Lessons Learned in the Introduction of TRIZ at Siemens Automation and Drives

Siemens A&D
Initial Situation
Introduction of TRIZ
Successes of TRIZ
Innovation Tool Academy

TRIZ-Conference 2007
Frankfurt, 06.11.2007

Dr.-Ing. Robert Adunka
Automation and Drives ST2
Mission

A&D Business Fields

<table>
<thead>
<tr>
<th>Manufacturing Automation</th>
<th>Process Automation</th>
<th>Electrical Installation for Buildings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sales growth: 9%</td>
<td>Sales growth: 14%</td>
<td>Sales growth: 5%</td>
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</table>

A&D is a world leader in all fields of automation and drives for applications in industry and infrastructure.
Systematically from Problem to Solution

The methodical path moves step by step to the solution and covers thereby the whole solution space.
Invention on Demand
Three workshop concepts

Initial Situation
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Solutions on Demand
- Ideas for the solution of technical problems during development or from customer requests
- Check to be realized ideas for novelty and cover it by patents if possible

Innovation on Demand
- Innovation of products, services and applications
- Product concepts with new attractive features
- Cover with patents

Patents on Demand
- Protection and expansion of the patent portfolio
- Produce new application patents
- Occupy „White spaces“ with patents

Alternative solutions
Products
Patents

TR Lesson Learned in the Introduction of TRIZ into Siemens A&D
Solutions on Demand

Input
- Technical problem
- History of trials for solutions
- Solutions by competitor

Workshop
- Brainstorming
- Morphologic Box
- TO Product analysis
- TO Process analysis
- TO Feature transfer
- TO Effects
- TO Principles
- TO Prediction
- Analogies

Output
- List or spreadsheet with the evaluated or weighted alternatives
- List with possible invention disclosures

TR Lesson Learned in the Introduction of TRIZ into Siemens A&D
To find a concept – with and without methodical approach

**WITHOUT METHODIC**

- idea 1
- substantiation and trial
- improved idea 1
- substantiation and trial
- final idea 1
- idea 2
- substantiation and trial
- improved idea 2

**WITH METHODIC**

- idea 1
- feature transfer
- idea 52
- selection
- improved idea 52
- improved idea 52 with additional features
- improving details

**SIEMENS**

TR Lesson Learned in the Introduction of TRIZ into Siemens A&D

Dr. Adunka, 06/2007, Seite 6
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Test phase: Does methodic thinking help our organization to come up with ideas? A&D ST2’s Invention on Demand Workshops in the fiscal year 2005/2006 show a clear success.

Legend:
- Documented ideas
- Invention disclosures

Timeline

TR Lesson Learned in the Introduction of TRIZ into Siemens A&D
Invention disclosures of the last years

Significant increase in fiscal year 05/06

Source: CT IP Customer Report
A&D GG world-wide
Report Date: GJ 99/00 – 05/06
A total number of 25 workshops were conducted. In these 244 employees attended.
## Invention on Demand

### Siemens A&D

### Initial Situation

### Introduction of TRIZ

### Successes of TRIZ

### Innovation Tool Academy

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### Used methods – kind

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<tr>
<th>Level of Methods</th>
<th>Methods</th>
<th>Appl.</th>
<th>SoD</th>
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Number of methods increases
## TR Lesson Learned in the Introduction of TRIZ into Siemens A&D

### Invention on Demand

### Siemens A&D

### Initial Situation

### Introduction of TRIZ

### Successes of TRIZ

### Innovation Tool Academy

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#### Kind of Methods:

- **Edward de Bono**
- **Classical TRIZ**
- **Modern TRIZ**
- **Based on TRIZ**
Improve existing

Task: Improvement of cable fastening

Problem description:
There are a number of different cable fastening devices used in power converters to satisfy the needs of different mounting surfaces. Each has a different assembling strategy.
Solution to the problem

Invention on Demand

Siemens A&D

Initial Situation

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Use of the method “Feature transfer”

Assembly improved

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Reduce costs

**Task: Reduce costs of 3SB1 lock**

**Problem description:**
The 3SB1 lock uses a micro switch for the key detection and a unique assembly for the connection to the wires.

Reduce the costs and make design smaller for new 3SB3 lock!
Initial design Siemens / CES and new design

**Invention on Demand**

**Siemens A&D**

**Initial Situation**

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**Successes of TRIZ**

**Innovation Tool Academy**

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The initial design Siemens / CES and the new design are compared in terms of functionality and manufacturing:

- **Initial Design Siemens / CES**
  - Functionality: +
  - Manufacturing: -

- **New Design**
  - Functionality: -
  - Manufacturing: +

**Use of innovative principle 7: „Matrjoschka“**

The diagram illustrates the use of the innovative principle 7, „Matrjoschka“, with an increase in functionality and manufacturing:

- Functionality: +
- Manufacturing: +
### Solution to the problem

#### Former design  | Parameter  | New design
--- | --- | ---
30 V / 0.5 A  | Switch. capacity  | 400 V / 10 A  
- NC special switching element  | Tapping  | - NC/NO standard switching element  
- Vulnerable to dirt  |  | - Protected in switch cabinet  
- Extra size  | Form and size  | - Standard size  
- No accessory usable  |  | - Standard accessory usable  
Key is in lock when at 0 position  | Key ejection  | Key is ejected in 0 position  

#### Manufacturing costs reduced
Knowledge levels of methods

- **Level 0:** Awareness of methods
- **Level 1:** Use of basic methods
- **Level 2:** Use of advanced methods
- **Level 3:** Use of professional methods

Invention on Demand

Siemens A&D

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Innovation Tool Academy
The Innovation Tool Academy – The Creative Analyst profession

Innovation Tool Academy Courses

- Professional course (15 days)
- Advanced course (5 days)
- Basic course (5 days)
- Introduction course (0.5/1.5 days)

Invention on Demand

- Siemens A&D
- Initial Situation
- Introduction of TRIZ
- Successes of TRIZ
Invention on Demand

Siemens A&D

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Innovation Tool Academy

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Innovation Tool Academy –
tests and certificates

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Professional course

Prof. Test → Prof. Creative Analyst

Advanced course

Adv. Test → Advanced Creative Analyst

Basic course

Basic Test → Basic Creative Analyst

Introduction course

Certificate of Achievement

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Invention on Demand

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Thank you for your attention