

## Rockwell Automation’s Partnership with Kraft, Profitability with OEE

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## Partnering for Success



Kraft and Rockwell Automation have had a strategic supplier alliance agreement since 1993. It began as both a product and architecture-based relationship, evolving to one that provides significant levels of services and solutions. As Rockwell Automation moved into the “Industrial IT” space, they did so with partners such as Kraft, linking their plant floor, manufacturing automation investment with their front office automation investment.

For any partnership to be successful, each player must have an understanding of expectations that describes how the investment will be paid off and in what time frame. Examples of this include monthly savings projected over multiple facilities and the projected bottom-line impact for full implementation. The length of the project and major milestones must be mutually agreed upon in advance. Philosophies must be in synch, such as an emphasis on executing an aggressive schedule on time and within the original plan as well as doing the project within or under budget.

The strength of the partnership is built on the ability of each player to drive the relationship based on their individual business needs as well as their ability to validate capabilities with their customers, the financial community, etc. It reflects each player’s skills as a well-managed company that can focus on how to best utilize their assets, such as capital spending and human resources, efficiently and effectively. A strong partnership allows each player to benefit from the best practices in the relationship, a “gold standard” that both companies can point to with other vendors.

“A more reliable line costs us less in materials and labor to run. OEE gives us the data to measure reliability.”  
 Frank Meegan  
 Senior VP, Operations  
 Kraft Foods North America

## Kraft’s Business Drivers

Kraft Foods Inc., the No. 1 U. S. food company, is a solid financial performer in spite of a weak domestic economy. Their performance can be attributed to aggressive productivity improvement targets, continuous improvements in asset efficiency, and desire for better information from their production management systems. These business drivers also include converting information into knowledge to provide a consistent measure of asset utiliza-

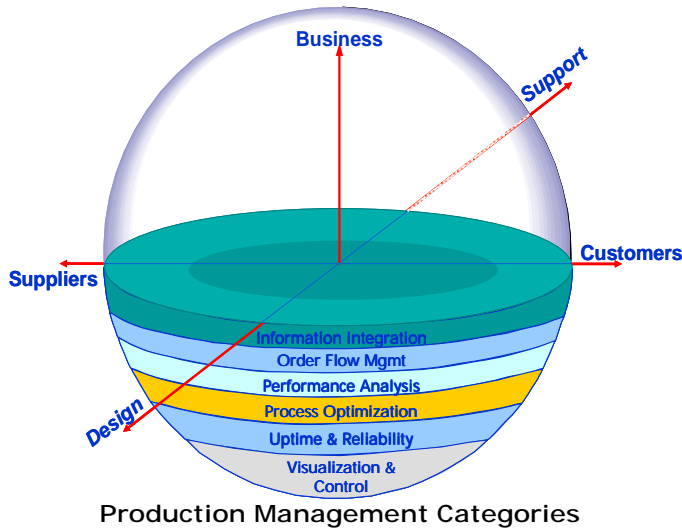
tion and performance across multiple facilities, as well as obtaining a consistent baseline to better focus improvements. This information consistency is required in order for Kraft to prioritize improvements and capital investments. On the factory floor, this information also provides line operators and team leaders with actionable data in real-time to help them make better decisions. For Kraft, the bottom line is higher productivity, profitability, and faster time to market.

One of the key reasons that Kraft achieves this level of success is the fact that senior management aggressively implements their business drivers and mandates the philosophy, discipline, involvement, alignment, sponsorship and support required at all levels of the organization. Senior management has ownership responsibility of the four key functions consisting of Quality, Manufacturing, Systems, and Operations. This is a role model for outstanding organizational behavior.

Organizational Driver:  
Overall Equipment Effectiveness (OEE) is the standard for expressing asset performance

## Collaborative Manufacturing and OEE

Production management systems are indispensable components of Collaborative Manufacturing Management (CMM) systems. They provide supervisory, analytical, and connectivity functions from the plant floor to enterprise systems and business partners. Supporting the enterprise's information-sharing requirements places new demands on manufacturing and typically requires the coordination of a disparate array of sources and platforms. The old model considered these categories of production management separate. Taken together, however, these categories are an integrated production management framework, addressing the plant-level needs and establishing the basis for connectivity to the enterprise and value chain.



One category of production management is performance analysis, which deals with plant and capital assets, and helps reduce process variability through the analysis of a wide variety of process and production data such as temperatures, pressures, and flow rates. The performance view of plant capi-

tal assets utilizes Overall Equipment Effectiveness (OEE) algorithms. OEE is a straight-forward approach to monitoring and managing the lifecycle of manufacturing assets. OEE is a calculation of three components: the first pass quality of a production run, the performance rated production when manufacturing, and the availability to produce when scheduled. Data taken from these three parameters and multiplied together results in a relative index that represents the overall performance of that asset. Kraft decided to

Availability x Performance x First Pass Yield = OEE

re-define OEE as only unplanned downtime. So the equation is: 24 hours/day = BUR + WEV, where BUR is the Business

Underutilization Ratio (affected by demand or seasonality), and WEV (Waterfall Effectiveness Value) is the combination of planned and unplanned downtime. Although it is thought that only OEE is changeable, the reality is that actually WEV is also manageable and not beyond a plant's control. This

"Reliability and productivity of assets is what drives our safety stock inventory."

Fred Sherriff

Vice President, Operations  
Kraft Foods North America

process brings to light many planned activities that need to be examined and justified. An example is Sanitation, which does not need to be run every day since the regulatory requirement is actually on contamination limits, not daily sanitation practices. Scheduling only needed sanitation releases asset capacity and drives up capital efficiency.

However, a business case for OEE needed to be developed, demonstrating the payback and benefits to Kraft in terms of dollars saved as well as how OEE addresses Kraft's ongoing business challenge of meeting its customer demands at the lowest possible cost. If it was justifiable, it also needed to incorporate Kraft's other MES initiatives in the areas of weight control, laboratory information management systems (Unilab), and on-line statistical process control (SPC) and rapid testing.

As the concept of Overall Equipment Effectiveness (OEE) started to mature, Kraft evaluated its potential with pilot installations. Kraft was a collection of different businesses (Kraft, General Foods, Oscar Mayer, Post), and the plants were aligned with those business divisions, resulting in a lot of inconsistency between plants. Kraft wanted a tool to guide capital investment. For example, Ready-to-Drink (RTD) beverages such as Capri-Sun are growing very rapidly, so the increasing demand appears to justify capital investment in additional manufacturing. However, the wide variation in WEV and OEE across existing RTD lines indicated that there was significant room for manufacturing optimization. By focusing on OEE improvement, Kraft was able to forego the purchase of 2-3 lines. These results demonstrated that OEE had tremendous promise for Kraft.

"We never clearly understood the impact that manufacturing variability had on conversion performance [raw materials to finished goods]. OEE drives that understanding."  
Fred Sherriff  
Vice President, Operations  
Kraft Foods North America

OEE real-time data infrastructure is a key driver and the foundation for a lot of other initiatives, such as Logistics, Quality Improvements, Optimization, and Labor.

Today, Kraft uses OEE as a standardized way of measuring packaging equipment performance. OEE can help determine what effect the current performance of any individual piece of equipment is having on the overall efficiency of the plant in terms of Key Performance Indicators (KPIs), such as throughput or downtime, and can generate reports of actual performance against targets. It can also indicate the cost of performance degradation. Having a consistent measure of asset performance enables Kraft's stakeholders to make smarter decisions about

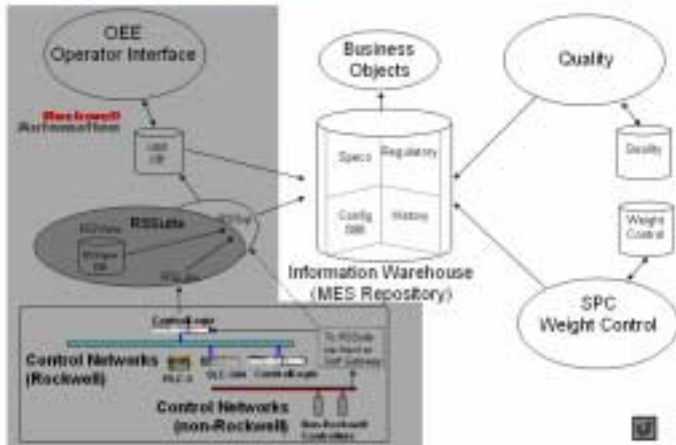
capital investments that yield the greatest return on investment. Understanding the OEE on the existing asset base gives Kraft insight as to whether performance improvements to an existing asset or augmenting the asset base with new equipment is a better capital spend. Additionally, comparisons between current performance and performance at design specifications are possible because of the predictive model-based method. This method helps production management make essential operating decisions to increase plant performance by optimizing maintenance schedules that account for maximum economic performance of equipment rather than solely depending upon attempts to predict and avoid failures. In

summary, OEE real-time data infrastructure is a key driver and the foundation for other initiatives, such as Logistics, Quality Improvements, Optimization, and Labor.

Another key concept behind the success of OEE at Kraft is "operator empowerment". Often the best suggestions for improvements come from the people most experienced with the equipment, most notably the operators. Measurable improvement comes from a culture of knowledgeable operators who are aware of their real-time production performance during the current hour and shift. It was observed that when operators know exactly how their behavior impacts manufacturing performance and profitability, productivity increases. An option for Full Operator OEE adds automatic downtime capture and real time displays, as well as the capability of measuring compliance to schedule to the capability of the base OEE application. Many improvements result from work practice changes initiated by the production teams or from increased focus on asset performance by those teams.

Kraft commonly analyzes the OEE and downtime data from the previous shift during "Green Room" sessions to brainstorm on creative ways to increase productivity on a line, or on how to eliminate the most common causes for downtime. Having an accurate view of asset performance and

## Kraft OEE Architecture



downtime cause data, in a culture that empowers the operator to focus on productivity improvements and elicit change, has resulted in significant increases in productivity and increases to the bottom line.

OEE fits into Kraft's future state vision of a "Totally Connected" company that links the plant floor through collaborative manufacturing management to the enterprise level as well as to retail, food service, suppliers, and co-manufacturers.

## Kraft's Beginnings with OEE

Kraft began testing the concept of OEE in Canada in 1994. Kraft's first pilot involved three plants and 64 production lines, linking collaborative manufacturing with modules for production reporting with Lot ID's, vendor managed replenishment, OEE and downtime, weight control, and decision support. Kraft monitored the savings which were categorized by line efficiency, standard loss allowance, labor, raw material yield, over-weight product, and miscellaneous expenses, from 1995 through 1997. The savings realized was over \$1.6 million, leading Kraft to conclude that collaborative manufacturing management drives asset reliability improvements that enable many other initiatives.

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To exploit their findings, Kraft tested another pilot application to track the benefits, better determine current project implementation costs, and focus on OEE and downtime collection along with yield tracking. This pilot resulted in savings of \$300,000 and an OEE improvement of 3 percent.

Both pilots led to a conclusion with confidence that confirmed the justification drivers for the total collaborative manufacturing approach.

A two-year capital project was justified and Rockwell Automation and Kraft became OEE implementation partners. Kraft included other MES initiatives in the areas of weight control, laboratory information management systems, and on-line statistical process control and rapid testing. It was then that the MegaMES program was born. After one year, the total ongoing savings is



running at \$14.6 million, with 80 percent of the benefits coming from OEE. Lines with Full Operator OEE installed are contributing 2-3 percent greater savings compared to Base OEE lines due to the additional actionable information presented to the operators. Kraft invested in lines in 48 plants that run 30% of the time or more, as full OEE is targeted for capacity-limited lines AND high-cost lines (either materials or labor).

## OEE, A Platform for Growth

Kraft utilizes OEE as a platform for growth, driven by a series of goals established by senior management. These include having OEE/WEV feed logistics planning, as reliability and productivity of assets drives Kraft's safety stock inventory levels. Kraft also wants to match maintenance investments with OEE data, answering the question, "What effect is maintenance having on this asset?" They want to compare asset life with asset performance over time. Kraft would like to eventually have a measure of the Total Cost of Ownership of a manufacturing asset. OEE/WEV data is the first piece of solving this puzzle.

Kraft uses OEE to indicate where to focus efforts for improvement. For example, a loss in 'availability' or 'performance' is a loss in asset time and people time, but not raw materials. A loss in 'first-pass quality' is the most expensive, as Kraft loses asset time, people time and raw materials. Kraft wants to align 'first-pass quality' with consumer feedback and complaints to see what was happening on the line during that time. Kraft would like to

"We wanted a tool to measure how our assets run when they are engaged."  
 Frank Meegan  
 Senior VP, Operations  
 Kraft Foods North America

break manufacturing assets into smaller units, with multiple measurement points. For example, on Ready-to-Drink (RTD) lines, Kraft measures total production after the filler. However, the machine that transfers pouches to the filler may drop one or two before filling. So Kraft needs a tool with additional granularity to measure the performance of this upstream asset.

Additionally, Kraft wants to better synchronize with suppliers. Today, this is done in only a few locations. For example, the bottle supplier for salad dressings made in Kraft's Montreal Mount Royal plant is directly plugged into Kraft's OEE data, allowing the supplier to know actual consumption. This is an example of Kraft's 'totally connected vision' coming to reality. Kraft wants to optimize raw materials use and packaging materials design. Different raw

Crewing = Operators + Maintenance + Manual Servicing

materials or packaging designs may result in slightly different OEE, so OEE is used

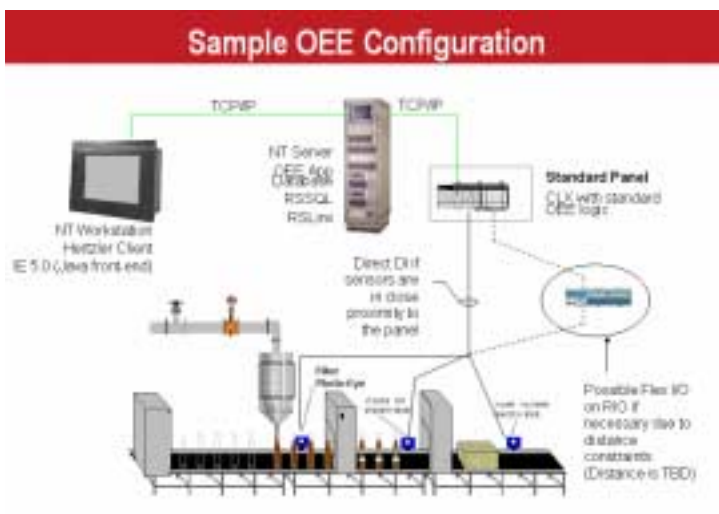
as a tool that allows Kraft to optimize manufacturing.

Kraft would also like to re-think and re-examine crewing, which is labor applied to manufacturing practices. (Crewing = operators + maintenance + manual servicing, which consists of people feeding the machine, or off-loading the machine, or generally keeping production going around some other problem). A line that has high OEE and is reliable needs less crewing. Crewing can be directly related to the cost of reliability. This is part of Kraft's philosophy to do more best-practice sharing among similar lines across the enterprise, allowing different plants to see who seems to be doing better than they are.

## A Strategic Supplier Alliance

Implementation consistency is a fundamental requirement for enterprise-wide MES initiatives. In Kraft's case, this means that OEE components must be collected identically for similar manufacturing processes, even at different plants. This equates consistency down to sensor placement on each manufacturing line. Otherwise, the confidence in MES data would not allow line-to-line or plant-to-plant comparisons, and support of this key business driver would be lost. Kraft partnered with Rockwell Automation to manage the North American rollout with consistent implementation, including training

and support functions.



Kraft has just completed implementation of OEE at 48 plants in North America, covering almost 500 manufacturing lines. Partnering with Kraft for this OEE roll-out, Rockwell Automation set up implementation teams across North America to assess the current infrastructure and equipment, modify the central design to each line, and implement the design, all without taking any line down during installation.

In addition, Rockwell Automation began working closely with Kraft's other MegaMES manufacturing vendors in the areas of weight control, laboratory information management systems, and on-line statistical process control and rapid testing, ensuring that all vendors are in alignment even if it means working with a traditional competitor. The initial OEE rollout is now complete; with payback being tracked for each line after a 30 day baseline is set. Projected activities include upgrading capacity-limited lines from Base OEE to Full operator OEE.

"Never before have 'maintenance' issues been at the executive level."  
Fred Sherriff  
Vice President, Operations  
Kraft Foods North America

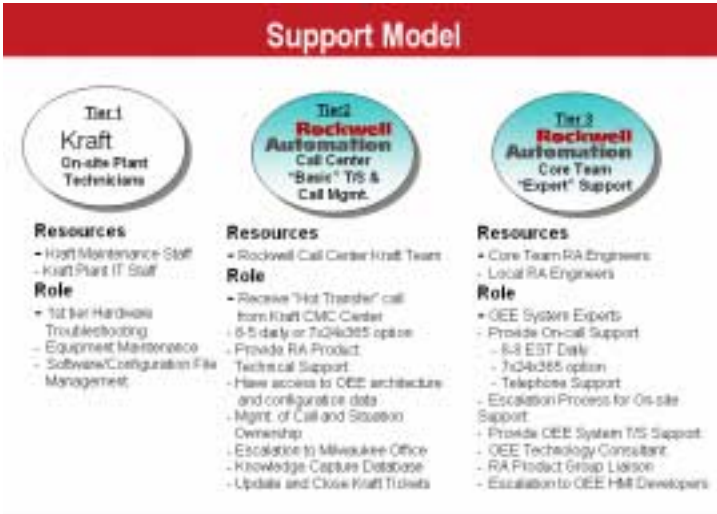
Reports for OEE savings tracking include "Line by Site", which reports on produced OEE Benefits, with summarization, for individual lines grouped by site. Reports also include "Product by Line, by Site", for individual products grouped by plant and line, and "Site", for individual sites and plants. These reports compare baseline OEE with the period OEE, calculate the OEE change and the direct variable labor per unit, and then provide a calculated savings based on the number of units produced.

Kraft is currently maximizing the benefit from OEE by establishing and sharing best practices across similar facilities (sister lines) and implementing targeted application improvements. Over the next two years, Kraft and Rockwell Automation plan to roll-out Full Operator OEE to existing capacity-limited base OEE lines, make enhancements to the existing OEE Applications, enhance the financial reporting, and increase the payback through additional training. Kraft's collaborative manufacturing development group is currently developing additional financial reports to add to all of their reports.

## A Choreographed Support Strategy

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A critical success factor in rolling out a supportable, enterprise-wide application on unique automation lines is partnering to establish the support strategy in early stages of the project. To minimize the application implementation and support costs, Kraft and Rockwell Automation maximized the use of common designs and standard interface layers during the design phase of the project. Kraft and Rockwell Automation tested the core designs extensively prior to rollout and maintained strict implementation guidelines and standards to ensure the success of the application. Prior to turning over ownership of the application to each plant, Kraft and Rockwell Automation



established the support strategy by drawing on the best practices from each organization, established the support infrastructure and support teams, and trained the plants on how to engage the support teams.

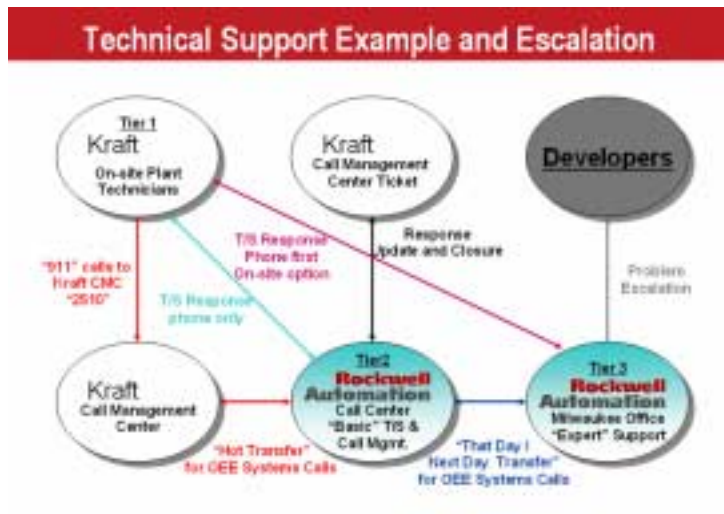
Kraft's plant line operators, plant line maintenance personnel and IT partners are their first line of defense in troubleshooting problems, and Kraft's call management center (CMC) acts as the plant call receiver and router. As Kraft's OEE support partner,

Rockwell Automation provides technical call handling, basic troubleshooting support, "OEE knowledgeable" level support, and ticket updating and closure in Kraft's call tracking system. All OEE support calls are covered by the Rockwell Automation support team, which has a complete support infrastructure and team in place.

The support program criteria requires that all calls are handled as 'Severity-2' base support, which means one hour response to a plant call, daily updates, and coverage during normal business hours 8:00 AM - 8:00 PM eastern time. An option is to provide this base support plus adding 24 hour, 365 day telephone coverage.

The support criteria also specify which partner provides what scope of support. For example, Rockwell Automation's scope of support includes troubleshooting OEE code and assisting in troubleshooting hardware with

the plant if needed. Rockwell Automation will also support the plant's line configuration efforts and networks, troubleshooting data communications linkage on the Ethernet and control networks. Kraft's scope of support includes troubleshooting hardware on machinery and supporting non-OEE code. Kraft will also maintain usable line configurations, update and create configurations, and troubleshoot and maintain the network infrastructure.



Rockwell Automation's support infrastructure includes the Rockwell Automation call center, with a hot-link call from Kraft's CMC. Rockwell Automation provides a Kraft-specific menu-tree, with the purpose of troubleshooting hardware problems and checking system configurations to see if they have changed. They have access to Kraft's OEE architecture, configuration data and resources on-hand, which include Kraft's plant system architecture and plant system configuration.

Rockwell Automation's support infrastructure also includes an application expert team, whose purpose is to troubleshoot system problems and check configurations, make software revisions, and adjust and improve configurations. They provide a test-bed for detailed troubleshooting and system level support by a team of application experts heavily involved in the application's design. This level of partnering between Kraft and Rockwell Automation also enables the remote implementation of application improvements and remote configuration management.

## The Monthly Meeting of Accountability

Demonstrating how committed senior management is to the continued success of OEE and the entire MegaMES initiative, Kraft holds a mandatory monthly meeting known as the Owners Forum. All senior management with MegaMES ownership responsibility, representatives from Rockwell Automation and Kraft's other MegaMES manufacturing vendors, as well as representatives from each Kraft North America manufacturing facility, are required to attend either in-person or by conference call.

Each meeting begins with a roll-call and evolves into up-to-date status presentations by each MegaMES team. Teams include Labor Information Systems (LIS), Weight Control, SPC & Rapid Testing (MQFS), OEE, Productivity Initiative Plus Systems (PI+), Document/Knowledge Management, Finance, Plant Maintenance (PM) and Materials Management (MM). Each group must present their current milestones and deliverables, key findings and their impact, activities next month, challenges, issues and concerns, solutions and a forward look ahead, and all metrics. In addition, presentations are made about various field issues relevant to the MegaMES team. Finally, all parties receive owner's feedback from the senior management team. Typical of Kraft's world-class teaming cul-

"The companies that are going to win have leaders that know how the work gets done, and understand the tools."

Fred Sherriff

Vice President, Operations  
Kraft Foods North America

ture, the Owners Forum provides an environment for the Project Teams at all levels to provide their input about project status and direction as well as raise critical issues to senior management stakeholders and receive immediate feedback from the Owners.

These meetings are especially important as a major project's strategies and tactics evolve based on time and experience. For example, the OEE strategy is shifting from the intense installation phase to critical application enhancements and assuring optimized OEE use at the plant sites. Tactics shift to a focus on issues such as removing user hurdles, mobilizing and focusing on resources, improving reporting capability and performance, reconciling reporting needs, and continuing the advancement for the benefit of the business.

Many organizations fail with major initiatives because they are not supported and implemented by all key senior management. Without this level of direction and involvement driving the initiative, there is no chance of a top-to-bottom adoption of the philosophy or the alignment required at all levels of the organization. This monthly meeting is another example of how outstanding organizational behavior, combined with the right partnerships such as Kraft's and Rockwell Automation's strategic supplier alliance agreement, are the most important factors that ensure the success of a major project or initiative, regardless of the technology.

## Value from Rockwell Automation

Rockwell Automation provides Kraft with vast experience in collaborative manufacturing consulting and solution implementations. The collaboration between Rockwell Automation and Kraft resulted in strategy development, KPI and business issues identification, solution design, support of collaborative manufacturing performance applications, and a distributed delivery model.

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Rockwell Automation also acted as an enabler for continuous improvement; with OEE improvements that provide substantial savings. There was joint design and implementation between the companies, including the implementation of timing constraints. The result was consistency across all North American plants and true partnering for support, including the cost for Kraft to maintain application experts for support,

a support team of technology and application experts, and an extension of Kraft's support infrastructure.

Much of what Rockwell Automation provides Kraft is through their Global Manufacturing Solutions Group (GMS). GMS reflects a clear commitment by Rockwell Automation management to sharpen its marketplace focus, respond to the changing needs of customers such as Kraft, and leverage higher growth segments of the Automation Industry – i.e. software and professional services. GMS is an important element in Rockwell Automation's strategy of delivering a complete automation solution to Kraft and their customers worldwide, and enhancing the intellectual content embedded in its products. Productivity-enhancing software solutions and professional services are a "must have" as Rockwell Automation transitions from a product supplier to a products and solutions provider.

"This process has given us the data to examine business utilization, planned downtime and unplanned downtime."  
Frank Meegan  
Senior VP, Operations  
Kraft Foods North America

The Global Manufacturing Solutions Group was formed in response to customer needs and is based on closely aligning services with customer business needs. It is comprised of: Professional Support Services; Training; Asset Management Solutions; Process Control Solutions; Software Applications and Solutions; and Consulting Services consisting of Engineering, MES, and Integration. GMS is committed to becoming a leading global implementation partner that can help manufacturing organizations such as Kraft become part of the enterprise's competitive advantage by taking out cost, increasing speed and agility, and enhancing operational connectivity and transparency. By providing the right information at the right time, GMS can make Kraft's manufacturing organization more effective in developing and delivering products, and thereby make the company more effective and competitive in the marketplace.

## Conclusions

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Recent studies indicate that the main reason for successful projects is strong project management and ownership at the senior management level. The most successful projects are those that invest the most time in the beginning, have active user involvement, and great team-work. Leadership is provided, but not micro-management. Communication is both regular and often, with frequently scheduled project review meetings and phone conferences. Continuous effort is made by the automation supplier to improve

"This is an evolution... You are not going to nail it the first time out. Expect to grow into it, and understand that you need to staff it, and provide leadership along the way"

Fred Sherriff  
Vice President, Operations  
Kraft Foods North America

communication, delivery, and the satisfaction of the manufacturer. An environment of partnership and teamwork is fostered, and a great team structure and atmosphere is created. Flexibility leads project teams to decide their own schedules to plan and complete the project. Encouragement and incentive are provided to team members to work hard. People are held accountable, and customer focus is always maintained.

Lessons learned from projects such as this include making sure that everyone is paying close attention to the details. Getting individual plant involvement and ownership is important, as plant readiness for the application is critical, especially where there are complications due to connections to multiple systems. The constant shuffling of resources can be a problem, as well as making sure that people are not getting burned out. It is critical that communication happens both up and down the chain of command. The focus should be primarily on project implementation, then on enhancements. Standard reports must be designed to meet specific plant needs, such as an operator-shift focus versus a department-plant focus. Training requirements cannot be underestimated, as all participants need a solid understanding of the application for training to be successful. There also needs to be a user champion whose mission is to make sure the user's needs are represented and met. This means placing a greater emphasis on future users, and need to get them comfortable with the tools earlier on in the process. It also means getting the user involved in the design and system use early on the front-end.

Results from this initiative also show that there is a significant value to having a standard measure of asset performance. Measuring productivity increases from an established baseline provides a means for understanding where improvements can be made, establishing measurable goals, and striving to achieve those goals. Collaboration at all levels and empowering the operators, as well as consistent communication of information detailing asset performance to senior management, enables better decision-making and keeps all eyes focused on productivity improvement and greater reliability in operations. This focus from all levels of an operation equates to dollars at the bottom line.

The most successful projects are those that invest the most time in the beginning, have active user involvement, and great teamwork.

In summary, this Rockwell Automation and Kraft MegaMES project can be considered a blueprint for success for both companies and their shareholders. This strategic supplier alliance is very successful because each

player has a clear understanding of Kraft's expectations as to how their investment will be paid off and in what time frame. The length of the project and major milestones are mutually agreed upon by each player in advance. Philosophies are in synch and each player has the ability to drive the relationship based on their individual business needs as well as their ability to validate their individual capabilities. Also, all parties acknowledge that this whole process is an evolution, and you are not going to nail everything down the first time out.

Kraft and Rockwell Automation are reflected as well-managed companies that can focus on how to best utilize their assets efficiently and effectively. This strong partnership allows both Kraft and Rockwell Automation to benefit from the best practices in the relationship, a "gold standard" that both companies can point to with other vendors.

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**Acronym Reference:** For a complete list of industry acronyms, refer to our web page at [www.arcweb.com/Community/terms/terms.htm](http://www.arcweb.com/Community/terms/terms.htm)

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