infer the mass flow with an averaged bulk density, so that the Rip Prevent system can provide the customer with information about the mass flow. Furthermore, overloading and overloading can be detected.

Condition Monitoring
In the local database on the system, data from the last 5 years can be stored in high resolution, so that a full analysis of the condition of the entire plant can take place using AI.

By means of the historical data, an optimal condition can be realized in order to reduce the energy demand, if necessary, or to detect wear events at an early stage.

Energy Efficiency Improvement
The goal of energy efficiency improvement is to realize the optimal power requirement per conveyed tonnage, so that the conveyed tonnage has low costs. By optimizing the energy efficiency of the conveying system, the energy demand and thus the CO2 emissions for the transport can be reduced. Furthermore, individual components can be analyzed by means of our technology, so that the energetically best components can be used and a return on investment calculation can be realized.

Maintenance Support
By means of a database that looks at the individual system components and the parameters entered by the customer, it is possible to take recurring maintenance measures so that the conveyor system is optimally maintained.

Electrical Network Analysis
The electrical network is important for every plant operator. Quality problems in the electrical network lead to interference, so that the components are overloaded and there is increased wear. Through a near real-time analysis of the network, anomalies can be analyzed and corrected through targeted measures so that the components are optimally loaded.

Benefits

The right Investment

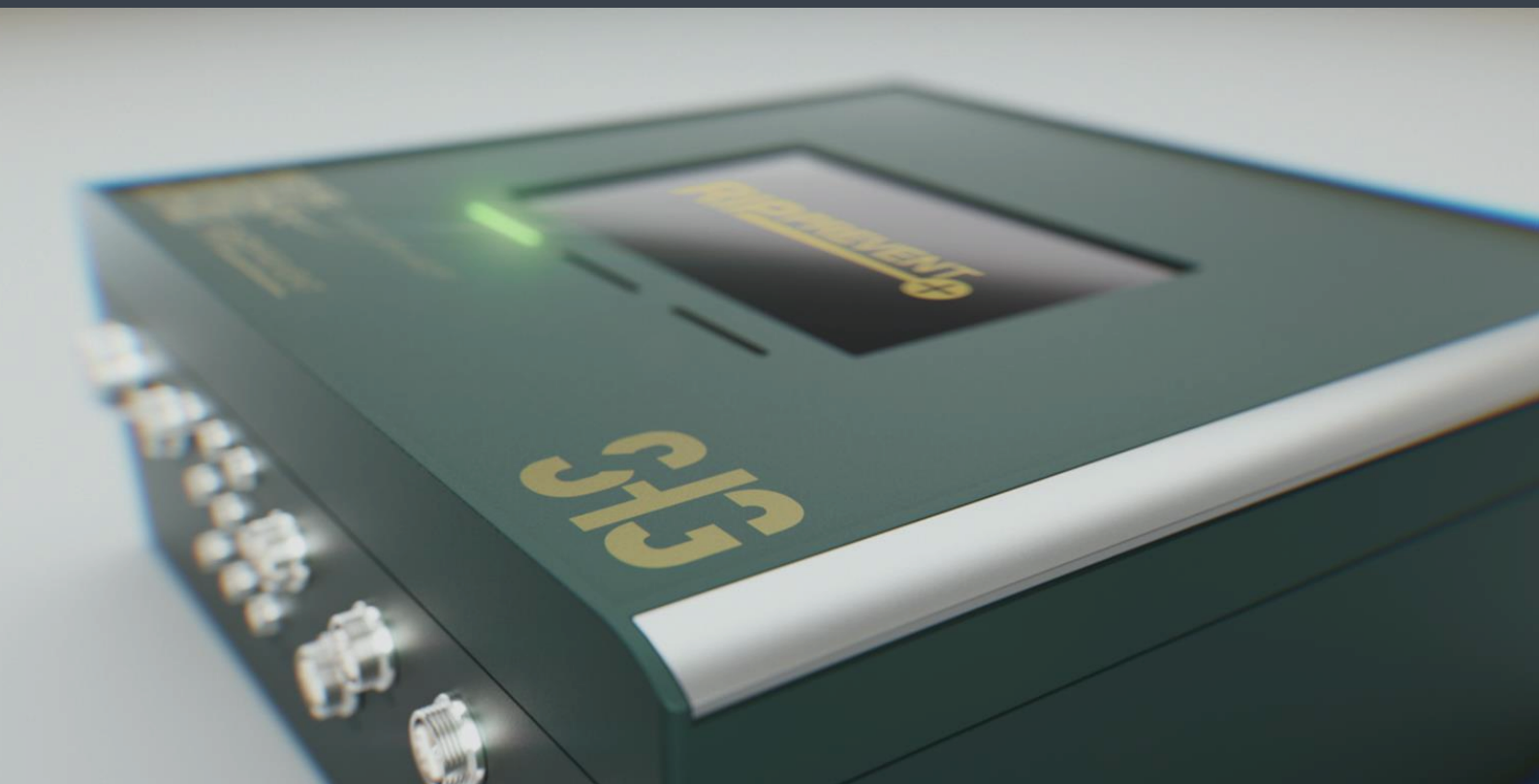
The goal in developing the Rip Prevent System was to create a system for the end user to monitor the most important components and operating parameters of a conveyor system – belt and motor. For a small monthly investment, the end user gets a wide range of functions in just a single system.

- Rip detection and preventive rip detection
- Anomaly detection
- Drive monitoring
- Mass flow calculation
- Condition monitoring
- Energy efficiency improvement
- Maintenance support
- Electrical network analysis

Data Analytics makes it possible to implement all functions and to offer on the one hand relevant safety functions such as monitoring the belt and the drive and on the other hand to optimize the processes and perform predictive maintenance, so that the operating costs are reduced continuously with increasing data quantity to an optimum.

With its many functions, the Rip Prevent system combines many functions in just one system and besides this it has a new service approach for monitoring systems. Due to the low monthly investment, SHG offers the following service guarantee:

- Lifetime hardware warranty
- Lifetime software updates



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