SURFACE AND DEEP MINING
INNOVATIVE AND FLEXIBLE
POWER QUALITY SOLUTIONS.
WWW.REINHAUSEN.COM
OPTIMAL POWER CONDITIONS FOR MINING ACTIVITIES WORLDWIDE.

GRIDCON® SVC
GRIDCON® STATCOM
GRIDCON® ACF
GRIDCON® HARMONIC FILTER
Mining activities involve challenging electrical loads. While large crushers, shredders, conveyors and SAG & BALL mills combine enormous requirements for power with very dynamic behavior, other devices such as winders and ventilation systems require stability for their continuous operation.

Moreover, in many situations mining installations are located at the edge of the power grid with long distances, up to hundreds of kilometers from the closest power generation plant. In consequence, short-circuit power levels are low and the mining processes are prone to power quality issues that may impede their proper operation.

Voltage sags and flicker resulting from the starting of heavy motors may disturb other mining loads or even reduce motor torque and thus reduce operating efficiency. Harmonics created by cyclo-converter drives for the operation of the GMDs or traditional converter drives can damage equipment, reduce its lifetime and lead to discontinuities in mining processes with resulting economical losses.

Given the complexity of mining operations and the significant capital required to install optimum power quality solutions, in most situations optimizing the power supply of mining activities entails thorough data collection, on-site measurements, power-grid simulations and evaluations of multiple solution concepts.

HIGH ELECTRICAL LOADS AND LONG POWER LINES TO MINING FIELDS ARE CHALLENGING POWER QUALITY.

GRIDCON® solutions offer comprehensive support for your system:

- Reactive power
- Harmonics
- Asymmetries
- Voltage fluctuations
- Voltage range violations
- Commutation losses
- Flicker
- Neutral conductor overloads
- Transient overvoltages
- Dynamic peak shaving
- Frequency fluctuations
- Voltage drops
PROFITABLE OPERATIONS IN MINING FIELDS.

GRIDCON® solutions ensure continuous operation resulting in optimized financial results.

State-of-the-art power quality equipment can ensure optimum effectiveness for mining activities despite the challenging conditions of such operations. Specialists from Maschinenfabrik Reinhausen (MR) can determine your needs and create an individual solution for you.

The implementation of GRIDCON® ACF active filters and harmonic filter circuits enables the dampening of harmonics to levels in line with applicable standards and norms.

GRIDCON® STATCOM and SVC compensate reactive power based on grid-operator requirements.

GRIDCON® POCO(X) are state-of-the-art, type-tested (up to 50 kA) metal enclosed panels for harmonic filter solutions which require minimal installation work at site.

The use of GRIDCON® MODULE & STATION (up to 30 Mvar) reduces your operating costs by decreasing charges for reactive power. It mitigates temperature effects from harmonics, and filters reactive power from the grid which in turn leads to lower maintenance costs.

GRIDCON® Solutions are based on MR’s proven range of power quality systems and are already implemented in several mining fields worldwide. A solution tailored to your individual requirements also takes into account all physical interrelationships and avoids any unwanted interactions between individual controllers and systems with the potentially arising negative impacts.
Your benefits

- Optimum energy efficiency, decreased fuel consumption of generators and therefore lower operating costs
- Legal assurance through compliance with local grid codes which facilitates insurance coverage or warranty claims
- Cost-effective production at the optimum operating point and increased payload due to increased motor torque
- Extended equipment lifetime thanks to reduced wear and tear
- Decades of experience in the provision of complete turn-key solutions - from problem detection up to commissioning
GRIDCON® SOLUTIONS FOR MINING FIELDS.

Ball mill drive in Chile – harmonic filter

### BALL MILL DRIVE IN CHILE

<table>
<thead>
<tr>
<th>SYSTEM TYPE</th>
<th>Power</th>
</tr>
</thead>
<tbody>
<tr>
<td>GRIDCON® PHF</td>
<td>13.8 kV 18.2 Mvar , 4 circuits</td>
</tr>
<tr>
<td>HARMONIC FILTER SYSTEM</td>
<td>HF02 / 7.5 Mvar, HF05 / 4.6 Mvar, HF11 / 4.6 Mvar, HF22 / 1.5 Mvar</td>
</tr>
<tr>
<td>E-HOUSE WITH SF6 SWITCH-GEAR SYSTEM</td>
<td>2 SF6 switchgear systems</td>
</tr>
</tbody>
</table>

### Situation
- Extension of mining plant by one 13.5 MW GMD (Ball Mill)
- Integration of the solution in the existing brown-field area

### Challenge
- Limited installation space at site
- Harmonic behavior of the converter unit

### MR Solution
- GRIDCON® HF 13.8 kV passive harmonic filter system
- Harmonic filter system GRIDCON® HF with 4 steps
- Extensive engineering (study, drawings, commissioning, site services)

### Customer benefits
- Complete turn-key project
- Reduced costs for reactive power consumption
- High production reliability through stable power supply
GRIDCON® SOLUTIONS FOR MINING FIELDS.

Mine hoist drive in Germany – hybrid solution with statcom and harmonic filter

**Situation**
- Former salt mine with a depth of 996 m with currently ongoing preservation and stabilization measures
- Mine with two-shaft hoisting systems

**Challenge**
- Load fluctuations, voltage changes and harmonics in the grid due to dynamic load of the shaft hoisting systems

**MR Solution**
- GRIDCON® STATCOM dynamic compensation system with reactive power regulation
- Harmonic filter system GRIDCON® POCOS IAC AFLR 25 kA in accordance with IEC 62271-200

**Customer benefits**
- Compliance with the utility specification regarding the point of common coupling
- High production reliability through stable power supply

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**MINE HOIST DRIVE IN GERMANY**

<table>
<thead>
<tr>
<th>SYSTEM TYPE</th>
<th>Power</th>
</tr>
</thead>
<tbody>
<tr>
<td>GRIDCON® STATCOM DYNAMIC COMPENSATION</td>
<td>20/0.69 kV ± 1,200 kvar</td>
</tr>
<tr>
<td>GRIDCON® POCOS HARMONIC FILTER SYSTEM</td>
<td>5 kV POCOS 1,200 kvar/HF05/300 kvar, HF07/300 kvar, HF11/600 kvar</td>
</tr>
</tbody>
</table>