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ACTIVITIES (D5)

Quality and safety, a challenge for traditional and new space (1)

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OneSide Tech, Mexico, omar.ariosto@gmail.comRISK MANAGEMENT FOR THE REAL-TIME LAUNCHING CALIBRATION SYSTEM INSIDE THE  
HARDWARE DESIGN AND FAILURE ANALYSIS APPROACH (FTA & MARKOV CHAINS) FOR  
THE REAL-TIME MEXICAN SATELLITE SPACE LAUNCH CENTER**Abstract**

In this paper, the Risk management for safety engineering, for the Real-Time Calibration System Hardware inside the Mexican Real-Time Satellite Launch Platform design is presented. The project has been developed using Risk assessment with Fault Trees Analysis (FTA), Markov Chains, and probabilistic Risk Assessment. As a contribution, using more tools that offer a better Risk Assessment, with IARA, an acronym for Identify, Assess, Reduce, Accept, is presented to this big project that needs to have the best Risk Assessment methodology.

The use and implementation of Kalman filters with the purpose to align and calibrate complex inertial guidance systems based on attitude error equation adding model parameters from related systems like accelerometers and gyroscope included inside the satellites. This approach, allows the interaction between the Hardware installed in the Launch Pad, the one installed inside the Rocket, the satellites and the Control Center. Mexico holds the fourth best place in the world for building a Space Port to launch Space Satellites, since its geographic location is optimal for its construction (near the Equator). It is essential to have the Probabilistic Risk Assessment and Failure Analysis Simulation using FTA (Widhchill Quality Software) and Markov Chains in Space Systems Engineering from its design, in order to minimize risks and avoid any possible catastrophe or position rocket failure throughout any wrong orbit by means of a quantitative probabilistic approach and Simulation.

Mexico is planning to construct a Space Port and a Rocket Space Launch Center in the near future in order to be part of the nations with Space Programs. Some methodologies are used for the System Design, Modelling and Engineering (Hardware and Software), such as Structured Analysis for Real Time (SA-RT), Detailed Block Diagrams for Hardware Design and LACATRE Real-Time Software Design. This is the first step to propose and build the first Satellite Launch Platform in Mexico, including the Real-Time Calibration System Hardware Design. Related Researching Work had been presented at 9th IAASS Conference at Toulouse France in October 2017, 67th IAC 2016 at Guadalajara Mexico in September 2016, IJERA NASA Indexed magazine (Vol 5. Issue 11 2015), presented at 7th IAASS Conference at Friedrichshafen Germany in October 2014, and during 6th IAASS Conference at Montreal Canada in May 2013.

Keywords – Risk Management, Safety Engineering, Calibration System, Real-Time Sensors, Hardware Design, Software Design, Markov Chains, Fault Tree Analysis (FTA), Space Rockets, External factor, Quantitative data, SA-RT.