B11.TR4: 2004

ANSI Technical Report for Machine Tools –

Selection of Programmable Electronic Systems (PESs/PLC) for Machine Tools

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Foreword

Recognizing the need for a guidance document on the subject matter, the ANSI-B11 Accredited Standards Committee for Machine Tool Safety formed a subcommittee consisting of professionals that are involved in manufacturing, safety, design and controls to develop a technical report giving guidelines for the selection of programmable electronic systems when applied to machine tools covered by the ANSI B11 series of safety standards. This Subcommittee began work on this Technical Report in October 1997. After a hiatus beginning August 2000, the Subcommittee resumed its work in June 2003, taking a very different direction and finally producing the work you are reading in early 2004.

There are annexes at the end of this technical report dealing specifically with the performance of safety related functions (control reliability), identification and analysis of failures, and safety related performance levels.

Publication of this Technical Report has been approved by the Accredited Standards Developer – AMT- The Association For Manufacturing Technology. 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.

While standards generally use the term **shall** to denote a requirement and the word **should** to denote a recommendation, this document is written using those terms consistent with how they are used in a standard (normative requirement vs. an informative recommendation). Nonetheless, the preceding paragraph remains true; nothing in this document is normative.

Suggestions for improvement or comments on the technical content of this technical report are welcomed. They should be sent to: AMT- The Association For Manufacturing Technology, 7901 Westpark Dr., McLean, VA 22102-4206, Attention: B11 Secretariat.

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The B11 Subcommittee on the Selection of Programmable Electronic Systems which developed this technical report had the following members:

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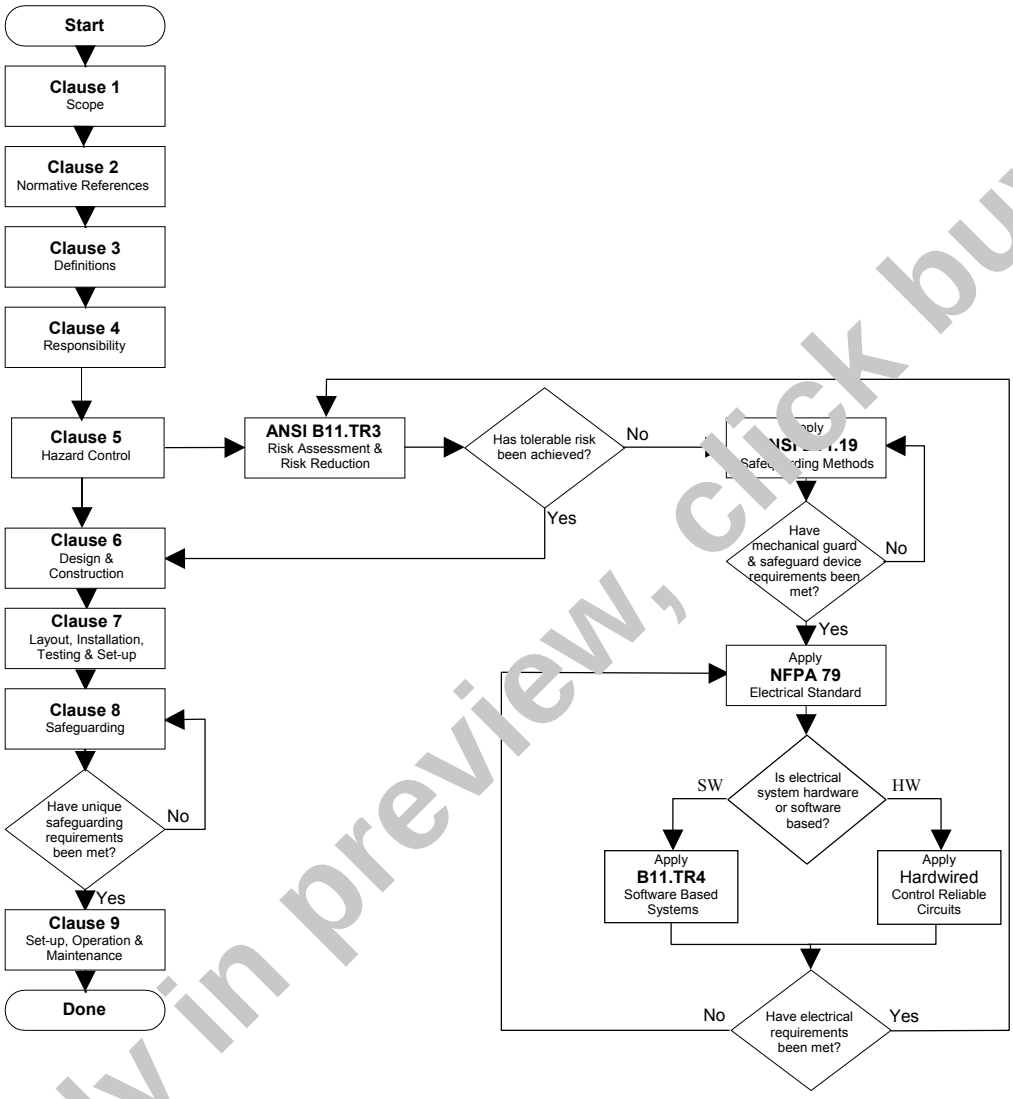
The B11.TR4 Subcommittee and the
ANSI B11 Accredited Standards Committee
would like to dedicate this work to Mr. Barry Stockton
who passed away on November 28, 2003.

Barry served as Chairman of this Subcommittee
during the majority of its development.

His contributions here, and to the ANSI B11
series of safety standards in general,
will be long remembered.

Introduction

General overview of the interaction between a typical ANSI B11 American National Standard and other standards / technical reports



Selection of Programmable Electronic Systems (PES/PLC) for Machine Tools

1 Scope and purpose

1.1 Scope

This Technical Report covers the safety related aspects of programmable electronic systems (PESs) for machine tools covered by the B11 series of safety standards (see inside cover for a listing).

1.2 Purpose

The purpose of this Technical Report is to provide guidance for the selection, design, construction, integration, and validation of PESs for the safety related functions of a machine production system. The terminology used in this document may not be used consistently throughout the industry, but this document does represent the concepts which are important when using and designing safety-related control systems.

NOTE: Usage of [machine] in the following text means any of the specific machine tools covered by the ANSI B11 'base' series of safety standards.

2 References

ANSI / NFPA 79 – 2002 *Electrical Standard for Industrial Machinery*

ANSI B11.19 – 2003 *Performance Criteria for Safeguarding*

ANSI B11.TR3 – 2000 *Risk Assessment and Risk Reduction - A guide to estimate, evaluate and reduce risks associated with machine tools*

ANSI / U.L. 1998 – 2000 Software and programmable systems

ANSI / RIA R15.06 – 1999 Industrial Robots and Robot Systems – Safety Requirements

CSA Z434-03 – Industrial Robots and Robot Systems – General Safety Requirements

CSA Z432-04 – Safeguarding of machinery

EN 954-1:1996 (ISO/DIS 13849-1:2004) Safety of machinery – Safety related parts of control systems – Part 1: General Principles for Design

IEC 60204-1 – Safety of electrical equipment of machinery used for general electrical safety aspects

IEC 61508 Parts 1-7 – Functional safety of E/E/PE safety-related systems used for the design of complex subsystems

IEC 62061 – Safety of machinery – Functional safety of safety-related electrical, electronic and programmable electronic control systems