LIGHTING EVOLVED
LED INITIATIVE PROGRAM

Safety

IEC 62471 Photo Biological Tested - No Effect on Human Eye or Skin
5000k Color Temperature Reduces Operator Fatigue
Low Voltage Electronics Eliminates Risk of Shock
Thermally Regulated Housings Eliminate Touch Burns
Increased Light Output Reduces Near Miss Incidences
RoHS Compliant Electronics Contain No Lead or Mercury.

Preventative Maintenance

Long Life LED Exceeds Half Engine Life
Solid State Components Completely Resist Vibration
Low Startup Current Draw Reduces Wear on Associated Components
Built-In Redundancy Lessens Chance of Full Fixture Failure
Built-In Thermal Management Prevents Overheating
IP-68 Rated Housings for Superior Ingress Protection

Cost Savings

Reduces Associated Component Wear
Less Expensive Than OE and HID Options
Increased Reliability for Increased Production
Reduces or Removes Unscheduled Lighting Maintenance
Increased Productivity Due to Less Operator Fatigue
Streamline Inventory Counts to Common Solution

Environment

RoHS Compliant Electronics
Contains No Lead or Mercury
Reduced CO2 Emissions
No Hazardous Disposal Required
Reduce Light Pollution
# Comprehensive Lighting Systems

## Open Pit
- Haul Trucks
- Rope Shovels
- Hydraulic Shovels
- Dozers
- Drag Lines
- Graders
- Drill Rigs
- Loaders

## Underground
- Haul Trucks
- Jumbos
- Bolters
- Muckers
- Loaders
- Concrete Sprayers
- Graders
- Utility Carriers

## Structural
- Work Shops
- Wash Bays
- Roasters
- SX/EW
- Crushers
- Haul Roads
- Exterior Building
- Low Bay / Mezzanine

## Support Equipment
- Light Plant Retro Fit
- Lube Trucks
- Tire Carriers
- Work Trucks
- Conveyor Systems
- Trams
- Drills
ADVANCED TECHNOLOGY

Beam Patterns

Developed in consultation with industry leaders to meet specific needs and provide for the most control of the light source.

10 Degree
Spot light applications

60 Degree
High beam open pit flood applications and work lighting

25 Degree
Long range flood applications

90 Degree
High beam underground flood applications and work lighting

25 Degree
Long range flood applications

3065 Elliptical
30°/65° low beam driving and tramming light

PART NUMBER EXPLANATION

Example
MXL - PMX - 30 - 60

Technology Series # of LED Beam Pattern
MIL Mining LED 10 10° Optic
MXL Mining Xtreme LED 25 25° Optic
XIL Commercial LED 40 40° Optic
60 60° Optic
90 90° Optic
e3065 30°/65° Elliptical

LIGHT TEMPERATURE

Vision X MXL Series lights are designed to produce the best operating conditions for operator safety and efficiency. The way this is done is through providing light at 5000k to ensure bright working conditions in both clear and dusty environments.
VISION X LED

Low Amp Draw
High Output
50,000 Hour Lifespan

LEDs

10 Watt LED
Highest light output per LED for greatest bulk light, producing the most light output per square inch.

5 Watt LED
Greatest distance meets greatest light output. A tight LED configuration along with 493 raw lumens per LED achieves the brightest light and the greatest distance.

3 Watt LED
Tight LED configuration for the best optical control. Achieve the greatest distance and depth.

Mounting

Bar Mount
Single-Stud Mount
Trunnion Bracket
Suspension Mount
Pit Master Xtreme Prime Series
Modular LED Upgrade for HPS and Metal Halide

Pit Master 400W Metal Halide Replacement

10° Narrow Beam
PART # MIL-PMX3010

60° Extra Wide Beam
PART # MIL-PMX3060

Technical Details
- Dimensions: 11.69" x 7.09" x 4.94"
- Lumens (2800Ma): 14,790 Lm
- Wattage: 150
- Weight: 5 kg
- Amp Draw (12V): 12.5A
- Vibration Rating: 15.6 Grms

Added Features
- Integrated Deutsch Connector with Plug-and-Play Harness
- 360° Adjustable Trunnion Bracket Mount
- Die-Cast Aluminum Housing
- Polycarbonate Lens
- Patent Pending

Pit Master 1000W Metal Halide Replacement

10° Narrow Beam
PART # MIL-PMX6010

60° Extra Wide Beam
PART # MIL-PMX6060

Technical Details
- Dimensions: 11.25" x 2.97" x 14.25"
- Lumens (2800Ma): 29,580 Lm
- Wattage: 300
- Weight: 6 kg
- Amp Draw (12V): 25A
- Vibration Rating: 15.6 Grms

Added Features
- Integrated Deutsch Connector with Plug-and-Play Harness
- 360° Adjustable Trunnion Bracket Mount
- Die-Cast Aluminum Housing
- Polycarbonate Lens
- Patent Pending
5 Watt Prime Series
Ripper and Explorer LED Series

Rugged Mounting Bracket Design
Prime Drive for Enhanced Reliability & Output.

- Integrated Electronic Thermal Management (ETM)
- Xtreme Five Watt LED is Driven to 90% Efficiency
- PWM Integrated Dimming Circuitry
- Advanced Heat Sink Design

8 Watt Prime Series
Ripper and Explorer LED Series

Rugged Mounting Bracket Design
Prime Drive for Enhanced Reliability & Output.

- Integrated Electronic Thermal Management (ETM)
- Xtreme Eight Watt LED is Driven to 90% Efficiency
- PWM Integrated Dimming Circuitry
- Advanced Heat Sink Design

Series Specifications

<table>
<thead>
<tr>
<th>Warranty</th>
<th>Extended</th>
</tr>
</thead>
<tbody>
<tr>
<td>Available Housing Floor</td>
<td>Black or White</td>
</tr>
<tr>
<td>Available Beam Patterns</td>
<td>10°, 25°, 40°, 60°, 30°/65°</td>
</tr>
<tr>
<td>Optic Purity</td>
<td>90%</td>
</tr>
<tr>
<td>Driven at</td>
<td>90%</td>
</tr>
<tr>
<td>Operation Temp</td>
<td>-40 Celsius – +80 Celsius</td>
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<tr>
<td>Input Voltage</td>
<td>9-32V DC</td>
</tr>
<tr>
<td>IP Rating</td>
<td>IP-68</td>
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<tr>
<td>Led Lifespan</td>
<td>50,000 hours</td>
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Technical Details

<table>
<thead>
<tr>
<th>Ripper 12 LED Work Light</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dimensions</td>
</tr>
<tr>
<td>Lumens (2800Ma)</td>
</tr>
<tr>
<td>Wattage</td>
</tr>
<tr>
<td>Weight</td>
</tr>
<tr>
<td>Amp Draw (12V)</td>
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<tr>
<td>Vibration Rating</td>
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<tr>
<td>Part #</td>
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<tr>
<td>Beam</td>
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<table>
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<th>Ripper 20 LED Work Light</th>
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<td>Dimensions</td>
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<tr>
<td>Lumens (2800Ma)</td>
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<tr>
<td>Wattage</td>
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<tr>
<td>Weight</td>
</tr>
<tr>
<td>Amp Draw (12V)</td>
</tr>
<tr>
<td>Vibration Rating</td>
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<tr>
<td>Beam</td>
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<th>Explorer 9 LED Light</th>
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<tbody>
<tr>
<td>Dimensions</td>
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<tr>
<td>Lumens (2800Ma)</td>
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<td>Wattage</td>
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<tr>
<td>Weight</td>
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<tr>
<td>Amp Draw (12V)</td>
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<tr>
<td>Part #</td>
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<tr>
<td>Beam</td>
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<table>
<thead>
<tr>
<th>Explorer 11 LED Light</th>
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</thead>
<tbody>
<tr>
<td>Dimensions</td>
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<tr>
<td>Lumens (2800Ma)</td>
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<tr>
<td>Wattage</td>
</tr>
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<td>Amp Draw (12V)</td>
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<tr>
<td>Part #</td>
</tr>
<tr>
<td>Beam</td>
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MXL MINING
RANGE DEFINITION

Mining Xreme Lighting (MXL) Range
The MXL Mining Range is the premier line of LED products for use on mine sites. The MXL Range enhances lighting performance, increases durability and simplifies maintenance with new features for the most dependable lighting for mining applications.

Forward Rake Trunnion
Allows light to mount in factory hole location while still protruding over metal bumper lip on many mining vehicles giving a larger field of view.

Rubber Isolated Bracket
No metal on metal contact lessens vibration symptoms on brackets, optics and electronics on circuit board and bolts.

304 Stainless
Increased protection against corrosion due to chemicals, acids and chlorides. 304 stainless steel contains twice the carbon over 316 stainless steel for increased strength in high vibration scenarios.

True Glow Optic Holder
Phosphorescent paint charges and glows off its own power, or off of other oncoming light sources when power is removed. Vehicles parked in staging areas or deep in a drift now have multiple safety indicators to approaching vehicles everywhere a True Glow light is mounted.

Side Bolt
Standard M8 bolt for socket adjustment.

5000K LED
Best all around color temp for both dusty and clear environments. Note, customers can special order in 4300K for extremely dusty environments.

Prime Drive Thermal Management
Regulates the temperature of the lights to an exterior housing temp of 130F (SSC); no touch burns and well below the ignition temperature for hydraulic fluid. Sustains long life of LED’s.

18-65v Input
Built to handle a wide voltage range as well as voltage spikes while only operating above 18 volts to prevent theft for automotive use.

Feather Start
Feather start technology allows a gradual introduction of amperage onto the circuit over a 5 second period reducing the wear on associated components: starter, alternator and battery systems as well as other sensitive circuitry being used.

Reverse Polarity Protection
Eliminates light failures due to improperly pinned or reverse polarity harnesses.

Reverse Polarity Operation
Allows light to operate regardless of the polarity input of the pins or harnesses. Eliminates troubleshooting and damage due to improper pinned or polarity harnesses.

Radius Bend Bracket
Eliminates failures due to fatigue applied on tight bends and acts as a cushion point to vibration.

Spray Clean Coating
Polytetrafluoroethylene (PTFE) non-stick coating allows dirt and grime to be washed away without scrubbing and also has a higher thermal conductivity than standard coating to dissipate more heat from the housing.

All Tight Bolt System
A combination of Nylocks, Nybolts and thread locker on every fastening entity on every light.

Laser Etched Beam
Added at every serial code location to denote the beam pattern on each light.

IP 69K
German standard DIN 40050-9 extends rating for high-pressure, high-temperature wash-down and steam cleaning.

CISPR 25
ANSI and IEC standard for vehicles, boats and internal combustion engines, defines limits of electromagnetic interference (EMI) and radio frequency interference (RFI). No EMI/RFI interference.
Vision X Lighting is a multinational company specializing in mining and heavy industrial lighting. Services including engineering, manufacturing and on site consulting for specific lighting needs on mobile and stationary equipment as well as structural building lighting applications. Currently we are active in over 45 countries and work with over 500 mine sites in designing lighting systems specific down to the model of equipment as well as the ore base they are working in. Customers include Barrick, Xstrata, BHP, Rio Tinto, AngloGold, Freeport McMoRan, Grupo Mexico, Kinross, Newmont, Kewit and Phelps Dodge to name a few of our larger customers. All of our lighting fit outs are designed around the particular piece of equipment and not just a generic light head. Factors include redundancy in the lighting system to reduce or eliminate unscheduled maintenance, reduction in amperage draw to reduce wear on associated components and increase of light output on the effective work area while reducing glare to peripheral equipment. Our contracted service facilities for North America are located in Elko NV, Salt Lake City UT, Billings MT, Fairbanks AK, Tuscon AZ, Beckley WV, San Diego CA, Calgary AB and Lively ON. Our North American Corporate is located in Seattle, WA. International Coverage includes Scandinavia, Europe, Africa, Australia, Russia, Asia and South America.

Vision X Lighting was founded in 1997 with the mission to engineer specific lighting models and configurations for niche market segments where lighting plays a major role in production, safety and unscheduled maintenance while conforming the highest EPA standards available. For the past 15 years we have worked with the majority of major mining corporations to develop these equipment specific configurations and fixtures to eliminate major costs from unscheduled maintenance, potential injuries and the mining industries footprint on the environment through the latest technology coupled with our IP in engineering. Our lighting fit outs not only include equipment specific instructions but also onsite training of maintenance staff as well as onsite consulting for new projects, maintenance schedules for proper replacement of equipment lighting and safety standards for properly lighting work areas. Our Seattle facility is our distribution facility with a 92% fill rate for North America, with local inventory in all of the service facilities in North America as well.

Vision X Lighting is a ISO 9001, QS 9000, ISO 14001, ISO/TS 16949 facility as well as a ECOPROFIT award winner. All of our efforts and products are designed around a no risk policy. Vision X ensures the products we offer have no effect on the environment they are used in and need no special disposal or recycling of the fixtures, all lights are tested to the IEC 62471 Photobiological standard ensuring the have no long lasting effects on the human eye or skin, all housings are thermally managed to ensure no touch burns will occur if a operator or mechanic comes into contact with the fixture and all lighting heads are a low voltage fixtures with no risk of electrical shock or burn other than the inverter systems required to drive in high voltage applications.
P&H 2800/4100 Technology Upgrade Overview

Opportunity
Lighting on P&H Models 2800 and 4100 has been adequate at best. New LED lighting technology has been designed specifically for these models to address issues with current lighting systems.

Objectives Achieved Through LED Upgrade
70% Reduction in power consumption over current OE lighting system
26% Increase in light output on effective Work Area (Measured in LUX on work surface in 12 critical points)
80% Decrease in light pollution (Stray light loss into surrounding hills and into oncoming equipment)
Built-in redundancy in each light fixture to completely remove unscheduled maintenance
Serviceable dual power supply and circuit board during PM
ROHS compliant components contain no Lead or Mercury and require no hazardous disposal

Scope Of Work
Direct 1 for 1 replacement of OE fixture
Bypass of OE ballast system allowing 120VAC to flow directly to light fixture

Financial Benefits Per Fixture

<table>
<thead>
<tr>
<th>Wattage</th>
<th>OPE HPS FIXTURE</th>
<th>XIL-PMX5060 LED FIXTURE</th>
<th>Reduction</th>
<th>Increase</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Amperage (120VAC)</td>
<td>8.33</td>
<td>2.5</td>
<td>5.8</td>
<td>70%</td>
<td></td>
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<tr>
<td>Comprehensive Lux at 12 locations</td>
<td>1678</td>
<td>2121</td>
<td>443</td>
<td>26%</td>
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</tr>
<tr>
<td>Daily Operating Wh (24 Hours)</td>
<td>24,000</td>
<td>7220</td>
<td>16,800</td>
<td>70%</td>
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</tr>
<tr>
<td>Monthly Maintenance</td>
<td>0.134</td>
<td>0</td>
<td>1.5</td>
<td>100%</td>
<td></td>
</tr>
<tr>
<td>kWh cost per month ($0.40 kWh)</td>
<td>$288.00</td>
<td>$86.40</td>
<td>$201.60</td>
<td>70%</td>
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</table>

Financial Benefits Per Machine (13 Fixtures)

<table>
<thead>
<tr>
<th>Wattage</th>
<th>OPE HPS FIXTURE</th>
<th>XIL-PMX5060 LED FIXTURE</th>
<th>Reduction</th>
<th>Increase</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Amperage (120VAC)</td>
<td>108.33</td>
<td>32.50</td>
<td>75.8</td>
<td>70%</td>
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<tr>
<td>Comprehensive Lux at 12 locations</td>
<td>21814</td>
<td>27573</td>
<td>5759</td>
<td>26%</td>
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<tr>
<td>Daily Operating Wh (24 Hours)</td>
<td>312000</td>
<td>93600</td>
<td>218400</td>
<td>70%</td>
<td></td>
</tr>
<tr>
<td>Monthly Maintenance</td>
<td>1.65</td>
<td>0</td>
<td>1.5</td>
<td>100%</td>
<td></td>
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<tr>
<td>kWh cost per month ($0.40 kWh)</td>
<td>$3,744.00</td>
<td>$1,123.20</td>
<td>$2,620.80</td>
<td>70%</td>
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<tr>
<td>Annual KWH Cost</td>
<td>$44,928.00</td>
<td>$13,478.40</td>
<td>$31,449.60</td>
<td>70%</td>
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<tr>
<td>10 Year ROI</td>
<td>$449,280.00</td>
<td>$134,784.00</td>
<td>$314,496.00</td>
<td>70%</td>
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<tr>
<td>Annual UM Cost ($60K/hr - 5hr repair)</td>
<td>$630,000.00</td>
<td>$ -</td>
<td>$630,000.00</td>
<td>100%</td>
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<tr>
<td>Annual CO2 Emissions (1.33 lbs/kWh)</td>
<td>151460</td>
<td>45438</td>
<td>106022</td>
<td>70%</td>
<td></td>
</tr>
</tbody>
</table>

Average Cost to Retrofit | $31,187.00 USD |
Annual Energy Savings | $31,449.60 USD |
ROI Energy Savings Only | < 1 Year |
Annual Unscheduled Maintenance Savings | $630,000.00 USD |
Total Annual Savings Per Machine | $661,449.60 USD |
ROI (Energy and UM Savings) | 18.25 Days |
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