

Technologies for sensitive and safe scaling in underground mining



... since 1968

EPAUS
...the people who care

HERMANN PAUS MASCHINENFABRIK GMBH

TECHNOLOGIES FOR SAFE AND PRODUCTIVE UNDERGROUND MINING – CAMARA ALEMAN, PERU

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| PAUS MINING & HISTORY |

FAMILY OPERATED COMPANY WITH TRADITION!

Paus is a family company, operated in the second generation, which designs and produces underground mining equipment. Our company can offer you:

- ✓ More than 50 years of experiences in machinery design and production
- ✓ Quality - Made in Germany
- ✓ Specialist for mining since 1974
- ✓ Solutions which will fit to your demands
- ✓ The feeling of understanding
- ✓ With every aspect in good hands



| PAUS PERFORMANCE |

Paus does not only convince with his vision and corporate principles:

- ✓ Transparency
- ✓ Excellent
- ✓ Appreciation
- ✓ Products “Made in Germany”
- ✓ Proximity to our customers
- ✓ Sustainable customer and supplier relationship
- ✓ Etc.

We think about the future!



| PAUS IN PERU |

PAUS AND FERREYROS – A LONGTERM PARTNERSHIP

Since 2011 Ferreyros distribute with Paus equipment in Peru. The machine design is specially adopted to the rough conditions in Peruvian mining market. This is what we can give to our customers:

- ✓ Knowledge about Peruvian mining sector and mining conditions
- ✓ Stock machines
- ✓ High spare parts stock in Peru
- ✓ Excellent service



| PAUS SERVICE |

Our service is top, because we are always the right partner or we have the right partner worldwide to solve your problems. We convince through:

- ✓ Motivated and excellent trained service personal
- ✓ Mining experts
- ✓ Online spare parts catalogue with worldwide access
- ✓ High spare parts availability
- ✓ Training on mine sites



| PAUS | MADE FOR MINING



| SCALING |



| SCALING IN UNDERGROUND MINES |

DEFINITION OF SCALING

Scaling, the removal of loose rock from the roofs and walls of a mine by manual or mechanized means, may be necessary during any stage of mining.



| SCALING IN UNDERGROUND MINES |

SCALING SKILLS

Scaling is one of the most dangerous jobs in the entire mining process. This is the reason why only the most experienced miners can do this job perfectly.

- ✓ Requires experience in use with tools or machines
- ✓ Requires knowledge in geology and rock mechanics
- ✓ Requires instinctive feelings for working with heavy duty machine
- ✓ Requires systematic approach and constant securing of galleries adapted to the changing conditions
- ✓ Requires excellent illumination especially in high galleries
- ✓ Requires sensitive energy input

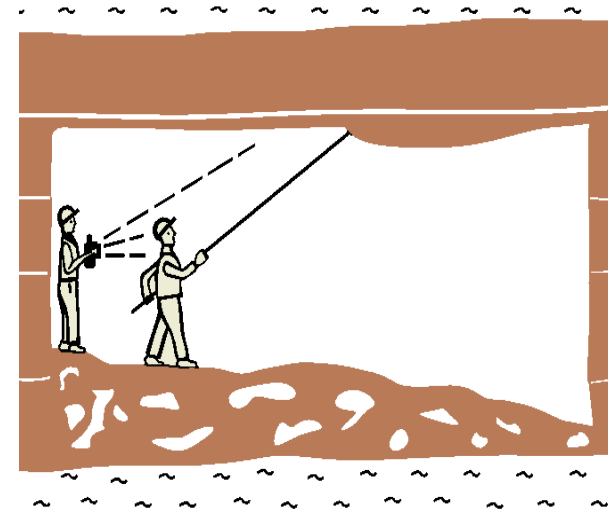


| SCALING IN UNDERGROUND MINES |

MANUAL VERSUS MACHINE

In South America a lot of scaling was done with scaling bars in the past. Nowadays more machineries are used to be more productive and more safe.

- ✓ Hard, unilateral physical exercise
- ✓ Miners work directly in hazardous areas
- ✓ High risk of accident due to fatigue, bad illumination, misjudgment of situations and working on uneven surface
- ✓ Less efficient and slow in operation speed
- ✓ Galleries with high altitudes requires platforms to reaching scaling area



| SCALING IN UNDERGROUND MINES |

MANUAL SCALLING

Manual scaling is :

- ✓ Unsafe
- ✓ Unproductive
- ✓ Uneconomical
- ✓ Forces a lot of injuries and missing working days



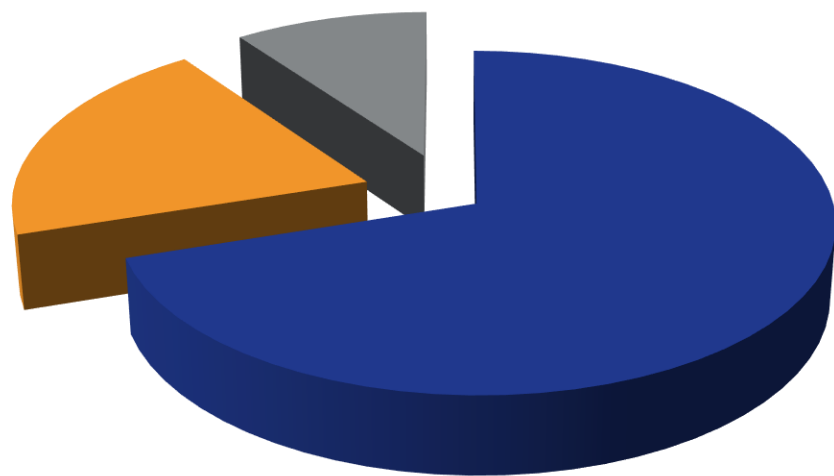
| SCALING IN UNDERGROUND MINES |

SCALING IN PERU

- ✓ From 2000 to 2007 there were 433 fatal accidents with 499 fatal victims in Peruvian mining industry and the majority of these accidents were caused by rockfalls in underground excavations
- ✓ IN 2019, there were 37 fatal mining accidents in Peru, which accounted for a total of 40 deaths. That same year, another 1,196 accidents left people badly injured or incapacitated, while 3,242 light accidents were reported.



| SCALER POPULATION|



■ Latin America 70 % ■ Europe 20 % ■ GUS 10 %

Total > 250 units working



| SCALER |

PRODUKT-HIGHLIGHTS

The Paus Scaler gives new standards in puncto safety, mobility and productivity in scaling. The highlights are:

- ✓ Highest safety standards for scaling in underground mining
- ✓ Compact machine with high working range
- ✓ Robust chassis with articulation and hydrostatic all wheel drive
- ✓ Sensitive and selective scaling
- ✓ „Remote“ controlled
- ✓ Low investment costs



| SCALER |

PRODUKT-DETAILS

Proven technology which convinces our customer since decades:

- ✓ Extreme maneuverable due to articulation (+/- 40°) and swiveling boom (+/-45°)
- ✓ Separate hydraulic circuits for hammer
- ✓ Robust telescopic boom
- ✓ Minimize operations costs and maximize operation time
- ✓ Made for extreme conditions (High altitude/ambient temperature)



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VARIANTS

Paus Scaler are available in the following set ups:

- ✓ 853 S8 with working height of 8m
- ✓ 1253 S10 with working height of 10m
- ✓ Possibility to attach different devises (max. attachment weight 300kg)
- ✓ Diesel
- ✓ Battery
- ✓ Diesel/electric



| SCALER |

THE NEW ONE

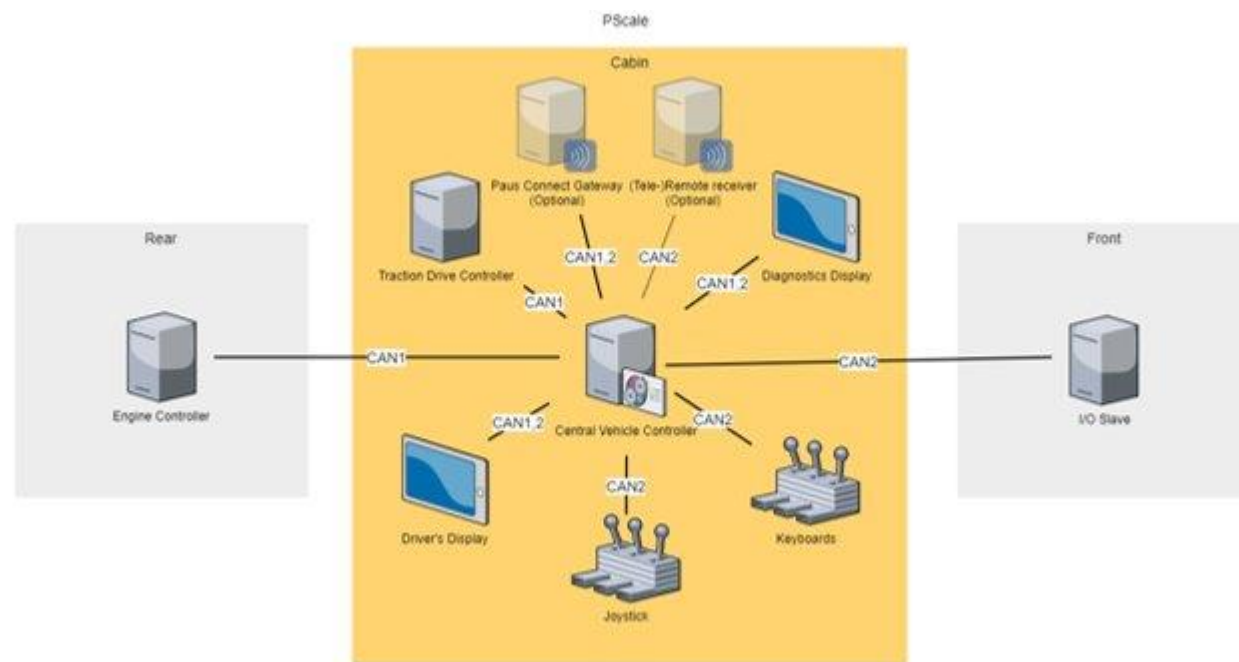
Paus has used its great experiences with the 853 S8 in scaling to design the new PScale 8-T. Here are the highlights:

- ✓ 50% more power for better performance in extreme altitudes (Power: 96 kW)
- ✓ 55% more cooling surface
- ✓ Paus Diagnose Display in combination with Paus Connect for more reliability
- ✓ 20° tiltable comfort cabin for better view to the working attachments
- ✓ New functions and features



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NETWORK ARCHITECTUR



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PLUG AND PLAY RADIO REMOTE CONTROL

- ✓ Radio Remote control responder plus receiver
- ✓ All Paus Scalers are prepared for plug in solutions
- ✓ Operator must be close to the machine to identify scaling areas
- ✓ Operator is not in the hazard area, must be in visible contact
- ✓ No special network requirements or infrastructure needed
- ✓ Small investment



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HYBRID TELEOPERATION

- ✓ Radio Remote controller with video system
- ✓ Multiple displays and Individual display sizes
- ✓ No network infrastructure required
- ✓ Operator is not in the hazard area, no visible contact necessary
- ✓ Low to medium investment



TELE OPERATION

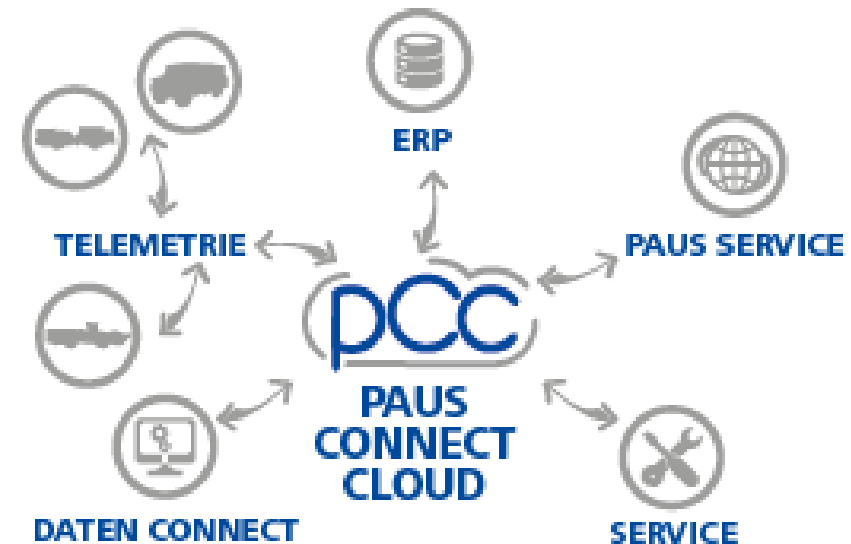
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| PAUS SERVICE |

Paus Connect gives our customer much more added value for their service:

- ✓ Statistic operation evaluation
- ✓ Remote diagnostic
- ✓ Real-time Monitoring
- ✓ Geofencing
- ✓ Machine release
- ✓ Activity monitoring
- ✓ Use on tablets and mobile devices
- ✓ Etc.



| SCALER |

Other specialties for Paus scaler under design and tests

- ✓ Emergency bottom
 - In case of any emergency and /or any rock falls the operator can press a bottom and the machine will stop working and goes in the transport mode and starts automatically to drive out of the hazard area
- ✓ Integrated sensor based system for the In-situ detection of loose rock during the scaling process (Project AMT, RWTH Aachen University)



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Thank you for your attention.



... SINCE 1968

„SOME PEOPLE REGARD PRIVATE LIFE
AS A PREDATORY TIGER TO BE SHOT.

OTHERS LOOK ON IT AS A COW THEY CAN
MILK.

NOT ENOUGH PEOPLE SEE IT AS A HEALTHY
HORSE, PULLING A STURDY WAGON.”

W. CHURCHILL

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