



# Finishes case study: *Artemide Egle Lamp*



## Introduction

Artemide, leading Italian company in design sector, global leader in house and professional upmarket illumination, has Bruschi as ideal supplier to achieve its aesthetical and functional needs for its products with zinc components. In details collaboration between Bruschi and Artemide has given rise to the Egle lamp project. Bruschi contribution to the product, following Artemide philosophy, was to bring out Michel Boucquillon project purity, using finishing and light structures which turned designer's idea into a concrete product for end users.



## Artemide & Bruschi: industrial co-design collaboration

Artemide collaborated and developed the project with Bruschi, in co-design terms: this partnership gave to Artemide more value in realizing products for end users.

All these ideas lead to create a product aligned to expectations of an Italian illumination company, who is leader in design and innovation.

The process started from a technical draw, updated with Bruschi advices: these suggestions were given in term of internal component structure and finishing, with a consequent saving in economic terms and production time.

The component was simplified during mould creation, thanks to ribs, with solutions that allowed thinner walls and a better surface quality. In this way the surface could be adapted to expected finishing treatment.

In order to obtain a better product Magmasoft simulations allowed a correct filling of the cast product, a fundamental condition for this product which will be plated with a chromium plating finishing to reach aesthetic levels. In addition Bruschi increased inner structure regarding assembly phase, saving on productive times.

This balance between aesthetic and technical element is the condition that allowed Artemide to propose a product which would exalt its design philosophy, but at the same time, obtaining an important saving.

Artemide is a client who embrace Bruschi advices: thanks to its 70 years of experience Bruschi has developed many solutions for leader global companies.



## The product

High aesthetic quality product like Artemide Egle lamp needs perfection of processes to reach client's aim. The correct approach to problem solution in every phase, in constant collaboration with client, in co-design terms, is fundamental to obtain the best shapes choice.

This case study defines the main steps of that: mould design, die casting parameters and finishing phase, that lead to reach aesthetic client needs. It is not just about the entire process, described briefly during introduction, but it is also a focus on productive cycle steps which made difference developing Egle.

### Mould design phase

Due to client's aim, during Egle lamp mould design, is important to deeply analyze feeding channels, ejection systems and thermal balance.

#### *Feeding channels*

Feeding channels are fundamental to guarantee the requested quality of the casted product: to obtain the correct output during finishing phase when is possible to find issues due to die casting. Instead, non - suitable feeding channels can cause defects such as flow marks and air entrapments, which would compromise final results during finishing phase, because these kind of defects would show up after galvanic treatments.

As said before, regarding design and handle feeding channels, considering filling speed is fundament to obtain a quality component.

\* For further information about filling speed parameters in details see below.

#### *Ejection systems*

Another phase to be deeply analyzed regards ejection. Of course a project developed without issues can avoid defects but, in case of non-correct ejection, is important to have abilities to avoid issues spreading during following phases.

In case of non-correct ejection many defects can appear, such as ejector marks and extractor marks. These defects are really complicate to find immediately after die casting, but during finishing phase and chromium plating in particular these defects can manifest clearly.

N.B. Being able to anticipate defects identification, using polishing phase directly on raw product, can avoid resources waste for finishing that will be for rejected product. This means try to figure out the whole process.

#### *Thermal balance*

A correct project approach in terms of thermal balance should give the chance to control temperature during die casting phase. In this case handling incorrectly temperatures can give defects, such as cold flows or hot spots, which can damage aesthetic finishing and final aims for the final result. These problems are easily recognizable for raw product, but the real difficulty is to analyze their deepness: in other words how they are deep in each products. In fact, if the problem concerns the most superficial part of the product, a polish phase can solve the defect but, instead, if defects are deeper, during treatment phase scrap could be produced.

A process simulation is the ideal tool to avoid these issues: to save resource and time before die casting. N.B. As can be observed this finishing of chromium plating is dangerous during mould design phase and is one of the most critical ones, which need more attention on every project detail.

## Die casting parameters

As said before, high aesthetic quality finishing requested by Artemide Egle lamp needs a perfect casted product to avoid scrap during following phases. In mass production terms, once found the correct conformation in manufacturing, repeating processes is the key to obtain the same result for every cycle: is needed a first design process phase orientated to stability and repeatability of principal process parameters, that will determine surface quality for finishing.

In die casting terms there is a selection of process parameters and variables but, concerning this particular project, is important to pay attention on quantity and position of release agent and on filling speed of mould.

### *Quantity and position of release agent*

Among the most important parameters to bear in mind during die casting, there is handling quantity and position of release agent to distribute on mould surface.

A huge amount of release agent create flow marks and blistering on component surface, while release agent lack can produce metal adhesion or metal soldering with huge problems of scratches caused by zinc characteristics: it stays stuck to steel and during ejection phase metal friction cause previous defects.

### *Speed of mould filling\**

In terms of speed of mould filling, during the first and second phase, is needed to be rapid in order to avoid quality problems and other defects above described that could appears during finishing phase.

It is a subtle equilibrium: few millisecond to fill allows to avoid defect on quality surface but, overstepped critical speed, is possible to run into cavitation phenomenon which can lead to erosions of steel mould.



## Finishing phase

As observed, mould design phase and mould parameters management are preparatory to finishing phase: to obtain a high quality finishing, as requested by Artemide, is important to have a perfect cast product, which can be reproduce in mass production terms and have an adequate finishing process. These two important phases, as parts of the entire process, could determine the project success. Obviously finishing phases are fundamental for a product as Egle lamp and, to better develop Boucquillon's idea, Bruschi divided the finishing process in two different phases.

### *Phase 1: Processing technique*

During phase 1, processing technique polishing has been applied on raw product. As for other cycle steps, also in this phase is important to analyze the chance to repeat the process: is appropriate to use automatic systems to guarantee this repeatability of component surface condition after the polishing, and is appropriate to design fixing systems, such as Jig or Fixtures, to close the component during automatic polishing on machines or through robots.

This phase 1 cannot be considered concluded without another washing phase, to eliminate every residual of abrasive paste: without this step the following galvanic phase would be compromised.

### *Phase 2: Galvanic finishing as chromium plate*

At the end of the previous process it is time to add chromium plate finishing: this finishing is composed by layers made of copper, nickel and chromium.

To guarantee an output that reaches Egle lamp quality level requested by Artemide is important to analyze in details galvanic treatment implant. Then is fundamental that this implant is innovative to handle immersion times and control bath concentrations to be used.

In addition is important not to underestimate the study of product hooking system to the structure: first of all to handle hooking point that has not to be visible to products, and to study product orientation compared to electrolytes position.

To obtain more info about the chromium plate finishing please send us an email with your request.



## Conclusions

The previous article has listed a selection of points to work on to mass produce aesthetic quality product aligned to client's requests on time and prices fixed.

Many of these methodologies seem to be simpler and other more complicated: the real difference is a continuous co-design service between suppliers and client and supplier's ability to handle different processes repeatedly in mass production terms.



## **BRUSCHI SpA**

### **Who we are**

For over 70 years we have been working in industrial production in the field of zinc die casting. Over time we've distinguished ourselves for our efficiency, our accuracy, our ability to listen to our customers' needs and our innovative drive in both the design, and technology.

Our technical staff is able to develop innovative and creative solutions, supporting the inventiveness of the customer and its designers.

We use the latest CAD programs which are compatible with both the customer systems and our industrial machines, to make the communication easier and to be able to share every step of the project.

### **SOLUTION-MAKER SINCE 1946**

Bruschi ensures quality across the board to deliver the results you need, contributing to the quality and overall functionality of our customer's business demands.

Over the years we have steadily increased the quality and reliability of our products and the casting process of zinc alloys.

### **Contact**

Bruschi plant is located in Abbiategrasso, about 20 km from the center of Milan, and about 40 km from the Linate and Malpensa airports.

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