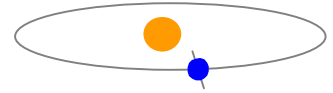


Fluid Optics™ Letter

La lettre des Syzygies



2002, March

EDITORIAL

We have the pleasure to present you the letter of the syzygies of the Spring equinox. We have the honour to welcome miss PESEUX, doctor in history of techniques, which had the kindness to present us a summary of its thesis. You will also find an article on optics used with LEDS.

Les inventeurs de l'Optique Fluide

PRODUCTS

Optics and LEDS

In the previous letter of syzygies, we saw how the luminous efficiency of the internal structure of light emitted diode of last generation has been improved.

We are going to continue on the geometrical optimization of the shape of the chip, the optics, to extract and to shape light emitted with these light

(Continued on page 4)

SUMMARY

Editorial

Products

Optics and LEDS.

History of techniques

" 100 YEARS OF CINEMA With BIG SPECTACLE : History and elaboration of special sizes "

News

HISTORY OF TECHNIQUES

" A 100 YEAR HISTORY OF "SPECTACULAR CINEMA" : Creation and evolution of special-sized formats "

By Valérie PESEUX

Since 1895, the search for the improvement of cinema has been constant, and has revealed a will to renew technical, artistic and sensational resources of the spectacle. Creativity, which originates in the fancy of inventors, poets and promoters, has produced a wide range of inventions and innovations which tend to go beyond limits of a too conventional cinema, and to get closer to the myth of "total cinema". The setting up of "special-sized formats" corresponds to the conception of a striking display, giving the impression of reality, by means of gigantic, three-dimensional images, of multiple sounds and of cinemas' and screens' new concepts. The wish to abolish the traditional size of the screen, and to achieve the audience's maximal field of vision, and the ambition to glorify the technical and sensory combination of the spectacle is recurrent in this parallel history. To place the spectator "in the heart of action", such is the ultimate aim. However, even if these exceptional film experiments (referred to as "spectacular cinema"¹), constitute a great chapter in the cinema history, they are often ignored by historians and art theorists who already have at hand a fascinating subject with the traditional cinema. Consequently, these attempts remain little known to the general public.

The interest in a study on special-sized formats is multiple. On the one hand, we wish to contribute to the

¹ The notion of " spectacular cinema " signifies here a will to create a sensational effect which amplifies the projection and the subject of the film, while usually the phrase implies the massive use of financial means in order to achieve a sumptuous display with stars and walkers-on.

(Continuation of page 1)

awareness and to the recognition of spectacular processes (such as wide-screen formats and panoramic, hemispheric, circular, three-dimensional, dynamic and olfactory cinemas). On the other hand, we hope to enrich previous works, by studying both French and American techniques, as well as their aesthetic, psychological, physiological and social implications. The purpose of this research is not only to review a technical history, but also to apprehend inventions in the context of the traditional cinema industry where the interactions of technical, artistic and financial decisions entail the development or the giving up of new processes.

So, four essential and chronological stages of evolution in the film history are to be distinguished : the change from silent to talking films, from black and white to colour (considered as two revolutions), and finally the use of magnetic then digital recording. Simultaneously, another movement whose importance has been underestimated develops : isolated inventors or producers in search of novelties work out unusual devices they try to impose repeatedly on the traditional cinema. Such a long span of time - a century of history- enables us to grasp from the origins the pattern of research, inventions, innovations, and of certain techniques' industrialization and to understand the direct implementation of special-sized formats in the cinema. In the same way, actors and promoters can be determined.

The essential elements of our reasoning revolve around a main point which aroused our interest : why were special-sized formats integrated into the traditional cinema repeatedly, then rejected most of the time ? Another question, linked to a more recent period of their history, completes our analysis : why are they met nowadays in a restricted channel such as World Fairs and amusement parks ? Does this particular application separates them definitively from the traditional cinema and from their recognition ?

The analysis of creation and history of special-sized formats follows a chronological and thematic plan. Their history is international but we have chosen to focus on France. Three key periods are dealt with.

Part I - The forerunners (1895-1949)

From 1895 till 1949, researches begin and inventions, often short-lived, appear. This initial phase of spectacular shows (where are displayed *panoramas*, dioramas, stereoscopes, etc.) precedes a period of research in the sphere of relief cinema, huge, panoramic, circular and hemispherical projection. This period of time represents a cultural and artistic inheritance where technical utopia holds a significant place. In the 20s, a first attempt at launching wide-screen formats is orchestrated by the American cinema industry, while three French innovators contribute strikingly to the history of spectacular cinema : Louis LUMIÈRE (gigantic projection, *Photorama*, *Photo-stéréo-synthèse* and stereoscopic cinema) Henri CHRÉTIEN (his invention, *the Hypergonar*, resolves three problems : panoramic, relief cinematography and sound registration on reduced formats) and Abel GANCE (his "trptych" is at the origin of the concept of *Polyvision*).

Part II – The development and operating of special-sized formats (1950-1959)

This second part attempts at examining the period of industrialization connected with researches and inventions from 1950 till 1959. Special-sized formats, up to then in the hands of engineers, scientists and artists, are developed and operated in the traditional cinema, and influence deeply the spectacle. A "race for novelties" is highly publicized by the American promoters, and begins in 1952 with the launch of the *Cinerama*. Next, the "format war", and the technical proliferation occur with the following inventions : three-dimensional cinema, *Cinemascope*, *Vistavision*, *Superscope*, *Todd-AO*, *Technicolor*, *Technirama* etc., aimed at transforming film

(Continued on page 3)

(Continuation of page 2)

spectacle (some shall speak of "technical revolution"), and at drawing the attention of the spectators seduced by a new domestic broadcasting media, the television. In France, the launch of these "world fairs" processes provokes many reactions and doubts, even though the industry resorts to a wide range of means to be at the technical "avant-garde", especially thanks to the action and support of the Technical Superior Committee (of the Image and the Sound). As far as Abel GANCE is concerned, he embarks on a struggle to make the paternity of his inventions recognized and challenges the *Cinerama* with a tool, the *Protérama*, and with a new writing, the *Polyvision*.

Part III - Towards new markets : from the cinema to the amusement parks (from 1960 to nowadays)

The third part highlights how special-sized formats start to focus on new markets after 1960. After a large-scale operating in the cinematographic industry, and a constant search for improvements, euphoria declines. Success based on new devices crumbles and the traditional cinema only selects the processes which can ensure further developments, and which do not require too big investments likely to endanger the film industry (*Scope*, *Panavision*, 70 mm etc.). The realization of the technical revolution so much sought for, which announced (according to some people) the cinema of the future, starts distinguishing itself from the traditional cinema and is linked again, as in the past, to the market of big events (World Fairs, amusement parks, scientific and technical museums, etc.). In France, the economic interest of these giant images is understood : *the Planète Futuroscope* and *the Géode* are two examples showing the success of special-sized formats' operating in the field of leisure where the Canadian Imax Corporation has prevailed (almost with an undivided supremacy for more than twenty years). The company is at the origin of this new market of the sensory leisure and of the perfecting of two major processes: *Imax and Omnimax*. As for the traditional cinema, enhanced by its technical achievements in the 50s, it has drastically evolved from a visual and sound point of view and has converged on the spectacular performance of the cinema.

Epilogue : towards the total cinema

In the epilogue, we suggest to summarize the conclusions of this study, to show the driving forces and curbs behind the innovation and the development of special-sized formats, to underline technical continuance and to anticipate their future. Then, we justify the race for spectacular cinema by inventors' quest for a complete representation of reality. On a more theoretical basis, we approach two themes inherent in the technical evolution of cinema generally speaking and in the spectacular cinema in particular : the impression of reality and the perceptive integration of images and sounds. Finally, we define the concept of "total cinema" according to contemporary works : as the "complete cinema" or the technical combination of image, sound and three-dimensional cinema amounting to the "synthesis of arts". Nowadays, promoters' concern incites us to complement these definitions by a third concept, that of "the physical and psychological integration of the spectator in the film by the stimulation of his senses".

This Ph.D was submitted at the national museum and college of Arts and Crafts in Paris, in October, 2001. A project of publication is current with a Paris publisher. But in order to bring this undertaking to a successful conclusion , financial partners would be essential for the issue of a work we wish of a highly aesthetic orientation.

Valérie PESEUX
Doctor of techniques history
vpeseux@worldonline.fr
Phone . 33 (0) 1 43 52 26 69

(Continuation of page 1)

emitted diodes.

EVOLUTION OF THE CHIP

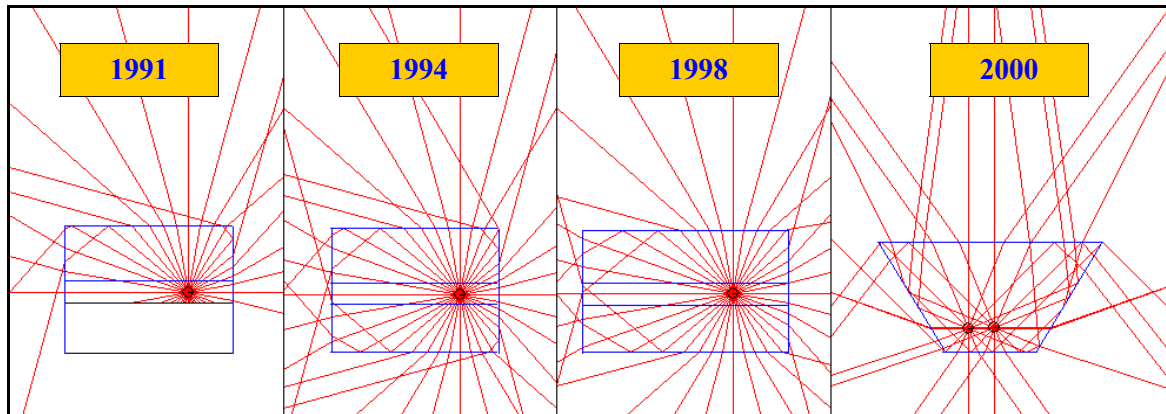


Figure 1 - Evolution of the geometry of the chip in the course of the years

In the 1991's, the chips of diodes were built in cubic forms and on absorbent substrate which absorbed, obviously, a big part of the emitted light.

In 1994, this absorbent substrate was replaced by a transparent substrate which permits enormously to increase the flux emitted by diode. The emitted flux was increased by a factor about three.

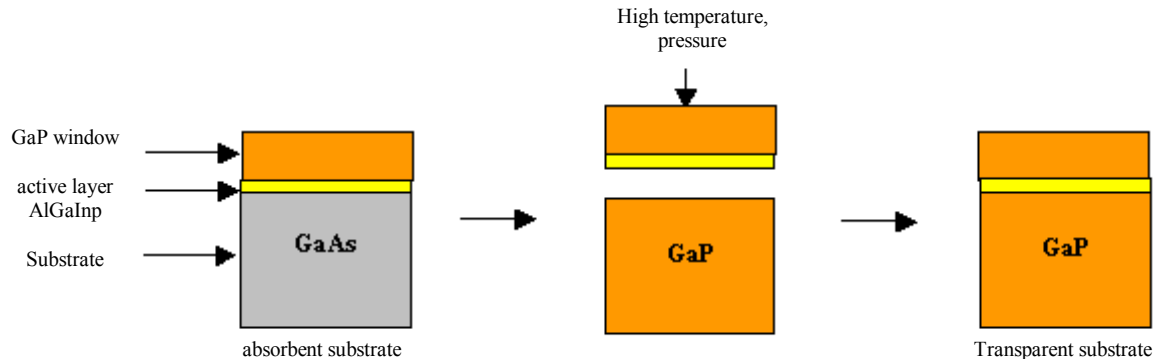


Figure 2 - Manufacture of a LED, in heterostructure AlGaInP, with a transparent substrate

To make the new chip, absorbent substrate GaAs is removed and, under the effect of a high-temperature and-pressure, transparent substrate GaP is stuck.

In 1998, diodes with chips of much more important sizes allowed to increase the flux emitted by a factor about five.

In the middle of 2000, the geometrical shape of the chip was revised and new diodes were built on chips with pyramidal forms. This new optimization of shape allowed to increase the flux emitted by a factor about one and a half.

(Continued on page 5)

The only optimization of the geometry of the chip allows the improvement of the luminous output of these diodes. Used shapes are simple and it is very likely that other geometry could again improve the emission of these chips.

OPTICS OF THE LED

To collect and to close the beam of light going from the chip, one uses supplementary lenses.

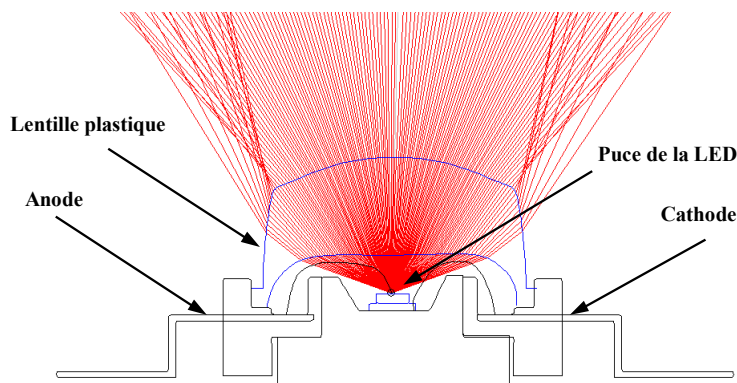


Figure 3 - Detail of the optics of a High-Flux type LED of Lumileds

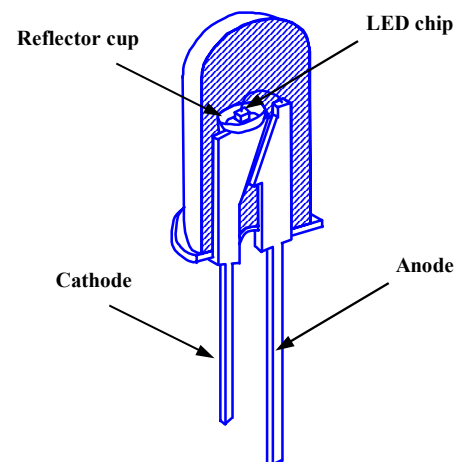


Figure 4 - Detail of the optics of a LED of 5mm

In most of the light emitted diodes, a plastic lens, integrated into the LED, is placed to reduce the opening angle of the emitted beam of light.

In other diodes, one adds a reflector which collects emitted light towards the back of the chip and a lens in a dome shape to concentrate the beam of light.

SUPPLEMENTARY OPTICS

Some lighting manufacturers use simply light emitted diodes by juxtaposing them without changing beams of light. Other manufacturers try, all the same, to work the emitted beams of these diodes by adding to it several optics.

In the state of the art, for every diode, several supplementary optics are used. For example, in the product of lighting exposed on the figure 5, the first serves for collecting outgoing luminous flux, a second to deviate it, and a third to spread it. The multiplication of optics since the generation of the light within the chip-of diode until the use, regrettably, results in numerous losses of light.

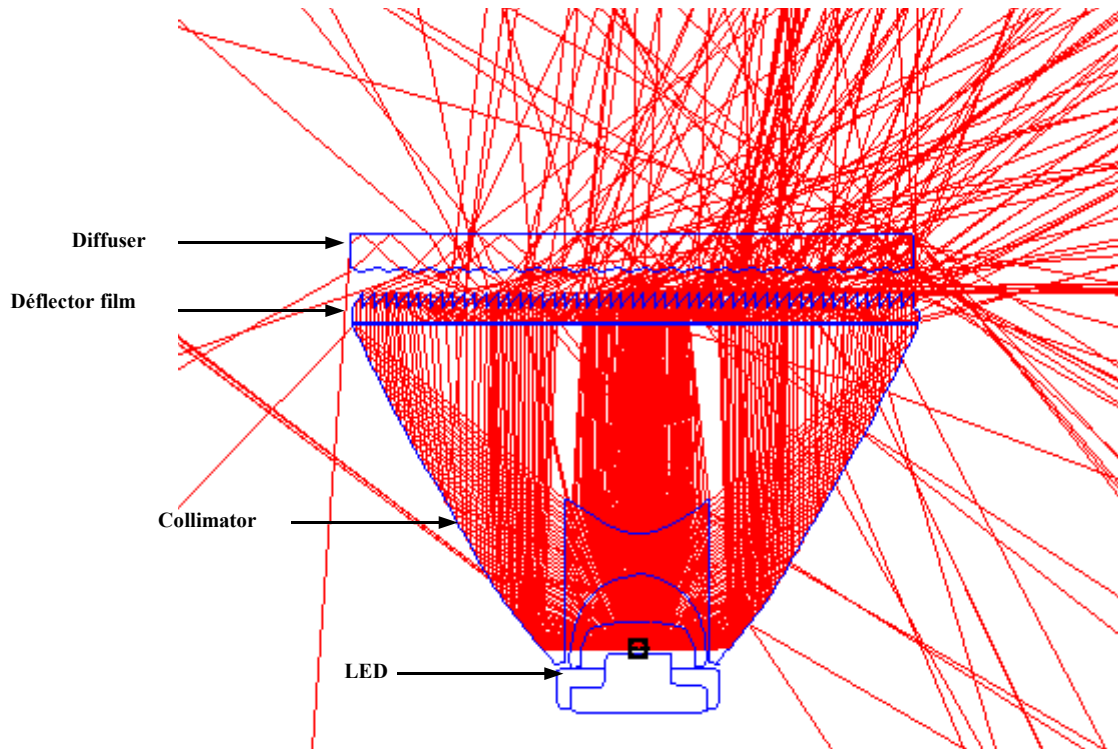


Figure 5 - Example of classic concept of a lighting product

The concept of the Fluid Optics, contrary to classic methods, attacks this problem and allows, due to the CONCOLS (CONCENTRATEUR-COLINÉARISEUR), to reduce in a sensitive way the number of optics allowing so better luminous output. Due to this concept one deals, with less optics, beams of light coming from one or several light emitted diodes.

CONCLUSION

Very too often neglected in the development of lighting products, the search for new optical geometry, allow to increase considerably outputs. Indeed, we saw, for example, that by changing only the shape of the chip by a simple pyramidal shape, a luminous output of the light emitted diode was significantly increased.

NEWS

If there is a subject you wish to see treated in this letter, you can directly contact us by email at the address:

syzygies@optique-fluide.org

You can also join MEGALUX, the company charged to exploit Fluid Optics at the address:

info@megalux.com

NEXT LETTER

The next Letter of the Syzygies will appear during the summer solstice, from end of June.