



## London South Bank University

Product Design Specification – Light and Image Project

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### Introduction:

The Spine, task lamp is designed for use at home or in the office, it is specially designed for use by designers and other creative types who require maximum adjustability not only in the direction and angle of the light but also the intensity and colour.

Set out to be completely cradle to cradle manufactured from recyclable materials the design incorporates repetitive components which keep the amount of tooling needed to a minimum reducing manufacturing times and costs .

The main body features a machined aluminium base which houses the electrical components (control box and IR sensor) and acts as a counter balance for the lighting rig. The spine is comprised of two extruded steel rods which are then rolled into a curve, 13 laser cut aluminium ribs spaced equally are the guide rails for the cable which both keeps the structure of the lamp under tension and also carry electricity from the 12V DC power supply to the LED pods. The pods are machined from solid billets and house the RGB LEDs which allow total control over colour and intensity, these are suspended between the guide wires and can be positioned in customisable arrays depending on the type of light the user requires.

## Specification:

### 1. Performance

- 1.1 The Spine - task light will be used in either the workplace or home,
- 1.2 It will have a small footprint to take up the least desk space possible,
- 1.3 It will have adjustable colour and light intensity and will be able to be positioned for optimum usability.
- 1.4 It will be for daily usage and must remain cold to touch even if running all day.

### 2. Environment:

- 2.1 In use the environment will have no factors that may effect performance.
- 2.2 It is used concurrently with computers and other electronic equipment therefore the environment will already have ideal conditions for use.

### 3. Life in service

- 3.1 The product is designed to last for many years.
- 3.2 The LED will last over 2 years before requiring replacement.

### 4. Maintenance

- 4.1 Due to the cradle to cradle design replacing worn components is quick and simple requiring no specialised tools or excessive force.
- 4.2 Components are designed to last for many years but when replacement is needed the user simply orders them free of charge and replacement parts are dispatched.
- 4.3 If any major faults are encountered the whole product will be replaced free of charge with the faulty lamp being dismantled and all parts reused.

### 5. Target product cost

- 5.1 Selling the product for £80-£110 production cost would ideally be around £40, taking in the cost of all materials, laser cutting of ribs, extrusion of spine, electronics system, suspension cables, and LEDs.

### 6. Competition

- 6.1 There are many other task lights on the market and every major company has their own style.
- 6.2 They all offer adjust-ability and most have a small footprint.
- 6.3 Many of the current models do not offer variable light and colour intensities.
- 6.4 Older models use standard bulbs therefore the LEDs used in my light will need less maintenance.

6.5 The latest competition is the 'Jake Dyson CSYS Task' which has pushed the boundaries of LED lighting, retailing at £500 this is at the higher end of the price spectrum but shows customers are willing to pay for quality and functionality.

## 7. Shipping

7.1 There are no specialised shipping requirements and the standard box allows for easy transportation in any type of delivery vehicle

7.2 Using existing relationships the lamp can be shipped overseas with relatively low cost and opening the product up to the global market (depending on country of purchase the correct connections will be added before dispatch).

## 8. Packing

8.1 There are two options for packaging -  
- Completely assembled in secure packaging to avoid damage in transit  
- Disassembled and flat packed boxed in less space

8.2 The second takes up less space decreasing the eco point values of transportation greatly.

8.3 The boxes will be recycled card with few markings.

8.4 The boxes will be secure enough to be stacked on a standard shipping create and will be designed to not buckle or squash under the weight.

8.5 There will be sections to keep all components separate to avoid scratching.

8.6 Protective plastic will cover the plug and keep the pins straight and true.

8.7 Instructions for assembly, use, care and maintenance will be included in a booklet also including warranty and model number and short company profile and welcome note.

## 9. Quantity

9.1 In the consumer market we estimate 1000 units sold in the first year and continuing to increase year on year

9.2 In the commercial market we see sales exceeding 5000 units by the end of year one .

## 10. Manufacturing facility

10.1 Initial manufacturing of prototypes would be outsourced using companies with expensive rapid prototyping machines.

10.2 In full production most components would be outsourced using companies that specialized in each discipline.

10.3 Specialised parts would be produced in house using the companies 5 axis CNC machine.

## 11. Size

- 11.1 Designed to be used at home or office desk space must be taken into account, therefore dimension constraints are: 100x100x600mm

## 12. Weight

- 12.1 Being a desk lamp, weight is not as relevant as it is not meant for constant movement, during tests the correct weight was found that would counter balance the arm and keep the light secure and upright.

## 13. Aesthetic, appearance and finish

- 13.1 Designed to be used in home or office the design of the lamp will be non offensive and should suit most interiors.
- 13.2 The lamp is designed based on nature, mimicking the curve and flex but not closely resembling one, too much resemblance would give the lamp more of a statement feel.
- 13.3 The thin spine and ribs give the lamp a minimalist profile with the main focus being the light produced.
- 13.4 It will look sturdy but not over engineered as this can often be misconstrued as clumsy.
- 13.5 There will be no paint used making each materials used visible therefore demonstrating greater the cradle to cradle manufacturing techniques.
- 13.6 The manufacturing processes will create the finish, such as lines from laser cutter and CNC machine again highlighting the cradle to cradle design ethics.
- 13.7 The materials used will give a matt finish allowing the quality of the light produced to be the main focus of the lamp.

## 14. Materials

- 14.1 All materials are to be fully recyclable with no permanent fixtures or glue.
- 14.2 They must also be readily available, easily fabricated and contain the required properties (flex in the spine, sheer strength of the ribs and high tension of the wires).
- 14.3 Being an indoor product it will not come into contact with rain or extreme temperatures although the materials used will be resilient to corrosion

## 15. Product life span

- 15.1 The product is designed to last for many years, the minimalist design fitting into any colour or design scheme.
- 15.2 Being cradle to cradle, at end of life all components can be dismantled and reused/recycled.
- 15.3 The LEDs will have a lifespan of over 2 years before replacement is needed.

## 16. Standards and specification

16.1 Products will be to the highest standards conforming with the global agencies and regulations, Europe – TUV and CE, North America – FCC and UL.

## 17. Ergonomics

17.1 The light is designed for easy use, with the pods able to be moved and positioned with no excess force needed.

17.2 Access to the LEDs is via the front of the pods therefore they are designed not to be too complicated and are easily opened for maintenance.

17.3 The main user interface is the remote control, which is designed to sit comfortably in both the left or right hand with all buttons easily reached by users thumb.

17.4 The power supply will be plugged into mains therefore a standard plug is used to avoid complication.

## 18. Customer

18.1 An initial survey was carried out which placed our target market 18+ professionals in a design focussed industry where quality light was a must.

18.2 Focus groups on a sample of the target market were carried out and it was found charging £100 to £200 was an acceptable amount for a quality product.

## 19. Quality and reliability

19.1 Quality features high in the company ethos therefore must conform to the quality rate of 96% fault free units produced each month.

19.2 Each unit will conform to the companies ISO 9002 standard procedures.

## 20. Shelf life (storage)

20.1 There are no shelf life limitations on the product , allowing storage for years without showing wear or degradation.

## 21. Processes

21.1 To keep manufacturing costs to a minimum the majority of the product is manufactured using pre existing techniques such as extrusion and forging.

21.2 An in house 5 axis CNC machine will be used for the more specialised parts overseen by the company technician.

## 22. Time scale

22.1 The time scale of this project runs from February 13 to March 14, with final product ready for sales April 14.

## 23. Testing

- 23.1 Prior to launching , accelerated corrosion tests will be carried out to simulate 10 years' exposure to the environmental condition mentioned earlier.
- 23.2 Fatigue tests will be carried out to simulate 10 years' service along with abrasion tests on any mating surfaces.
- 23.3 All relevant British standard tests must be carried out on every component.
- 23.4 The lights and remote will be tested to ensure optimum lux readings can be recorded.
- 23.5 The full assembly will be tested on an AQL basis with a level of 2.5 for compliance with the performance and environment requirements specified.

## 24. Safety

- 24.1 The earlier mentioned standards and specifications will ensure the safety of the design.
- 24.2 BS 3456, Part 2, Section 232 – Dealing with the safety of household electrical appliances should be observed.
- 24.3 No radiation will be emitted.
- 24.5 The LEDs will be covered to avoid direct viewing.

## 25. Company constraints

- 25.1 Currently no company constraints can be seen.

## 26. Market constraints

- 26.1 The main constraint is that of the electrical connections and electricity supply, therefore the lamp must be usable in every market country.
- 26.2 Another constraint is product cost but this will be set using data collected from competition and market research.

## 27. Patents, literature and product data

- 27.1 The name 'Spine Lamp' is a registered trademark of nyx.
- 27.2 A patent application has been submitted for the flexible spine and pod connection system.

## 28. Political and social implications

- 28.1 None can be seen at this time

## 29. Legal

- 29.1 None can be seen at this time

### 30. Installations

- 30.1 As mentioned the product will come disassembled but the simple design allows for minimum effort during installation.
- 30.2 No additional mounts or brackets are needed.

### 31. Documentation

- 31.1 The product will be delivered with a complete set of manuals customised for country of purchase.
- 31.2 The user manual will include all mentioned earlier.
- 31.3 The service manual will include information on maintenance and contact information for replacements and faulty parts.

### 32. Disposal

- 32.1 At end of life the lamp will be returned to the manufacturer for full disassembly and recycling.

### 33. Economy

- 33.1 Aimed at the more design focused office and home means customers will be more willing to pay for a quality, high performance product.
- 33.2 Made from cradle to cradle components increases the initial price but will increase longevity in the piece.
- 33.3 Due to the style of the product there will be no over engineering, with no unnecessary parts, each component playing an important role.