Systematic Innovation e-zine
Introduction

Welcome

Welcome to the first of our TRIZ and systematic creativity magazines. We hope that this publication will become one of the things you reach for regularly each month. We realise, in these days of massive information overload that this represents us with the rather substantial challenge of trying to combine large quantities of uniquely valuable knowledge in a highly concise and readable way. We offer the humble guarantee that the content of the newsletter will be full of things that will be highly relevant to your application of TRIZ and that you won't have seen anywhere else before. We sincerely hope you will find it possible to both skim through the whole letter in a few minutes, and to delve into the fine detail of some of the new knowledge we're presenting for considerably longer.

Systematic Innovation has and will continue to have an active TRIZ and systematic creativity research programme. The newsletter is our way of communicating the findings of that research before it finds its way to any other source. In keeping with the fact that '99% of problems have probably been solved already by someone else' and that we aim to provide a portal service – helping you find the best in creativity research in the shortest possible use of your valuable time – we hope also that we can use this forum to direct readers to the finest content of other related publications. We thus hope to become a useful complement to other TRIZ knowledge sources.

We hope you enjoy it. If you don't, please let us know; if you do, please tell everyone else.

Editor

Patent Analysis

Our patent team is busy updating and improving some of the main TRIZ tools through a systematic programme of analysis of world intellectual property. Each month in the e-zin we will be featuring some of the findings of the team, focusing on some of their favourite examples from up to the minute granted patents from across all of the scientific and engineering disciplines, and which offer some interesting tips and suggestions for readers irrespective of whether they are directly interested in the specific invention.

This month, their attention was particularly drawn to US patent 6,271,286 granted to Binney and Smith in August for erasable coloured pencil leads. Anyone who has used coloured pencils will know how difficult it is to erase any mistakes.

In order to understand the problem and to see the interesting solution developed by the inventors, we need to zoom-in to examine the pencil lead at the sub-micron scale. Most coloured pencils are formed from a complex combination of constituents providing different functions and attributes – colour, strength, evenness, flexibility, prevention of fragment formation, etc. Of particular relevance to the question of erasability is the use of waxes to provide the binding function. The waxes used are very good at achieving the function of keeping the lead together and releasing it onto the paper in a controlled manner, but they are a nuisance when it comes to erasing. This is because the heat generated by an eraser causes the waxes to melt and thus bind themselves into the surface of the paper.

From a TRIZ perspective, we might see this problem in one of two main ways; the first would be to look at it as a 'knowledge' problem; are there any ways of achieving the 'binding' function other than using wax? The other way would involve recognising the existence of a contradiction associated with the wax. As shown in the figure – an extract from a rather more complex function and attribute analysis picture – the wax provides a useful 'bind' function, and also a harmful 'marks' function.

The first response of our researchers was to map this contradiction as one in which we wished to improve erasability ('adaptablity or versatility' or 'convenience of use' on the Matrix), and that loss of the 'binding' function ('stability of the object's composition') was the thing that prevented the improvement. The Inventive Principles suggested by both of these contradictions were very similar, and in fact both Principle 35 and Principle 30 came up in both boxes in the Matrix.

These two, in fact, turn out to be the Principles used by the inventors, who appear to have successfully replaced the wax with the use of tiny PTFE or similar fibres to perform the binding function. The use of Principle 35 'Parameter Changes' – i.e. change the wax, is perhaps not so useful as a solution trigger except in retrospect, but Principle 30 'Flexible Shells and Thin Films' is a very clear steer in the direction of the chosen solution. This is especially so when we see the CREAX defined extension to Principle 30 – 'use thin fibres and webs' – the result of a substantial number of other examples we've found of fibres being used in similar ways.

So, US6,271,286 may be seen to support the current Matrix. The evidence we have accumulated so far suggests that for solutions at this small size scale, this is quite unusual; and that more often than not, we are finding that the Principles used by inventors at the sub-micron scale are not the ones recommended by the classical Matrix. More on this in the future. For now, we leave you to think about how the micro-scale binding plus flexibility/coherence contradiction solving properties of fibres might be able to be used to solve a problem of yours.

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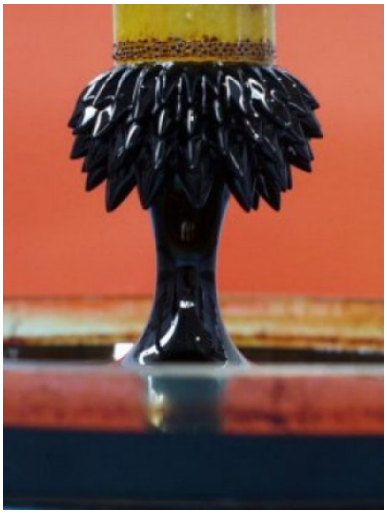
Investment – Ferrofluids

No-one here at Systematic Innovation has any particular interest in share dealing, but we are often asked by customers and clients, whether – seeing as all technology evolution trends are predictable (!) – we have any hot tips on 'good' investments for them.

This immediately puts us on some rather dangerous territory, because, as we hopefully get to demonstrate wherever we go, although the TRIZ trends are extremely effective in predicting the 'what's of new technology, they offer little in the way of determining the 'when's. So, with that health warning in mind, and a fistful of disclaimers – the price of shares can go down as well as up, etc – we will be using this section of the newsletter to suggest some good technology directions and the TRIZ-based reasons why they are important.

This month we look briefly at ferro-fluids – a relatively new class of materials finding increasing application in a wide variety of different applications from seals to dampers, measurement devices to heat exchangers. Essentially a ferrofluid is a stable colloidal suspension of ferromagnetic mono-domain particles in a liquid carrier. To avoid agglomeration due to attractive forces each particle is coated by long-chain molecules or by an electrostatic layer. Due to the smallness of the particles (diameter ~ 10nm) the properties of ferrofluids are substantially affected by thermal Brownian motion. When exposed to a magnetic field, a ferrofluid behaves like a paramagnetic gas of high permeability.



Ferrofluids are believed to offer an important new capability in a form which – at the macro-level at least – is very simple. They are important from a TRIZ perspective when we think about S-Field analysis and the very simple test of a viable system contained there – a viable system must have at least two substances and a field. In very simple terms, a ferro-fluid is a substance which already has a field attached to it. It thus gives us two of the three parts required to form a system.

Find out more about ferrofluids at http://www-theory.mpip-mainz.mpg.de/~hwm/ferro.html, or search for 'ferrofluids' on one of the patent search engines.

TRIZ and Humour

It is a well known fact that the very best way to kill a joke is to try and analyse what makes it funny, so what we're hoping to do in this section of the newsletter each month is probably a fatal mistake. So, safe in the knowledge that any shred of credibility any of us here at Systematic Innovation might have pretended to possess has already packed its bag and is ready to leave the building and vowed never to return, we are proud to get unveil our cartoon for this month.

The general idea – aside from our credibility assassination – is to demonstrate the importance of contradiction in humour. The large majority of humour, in fact, is built on contradiction, with the vast majority of jokes being based on the teller encouraging the listener's brain to go in one direction while the punch-line lies in another. The resolution of this contradiction, the moment we make the jump from our 'wrong' interpretation to the 'right' one is, according to those that have the luxury of wasting their lives studying in this area, the mechanism that triggers our laughter. It should be no surprise therefore, to know that humour also plays an important part of the creative processes involved in inventive problem solving. Anyone that sees a 'good' contradiction-breaking solution for example is likely to react with a laugh before they start filling out their patent application forms.

Without wishing to admit that anyone in the company actually spends any of their working day studying these things, we are fairly well convinced that all jokes are based on the same 40 Principles that so far govern the resolution of technical contradictions. Most cartoonists seem to manage whole careers based on just one or two of the Inventive Principles (usually number 13!). One or two exceptional cases seem to have a working knowledge of close to all 40.

This month, we present a cartoon illustrating the infrequently used Principle 16 'Partial or Excessive Actions'. Future months will see us massacring perfectly good jokes based on other Principles. In the meantime, if anyone who also doesn't spend any of their working day looking at cartoons, accidentally happens across something illustrating the Inventive Principles (especially the highly illusive Principle 37 – the only one we're still missing!) we would be very happy to hear from you or your anonymous friend.