Oficjalnie publikowane wymogi programu szkoleń dla kandydatów na specjalistów 1, 2 i 3 stopnia MA TRIZ

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DETAILED DESCRIPTIONS OF THE TOPICS REQUIRED FOR LEVELS 1 - 3

Level 1

1. Function Analysis for Products (devices).

1.1. Component Analysis.

Components of the system and Supersystem. What can be and cannot be a component; how to choose the right hierarchal level for component analysis.

1.2. Interaction Analysis.

What is an interaction in TRIZ. How to build the interaction matrix. Connection of the Component Analysis and the Interaction Analysis. What information the cell of the Interaction Matrix contains.

1.3. Function modeling.

How to formulate a function correctly, conditions of a function existence. Main Function of the engineering system. What is Target and how to identify it. Function types, function ranks, how to identify function ranks: basic, additional and auxiliary functions. Levels of function performance – insufficient, normal and excessive. Importance of defining the system boundaries.

1.4 Value Analysis (Function / cost diagram, cost diagram).

1.5 Outcomes of Function Analysis: Types of Function disadvantages.

2. Value / Ideality.

3. Introduction to Cause-Effect Chain Analysis.

What CECA is. Outcome of CECA: Initial and Key Disadvantages. How to choose a Key Disadvantage. Connection between Function Analysis and CECA.

4. Trimming.

4.1. Definition of Trimming. Rules of Trimming A, B, C.

4.2. Recommendations for Rule C.

4.3. Outcomes: Trimming Problems.

5. Modeling Key Problems as Engineering Contradictions (Technical Contradiction, System Contradiction) and Problem Solving.

5.1. Definition of Engineering Contradiction. Inventive Principles for resolving Eng.C. Formulating Eng.C.: If-Then-But format.

5.2. Contradiction Matrix (Altshuller's). 40 inventive principles. How to covert specific parameters into typical parameters.

Outcomes: Original Contradictions and alternative Contradictions and a Model of Solution.

6. Modeling Key Problems as Physical Contradictions and Problem Solving.

6.1. Definition of PhC.

6.2. Algorithm for resolving Physical Contradictions: separation, satisfaction and bypass. Separation in time, space, relations, system level.

6.3. Connection between Technical and Physical contradictions - If-Then-But table - converting Technical contradictions into Physical Contradictions.

6.4. Outcomes: Model of solution.

7. Resources and Resource Analysis.

7.1. Notion of resource. Types of resources.

7.2. Resource Analysis.

7.3. Outcome: Using resources for a) Component model; b) Trimming c) Resolving Contradictions

8. Scientific Effect Database

8.1. Algorithm for use of Scientific Effect Database

9. Brief History of creation and evolution of TRIZ.

Reference: 40 Principles paper.

10. System Operator (9-Screens)

10.1. Sub-system, System, Super-system

Level 2.

1. Function Analysis for Technological Processes.

1.1. Component Analysis. Difference between the Component Analysis of Devices and Processes. Notion of an Operation. Importance of identifying the process boundaries.

1.2. Function modeling. Function ranking system for Technological Processes: definitions of:

- productive functions

- providing functions

- corrective functions.

1.3. Notion of a defect.

1.4. Types of providing functions:

- transportation functions

- measurement functions

- supportive functions.

1.5. Function-Cost/or another goal parameter Diagram for Processes and Products.

2. Trimming for Technological Processes.

2.1. Rules of Trimming for:

- Productive functions

- Providing functions (all types)

- Corrective Functions.

3. Nuances of Cause-Effect Analysis

3.1. Operators AND and OR

3.2. Vicious circles

3.3. Using parameters / formula in CECA.

4. Substance-Field Modeling and System of Standard Solutions

4.1. The major idea, types of subfields: incomplete, harmful, complex, chain, double, measurement.

4.2 System of Standard Inventive Solutions. Classes of Standard Solutions – for what type of S-F models each class is designed.

4.3 The most powerful and most used standard solutions from each class (students should know at least 2-3 from each class).

5. Feature Transfer.

5.1. Algorithm. Competing and Alternative Systems.

5.2. Types of feature transfer:

- transfer with a physical component,

- mixtures,

- pure feature transfer.

5.3. Multiple loop Feature Transfer.

6. Introduction to ARIZ-85C. The history of ARIZ, its major goals, its strong sides (going through all the possible problem models that TRIZ offers, using the resources, formulation new PhCs about the resources).

6.1. The concept of Mini-problem and Ideal Final Result. The difference between Ideal System (Ideal machine) and IFR.

6.2. ARIZ structure and major parts.

7. Introduction to S-Curve Analysis.

7.1. Notion of S-Curve evolution and its origin (Reference Book: TESE Robert).

7.2. Development of the Engineering System through the S-Curve stages.

7.3. Major indicators of the four stages of the S-Curve. Major recommendations for the four stages of the S-Curve (the detailed indicators and recommendations as well as Transitional Stage and “Reincarnation” of engineering systems are in the topic “Trends of Evolution” or Level 3).

Level 3.

1. Trends of Engineering System Evolution: trends, mechanisms of every trend, and algorithms to some mechanisms (Reference: TESE Robert):

1.1. Trend of Increasing Ideality (Value):

- different modes of value (ideality) increase for different stages of the S-Curve

- Ideal System as the goal of the Trend

1.2. Trend of Completeness Increase.

- notions of the operating engine, the source of energy, the transmission and the control block and the sequence the engineering system acquires tchem.

1.3. Trend of Transition to the Supersystem and Microlevel and its mechanisms:

- mechanism for merging systems that perform the same main function and its algorithm “Feature Transfer”.

- mechanism for systems the perform different main functions (including allied systems)

- mechanism for the depth of integration

- mono-bi-poly

1.4. Trend of Trimming Increase and its mechanisms:

- mechanism of trimming function blocks (transmission, source of energy, control block)

- mechanism of trimming operation for Technological Processes

- mechanism for trimming components of low value

1.5. Trend of Increasing Coordination and its mechanisms:

- Shape coordination and the checklist for that

- Action coordination and the mechanism for that

- Rhythm coordination

- Material coordination and the checklist for that

1.6. Trend of Increasing Controllability and its mechanisms:

- mechanism of Level of Controllability increase

- mechanism of Number of controllable states increase

- mechanism of Stability decrease

1.7. Trend of Flow Enhancement (energy, substance and information) and its mechanisms:

- Useful flow conductivity increase and its checklist

- Useful flow utilization increase and its checklist

- Harmful flow conductivity decrease and its checklist

- Harmful flow impact decrease and its checklist.

1.8. Trend of Dynamization Increase and its mechanisms:

- mechanism of segmentation,

- mechanisms of dynamizations for substances and fields,

- dynamization of functions.

1.9. Trend of Decrease of Human Involvement.

1.10. Trend on Non-Uniform Development

1.11. S-Curve Trend of Evolution – advanced level:

- Transitional Stage of the S-curve.

- Detailed indicators and recommendations for each stage of the S-curve.

- possibility of re-incarnation of the Engineering System. Scenarios for returning from Stage 4 to earlier stages of the s-curve.

- Pragmatic S-Curve Analysis. What type of innovation does your product need now?

2. ARIZ – proficiency level.

2.1. All ARIZ parts, steps, their details and nuances, ability to do ARIZ on your project.

3. Super-Effect Analysis (also can be explained in part 8 of ARIZ).

4. Flow Analysis.

4.1. Notion of Flow Analysis. Types of Flows: substance, energy, information.

4.2. Categories of flows: useful, harmful, neutral, wasted.

4.3. Types of Flow Disadvantages:

- grey zones,

- stagnant zones,

- low flow density,

- bottlenecks,

- long channel,

- and others.

4.4. Recommendations for increasing useful flow conductivity.

4.5. Recommendations for increasing useful flow utilization.

4.6. Recommendations for decreasing harmful flow conductivity.

4.7. Recommendations for decreasing harmful flow impact.

4.8. Connection of Flow Analysis and CECA.

5. Clone Problems. Definition and the Algorithm for Clone Problem Application (Ref. VDI Standard).

6. Failure Anticipation Analysis (AFD, Subversive Analysis) (Ref. Svetlana).

7. TRIZ-based Forecasting (Ref. Boris; others, VDI).

7.1. Specifics of using TRIZ tools (FA, CECA, Trimming, FT, etc.) in TRIZ Forecast projects.

8. Scientific Effects.