3M LED Lighting Solutions
More Light.
More Control.
Less Energy.
3M Optics Enable.

3M™ Enhanced Specular Reflector (ESR) puts some of the world’s most reflective surface into your luminaire. That reflectivity is an extraordinary advantage, but it’s what you can do with it that will revolutionize your designs. We offer 3M ESR as a standalone product—either as a sheet or a tape. We also offer it with an adhesive backing that allows it to be laminated to a variety of substrates, including paper, cardboard, metal, plastics and fiberglass materials. 3M ESR can be easily die-cut, cold embossed, punched, perforated and folded into a wide range of shapes and sizes.

- 3M ESR is super-reflective and when combined with its other properties, it can virtually eliminate many traditional constraints: It does not corrode. It does not conduct electricity. It does, however, conform to a variety of surfaces. As the examples presented in the following pages show, this combination of properties enables system innovation in efficiency, size, and overall optical performance.

- 3M’s engineered light-steering and diffuser materials are also available as standalone products or with a backing of the 3M optically clear adhesive. As with 3M ESR, our light-steering and diffuser materials can be pre-cut to your specifications for easy integration into your luminaire design.

- 3M also offers optical components based on its reflective, diffusive and light-steering films. One example is the 3M™ Collimating Horn, which gives luminaires excellent efficiency, angular control and color quality, relative to conventional materials.

Differentiate your lighting products with breakthrough materials from 3M. Enabling the use of less energy, less weight, and delivering exceptional value.

3M catalyzed the LED digital display industry by working with our customers to drive innovation and redefine what’s possible. Televisions, smartphones and other digital displays have migrated to economical, energy-efficient LEDs—a transition enabled in large part by 3M light management technologies.

Now 3M is applying many of those same technologies to the transformation of LED lighting. As LEDs replace incandescent and fluorescent bulbs, our materials and components promise lighter, brighter, more adaptable luminaires that use less energy.

- Reflective materials—available as sheets or tapes, with or without an adhesive backing—some of the most efficient reflectors available today. This gives you excellent performance in collimating and transporting light, while being amazingly lightweight and easy to cut, shape and form.

- Microstructured light-steering materials—also available in multiple formats—can be tailored to put illumination where you need it, maximizing visual impact and minimizing energy consumption.

- Diffusion materials soften or eliminate LED hotspots. This means fewer LEDs, more spatial and color uniformity and a more satisfying visual experience.

- Optical adhesives allow users to mount diffuser and light-steering materials with a minimal impact on transmission efficiency.

- Digital diffusers use LCD technology to enable low power, remote switching. This technology delivers a new level of intelligent lighting controls—empowering users to transform a luminaire’s output from flood to spot lighting with the simple push of a button.

In the display industry, we have built long-standing customer relationships and delivered exceptional value by applying science to light. We transformed the status quo through the rigorous commercialization of new materials, delivery formats and optical architectures. Now, we are sharpening our focus to deliver world class optics to LED lighting.

Our promise is simple: engage us, challenge us and we will work passionately to deliver enabling solutions.
Refrigerated Display Illumination:

More light with less energy, using the 3M™ Light Tube

Around the world, regulatory agencies are implementing new rules for the energy consumption of refrigerated displays. U.S. equipment manufacturers, for example, need to reduce their power consumption by up to 30 percent. At the same time, food and beverage companies are urging equipment makers to improve the quality of light in their refrigerated displays.

The 3M Light Tube, a model design, demonstrates how both the efficiency and quality of refrigerated displays can be addressed. The design is a directional light tube, consisting of a polycarbonate tube with an LED at one or both ends. The interior of the tube is partially lined with 3M Enhanced Specular Reflector (ESR) mirror film. An aperture running the length of the tube is covered with a strip of microstructured film that extracts and directs the light.

Light injected from the LED(s) reflects off the 3M ESR as it moves down the tube; this produces spatial and color uniformity. As light exits the tube through the aperture, the microstructured light-steering film concentrates it on the display case contents.

The 3M Light Tube helps enable brighter displays that consume less energy than conventional fluorescent, incandescent, and even LED strip lights. The design also isolates heat within the display as the LEDs are at the ends of each tube. When heat and lighting efficiencies are taken into account, the 3M Light Tube can help improve application efficiency.

Linear lighting is ubiquitous and where quality and efficiency matter—the 3M Light Tube offers clear advantages over fluorescent, incandescent and alternate LED lighting options.
Pop-Up Lighting:

Ultra-lightweight, flexible and portable illumination with the 3M™ Air Light

Unless you travel with a team of roadies, you need your temporary exhibit to be lightweight. It needs to be easy to assemble and take down. And it has to be adjustable: what worked in Albuquerque won’t necessarily work in Detroit.

In particular, the fixtures and scaffolding needed to light temporary exhibits can be heavy, cumbersome to put together, and inflexible. That translates into inconvenience, time, and expense.

3M Air Light demonstrates another approach. 3M Enhanced Specular Reflector (ESR) mirror film is laminated to cardboard which can be cut to form a variety of fixture shapes and sizes. This creates a highly efficient, ultra-lightweight luminaire that you can pick up with two fingers.

No other known lighting system combines 3M™ Air Light’s versatility, weight reduction, and portability. The remarkable ease of customization opens entirely new options for creating a stunning visual environment.

With 3M Air Light, it’s easy to design a unique luminaire with apertures that put light where you want it. In less than 15 minutes, you can create the look and feel of architectural lighting at a fraction of the cost.

3M™ Ducted Lighting:

An economical, energy-efficient solution for retail, commercial and industrial applications.

Data centers and long aisles are typically lit with linear LED or fluorescent bulbs. In order to create an environment where light is placed where it is needed, 3M Ducted Lighting provides a system level solution that can reduce installation, maintenance and operation costs while providing uniform, efficient lighting.

This model design begins with an array of LEDs, their light guided by 2.5-inch deep collimating horns formed from 3M™ Enhanced Specular Reflector (ESR) mirror film. The light is transported along a duct that is also lined with 3M ESR and emitted through an aperture that’s designed specifically for the application.

This architecture provides breakthrough opportunities in luminaire design and maintenance:

• 3M Ducted Lighting can be easily tailored to your specific needs: the ducts can be equipped with apertures and light-steering films to put the light where it’s needed.

• The LEDs can be located for excellent efficiency and convenience. In a data center or a refrigerated warehouse, this means heat generated by the LEDs can be managed outside the temperature-controlled space. They can also be located far away from sensitive or hazardous equipment, minimizing risk and downtime during maintenance. This provides the convenience of low installation and maintenance costs for remote source lighting.

• Because component replacement and upgrades are easy and fast, you’ll never hesitate to improve the efficiency of your system.

The net result is a modular, scalable, future-proof design that delivers quality illumination with improved application efficiency.
3M Delivers: How we can do what others can’t.

Multilayer optical films
The first 3M films were developed as tape backings. Over the decades, we’ve transformed our manufacturing capabilities to make nano-layered films that can—among many other uses—enhance brightness in LCD displays, block UV light from passing through windows, and carry daylight deep into buildings. In some instances, our films combine hundreds of layers (some just 15 nanometers thick, much less than any wavelength of visible light) in the thickness of a piece of paper. These amazing constructions can be tuned to transmit or reflect specific wavelengths and states of polarity. 3M Enhanced Specular Reflector (ESR) uses this multilayer technology to create one of the world’s most reflective surfaces, which is used in lighting fixtures to minimize absorption and increase efficiency.

Microreplication technology
Since the mid-1960s, 3M has pioneered the manufacture and use of films patterned with tiny, precisely shaped structures; these structures give materials new physical, chemical, or optical properties. Our microreplicated prisms are used in road signs, electronic displays, and exterior building illumination to capture and reflect light more brilliantly. Today, we manufacture optical films with structures on one or both sides to tailor the film for our customers’ purposes: we can concentrate and direct light for maximum efficiency or scatter it to create spatial and color uniformity.

Optical adhesives
3M is a world leader in adhesive technology. We’ve invented adhesives so strong they can hold a structural panel to a building...and others so gentle they yield to a child. Because 3M engineers its adhesives to fit our customers’ needs, they are used in such diverse products as airplanes and cell phones, automobiles and medical dressings. In the lighting industry, our optically clear adhesives ensure that light will pass through a lens or other substrate after a steering film has been applied. We also offer diffusive adhesives that can help to reduce hotspots and improve uniformity. And, of course, we have more conventional adhesives to ensure that reflective films and tapes stay firmly and evenly attached to substrates.

Vision science
3M scientists have spent decades analyzing how viewers are affected by all the attributes of a display screen—the color gamut and temperature, brightness, contrast, viewing angle, resolution and more. We’ve even developed a tool called the 3M™ Display Quality Score (DQS) that integrates many of these variables into a single score. Now we’re applying that expertise to lighting, helping our partners achieve better visual performance with less weight and an excellent total system cost.
Partner with one of the world’s top technology companies.

When you work with 3M, you aren’t just working with one lab or one division. You’re gaining access to one of the world’s most advanced and extensive technology companies.

3M has over 80 years experience with light management, from early traffic signs to high-resolution smart phone displays. We understand color, heat mitigation and adhesives.

We’re also masters of highly efficient, roll-to-roll manufacturing: from multilayer optical films with layers that are a few nanometers thick to microstructured films with optical prisms…and then we developed the equipment to make it by the mile. This means we have an long-standing capacity to meet your current and future demands.

We’re eager to share our expertise with our partners and—with operations in more than 70 countries and laboratories in 36—we’re never far away. Our 8,500 researchers are there to provide technical support, from testing to prototyping, that will help keep your operations at the forefront of today’s technology and manufacturing.
3M LED Lighting Solutions

Precision Illumination from 3M
Bright, bold… and energy-efficient