



**CAD+**

LIGHTING CONSULTANTS

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PROCESS

## DEVELOPMENT CYCLE

Our development cycle is inherently iterative. Where each of the five elements of the cycle influences the others. These elements are neither linear nor independent but rather they represent the inseparable parts of the whole development cycle. Where each element is as important as the next. These elements are:

### STRATEGY

We create and maintain a clearly defined strategy for all our projects. This helps to clarify the chosen development direction to all stakeholders involved. It also defines the time and effort that will be required to pursue that direction. Based on the outcome of other development activities the strategy is periodically reviewed and where necessary adjusted.

### ANALYSIS

Our analysis can take on various forms and occurs at most stages of the development cycle. The outcomes of our analysis, whether digital or physical in nature, are fed back into the development process. This fuels further strategy reviews and where required further discovery.

### DESIGN

Design activities are driven by the outcomes of the other development activities. After review, designs are iterated and improved. Where necessary several loop backs within the development cycle allow a convergence on a preferred "optimised" solution.

### DISCOVERY

Exploration of the market opportunities and benchmarking of existing products helps us to create meaningful project definitions. Understanding all the positives and negatives of what has gone before allows us to chart a path forward. Clear and concise appraisals of the current state of the art ensures that the chosen design direction is purposeful and not random.

### ENGINEER

Engineering activities ensure robust solutions are produced. Engineering is the scaffold on to which our designs are embodied with high level of confidence. The cyclic nature of our development process ensures all our design solutions are thoroughly engineered. These can then delivered, right first time, whilst remaining on time and on budget.



# PROJECT PHASES

## CONCEPT GENERATION PHASE 1

### CONCEPT EXPLORATION

- + Product Benchmarking
- + Market Evaluation
- + Regulation Research
- + Blue Sky Concept Sketches

### CONCEPTUAL DESIGN

- + Functional Layouts
- + Concept Sketches in 2D & 3D
- + Concept Outcomes Generated
- + Initial Concept Analysis

### CONCEPT HANDOVER

- + Presentation of Design Concept
- + Concept Review Meetings
- + Detailed Information Summary
- + Generate Specifications for Phase 2

## CONCEPT DEVELOPMENT PHASE 2

### CAD / CAE EMBODIMENT

- + Design Intent Captured in CAD
- + Optical System Definition
- + Lit / Unlit Appearance Simulations
- + Visualisation Using Rendering Tools

### CAD / CAE DEVELOPMENT

- + Package Secure in 3D CAD
- + Optical System Embellishment
- + Design Simulations / Analysis
- + Visualisations of Design Intent

### DEVELOPMENT HANDOVER

- + Development Presentations
- + Development Review Meetings
- + A-Surface Data Transfer
- + Generate Specifications for Phase 3

## DESIGN FOR MANUFACTURE PHASE 3

### DETAIL DESIGN

- + Design Iteration
- + Maturation of CAD
- + Design Analysis Reporting
- + Design Reviews

### RFQ DOCUMENTATION

- + BOM / BOQ Definitions & Costings
- + Data Management
- + Documents & Supplier Packs
- + RFQ Submissions & Collation

### RFQ HANDOVER

- + Supplier Nomination
- + Supplier Meetings
- + Data Transfer & Control
- + Generate Specifications for Phase 4

## MANUFACTURING & SUPPORT PHASE 4

### MANUFACTURE SUPPORT

- + Processing & De-bugging
- + Change Control Issues
- + Impact Assessments
- + Product Maturation

### VALIDATION SUPPORT

- + Homologation Documentation
- + DVP Planning & Costing
- + Fixture Design & Sourcing
- + Sample Preparation

### PRODUCT SUPPORT

- + Data Management Advice
- + Continuous Improvement
- + COP Trouble Shooting
- + Technical Marketing Materials

Projects are split into 4 distinct phases and together offer a full-service provision as shown.

Each of the 4 phases are intended to prepare robust foundations for any subsequent phase culminating in a product that is fit for purpose, ready for market and on time.

Comprehensive Phase 1 and Phase 2 activities avoid troublesome downstream issues and any wasted time due to a lack of clarity or direction. The use of both virtual and physical prototyping ensures success along the way.

Phase 3 & 4 both consume significant resources and investment. By using a systematic and thorough approach ensures that all projects run smoothly.

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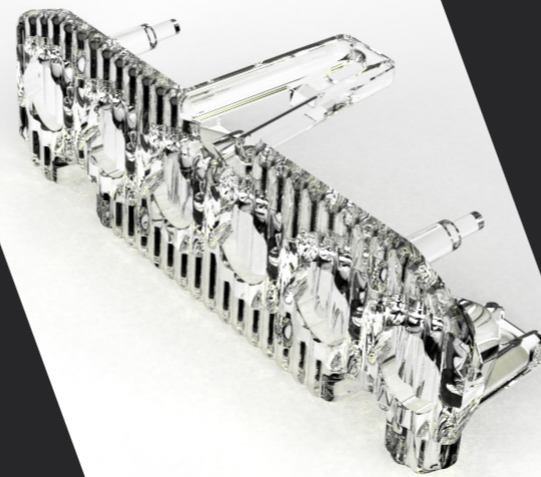
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## FIND OUT MORE

### CASE STUDY #1

Bespoke design of light engine optics plate

- + Designed for volume manufacturer and hard tooling
- + Special Warning Lamp (ECE R65) compliant
- + No physical prototyping required only simulations to verify functionality
- + Design solution is compatible with an outer lens that has multi-angled outer surface
- + Right first time, our optical solution functioned straight off the tool with no corrections required



### CASE STUDY #2

Development of full exterior lamp set for small series 3D printed Hyper car

- + Lamp designs implemented on vehicle validation prototypes
- + Fully functional lamps evolved from client's A-surface data
- + Included both electronics development and vehicle integration
- + Comprehensive lighting simulation to verify lighting compliance of lamps
- + Unique intricate carbon cladding on full width rear lamp

