

3×3 Puzzle Cubes with Gears

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Looking at a Gear Cube XXL, you can't help but think about a Rubik's Cube. Both are 3×3 puzzle cubes with brightly colored pieces. Moreover, both are sold commercially as toys.

Created by Oskar van Deventer, the Gear Cube XXL and the smaller Gear Cube are made by Mefferts, a brand of puzzle toys, and are distributed by Recent Toys, Amsterdam, The Netherlands.

You also can't help but notice that Oskar's cube is different from a Rubik's. On Oskar's cube, the pieces have gear tooth shapes on them. This difference goes deeper than the surface. The shapes are actual gear teeth that extend into the puzzle's interior and that mesh and roll with each other. So, even though it looks *like* a Rubik's Cube, Oskar's cube works quite differently.

To understand how Oskar's cube works, though, you have to start with a Rubik's Cube. Holding a Rubik's in your hands, looking at a side, you see nine pieces. The pieces form three columns: a left, a middle, a right. Each column has three pieces. When you work the cube, you turn one column, say the right column, while you hold the left and middle columns steady.

With Oskar's cube, when you turn the right column, the middle column also turns. Now, both columns turn in the same direction, but the middle one turns at half-speed. So, if you do two full turns of the right column, the middle column will do one full turn.

Also, because the teeth mesh and rotate, they end up with a different orientation than they had when you started turning the right column. So, you'd have to do many double full turns of the right column to compensate for the turning of the middle column.

With all that turning, meshing, and rotating, you may think Oskar's cube would be hard to solve. "It looks very difficult," Oskar says, "but it is actually easier to solve because the gears limit how far one can scramble it."

From the start, the gears were the special part, the wrinkle, in the cube's design. Back then, the cube was a design challenge between friends, an impossible design challenge.

In 2007, in July, Oskar was in Brisbane, Australia. He had traveled from his hometown, Leidschendam, The Netherlands, to attend an annual event. An electrical engineer, Oskar works in information and communication technology. The event, though, was about his hobby.

Oskar is a puzzle enthusiast: "I have been designing mechanical puzzles since I was 12 years old." The event was the International Puzzle Party. Naturally, Oskar ran into a number of friends, fellow puzzle enthusiasts. One of them, Bram Cohen, had a design challenge for Oskar.

Specifically, the challenge was: Create a 2×2 puzzle cube with an inner mechanism that is symmetrical and is generic—that is, can be used in different puzzles, like a 2×2 or a 3×3. For puzzle designers, a 2×2 cube with a generic, symmetrical inner mechanism isn't a new challenge. It's an *ultimate* challenge: "It is like our moonshot," Oskar says.

To explain, Oskar starts with a Rubik's Cube. As a 3×3, a Rubik's uses an inner mechanism that's symmetrical. With a regular 2×2 cube, the inner mechanism isn't symmetrical. Rather, it's a doctored 3×3 in which some parts have been glued together. So, in Bram's challenge, symmetry was one degree of difficulty, genericness was the second degree. The third was Bram's wrinkle on the mechanism's design. "He had the idea of having something that is geared," Oskar says.

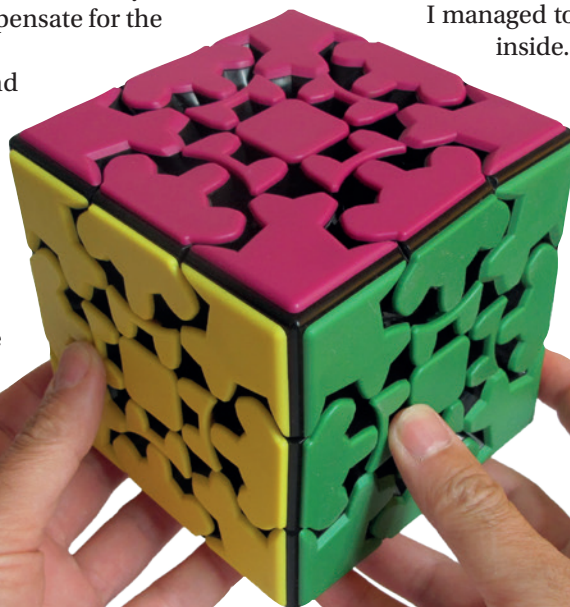
The challenge wasn't a surprise. Puzzle designers often give fun challenges to each other as part of their hobby. Bram's wrinkle wasn't a surprise, either. "Bram is the guy with the crazy ideas," Oskar says.

So, Oskar took up the challenge, with mixed results. "I could not answer Bram's puzzle-design challenge," he says, "but

I managed to build a 3×3 Rubik's Cube with gears inside. Then, it hit me that I should expose

those gears at the outside." This last design became the Gear Cube and the Gear Cube XXL.

Oskar's cube, however, is only one of his geared inventions. Others can be seen in videos on his YouTube channel, OskarPuzzle. Now, Oskar has created hundreds of puzzles, so his channel has hundreds of videos. "My hobby is puzzle designing," he says, "and I do a lot of that." **PTE**



The Gear Cube XXL is a 3×3 puzzle cube that uses a geared mechanism for turning the sides and pieces. The XXL is the cube's large version, with sides of 4¾"×4¾". The cube's small version has sides of 2½"×2½". (Photo courtesy of Recent Toys)