Doris Schattschneider

M.C. Escher:

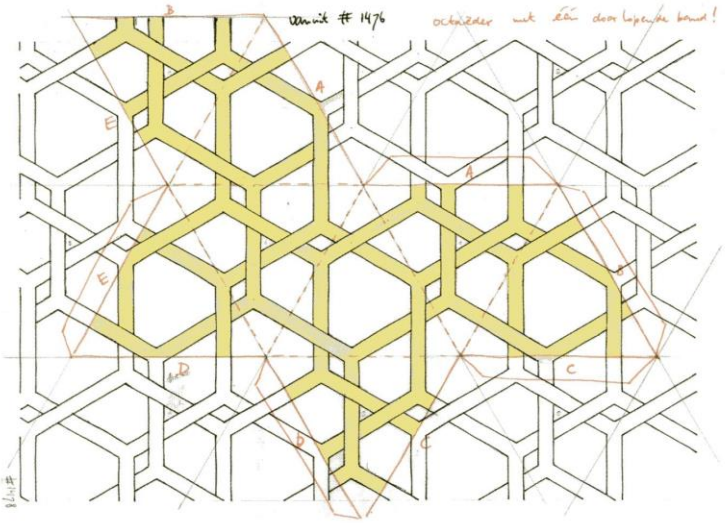
Visions of Symmetry

370 pages 438 illus., hardcover
ISBN: 0-500-51169-1, published 2004

Page 353-354:

three-dimensional form and walk, run, fly, or swim, creating the picture's story. But Nakamura also camouflages his tessellations as texture—in foliage, waves, feathers, and clouds. The discovery of these hidden interlocked creatures adds an extra measure of delight for the viewer. Nakamura has also explored three-dimensional layered tilings by various animal shapes. In these, the animal's body is outlined on a slab of wood, and other slabs that outline its legs, wings, and sometimes, ears, are added to both sides of the body in new layers. The three-layered tiles then fit together exactly and can be stacked to completely fill space.

Rinus Roelofs began a formal study of applied mathematics and after four years, changed direction and completed an art degree, concentrating in sculpture. Like Escher, he likes to work out ideas with hand-drawn sketches, but then uses computer software to turn those sketches into views of three-dimensional works that can be animated, printed as pictures, or have their data interpreted by special "3-D printers" into real models in wax or plastic. Just as Escher was fascinated by interwoven layers of grids of circles and of hexagons (see pages 87,92–93, 226, 232), Roelofs also has explored such grids and the questions they suggest (see his article "Not the tiles, but the joints..."). One exploration led to an unusual sculpture. He began with a grid of three layers of interwoven regular hexagons, then shifted the layers a bit so that the pattern of a regular octahedron would fit the symmetry of the interlaced grid. He then cut out and folded the pattern into its three-dimensional form, wrapping the interlaced grid around the polyhedron. From that model, he noticed that



Rinus Roelofs. An interlacing of three grids of regular hexagons (above right) leads to a modified interlacing on the flat pattern of an octahedron (above left). Folding this up produces a grid-covered paper model of an octahedron (below right). Rendering the grid on the model as three-dimensional interlaced bands in space leads to a bronze sculpture (next page).

the bands outlining the hexagons all connected continuously, and if the white of the paper were to disappear, the interlaced bands could actually be realized as the interweaving of just one layer of the hexagons. Finally, he used the software *Rhinoceros* to turn his paper model into a pleasing sculpture that was cast in bronze.

In his 1958 book *Regelmatige vlakverdeling (The Regular Division of the Plane)* Escher opens by lamenting his artistic isolation in pursuing his fascination with symmetry:

> Why am I the only one fascinated by it?...
>
> In mathematical quarters, the regular division of the plane has been considered theoretically, since it forms part of crystallography. Does this mean that it is an exclusively mathematical question? In my opinion, it does not. Crystallographers have put forward a definition of the idea, they have ascertained which and how many systems or ways there are of dividing a plane in a regular manner. In doing so, they have opened the gate to an extensive domain, but they have not entered this domain themselves.... [A] long time ago, I chanced upon this domain in one of my wanderings.... Sometimes I think I have trodden all the paths and admired all the views; and then I suddenly discover a new path and experience fresh delights.
>
> I walk around all alone in this beautiful garden, which certainly does not belong only to me, but whose gate is open to everyone.

Today, Escher is not alone. His work has infected others with the same enthusiasm, and they walk not only the paths he trod, but, like him, discover new paths and experience fresh delights.

Rinus Roelofs