

# **Implementation of Safety Instrumented Systems by Fuzzy Risk Graph**

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## **Abstract**

Although the risk graph method, described by the IEC 61508 standard is widely used for the determination of Safety Integrity Levels for the Safety Instrumented Functions (SIF) that make up Safety Instrumented Systems (SIS) for processes. This technique presents limitations regarding the linguistic interpretation of the parameters of risk analyzed. In addition, the calibration of the risk graph method as described by the IEC61511 standard consists to use discrete intervals include also a problem of uncertainty in the calculation of Safety Integrity Levels. The purpose of this work is to improve of conventional risk graph in order to propose a better implementation of safety instrumented systems (SIS). The proposed model based on fuzzy rules, considers the parameters defining the risk graph as inputs of a fuzzy inference systems and the Safety Integrity Level (SIL) as output. In order to validate the proposed model, a case study on an industrial system is carried out. The results show a particular interest of fuzzy graph risk for estimating the appropriate Safety Integrity Level than that given by the risk graph conventional.

## **Keywords**

Risk graph, Safety Instrumented Systems, Safety Integrity Levels, uncertainty, fuzzy rules.