

# Cube Label Sheet Design

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## Introduction

This document is about DIY (Do It Yourself) label sheet design for 3x3x3 **Rubik's Cubes**. A label sheet contains *stickers* that can be stuck down onto a cube face. Customized stickers are used for *Calendar* or *Picture Cubes* where regular Rubik's Cube stickers are removed from each cube face and replaced with these DIY stickers.

Design details are given for **2048x2048** pixels textures that can be *freely* downloaded from [Randelshofer.ch](http://www.randelshofer.ch/) and for label sheets that can be bought from [Rubik's.com](http://www.rubiks.com/). These are used for printing stickers with inkjet printers.

Cube Stickers – Useful Links	
<a href="http://www.rubiks.com/">http://www.rubiks.com/</a>	<a href="http://cubsmith.com/">http://cubsmith.com/</a>

There are **Virtual Cubes** that can be *virtually* rotated and twisted on a computer screen and **Real Cubes** that can only be *physically* rotated and twisted by hand. A **Texture** is laid down onto a Virtual Cube whereas real **Stickers** are stuck down onto a Real Cube.

A Calendar or Picture Cube is designed by placing letters, numbers, symbols or pictures on a texture which is then laid down onto a Virtual Cube (see <http://www.randelshofer.ch/> for more details).

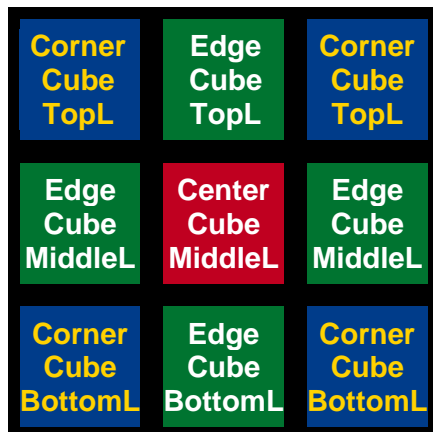
The following example shows a **Time Zone Cube**. This is a 3x3x3 **Rubik's Cube** used to display the names of *most* capital or main towns in the world *together* with their associated UTC Time Offsets. **DST** (Daylight Saving Time) can also be displayed as an option.

The *Virtual* Time Zone Cube shown below displays an UTC Time Offset of '+ 0' for **LON** (LONDON – Great-Britain), which is the UTC Time Offset there in winter time. If the DST option had been used, then the offset would have been set to 'DST 0' in winter time and to 'DST 1' in summer time.

Example – Time Zone Cube		
<p>Time Zone Cube</p> <p>Original design 2008 by André Boulouard and Walter Randelshofer</p>	<p>Copyright © 2008 André Boulouard Walter Randelshofer Werner Randelshofer All rights reserved.</p>	
Time Zone Cube Texture		Virtual Time Zone Cube
Download <b>CubeTwister</b> from: <a href="http://www.randelshofer.ch/">http://www.randelshofer.ch/</a>		

## Terminology

In a 3x3x3 **Rubik's Cube**, there are 8 *Corner Cubes*, 12 *Edge Cubes*, 6 *Center Cubes* and 6 *Cube Faces*. There are also 4 Corner Cube faces, 4 Edge Cube faces and 1 Center Cube face *per Cube Face*, as shown below.



There are 1 face per Center Cube, 2 faces per Edge Cube and 3 faces per Corner Cube.

There are also 3 horizontal *Layers* called *Top*, *Middle* and *Bottom Layers*.

Cube Lexicon		
English	Français	Deutsch
Cube	Cube	Würfel
cubeie, cube	cube, petit cube	Würfelteil, Teil des Würfels
face	face	Seite, Seitenfläche
front face	face avant	vordere Seite, vorne
back face	face arrière	hintere Seite, hinten
left face	face gauche	linke Seite, links
right face	face droite	rechte Seite, rechts
top face	face supérieure	obere Seite, oben
bottom face	face inférieure	untere Seite, unten
sticker	étiquette (autocollante), plaquette	Kleber, Farbkleber
tile	tuile, plaquette	Plättchen, Farbplättchen
center cube, center	cube central, centre	Mittelwürfel, Mittelstein, Mitte
edge cube, edge	cube-arête, arête	Kantenwürfel, Kantenstein, Kante
corner cube, corner	cube de coin, coin	Eckwürfel, Eckstein, Ecke
layer	couronne	Schicht, Scheibe
top layer	couronne supérieure	obere Schicht, obere Scheibe
middle layer	couronne intermédiaire	mittlere Schicht, mittlere Scheibe, Mittelschicht, Mittelscheibe
bottom layer	couronne inférieure	untere Schicht, untere Scheibe
orientation, direction	orientation	Orientierung
to solve	résoudre	lösen, zusammen drehen
to twist	pivoter	drehen
to rotate	tourner, effectuer une rotation	drehen
clockwise	dans le sens horaire	im Uhrzeigersinn
anticlockwise, counter-clockwise	dans le sens anti-horaire	im Gegenuhrzeigersinn

# Cube Label Sheet Design

All documents have been designed using Microsoft Office Word 2007. The Word 2007 Trim Tool has been used for selecting and copying some parts of the textures. All documents Size Unit should be set to 'pt'.

## Basic Units

1 pixel = 1 px = (25.4 mm/96)

1 point = 1 pt = (25.4 mm/72)

2048 pixels = (2048x72/96) points = 1536 points = 541.87 mm

## Design Step 1

- Create a new document of 1536x1536 pt size with header, footer and all margins set to 0 pt. The text should be top-left aligned.
- Or use the [Time Zone Cube Texture](#) document as a template.
- Insert a **2048x2048** pixels image from [Randelshofer.ch](#) onto the document. Check the image size. It should be 1536x1536 pt.
- Or insert your own 2048x2048 pixels image. In that case, there should be a vertical 24 pt wide blank strip on the right and an horizontal 24 pt wide blank strip at the bottom of the image.

## Design Step 2

- Open the A4 [Time Zone Cube Label Sheet](#) document and use it as a template.
- Using the Microsoft Word 2007 Trim Tool, select a 9-sticker face on the 1536x1536 pt image document. Different Trim Values are used for each face. These are given in the following Table:

Trim Values – Selection of 9-Sticker Faces						
2048x2048 Texture						
			'U' Face			
		Left = 504 pt	Up= 0 pt			
		Right = 528 pt	Down= 1032 pt			
'L' Face		'F' Face		'R' Face		
Left = 0 pt	Up= 504 pt	Left = 504 pt	Up= 504 pt	Left = 1008 pt	Up= 504 pt	
Right = 1032 pt	Down= 528 pt	Right = 528 pt	Down= 528 pt	Right = 24 pt	Down= 528 pt	
			'D' Face		'B' Face	
		Left = 504 pt	Up= 1008 pt	Left = 1008 pt	Up= 1008 pt	
		Right = 528 pt	Down= 24 pt	Right = 24 pt	Down= 24 pt	

- Re-size the selected face image to 162x162 pt.
- Copy and Paste the re-sized face image onto a cell of the A4 document.
- Undo commands in the 1536x1536 pt document until the full-size image is displayed again on the screen.
- Select another 9-sticker face and continue in the same way until all 6 face images have been pasted onto 6 cells of the A4 document.

**Note:** All 6 Top-Left stickers have a Rubik's.com logo on them. If you don't want to display *all* these 6 logos on your cube, see below for a workaround.

## Design Step 3

Rubik's.com label sheets have logos that have already been printed on *each* of the 6 Top-Left labels. If you don't want to display these logos on your cube, here is a workaround:

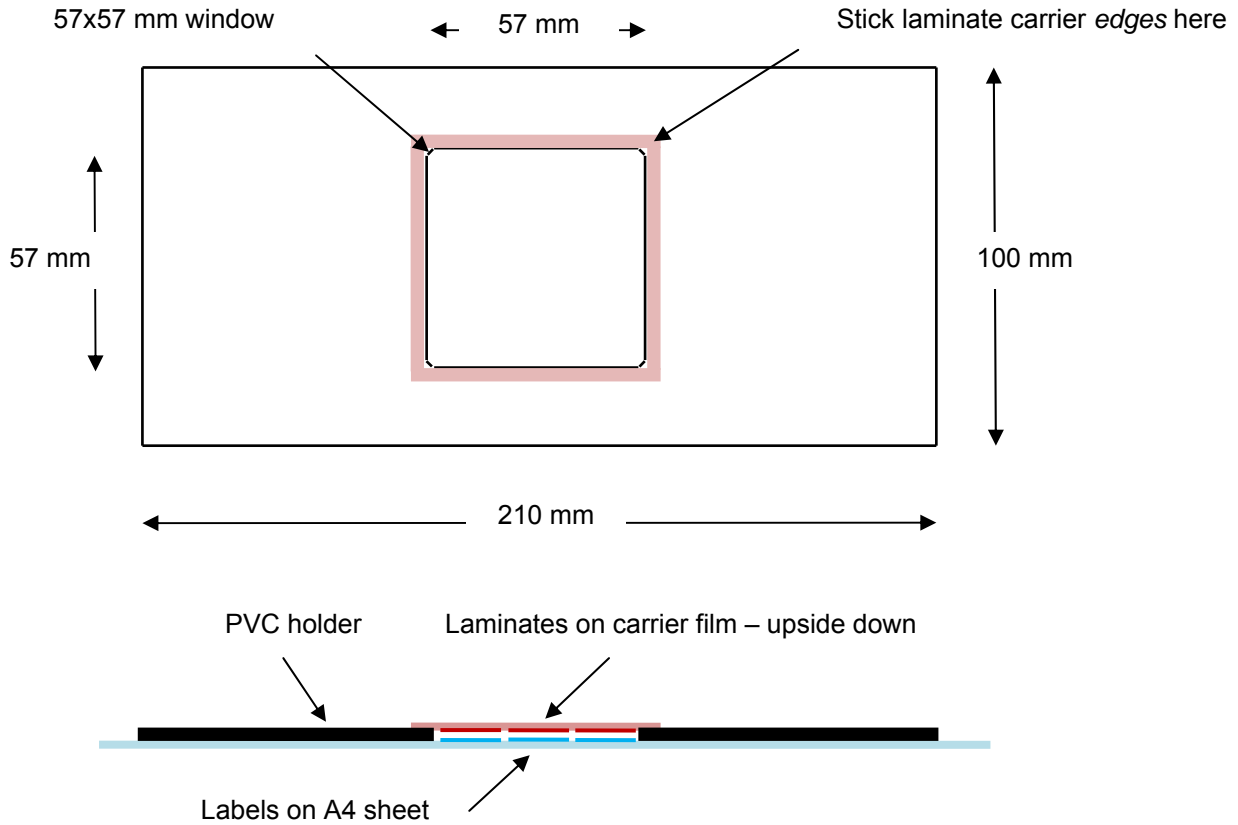
- Create an *extra* label sheet for the 6 Top-Left stickers of the texture.
- Or open the A4 [Top Left Label Sheet](#) and use it as a template.
- Using the Microsoft Word 2007 Trim Tool, select a Top-Left sticker on the 1536x1536 pt image document. Different Trim Values are used for each Top-Left sticker. These are given in the following Table:

Trim Values – Selection of Top Left Stickers									
2048x2048 Texture									
				'U' Face					
				Left = 504 pt	Up= 0 pt				
				Right = 864 pt	Down= 1368 pt				
'L' Face		'F' Face				'R' Face			
Left = 0 pt	Up= 504 pt		Left = 504 pt	Up= 504 pt		Left = 1008 pt	Up= 504 pt		
Right = 1368 pt	Down= 864 pt		Right = 864 pt	Down= 864 pt		Right = 360 pt	Down= 864 pt		
				'D' Face					
				Left = 504 pt	Up= 1008 pt		Left = 1008 pt	Up= 1008 pt	
				Right = 864 pt	Down= 360 pt		Right = 360 pt	Down= 360 pt	

- Re-size the selected sticker to 54x54 pt.
- Copy and Paste the re-sized sticker onto a cell of the *extra* label sheet.
- Undo commands in the 1536x1536 pt document until the full-size image is displayed again on the screen.
- Select another Top-Left sticker and continue in the same way until all 6 Top-Left stickers have been pasted onto 6 cells of the *extra* label sheet.
- Using a pair of tweezers, remove all 6 Top-Left labels that have a logo printed on them and replace them with those of the *extra* label sheet.

## Laminates Alignment

Once the label sheet has been printed, laminates can be stuck onto the labels. Nine laminates are attached to a carrier film and must be carefully aligned with the labels. This is the *most* critical part of the process. After many attempts, a simple but highly effective method for aligning laminates with the labels has been found. The basic idea here is to take advantage of the slight difference in reflectivity that exists between laminates and other parts of the carrier film. This is only efficient if the laminates are very close to the label sheet surface. But if the laminates are too close, then they will stick on the surface before completion of the alignment procedure. The optimal laminates height above the sheet seems to be around 200 microns. So, by using a 200 micron thick PVC transparent binding cover as a carrier film *holder* and by moving it on the sheet surface, laminates can be aligned with labels. A 57x57 mm window should be cut into the PVC cover in order to stick the laminate carrier four edges onto the four *internal* PVC cover edges. All nine laminates are now free to be moved at a 200 micron height *above* the label sheet and can then be precisely aligned with and stuck onto the labels.



### Photos of laminates & labels on a 200 micron PVC carrier film holder



# Real Cube Examples

Real Cubes Photos			
Breton First Names Cube			
<u>TRO BREIZH</u>	<u>KUB BREIZH</u>	<u>MERIADEG</u>	<u>TUDWAL</u>
			
Time Zone Cube			
<u>LONDON – UTC+0</u>	<u>NEW-YORK CITY – UTC-5</u>	<u>NEW-DELHI – UTC+5:30</u>	<u>SYDNEY – UTC+10</u>
			
Constellation & Star Names		Clock & Calendar	
			
<u>Polaris – Ursa Minor</u>	<u>Tuesday July 8, 5:00 PM</u>	<u>Arabic &amp; Roman numerals</u>	<u>Chinese numerals</u>

## Cube Stickers Examples

There are many examples of cube stickers on the following pages. They have been downloaded from [Randelshofer.ch](http://Randelshofer.ch) and processed as explained on the preceding pages. Each of these pages can be *directly* printed on [Rubik's.com](http://Rubik's.com) label sheets and stuck down on cube faces afterwards.

2048x2048 Textures Examples		
<a href="#">Mì MemoQube</a>	<a href="#">Wáng MemoQube</a>	<a href="#">Chinese Calendar Cube</a>
<a href="#">Indonesian Calendar Cube</a>	<a href="#">Arabic Calendar Cube</a>	<a href="#">Russian Calendar Cube</a>
<a href="#">Breton Calendar Cube</a>	<a href="#">Breton First Names Cube</a>	<a href="#">Time Zone Cube</a>
<a href="#">Math &amp; Phys Constants Cube</a>	<a href="#">Constellation &amp; Star Names Cube</a>	<a href="#">Clock &amp; Calendar Cube</a>
Sundial Cube		

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完 成 长  
就 家 果

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边 地 区  
主 位 图

当 高 心  
月 中 间  
等 午 饭

广 近 远  
房 东 北  
西 京 方

用 公 看  
办 法 文  
院 语 学

出 大 贵  
本 国 歌  
民 外 画

班 长 子  
老 大 家  
医 师 生

好 看 见  
教 书 包  
药 店 主

语 文 字  
法 中 国  
汉 学 年

作 风 衣  
汽 水 果  
歌 手 工

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名 人 民  
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黄 河 山  
出 口 才  
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