

The Application of TRIZ to Stapling the Contradiction Matrix

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Introduction

When I was introduced to TRIZ, I tried to test it by applying it everywhere, irrespective of any technical field. The reason to do this was not only skepticism but also curiosity – can we innovate or improve things with such a simple method?

Whenever I went to buy anything I looked at the opportunities to apply TRIZ to develop the product to next level. I tried to figure out how a product had evolved to its shape, size and features and looked at the competitive edge of one product over the other. To my amazement I was able to find TRIZ Principles everywhere in technical, and non-technical, fields.

The problem

When a document consists of many pages the simplest way to keep them together is to staple the pages. Stapling makes the document a sequential arrangement of pages - easier to hold, store, file and read.

There are various methods for stapling. The figures below show the method to staple which is termed as “back-to-back” stapling.

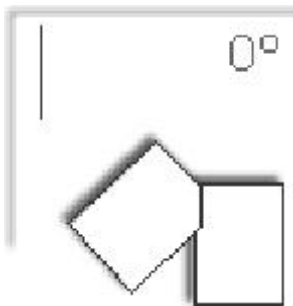


Figure 1

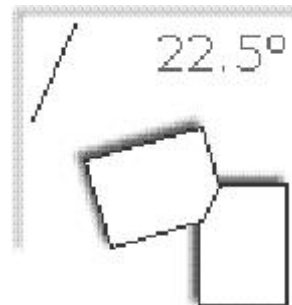


Figure 2

Worsening Feature →

↓

Improving Feature

←

Stapled at two places

	Weight of moving object	Weight of stationary object	Length of moving object	Length of stationary object	Area of moving object
	1	2	3	4	5
1	Weight of moving object	+	-	15, 8	-
2	Weight of stationary object	-	+	28, 34	-
3	Length of moving object	8, 15, 28, 34	-	+	-
4	Length of stationary object	-	35, 28, 40, 29	-	+
5	Area of moving object	2, 17, 28, 4	-	14, 15, 18, 4	+
6	Area of stationary object	-	30, 2, 14, 18	-	26, 7, 3, 32
7	Volume of moving object	2, 26, 28, 40	-	1, 7, 4, 35	-
8	Volume of stationary object	-	35, 10, 13, 14	-	35, 8, 2, 14
9	Speed	2, 28, 13, 38	-	13, 14, 8	-
10	Force (Density)	8, 1, 37, 18	-	17, 13, 3, 28, 10	13, 10, 15
11	Stress (pressure)	13, 35, 37, 40	-	13, 23, 35, 10, 35, 1, 14, 16	10, 15, 36, 28
12	Shape	8, 10, 23, 40	-	15, 10, 23, 34, 5, 13, 14, 10, 7	5, 34, 4, 10
13	Stability of the objects composition	21, 38, 2, 38, 38, 1, 38	-	13, 15, 1, 26, 37	2, 11, 13
14	Strength	1, 8, 40, 15	-	40, 28, 27, 1, 35	1, 15, 8, 15, 14, 3, 34, 40, 28
15	Emission of action of moving object	13, 3, 34, 31	-	2, 13, 3	-
16	Emission of action of stationary object	-	5, 27, 13, 16	-	1, 40, 35
17	Temperature	36, 22, 6, 38	-	22, 35, 32	15, 13, 3, 15, 13, 3, 3, 35, 33, 18
18	Illumination intensity	13, 1, 32	-	2, 35, 32	13, 32, 13, 32
19	Use of energy by moving object	12, 13, 28, 31	-	12, 28	-
20	Use of energy by stationary object	-	13, 3, 5, 27	-	-

Figure 8: Another Stapling Variant

Figures 7 and 8 show variants of the stapling method. In a more sophisticated way the pages can be stapled back-to-back on the X axis as shown in Figure 8, rather than stapling on the Y axis. But in these scenarios the contradiction was that although stapling the pages made for better handling and reading, my navigation-ability and my ability to read the correct columns worsened.

If I tried to improve parameter 33 - 'ease of operation' (by stapling) the other key parameter, 28, 'measurement accuracy' worsens. Using the contradiction matrix I identified the following Principles as applicable for improving the contradicting parameters:

Improving feature: ease of operation 33rd parameter of contradicting parameters

Worsening feature: measurement accuracy 28th parameter of contradicting parameters

On mapping the same on the TRIZ contradiction matrix, the following Principles are recommended:

33 @ 28 = 25, 13, 2, 34

"@" represents "at the cost of" – the above can be read as "33 improves at the cost of 28."

Principles to apply are:

Principle 25 - 'Self-service'

Principle 13 - 'The other way round'

Principle 2 - 'Taking out'

Principle 34 - 'Discarding and recovering'

Solution One

I began with Principle 13 – 'the other way round' – I interpreted as changing the direction/place/dimension of stapling. In this case, rather than stapling pages one behind the other (e.g., back-to-back) I put them together, one below the other and stapled them. This made navigation simple. This is illustrated in Figure 9 below.

The image shows a TRIZ contradiction matrix with rows 16 through 19 and columns 1 through 34. Three columns are highlighted with the text "Stapled here", "Stapled here too", and "Stapled here" above them. The highlighted columns correspond to the recommended principles 25, 13, 2, and 34.

Figure 9

Still, due to the gap on the pages navigation is not that very easy.

Solution Two

Next I tried using Principle 13 in conjunction with Principle 2 - 'taking out' - applying the Principles together for a better solution.

Rather than stapling pages back-to-back or one below the other I turned them inside out, a variant of ‘other way round.’ Both blank sides face out with the matrix inside. [If you plan to try this yourself, check that bottom row of first page (number 19) of table is touching top row of the second page (number 20).] Now staple the pages from outside such that the extra space between table contents is out of the staple pins. Flip the page, fold the pages along the staple pins and the table is in order without a navigation problem. The pages are stapled inside-out and the white space of the paper is out by folding the stapled area of page. (See Figure 10.)

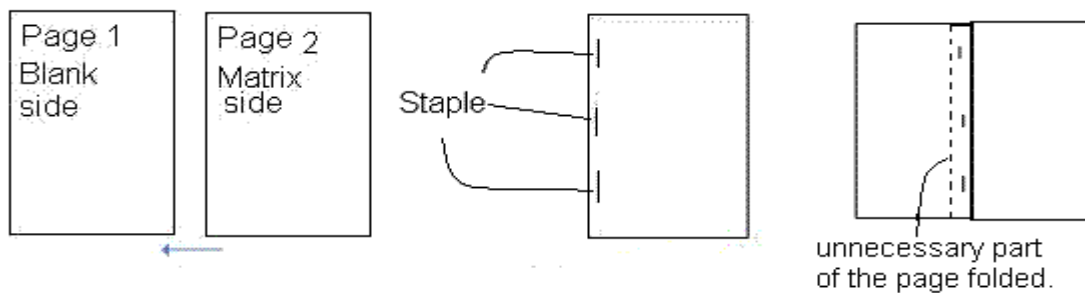


Figure 10

Page 1: Worsening feature title on top
Page 2: The second part of the matrix

Figure 11: The Solution

Taking into account Principle 13 in conjunction with Principle 2 I stapled the contradiction matrix pages such that the matrix looks like a single document even though it is a two page document. The stapled matrix has improved accuracy and ease of navigation, documenting, filing and handling. Additionally, the folding and documenting, filing of the contradiction matrix is easier when compared to variant shown in Figure 9 of the solution.

Conclusion

TRIZ, though devised using the patent database, can be applied in relatively simple areas like stapling pages, proving that it can be applied in technical and non-technical fields. TRIZ is a versatile and universal tool for innovative thinking, tackling psychological inertia and solving contradictions.

Acknowledgement

First, the credit for my being able to analyze this small operation and write this paper goes to Genrich Altshuller. TRIZ is a result of his acumen, perseverance and persistent effort. His selfless work has helped many engineers and scientists to extract the inherent advantages of this theory. Secondly, I thank K. Pradeep Patent Engineer and Sampoorna Patti Patent Searcher, of Philips Electronics India Ltd., for introducing me to TRIZ, giving me the ability to look at small things with a microscopic eye.

About the Author KRD Pravin (Pravin Koshti)

Pravin received his engineering degree in Electronics from [Madhav Institute of Technology and Science, Gwalior \(MP\) India](#). His major interests include learning and implementing new concepts. His work ethic does not come as a sense of obligation, but from the satisfaction he gain from completing a project successfully.

He worked on Artificial Intelligence as a major project work during his undergraduate studies and was published in the national level conference. At present Pravin's focus is applying TRIZ to problems irrespective of their field, simplicity or complexity.

His experience includes systems, networks, development, support and maintenance, teaching Game theory, Queuing theory and models in a management school, and drafting/searching patent specifications and technology forecasting. Pravin is a registered Patent Agent with the [Patent Office of India](#) and this paper was conceived when Pravin was working as a Patent Engineer at Prodhovidhi Consulting, Bangalore. Presently, Pravin is a Consultant with [Breakthrough Management Group, India](#). His major areas of interest are TRIZ Six

Sigma and applications of TRIZ for Software/hardware applications and IT solutions.

References

Source for Figure 1-5: www.simoncox.com

www.triz-journal.com