SSG Case Study Template

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Company represented: Union Investments L.L.C.

Role: Asset Owner

Sector: Other Industrial (Plastics Manufacturing - Rotomolding)

Asset owner: Firm Industries

Introduction

Description of assets in study

The case study focuses on the configuration management of a production cell comprising six large, computer-controlled rotomolding ovens, their respective cooling stations, and material handling systems. These are critical capital assets where precise control of temperature, rotation speed, and cycle time is essential for product quality and output. The operational environment is a demanding industrial facility in the Ras Al Khaimah Economic Zone (RAKEZ) Al Hamra Industrial Area, UAE, subject to high ambient temperatures and humidity.

When was the activity carried out?

The formal Configuration Management process was initiated in Q4 2023 to support a major plant expansion and was fully implemented by Q1 2025. The process is now part of ongoing operational asset management.

Why was the activity carried out?

The activity was driven by several factors:

1. **Business Risk:** High rates of product quality variation and scrap, directly linked to inconsistencies in machine settings and undocumented modifications.
2. **Operational Risk:** Unplanned downtime due to incompatible replacement parts and firmware issues, impacting production targets.
3. **Corporate Direction:** A strategic initiative to achieve ISO 55001 certification and implement world class manufacturing principles and Good Manufacturing Practice (GMP).
4. **Environmental Impact/Sustainability:** To reduce material waste (a key raw material being LLDPE virgin granules) and optimize energy consumption of the ovens.

The approach was designed as a repeatable programme to manage the entire lifecycle of all critical production assets, not just the new ones.

Terminology

1. **Configuration Item (CI):** A uniquely identifiable piece of production equipment, a critical sub-assembly (e.g., oven burner system, PLC controller), or a firmware/software version treated as a single entity for configuration management.
2. **Configuration Baseline:** The approved and documented "as-built" state of a CI after installation or a major overhaul, including all settings, calibrations, and software versions.
3. **Change Request:** A formal proposal to permanently modify an established configuration baseline, such as a PLC software update.
4. **Variance Request:** A formal request for a temporary deviation, for instance, using an alternative thermocouple for a short period due to supply chain delays.

Description of activity

Methodology

The methodology followed the "Plan-Do-Check-Act" cycle, aligned with ISO 55001. A centralized Asset Register within a Computerized Maintenance Management System (CMMS) was configured to act as the Configuration Management Database (CMDB). This approach was chosen for its practicality and direct integration with daily work orders.

The approach was applied to multiple asset types (ovens, chillers, material mixers) and addressed multiple risks, from production quality to operational availability. It linked directly to the business objective of "Right First Time" manufacturing. By providing a clear history of changes, the approach allowed for a cost/benefit analysis of modifications, correlating configuration changes with scrap rates and energy usage. It is a rolling, repeatable programme integral to the asset management system.

References

The methodology was based on:

- ISO 55001:2014 Asset Management – Management systems – Requirements.
- ISO 9001:2015 Quality Management Systems – requirements, for traceability and control of change.
- The Institute of Asset Management's (IAM) "Asset Information" Subject Specific Guidance (SSG).

Risk types

The Configuration Management process was designed to mitigate several key risk types, including:

- **Operational Risk:** Machine downtime and production stoppages.
- **Business Risk:** Financial loss from high scrap rates and missed customer orders.
- **Maintenance Risk:** Incorrect maintenance procedures or parts leading to longer repair times.
- **Technology Risk:** Firmware updates causing incompatibility with other machine systems.
- **Reputational Risk:** Failure to deliver consistent product quality to key clients.

Risk management process

Technical risks identified through configuration tracking (e.g., a specific PLC version correlating with high scrap rates) were escalated to the corporate risk register. The risk matrix from the company's IMS (Integrated Management System) was used. A monthly Asset Management Review meeting, chaired by the Plant Manager and attended by the Quality and Maintenance Managers, served as the Configuration Control Board (CCB), providing governance. The configuration status reports directly informed the annual asset management plan for budgets and maintenance strategies.

Tools used

- A Cloud-based Computerized Maintenance Management System (CMMS) configured for CMDB functionality.
- Microsoft SharePoint for document control (manuals, baseline agreements).
- The existing ERP system (Oracle NetSuite) for linking CI data to spare parts inventory and cost centers.
- Note: We are in the process of shifting to Odoo and exploring a Plant Maintenance System as well.

Costing

Financial parameters were primarily evidence-based, using historical data on scrap rates, downtime costs, and energy consumption. Expert judgement was used for estimating the benefits of proposed upgrades. The process was directly linked to the operational budget, with approved changes impacting spares inventory and maintenance spending. The cost of carbon was considered indirectly through the focus on reducing energy consumption, though a formal shadow price was not used.

People

The exercise involved a cross-functional team:

- **Executive Sponsor:** Plant Manager.
- **Core Team:** Maintenance Manager (acting as Configuration Manager), Process Engineer, Quality Assurance Manager, CMMS Administrator.
- **Stakeholders:** Production Shift Supervisors, Senior Technicians, Procurement Officer. The core team consisted of 4 people with regular input from 10+ stakeholders. The approach was fully endorsed at the Plant Manager level.

Evaluation

What was the main output of the activity?

The main outputs were:

1. A definitive Configuration Item Register for all critical production equipment.
2. A Configuration Management Plan integrated into the Quality Management System.
3. Established Configuration Baselines for all six rotomolding ovens.
4. A formal, documented process for Configuration Management Change and Variance Requests.

5. Regular Configuration Status and Evaluation Reports for management review.

This resulted in a prioritised investment plan for PLC upgrades and a documented justification for standardizing spare parts, leading to a reduction in inventory carrying costs.

Validation

Validation was achieved through:

1. **Quality Data Correlation:** A direct, measurable correlation was established between the implementation of configuration controls and a 40% reduction in product scrap rates over 18 months.

2. **Internal Audits:** The process was scrutinized and confirmed during internal audits for both ISO 9001 and the upcoming ISO 55001 certification audit. We are also finalising the implementation of ISO 14001 and ISO 45001.

3. **Practical Verification:** Maintenance technicians conducted physical audits to verify that machine nameplates, PLC versions, and critical component serial numbers matched the CMMS records.

Outcome

The activity was successful.

The outcome exceeded predictions in terms of quality improvement. The key embedded practice that changed was the cultural shift from making informal "tweaks" to machine settings to requiring formal review and approval for any change. This improved communication between production, maintenance, and quality departments.

In hindsight, two things would be done differently:

1. **Involve machine operators from the start:** They possess invaluable tacit knowledge about machine behavior. Their early involvement in defining the initial baselines would have accelerated buy-in.

2. **Simplify the Change Request form:** The initial form was too complex, causing resistance. A simplified, digital form within the CMMS greatly improved compliance.

For Firm Industries, implementing Configuration Management has transformed their view of industrial equipment from isolated machines to a controlled production system. This has directly enhanced product quality, operational reliability, and profitability in a competitive market.