

TRIZ tools approach to innovate around patented technologies



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TRIZ (/ˈtriːz/; **Russian**: теория решения изобретательских задач, teoriya resheniya izobretatelskikh zadatch,

literally: "theory of the resolution of invention-related tasks"

TRIZ was developed by the Soviet patent clerk Genrich Altshuller

it is "a problem-solving, analysis and forecasting tool derived from the study of patterns of invention in the global patent literature".

Thus, TRIZ is essentially a summarized collection of the world's known solution methods gleaned from patents.

Patents are the documentation of a solution to a given problem.

By framing your problem with the *indexed standardized problems*, you can pair with the *standardized solution paths* to explore options for your situation.

The TRIZ index of standardized solutions is straightforward and comprised of;

- 40 inventive principles to resolve a contradiction
 - *where both benefit & harm are produced at the same time*
- 76 standard solutions
 - for improving beneficial effects & reducing harmful effects
- 8 patterns of technical evolution
- [Scientific effects database](#)

So, have you ever been stalled due to a competitor's patent

TRIZ offers a rigorous approach for your team to employ

1st having thoroughly read the patent we collectively build a Perspective Map

- **to expand understanding & explore additional benefits**

We will use Lifestraw IP as an example

Perspective Map & Benefit Ideation

<i>Expanding perspective / setting context</i>	<u>Prior Condition</u> <i>previous state</i>	<u>Current Situation</u> <i>Life Straw</i>	<u>Future Condition</u> <i>issues, opportunities,</i>
<u>Supersystem</u> <i>environment</i>	-drought, flood, earthquake, power outages -only surface water available & unfit for drinking	-means for different needs, silt, bacteria, chemicals	-restricted materials, recyclable, rechargeable -useful in arid environments
<u>System</u> <i>basic benefits; personal potable water generation</i>	-sand filtration, -boiling	-LifeStraw -portable and compact -need for low cost -simple and reliable to use for sustaining life	-scalable for families, higher output, shareable without cross contamination -improve taste -indication of end of useful life -purification for medical use -nutraceuticals
<u>Subsystem</u> <i>core technologies</i>	-mechanical filtration, -chemical binding -activated carbon	-customizable filtration/purification	-Ozone powered, via solar pv -pump action for higher output/pressure -flexible volume for H2O storage

Defeat patent / Improve Device

- With understanding of the inventive intent and having explored some future benefits....*and from TRIZ knowing*

Functions deliver Benefits

- we can by breaking independent claim(s) into function statements:
a **Subject** that **Acts** on an **Object**
i.e. sugar sweetens tea
- generate the function map... *(Note: not a process map)*

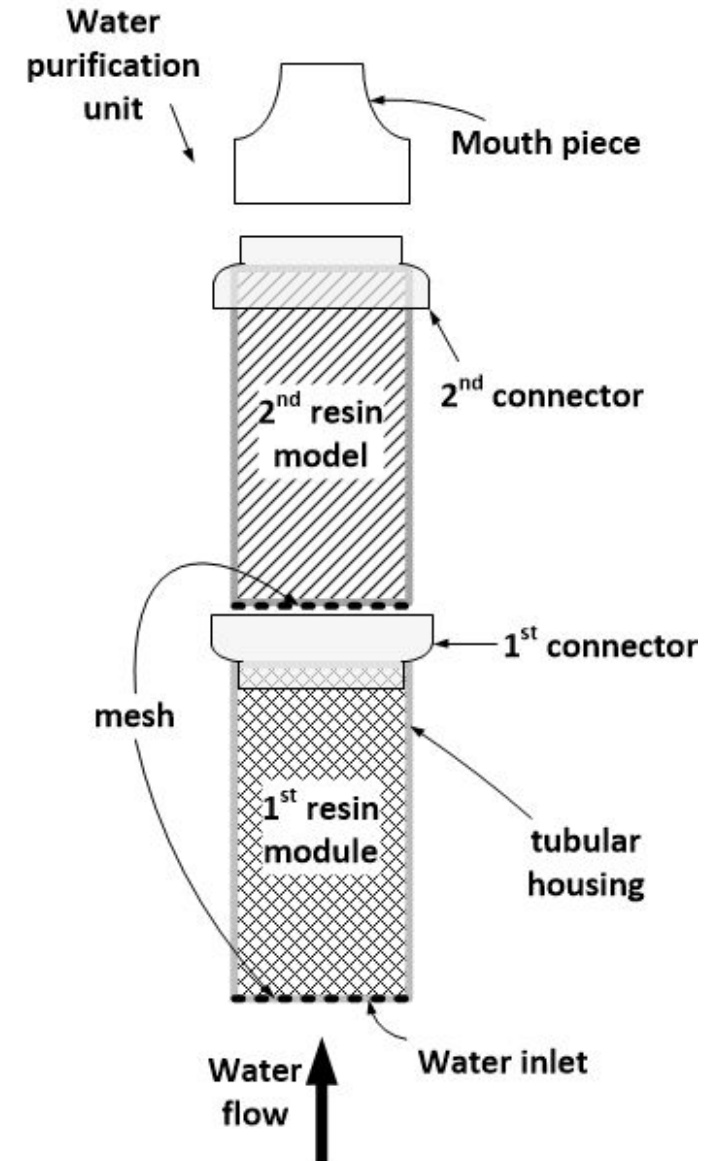
Modular water purification unit US 2010/0032358 A1

1. A portable water purification unit in the form of a **tubular housing** with a length of less than 50 cm and a width of less than 80 mm, the tubular housing having a **first opening** at a first end for entrance of water into the tubular housing and a **mouthpiece** at an opposite end for **Suction of water** through the tubular housing, the mouthpiece having a narrowing part towards the opposite end and configured for **fitting to a human mouth**,

wherein the **tubular housing comprises** at least a **first module** and a **second module containing** mutually different **water purifying granular resins**, the first module having a **first connector** and the second module having a **second connector**, the first and the second connector both being tubular and being **connected** for **confining water** flowing through the first and the second modules, the first module or the second module or both having at least one water permeable **mesh** with a mesh size smaller than the grain size of the resins for **preventing mixing of the resins**.

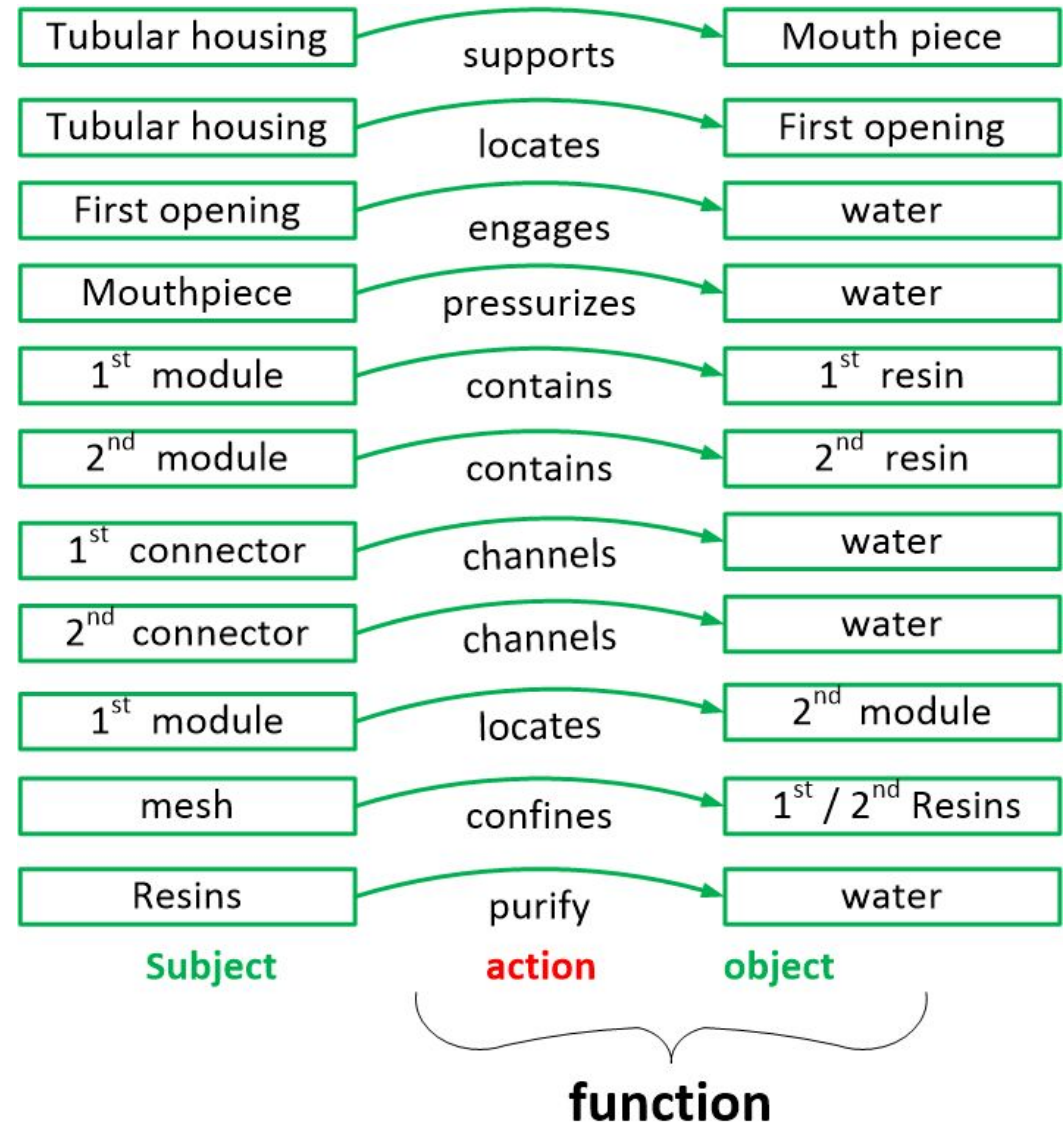
This not a grammar lesson but taking the **single sentence** claim and pulling out the elements and functional relationships of what the claim describes.

A schematic sketch helps with understanding the verbiage, you might use a patent drawing or build your own as shown adjacent.

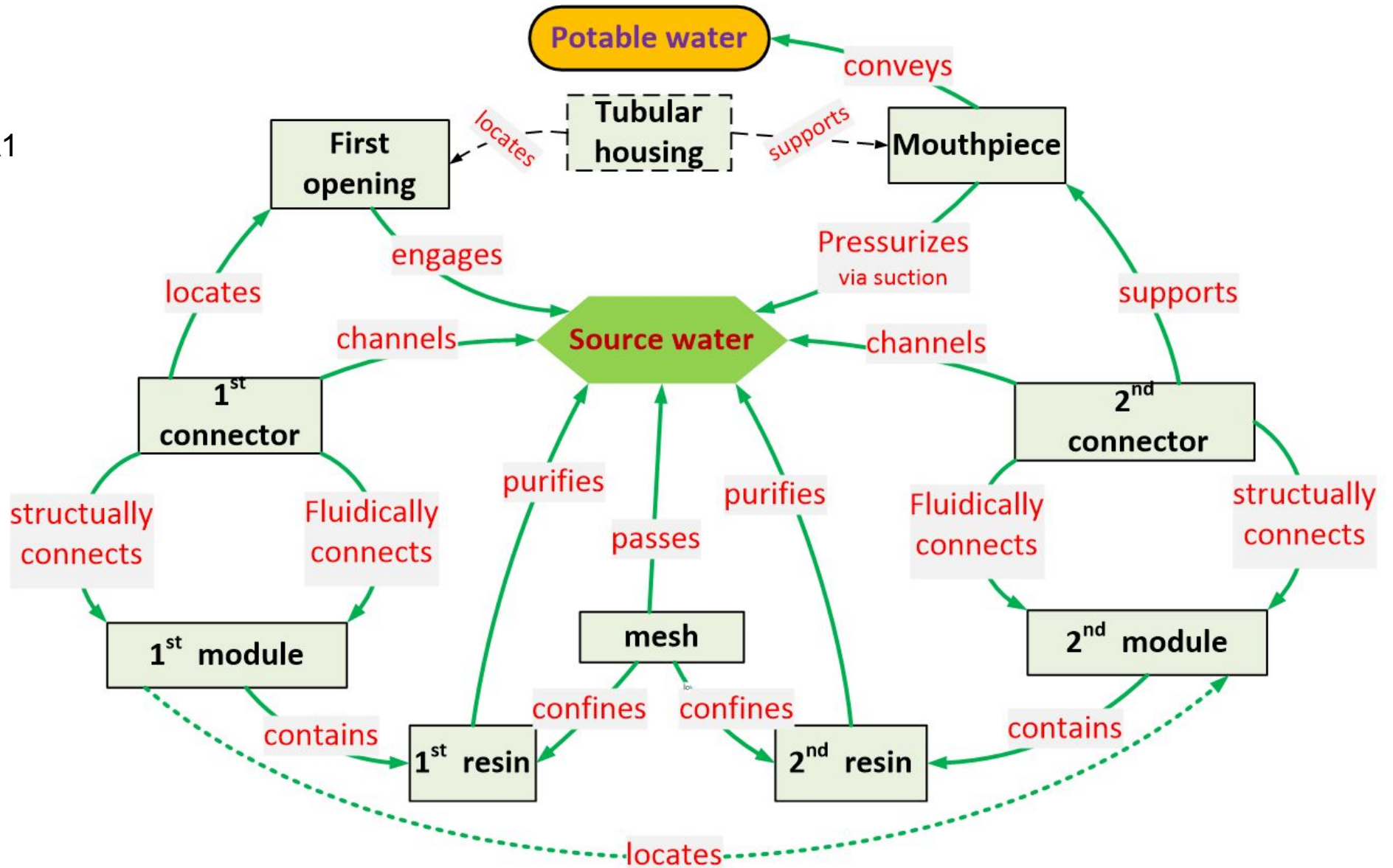


Thus, from the claim we can extract the following Functions

With these in hand we build the function map



Lifestraw Function
Map per claim 1
US 2010/0032358 A1



We will focus on two more TRIZ tools

1) Trimming

2) Contradictions Matrix

both while Applying the 40 Inventive TRIZ Principles

Trimming Questions

- Do we really need this function
 - Can we combine elements
 - Can we accomplish this in other ways

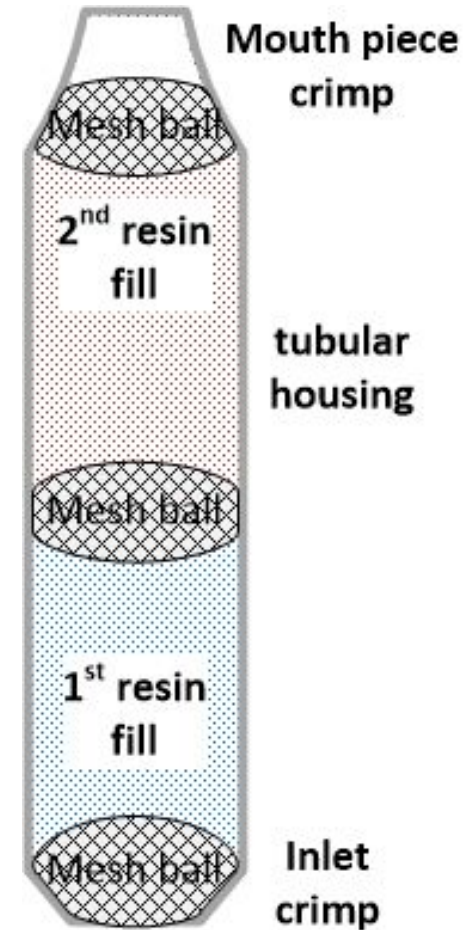
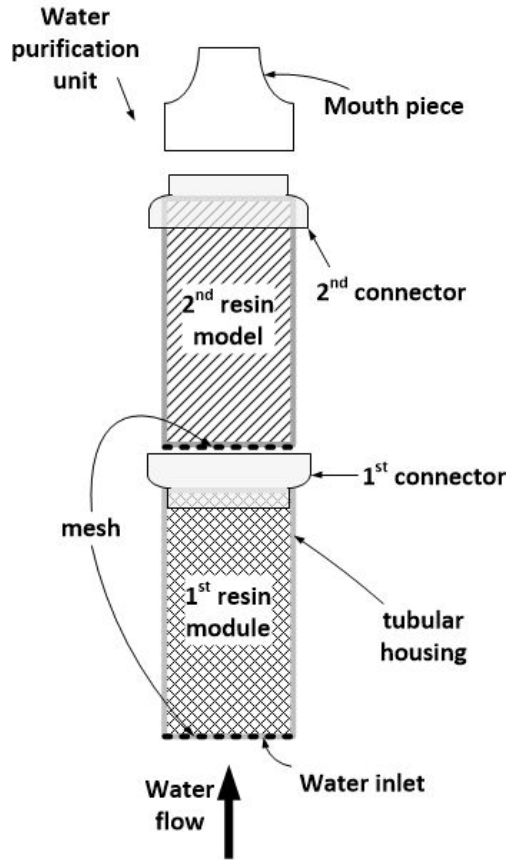
Trimming to defeat the claim

- trim out connectors & module walls via
 - crimp form a single tube with a inlet retainer
 - use a compressible mesh ball to retain resins
 - crimp mouthpiece onced filled

Taking Out Principle 2, Parameter Change 35

- trim the two modules into one via
 - Combine resins into single module if this does not harm efficacy significantly
current LifeStraw uses a membrane bundle filter
- Segmentation Principle 1***

Thus, we have potentially defeated the claim



Let us turn to Contradictions

TRIZ at it's heart provides for solving contradictions

- Contradiction - positive & negative outputs from the same function
 - *I.e. filter removes silt, filter becomes clogged*

what contradiction does the **function resin purifies water** provide solutions for

from the standardized triz parameters we select **Reliability & Productivity**

Thus, we seek to improve filtration Reliability but filter Productivity suffers

Using our parameters

Improving Reliability

while

Productivity suffers

the TRIZ Contradiction Matrix suggests

4 inventive principles to explore for ideas

Improving Parameter <i>what do we want to make better?</i>	Undesirable Result <i>what gets worse as a result?</i>	Inventive principles
27 Reliability	39 Productivity	1 35 29 38

Principle 1: Segmentation

- a. Divide an object into independent parts.
- b. Make an object sectional - easy to assemble or disassemble
- c. Increase the degree of fragmentation or segmentation

Principle 35: Parameter Change

- a. Change the aggregate state of an object, the concentration of density, the degree of flexibility or the temperature.

Principle 29: Pneumatics and Hydraulics

- a. Replace solid parts of an object with gas or liquid. These parts can use air or water for inflation or use air or hydrostatic cushions.

Principle 38: Accelerate Oxidation

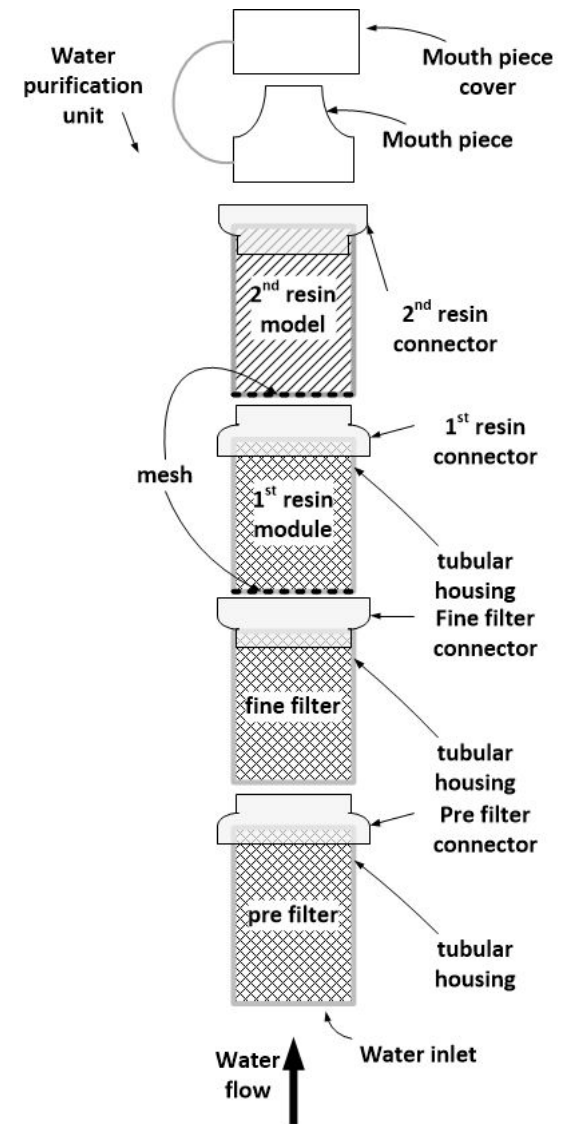
- a. Replace normal air with enriched air.
- b. Replace enriched air with oxygen.
- c. In oxygen or in air, treat a material with ionising radiation.
- d. Use ionised oxygen.

New IP

- key modules so that modules can only be assembled in consecutive treatment order, i.e.
 - mechanical filtration followed by chemical treatment
 - larger mechanical filtration followed by finer mechanical filtration

Segmentation Principle 1 + Asymmetry Principle 4

***We might not defeat the claim
but
we have an improvement we can leverage***



New IP

- Mouthpiece & Bag of resin that can be opened up and Storage bag dipped in water to fill then allow human squeeze to force water through resins and also provide storage of water

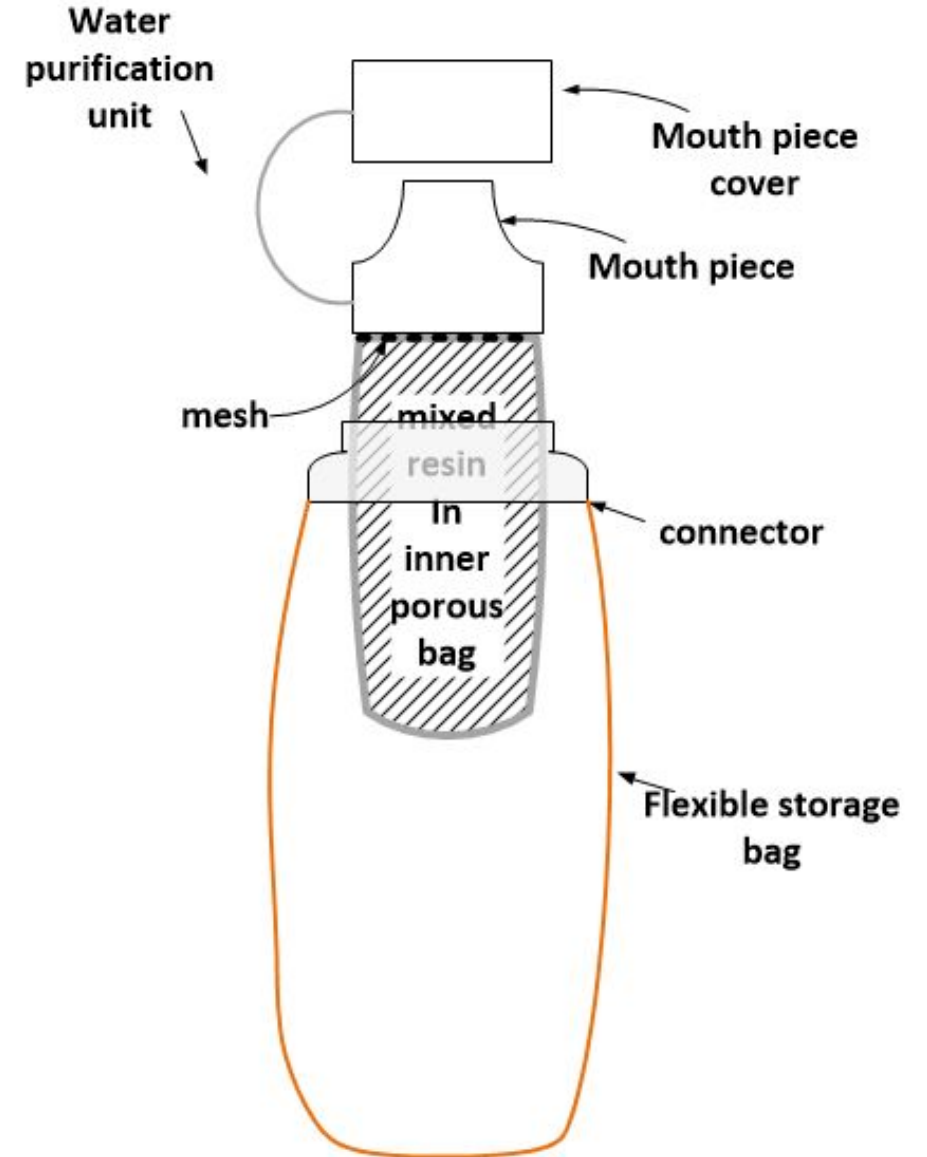
Parameter Change Principle 35

Flexible Membranes / Thin Films Principle 30

- Mouthpiece, silt filter & PEM cell ozone generator cap for purification

Accelerate Oxidation Principle 38

New ideas, new benefits



We hope you now have some appreciation for TRIZ in innovation

Always useful for generating new ideas

Now we can see how to use in the workaround of patent claims

Questions?

**This presentation will be posted shortly after the
ABI AVD Mfg Conference
at**

<https://www.leverageandgrow.com/blog>

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Description

Steve has over 30 years as a product engineer, with development of product architectures and process concepts, feasibility studies, fabrication and cost & performance evaluation. Demonstrating a penchant for invention, this evolved into corporately supporting project teams to extract out their inventions and driving breakthrough concept solutions. This enabled expanding market leadership, which is, in turn, supported by patent positions via internal generation and in conjunction with select suppliers. A seasoned facilitator of Invention Workshops with over 100 invention workshops since 2004 spanning NA, SA, Europe, China and India, Steve is also a certified GBTRIZ facilitator. He brings value to an organization by assisting clients in the self-development of unique solutions to complex and simple problems and helps identify previously unidentified customer benefits.



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Description

Todd Van Thomme is a registered patent attorney and shareholder in Nyemaster Goode's Intellectual Property department in Des Moines. His practice is diverse, but primarily focuses on partnering with both startups and larger clients to identify and collaborate on mechanical, chemical, nutraceutical, pharmaceutical, and food science-related intellectual property needs. An Iowa native, Todd spent time in private practice and as a secondment in-house counsel for Whirlpool Corporation in Michigan after completing his undergraduate degree in chemistry from Iowa State and his JD at Drake. He returned to Iowa to take on his current role at Nyemaster five (5) years ago. Todd is the Past President of the Association of Patent Law Firms and the Iowa section of the Institute of Food Technologists. Todd is also an ABI Leadership Iowa graduate.