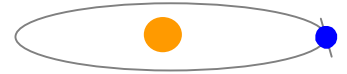


Fluid Optics™ Letter

La lettre des Syzygies



2001, June

EDITORIAL

We have the pleasure to present you the letter of the syzygies of the summer solstice in which you will find two articles: a first on a new concept of headlamp with a new design, the second on a new processor of points files for the CAD software Rhinocéros.

The inventors of the Fluid Optics

SOFTWARE

XTridi arrive under Rhinocéros

Some of you already know XTridi, the processor of points files measured by three-dimensional measurement machines. XTridi was indeed incorporated into the CAD software XMold published and distributed by Xitron France.

Thanks to the kit of development of the Rhinoceros CAD software pu-

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SUMMARY

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Laying of a new automotive headlamp : the transparent egg

Software

XTridi arrives under Rhinoceros

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CONCEPT

LAYING OF A NEW AUTOMOTIVE HEADLAMP, THE TRANSPARENT EGG

We chose to present you, in the range of dioptric projectors, a new kind of headlamp projector which is ENTIRELY TRANSPARENT.

We have not the talent of the various designers teams which we work with. However, to illustrate our presentation, we made some views of CAD and some synthesis images.

As we see it in the evolution of the automotive design, the tendency is not to hide the technique, on the contrary, to integrate it into the design of the projector. Due to its beautiful and original shapes, the Fluid Optics answer to this need.

In this new projector, we resume partially the concept of the completely transparent dioptric reflector presented on our Web site in the column "optical systems". This reflector can create a convergent beam to get back the maximum of light coming from a source with a filament or an arc.

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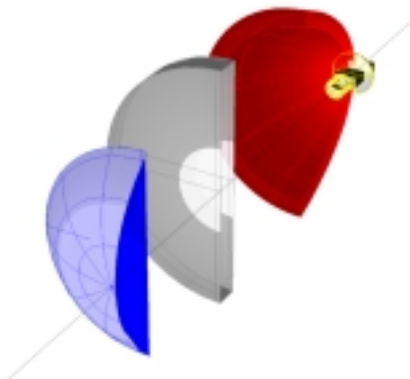
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In this example, to fix ideas, we used a halogenous source H3 of 55W.



CAD Model of an automotive
lightsource (type H3)

This concept of reflector is economically interesting because the reflector can be made by moulding in a simple injection, avoiding so the phase of painting or the deposit.



CAD model of the optical system
- dioptic reflector in red
- opto-mechanical component in gray
- output optic in blue

With a completely transparent dioptic reflector, it is possible to create a high beam. To realize the low beam, it is necessary to combine in the reflector another optical component.

In the state of the art, the systems have a removable mask which allows to pass from the high beam to the low beam. However, in this simple type of shutter 50% of luminous flux is lost.

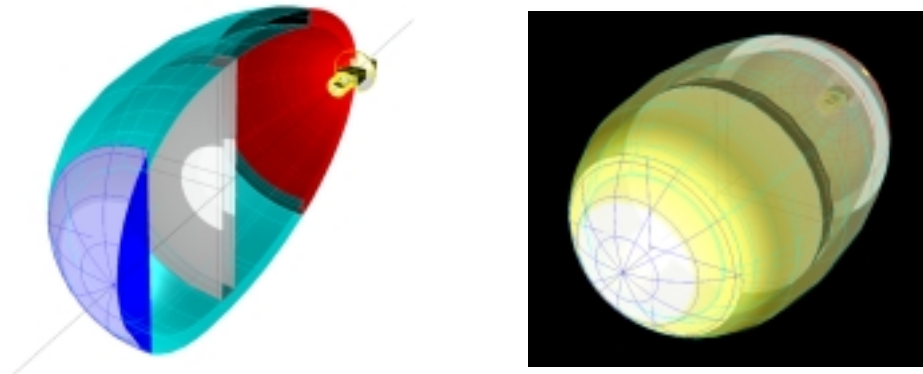
To prevent this loss of flux, we work on a compact opto-mechanical system capable of using 100% of the useful flux for the two types of generated beams.

The exit optic is calculated to get the flux and to colinearise it by throwing it on the road.

According to the action exercised on the opto-mechanical component we obtain a high beam or a low beam.

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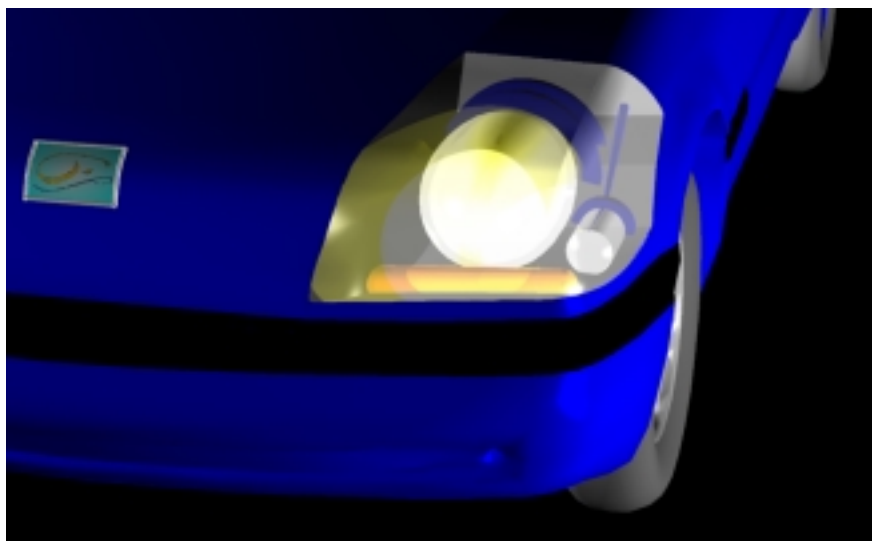
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The complete headlamp. CAD view on left. Synthesis image on right.

The not reflected flux is collected by the shell which completes the optical system to form a projector with the shape of transparent egg. The shell maybe worked to create various brilliant effects. Indeed the not reflected flux usually lost and annoying, can be recovered to make some brilliant design.

To illustrate the use of the projector, we imagined its place in a car with the other necessary functions.



We placed in the left front of this car imagined in CAD, a headlamp in shape of a transparent egg, a transverse transparent cylindrical flashing light, and finally a small longitudinal transparent cylindrical lantern. The sources of the flashing light and the lantern can be sources with a filament or light emitting diodes.

We synthesized in the transparent egg some specific properties of the fluid optics, it does not forbid at all to give to this egg a different aesthetics while preserving the same optical properties with the same transparent aspect.

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The advantage of such a solution of dioptric headlamp remains on its ability to present a beautiful design and to have a good level of feasibility. It becomes indeed possible with this type of concept to produce dioptric headlamps in series because the thicknesses of the various optical components can be little thick.

Nota: All the optics created by MEGALUX are protected. To preserve the confidentiality, we did not represent on this document the profiles and the shapes assuring useful dioptric functions.

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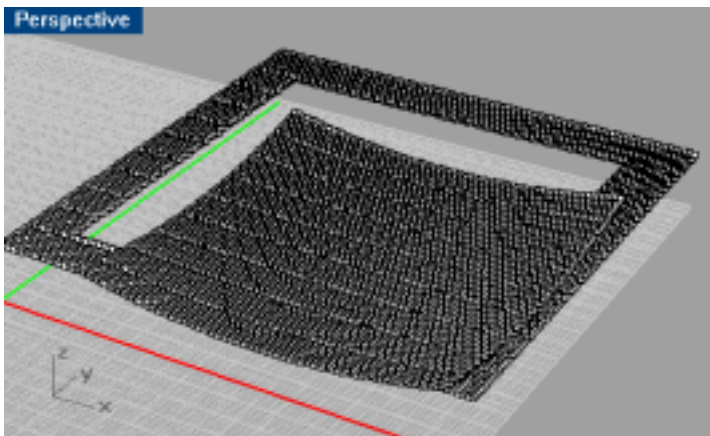
blished by the MCNEEL company, XTridi was carried successfully into Rhinoceros as a plug-in.

The points (X, Y, Z) are obtained by measuring the manufactured object and these data are treated by XTridi to reconstruct the CAD model. XTridi allows to handle a matrix of points structured on sections according to X constant, Y constant, Z constant or by any suite of points. The number of points processed is limited only by the memory and the speed of the computer. It is possible to reduce the number of points by setting a simple parameter. The file to be processed needs to be a text file. The file can be in a lot of formats including the ISO format.

Measures are handled to create the following entities: point, NURBS curves and NURBS surfaces. For curves and surfaces, two methods of treatments are used: interpolation and approximation by the least squares with a check of tolerance.

To illustrate briefly XTridi's features, we took a set of points coming from a model of a mould of an aspheric lens. The part of the controlled mould was measured by taking 100x100 points. Points are organized in 100 equidistant sections containing 100 equidistant points.

POINTS



The points of measures become entities points in Rhinoceros.

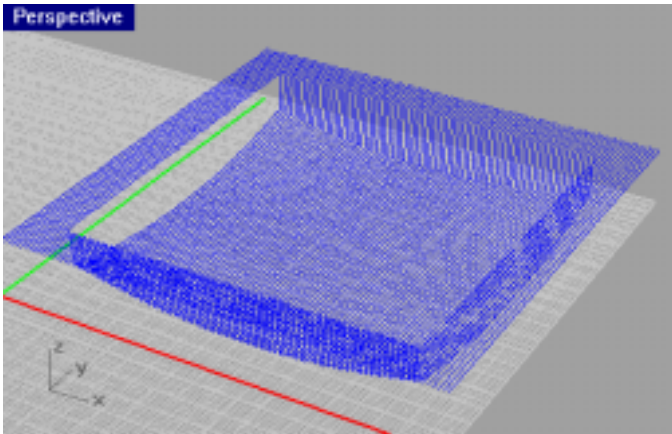
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CURVES

Interpolation

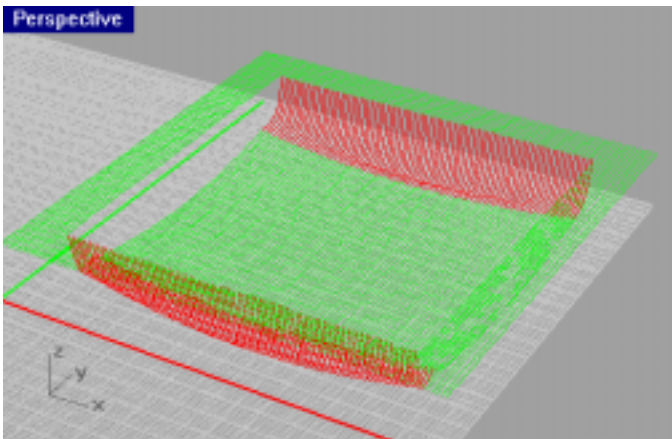
Sections are handled and interpolated to create a set of curves passing by all the points of measures.



These curves are NURBS of order 1 and each include 10 control points for 10 points of measures. Every section contains 10 NURBS curves. Every curve is jointive to the previous one by its extremity.

It is possible for every curve to choose the number of points of measures to be handled as well as the order of the curve NURBS to be obtained.

Approximation



As first, every section contains 10 NURBS curves. On the other hand we saw that to treat 10 points of measure we create a NURBS curve with 10 control points. Here it is not case, we use the least squares' approximation to reduce the number of control points. In this example we pass from 10 points of measures to 4 control points for every NURBS curve.

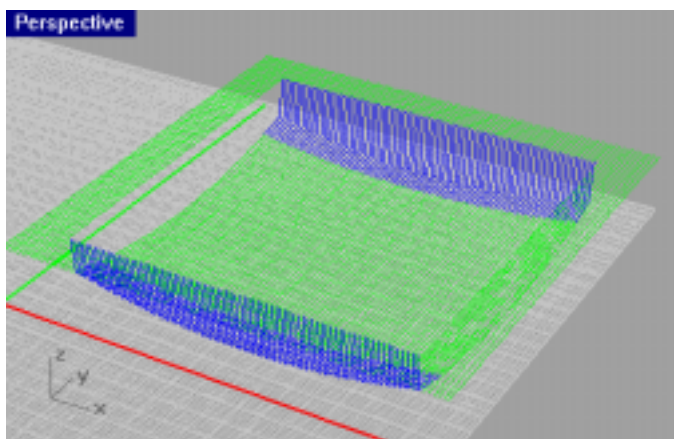
It is possible for every curve to choose the number of points of measures to be treated as well as the order of the NURBS curve and the number of control points to be obtained.

For every approximation we verify that the curve crosses near points at a minimal distance called tolerance. Tolerance chosen in our example is 0,1 mm. We can notice that for falls in Z coordinate of measure points, the approximation tries to smooth the points and does not work correctly giving us a distance superior to 0,1mm. Curves, which do not respect tolerance are represented on one hand in red and on the other hand moved in another CAD layer.

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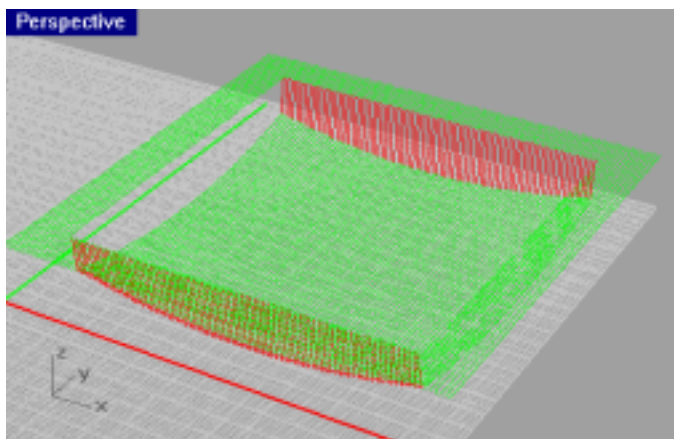
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Correct Model



By combining the approximation model and the interpolation model, we obtain a model approaching the measures to less than 0,1 mm.

Creation of polylines



A function was created specially for the users working on moulds. They need to create a polyline for each section. But the polyline can be correct only and only if the polyline does not contain two consecutive points whose the distance is not upper a certain value and if there are not three consecutive points forming an angle superior to a given value. For our example, from left to right, we obtain sections made with only one green polyline; other sections made with two red polylines and three green polylines, and then again sections made with only one green polyline. The red polylines are represented in this colour because in these places the previous criteria are not respected.

red polylines are represented in this colour because in these places the previous criteria are not respected.

Continuation of this article in the next letter

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 for the autumnal equinox, end of September.