

## Producing with Quality Nidec Global Appliance Case Study




### Introduction

Staying competitive in a globalized world goes far deeper than the “next best thing.” For Nidec Global Appliance, the focus is to deliver a comprehensive portfolio with high standards of quality, competitiveness, and energy efficiency, generating innovation that anticipates trends in the appliance segments.

Nidec Corporation, based in Japan, is one of the biggest motors producing groups in the world. In 2019, they acquired Embraco, based in Brazil, to form a new division focused on refrigeration solutions. The Embraco brand is well known for pioneering the development of variable speed compressors and the use of natural refrigerants critical for reducing energy consumption.

According to the International Institute of Refrigeration (IIR), refrigeration and air conditioning together account for 17% of the electricity consumption in the world. Embraco’s innovative solutions deliver a better quality of life and have a significant impact on the environment. The variable speed compressor, for example, brought an average savings of 35% of energy consumption. This technology varies speed to refrigeration systems to reduce energy consumption, meeting the most stringent energy efficiency levels legislated around the world.

Nidec Global Appliance addresses both the home and commercial appliance market segments with an annual production capacity of 60 million units (motors and compressors). The company has a presence in eight countries including eleven manufacturing plants, over fifty research and development laboratories, three sales offices and one global business support center.

Since the acquisition, Nidec Global Appliance has continued to expand its refrigeration compressor business under the Embraco brand. To bring out new families of products and customer specific variants faster, Nidec Global Appliance has embarked on a digital transformation. With the support of top management, IT and Engineering partnered to deliver more with less; increasing the number of projects, accelerating time to market, driving down costs, and improving quality.

## Global Pressures

*Products are changing.* The EU climate and energy framework sets an energy reduction target of 40% between 2020 and 2030, relative to 1990 levels, greatly impacting companies like Nidec Global Appliance. Household and commercial appliances like dishwashers and refrigeration systems will be relabeled by the new standards, and many current product designs will fail these standards. What is currently considered a AAA rating will be rated an F under the new standards.

*Global competition is intensifying.* Chinese and Japanese competitors are innovating and catching up fast. Energy efficiency translates into price. While Nidec Global Appliance has a history of being first to market, there is global excess capacity. Nidec must accelerate product development or risk significant price erosion for their products.

*Supply chains are being disrupted.* As the pace of innovation increases, Nidec must quickly certify new and existing supplier parts or risk costly time to market delays.

## About the Study

This study was built around the following key performance indicators (KPIs) and the results Nidec Global Appliance saw by implementing their Product Lifecycle Management (PLM) strategy were:

- Number of Large Projects: Increased by 284%
- Time-to-market: Decreased by 48%
- Resources: Decreased by 22%
- Quality: Cost of non-quality reduced by 40%

## Challenges

Nidec Global Appliance started to use PTC's Windchill in 2015 to manage their CAD data, otherwise leaving product-related information in siloed systems. With disconnected systems and processes, there were inevitable product delays with low first pass yields, internal and customer line failures, rework, and field failures.

With their globally dispersed enterprise and massive number of products produced each year, Nidec Global Appliance knew that uniting and streamlining product development was critical to improve time to market and reduce the cost of quality issues.

Before the enterprise-wide PLM initiative, Nidec Global Appliance's traceability and governance of parts, product documents, certifications, and processes were project based and disconnected. With Nidec Global Appliance locations in Brazil, Mexico, China, and Europe, each region had a separate database for documentation and processes were siloed from each other. With Nidec's products containing thousands of variants, 17,000 unique product bills of materials (BOMs), and no global accessibility, there was frequent duplication of efforts and no consistent quality assurance.

Without a single source of truth, it was hard for employees to find the documentation and history they needed to accurately design a product variant. This led to having to duplicate tests for small variant changes causing delays for new variants and new products. Both large and mid-sized projects were additionally driving up program costs due to preventable rejects, rework, scrap, additional labor hours, and cycle time.

Engineering changes were also problematic. Developers had to input their work into segregated Windchill and SAP systems, doubling effort and increasing the likelihood of mistakes. Data in SAP was different from Windchill. What was the source of truth? While this did not disrupt individual project teams, it failed at an enterprise-level, as the lack of process control, supplier control, and inspection/test governance caused further delays in getting products to market. Moving designs from development into production suffered as the BOM and related work instructions would often be inconsistent. For example, a single part might have two places where it could be inserted, or a single assembly step could potentially use two different parts.

Changing the way people work was not easy. "There were real or perceived reasons for differences in process based on specific scenarios. Independent R&D teams did not understand why they had to standardize on a process that was different from what was already working for them. No one wanted to work differently," said Thalita Begliomini, Global IT Manager for Governance, Risk, and Compliance. "We had to convince our teams that IT could support them even better with standardized processes. Now everyone understands what we can do together."



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For Nidec Global Appliance's original equipment manufacturer customers (OEMs), there was not a standardized way to communicate product changes. This caused confusion on what to inform the OEM about and how to communicate the changes, as changes made to products didn't have a set engineering change notice (ECN) process or traceable documentation and certifications. Without this knowledge, OEMs could experience line failures, needlessly costing Nidec Global Appliance time and resources to fix the problem and damaging their reputation.

The supply chain also suffered without a standard set of requirements. Delays in supplier certifications were due to both inconsistent certification procedures and supplier databases spread across the regions. Similarly, if a compressor failed in the field, such as in a customer's refrigerator, the quality team was not able to trace development, supplier, and manufacturing information for root cause analysis, corrective and preventive action.





## The Solution

With a very decentralized footprint, and a huge challenge ahead, Nidec set out to see how they could optimize the enterprise. IT leadership knew they had to build a robust ecosystem of technology that not only worked together but also could enable the company to run in a compliant way together with quality, safety, and speed.

The team decided to partner with PTC. Windchill was selected as the strategic system for product related information. Windchill's out-of-the-box PLM processes were used to create the governance and traceability required to transform the culture of the company to speed up delivery.

To create a solid pillar of manufacturing, IT partnered with R&D to clean up databases and understand the current infrastructure. Then, they set out to organize all the product related information by taking a parts centric approach, creating engineering bills of materials (EBOMs).

This enabled R&D, for example, to easily access product data regardless of their geographic region and team, or the product variant being designed. Countless hours of rework and testing were eliminated. Change and configuration management was implemented to ensure that change requests made during the development processes were linked to documents and automatically archived with all the appropriate approvals and considerations.

To eliminate the fear of losing data between Windchill and SAP, product structures were aligned. Now, whenever a BOM is approved in Windchill, SAP is automatically updated. Also, whenever someone sees a problem on the production line, they can open a deviation in Windchill, and actions can be taken to approve and run tests.

And with new processes comes new efficiencies, for example, when planning a project, employees are assigned specific roles to reduce rework, such as using the same person to test at the beginning and the end to ensure quality.

Customers benefit from PLM as well with a well governed Engineering Change Notice (ECN) process, changes are analyzed and discussed. The available documentation of tests and certifications aid the process.

Suppliers also benefit from the stronger certification system. The integrated system to manage documentation provides visibility and ensures higher quality products.

"The main R&D processes are globally digitized leveraging the use of trusted data based in a robust process managed by Windchill, enabling the company to drive the business based on data and start a journey using artificial intelligence," said Luiz Gustavo de Oliveira, Head of Technology and Analytics.

## The Result

To stay competitive and a leader in energy-efficient refrigeration solutions, Nidec Global Appliance needed to transform their enterprise. By implementing a digital PLM strategy and integrating their disparate systems like Windchill and SAP, Nidec Global Appliance was able to redefine quality practices throughout their products' lifecycles.

"With each new generation, we have delivered a 5% improvement in energy efficiency," said Gerson Heusy, R&D Senior Manager. "Innovation is present through innovative tools."

These innovative tools have drastically changed the timelines of Nidec's products, with time-to-market decreasing by 48% and a 284% increase in the number of large projects. And they are accomplishing this with 78% of the resources they had prior to PLM. With enhanced governance and traceability, as well as other enterprise quality initiatives, the cost of non-quality also was reduced by 40%.

Currently, 900 employees are using Windchill with 300 using it every day globally, 24/7, and IT has become a partner in PLM's success to ensure it meets the needs of the enterprise.

"The IT team learned with R&D to embrace together a more agile approach," said Thalita Begliomini, Global IT Manager for Governance, Risk, and Compliance. "Our teamwork, methodology, and tools evolved over time based on a continuous improvement philosophy."



## The Future

The IT team has now established a level of trust with R&D. Newly energized; the next frontier is to start digital transformation in operations extending the digital thread into the factory. The priority will be measuring efficiency by delivering the parameters of the production line to look for opportunities for reducing operational costs, boosting factory output, and improving asset utilization. No doubt Nidec Global Appliance will be weaving quality into their digital thread.

