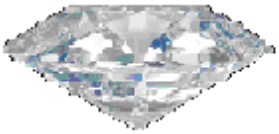
INTRODUCING

GEM  BRIGHT™

Magnetic Induction Lighting

Exclusively from

ULTRA-TECH™ LIGHTING

Because reflective properties of gem stones are so unique, extraordinary lighting is required.

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Overview –

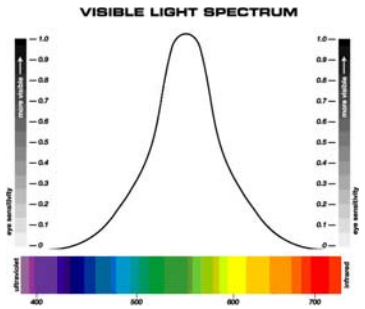
There is a reason diamonds are viewed under natural northern light. The sun's full spectrum is available absent glare and without spectral bias. Unquestionably, light is the fundamental source of all gemstones' beauty. From a gemological perspective, light is the single most critical element for determining quality and value. Up until the development of new Gem-Bright™ magnetic induction lights (MIL), gemologists and jewelers have had to work under sub-optimal light from sources like incandescent, fluorescent, halogen, metal halide, and LED lamps. All of these lighting technologies suffer from spectral bias and deficiencies relative to examining diamonds and colored gem stones. Ultra-Tech™ Lighting has developed a full spectrum light source with a diffusing reflector that provides ideal illumination for viewing and evaluating gems.

The Science of Lighting Gems –

The crystalline carbon structure of diamonds is extraordinarily complex and unique. When faceted, both white and colored diamonds have the ability to refract and internally reflect light. The enormous density of carbon atoms actually slows light from its maximum speed of 186,000 miles per second to only 80,000 miles per second. The ability to trap and internalize light presents several challenges when using artificial lighting. Considerations include:

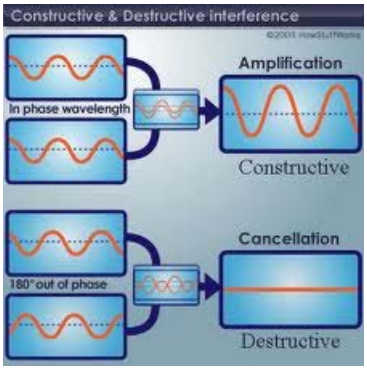
- Spectrum
- Color Rendition Index (CRI)
- Color temperature
- Intensity (lumens or foot candles)
- Flicker
- Diffusion

In comparison to white (colorless) diamonds, colored gems have inherent spectral bias. From tanzanite to corundum, the particular color, impurities, structure, and cut, will influence the way light is presented from the stone to the viewer. Moreover, the retinal characteristics of every eye will range from slightly different to radically different; i.e. color-sensing to color blind. The objective in viewing and grading gems is to create as *neutral* a light as possible so that the light source does not prejudice the observation. This means the spectrum should be as uniform as possible over the visually perceived range from violet to red. To be sure, there are techniques that can reveal fluorescence using an ultra-violet "black light." Gem-Bright™ fixtures provide sufficient light within the fluorescing spectrum to detect these characteristics.



The average human eye sees from approximately 400nm to 700nm. Anyone who has ever made the mistake of touching a halogen or metal halide bulb knows that they are extremely hot. This means that much of the bulb's energy is dissipated in the non-visible infrared frequency. By the same measure, standard fluorescent bulbs and LEDs

generate non-visible ultra-violet. Concentrations of invisible light do little to enhance the gem's presentation. However, light acts in a similar fashion to radio waves and sound waves to create harmonics and complementary or cancelling wavelengths. We are all familiar with the principles of noise-cancelling headphones where opposing sound waves can create silence. Within the molecular lattice of a diamond, light is reflected and bent to create the phenomenon known as "brilliance." The cut of the stone will determine how light moves into the gem, within the gem, and out of the gem. An unbalanced light source such as fluorescent, halogen, metal halide, and LED can generate alternating wavelengths that cancel each other out within the stone. This is known as "destructive interference." The result can be a dull or flat appearance in an otherwise beautiful gem. In contrast, a balanced spectrum with the right color rendition index (CRI) and color temperature can generate "constructive interference" that actually amplifies visible light wavelengths within the stone. This creates a glistening effect commensurate with the stone's cut and quality. When a white or color diamond is viewed under Gem-Bright™ lighting, the appearance provides the most likely performance of the stone under all lighting circumstances… and in particular, under natural sunlight.



Rubies, sapphires, emeralds, and other color gems are equally sensitive to light source. If a ruby is presented under light with a red spectral bias (fluorescent, halogen, LED, incandescent), it can take on excessive color depth that will assuredly wash out under natural daylight. The same stone viewed under a blue spectral bias will gain a purple hue that is not necessarily inherent in the ruby's true color.

The more balanced a spectrum is from ultra-violet into red, the more uniform the refraction. The higher the color rendition index, the more accurate the perception of true color. The higher the color temperature as measured in Kelvin, the more white and bright the light. Consider the northern light spectrum illustrated below. Notice the uniformity of light from end to end. This is the ideal light for viewing white or fancy color diamonds and gem stones.

The Critical Gem-Bright™ Difference –

Popular lamps for jewelry displays include SoLux halogen ranging in color temperature from 3500K for colored gems, pearls, semi-precious minerals (malachite, lapis lazuli, etc), and metals (gold, platinum, palladium, silver) to 4100K for diamonds. In general, available color temperatures have been limited to 4500K and under.

Gem-Bright™ lamps range between 5000K for colored gems to 6500K for diamonds and metals. The extraordinary white light eliminates color bias within any faceted stone while presenting the true nature and texture of metals and minerals. The lamps incorporate a spectrally tuned nano-reflector that diffuses light in the correct geometric proportions and wavelengths. There is just the right balance in the violet range to reveal florescent properties without exaggerating blue hues within the stone.

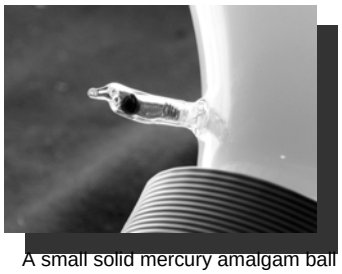
Alternative light sources like metal halide, incandescent, and fluorescent can lose between 20% and 40% of their original luminosity within the first third of their lifecycle. This means that the light you began with using a new lamp or bulb quickly deteriorates. This causes a loss of consistency even when viewing under the same light source. Gem-Bright™ lamps retain 95% of their original luminosity over a remarkable 100,000 hour projected lifecycle… the equivalent of eleven years burning 24 hours/7 days per week.

Gem-Bright™ fixtures have a color rendition index exceeding 85. This means colors appear "true" without bias from the light source. Magnetic induction lights (MILs) have no electrodes and are not subject to flicker. This prevents eye fatigue often associated with LED, metal halide, halogen, and fluorescent lighting. Gem-Bright™ lamps are only warm to the touch. They generate very little heat and are comfortable to work under.

Consider differences at a glance:

FEATURES	HID	CFL	LED	Gem-Bright™	Other MIL
100,000 hour life cycle (11 yrs @ 24hrs x 365 days)	No	No	No	**YES**	Yes
50% energy savings	< 30%	< 30%	Some	**YES**	Some
Gem-Bright™ Spectral Technology	No	No	No	**YES**	No
Proprietary Geometry	No	No	No	**YES**	No
Instant strike - no warm up or cool down	No	Yes	Yes	**YES**	Yes
Full Spectrum with CRI > .85	No	Few	No	**YES**	Some
Color Temperatures up to 6,500K	No	No	No	**YES**	Some
Exceptionally high power factor > .95	No	No	No	**YES**	Yes
Unparalleled Warranty 5 years 50K hrs	No	No	No	**YES**	Some
Fully recyclable, no special disposal	No	No	No	**YES**	Yes
Lease Financing Available	No	No	No	**YES**	No

Gem-Bright™ technology provides a major environmental feature that goes beyond lighting. Today's environmental awareness and our sustainability needs are addressed by the "Green" nature of MIL fixtures. Unlike fluorescent bulbs and other lighting that uses dispersed mercury, MIL bulbs employ an encapsulated solid mercury amalgam slug that can be clipped and recycled. There are no PCBs or circuit boards like LED lamps. MIL glass bulbs are 100% recyclable. Even the induction magnets can be sent back to Ultra-Tech™ Lighting for recycling or simply disposed of as metal.



A small solid mercury amalgam ball is easily and safely snapped off for recycling. Magnets are recyclable metal, and the remainder of the bulb is disposable glass.