Designing for Sustainable TCO in Connected Manufacturing Implementations

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THE #1 NAME IN HOME BACKUP GENERATORS

Founded in 1959, Generac was the first to engineer affordable home standby generators, along with the first engine developed specifically for the rigors of generator use, and is now the #1 manufacturer of home backup generators. Generac manufactures the widest range of power products in the marketplace including portable, residential, commercial and industrial generators. We are also the leading designer and manufacturer of manual and fully automatic transfer switches and accessories for backup power applications up to 2 MW.
OVER 2.7M FT² OF VERTICALLY INTEGRATED MANUFACTURING CAPACITY SERVING A GLOBALLY DIVERSE COMMERCIAL FOOTPRINT
Product Portfolio

**Consumer Power**
- Air-cooled Home Standby Generators
- Liquid-cooled Home Standby Generators
- Portable & Inverter Generators

**Engine Powered Tools**

**Chore-Related Outdoor Power Equipment**
- Pressure washers
- Water pumps
- Field & brush mowers
- Trimmer mowers
- Chippers & shredders
- Log splitters
- Lawn & leaf vacuums
- Stump grinders

**C&I Stationary**
- Larger kW & Container Gensets
- Industrial Stationary Generators
- Commercial Stationary Generators

**C&I Mobile**
- Light Towers
- Mobile Generators
- Heaters & Pumps
Foundations in Connected Manufacturing
The Generac MOM Journey

✓ Established Enterprise and In-Plant Process Historians - 2015
✓ Integrated Automated Test Cells w/Process Historians and ECC - 2015
✓ Conducted As-Is / To-Be Requirements Gathering and Documentation - 2016
✓ Evaluated In-House Application Vendors (Automation & ERP) - 2016
✓ Selected SAP Manufacturing Suite (ME, MII, and PCo) - 2016
✓ Conducted Analysis w/SAP and Partner for Pilot Project Functionality - 2016
✓ Implemented Pilot Project in Specific Areas of Selected Plant - 2017
The Generac MOM Landscape
Leveraging the SAP Investment

Level 4
Enterprise Business Processes

Business Planning & Logistics
Plant Production Scheduling, Shipping, Receiving, Inventory, etc.

Level 3
Manufacturing Operations
(Shop Floor Level)

Manufacturing Operations
Dispatching Production, Production Scheduling, Order Execution, Tracking & Traceability, Data Collection, Quality Management

Level 2
Automation / Connectivity

Device Integration
Data Historians

Level 1
Shop Floor Process Control

RFID Sensors
Weigh Scales
Inspection Equip./Testers
Environmental Esg/Asset Sys
PLC/DAS/SCADA

Enterprise/Management Level
SAP ERP

Region/Plant Level
SAP ME
SAP MII

Line/Cell Level
SAP Pco
Implementation Partners

• Seeit Solutions (SAP ME, MII, PCo, Blueprinting, etc.)

724 E. Kensington Road
Arlington Heights, IL 60004
Phone: (847) 483-8703
Fax: (847) 298-4788
info@seemitii.com

• Stone Technologies (Device Integration PLC Interfaces)

1 866 STONETEK
636 530 7240
Fax: 734 448 2014
550 Spirit of St. Louis Blvd
Chesterfield, MO 63005
TCO – Total Cost of Ownership
Managing Throughout the Project Lifecycle

- Project Preparation (Requirements Gathering)
- Blueprinting (Design)
- Realization (Build)
- Test (UT, SIT, UAT)
- Final Preparation (Cutover)
- Go Live Support (Hypercare)

**Unforeseen Cost Challenges to be Wary Of**

- Connecting the “Things” of the IIoT
  - Wired vs. WiFi, Non-ENET Capable PLCs, Undersized PLC CPUs
- Change Orders Due to Miscommunications Between Developers
  - Naming Conventions, Points-of-Interface, Etc.
- Inability to Test End-to-End (No DEV / QA Machines Available)
  - Machine Interfaces Must be Thoroughly Simulated
- Limited Resources – Implementation Team Needs to Roll-Off Post Hypercare
  - Pressure to Wean Off External Consultants
Leveraging Industry Standards / Best Practices
Speaking with a Common Language

- ISA-95
  - Production Modeling, ERP to MOM Interfaces
- ISA-88
  - Data Point Naming Conventions (Tagnaming)
- PackML
  - Device Integration Modularity (PLC / SCADA Interfaces)
- MESA (Manufacturing Enterprise Solutions Association)
  - Education and Training

Benefits of Adapting Standards

- Flexibility to Choose SI Partners
  - Standards-based Documentation is Easily Exchanged and Understood
- Ability for Development Teams to Work Remotely and Independently
  - Confidence that Everything will Work when Brought Together
- Easier Integrations with External Application Platforms
  - Plug and Play with Solutions from the Best Vendors
- Reduced Risk from Personnel / Team Changes
  - Tribal Knowledge becomes a Thing of the Past
ANSI/ISA-95, or ISA-95 as it is more commonly referred, is an international standard from the International Society of Automation for developing an automated interface between enterprise and control systems. This standard has been developed for global manufacturers. It was developed to be applied in all industries, and in all sorts of processes, like batch processes, continuous and repetitive processes.

The objectives of ISA-95 are to provide consistent terminology that is a foundation for supplier and manufacturer communications, provide consistent information models, and to provide consistent operations models which is a foundation for clarifying application functionality and how information is to be used.
Applying ISA-95
Requirements Definition
Applying ISA-88
Production Modeling + Taganning

ISA-88

From Wikipedia, the free encyclopedia

S88, shorthand for ANSI/ISA-88, is a standard addressing batch process control. It is a design philosophy for describing equipment, and procedures.

Perhaps a Less Confusing Way to Show It

(L. Craig, WBF 2005 Tutorial: An S88 Overview)
Applying ISA-88
Production Modeling + Tagnaming
Applying PackML
Commonality in Device Integration

PackML

From Wikipedia, the free encyclopedia
(Redirected from Packml)

PackML (Packaging Machine Language) is an industry technical standard for the control of packaging machines, as an aspect of industrial automation.

The Manufacturing Automation Industry is broken down into three main categories; Continuous control, Batch control and Discrete control.[1] The batch control industry and the packaging industry (discrete control of packaging machines) are the focus of a set of standards and guidelines that are similar but have differences driven by equipment functionality.[2]

The primary objective of PackML is to bring a common “look and feel” and operational consistency to all machines that make up a Packing Line (note: can be used for other types of discrete process)[3] PackML provides:
• Standard defined machine states and operational flow[4]
• Overall Equipment Effectiveness (OEE) data [4]
• Root Cause Analysis (RCA) data[4]
• Flexible recipe schemes and common SCADA or MES inputs[4]
Applying PackML
Commonality in Device Integration
Adopting Non-Traditional UI Platforms
Lower Cost Hardware for Every Function

Assembly Line UIs

Big Screen Dashboards

Machine Shop UIs
Adopting Non-Traditional UI Platforms
Google G Suite Admin Console
Predictive Monitoring w/Analytics
Ensuring a Robust and Stable Platform