

TECHNICAL REPORT
ISA-TR106.00.02-2017

**Procedure Automation for Continuous
Process Operations – Work Processes**

Approved 3 May 2017



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Procedure Automation for Continuous Process Operations – Work Processes

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ISA
67 Alexander Drive
P. O. Box 12277
Research Triangle Park, North Carolina 27709
USA

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AFFILIATION

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Consultant
User Centered Design Services
Automated Control Concepts
Yokogawa
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PROCEDURE AUTOMATION FOR CONTINUOUS PROCESS OPERATION – WORK PROCESSES

INTRODUCTION

This technical report describes work processes involved with automating procedures that monitor and control continuous processes. This technical report is written for new process facilities as well as control upgrades to existing facilities.

This technical report does not intend to instruct organizations how to identify and justify projects or provide the details of work processes, rather it is intended to provide a generic set of work processes that provide guidance for procedure automation project execution phases.

The primary intended audience for this document is technical managers, project managers and engineering personnel responsible for the automation of continuous process operations in new and existing plants. This technical report may also be of interest to members of engineering departments of owner/operators, and engineering personnel of engineering and procurement organizations, automation vendors, system integrators and other process engineering practitioners.

This technical report uses models and terminology from ISA-TR106.00.01, *Procedure Automation for Continuous Process Operations – Models and Terminology*. The earlier technical report should be read to understand the meanings of these terms and models.

As a technical report this is an informative document, use the parts that apply to your project as appropriate.

Clause 2, References, provides a list of standards, publications, reference materials and other associated documents that have influenced the content of the technical report. The reference list provides an easy place to find related materials should the reader want to investigate the content further.

Clause 3, Definitions of terms and abbreviations, lists key terminology used throughout the technical report and provides clear definitions of terms used within the technical report. Frequently the same or very similar terms may be used in other standards, references, or within certain industry segments and may have different meanings than used within this technical report. It is requested that reader read this section before going in depth to the remainder of the report. This section should also be used as references for clarification should the reader have doubt about the meaning of a specific term when reading the report.

Clause 4, Automated procedure lifecycle reference model, presents a model of the life cycle of an automated procedure, including a procedure automation strategy activity that is separate to any specific automated procedure.

Clause 5, Procedure automation strategy, explains typical contents of a strategy which can be used to standardize the detailed approaches to using automated procedures in an organization.

Clause 6, Planning and definition, describes practices for planning the use of automated procedures on a project.

Clause 7, Requirements and design, covers activities related to the creation of the procedure requirements and procedure implementation models that were described in technical report 1.

Clause 8, Implementation, describes the activities involved in creating implementation modules, and their testing, training, installation, commissioning, and the project audit activity.

Clause 9, Operation, describes the activities where automated procedures are used to help operate a process.

Clause 10, Retirement, addresses the activity where automated procedures are removed from operation.

Clause 11, Impact on Management of Change (MOC) work processes, addresses the impact of automated procedures on existing MOC work processes.

Annex A, Procedure automation philosophy examples, provides a sample outline of a procedure automation philosophy document.

Annex B, Metric examples, provides examples of metrics that can be used to measure the use and effectiveness of automated procedures.

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1 Scope

This technical report provides information regarding the work processes involved in the lifecycle of automated procedures for continuous process operations.

The work processes that are unique to automating procedures are the primary focus. Work processes that are related to automating procedures but are also common across multiple domains such as construction, hazardous operation review, and software development may be covered in less detail or not at all.

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2 References

The following referenced documents are useful for understanding this technical report. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies. These references are broken into three categories, cited references, relevant references and reference of interest. These levels reflect the relative importance of the individual documents.

2.1 Cited references

ISA-TR106.00.01-2013, *Procedure Automation for Continuous Process Operations – Models and Terminology*

ANSI/ISA-18.2-2016, *Management of Alarm Systems for the Process Industries*

2.2 Relevant references

ANSI/ISA-62381-2011 (IEC 62381 Modified), *Automation Systems in the Process Industry – Factory Acceptance Test (FAT), Site Acceptance Test (SAT), and Site Integration Test (SIT)*

ANSI/ISA-62382-2012 (IEC 62382 Modified), *Automation Systems in the Process Industry – Electrical and Instrumentation Loop Check*

2.3 References of interest

BULLEMER, P., KIFF, L., and THARANATHAN, A. Common Procedural Execution Modes during Abnormal Situations. Paper presented at the Mary Kay O'Connor Process Safety Center International Symposium, College Station, TX. October 26-27, 2010. p.19.

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3 Definitions of terms and abbreviations

3.1 Definition of terms

3.1.1 alarm response procedure

guidance for response to an alarm (e.g., operator action, probable cause)

NOTE Based upon ANSI/ISA-18.2-2016 standard.

3.1.2 alarm

audible, visible, or both means of indicating to the operator a process equipment malfunction, process deviation, or abnormal condition requiring a timely response

NOTE Based upon the ANSI/ISA-18.2-2016 definition.

3.1.3 alert

audible, visible, or both means of indicating to the operator a process equipment malfunction or a process condition that requires awareness, that is indicated separately from alarm indications, and which does not meet the criteria for an alarm

NOTE Based upon the ANSI/ISA-18.2-2016 definition.

3.1.4 automated procedure

an operating procedure with at least some automation

3.1.5 critical operation

Functions that have a high impact on the safety, environment, utilization, or availability of the process if not properly executed.

3.1.6 lifecycle instance

the work processes involved in automating procedures for a single project

3.1.7 manual procedure

an operating procedure with no automation

3.1.8 normal operation

desired function of the process

3.1.9 operating procedure (standard operating procedure, SOP)

description of a sequence of tasks to be performed, data to be recorded, operating conditions to be maintained, samples to be collected, and safety and health precautions to be taken to accomplish a specific objective

NOTE Based upon description in U.S. Government OSHA Appendix C to 1910.199 Compliance Guidelines and Recommendations for Process Safety Management (Nonmandatory).

3.2 Abbreviations

ANSI	American National Standards Institute
ASTM	American Society for Testing and Materials
BPCS	Basic Process Control System
CAP	ISA Certified Automation Professional
CCST	ISA Certified Control System Technician
CPU	Central Processing Unit

DCS	Distributed Control System
DDS	Detailed Design Specification
DOE	U.S. Department of Energy
FAT	Factory Acceptance Test
FEED	Front End Engineering and Design
FRS	Functional Requirements Specification
HMI	Human Machine Interface
HSE	Health, Safety Environmental
I/O	Input / Output
IEC	International Electrotechnical Commission
IEEE	Institute of Electrical and Electronics Engineers
ISA	International Society of Automation
LNG	Liquefied Natural Gas
MAT	Model Acceptance Test
MOC	Management of Change
MOM	Manufacturing Operations Management
OSHA	Occupational Safety and Health Administration
PCSD	Process Control Strategy Document
PID	Proportional, Integral, Derivative
Pre-FEED	Preliminary Front End Engineering and Design
ROI	Return on Investment
SAT	Site Acceptance Test
SIS	Safety Instrumented System
SIT	Site Integration Test
SME	Subject Matter Expert
SOP	Standard Operating Procedure
TR	Technical Report
URS	User Requirements Specification

4 Automated procedure lifecycle reference model

This technical report organizes work processes for developing and maintaining automated procedures into a lifecycle reference model in order to provide context to work processes and make them more sustainable. The lifecycle reference model described in this technical report is intended to be incorporated into an operating organization's project methodology, such as common gate-oriented or "V model" project methodologies.

The integration of the lifecycle reference model and associated work processes into an organization's project methodology is a critical success factor for achieving financial and operational success with procedure automation. The lifecycle reference model and associated work processes may be scaled up, for large and "mega" projects, or scaled down for operational activities as appropriate for each organization's requirements.

Figure 1 depicts the ISA106 automated procedure lifecycle reference model. In this model the rounded rectangles represent the work processes, or their deliverables, that are directly related to the lifecycle of automated procedures.

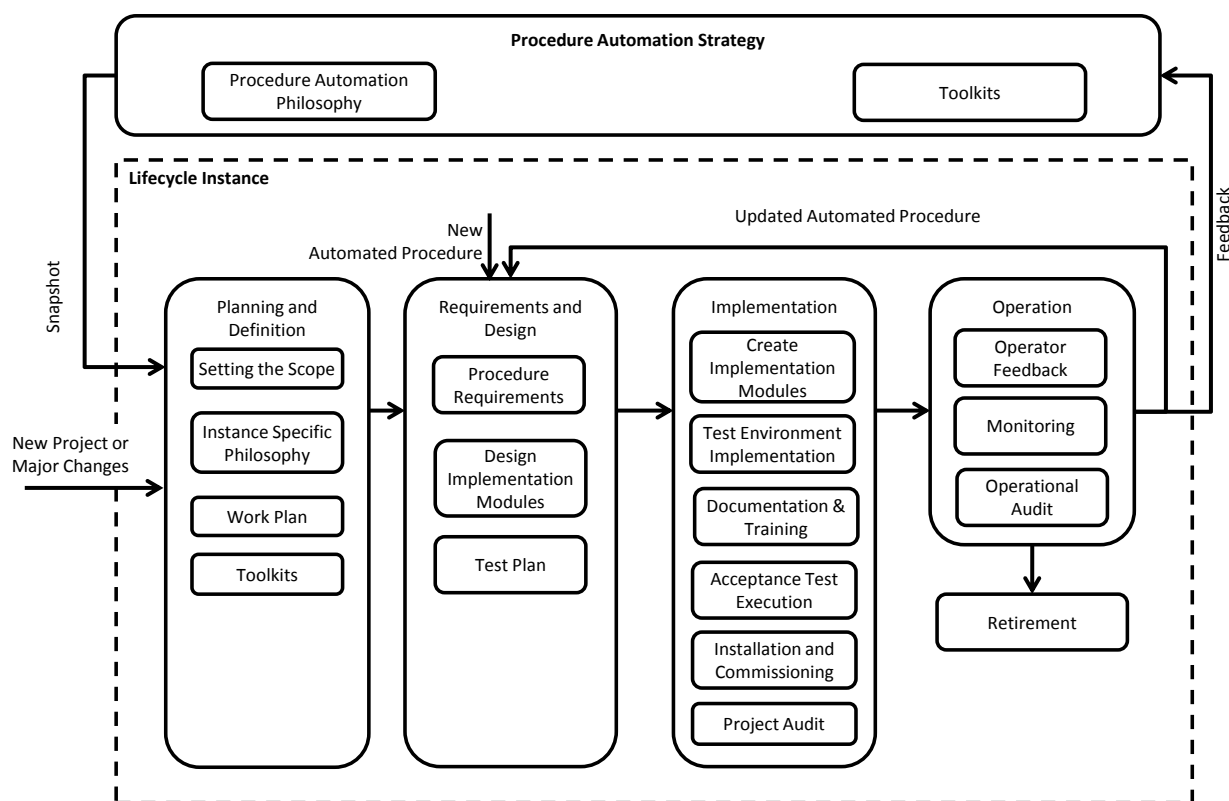


Figure 1 – Automated procedure lifecycle reference model

The procedure automation strategy, shown as the outer rounded rectangle at the top of Figure 1, is typically organization-, business- or program-wide and is developed and maintained on its own time line, independent of any specific lifecycle instance (e.g., a project or operational implementation). The procedure automation strategy contains two work processes identified by their deliverables:

1. Procedure automation philosophy
2. Toolkits