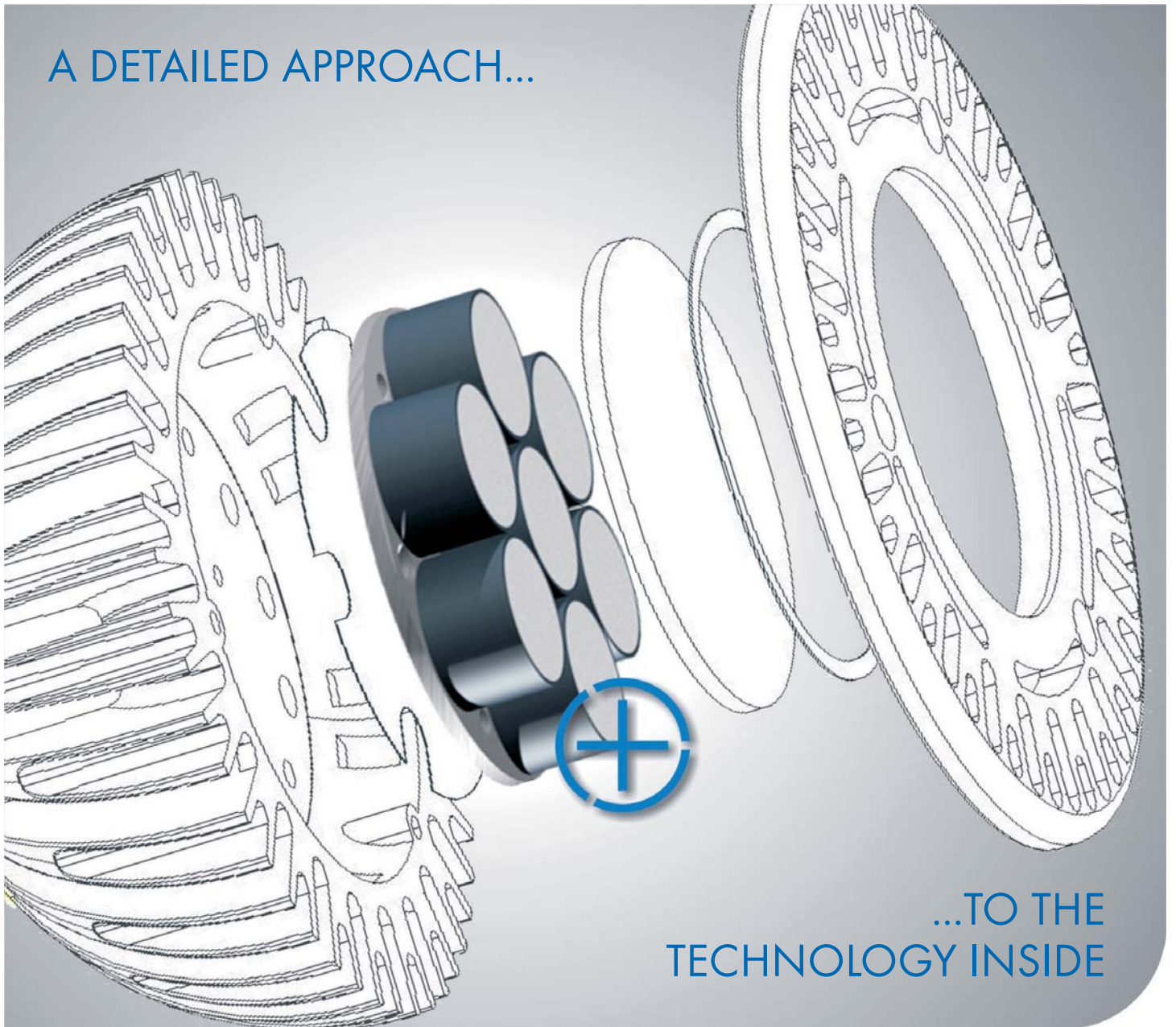




forge europa

LED LIGHTING EXPERTS

A DETAILED APPROACH...



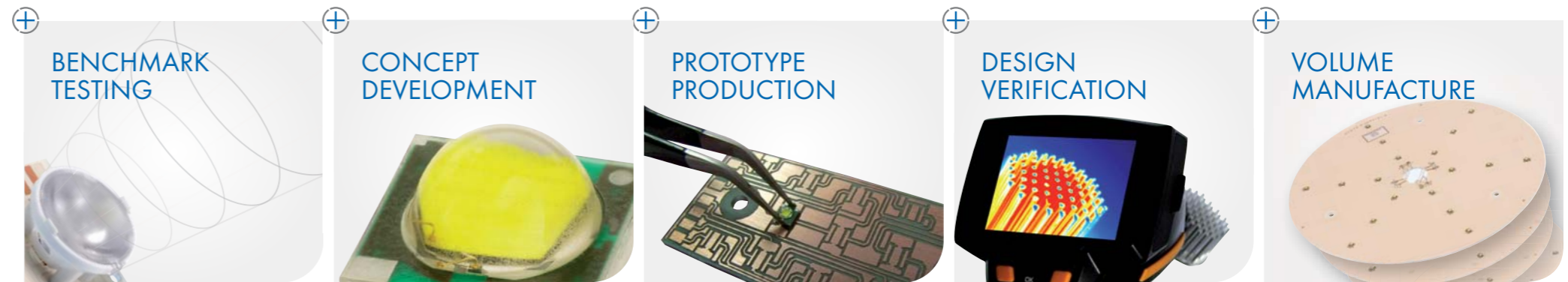
...TO THE
TECHNOLOGY INSIDE



www.forge-europa.co.uk

OUR EXPERTISE DELIVERS QUALITY AND RELIABILITY

Forge Europa offers a comprehensive portfolio of expert design, development and manufacturing capabilities, enabling the optimal development of reliable and ultra-efficient LED based lighting solutions:



BENCHMARK TESTING

Benchmark performance testing is an important first step in the development of a successful LED based lighting product, particularly if you are looking to integrate LED technology into an existing fitting or luminaire design.

As part of our design process we will evaluate your existing luminaire using our in-house photometric testing facilities to gain the initial performance data upon which our engineers will base their LED design proposals.

The benchmarking process typically involves the measurement of key characteristics including light output, colour temperature and beam pattern to ensure a successful transition to LED technology from more traditional lighting approaches.

Our ability to undertake such comprehensive testing centres around our in-house R&D laboratory that includes a near-field goniophotometer, integrating spheres, a desktop spectral/goniometric analyser alongside a wide range of equipment for the accurate measurement of parameters such as operating temperatures and power consumption.

CONCEPT DEVELOPMENT

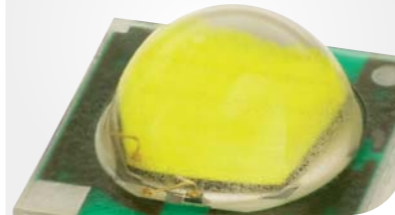
Concept Development to Detailed Design

Following on from initial benchmark testing of your luminaire, or upon receipt of comprehensive performance specifications, our design team can begin the process of examining routes to achieving a fit-for-purpose LED solution suitable for your end application.

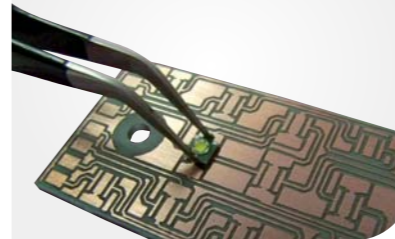
LED Device Selection

Our engineering and sales team have extensive experience in the selection of LED components, examining a wide range of characteristics to ensure the selection of the best LED device to suit the end application whilst taking into account the unique nature of your specific product.

CONCEPT DEVELOPMENT



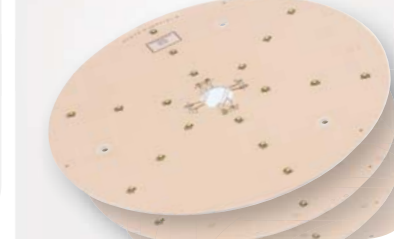
PROTOTYPE PRODUCTION



DESIGN VERIFICATION



VOLUME MANUFACTURE



Some examples of the criteria we use as part of our evaluation include:

- Typical lumen output
- Colour temperature (CCT)
- Colour Rendering Index (CRI)
- Thermal resistance
- Lifetime
- Efficiency

Alongside these quantitative measures of the LEDs performance, we also remain conscious of any cost considerations that may impact upon the commercial viability of the product.

Forge Europa always select the best LED device for the application. As a designated Cree Solutions Provider we specialise in the use of the Cree XLamp™ range of lighting-class LED components, more information on the specific components within the range is available at www.forge-europa.co.uk

PCB Materials

The foundation of any LED lighting product is the printed circuit board (PCB). This material provides the electrical and thermal connections that allow the LED to function effectively. Typically there are two PCB material options when using lighting-class LED components, FR4 or IMS.

FR4 materials, often with through-hole plated thermal vias, offer a cost effective substrate that can cater for a wide range of applications generally in the lower power area.

Insulated Metal Substrate (IMS) is a far more high performance material, offering excellent heat dispersal characteristics by allowing rapid conduction of heat through the PCB to the underlying heat-sinking and eventually the surrounding environment. Opting for IMS PCB technology allows for the development of high power designs that can deliver outstanding performance and long life.

Optics and Thermal Management

The design and manufacture of LED based lighting products extends well beyond the mounting of LEDs onto circuit boards. A well designed product must take into consideration optical and thermal factors that can impact upon the efficiency and practicality of the finished luminaire.

Optical design often starts with a target lux level at a prescribed distance in combination to a desired beam pattern. This can be determined empirically as part of the benchmarking of a product or can be defined as part of the design brief. Our design team will then begin looking at how best to achieve these characteristics using an extensive portfolio of lenses, reflectors and diffuser materials.

Thermal design encompasses elements ranging from the LED component through the actual environment in which the luminaire is intended to be operated. The 'on-board' elements are taken care of as part of the PCB and LED device selection, however it is often necessary for our engineers to advise on wider aspects of the luminaires' design, up to and including the physical construction of the product.

As part of many designs we will create a thermal gasket to suit the layout your PCB. Typically this thermal gasket is manufactured from graphite paper and is sandwiched between the PCB and underlying gear tray or external housing to maximise contact between the circuit board and the secondary heat sinking of the product.

LED Drivers and Control

The adoption of LED technology often requires the consideration of different power supply approaches than you may be used to.

Forge Europa has an extensive range of power factor corrected LED drivers and we can base a custom PCB design around the parameters of these units, alternatively, if you have a specific driver already specified we can take into consideration the performance characteristics of that product into any design we undertake.

PROTOTYPE PRODUCTION

Once we have outlined our design concepts to you on paper and we believe we are on the way to achieving a successful solution, we can then deliver a proof-of-principle prototype manufactured on either FR4 or IMS PCB.

These in-house prototypes use similar materials to those used in volume manufacture so they can be used for design verification purposes in our laboratory and allow you to see how the end product will integrate and perform in your final product.

Following prototype approval, technical specifications including drawings are generated for final sign-off prior to production.

DESIGN VERIFICATION

Similar to the initial benchmark testing procedure, once we have undertaken the conceptual design and production of a prototype LED assembly, we can then progress to carry out a comprehensive testing regime of our LED solution when integral to your luminaire.

This testing will once again centre on the use of our in-house goniophotometer, allowing us to measure a wide range of parameters including lux levels and beam patterns, in addition to generating IES and Eulumdat files suitable for use in professional lighting design software.

VOLUME MANUFACTURE

Forge Europa's volume manufacturing capability covers all disciplines associated with the production of high-quality LED assemblies. From automated pick-and-place SMD assembly and reflow processes to cable looming and burn-in qualification testing.

We offer both UK and Asian manufacturing routes, accredited to ISO 9001:2008.

Quality is built into all our products, from design through to manufacture, by using high performance materials and robust production techniques, and is backed up by expert technical support staff who are available to answer your queries and assist you with any further technical developments.



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LED LIGHTING EXPERTS

SUMMARY

Forge Europa is proud to be at the heart of the solid state lighting revolution. For over 18 years, Forge Europa has been developing, designing and manufacturing award winning LED lamps, LED displays and solid state lighting solutions.

We are experts in our field and recognised globally for your innovative and flexible approach to delivering custom designed LED components and LED lighting solutions.

Our mission is to accelerate the adoption and evolution of LED technology by providing value engineered solutions, delivering design excellence, design support, superior performance and sustainable quality.

We have the expertise, experience and capability to help you with your lighting application, please call our sales team to talk through your requirements on **+44 (0) 1229 580 000** or email us at info@forge-europa.co.uk

www.forge-europa.co.uk



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