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Australian Standard®

Fault tree analysis (FTA)

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- Australian Chamber of Commerce and Industry
- Australian Electrical and Electronic Manufacturers Association
- Australian Industry Group
- Australian Nuclear Science & Technology Organisation
- Australian Organisation for Quality
- Certification Interests (Australia)
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STANDARDS AUSTRALIA

RECONFIRMATION

OF
AS IEC 61025–2008
Fault tree analysis (FTA)

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Fault tree analysis (FTA)

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PREFACE

This Standard was prepared by the Standards Australia Committee QR-005, Dependability.

The objective of this Standard is to describe fault tree analysis and provide guidance on its application to reliability modelling.

This Standard is identical with, and has been reproduced from IEC 61025 Ed.2.0 (2006), *Fault tree analysis (FTA)*, which is part of a suite of Standards developed by the IEC Technical Committee IEC/TC 56, Dependability, and is suitable for use in conjunction with the AS IEC 60300 series of dependability management Standards.

As this Standard is reproduced from an International Standard, the following applies:

(a) Its number does not appear on each page of text and its identity is shown only on the cover and title page.

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The terms 'normative' and 'informative' are used to define the application of the annex to which they apply. A normative annex is an integral part of a standard, whereas an informative annex is only for information and guidance.

CONTENTS

INTRODUCTION

Fault tree analysis (FTA) is concerned with the identification and analysis of conditions and factors that cause or may potentially cause or contribute to the occurrence of a defined top event. With FTA this event is usually seizure or degradation of system perfomance, safety or other important operational attributes, while with STA (success tree analysis) this event is the attribute describing the success.

FTA is often applied to the safety analysis of systems (such as transportation systems, power plants, or any other systems that might require evaluation of safety of their operation). Fault tree analysis can be also used for availability and maintainability analysis. However, for simplicity, in the rest of this standard the term “reliability” will be used to represent these aspects of system performance.

This standard addresses two approaches to FTA. One is a qualitative approach, where the probability of events and their contributing factors, – input events – or their frequency of occurrence is not addressed. This approach is a detailed analysis of events/faults and is known as a qualitative or traditional FTA. It is largely used in nuclear industry applications and many other instances where the potential causes or faults are sought out, without interest in their likelihood of occurrence. At times, some events in the traditional FTA are investigated quantitatively, but these calculations are disassociated with any overall reliability concepts, in which case, no attempt to calculate overall reliability using FTA is made. The second approach, adopted by many industries, is largely quantitative, where a detailed FTA models an entire product, process or system, and the vast majority of the basic events, whether faults or events, has a probability of occurrence determined by analysis or test. In this case, the final result is the probability of occurrence of a top event representing reliability or probability of fault or a failure.

STANDARDS AUSTRALIA

Australian Standard

Fault tree analysis (FTA)

1 Scope

This International Standard describes fault tree analysis and provides guidance on its application as follows:

– definition of basic principles;
  - describing and explaining the associated mathematical modelling;
  - explaining the relationships of FTA to other reliability modelling techniques;
– description of the steps involved in performing the FTA;
– identification of appropriate assumptions, events and failure modes;
– identification and description of commonly used symbols.

2 Normative references

The following referenced documents are indispensable for the application of this document. For the references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

References to international standards that are struck through in this clause are replaced by references to Australian or Australian/New Zealand Standards that are listed immediately thereafter and identified by shading. Any Australian or Australian/New Zealand Standard that is identical to the International Standard it replaces is identified as such.

IEC 60050(191), *International Electrotechnical Vocabulary (IEV) – Chapter 191: Dependability and quality of service*

~~IEC 61165, *Application of Markov techniques*~~

AS IEC 61165, *Application of Markov techniques*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in IEC 60050(191) apply.

In fault tree methodology and applications, many terms are used to better explain the intent of analysis or the thought process behind such analysis. There are terms used also as synonyms to those that are considered analytically correct by various authors. The following additional terms are used in this standard.

3.1
outcome
result of an action or other input; a consequence of a cause

NOTE 1 An outcome can be an event or a state. Within a fault tree, an outcome from a combination of corresponding input events represented by a gate may be either an intermediate event or a top event.

NOTE 2 Within a fault tree, an outcome may also be an input to an intermediate event, or it can be the top event.