
Enterprise - Control System Integration

Part 3: Activity Models of Manufacturing Operations

Draft 6
December 2001

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

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The following people served as active members of ISA SP95 for the preparation of Part 3:

Name	Company
Gary Addison	Lyondell - Equistar
William H. Bosler **	Texas Consultants Inc.
Dennis Brandl ***	Sequencia
Bernie Brown	DuPont
Yves Carrier	Keops Technologies Inc.
Carey Clements	Honeywell Inc.
Chris Conklin	Dow Corning
Daniel G. Dziadiw	Propack-Data
David Emerson	Yokogawa
Kevin Harris	Honeywell-Poms
Jay Jeffreys	Wonderware
Charlotta Johnsson	Siemens – Orsi Automation
Baha Korkmaz	Automation Vision Inc.
David Kravitt	SCT
Roddy Martin	AMR
Paul Moylan	Rockwell Automation
Saroj Patnaik	Fisher-Rosemount
Anne Poorman	ABB Automation
Gary Rathwell	Enterprise Consultants
Leon Steinocher	Fluor Daniel
John Suttom	ABB Inc
Swarandeep Singh	ABB Inc
Keith Unger *	EnteGreat
Jean Vieille	Consultant
Chris Monchinski	Automated Control Concepts
Theodore Williams	Purdue University

* Chairman

** Vice Chairman

*** Editor

**** Secretary

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Enterprise/Control System Integration

Part 3: Activity models of manufacturing operations

FOREWORD

This standard is Part 3 of a multi-part set of standards that defines the interfaces between enterprise activities and control activities.

Section 4 is normative. The intent is to describe the activities associated with manufacturing operations, maintenance operations and quality operations.

Annex A is informative. It defines how ... *Editors note: This is just a place holder for now.*

NOTE: This is a draft document, notes and other draft text is included in this document.

As currently envisioned, ANSI/ISA-95 consists of the following parts under the general title *Enterprise/Control System Integration*:

- Part 1: Models and terminology
- Part 2: Object models and attributes
- Part 3: Activity models of manufacturing operations
- Part 4: Object models of manufacturing operations *Editor's note: This is a possible Part 4, defining detailed object models of information that flows between the activities defined in Part 3.*

Introduction

This part of the standard defines activity models for manufacturing operations that enable enterprise/control system integration. These models operate between the logistics & planning functions and the manual & automated process control functions. The models are consistent with the Part 1 data models and the Level 3 (Manufacturing Operations and Control) definitions.

The goals are to reduce the risk, cost, and errors associated with implementing manufacturing operations, and to have enterprise systems and manufacturing operation systems that inter-operate and easily integrate. The standard may also be used to reduce the effort associated with implementing new product offerings.

This part of this standard provides models and terminology for defining the activities of manufacturing operations. The models and terminology defined in this standard

- emphasize good practices of manufacturing operations;
- can be used to improve existing manufacturing operations systems; and
- can be applied regardless of the degree of automation.

Specifically, this standard provides a standard terminology and a consistent set of concepts and models for defining manufacturing operation activities. Benefits produced will:

- reduce the user's time to reach full production levels for new products,
- enable vendors to supply appropriate tools for manufacturing operations,
- enable users to better identify their needs,
- reduce the cost of automating manufacturing processes,
- optimize supply chains, and
- reduce life-cycle engineering efforts.

It is not the intent of this standard to

- suggest that there is only one way of implementing manufacturing operations;
- force users to abandon their current way of handling manufacturing operations; or
- restrict development in the area of manufacturing operations;
- to restrict its use only to manufacturing industries.

ENTERPRISE/CONTROL SYSTEM INTEGRATION

Part 3: Activity Models of Manufacturing Operations

1. Scope

This part of the standard defines activity models for manufacturing operations that enable enterprise/control system integration. These models operate between the logistics & planning functions and the manual & automated process control functions. The models are consistent with the Part 1 data models and the Level 3 (Manufacturing Operations and Control) definitions.

The scope of Part 3 is limited to:

- A definition of the activities associated with the manufacturing operations and control domain defined in Part 1 of this standard, as the Level 3 functions, as illustrated in Figure 1.

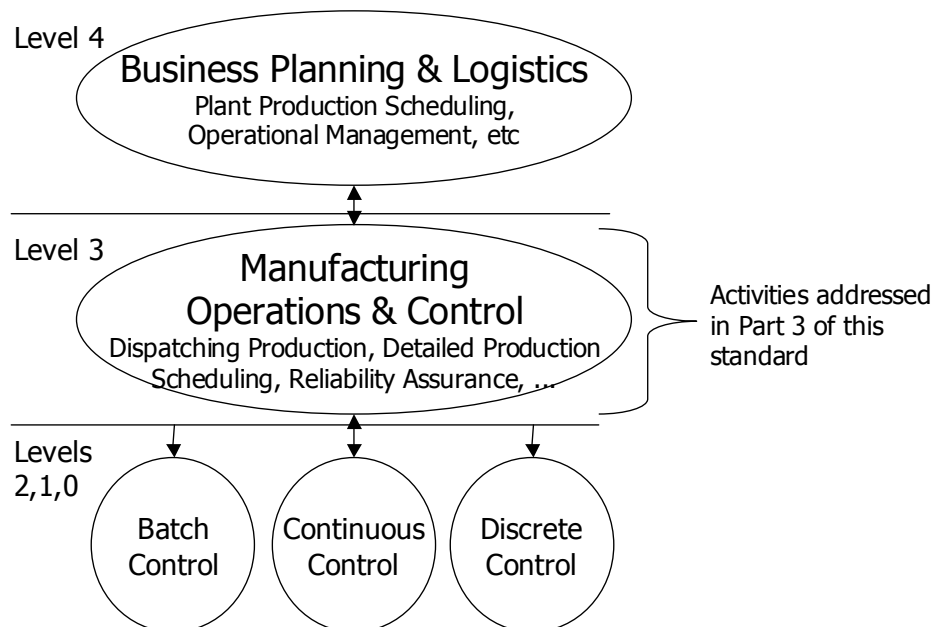


Figure 1 - Scope of part 3

2. Normative references

The following normative documents contain provisions, which through reference in this text, constitute provisions of this part of this standard. At the time of publication, the editions indicated were valid. All normative documents are subject to revision, and parties to agreements based on this part of this standard are encouraged to investigate the possibility of applying the most recent editions of the normative documents indicated below. Members of IEC and ISO maintain registers of currently valid normative documents.

- ISA 95.00.01-2000, Enterprise/Control System Integration – Part 1: Models and Terminology
- ISA 95.00.02-2001, Enterprise/Control System Integration – Part 2: Object Model Attributes
- ISO/IEC 19501-1 Information Technology—Unified Modeling Language (UML)—Part 1: Specification
- ANSI/ISA-S88.01-1995, Batch Control – Part 1: Models and Terminology

3. Definitions

For the purposes of this part of this international standard the following apply.

3.1

EH&S

Environmental health and safety

3.2

manufacturing operations

the functions of a manufacturing facility which convert raw materials and energy into products

In the PERA model the concept of manufacturing defines the hardware used in production. The manufacturing operations functions defined in this part relate to the information functions of the PERA model.

3.3

Manufacturing operations information

the collection of information used by, or generated by, production operations, maintenance operations, and quality operations

4. Manufacturing operations models overview

4.1 Manufacturing operations models

Manufacturing Operations are those functions of a manufacturing facility which convert raw materials and/or parts into products. Manufacturing operations include activities that may be performed by physical equipment, human effort, and information systems. By performing those functions, the facility fulfills the business mission of the facility.

Manufacturing operations information refers to the collection of information about the scheduled, use, capability, definition, history, and status of all of the resources (personnel, equipment, and material) within the manufacturing facility.

All the functions of handling operational data, information about operational scheduling, information about production results, and general management of the information that supports and control the physical operations of manufacturing are included within the manufacturing operations functions.

These functions may be grouped under heading such as process control, scheduling, and production data, but have a common collection and use within the manufacturing facility.

Each function includes the collection, handling, storage, and use of data and other forms of information important to the successful execution and documentation of the physical activity and its compliance.

The manufacturing operations activities included in Level 3, the dotted line area in the *Functional enterprise-control model* of Part 1 - Figure 5, are defined in three models, as depicted in Figure 2.

- The *production operations model* includes the activities of production control and the subset of the production scheduling, product inventory control, and material & energy control activities that are defined as being in Level 3.
- The *maintenance operations model* includes the activities of maintenance management included in Level 3.
- The *quality operations model* includes the activities of quality assurance included in Level 3.

This document is organized into sections corresponding to the three models of operations listed above and shown in Figure 2.

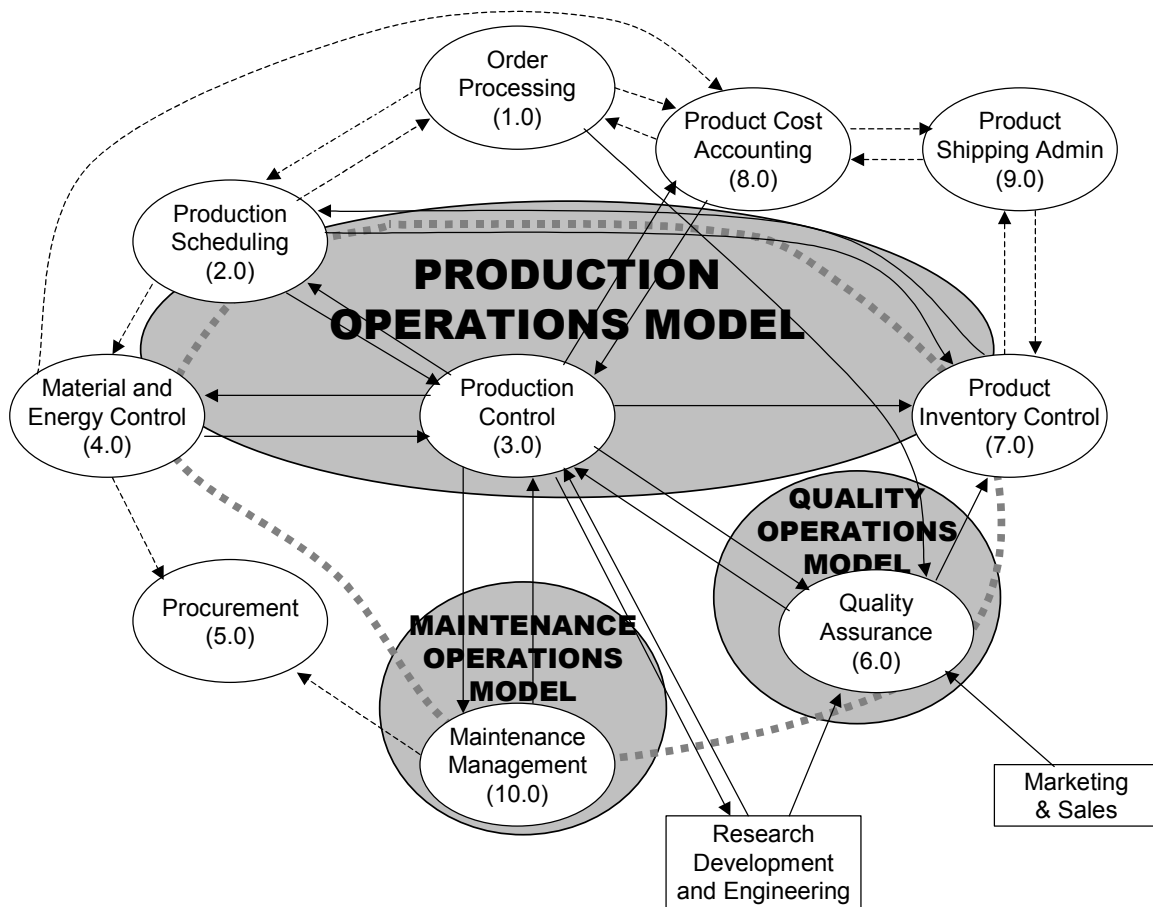


Figure 2 – Manufacturing operations models

4.2 Manufacturing operations information

The structure of the information exchanged in production operations, provides a similar structure for maintenance operations and quality operations, as depicted in Figure 3. The production schedule, production performance, product definition management, and production capability, shown in the figure as bold and underlined text, are defined in Part 1 of this standard. There are equivalent information structures for maintenance and quality, even if they do not necessarily cross the business-to-manufacturing boundary. The collection of all information from these elements is called *Manufacturing Operations Information*.