

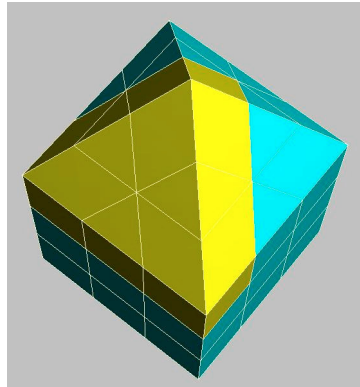
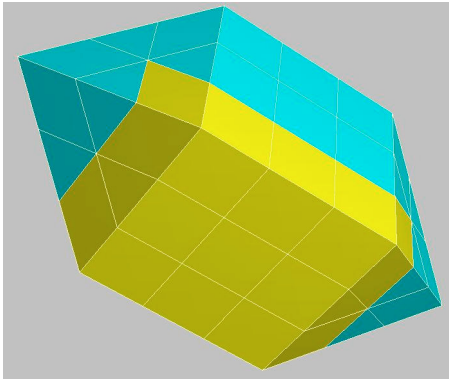
Virtual True Rubik Elongated Square Dipyramid

by Eduard Baumann

Rotational puzzles can be played virtually in a computer program. If real versions of such a rotational puzzle are available on the marketplace then there is no doubt that they are superior to any virtual version.

It is possible that very obvious generalisations of real rotational puzzles are very hard to realize. The necessary mechanics can be very difficult or impossible.

In such cases a virtual program may be more convincing. Lets look at the houselike ennahedron which still has a small number of faces (12). Here is an illustration which shows the rotated part (slice) in another color.



For this polyhedron a mechanical realisation is certainly not possible because the sides of the "cubicle" change their form when the slice is turned.

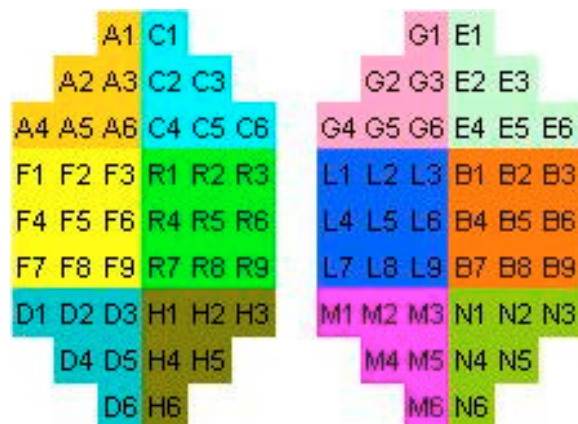
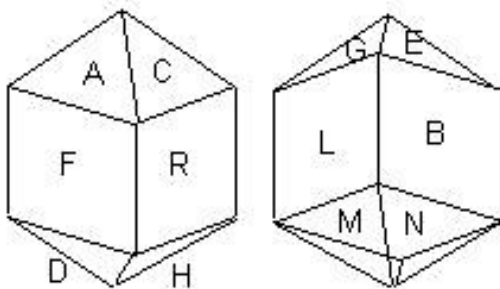
The programmed version of this rotational puzzle has the very big

advantage of easy undo's and of the automatic execution of compactly written sequences. It is also possible to retain the whole history of all movements done on the puzzle.

Principles for an Excel Worksheet

- record simple cell circulations
- give such recordings one letter names
- have one macro which calls all such recordings following a sequence given in form of a letter string in the selected cell
- the saving of positions are simple copy/pastes and 'undo' can also be prepared by copy/paste.

The forced cartesian arrangement of the cells in the Excelsheet shows as follows (shown are at left the front part and at right the back part seen from inside). In order to not loose interesting aspects it is clear that all parts must be distinguishable. This can be obtained giving a individual letter



for each label.

In the following the letters C,D,E, ... mean the turning of the corresponding slice by 90° or 120° clockwise, seen from outside.

Only the turning of three slices F and A and two turnings of the whole polyhedron (a) around the vertical axis T and (b) parallel to right side U are predefined. With this all other turns can be constructed. For example $R = TCT$.

Notation:

\underline{F} is the inverse of F. The elements in round brackets change place in a cycle. $[RF]$ is the commutator of \underline{R} and F and means $\underline{R}F\underline{R}F$.

The near neighbourhood commutator NNC like $[AF]$ gives an cycle for three edge cubicles with side effects on corners.

The far neighbourhood commutator FNC like $[CF]$ which is not possible on classic Rubik cube yields a cycle for three corners without side effects on the edges.

The edge cubicles cannot return to their home place with a twist.

To complet the tool for a strategy we need a sequence which turns corners on place. $Z = [AC[DR]]$ turns corner F3 and F9 by 180°.

Strategy

- (a) place all edge elements with NNC's
- (b) place all corner elements with FNC's
- (c) orient all corner elements with Z

An Excelsheet with the True Rubik Elongated Square Dipyramid is available at baumann@mcnet.ch.