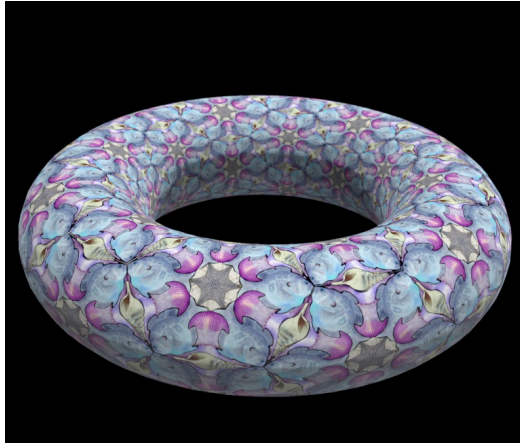


# Ulrich Seidel *Das PR-Projekt - Penrose & Riemann*



**Bio:**  
My passion is to notice beautiful mathematical structures and patterns and to show them with natural motifs familiar to non-specialists in geometry. My first tessellations date from 1993 in the midst of my academic studies: Technomathematik in combination of Mathematics, Mechanical Engineering and Applied Computer Sciences. I set my focus on geometry and simulation and ended the studies with diploma at Karlsruhe University. With my interdisciplinary view on science the way to computer graphics was not too far. My creative process for a new design starts with pencil and paper. Scanner and Software come later as a tool for realization. Graphic software made significant technical advances. There are still many patterns to discover that can be used for different design purposes: accessoires for living, attractive consumables, animations, puzzles and games and of course high quality graphical prints. There were lots of tessellations invented since 1973 that M. C. Escher could not work with any more. My challenge is to illustrate these abstract geometric patterns with real motifs.  
I live in the region of Rhein and Neckar for more than 20 years. When I put the pencil away and switch my computer off, I go for jogging with my wife, I sing in the choir or play viola with other musicians.

**Project description:**  
The film is about discretization of patterns, colours and shapes. The animation illustrates that a 2D periodic pattern can be mapped seamless to a torus. Riemann surfaces are more suitable to display aperiodic patterns in three dimensions. Hence the Penrose tiling consisting of birds is shown on a helicoid.

**Mathematical inspiration:**  
The very beginning is a “big bang” - where a single point expands. There can be seen the genesis of a periodic sea life pattern in the plane. The pattern transforms to a solid with hexagonal profile. The prism is bent to a ring, and the grade of approximation increases. The torus is morphed to a catenoid. The sea life motif suddenly shows a singularity (Droste effect).  
The second part shows special properties of Penrose tilings. Every part of the pattern repeats endlessly, but there exists no translation to make the pattern fit as a whole. The discretization of the bird motives reveals hidden structures. The Penrose tiling is used to illustrate Moiré effects and refinements. The Riemann surface acts out as helicoid. The mapped aperiodic tiling leads to a seamless representation in three dimensions. The animation ends with the message to use mathematics to make the world a better place. The software VaryLab from SFB TRR 109 - Discretization in Geometry and Dynamics – was used to map geometric patterns to objects without linear distortion.

