Announcement

LED-Based Lamps Used in Explosion-Proof Lighting
Global Market Forecast 2015-2022

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LED Lamps Used In Explosion Proof Lighting
Global Market Forecast
2015-2022

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Report Description

This is the ElectroniCast analysis and forecast of global market consumption of LED-based lamps used in explosion-proof lighting.

This market forecast of the American, European/Middle Eastern and African (EMEA), and Asia Pacific (APAC) regional consumption is presented for selected LED-based lamps in selected applications, which require explosion-proof lighting solutions.

For the purposes of this study, ElectroniCast defines explosion proof lights (also known as hazardous location lighting and intrinsically safe lights) as lighting products, which are certified in accordance with and compliant to International regulative and safety standard bodies for use in areas where flammable petrochemical vapors and/or pulverized dust exist or have the potential to exist.

The information is presented in easy-to-follow illustrations and text. The LED explosion-proof lighting market environment is discussed. LED lighting technology overviews, trends and analysis are presented. Terms, acronyms, and abbreviations used are defined.

Working environments that contain explosive gases or dust are extremely volatile environments. All it takes is a single spark to cause an explosion. A variety of lights are available that are considered explosion proof lighting because they prevent any possible ignition sources from being exposed to the air.

Lights are a common cause of explosion ignition. Low energy light fittings can help to prevent explosions because they do not produce enough energy to ignite source materials. This intrinsically safe equipment, though, can sometimes provide low quality lighting.
In the process of this market research project, in addition to interviewing existing customers and potential customers of LED-based explosion-proof lighting, ElectroniCast Consultants also studied lighting manufacturers with various ranges of hazardous area lighting products, which are suited to use in high-risk areas. The lighting fixtures are designed for situations where explosive gases and dusts are found, providing suitable lighting without enabling a risk of explosion.

The light emitting diode (LED) market, despite exciting innovative devices driven by technological advances and ecological/energy-saving concerns, still face challenges in overcoming performance/price limitations and in attracting widespread consumption.

This report, by ElectroniCast Consultants, provides the research findings of our study of the global consumption of Light Emitting Diode Lamps, which are used in luminaires in solid-state lighting (SSL) Explosion-Proof Lighting applications.

The term "solid state" refers to the fact that light in a light emitting diode (LED) is emitted from a solid object, which does not contain moving parts or parts that can break, rupture, shatter, leak or contaminate the environment—a block of semiconductor—rather than from a vacuum or gas tube, as is the case in traditional incandescent light bulbs and fluorescent lamps.

Compared to incandescent lighting, LED-based solid-state lighting (SSL) delivers visible light with reduced heat. In addition, its solid-state nature provides for greater resistance to shock, vibration, and wear, thereby significantly increasing its lifespan.

**LED Level Quantified in the ElectroniCast Study**

Below, are five levels (or "food chain") pertaining to the LED marketplace. For the purposes of this ElectroniCast study, we quantify and provide a market forecast for “Level 4”

- Level 1 - The chip or die
- Level 2 - The LED component (packaged LED)
- Level 3 - LED array; may include optics, heat sink and/or power supply
- **Level 4 – Lamp and Immediate Explosion-Proof Packaging**
- Level 5 - Luminaire (light fixture/lamp holder/exterior brackets)

The following regions are quantified in this study report:

- America (North, Central and South America)
- EMEA (Europe, Middle East and Africa)
- APAC (Asia Pacific)

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This report provides the 2015-2022 forecast by the following functions:

- Consumption Value (US$)
- Quantity (number/units) – Lamps only (not the fixtures)
- Average Selling Prices ($, each)

The value is determined by multiplying the number of units (lamps) by the average selling price (ASP) in US Dollars. The ASPs are not retail prices; the prices are based on the price of the LED lamp at the initial factory level (prior to FOB – Free On Board). The value is then based on the end-use application in each region.

During the market research process, ElectroniCast analysts perform interviews with authoritative and representative individuals in the LED and lighting industry, plus – R&D and industrial/factory/manufacturing, from the standpoint of both suppliers and users of explosion-proof LED lighting products.

**Market Forecast Product Categories**

This market forecast of the worldwide consumption is presented for four (4) major lamp-type categories, as shown below:

- Spot, Flood and General-Area
- Linear: Tube and String/Strip
- Small portable-type: Flash lights, wearable headlamp
- Specialty, Panel and Miscellaneous

**Market Forecast Sub-Application Categories**

This market forecast of the worldwide consumption for LED lamps used in explosive-proof lighting is presented for four (4) major end-user group (sub-application) categories, as shown below:

- Power Plants, Pumping Stations, Substations
- Military Bases, Airports, Other Transportation Facilities
- Gas Stations, Paint-Spray Booths, Other Commercial/Industrial, Other/Non-Specific
- Oil Fields, Oil Refineries, Offshore Oil Platforms, Oil Tanks, Tunnels, Wharf, Mining and Other Similar

Increasingly, the automatic assembly and test manufacturing process for LED solid-state lighting products allow for mass-production capability. In addition, over the next few years, the average selling prices of the LED-based lighting products will be driven lower, as a result of production efficiencies, yield improvements (aided by quality controls), competition (both market competition and technology competition), marketing/sales distribution improvements, and other factors.
**Market Opportunity Analysis – Market Dynamics**  The study process by ElectroniCast Consultants takes into account the following points:

- Standards (including general regulations & standards, environmental issues, etc.)
- Policies and schemes for promoting the penetration of LED lighting
- Industry trends in LED lighting fixtures
- Distribution/Sales Channel
- LED Explosion-Proof Lighting competitive environment is considered

Since the light output of individual light-emitting diodes (LEDs) is small compared to incandescent and compact fluorescent lamps, multiple diodes are often used together. With continuing improvement of diode technology, high power LEDs with higher lumen output is enabling the replacement of other lamp technology with LED lamps.

Luminaries are lighting fixtures complete with the light source or lamp, the reflector for directing the light, an aperture (with or without a lens), the outer shell or housing for lamp alignment and protection, an electrical ballast (if required), and connection to a power source, and usually a socket to hold the lamp and allow for its replacement.

The light emitting diode (LED) market, despite exciting innovative devices driven by technological advances and ecological/energy-saving concerns, still face challenges in overcoming performance/price limitations and in attracting widespread consumption.

**Consumption Value Forecast**  The global consumption value of LED-based lamps in explosion-proof lighting is projected to reach $172.5 million in 2015. During the 2015-2022 timeline, ElectroniCast forecast that the consumption (use) value is set to increase at an average annual rate of 8.4 percent to $303 million in the year 2022. The Europe, Middle East and African (EMEA) region, driven by its use of explosion-proof lighting in the oil-related industry, is forecast for slightly faster growth than the American region. Market forecast data in this study report refers to consumption (use) for a particular calendar year; therefore, this data is not cumulative data.

In terms of value, the Asia Pacific (APAC) region is forecast to grow at a faster pace versus other regions during the forecast period, driven by use of the LED lamps in the commercial/ industrial (factory) application. The American region (South, Central and North America) region, pushed initially by the mining and oil-relation sub-applications and is forecast later-on to hold strong market positions in commercial/industrial, mining/oil-related, as well as the military and transportation-oriented sectors.

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*All values and prices in this report are at factory as-shipped levels, and are in current dollars, which include the effect of a forecasted 5 percent annual inflation rate over the forecast period.*
The Specialty, Panel and Miscellaneous lamp category is forecast to increase at the fastest pace during the forecast period. ElectroniCast market research shows that LED lamps specifically designed and tested for use in (explosion-proof / harsh environment) application-specific fixtures will continue to increase in consumption value at a steady pace.

In the General-Area lighting application, the large range of existing (relatively common) LED-based spotlights and various-types and sizes of standard-appearance bulbs or globes, have already found their way into the explosion-proof lighting fixture marketplace.

Eventually, LED-based linear (tube) lamps, which are ideal candidates to replace fluorescent tubes, are forecast to find a niche in the explosion-proof lighting arena. The prime market target for the LED linear Tube is lighting for Paint Spray Booth/Facilities. The fluorescent tube has long been an acceptable lighting solution explosion-proof lighting fixtures, due to relatively high efficiency and long life. LED efficiencies are set to exceed those of fluorescent tubes, with dimming and controllable color rendering readily achievable.

Another product category that we quantified and are presenting a market forecast for in this ElectroniCast study is the LED lamps used in harsh-environment or more specifically explosion-proof portable flashlights, which also include wearable headlights (such as headlights used in the mining industry).

The Gas Station, Paint Spray Booth and Commercial/Industrial category is projected to lead in relative market share of the global consumption value with 49 percent in 2015. The Oil and Mining related industry category is relatively saturated in the use of lighting requirements, versus the other application categories.

The Military Bases, Airports and Other Transportation category is forecast with gradual and steady growth, based on the large number of end-user facilities, potential expansion and Total Available Market (TAM).

ElectroniCast Consultants also views the Power Plants, Pumping Stations and Sub-stations category as relatively saturated in terms of use of explosion-proof lighting, but not necessarily LED-based explosion-proof lighting; therefore, as replacement for existing lighting fixtures, which use non-LED (incumbent-technology) lamps, is required, LED-based units are forecast to take market share.
According to ElectroniCast, the Gas Stations, Paint-Spray Booths, Other Commercial/Industrial leads in market share in 2015...

LED Lamps Used in Explosion Proof Lighting
Global Consumption, By Type ($172.5 Million in 2015)
Source: ElectroniCast Consultants

Market Research Methodology

Market analysis and technology forecasting are complex tasks. Any predictions of the shape and trends of technology and economic movement start from the notion that the germ of what will be important tomorrow is present, although smaller or larger or in a different form, in our environment today. However, taking as a basis for a prediction the assumptions of current, conventional belief creates a set of preconceived notions that can lead to serious mistakes. ElectroniCast, instead, looks to the basic driving forces.

Information Base

This study is based on analysis of information obtained continually over the past several years, but updated through the beginning of January 2016. During this period, ElectroniCast analysts performed interviews with authoritative and representative individuals in the LED manufacturing (materials, integrated circuits/circuit boards, packaging, devices, connectors/pins/end-caps, plastic, aluminum and glass manufacturers, associated parts/pieces, fittings/fixtures) and military/aerospace, harsh environment concerns, painting (paint spray booths), oil/gas and mining, power generation/nuclear, industrial/manufacturing, mass transit authorities, transportation/infrastructure, R&D, gas stations/service...
stations (lighting distributors), government, and other. The interviews were conducted principally with:

- Engineers, marketing personnel and management at manufacturers of LEDs (chips, components, lamps and fixtures) as well as other technologies
- Design group leaders, engineers, marketing personnel and market planners at major users and potential users of LEDs
- Other industry experts, including those focused on standards activities, trade associations, and investments

The interviews covered issues of technology, R&D support, pricing, contract size, reliability, documentation, installation/maintenance crafts, standards, supplier competition and other topics. Customers and distributors were interviewed, to obtain their estimates of quantities received and average prices paid. Customer estimates of historical and expected near term future growth of their application are obtained. Their views of use of new technology products were obtained.

The analyst then considered customer expectations of near term growth in their application, plus forecasted economic payback of investment, technology trends and changes in government regulations and funding/tax-break legislation/rules in each geographical region, to derive estimated growth rates of quantity and price of each product subset in each application. These forecasted growth rates are combined with the estimated baseline data to obtain the long-range forecasts at the lowest detailed level of each product and application.

A full review of published information (secondary research) was also performed to supplement information obtained through primary research (interviews). The following sources were reviewed:

- Professional technical journals and papers
- Trade press articles
- Technical conference proceedings
- Product literature
- Company profile and financial information
- Additional information based on previous ElectroniCast market studies
- Personal knowledge of the research team

In analyzing and forecasting the complexities of worldwide markets for light emitting diode products, it is essential that the market research team have a good and a deep understanding of the technology and of the industry. ElectroniCast consultants who participated in this report were qualified.

**Bottom-up Methodology** ElectroniCast forecasts, as illustrated in the forecast data structure, are developed initially at the lowest detail level, then summed to successively higher levels. The background market research focuses on the amount of each type of product used in each application in the base year (last year: 2015), and the prices paid at the first transaction from the manufacturer. This forms the base year data.
ElectroniCast analysts then forecast the growth rates in component quantity use in each application, along with price trends, based on competitive, economic and technology forecast trends, and apply these to derive long term forecasts at the lowest application levels. The usage growth rate forecasts depend heavily on analysis of overall end user trends toward equipment usage and economic payback.

About ElectroniCast

ElectroniCast, founded in 1981, specializes in forecasting technology and global market trends in fiber optics communication components and devices, as well providing market data on light emitting diodes used in lighting.

As an independent consultancy we offer multi-client and custom market research studies to the world’s leading companies based on comprehensive, in-depth analysis of quantitative and qualitative factors. This includes technology forecasting, markets and applications forecasting, strategic planning, competitive analysis, customer-satisfaction surveys and marketing/sales consultation. ElectroniCast, founded as a technology-based independent consulting firm, meets the information needs of the investment community, industry planners and related suppliers.

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LED-Based Lamps Used in Explosion-Proof Lighting
Global Market Forecast and Analysis

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