Mining & Aggregate Industry

Buyer’s Guide for Submersible Pumps
Facing Industry Challenges
The mining industry plays a critical role in the U.S. economy. In addition to the substantial number of jobs it supports, mining produces the raw materials essential to the functioning of many other industries including manufacturing, agriculture, and construction.

The mining industry, however, is facing many challenges. Fluctuating demand, increasingly scarce resources, and stricter and more costly regulations are putting pressure on companies to better control costs and improve efficiency and performance.

Why Do Pumps Fail?
Achieving optimal performance in an industry filled with hazardous conditions and complex extraction and drainage activities requires the most reliable, durable, and efficient pumps available. Inferior pumps lead to pump failure, which causes costly downtime with expensive repairs and a halt to productivity.

Pump failure can result from a number of factors, but is typically attributed to three main causes:

• **Clogs:** Pumping heavy slurry with large particles, dust, dirt, and rocks will wear out regular pumps leading to an inability to pass solids and a build-up of system-clogging debris.

• **Erosion:** Gritty and abrasive materials erode cast iron and rubber-lined pumps and shorten their service lives.

• **Corrosion:** Acidic and caustic solutions quickly corrode cast iron pumps leading to premature wear and pump failures.

• **Overheating:** Pumps lacking the ability to keep internal motor functions cool will lead to overheating the system.

Finding Pumps that Perform
Selecting the right equipment is crucial for mining companies. In a market flooded with submersible dewatering and slurry pump products, it can be hard to determine the top performers. The elements to look for in a pump come down to smart design and high-quality components.

For maximum slurry handling capability, hard metal components like chrome iron agitators and semi-open impellers withstand higher concentrations of sand and other abrasive materials.

Features such as stainless steel shafts and shaft sleeves, replaceable chrome iron wear plates, and pump volutes cast from hardened ductile iron with extra thick walls will lead to better corrosion resistance and higher endurance.

Safeguards like temperature overload protection, class H motor insulation, and heavy-duty mechanical seals will help prevent overheating while built-in sensor probes alert staff to potential problems. Some pumps feature intelligent design such as a top-discharge structure that utilizes the fluid being pumped for natural cooling of motor functions.

Choosing BJM Pumps
BJM Pumps has been providing innovative and effective pump solutions since 1983. We have built our reputation as an industry leader by producing the highest quality products while being responsive to our customers’ needs.

Our experience and expertise in challenging industries like the mining and aggregates industry make us the ideal partner to help drive your success.
“Pump” Up Your Mining Performance

In the mining industry, pressure to keep up with competition, fluctuating demand, and resource scarcity means finding new ways to succeed. How do you rise above these challenges? The key to maximum performance in the demanding and complex world of mining is having the best equipment.

BJM Pumps helps you meet the challenge by delivering reliable, durable, and long-lasting equipment. No matter the properties of the liquid, we construct pumps that withstand the rugged mining applications that inferior pumps can't handle. Our submersible slurry pumps minimize downtime and allow you to save on repair and maintenance costs. Your projects stay on track in the harshest environments.

The pump you need, guaranteed.

Dewatering, Clear Water
R Series, J/JH Series

Dewatering, Corrosive Liquid Runoff
RX Series, JX/JHX Series, SKX Series, SX Series

Light Slurry
LWA Series, KB Series, KHD/KHH Series

Medium, Heavy, and Severe Slurry
KZN Series, KZNR Series, KZN-HYD Series, KZN-HYDR Series, KZE Series, XP-KZN Series, HAZ Series
KZN Pump Discharges Heavy Slurry to Keep Roads Open at Cement Plant

The Company

At its Pennsuco operation near Miami, Titan Florida Cement and Aggregates—a unit of Titan America LLC—operates the largest cement facility in Florida and the fifth-largest quarry in the United States. Annual cement production at the Pennsuco plant exceeds 1.8 million tons, and the quarry produces more than 7.5 million tons of limestone products a year. The plant produces bulk and bagged cement and aggregate products that are sold to public and private construction markets.

The Challenge

South Florida is known for its flash rainstorms, especially in summer when a downpour is often a daily occurrence. Titan Florida Cement and Aggregates’ Pennsuco facility mines, washes and sizes gravel and produces cement. The dusty work is made more challenging during heavy rain. Roads become impassable as rock dust, sand, gravel, grit and other debris wash across the flat terrain. Workers use heavy earthmoving equipment to plow the slop off to the side of the roads, reopening them to traffic. The highly abrasive runoff collects in a pond some 100 yards long by 40 yards wide. The pond must be pumped often to keep its level low enough to prevent the roads from flooding again. The workers also uses water from the runoff pond to wash screens in the plant.

The Solution

For many years, the Pennsuco plant used belt-driven Gallagher/Ash pumps to keep the runoff pond at the proper level. However, the pumps were expensive and difficult to maintain, as there were long lead times for parts. Furthermore, the parts themselves were expensive.

Challenge:

Titan Florida Cement and Aggregates plow a mixture of abrasive rock dust, sand, grit, and rain off roads where it collects in a pond. They need to pump the pond often to keep it from flooding the road.

Solution:

Replaced Gallagher/Ash pumps with KZN110 heavy-duty submersible slurry pump.

Results:

They added a second KZN110 pump and both pumps are running reliably for three years.

Working with Barney’s Pumps in Coral Springs, Florida, plant engineers purchased a KZN110 heavy-duty submersible slurry pump from BJM Pumps. The pump is especially designed for pumping heavy slurries containing lime, mill scale, coal, ash, silt, sand, or gravel. Its key components are made of high-chrome iron to resist abrasion, and the pump features an agitator that puts heavy solids into suspension so they can be pumped away with the liquid. Titan Florida Cement and Aggregates later purchased a second KZN110, and the two KZNs have been running reliably at Pennsuco for more than three years. The Gallagher/Ash pumps are now stored for backup use only.
The Company
A midwestern manufacturer produces a range of silica proppants. Proppants are solid materials, such as treated sand or ceramic particulate, that are typically used in the hydraulic fracturing process to keep an induced hydraulic fracture open for optimal oil and gas extraction.

The proppant manufacturer operates the mining facility with a closed-loop water system. This closed-loop system allows their wash plant to operate without discharging process water into dry runs, local wetlands, and nearby creeks. Instead, the water and sand are collected in sumps and recirculated through a filter press to release the moisture from the sand.

This frac sand reclamation process dictated specific requirements for the sump pump. Already using a KZN submersible pump in one of their sumps, the manufacturer contacted BPH Pump & Equipment Inc. to source another KZN pump for a new sump.

The Challenge
1. The pump needed to be resistant to abrasion. The sump was collecting very fine sand which can wear down the internal components of submersible pumps.

2. The pump needed to reliably transport a thick slurry. A simple dewatering pump would not be reliable in this application.

3. The pump must run 24/7 continuous duty. The sump pump needs to run continuously while the filter press is operating.

The Solution
BPH Pump & Equipment Inc., recommended a BJM KZN75-460T Submersible Slurry Pump. It’s been operating well for two year due to its:

1. Abrasion-Resistance:
   • 28% Chrome Iron Agitator to suspend sand, silt, and mud to be efficiently transported.
   • High-Chrome Semi-Open Impeller to handle sand, silt, and muddy slurries with concentrations of solids as high as 50% by weight.
   • Replaceable Chrome Iron Wear Plate on the suction side to counter the effects of erosion, and to provide higher endurance for abrasive applications.

2. Reliable Pumping
   • Superior Class H Motor Insulation Protection through double silicon carbide mechanical seals housed in a separate oil-filled seal chamber and a heavy-duty lip seal, and has built in amperage (FLA) and temperature overload protection.
   • Slim, top discharge design for easy installation and motor cooling by the pumped liquid.
   • Seal Minder® Moisture Detection System with a sensor probe inside the oil chamber to alert of problems.

3. 24/7 Continuous Duty
Able to handle abrasive slurries with a stainless steel shaft and shaft sleeve to reduce wear. The pump has hardened ductile iron volutes, which at 300 Brinell hardness, are twice as resistant to abrasives as standard ductile iron and added durability.
KZN Severe Duty Slurry Pump Lasts Twice as Long as Sewage-Style Dewatering Pump in Illinois Coal Mine

The Company

The company operates nine coal-mining facilities, including surface and underground mines, in southern Illinois.

The Challenge

Water is a constant presence in and around a coal mine: sprayed water suppresses explosive coal dust; water seeps into mine tunnels; rain percolates through stockpiles of newly mined coal; trucks must be washed before they can be driven on highways. Submersible pumps are installed in many locations at a coal mine: within the mine itself to clear tunnels of accumulated spray water and seepage; in runoff ponds or reclaim tunnels that run under outdoor coal stockpiles; in sumps that collect material that falls off and is washed away from conveyor belts; and in truck-wash sumps.

In most every case, the pumps are required to handle muddy, acidic slurry of water, chunks of coal and coal fines, dust, dirt and rocks. The debris is heavy to pump and quickly wears out standard submersible dewatering pumps. Large pieces of material that fall out of solution usually collect at the intake and will clog or destroy an inferior pump. Coal fines are extremely abrasive to the internal components of a pump and dramatically shorten the life of a traditional pump when used in such harsh conditions.

Coal extractors, processors, transporters and electricity generators have typically used submersible pumps built for sewage to manage water in their operations, usually with poor results. Additionally, the failure rate of these pumps in the coal industry’s tough conditions has been consistently high, requiring frequent repair, rebuilding and replacement of pumps; unacceptable rates of downtime; high labor costs; unsafe working conditions and risks of regulatory noncompliance or environmentally destructive spills.

An Illinois coal-mining company was using a sewage-style submersible dewatering pump at the bottom of a 3,000-gallon runoff pond that collects thick slurry draining from several raw and clean coal piles.

Challenge:
An Illinois coal mine’s sewage-style submersible dewatering pump only lasted six months due to the abrasive, acidic water.

Solution:
Replaced current pump with BJM KZNR150 Severe Duty Slurry Pump.

Result:
The KZNR150 is pumping roughly 500 gallons per minute, eight hours a day and lasted twice as long as the previous pump.

The water in the pond is so abrasive and acidic that the company was getting no more than six months of use out of each sewage-style pump.

The Solution

The mine replaced its submersible pump with a BJM 20-horsepower KZNR150 Severe Duty Slurry Pump. It features hardened ductile iron volutes cast with extra thick walls where pumped slurry enters the discharge. Capable of handling more than 1,100 gallons per minute, the KZNR150 is pumping roughly 500 gallons per minute, eight hours a day. It has lasted twice as long as their predecessors, with benefits in cost savings, uptime and reduced threats of a spill. Because the pumping components—the agitator, impeller and wear plate—are constructed with abrasive-resistant, high-chrome iron, the pump has been a workhorse at the Illinois mine.
Sand Fine Reclamation Becomes Cost Effective With BJM Submersible Agitator Pumps

The Company
A sand and gravel wash plant was trying to find a more economical way to recover the sand fines that had previously been lost in the process of cleaning aggregate. Sand fines, which are essentially granular sedimentary particulate, are typically required for the mixing of a high-grade concrete commonly used in oilfield applications. The sand and gravel wash plant initially set up the sand fine reclamation process to send the sand slurry, via gravity, directly to the self-priming centrifugal pump from the aggregate shaker and wash unit. The self-priming centrifugal pump then transferred the fine clay and sand slurry to another process stage to recover the sand fines, rather than sending the material to a settling pond.

The Challenge
The sand and gravel wash plant operates about 6 to 7 months each year. Their system runs an average of 10 hours per day, five days each week. They had initially set up the sand fine reclamation process to send the sand slurry, via gravity, directly to the self-priming centrifugal pump from the aggregate shaker and wash unit. The self-priming centrifugal pump then transferred the fine clay and sand slurry to another process stage to recover the sand fines, rather than sending the material to a settling pond.

The Solution
The IESS support specialist recommended the following changes:

- Allow gravity to pull the sand slurry from the aggregate shaker and wash screen into a 300-gallon container.
- Place a BJM Model LWAE15 submersible dewatering pump inside the 300-gallon container to transfer the slurry to a sand-recovery unit.

The LWA Series is constructed for dewatering sand, silt, coal fines, and abrasive light slurries. The pumps have a chrome iron impeller and wear plate. Chrome iron counters the effects of erosion and provides higher endurance for abrasive applications.

The LWA Series Submersible Dewatering Pump has a hardened ductile iron volute and agitator. The built-in agitator is perfect for stirring up the fine sand particulate with the wash water so the slurry can be efficiently transported while also maintaining the required container (or basin) volume.

The LWA Series Submersible Dewatering Pump has a hardened ductile iron volute and agitator. The built-in agitator is perfect for stirring up the fine sand particulate with the wash water so the slurry can be efficiently transported while also maintaining the required container (or basin) volume.

The LWAE15 transfers the slurry to a sand-recovery unit, delivering approximately 120 GPM (gallons per minute) at 25 TDH (Total Dynamic Head). The in-flow from the aggregate shaker and wash screen is manually regulated, staying between 80 - 100 GPM. For cooling purposes, the LWA Submersible Dewatering Pump must be fully submerged at all times. Therefore, the process slurry being discharged from the LWAE15 is also manually regulated so that a specific amount can be bypassed back into the 300-gallon container to maintain pump submersion.

The LWAE15 reliably pumped the sand slurry for 800 hours before having to be rebuilt. The pump-related cost of sand fine recovery is now $1.06 per hour of operation as compared to the $11.43 per hour cost when using the self-priming centrifugal pumps.
Handle the Most Difficult Mining Pumping Applications.

Submersible pumps are crucial to the mining and metals industry. They help maintain operations to avoid downtime and to keep miners safe. As such, mining, metals and aggregates companies need pumps that are durable enough to handle large, abrasive solids without clogging or failing. This includes rock slurries that many pumps are unable to handle. Our pumps can stand up to these applications from dewatering pumps to keep your mines dry or prevent flooding to heavy duty slurry pumps that can handle chunks of rock, coal, dirt and more.

Clear Water Dewatering Pumps

R Series
Perfect for general dewatering in a variety of applications, the R Series pumps are lightweight and compact for excellent performance and quality.
- Top discharge for better motor cooling and slim line design
- 304 stainless steel motor housing offers lighter weight and corrosion resistance
- High temperature automatic overload switch protects against motor failure due to overheating
- Cast iron construction stands up to rough handling

J/JH Series
Top performance and high quality for a very modest investment. Designed for long life and trouble-free performance. High flow or high head versions available.
- Advanced double mechanical seal design with separate lip seal to protect against leaks
- Seal Minder® moisture detection system (optional) offers early warning of water in the oil chamber prior to entering the motor
- High temperature automatic overload switch protects against motor failure due to overheating
- 304 stainless steel motor housing offers lighter weight and corrosion resistance

All pumps are tested at factory, both for performance as well as safety. (Specifications dependent on model & may change without notice.)
**Corrosive Liquid Runoff Dewatering Pumps**

**RX Series**
Top discharge to pass the liquid up and around the motor before discharging. This helps to better cool the motor in low level liquid applications. Corrosive protection from 316 stainless steel on all wet and liquid exposed surfaces.

- Motor is protected by double mechanical seals
- Winding protection and (NEMA) Class F motor insulation allows motor temperature to raise to 230°F
- Automatic switch turns pump motor off if temperature and/or amp draw raises too high

**SX Series**
With non-clog reliability, the SX Series pumps provide high volume and lift for wastewater. Corrosive protection from 316 stainless steel on all wet and liquid exposed surfaces.

- Non-clog impellers to pass solids through to downstream processing
- Custom engineered double mechanical sealing system
- Two impeller trims available for each model, to expand hydraulic coverage

**SKX Series**
The SKX Series pumps' Tungsten carbide cutting tip(s) shred solids that would clog an ordinary pump. Cast 316 stainless steel construction is ideal for corrosive environments that have solid wastes that may need to be shredded or cut.

- Delivers high volume of liquid through 2”–6” pipe
- Tears through tough waste with 360° shredding
- Grabs debris with engineered cutting slots on suction plate

**JX/JXH Series**
Our 316 stainless steel pumps offer maximum corrosion resistance to minimize repair and replacement costs. Avoid environmental penalties that result from failed corroded cast iron pumps. High flow or high head versions available.

- Motor is protected by double mechanical seals
- Winding protection and (NEMA) Class F motor insulation allows motor temperature to raise to 230°F
- Automatic switch turns pump motor off if temperature and/or amp draw raises too high

*All pumps are tested at factory, both for performance as well as safety. (Specifications dependent on model & may change without notice.)*
Light Slurry Pumps

LWA Series
Tough and durable, the LWA Series pumps are constructed for dewatering sand, silt, coal fines and abrasive light slurries. These economical hard metal pumps are built to keep your production running to save repair costs.

- High chrome iron impeller and wear plate
- Hardened ductile iron volute and agitator
- Built-in agitator keeps solids from settling at the bottom to prevent clogging

KB Series
Able to handle tough silt, sand or coal fines, these pumps are a great solution for mining applications. Top discharge design allows pumping down lower than 11” and provides better durability and portability.

- Abrasive resistant hi-chrome iron impeller, wear plate, and agitator suitable for light slurry dewatering
- Hard metal agitator design to remove settled solids
- 2-pole motor designs for higher head hydraulics
- Class H motor insulation with amperage (FLA) and temperature overload protection
- Oil-lubricated, double mechanical seals and heavy duty lip seal for additional protection

KHD/KHH Series
Removing ground water from a deep excavation requires a high head submersible pump. BJM Pumps’ high head dewatering line of pumps helps you reach the heights you need while handling liquids with abrasive solids.

- The KHD series are single stage impeller pumps, while the KHH series are dual stage pumps
- High chrome iron impeller and ductile iron wear plate and pump volute
- Oil-lubricated, double mechanical seal design featuring early warning seal failure protection circuit to ensure the longest pump and motor life
- Solids handling capabilities up to ¼”
- Superior motor life with Class F Motor Insulation

All pumps are tested at factory, both for performance as well as safety. (Specifications dependent on model & may change without notice.)
Medium, Heavy and Severe Slurry

KZN Series
Hard metal components make the KZN pumps the right pump for the most difficult mining slurries you deal with every day.

- 28% chrome iron agitator, wear plate and impeller for unsurpassed abrasion resistance
- Hardened ductile iron volute for twice the abrasion resistance of standard ductile iron
- Superior protection with Class H motor insulation with FLA and temperature overload protection
- Top discharge, slim line design for additional motor cooling

KZN-HYD/HYDR Series
Our KZN-HYD Series pumps are the hydraulic version of our popular KZN Series slurry pumps. Used where electric power is not available or for variable speed needs, the pumps are ideal for difficult applications.

- Intrinsically safe in hazardous environments
- Speed can be varied for higher heads and flows
- Ability to run dry without overheating the motor and to stall without damaging the pump
- Hydraulic version of our KZN severe duty pump is also available

XP-KZN Series
The explosion proof XP-KZN pumps are hard metal agitator pumps designed for operation in Class I, Division 1, Groups C & D hazardous environments (temp. code T3C).

- FM-approved explosion proof motor meets NFPA (70), NEC and OSHA requirements for Class I, Division 1, Group C & D hazardous locations
- All the hard metal features of the KZN Series pumps
- Top discharge, slim line design for additional motor cooling

HAZ Series
BJM Pumps’ HAZ Series pumps are the first permissible slurry pumps with an agitator. They are designed and constructed for abrasive coal slurries.

- High-chrome iron impeller, wear plate and agitator
- Built-in agitator keeps solids from settling at the bottom to prevent clogging
- Hardened ductile iron volute
- Class H motor insulation with amperage and temperature overload protection
- Available as MSHA Part 7 (pump only) or MSHA Part 18 (pump with controls)

KZNR Series
Some slurry solids are so abrasive that pump service life depends on an extremely hardened casting. BJM Pumps’ KZNR Series pumps offer this level of casting through a proprietary process to stand up to extreme abrasiveness.

- Hardened ductile iron volute up to 71 Rockwell C (compared to class 30 for the KZN pumps)
- Severe duty submersible slurry pumps that are unmatched in the industry

KZE Series
These high capacity, hard metal slurry pumps with agitator are the choice for the most difficult mining pumping applications to keep your production running.

- High chrome iron wear parts (volute, impeller, wear plate)
- High chrome iron agitator keeps solids from settling at the bottom to prevent clogging
- Semi-open impeller capable of passing 1” solids to accommodate heavy slurry loading

All pumps are tested at factory, both for performance as well as safety. (Specifications dependent on model & may change without notice.)