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THE IMPLEMENTATION OF TRIZ IN THE AIR TRANSPORT SYSTEM.

Nowadays TRIZ (Teoriya Resheniya Izobreatatelskikh Zadatch - Theory of Inventive Problem Solving) become popular to not only solve problems in Technical System but also become useful in solving universal problems.

In this article, I want to give some recommendations for the implementation of TRIZ in the Air Transport System and examples of how easily technical problems can be solved.

Keywords: ideal solution, systematic approach, technical system development, automatization, the human factor.

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Внедрение ТРИЗ в систему воздушного транспорта.

В настоящее время ТРИЗ (Теория решения изобретательских задач) становится популярной не только для решения задач в Технической системе, но и становится полезной для решения универсальных задач.

В этой статье я хочу дать некоторые рекомендации по внедрению ТРИЗ в систему воздушного транспорта.

Ключевые слова: идеальное решение, системный подход, разработка технических систем, автоматизация, человеческий фактор.

TRIZ stands for Teoriya Resheniya Izobreatatelskikh Zadatch, which, translated into English approximates to the Theory of Inventive Problem Solving. TRIZ research began in 1946 when engineer Genrich Altshuller was tasked with studying patents.

The main findings of Systematic Innovation are:

1) That the same problems and solutions appear repeatedly across different industries, but that most organizations tend to re-invent the wheel rather than look outside their own experiences or the experiences of their direct competitors.
2) That the most powerful solutions are the ones that successfully eliminate the compromises and trade-offs conventionally viewed as inherent in systems.
3) That there are only a small number of possible strategies for overcoming such contradictions.
4) That the most powerful solutions also make maximum use of resources. Most organizations are highly inclined to solve problems by adding things rather than making the current things work more effectively, or transforming the things viewed as harmful into something useful.
5) That technology evolution trends follow highly predictable paths.

Ideality is in many ways similar to the concept of ‘value’. Ideality is defined as the sum of the benefits that a system delivers to its user divided by the sum of the cost of delivering those benefits and the any other negative side-effects that may occur (waste, waiting time, environmental damage, etc). The original TRIZ researchers identified a very simple phenomenon common to all successful innovations – that they all delivered a higher level of ideality than the products and processes that preceded them. I hope that the idea that we should

give customers more good things and less bad if, we are going to be successful is not a great surprise. It does mean, however, that there is a definable direction of success. More interesting than this idea of direction is the concept of a final destination. In Systematic Innovation, this final destination is known as the Ideal Final Result (IFR). The IFR is defined as that point when the customer gets all the benefits they want, without any of the costs or harms. While this concept might sound very theoretical, at the very least it offers a long-term evolution goal.

In an example, we can consider TCAS development, in the future according to with ideality any system disappears but function will exist. How it can happen, TCAS will join with other aircraft systems, for example with FMS (Flight Management System), the role of TCAS could be performed by FMS with autopilot operation. It could give us several benefits: autopilot operation will be coordinated with FMS and other nearby flying aircraft systems, the prevention from human factor negative influence, etc. Example of following incident also proves the idea automatization better than human operator: On 21 September 2012, a Bombardier BD-700 aircraft, registration EC-JIL and call sign MGO758, was making a flight from Nice (LFMN) to Ibiza (LEIB). At the same time, a Dassault Falcon 2000, registration CS-DNP and call sign NJE599U, was flying to Ibiza from Porto (LPPR). Aircraft EC-JIL was in radio and radar contact with the Palma ACC2, Ibiza Approach (APP) Sector, and was receiving vectors to intercept the runway 06 localizer (LLZ) at LEIB. It was on a course of 240° to the southeast descending to FL 080. Aircraft CS-DNP was on a southeasterly course direct to the IAF TILNO on the ILS approach to runway 06 at LEIB. It was under the control of TACC Levante. Later, once in contact with Ibiza APP, it was cleared to continue its descent to FL 090. At 19:12:24, Ibiza APP cleared aircraft EC-JIL to descend to 2,500 ft, and at 19:13:36, it instructed aircraft CS-DNP to reduce speed to 250 kt and cleared it to descend to 3,000 ft. At 19:14:58, aircraft CS-DNP reached the IAF TILNO. After passing it

the aircraft turned left toward the localizer. Seconds later, at 19:15:35, aircraft CS-DNP requested to intercept the ILS glide slope for runway 06. Ibiza APP instructed it to turn right to 160° and cross the localizer. After several requests made by aircraft CS-DNP to confirm the instruction to cross the localizer, at 19:16:06, Ibiza APP, after instructing a turn to 160° on two occasions, instructed the crew to turn immediately heading 180°. Aircraft CS-DNP started the turn when it was over the localizer, placing it on a course toward EC-JIL, which had previously been cleared to turn right heading 270°. At 19:16:38, both aircraft notified ATC that they had received a TCAS RA. Aircraft CS-DNP was established at 3,000 ft and had passed the runway 06 localizer, on a heading opposite that being flown by EC-JIL, which was descending to 2,500 ft as authorized. The two aircraft flew within 1.2 NM horizontally and 300 ft vertically of each other. Both aircraft completed their flights without further incident. There were no injuries and there was no damage to either aircraft.

In conclusion, the implementation of TRIZ in the Air Transport System helps to accelerate technical system development which lead to replacement human operators with automatic system. This will prevent us from lot of accidents and incidents.

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