

GLOBAL MINING REVIEW

OCTOBER 2019
VOLUME 2 ISSUE 4



KOMATSU



CONTENTS

- 03 **Comment**
- 05 **News**
- 10 **Industry View**

REGIONAL REPORT: ASIA PACIFIC

- 12 **Trends And Threats For Asia Pacific Miners**
Peter Bryant, Clareo, USA.

SPECIAL REPORT: PRECIOUS METALS

- 18 **What Lies Ahead?**
Ryan Cochrane, CRU, UK.

UNDERGROUND DRILLING

- 23 **Creating An Impact**
Audrey Beurnier, Aramine, France.

ROOF & GROUND SUPPORT

- 26 **Something In The Air**
Tony DeGuseppi, King Shotcrete Solutions, USA.
- 31 **The Art Of Safe And Efficient Bolting**
Andre Mendes, ThoroughTec Simulation, Canada.

SHOVELS, EXCAVATORS & DRAGLINES

- 35 **Transforming Minerals Processing And Handling**
Jaakko Lipsanen, ALLU Group Oy, Finland.
- 40 **Data: Staying In Shape**
Sarah Lispet, Hitachi Construction Machinery, Australia.

TRUCKS & TYRES

- 44 **Swapping The Old Ways For A Circular Economy**
Dan Allan, Kal Tire's Mining Tire Group, Canada.
- 47 **Nip In The Bud**
Rekha Kapadia and Greg Desrosiers, Key Maintenance Technologies, Canada.

FUELS & LUBRICATION

- 51 **Grease Is The Word**
Bret Jenkins (Whitmore®/Jet-Lube®, USA) and Michael D. Holloway (5th Order Industry LLC, USA).
- 55 **Driving To A New Level Of Success**
India Hester, Rio Tinto, Australia.

CONVEYORS & DUST CONTROL

- 57 **Safety Matters**
Laura Hoggan, REMA Tip Top, USA.
- 60 **Working Around The Clock**
Markus Luoma, Nepean Conveyors Oy, Finland.

LITHIUM

- 65 **The Power Of Lithium**
Henk Van Alphen, Wealth Minerals, Canada.

FILTRATION, LEACHING, WASHING & SEPARATION

- 69 **Thirsty For Sustainability**
Rodrigo Gouveia, Metso, USA.

WATER MANAGEMENT

- 73 **Combating Mine Effluents**
Alex Drak, Roi Zaken Porat and Tomer Efrat, IDE Technologies, Israel.

DOMES, STOCKYARDS & SILOS

- 77 **Stockyard Operation And Latent Capacity**
Justin Willis, Andvare, Australia.



ON THE COVER

Jobsite optimisation is the ultimate goal of an autonomous haulage system (AHS). To achieve this, connectivity and networking between machines and digital site plans is essential. Komatsu dedicates a significant portion of R&D efforts to open data platforms that enable global collaboration and enterprise wide optimisation. Komatsu's industry-leading AHS solution also offers interoperability between manned and autonomous trucks leveraging essential components: FrontRunner for machine operation and guidance; and DISPATCH for fleet management, location tracking and production optimisation. To learn more, visit: <https://www.komatsuamerica.com/autonomous-haulage-system>

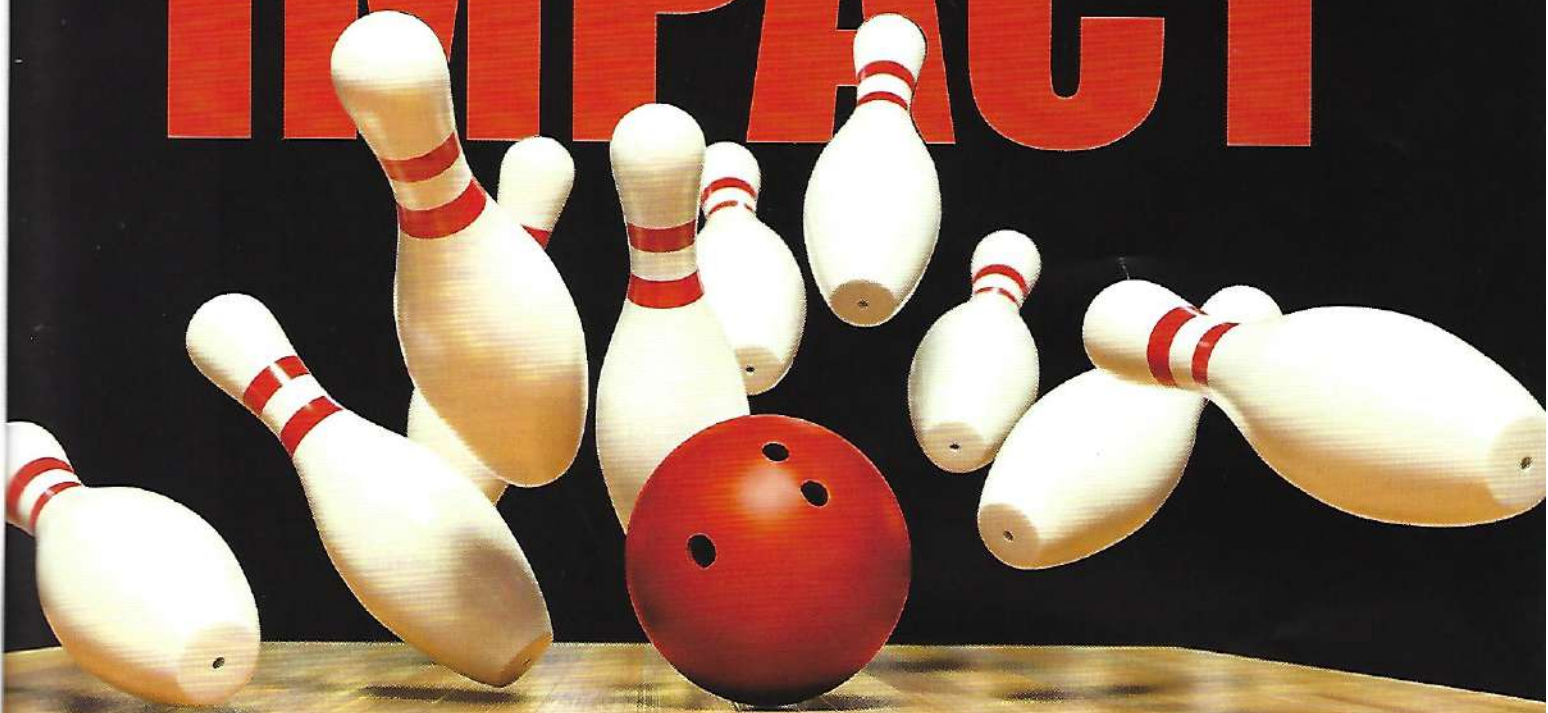


Global Mining Review is a fully-audited member of the Audit Bureau of Circulations (ABC). An audit certificate is available from our sales department on request.



Copyright © Palladian Publications Ltd 2019. All rights reserved. No part of this publication may be reproduced, stored in a retrieval system, or transmitted in any form or by any means, electronic, mechanical, photocopying, recording or otherwise, without the prior permission of the copyright owner. All views expressed in this journal are those of the respective contributors and are not necessarily the opinions of the publisher, neither does the publisher endorse any of the claims made in the advertisements. Printed in the UK.

CREATING AN IMPACT



Audrey Beurnier, Aramine, France, considers the impact of the mechanisation process on a Southern Filipino mine's drilling methods.

About 1 year ago, a small gold mine located in the Southern Philippines decided to optimise productivity. The mine had very narrow sections to follow gold veins closely and reduce the dilution to a maximum, which compelled the miners to hand drill. The mine director said that their staff found the hand drilling exhausting, and consequently sought a solution that could reduce the physical demands of the task while increasing productivity.

Whether for explorative drilling or development drilling, there are still plenty of mines around the world that use manual techniques. These methods present different safety challenges because of the close proximity of the worker to the drill, and the vibrations endured by the operator.

The director explained that these vibrations are difficult for the different operators' bodies to sustain, which is why it engenders a high rotation of people on this task. A study conducted by OPPBTP in 2016 proved that the level of vibration endured by an operator's arms and hands in 1 day is approximately 2.5 m/sec.², and the hand drilling task causes vibrations on the operator between 11 - 30 m/sec.².

The project

Aramine was asked to deliver a mechanised narrow drill rig that was easy to operate and maintain. A proposal was made for the Aramine D130D miniDriller® – a machine based on the miniLoader frame so the inventory of parts is easier for the mine. The company's R&D



Figure 1. Testing the Aramine miniDriller D130D.



Figure 2. Aramine miniDriller D130D.



Figure 3. Aramine miniDriller D130D before leaving Aramine South of France workshop.

department used the basis of the miniLoader and integrated the necessary components for drilling, such as the air compressor, water pressuriser, drifter lube system and drilling control. The drill rig designed in France is simple to operate and adjust, and can be used in galleries with sections from 6 - 14 m².

"We have integrated a comfortable seat with important suspensions to minimise significantly the vibrations," said Sylvain Reynier, the company's R&D Director.

Safety of the operator was also a big concern of the Filipino mine, which is why the miniDriller must follow strict regulations of safety and must, for example, include a roll-over protection structure/falling object protective structure (ROPS/FOPS) canopy. The canopy was a pressing issue for the director due to concern that mechanised drilling could cause more falling blocks than hand drilling.

A remote control for drilling was also included, which allowed the operator to be approximately 3 m away from the machine, and in doing so, resolving the issue of proximity. In addition, it took into account the extremely difficult maintenance conditions faced in narrow vein mines during the machine's development and the choice of the different spare parts and components.

As hoses are subjected to immense pressure, it was decided that extreme safety measures should be taken for the hydraulic hoses and electric harnesses. The goal was for it to be unnecessary for the user to repair the machine while it is working, so it was important to over-size the components and hoses.

The machine was delivered in the mine with a technician to start it. The first step was to check if the mine had the necessary ventilation and adequately conditioned air inlets to welcome new diesel equipment. However, the working team realised that the mine entrance was too small to let the machine in. This caused complicated logistics when it came to conveying mechanised material, but fortunately it is a common issue in mines around the world. The driller was designed to be easily assembled and disassembled in order to overcome the difficulties of small entrance or small path in the mine. The technician had to disassemble the machine at the surface, then lower small modules in the mine where they were reassembled and welded.

The technician started the training with a reminder of the basic rules of safety for using such a machine, such as staying away from the area of evolution, staying visible to the driver of the drill and wearing ear protection.

Operator training is a key step for mechanisation. It can be difficult for an operator accustomed to hand drilling to start using a machine, because they must learn how to control the machine with fewer sensations.

Reynier stated: "It is really important to accompany the operator in the startup and the handling of the machine. Indeed, the failure of the mechanisation process setup is more often due to a problem of the operators' competences than due to a machine problem."

After a week of startup and training, the mining operators were ready to use the driller.

Before the mechanisation, the drilling of a face required two jackhammers and the presence of three miners to cut 1 m per shot, but with the machine they were able to reach between 2.8 - 3 m in quick time.

Narrow vein: challenging machines

The biggest challenge when designing a drilling machine for narrow vein mines is to make it as compact as possible while keeping the components easily accessible for maintenance. But compactness should not come at the expense of easy maintenance.

When choosing components for narrow vein machines, engineers must think 'reliability', 'compactness' and 'accessibility'; the placement of components in the machine must be optimised, which is a crucial step for making the machine as compact as possible. As an example, the distributors will be placed as close as possible to the cylinders to limit the size and number of hoses used for cylinder supply.

Therefore, it is possible to simply have fewer and shorter hoses and increase their reliability. In this case, the components would be placed closer to their area of operation.

The process of mechanisation

During the process of mine mechanisation, the operators who drive the drills will not be used to handling technical machines. Typically, they will be in the habit of feeling their manual tools while working, whereas with a drilling machine the information comes from different indicators. This is why the machine must be easier to use and adjust; the drill rig must be extra reliable while considering the ergonomic potential of the machine to facilitate manoeuvring inside the mine.

Although a drilling machine does not need to go back and forth in the mine as much as a loader could, it must be ergonomic, handy and easy to manoeuvre to facilitate its moves from one front to another in reduced galleries.

Reynier added: "We are working on a fully electric version, with a battery module for moving and a cable module with reel to connect the machine to the mine's electrical network for drilling. This machine, associated with our battery loaders, will finally stop all gas emissions due to diesel in the mine. A step forward, all the more important in narrow vein mines."

Conclusion

The important thing for a mining company, as for any business, is to make profit. The mechanisation of the mine is a decisive step to increase productivity while improving working conditions and reducing labour and fatigue.

Nevertheless, it should be noted that it must be done with good support to train skilled workers to maintain and operate the drill rigs.

The machine should also be chosen carefully to be easy to maintain and operate in order to successfully achieve the complete mechanisation of the mine. **GMR**



**SOME THINK
RAW MATERIAL
TRANSPORT
REQUIRES A
COMPLEX INFRA-
STRUCTURE.
WE THINK
DIFFERENT.**

Mined raw materials travel along extensive transport routes. Overland and pipe conveyors are an energy efficient, reliable and environmentally friendly way of transporting the commodities over long distances to the plant or storage area. We customise the curved belt conveyors to overcome any challenging topographical circumstances. This minimises the transfer points and the number of systems and reduces investment, operational and maintenance costs.

For more information visit www.beumer.com

**MADE
DIFFERENT**