

### **Hella Work Lamp Range**

For mining vehicles and production plant, good lighting is essential for activities other than just driving. Haul trucks, shovels, drills, cranes and other special purpose vehicles often need separate, pivotable 'work lamps' for loading, unloading, and other operations.

Using the right work lamp can make the work easier and, in most cases, a lot safer. That's why Hella, long a pioneer in innovative lighting technology, offers a wide range of work lamps designed for specific applications.

### **Hella Lighting Technology**

Hella's range of work lamps includes long, short and mid-range lamps, offering close or wide illumination. You can select Hella work lamps that suit the specific task best using Halogen, Xenon or LED technology. Lamps

are available with integral handles, dual beam optics and a wide range of mounting options. For complex projects we would suggest you contact our applications engineering service.

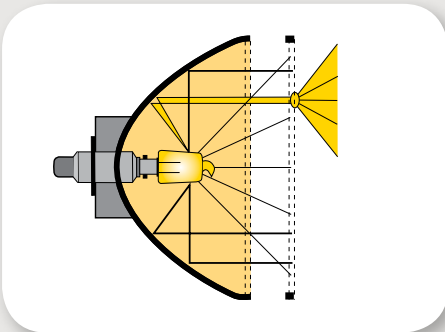
## Hella Work Lamp Systems

### The Paraboloid Lamp

The paraboloid lamp is classic amongst the lamp systems in use today. It uses a paraboloid reflector and the light source is located at its focal point. The reflector captures the light, bundles it and radiates it.

The lens ensures that the light is distributed as required, directing it to pre-specified areas in front of the lamp. Effective paraboloid lamps have a large reflector in order to capture a great deal of light.

The lens must be as vertical as possible in order to ensure good light refraction. Reflectors with a long focal length provide good long-range illumination; those with short focal lengths collect more light and provide good short-range illumination.



Paraboloid lamp with refractor lens

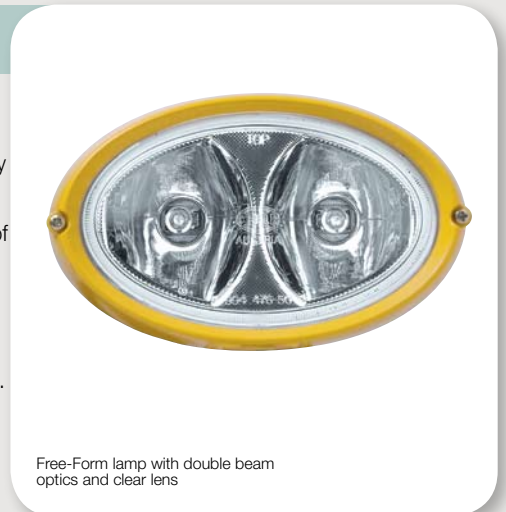
### The Free-Form (FF) Lamp

The FF lamp represents a quantum leap in lamp technology. Its reflector surface no longer corresponds to an even paraboloid. Rather, each point of the reflector surface has an exactly defined function: to collect light, concentrate and direct and distribute it.

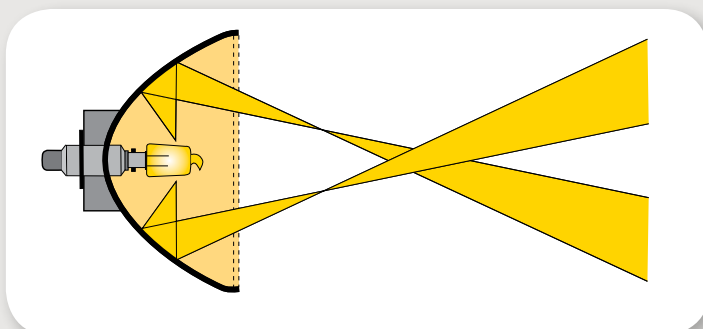
The reflector alone generates the desired light distribution. The entire light output of an FF lamp is comprised of more than 50,000 spots of light. The entire reflector is effective in Hella Free-Form work lamps. The FF lamp takes the light exactly to where it is supposed to be.

The result: brighter, more even illumination of the work area, greater range, and hardly any scatter loss or dazzling.

In order to calculate the reflector surface of an FF lamp, extremely powerful electronic computers and high-precision tools and production machines are required. Fractions of a thousandth of a millimetre alter the effectiveness of the entire system.



Free-Form lamp with double beam optics and clear lens



### What is Xenon light?

Instead of a coiled filament, a light arc is the light source in Xenon lamps. The bulb, which is only the size of a cherry stone, is filled with Xenon gas and metal salts. In order to ignite the Xenon bulb, an extremely high voltage of approximately 20,000 volts is required.

This is provided by an electronic ballast: 12V or 24V and direct current is transformed into 20,000V alternating current.

At temperatures of around 5000°C, a light arc is created. With a power consumption of a mere 35 watts, this generates 2.5 times the light flux of an Halogen globe of the same

power or equivalent to a 100W Halogen globe.

The current generation of control units is only half the size of and approximately one third lighter than the first and second generation.

The ignition electronics can now be completely integrated into the control unit. As a result of these control units, the lamp's light is almost independent of voltage fluctuations in the vehicle electrical system, as the electronics operate the Xenon globes at constant output.



### MustADD® Filter Technology

Operational duty cycles in mining are some of the most demanding and are normally combined with intensive switching cycles, dust-loaded air, corrosive atmospheres and often high levels of humidity.

Equipment designed for less demanding environments will not maintain their claimed lighting performance for a long period when used in mining. Hella designs fully sealed LED "fit and forget" lights whenever possible for mining applications. Where "fit and forget" is not practical, the reality of mining operational demands is taken into account. Due to their heavy usage loads, mining lights must be designed to allow for far more globe changes than are required elsewhere, and they must be fitted with seals that will function under less than perfect conditions.

To overcome the problems encountered in practice with semi-perfect seals, Hella mining work lamps incorporate sophisticated breathing paths and air filters. This ensures that a low-resistance route is always available for air to enter and leave the luminaire; eliminating pressure gradients across seals and the consequence of unpredictable leakage behaviour. It is essential that these aspects are thoroughly integrated at the design stage.

Hella's patented MustADD® breathing system chemically cleans and dehydrates the air drawn into the lamp every time it is switched off, resulting in significantly extended product life. The combined particulate, chemical and de-hydrating barrier effectively reduces

corrosive damage and allows AS500 FF® work lamps to operate repeatedly in harsh environments for extended periods.

MustADD® air filters remove dust particles to sub-micron level from the air and minimise airborne moisture, ensuring optimum light performance is maintained in corrosive environments.

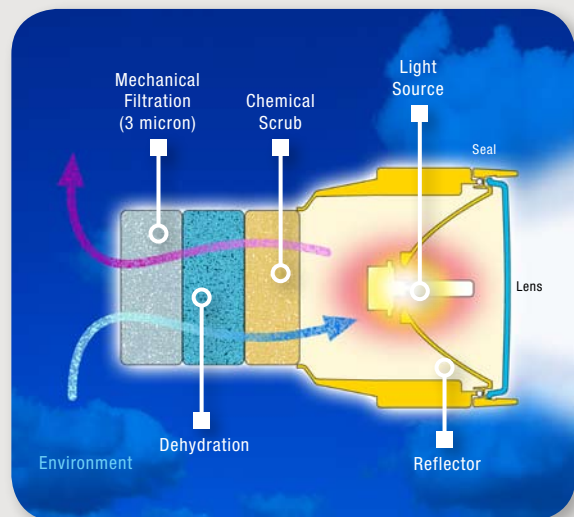
Heavily contaminated air typical in mining environments rapidly deteriorates the operational performance of most air filter systems. The MustADD® system is designed to substantially regenerate itself through two actions:

#### Action 1

When switched on, the active components in the system rapidly heat up and impart some heat to the air inside the assembly. This heating action increases the internal air pressure and lowers the relative humidity simultaneously; thereby forcing the vented air to re-absorb moisture from the desiccant as it is expelled from the light.

#### Action 2

The vigorous vibration of the equipment to which the work lamp is mounted, mechanically cleans accumulated particulate matter from



the membrane. The physical structure of the micro-porous membrane is specified so that the particulates are stopped on the surface and not trapped within the filter medium.

MustADD systems of various levels of sophistication are implemented across the Hella mining product range, to deliver optimum value according to the product's intended application. Even the least sophisticated implementation, using only the particulate barrier, delivers remarkable results due to the fact that the same design methods and specialised materials are used, regardless of product.

## DRACO® vibration damping systems

Operational duty cycles in mining are some of the most demanding, and field research by Hella has measured shock and vibration levels of remarkable magnitudes.

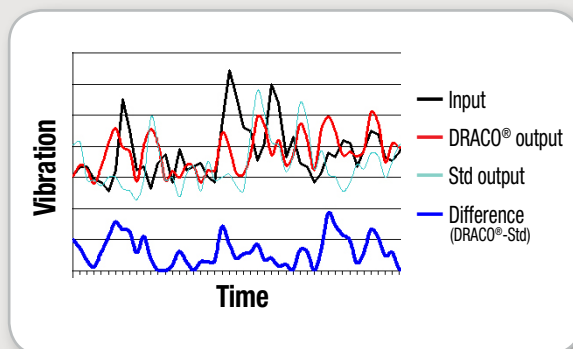
Equipment designed for less demanding environments will fail rapidly when used in mining, and often when most needed. Our design aim is to produce equipment that will function reliably in a continuously shock and vibration laden environment.

Most types of mine lighting equipment requires single point mounting to allow for azimuth and elevation adjustments. This arrangement concentrates stress and maximizes overturning moment of inertia in the light that is mounted. To analyse the mechanical design effectively and deliver reliable and predictable results, it is essential that these aspects are thoroughly integrated at the design stage; just adding impressive looking brackets often leads to poorer performance and progressively cascading failures.

Hella developed our unique DRACO® vibration damping technology to enable us to limit

the vibration passing from the mounting surface of the mining machine to the relatively fragile globe in the light fitting. DRACO dampening effectively eliminates resonant behaviour and is specifically designed for systems subject to stochastic (random) vibration with a large dynamic range, like that typically found on mining machines. We can adjust the system parameters to suit each light and its application

DRACO vibration damping systems consist of at least two rigid mounting plates separated by two (or more) flexible compounds of differing hardness and damping properties, arranged in parallel in one damper assembly. This provides a non-rigid mounting arrangement between the vibration source (the mining machine) and load (the light fitting). Vibration signals are delayed in time, reduced in amplitude,



as well as altered in spectral composition when some vibration energy is converted into heat as it passes through each of the flexible compounds. Detail differences between the damping behaviour compound types creates a relative phase shift in the vibration signals exiting each compound. When the two (or more) vibration signals are re-combined in the light fitting, a new vibration signal is created with a compressed dynamic range and lower peak vibration level, reducing the stress in the load (light fitting) significantly.

## Xenon Gas Discharge (XGD) Work Lamps

### What is Xenon lighting technology?

Xenon globes use an electric current passed through Xenon gas to produce light, rather than a filament. Not only does this method require minimal electric current draw compared to filament lighting, it is also very close to daylight.

As the human eye is designed to see in daylight, Xenon lighting causes less eye strain than other globe types, making it a more convenient and safer night lighting option. It also reflects road signs and markings more brightly.

### Advantages of Xenon lighting

- Wider (up to three times as large) and more uniform illumination
- Twice the light of standard Halogen globes, with less than half the power usage – safer and more environmentally friendly
- Light colour very similar to daylight – reduces strain on the eye
- Steady brightness levels even if power supply varies
- Impact and vibration-resistant light arc ensures a globe service life five times longer than standard globes

### Xenon Gas Discharge Work Lamps

The Hella XGD models are high-performance, robust work lamps designed for most extreme and heavy-duty assignments.

Hella Mining Work Lamp features:

- Improved lens protection through extended housing
- Custom built Xenon ballast and electronic circuitry integrated into housing for greater reliability
- Inbuilt handle for easy aiming
- Integrated AMP plug with connection cable or DT Plug
- DRACO® vibration-damping pivot base and mounting bracket
- Available in 12V DC and 24V DC application
- Special seals
- MUSTADD® filter.



## Halogen Work Lamps

### Single Beam FF

Although compact in design, the Single Beam FF has twice the light output of standard lamps.

- Suitable for both upright and pendant mounting on horizontal and vertical surfaces

#### Particularly suitable for:

Situations where space is at a premium and non-critical tasks where light is required occasionally for short periods.

### Double Beam FF

The Double Beam FF utilises a twin reflector system with two Halogen globes and two precisely coordinated FF reflectors. This allows it to light up an extremely large area - in fact, it has three times the light output of conventional work lamps of the same size.

Other features include:

- Suitable for both upright and pendant mounting on horizontal and vertical surfaces
- Can be rotated by 330 degrees and tilted by 100 degrees

#### Particularly suitable for:

Situations where a large area must be well illuminated. When used with the Hella I+I system, Halogen lights can be used in critical task applications where light is required intermittently for short periods..



### Tips for Better Lighting

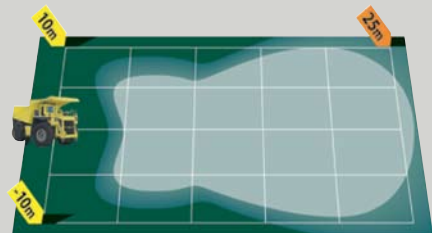
- 1 Beam distribution is very important. Make sure you choose a beam pattern which suits your application. Hella's extensive range of work lamps is available in three different beam patterns, as shown on the right.
- 2 Always use quality cabling, relays and switches. Hella has a complete range available – ask your supplier for more information.
- 3 For more flexible illumination with greater manoeuvrability, consider using a pedestal mounting bracket.

### Beam Patterns

Hella's extensive range of work lamps are available in three different beam patterns.

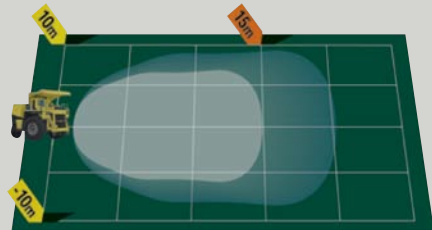
#### Long range wide spread

for illumination of the greatest area.



#### Close range concentrated

for intense illumination of a small area.



#### Medium range wide spread

for strong illumination of a fairly large area.

