4. Modeling the Problem

The algorithm of inventive problem-solving ... based on identification and elimination of the contradiction – the main factor that restrains further development of the system.  

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4.1. Contradictions

There are many ways to define and regard contradiction models. However, we shall concentrate on the definitions which are of great relevance to the basics of the classical TRIZ. However, during the expanded courses we will also examine other models.

| Definition of "Contradiction" | Contradiction – model of a system conflict that reflects the incompatible demands on the functional properties of an object. |
| Definition of "Binary Model of Contradiction" | Binary model of contradiction—or more simply binary model or binary contradiction—reflects the incompatibility conflict between two properties (factors) only. |

The graphic binary contradiction is presented in fig. 4.1.

fig. 4.1. Generalized graphical presentation of binary contradictions

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Any intricate, complex, multifactored conflict can be shown in the form of the composition of binary models. Hereafter, the main binary “key” contradiction must be found, the solution of which is a necessary condition for the resolving to the complex composition model.

Let us formulate the contradictions for first five problems, P1 through P5, in an informal style (but of course close to the TRIZ style presented later in the text).

Example 4.1. Problem P3. Ruby Stars of the Moscow Kremlin

A) The star must have a **large surface area** to be visible from afar, BUT (VS) this leads to **large windage (sail area)** and **low reliability** in strong wind.

**Formula:** Star ► large surface area VS low reliability

The "VS" means here "versus."

B) The star must be large (i.e., have a large surface area to be visible from afar), BUT (VS) it must be little (to have a slight windage (sail area) and to be resistant to strong wind).

**Formula:** Star ► large surface area VS small surface area.

Example 4.2. Problem P2. Icicles Frozen to Gutters

A) The icicle has to be fastened securely to gutter VS thaw-related damaging factors (because of increasing temperature of the gutter surface).

**Formula:** Icicle ► fastened securely VS temperature

B) The icicle **must hang under the gutter** until it melts **VS** the icicle **must not hang under the gutter** as it detaches itself from the water gutter when it warms up

**Formula:** Icicle ► (must hang VS must not hang) under the gutter

Example 4.3. Problem P4. "Magic Faucet"

1) The water jet ► must be there because… it is already there! **VS** must not be there because the feeding pipe is not there! (not visible!)

2) The water jet ► needs a lot of water **VS** it must have a large height for non-stop water flow!

Example 4.4. Problem P5. Convince People to Go in for Physical Exercise

3) The poster ► is useful **VS** boring

4) The poster ► must attract interest about its usefulness **VS** the poster does not attract interest because it is boring

Example 4.5. Problem P1. Genrikh Altshuller’s Experiment

5) Two ropes ► (must be close **VS** do not have to be close over the long distance) – to the child

6) Two ropes ► one rope swinging for a long time **VS** the rope quickly loses its swinging energy