RIA TR R15.306-2016

technical report

RIA TR R15.306-2016

for Industrial Robots and Robot Systems — Safety Requirements

Task-based Risk Assessment Methodology

Registered with ANSI
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Robotic Industries Association

Technical Report
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Task-based Risk Assessment Methodology

Secretariat
Robotic Industries Association

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Foreword

The Robotic Industries Association (RIA) has prepared this technical report with the objective of enhancing the safety of personnel associated with industrial robot systems, including robots, robot end-effectors, and ancillary equipment, by presenting a task-based risk assessment methodology that has been demonstrated to provide risk reduction guidance for hazards presented by industrial robot system applications.

Risk assessment is an important requirement in the American National Standard ANSI/RIA R15.06-2012. The standard, a national adoption of the International Standard ISO 10218:2011 (parts 1 and 2), does not offer any risk assessment methodologies, and there are many from which to choose.

The RIA subcommittee R15.06 on safety has updated the methodology originally presented in ANSI/RIA R15.06-1999. The methodology presented in the 1999 edition is still valid; however, the look-up matrix tables and some terminology have been revised. Safety must be a conscious effort on the part of everyone associated with automation and industrial robot systems. Personnel skills, training, attitude, and corporate safety culture are extremely important factors in any safety program being successful. Each industrial robot system application is unique and therefore presents unique hazards. These hazards and their associated risks must be assessed and reduced to an acceptable level. This methodology is consistent with the task-based risk assessment requirements described in ANSI/RIA R15.06-2012.

This Technical Report has been updated since the initial version was first published in 2014 (RIA TR R15.306-2014). One of the key updates is to Table 2 – Risk level decision matrix. This table has been updated to a 3x3x3 matrix with three levels each of severity, exposure and avoidability. Table 3 – Hierarchy of risk reduction measures has also been updated. Table 3 now identifies three broad categories of risk reduction measures: Inherently safe design measures; Safeguarding and complementary protective measures; and Information for use. Due to functional safety, the requirements in Table 5 – Minimum functional safety performance have been updated to be consistent with ANSI/RIA R15.06-2012.

This technical report is supplemental to ANSI/RIA R15.06-2012 and is not itself a standard. The referenced industry standards and technical reports are voluntary. RIA makes no determination with respect to whether any robot, associated safety devices, manufacturer, or user is in compliance with published standards.

Publication of this Technical Report that has been registered with the American National Standards Institute (ANSI) has been approved by the Accredited Standards Developer, Robotic Industries Association. This document is registered as a Technical Report according to the Procedures for the Registration of Technical Reports with ANSI. This document is not an American National Standard and the material contained herein is not normative in nature. Comments on the content of this document should be sent to:

> Robotic Industries Association
> Attn: Subcommittee on Safety
> 900 Victors Way, Suite 140
> Ann Arbor, MI 48108

Participants in the preparation of this technical report included:

R15 Standards Approval Committee

R15.06 Safety Committee

Committee Secretary

Contents

Technical Report
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0   Introduction

This technical report is supplemental to ANSI/RIA R15.06-2012 and replaces RIA TR R15.306-2014.   It provides a task-based risk assessment methodology for industrial robot system applications suitable for identifying hazards and reducing risks to an acceptable level.

This technical report references the risk assessment process outlined in ANSI B11.0-2015, *Safety of Machinery*. ANSI/RIA R15.06-2012 normatively references ANSI/ISO 12100:2012 (ISO 12100:2010 IDT), *Safety of machinery – General principles for design – Risk assessment and risk reduction.* Where applicable, references to relevant clauses in ANSI/ISO 12100:2012 are also provided in notes.

Where differences in requirements between ANSI B11.0-2015 and ANSI/RIA R15.06-2012 or between B11.0-2015 and RIA TR R15.306-2016 exist, the requirements of ANSI/RIA R15.06-2012 shall apply.

For simplicity in reading, a reference to Part 1 is a reference to ANSI/RIA R15.06-2012 Part 1 and a reference to Part 2 is a reference to ANSI/RIA R15.06-2012 Part 2.

1   Scope

The scope of this technical report is to provide a task-based risk assessment methodology that meets the risk assessment requirements outlined in ANSI/RIA R15.06-2012.

A number of methodologies are available to do a risk assessment.   Any risk assessment methodology that identifies tasks and prescribes risk reductions equivalent to or more stringent than the requirements in this technical report is acceptable (see Part 2 Clause 4).

This entire document is informative in nature, and is not a standard.   The use of the word "shall" and "should" in a particular statement indicates the relative importance of specific criteria or features in this technical report.

1.1   Limitations

This technical report provides guidance on task and hazard identification and risk reduction commonly associated with industrial robot systems. A task-based risk assessment can identify hazards where the relevant risk reduction measure is specified in a regulation or standard other than ANSI/RIA R15.06-2012. When tasks associated with these hazards are identified, the applicable risk reduction measure would be to comply with the requirements in the other documents. Such hazards include, but are not limited to, the following:

- Fire or flammability hazards;

- Electrical hazards, including electrical shock;

- Confined space entry;

- Slips, trips, or fall hazards;

- Working at heights;

- Hazards associated with welding, such as arc flash or radiation; or