Design for Patentability®

Sergei Ikovenko, Dr-Eng, PhD, LL.M

in cooperation with

Massachusetts Institute of Technology

WIPO WORLD INTELLECTUAL PR ORGANIZATION

Tufts UNIVERSITY

Встреча Московского ТРИЗ Клуба 06.11.2019

Тема : «Разработка патентноспособных инженерных решений»
(Design for Patentability® - DFP)

Основные разделы доклада:

1. ТРИЗ и DFP. История.
2. DFP стратегии/инструменты разработки и проектирования:
   - стратегии по обходу конкурирующих патентов
   - стратегии по усилению собственных заявок/патентов
   - разработка дополнительных пунктов формулы
   - другие
3. DFP и ВОИС (WIPO).
4. Практика DFP в ведущих компаниях мира (Hyundai Motor, GE, Huawei, VIVO, Siemens, Philips, TATA, Motor, BOE, Mahindra, etc.)

Докладчик:

Яковенко Сергей, Dr-Eng, PhD, LL.M (магистр патентного права), ТРИЗ Мастер.
Профессор (Tufts University, MIT), президент DFP (Design for Patentability®) Institute, преподаватель Академии ВОИС ООН (WIPO), ведущий преподаватель программ ТРИЗ на GE, Hyundai Motor, Siemens, ABB, BOE, Intel и т. д., председатель ЭМС МАТРИЗ. Автор 4 книг по ТРИЗ (English, Chinese), 116 изобретений.

Design for Patentability® (DFP) is a powerful innovative design methodology based on a rational and disciplined process. It employs an efficient suite of tools and methods for improving existing products and technologies as well as for developing winning next-generation products.

These approaches can also be used to develop the required functionality, reduce the cost of manufacturing processes, enabling the new and improved products to be brought to market with a very high probability of being patented.

DFP and TRIZ. History.

1989 - first article with V. Kaner and V Berezina
1995-2004 - P&G, Honda, Toyota, Alstom, Total, Shell Oil, etc.   TRIZ programs, Invention Machine Corp.
2004 - 2015 – Intel, GE, Siemens, etc. GEN3Partners

Presentation at TRIZ Congress, 1991

TRIZ for Patent Strategies. 2010.

S.N	Type of Patent Strategy	TRIZ Tools
1.	The Antidote Strategy	Function Analysis, Cause Effect Chains Analysis, Trimming, Function Oriented Search
2.	The Picket Fence Strategy	S Curve Analysis, Trends of Evolution, Function Oriented Search, Reverse Contradiction Analysis
3.	The Tall Gate Strategy	S Curve Analysis, Trends of Evolution, MPV Analysis
4.	The Submarine Strategy (old and new)	Trends of Evolution, Function Oriented Search
5.	The Counter Attack Strategy	Function Oriented Search, Reverse Contradiction Analysis, Semantic Tools
6.	The Stealth Counter Attack Strategy	Function Oriented Search, Reverse Contradiction Analysis, Semantic Tools
7.	The Competitive Patent Circumvention Strategy	Function Analysis, Cause Effect Chains Analysis, Trimming
8.	The Patent Busting Strategy (Doctrine of Equivalents and Prosecution History - Estoppel)	Function Analysis, Function Oriented Search
9.	The Blanketing Strategy	Function Oriented Search, Trends of Evolution
10.	The Bargaining Chip Strategy	Trends of Evolution
11.	The Cut-Your-Exposure Strategy	Function Oriented Search

DFP Programs Deployment by Patent Offices. 2018-2019.

DFP Programs are supported by a number of national Patent Offices, for example:

- **China Patent Office**
- **Patent Office of Poland**
- **European Patent Office**

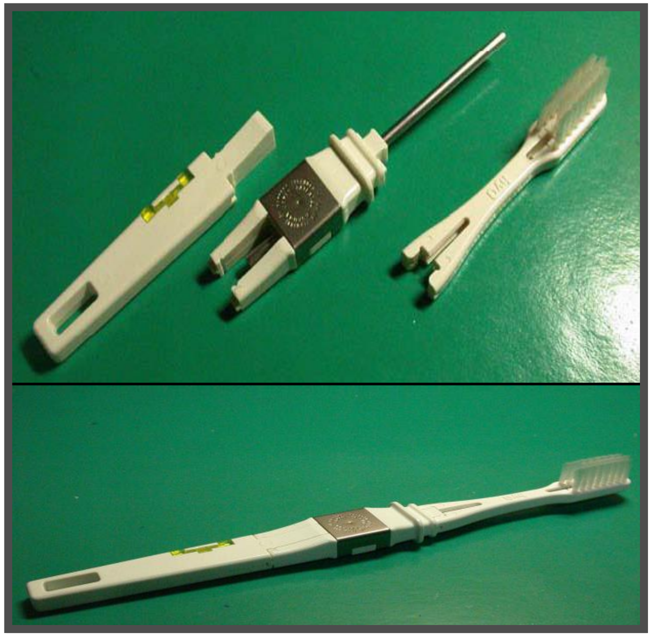
DFP Strategies.

Competitive Patent Circumvention.

Ionic Toothbrush

A Case Study in Patent Circumvention

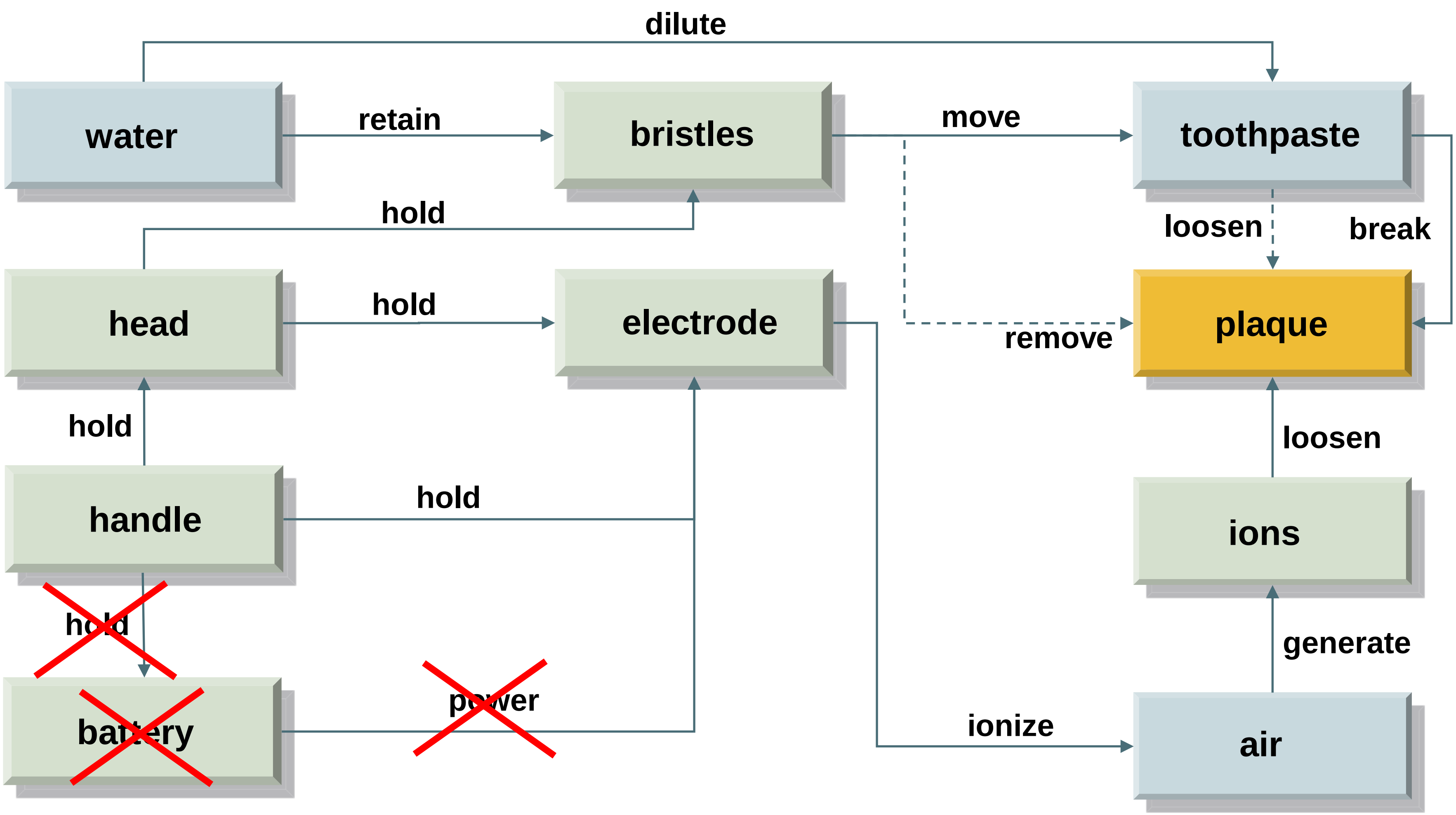
DFP — Competitive Patent Circumvention: Example



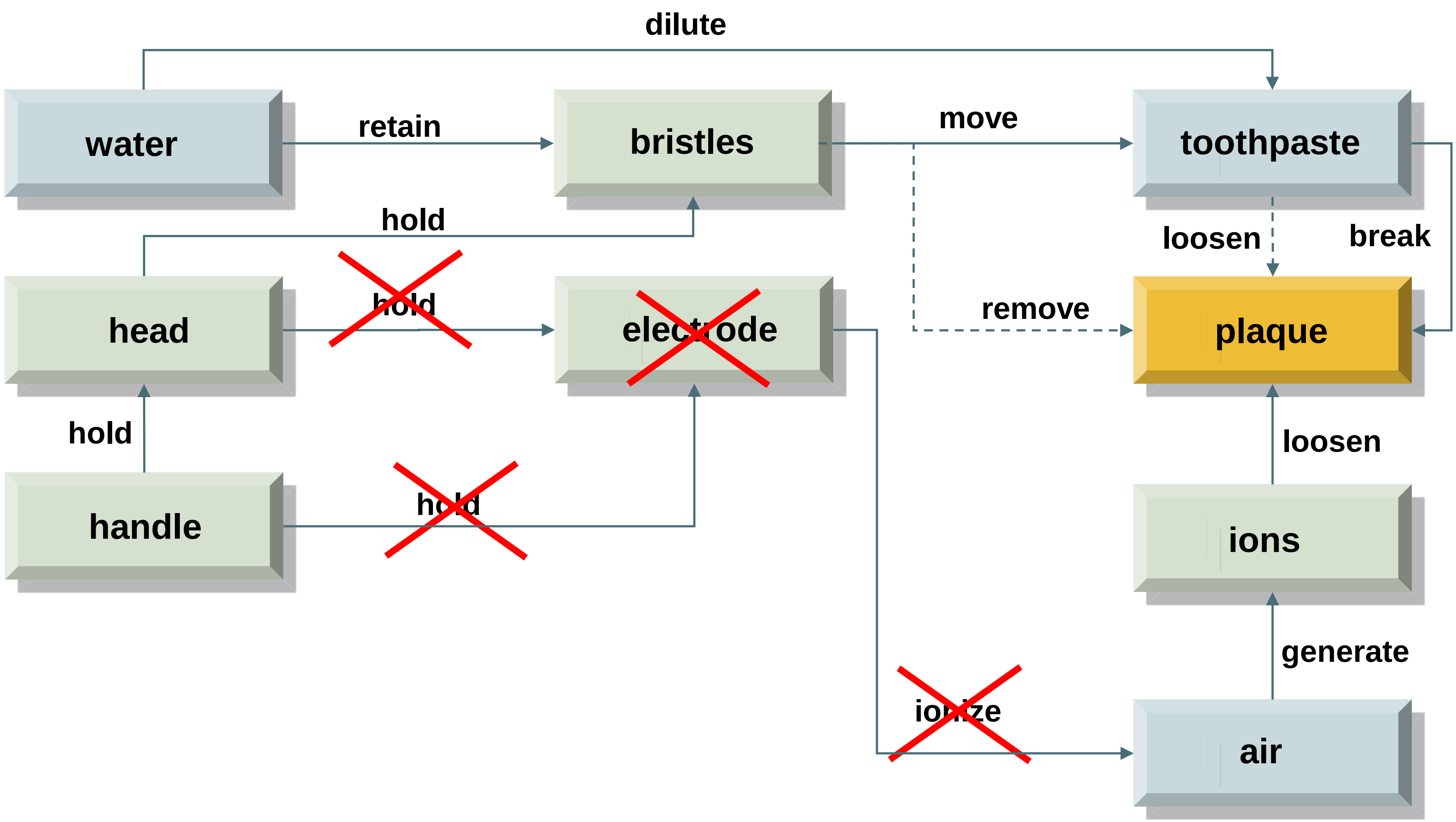
Scenario: Ionic Toothbrush

- **The Independent claim of a patent describes a toothbrush that consists of a head containing bristles, and a handle that holds the head.**
- **The handle and head also hold an electrode that is powered by a battery inside the handle**
- **The electrode ionizes air for easy plaque removal**

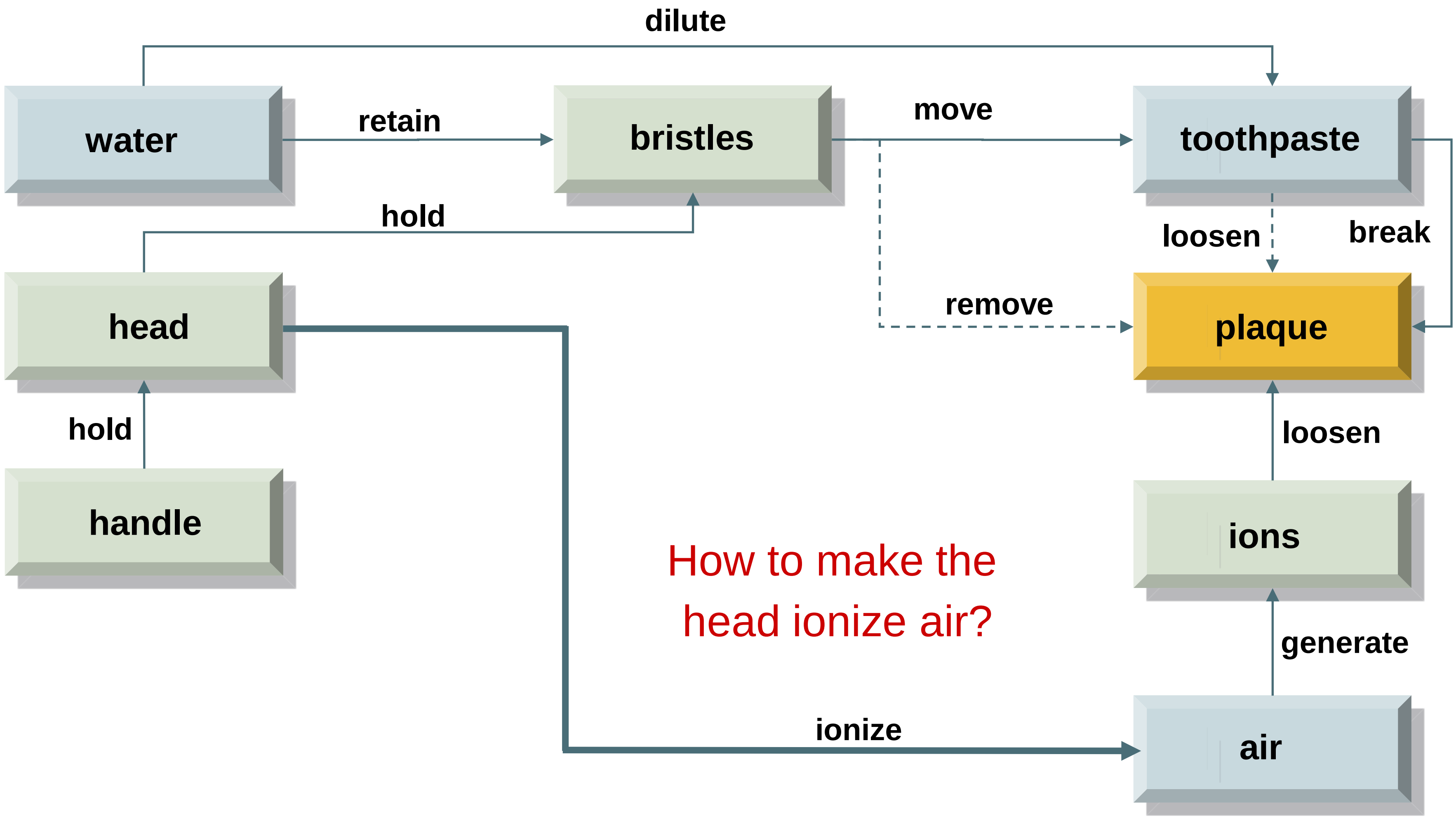
Ionic Toothbrush: Function Model and Trimming



Ionic Toothbrush: Function Model and Trimming

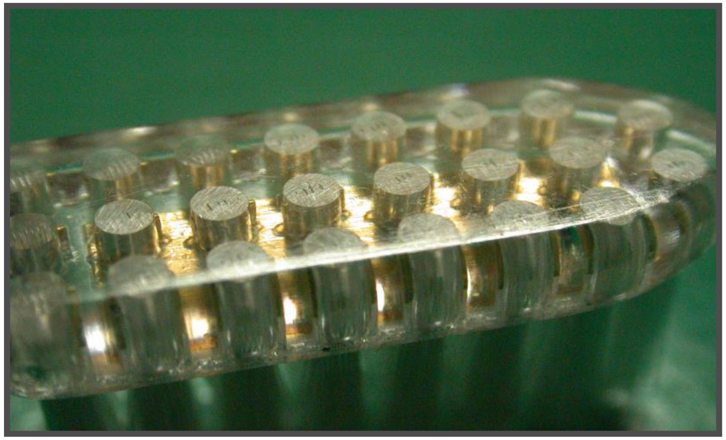


Ionic Toothbrush: Function Model and Trimming



How to make the head ionize air?

Ionic Toothbrush: Solution



- **Solution**
  - **The toothbrush head surface is covered with an alloy that, when in contact with toothpaste and water, works as an active couple and generates voltage.**
  - **As a result the head itself ionizes the air near the plaque**

Doctrine of Equivalents

A judiciary-created doctrine, intended to prevent patent infringers from stealing the benefits of the inventions of others


No 2032695

THE UNITED STATES OF AMERICA

TO ALL TO WHOM THESE PRESENTS SHALL COME:

Whereas GEORGE GIMERA and GEORGE G. BLAISDELL, of Bradford, Pennsylvania, assignors to ZIPPO MANUFACTURING COMPANY, of Bradford, Pennsylvania, a partnership consisting of GEORGE G. BLAISDELL, W. G. BLAISDELL, FRANK W. CALKINS, GEORGE GIMERA, and GEORGE B. MORRIS,

PRESENTED TO THE Commissioner of Patents A PETITION PRAYING FOR THE GRANT OF LETTERS PATENT FOR AN ALLEGED NEW AND USEFUL IMPROVEMENT IN

POCKET LIGHTERS,

A DESCRIPTION OF WHICH INVENTION IS CONTAINED IN THE SPECIFICATION OF WHICH A COPY IS HEREUNTO ANNEXED AND MADE A PART HEREOF, AND COMPLIED WITH THE VARIOUS REQUIREMENTS OF LAW IN SUCH CASES MADE AND PROVIDED, AND

Whereas UPON DUE EXAMINATION MADE THE SAID CLAIMANT s are ADJUDGED TO BE JUSTLY ENTITLED TO A PATENT UNDER THE LAW.

NOW THEREFORE THESE Letters Patent ARE TO GRANT UNTO THE SAID Zippo Manufacturing Company, a partnership consisting of George G. Blaisdell, W. G. Blaisdell, Frank W. Calkins, George Gimera, and George B. Morris, their heirs OR ASSIGNS

FOR THE TERM OF SEVENTEEN YEARS FROM THE DATE OF THIS GRANT

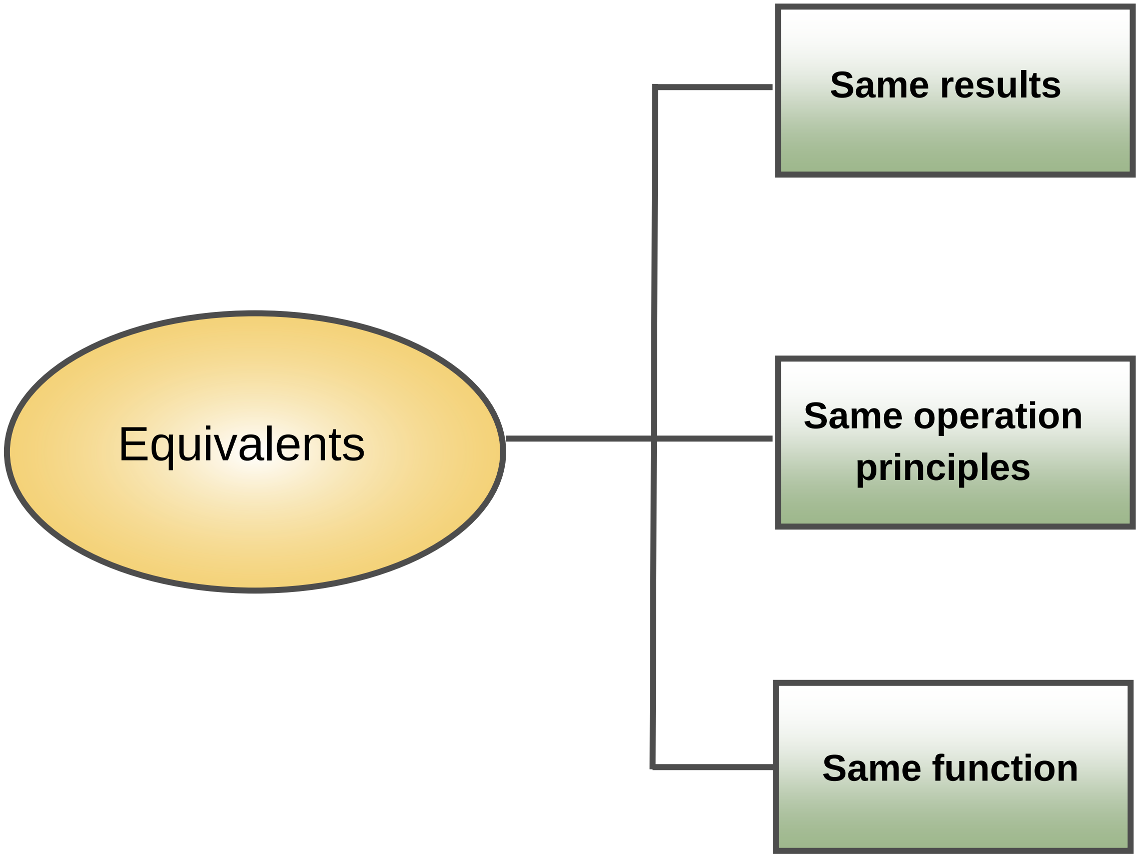
THE EXCLUSIVE RIGHT TO MAKE, USE AND VEND THE SAID INVENTION THROUGHOUT THE UNITED STATES AND THE TERRITORIES THEREOF.

In testimony whereof I have hereunto set my hand and caused the seal of the Patent Office to be affixed at the City of Washington this third day of March, in the year of our Lord one thousand nine hundred and thirty-six, and of the Independence of the United States of America the one hundred and sixtieth.

Attest:
H S Miller
Law Examiner.

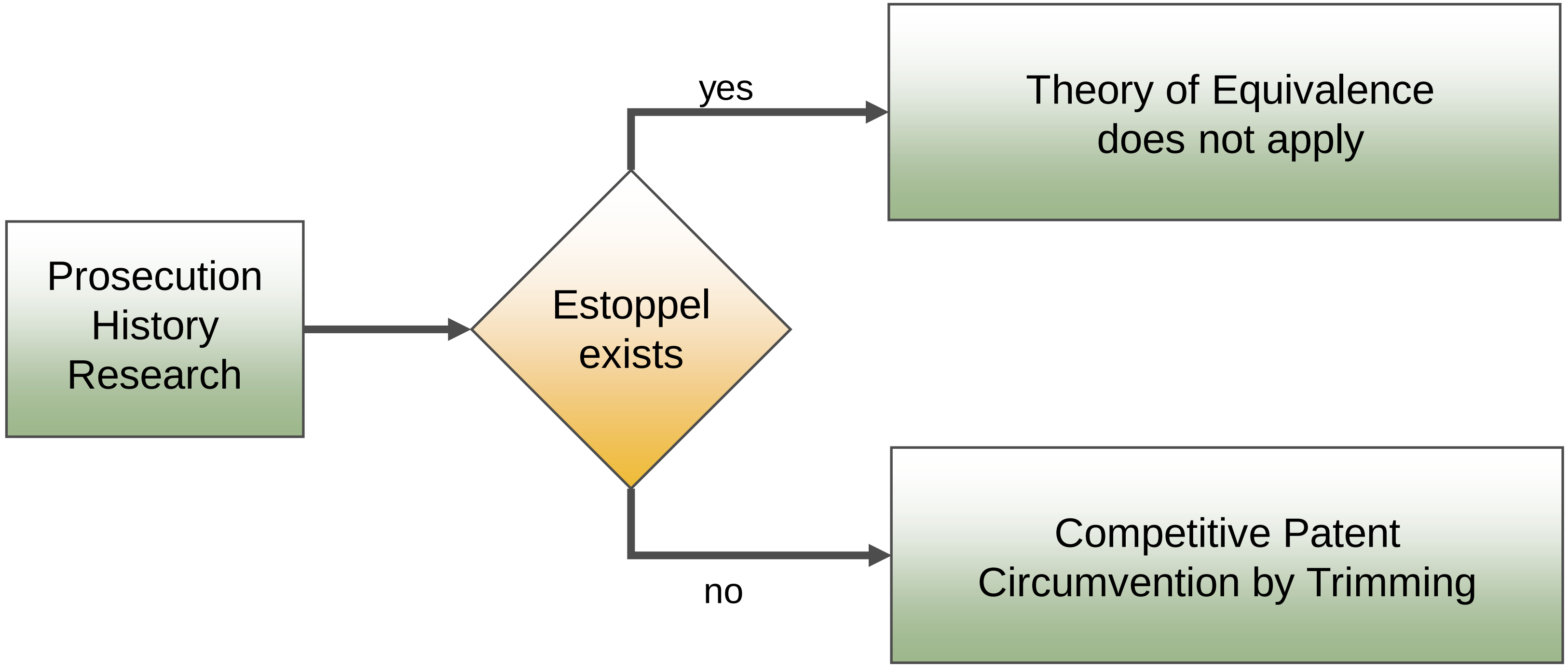
Conway P. Coe
Commissioner of Patents.

- The Definition of an Equivalent:



Function-Oriented Search (FOS) is a problem solving tool based upon identifying existing technologies worldwide, using function criteria.

Competitive Patent Circumvention Strategy by Prosecution History Estoppel Research



The Competitive Patent Circumvention Strategy by History Estoppel Research

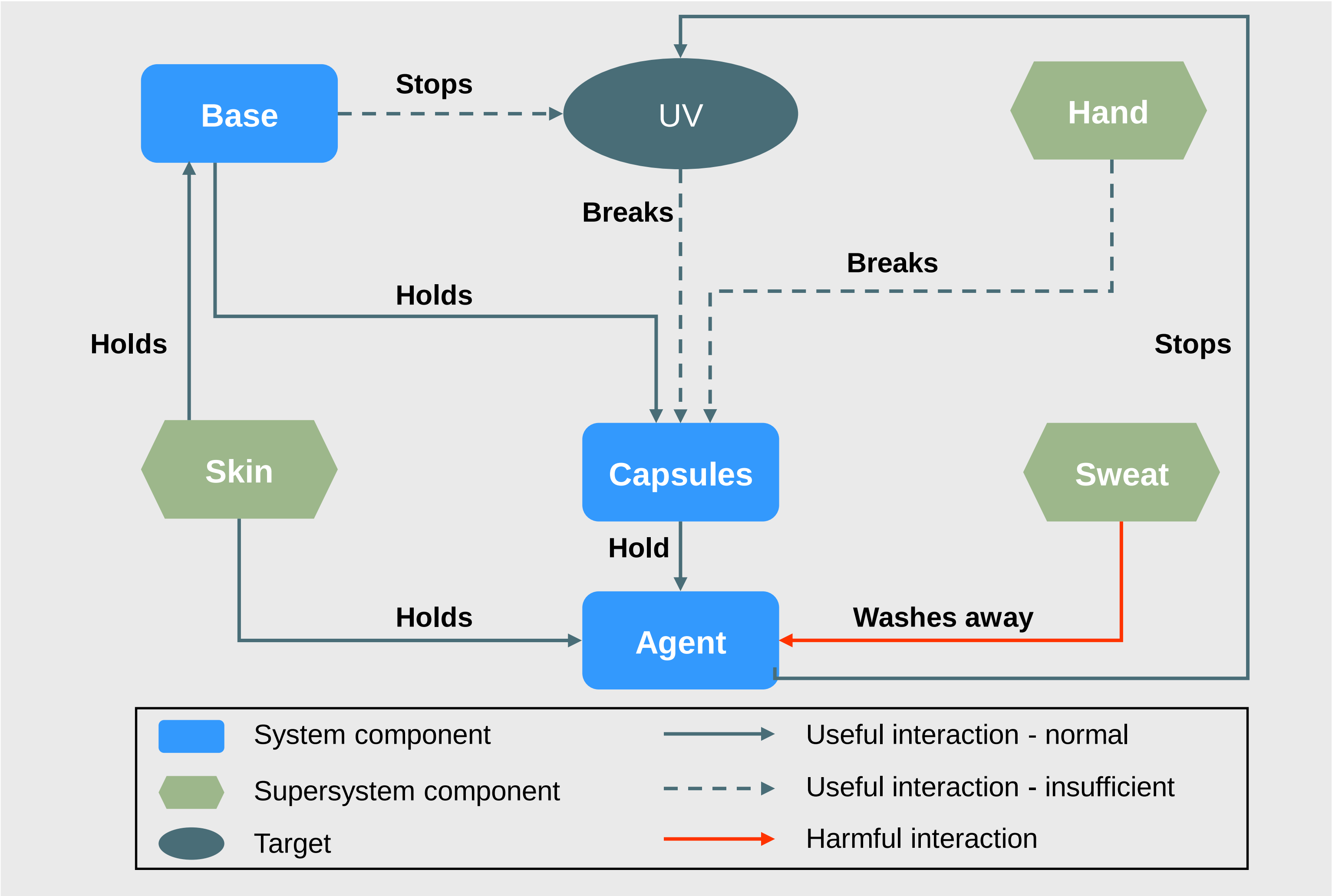
- **The strategy is designed for circumventing competitive patents by substituting a component of an independent claim with another component. To avoid applying the Doctrine of Equivalents, the prosecution history is researched to determine a possibility of the Estoppel.**

- **TRIZ tools used for the strategy: Function Analysis, Function-Oriented Search.**

Sunscreen

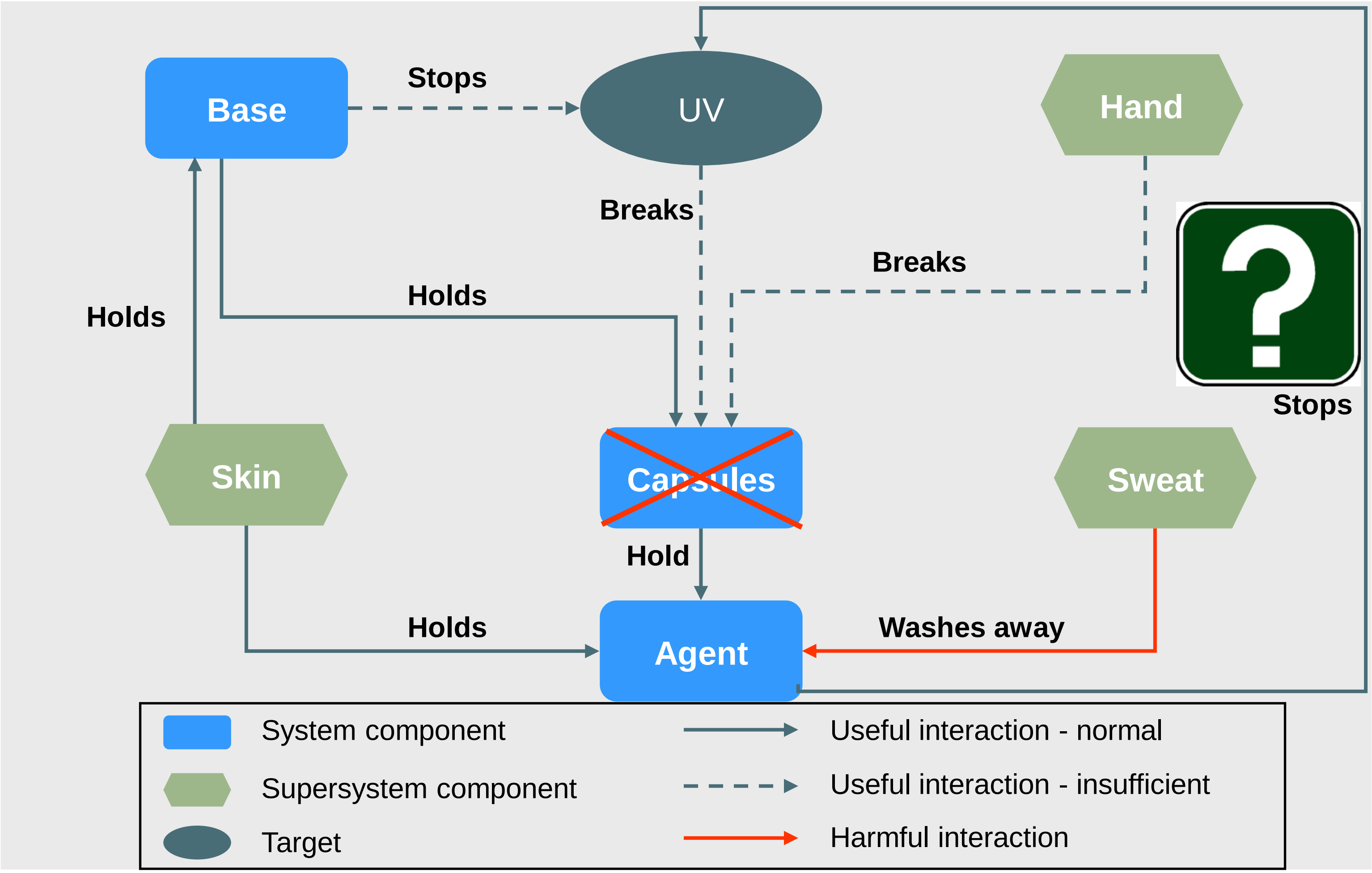
- **Scenario:**
  - **Sunscreen contains a base and microcapsules with an agent that protects skin from UV radiation**
  - **The material of the capsules biodegrades under the influence of UV radiation and releases the agent onto the skin**
  - **The degradation speed depends on the intensity of the UV radiation**

Function Model

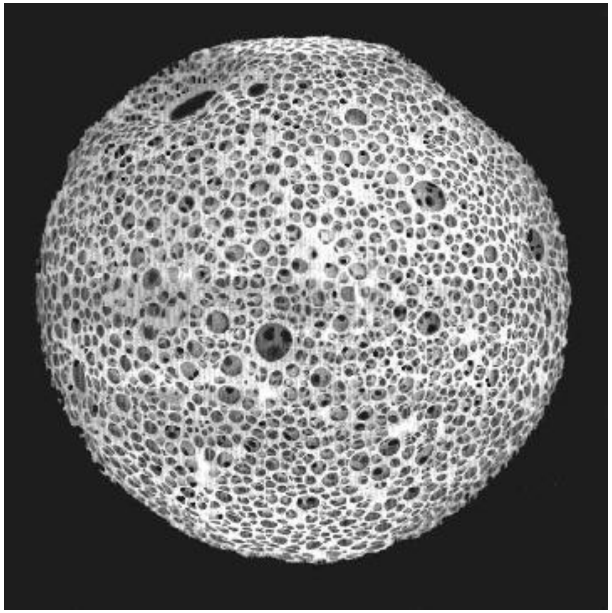


New Function Model

- **Trimming problem: How to hold an agent?**



Solution

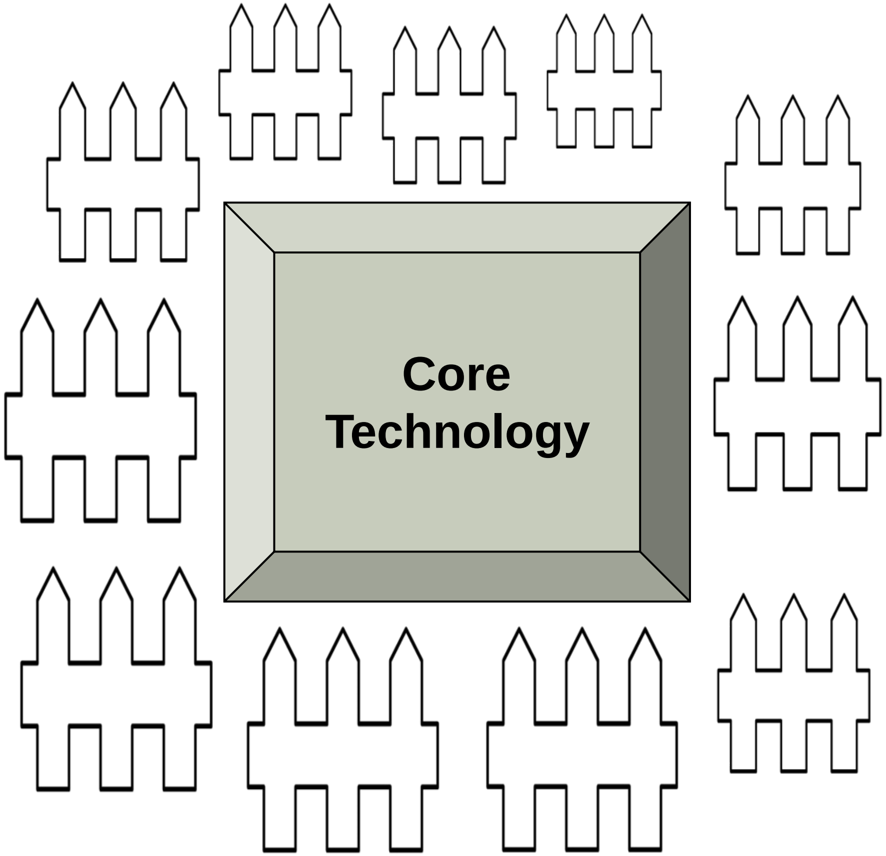


- **To enhance the products effectiveness:**
  - **Porous microspheres are used instead of capsules**
  - **The Doctrine of Equivalents could not be applied because of the Estoppel**

Development of the Dependent Claims

Picket Fence Strategy

A number of smaller incremental innovations about the core technology.



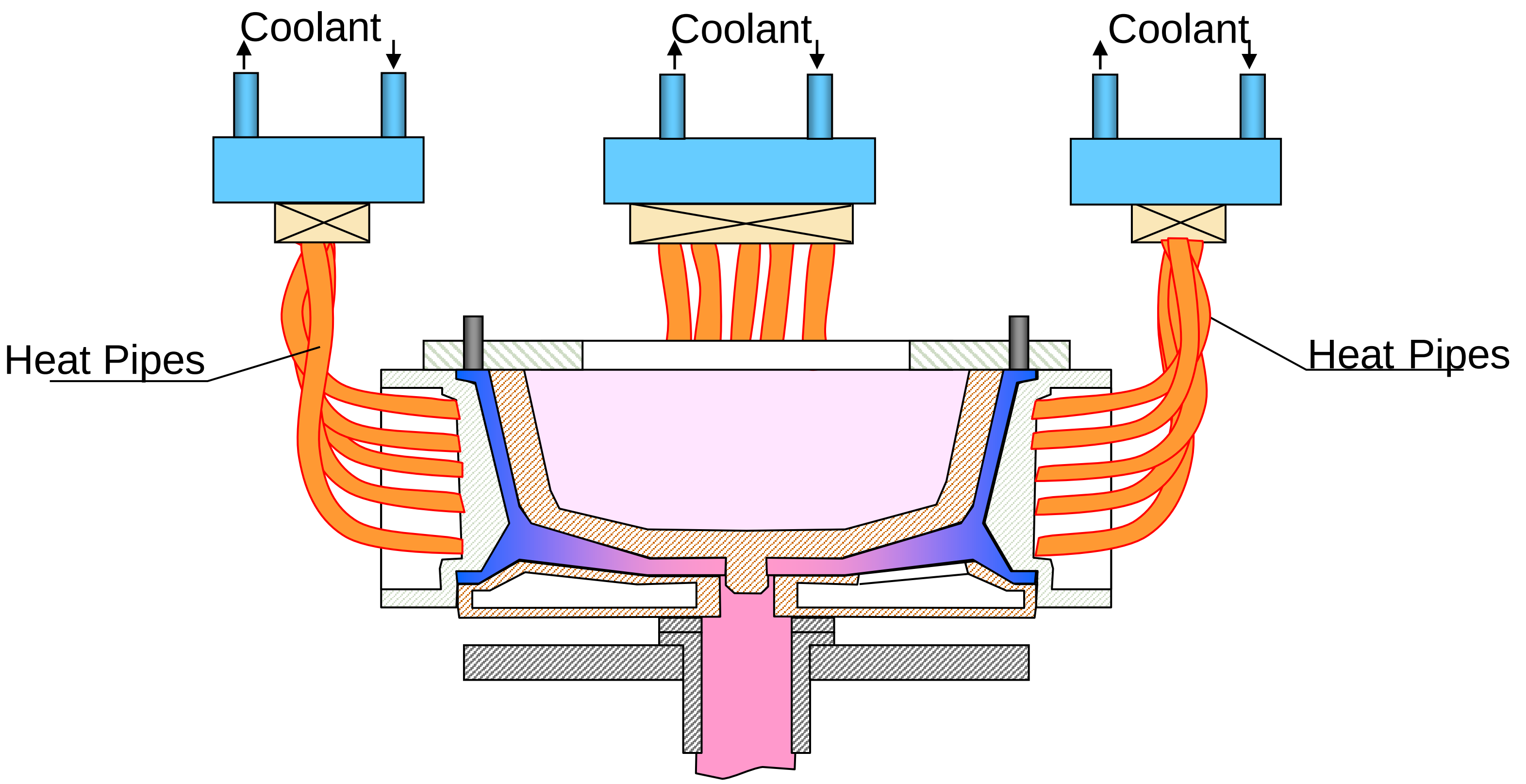
GEN3 PARTNERS

Aluminum Wheel Cast Die

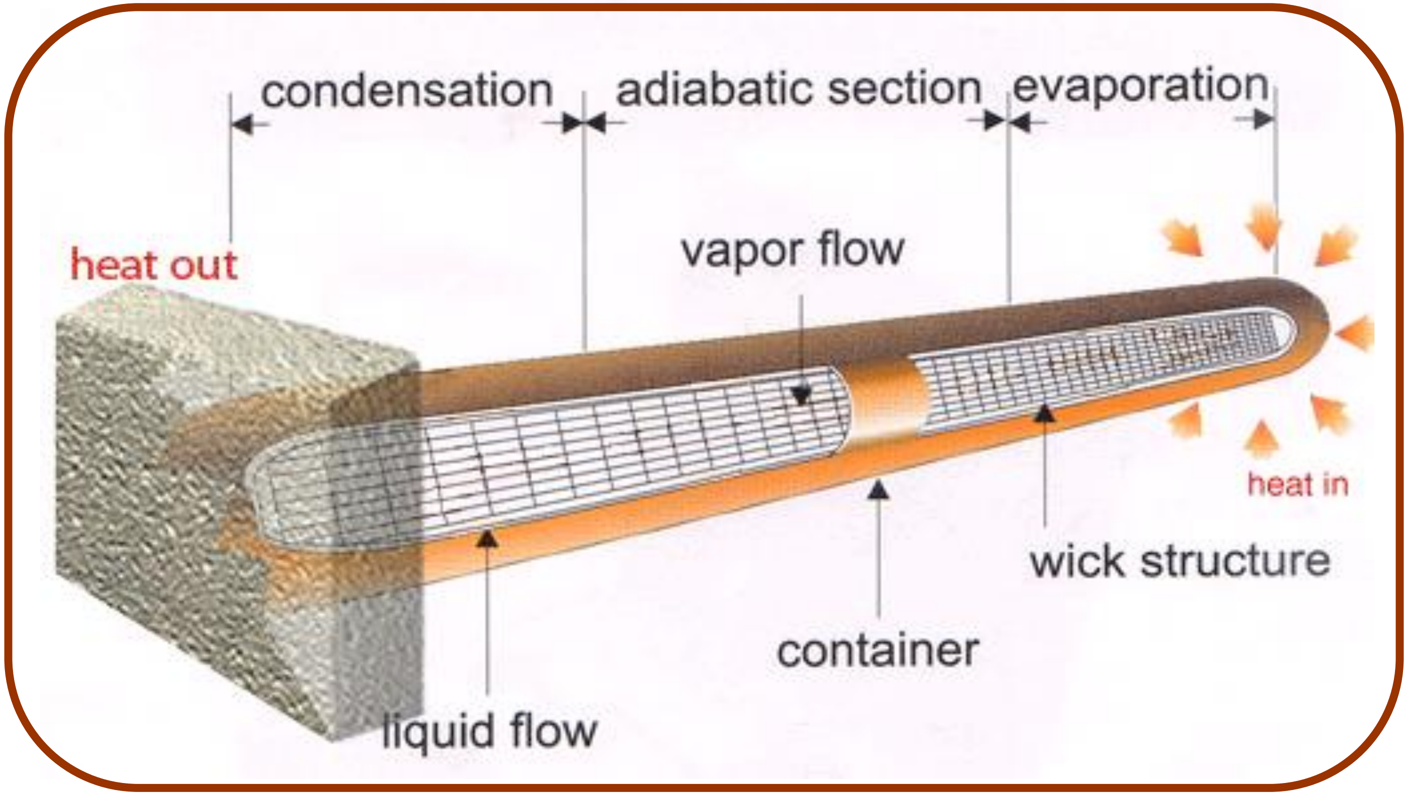
ALCOA

Cast Dies Cooling with Heat Pipes

The idea is to control the cooling of the die with heat pipes.

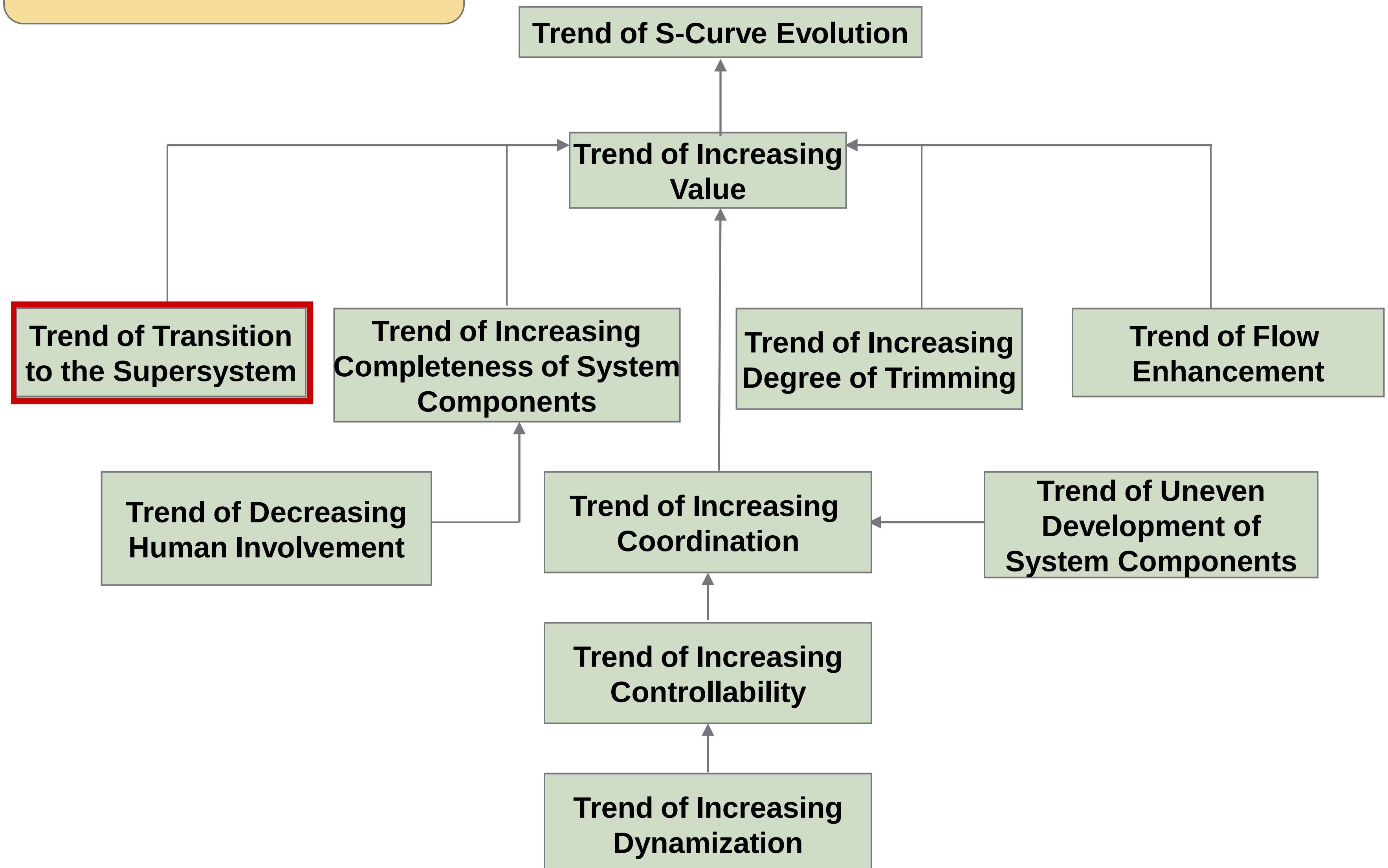


Heat Pipe

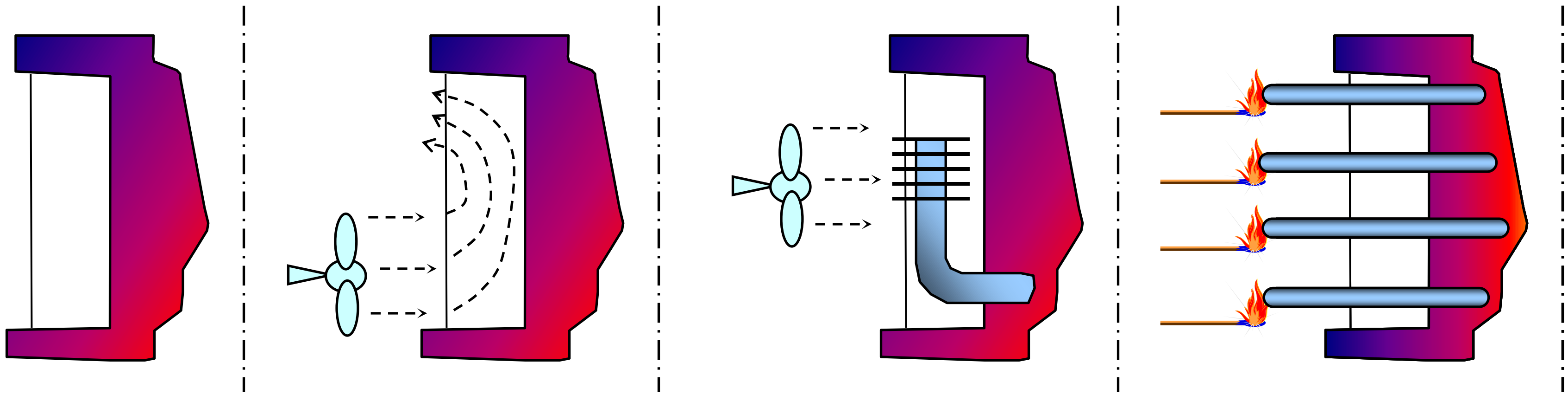

condensation
adiabatic section
evaporation
heat out
vapor flow
heat in
wick structure
container
liquid flow

Trends of Engineering System Evolution

Hierarchy of Trends



Trend of Transition to The Supersystem



Natural cooling

Forced air cooling

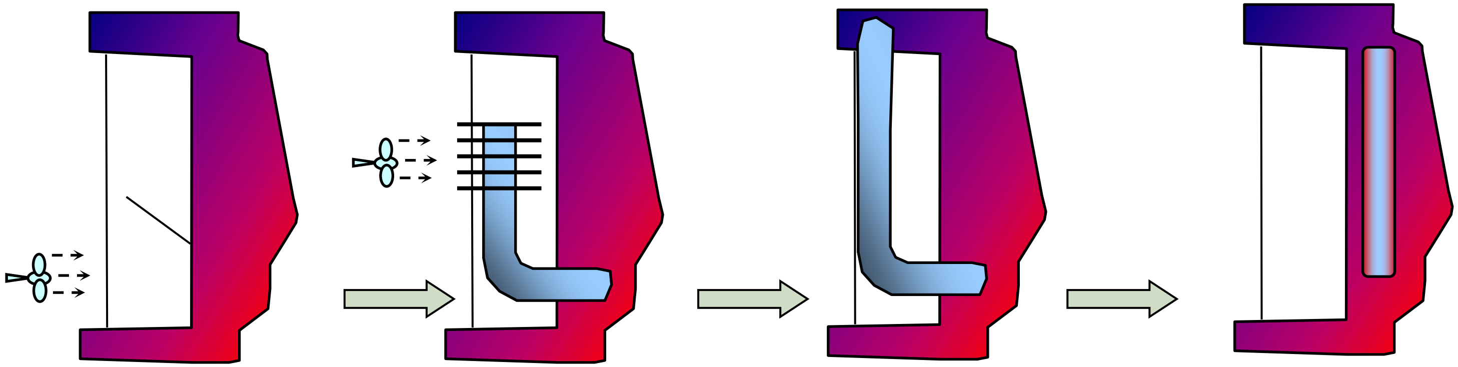
Target cooling using HP

Targeted cooling and heating using HP

Trend of Transition to the Supersystem

Use HP in casting to generate the optimum thermal modes

- **Cooling of certain die zones**
- **Transfer heat from a higher heated part of the die to a cooler part**
- **Implementation of partial self-control**

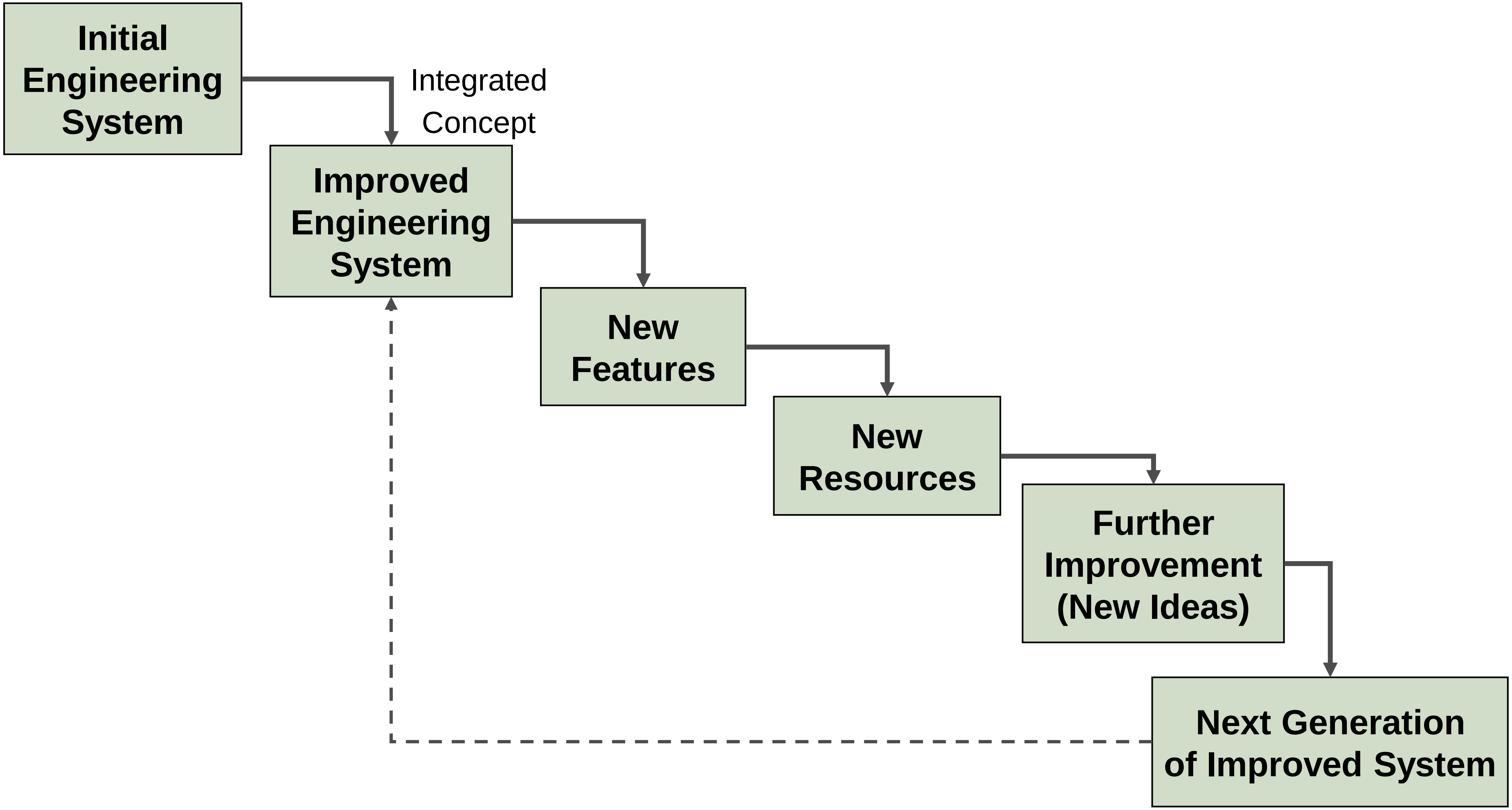


Blast Furnace Gas Cleaning System

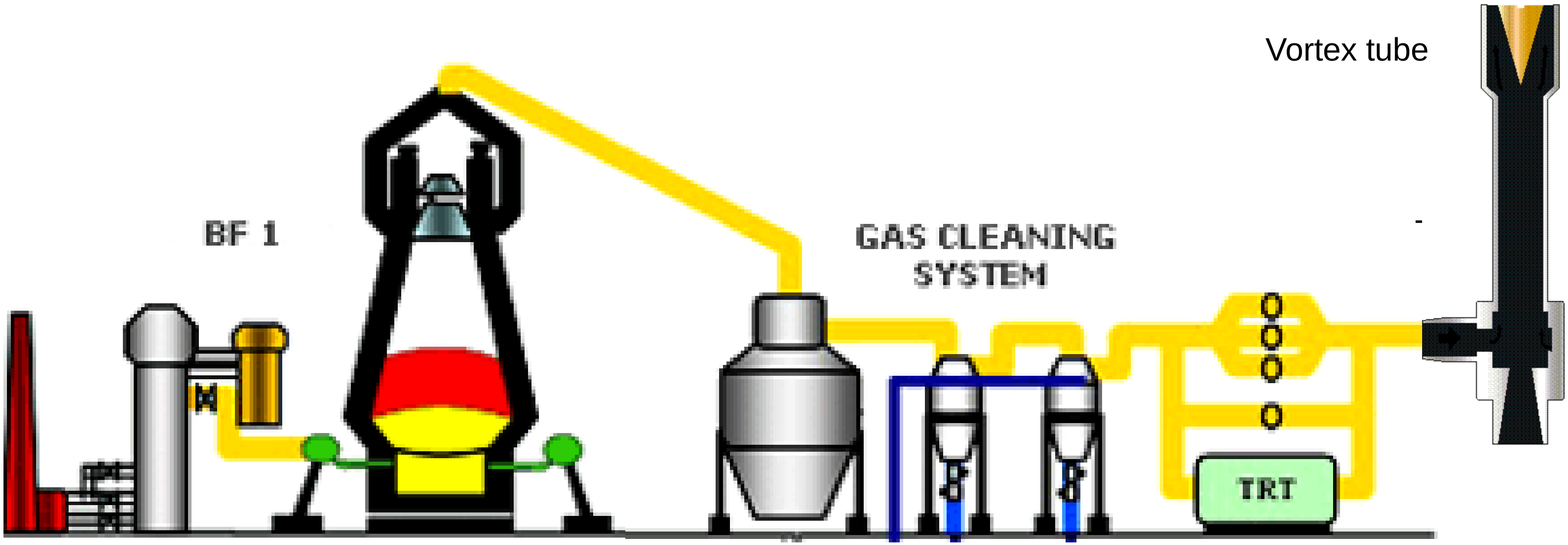
NIPPON STEEL &
SUMITOMO METAL

Nippon Steel Corporation

Super-Effect Algorithm

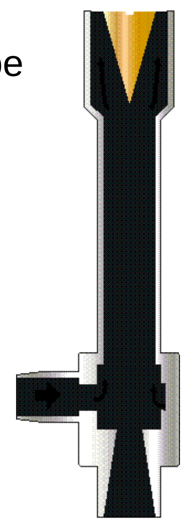


Blast Furnace Gas Cleaning System

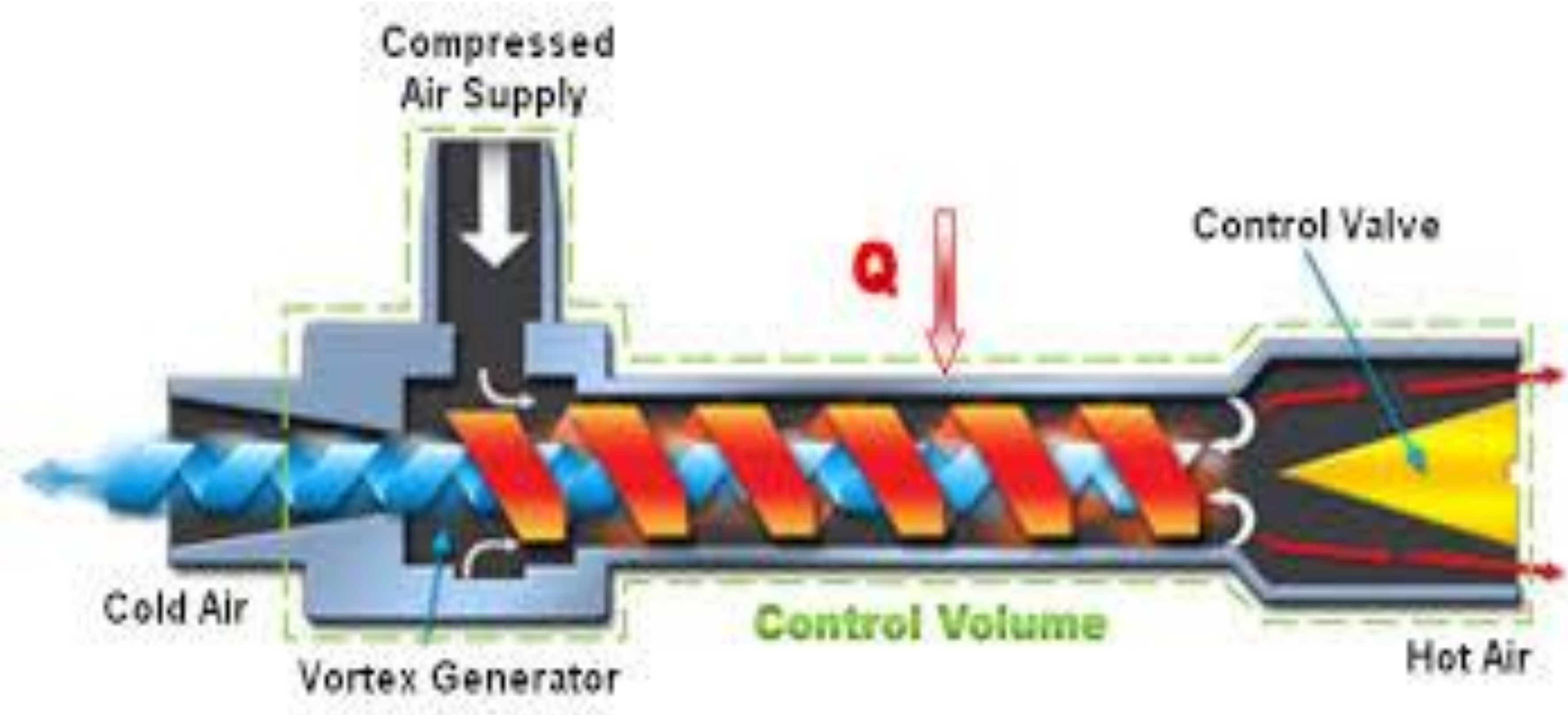


Vortex tube

New



Vortex Tube

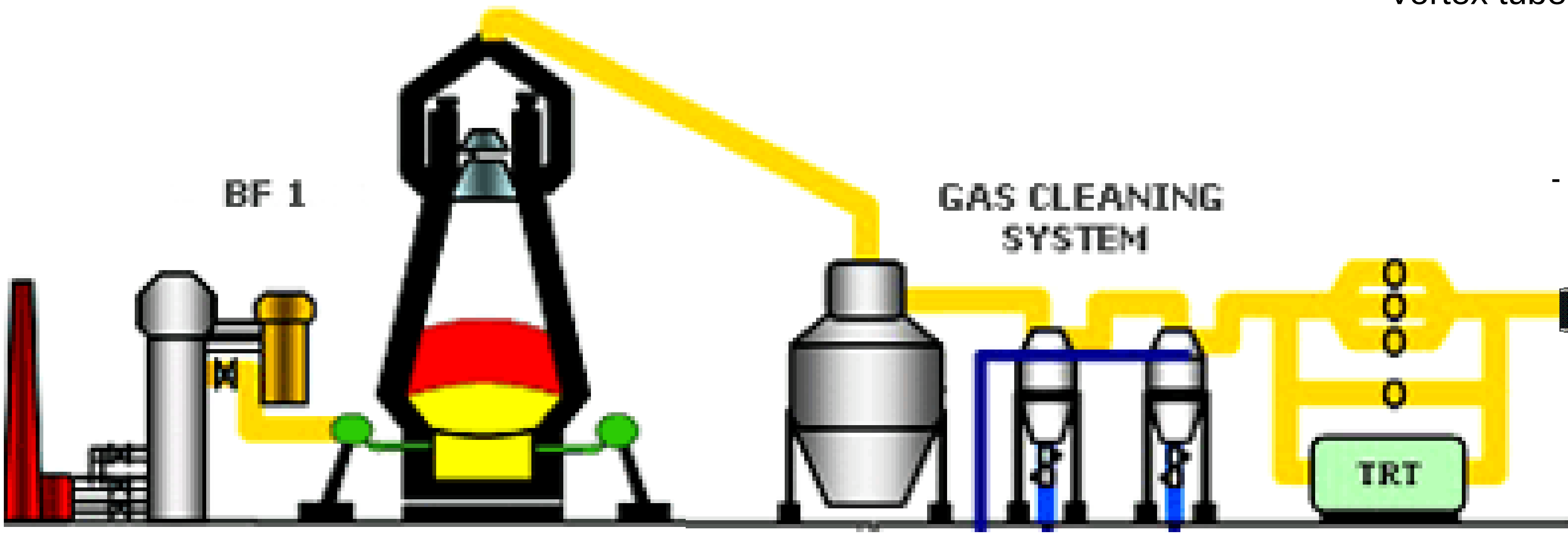


Compressed Air Supply
Q
Control Valve
Cold Air
Control Volume
Vortex Generator
Hot Air

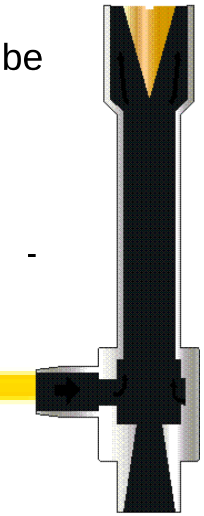
Algorithm

1. **Instead of the throttle we use a Vortex Tube**
2. **Vortex Tube**
3. **Hot gas, cold gas, centrifugal force, low pressure gas**
4. **To heat, to cool, to…..**
5. **Describe the next generation of the improved system**
6. **Repeat steps 1-5 for the next generation system**

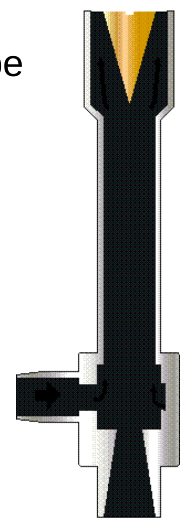
Blast Furnace Gas Cleaning System

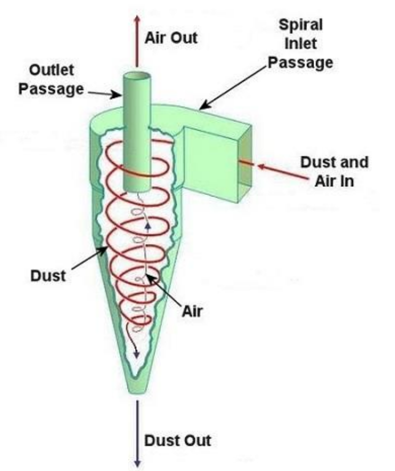


Vortex tube



Vortex tube





DFP and WIPO. DFP Practice in world leading corporations

DFP Programs were included into WIPO-funded degree programs:

Design for Patentability™ programs have been included into Master Degree programs (LLM) funded by WIPO that are in

- Jagiellonian University (Krakow, Poland)
- Tongji University (Shanghai, China)
- University of Turin (Turin, Italy – coming)

World Intellectual Property Organization (WIPO) Asian DFP Program.

Massachusetts
Institute of
Technology

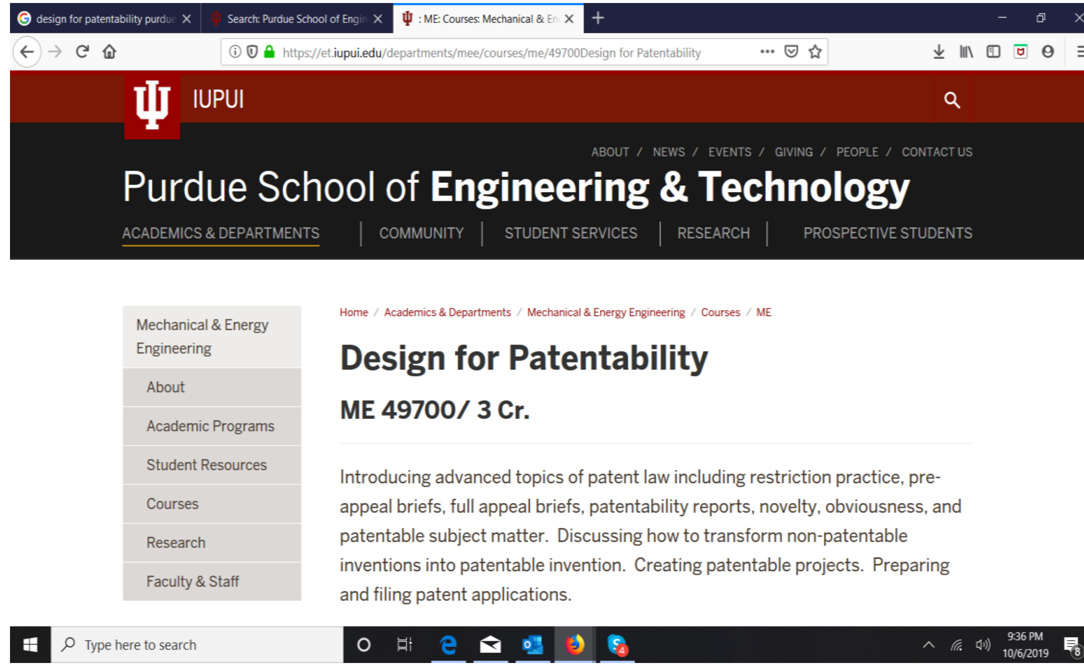
MEMORANDUM OF COOPERATION

The MIT Innovation Programs of the Office of Graduate Education are signing this Memorandum on cooperation with the Design for Patentability™ Institute in development and teaching the DFP methodology.

DESIGN
FOR
PATENTABILITY

Deputy Director of the MIT Office of Graduate Education	**President of DFP Institute**

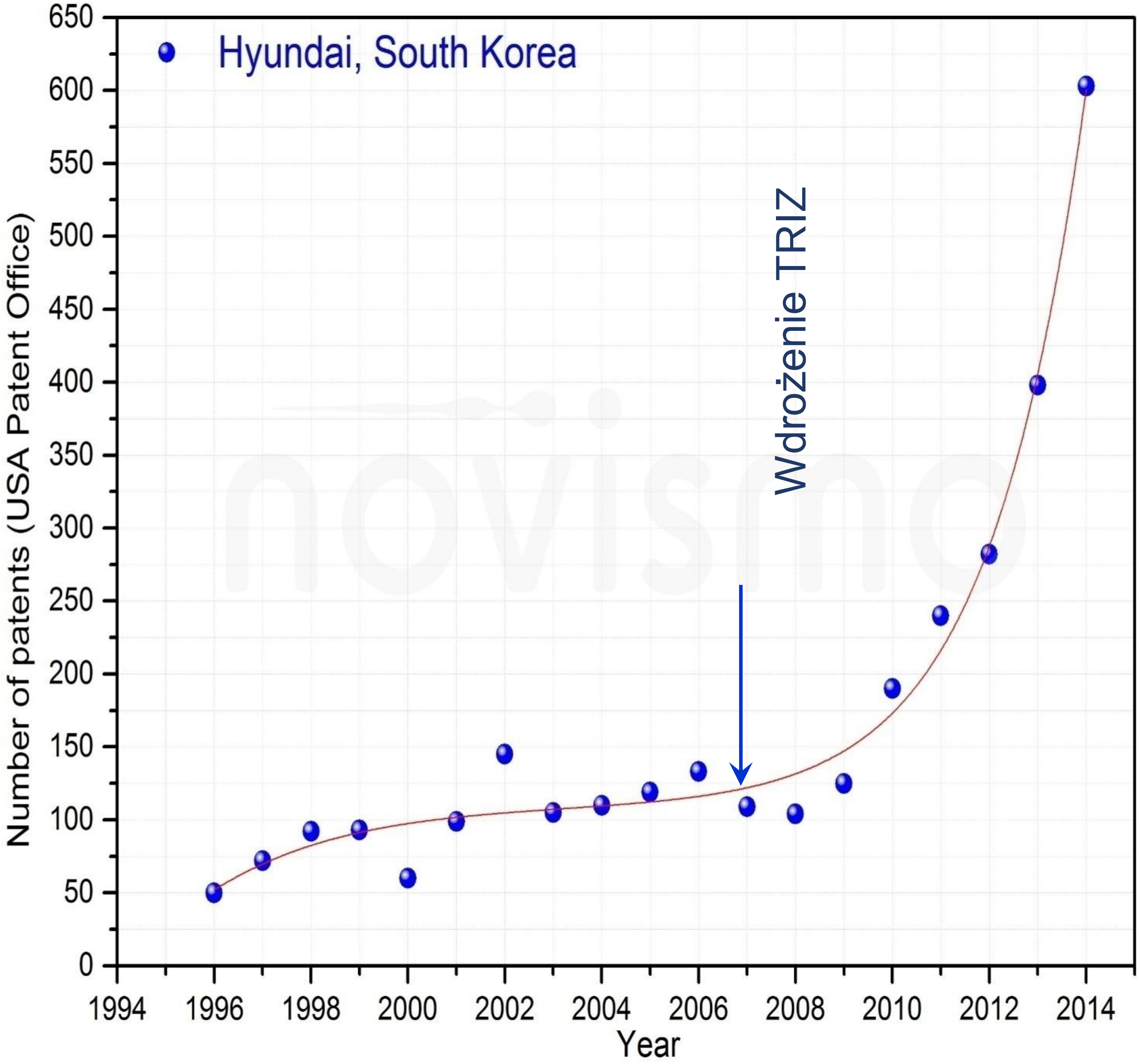
DFP and Academia



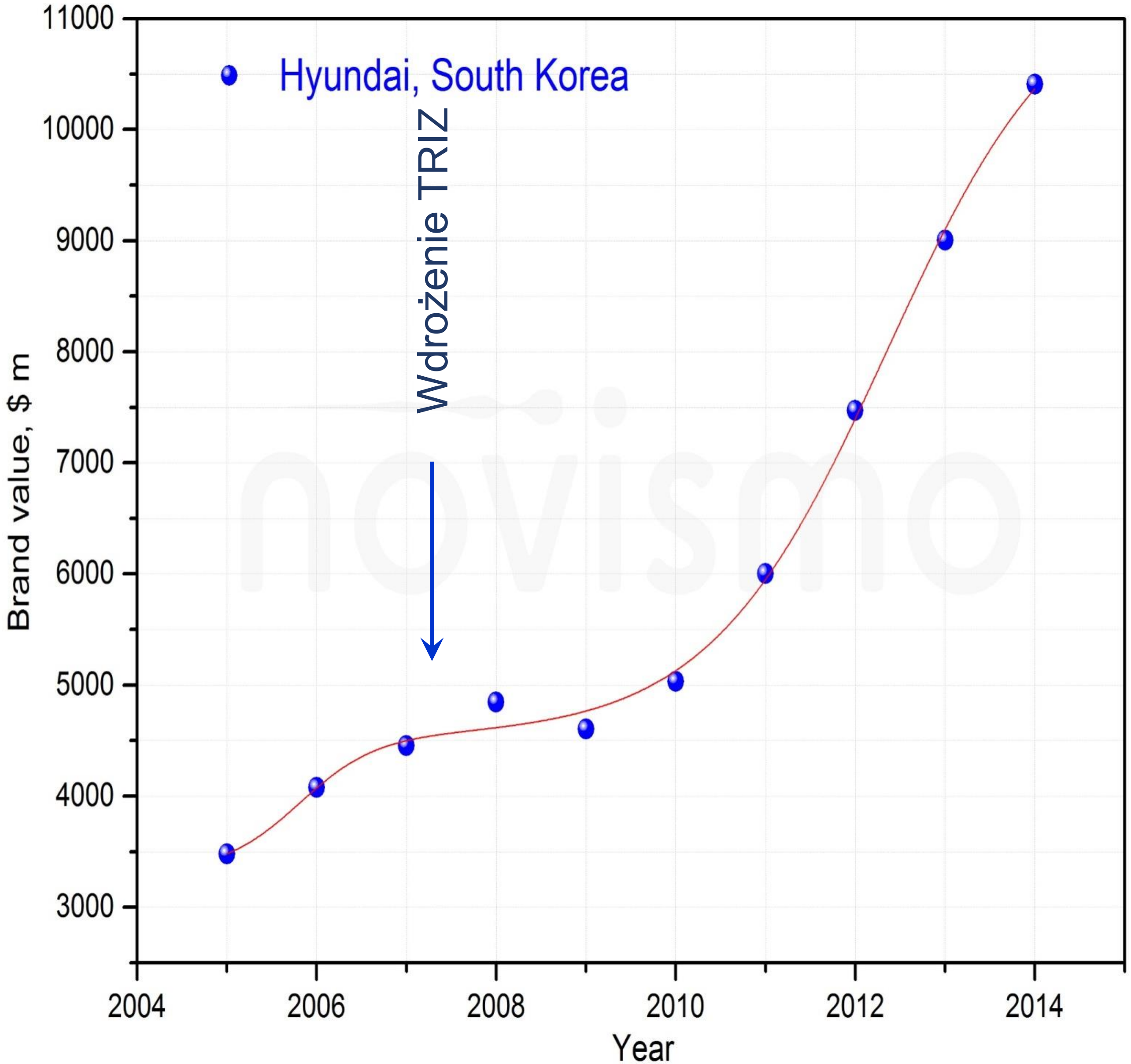
DFP, Level 1 certification program

Honeywell, India

DFP → IP → Value


Hyundai, South Korea
Wdrożenie TRIZ
Number of patents (USA Patent Office)
650
600
550
500
450
400
350
300
250
200
150
100
50
0
1994
1996
1998
2000
2002
2004
2006
2008
2010
2012
2014
Year

DFP → IP → Value



FORTUNE

Design for Patentability™, Level 2 DFP Program, China Patent Office.


Design for Patentability 合影
19/6/2 深圳
Shot on NEX S
vivo AI camera
2019.06.02 13:36
黄奂衢 傅劲松 吴华平 沈子轩 刘爽 饶中 王伟 王家岳 郑法明
扬长洲 韩奎华 杨杰 陈安刚 廖为庆 徐昊 解洪兴 韩旭东 王辉
伋风林 曹纯 莫云菲 Sergei Ikovenko 谭龙花 韩楠 刘勇谋

SABIC, India

Continental Automotive, Germany

DFP Certification

DESIGN FOR PATENTABILITY

CERTIFICATE

No. 1.19.000100

This is to certify that

Dr. ADAM SMITH

has successfully completed LEVEL 1 program in

DESIGN FOR PATENTABILITY

in accordance with the requirements of the DFP Institute and is awarded the qualification of DFP Practitioner, Level 1.

Sergei Ikovenko

Dr-Eng, PhD, PE, LLM, Professor (MIT, Tufts University), President of DFP Institute

Database of DFP Institute certificates and more information about certification. www.dfp-institute.com/certification

Affiliations Partnerships Cooperation

DESIGN FOR PATENTABILITY

CERTIFICATE

No. 2.19.000100

This is to certify that

Dr. ADAM SMITH

has successfully completed LEVEL 2 program in

DESIGN FOR PATENTABILITY

in accordance with the requirements of the DFP Institute and is awarded the qualification of DFP Practitioner, Level 2.

Sergei Ikovenko

Dr-Eng, PhD, PE, LLM, Professor (MIT, Tufts University), President of DFP Institute

Database of DFP Institute certificates and more information about certification. www.dfp-institute.com/certification

Affiliations Partnerships Cooperation

DESIGN FOR PATENTABILITY

CERTIFICATE

No. 3.19.000100

This is to certify that

Dr. ADAM SMITH

has successfully completed LEVEL 3 program in

DESIGN FOR PATENTABILITY

in accordance with the requirements of the DFP Institute and is awarded the qualification of DFP Practitioner, Level 3.

Sergei Ikovenko

Dr-Eng, PhD, PE, LLM, Professor (MIT, Tufts University), President of DFP Institute

Database of DFP Institute certificates and more information about certification. www.dfp-institute.com/certification

Affiliations Partnerships Cooperation

Selected topics of DFP - 1:

- decomposing patent claims, Ghost Components™
- specifics of Function Analysis of patent claims
- trimming for patent circumvention:
  - partial trimming
  - Dragon Patents™ and how to deal with them
- Attribute Analysis for patent circumvention:
  - types of attributes
  - rules of converting attributes into functions
  - methods of resolving attribute contradictions
- methods of boosting up NOVELTY criterion
- Methods of boosting up NON-OBVIOUSNESS criterion
- Innovative hybridization and rules for securing the patentability of hybrids

Design for Patentability®

Sergei Ikovenko, Dr-Eng, PhD, LL.M

in cooperation with

Massachusetts Institute of Technology

WIPO
WORLD INTELLECTUAL PR ORGANIZATION

Tufts
UNIVERSITY

Design for Patentability®

Thank you for your attention!

Спасибо за внимание!

Q & A