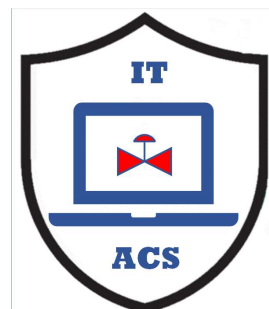




Configuration of Level 1 & 2 Devices and Networks

MLM-078-A

Industry	– All
Principal Role	– All
Professional Role	– All
Enterprise Phase	– All



Turn on your audio and
click start to begin video

START

This MLM describes use of the ISA 108 standard on configuration and management of intelligent industrial devices (IIDs) and networks.

Click the START button when you are ready to proceed.

What is ISA 108 ?



ISA 108 is a standard established to assist engineers to apply Intelligent Industrial Devices (IIDs) such as smart instruments, device controllers and associated industrial communication highways.

It also describes the design, operation, and maintenance of control and automation systems that contain IIDs.



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ISA 108 is a standard established to assist engineers to apply Intelligent Industrial Devices such as smart instruments, device controllers and associated industrial communication highways.

It describes how to apply intelligent Industrial Devices (or IIDs), including the design, Operation, and maintenance of control and information systems that contain IIDs.

How is ISA 108 Structured?



- **Part 1** describes **concepts**, models, and terminology.
- **Part 2** contains normative content (**what to do**).
- **Part 3** contains implementation guidelines (**how to do it**)
- **Part 4** contains implementation **examples**



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ISA 108 contains the following sections:

Part 1 describes concepts, models, and terminology. This was issued as ISA108 and submitted to the International Electrotechnical Committee as IEC 63082-1.

Part 2 contains normative content (what to do).

Part 3 contains implementation guidelines (how to do it) , including Work Processes, Procedures, and Tasks, and who should execute these.

Part 4 contains implementation examples, including vertical industry examples (like oil refining) or product type examples (such as control valves).

Why is ISA 108 Standard Needed?



Intelligent Industrial Devices (IIDs) can bring significant benefits by reducing spares and predicting failures; however, this potential is often not realized.

Implementation problems have included:

- Capabilities not fully implemented or adequately maintained.
- Vendors have failed to supply, support, and update communication and configuration software.
- IID Implementation failures have cost \$ billions of dollars.
- Failure to use available IID Health and Diagnostics have caused plant shutdowns.



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Intelligent Industrial Devices (IIDs) can bring significant benefits by reducing spares and predicting failures; however, this potential is often not realized.

Major implementation problems include:

- Added complexity has meant that IIDs are often never fully implemented or adequately maintained.
- Vendors have failed to supply, support, and update communication and configuration software, particularly for others' products.
- There are examples of industrial disasters costing \$ billions that have involved IID Implementation failures.
- Unnecessary shutdowns costing \$ millions have been caused by failure to use available IID Health and Diagnostic information.

Why is ISA-108 Standard Needed?



As IIDs become more complex, managing associated data and design decisions becomes increasingly difficult.

- IIDs may involve hundreds or even thousands of data values
- Reasons for design choices may be lost between Engineering and Operations.
- Tag and Loop Data may be corrupted as it is passed between incompatible Engineering, Construction, Operations, and Maintenance systems.
- Plant maintenance may not be able to determine “like-for-like” replacement of IIDs.



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As IIDs become more complex, managing associated data and design decisions becomes increasingly difficult.

- IIDs may require selecting and maintaining hundreds or even thousands of data values whose sheer volume is challenging
- The reasons for design choices is often lost between Engineering and Operations.
- Tag and Loop Data may be corrupted as it is passed between incompatible Engineering, Construction,, Operations and Maintenance systems.
- Plant maintenance may not be able to determine whether “like-for-like” replacement of IIDs is possible.

Why is ISA-108 Standard Needed?



Accuracy of IID configuration may deteriorate with time, with errors of 30% or more after a few years such as:

- Hand-held programming devices allow “ad-hoc” changes that may not even be documented and may remain for years.
- Field devices may be changed without updating related higher-level systems (e.g., DCS or SAP).
- Undocumented Changes – Hand-held programmers may be used to *change configurations without updating central “approved” records*.
- Lack of Consistency – IID replacement or repair procedures are often not documented
- Cybersecurity incidents (by external or internal actors) may result in safety, quality, or financial impacts.



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Many companies have found that the accuracy of IID configuration deteriorates with time, with configuration errors in 30% or more of their devices after a few years of operation.

Configuration errors may include:

- Quick Fixes – Hand-held programming devices facilitate “ad-hoc” modifications. As a result, unauthorized changes may persist for years.
- Uncoordinated Changes – Field devices may be changed without updating higher level systems (e.g. DCS, SCADA, SAP, etc.)
- Undocumented Changes – Hand-held programmers may be used to change configurations without updating central “approved” records.
- Lack of Consistency – IID replacement or repair procedures are often not documented or enforced.
- Cybersecurity incidents (by external or internal actors) may result in safety, quality, or financial impacts.

Why is the ISA-108 Standard Needed?



IIDs often require support from the supplier, such as:

- Custody transfer meters that require regular certification.
- Diagnostic devices like vibration analyzers
- Boiler stack gas analyzers and fuel optimizers
- Fleet management (e.g. analyzers) including maintenance support and training

For cybersecurity reasons, site personnel are reluctant to allow remote access because there is little guidance on how to manage access.



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IIDs often require support from the supplier, or specialist services contractors, such as:

- Custody transfer meters that require regular certification or monitoring
- Sophisticated diagnostic devices like vibration analyzers that require specialists to interpret
- Boiler Stack Gas Analyzers including fuel optimizers
- Fleet management (e.g. analyzers) including maintenance support and training

For cybersecurity reasons, site personnel are reluctant to allow remote access as there is little guidance on how to manage access to these devices.

How is ISA 108 Used by Engineering?



During Engineering Phase, ISA 108 provides:

- Standardized Work Processes/Procedures/Tasks for design of IDM devices and systems that integrate with other engineering standards.
- interfaces between Roles, including “Swim Lane Charts” and Workflow Diagrams.
- Example(s) of how a Repository can be used to manage IID Information that are structured by “Industry” or Technology.
- Example standard formats for Engineering data in the Enterprise IDM Program.
- How to facilitate “handover” of information between Project and Operations.



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During Engineering Phase, ISA 108 provides:

- Standardized Work Processes/Procedures/Tasks for managing the continuity of IDM information through all phases from design to operations and maintenance.
- Standardized Tasks (within Work Processes) requiring special training and certification.
- Examples of Roles associated with Work Processes and Tasks, and interfaces between Roles, including “Swim Lane Charts” and Workflow Diagrams. These examples (and those that follow) will be structured by “Industry” (e.g. , Oil Fields or Pipelines) or Technology (e.g., Smart Valves).
- Example(s) of how a Critical Information Repository can be used by the Owner/Operator to manage IID Information.
- Example standard formats for Engineering data (e.g., STEP, ISO, etc.) to be defined in the Enterprise IDM Program.

How is ISA 108 Used by Operations & Maintenance?



During Operations Phase, ISA 108 provides:

- A way for maintenance to replace “like-for-like” or require engineering.
- How to detect changes in IDM configuration and/or Design Parameters.
- Procedures for regular upload and comparison of Field Device Configuration
- Use of standard field device communication protocols (e.g. FDI, OPC UA, etc.)
- Work Processes for Management of Change (MoC) of IID Information
- KPI's and Audit requirements for Intelligent Device Management (IDM) Programs.
- Requirements for setup of local IDM support and management of Corporate IDM Program



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During Operations and Maintenance Phase, ISA 108 provides:

- Risk-based Work Processes that integrates with other engineering standards
- A way for maintenance to replace “like-for-like” or require engineering.
- How to facilitate “handover” of information between Project and Operations.
- How to detect changes in IDM configuration and/or Design Parameters.
- Procedures for regular upload and comparison of Field Device Configuration.
- Use of standard field device communication protocols (e.g. FDI, OPC UA, etc.).
- Work Processes for Management of Change (MoC) of IID Information.
- KPI's and Audit requirements for Intelligent Device Management Programs.
- Requirements for the setup of local IDM support and management of Corporate IDM Program.

Author



Gary has more than 40 years of experience with enterprise integration and optimization projects, including PERA master planning and project management.

As one of the initial authors of the PERA Handbook of Master Planning, he has used PERA Enterprise Architecture and Master Planning methodologies throughout his career including control and information systems for oil production, pipelines, refining and marine loading, petrochemicals, coal, gas, and oil-fired power plants, polyethylene, ammonia, explosives, paint, pulp and paper, food and beverage, and pharmaceuticals. LNG facilities included world-scale arctic, European, and US Gulf coast complexes.

Gary was a voting member of the ISA 108 Committee.

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