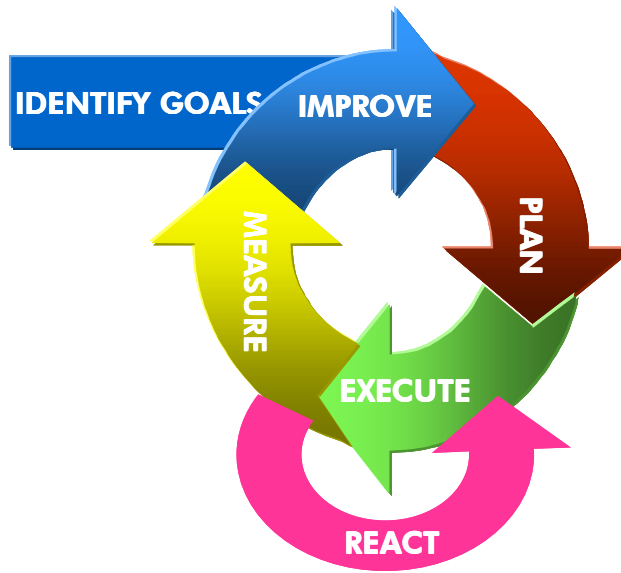
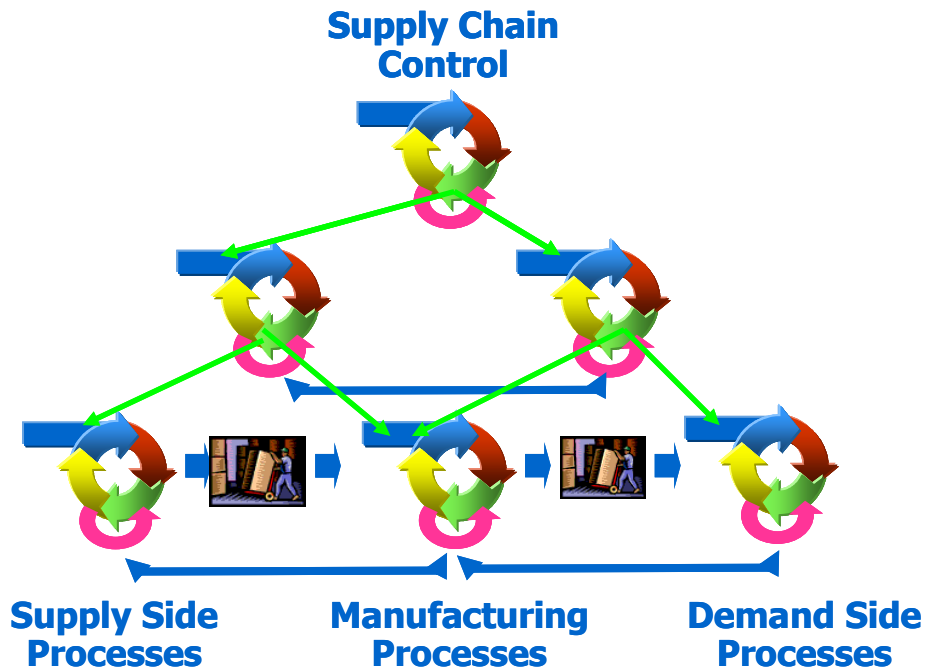


Operational Excellence in Supply Chain Management

ADEXA Enterprise GPS



The Basic Operational Excellence Process



Operational Excellence Process for Supply Chains

Introduction

Supply Chain Operational Excellence is a management strategy that helps manufacturers optimize their performance in those areas that really matter, achieve preferred supplier status, and survive in extremely competitive markets. Implementing such programs is challenging but possible when companies use appropriate software solutions.

This paper describes the basic tenets of Supply Chain Operational Excellence, establishes a model for selecting supporting software and demonstrates how ADEXA's Enterprise GPS meets these challenging issues.

Operational Excellence Becomes "The Strategy" for Manufacturers

Operational Excellence is fast becoming "The Strategy" for manufacturing companies. Today's customers are continuously demanding higher quality, better service and lower costs. And, globalization makes it easy to shift allegiance when suppliers do not satisfy their needs. Investors are likewise punishing companies that don't achieve consistent growth, increased earnings and higher return-on-assets. Just keeping up with the competition is no longer enough.

Surviving in the new competitive environment is clearly a challenge. And economic malaise across the globe makes it even more difficult. During the 90's, markets grew at strong rates and companies who maintained parity with competitors still achieved good profitability. But proactive strategies that increase market share are required for success in stagnant and declining markets. Operational Excellence is such a strategy and helps companies distinguish themselves, become preferred suppliers and expand market position.

Understanding Operational Excellence

Operational Excellence is “Consistently Doing the Right Things Well”. While this may sound simple, adopting an Operational Excellence strategy can have significant and far-reaching implications. Operational Excellence is a management philosophy that demands introspection, action and a focus on continuous improvement. Charting and staying this course requires strength but the rewards can be enormous.

**Operational Excellence =
Consistently Doing the Right
Things Well**

Implementing this strategy in Supply Chain Management requires new solutions that focus on key business issues, continuously measure performance and drive the organization towards continuous improvement

Defining what Operational Excellence means within a given organization is the first challenge. What are the right things to do? What do customers value from their suppliers? Cost? Quality? Service? All of the above? How will you know when you are doing them well? Companies that don't answer these questions waste precious time and resources achieving the wrong goals while losing market share to smarter competitors. Companies who answer these questions set their course properly and get the most from their efforts.

Companies practicing Operational Excellence not only recognize what they need to do, but do it ahead of the competitive pack. They always know where they are and have the ability to rapidly plan and execute the best course of action to win the race to customer satisfaction.

Companies practicing Operational Excellence are also reliable partners. They consistently demonstrate a commitment to delivering on promises. They rapidly communicate plans throughout the organization, keep all operations synchronized, monitor progress in real-time, and rapidly react to problems to ensure that their goals are always achieved.

Finally, these companies recognize that Operational Excellence is a journey not a destination. Customers will continue to change the very definition of what it takes to have Operational Excellence. Plans will not always produce expected results and will have to be adjusted. Competitor actions will negate the impact of even the best laid plans. A program of continuous overall evaluation and improvement is therefore basic to Operational Excellence.

Operational Excellence in Supply Chain Management

Implementing Operational Excellence can be challenging for any organiza-

KPI	Description
Delivery Performance	The percentage of orders that are fulfilled on or before customer request date or original scheduled date.
Fill Rate	% of shipments from stock orders shipped within 24 hours of order receipt
Lead time	The average actual lead times consistently achieved from customer authorization to receipt of order
Perfect Order Fulfillment	The % of Orders meeting delivery performance, with complete and accurate documentation, and not damaged.
Supply Chain Response Time	The time it takes the Integrated Supply Chain to Respond to Abnormal (significant) change in demand
Production Flexibility	Upside: number of days required to achieve an unplanned sustainable 20% increase in production. Downside: Percentage order reduction sustainable at 30 days prior to delivery with no inventory or cost penalties.
Total Logistics Cost	Sum of Supply Chain Related Cost for: MIS, Finance, Planning, Inventory, Material acquisition, Order Management.
Value added Productivity	Calculated as Total Product Revenue, less Total Material Purchases divided by Total Employment.
Warranty Costs	Materials, Labor and problem diagnosis for Product Defects
Inventory Days of Supply	Total gross value of inventory at standard cost before reserves for excess and obsolescence
Cash to Cash Cycle Time	Inventory Days of Supply + Days Sales Outstanding minus days of Payables
Asset Turns	Total Turns of Capital employed.

Goals for Supply Chain Operational Excellence

tion. As a new management philosophy, the impact can be significant and necessitate cultural, organizational and system changes. Extending this strategy across internal and external Supply Chains magnifies benefits but also introduces more obstacles to overcome.

Supply Chains are complex systems of interdependent organizations and processes. Engineering, sales, manufacturing, procurement and logistics all play a key role in the creation and delivery of goods to customers. Each of these processes has its own challenges, goals and optimal operating strategies that drive local actions. Reconciling these often conflicting actions and creating a single high performance whole is the key challenge for supply chain Operational Excellence.

Performance of individual processes can be measured by two characteristics. First, how good is average performance in terms of quality, cost, service, reliability, lead time, etc. Second, how responsive is the process with respect to changes in requirements and reacting to internal problems. Customers expect their preferred suppliers to provide good performance all the time and to accommodate their every whim, regardless of how late it may occur in the order cycle.

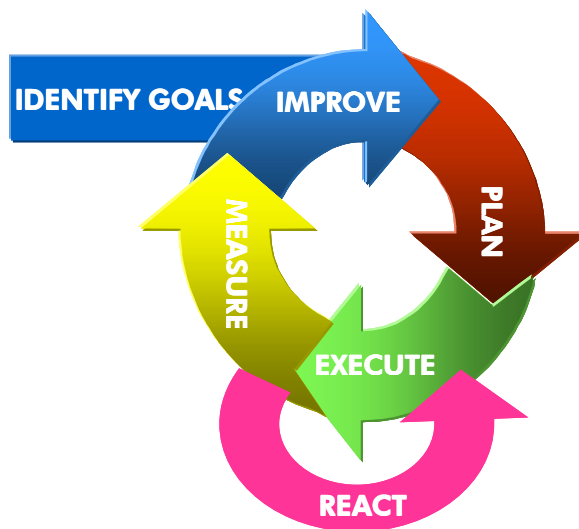
Supply chain performance can also be measured by average performance and responsiveness to change, but on an end-to-

end basis. Since the supply chain is a system, the “weakest” and “least responsive” processes determine the performance of the entire supply chain. Supply chain performance can also be measured by how well individual processes are synchronized. This is reflected in how well inventories are managed. Excessive inventories add costs, lower overall responsiveness and are a key differentiator between market leaders and “also rans”.

Operational Excellence in Supply Chain Management implies Operational Excellence within each of the individual processes and in the way the supply chain operates as a whole. Customers have many touchpoints with supply chains and expect high levels of quality, cost and service in all of their interactions. They likewise expect all supply chain processes to work together, with seamless information flow and smooth material handoffs. Excuses that another group is the cause of a late delivery lose credibility for the entire supply chain.

Implementing Operational Excellence in Individual Processes

Individual supply chain processes are generally complex and require some form of control. This includes planning systems that determine what to do and execution systems that ensure these plans are achieved. Measurement of results is a key element of the control system and provides the basis for evaluating performance.



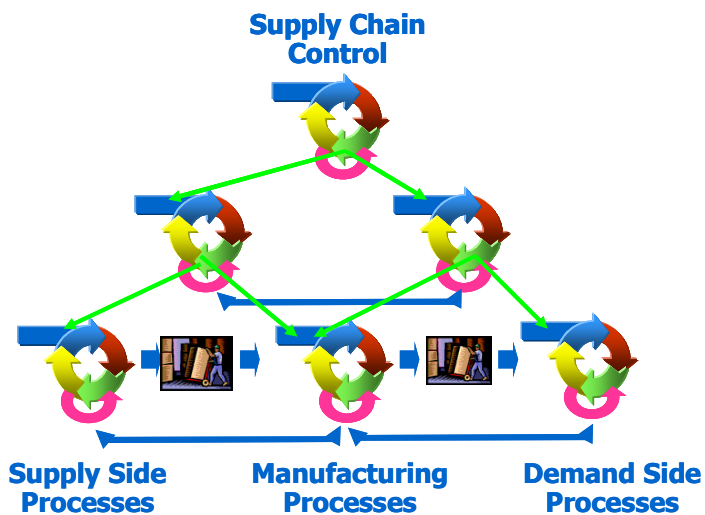
All companies have control systems for their processes. Whether ad-hoc or formal, there are always normal ways to organize and accomplish specific operational tasks. Operational Excellence programs focus on continuously improving these processes to ensure that performance is consistent, reliable and achieves certain goals. Not only are daily tasks planned and executed, but past performance is analyzed and used to adapt strategies to attain ever higher levels of performance. A complete Operational Excellence program will also focus on accelerating reaction to anomalous events and developing trends to forestall potential customer dissatisfaction.

While individual Operational Excellence programs are vital to establishing a reliable supply chain, these programs must be tempered by their impact on the supply chain’s overall objectives. Managers focusing solely on paro-

chial views of “The Right Things to Do” can confound improvement efforts of other operations, encourage a “silo mentality” and detract from supply chain performance.

Leveraging Operational Excellence across the Supply Chain

Operational Excellence for Supply Chains is focused on optimizing performance across all processes. Local measures of performance are made subservient to achieving the global “Right Things to Do”. Synchronization of activities among partners also becomes a key focus.



Like individual processes, Supply chains are also complex processes and demand their own, separate control systems to develop and execute optimal plans. Which plant should satisfy which order? What is the best production sequence considering manufacturing and distribution requirements? Should we increase inventories to enable longer production runs? These are all questions that require a global perspective of supply chain objectives. Depending upon supply chain complexity, this can result in a hierarchy of Operational Excellence processes with each new level addressing increasingly global issues across broader processes and process groups.

Successful execution of supply chain plans depends upon the ability of individual processes to manage their own performance and respond to changing signals. Processes must be under control and reliable before higher level control systems can be effectively implemented. Monitoring of performance at each process is a key means of evaluating readiness for higher level control.

Since global objectives are often different from parochial concerns, individual operations may be wasting time and resources improving processes that are already adequate. Continuous improvement of Supply Chain performance requires identification and improvement of bottleneck processes. The “weakest” and “least responsive” operations then gain the attention of all

supply chain partners and coordinated efforts are made to raise the offending performance.

The need for alignment and synchronization adds to the challenge of supply chain Operational Excellence. Collaboration provides the primary means to improve process alignment and synchronization by stiffening the system's inventory and lead time "shock absorbers". Collaboration can occur at multiple levels and in a myriad of ways. Direct connection between execution systems can provide rapid detection and response for anomalous occurrences. This helps to reinstate synchronization after problems have occurred and improves average supply chain performance. Sharing of plans provides similar benefits and helps to align processes before problems occur. Collaboration in the form of joint planning raises this to the strategic level and keeps the entire supply chain aligned and synchronized with the global objectives.

Mapping Operational Excellence Requirements to Solutions

High performance software solutions are vital to implementing Supply Chain Operational Excellence. Supply chains are simply too complex and too dynamic to be managed through spreadsheets, faxes, telephone calls and email systems. Companies that recognize this will establish high velocity, agile supply chain systems that please customers and achieve the coveted competitive advantage.

Solutions are required to manage individual operations and the entire supply chain. Solutions for individual operations must support reliable, responsive management of local processes and visibility for higher level systems. Supply chain systems must support identification of global requirements and interoperability with individual operations for execution, evaluation and improvement.

Solutions for Process Operational Excellence

Conventional supply chain management solutions can provide support for most individual Operational Excellence programs across the full spectrum of Plan, Execute, Measure, Improve and React.

Focus	Solutions	Selection Criteria
Plan	Production Planning/Scheduling Distribution Planning Transportation Planning	Reliable and Responsive Performance Adaptability
Execute & Measure	Manufacturing Execution Warehouse Management Transportation Execution	Seamless Integration with Planning Open, internet access to performance measures
Improve	Process Analytics Process Modeling Process Simulation	Integration with planning and execution systems Automatic adaptation
React	Process Event Management	Integration with planning and execution systems Real-time, rapid response

Process Operational Excellence Solution Map

ing tools that support improved reliability and responsiveness. These key capabilities can be leveraged into supply chain advantage that will often outweigh the benefits of incremental improvements in local operations.

Selecting planning solutions that are adaptable to existing processes can also be important to achieving Operational Excellence. Many solutions require that a company's basic business processes be modified to adapt to the solution. While this can be positive and "bootstrap a company into best practices" this approach can also increase implementation time and jeopardize loss of a company's unique competitive advantage when existing processes are already superior.

Manufacturing execution, warehouse management and transportation management solutions can provide the necessary tools to ensure good local execution of plans and support the real time measurements required for supply chain Operational Excellence. Seamless integration of these systems with planning is a top priority for individual Operational Excellence. Effective information flow is vital for better responsiveness and for having the visibility that is vital for continuous improvement. Open, internet-based access to real time data is also a key criteria in selecting these tools as this enables supply chain Operational Excellence measurement and react processes.

While there are many solutions that can be used to evaluate and improve performance of process planning and operation, they are often not used.

Production planning, distribution planning and transportation planning solutions can provide a good base for operational excellence in the associated processes. In many cases, these tools are based upon sophisticated algorithms that can drive the process towards maximum efficiency, maximum throughput, and minimum lead time. While this can be important in many cases, and should always be considered, the key concern for Operational Excellence is hav-

Simply getting the most out of existing systems is the “low hanging fruit” for Operational Excellence and Process Analytics, Process Modeling and

Focus	Solutions	Selection Criteria
Identify Goals	Best Practices	Global KPI Perspective
	Strategic Planning	Integrated with Measurement Systems
Plan	Supply Chain Planning	Reliable and Responsive Performance
	Sales & Operations Planning	Adaptability
	Profit Optimization	
Execute	Order Management	Interoperability with disparate systems
	Supply Management	Open, internet access to data
Measure	Business Analytics/OLAP	Focus on KPIs Real-time
Improve	Supply Chain Design & Simulation	Integration with planning and execution solutions
React	Supply Chain Event Management	Real time, Internet-based Filtered detection of changes, variances and trends
Collaboration	Design & Lifecycle Management	Cover all supply chain interfaces
	Demand Planning	Exploit the internet for communication
	Supply Planning	
	Inventory & Material Control (VMI, CPFR)	Support multiple levels of collaboration (Execution, Planning, Strategy)
	Collaborative Manufacturing	
	Logistics & Transportation Management	

Supply Chain Operational Excellence Solution Map

Process Simulation solutions exist for most processes. But using these tools can be cumbersome and having these tools integrated with existing planning and execution systems is vital to effectively using them. Processes and business rules change on a frequent basis and can rapidly degrade performance of unattended control systems. Solutions that support automatic adaptation should be considered in all Operational Excellence programs.

Real-time reactive planning, driven with process event management systems, is a relatively new concept that is only now being enabled through better integration of planning and execution systems. Despite this nascent state, these solutions should be considered a vital component of an Operational Excellence solution toolbox. The benefits of fast reaction to changes and process problems are large and affect performance both in terms of average performance and responsiveness.

Solutions for Supply Chain Operational Excellence

Supply chain complexity continues to increase and demands adaptable, comprehensive solutions that can deal with the challenging issues of scalability and connectivity. Globalization likewise demands that supply chain Operational Excellence solutions support internet communication and interoperability with a variety of support systems in the front and back office.

Identifying “The Right Things to Do” is one of the primary tenets of Supply Chain Operational Excellence. And, the “Right Things” will change as competitor’s actions and reactions shift the competitive landscape. Strategic planning tools that help enterprises understand where they are and where they must be relative to industry best practices are crucial. Unfortunately, there are few solutions today that actually address these issues. Ones that are seamlessly integrated with performance monitoring systems, which is key to continuous improvement, are even less common, despite their obvious benefits.

Fortunately good solutions do exist for operational planning at the supply chain level across many industries. Like the solutions for individual processes, many are based upon advanced optimization algorithms that can rapidly adjust strategies to synchronize supply and demand streams. However, the importance of optimality versus speed of response will depend upon the specific industry dynamics. Adaptability of these solutions to existing processes, that provide competitive advantage, should be a primary selection criteria.

Execution at the supply chain level naturally focuses on management of customer orders and purchase orders issued to suppliers. Perfect Order Fulfillment is a key measure of supply chain performance and is one of the ultimate goals for supply chain Operational Excellence. This metric can also be applied to both the outgoing and incoming process streams. While lower level control systems may execute the actual material movements, Order and Supply Management systems decide on who should fulfill requests, monitor compliance, react to problems and support real-time visibility across the complete supply chain. Given the global nature of many supply chains, interoperability with many disparate systems and secure internet-based communication are key features to consider in such solutions.

Business analytics with On-Line Analytical Processing (OLAP) is gaining considerable attention in supply chain management circles. This is a vital tool for Supply Chain Operational Excellence since it supports the functionality necessary to manage daily events and improve performance. The key concern in selecting a solution for a Supply Chain Operational Excellence program is that information is collected on Key performance Indicators (KPIs) that really matter to customers. Such information enables all partners to determine where they are and what they need to do to suc-

ceed. Ideally this information is collected and evaluated on a real time basis to enable early identification of developing trends.

Being complex systems, supply chains offer many opportunities for continuous improvement. Simulation can be used to evaluate different supply alternatives as well as supply chain robustness to significant changes such as supply disruptions, etc. Optimization based network design tools can be used to identify the best strategic supply channels, facility locations, and distribution networks. In both cases, a key concern for Supply Chain Operational Excellence is that these tools are integrated with the real time performance measuring system. Simulation and optimization results are only as good as the data they base decisions upon and this can change rapidly.

Supply chain event management is another solution that is becoming a basic element of supply chain management. It is especially important for Operational Excellence programs since it supports both adaptive and reactive strategies. Supply chain event records can provide a good measure of supply chain performance and should be integrated with Business Analytics/OLAP solutions to be most effective. This enables proper filtering of events to determine what is and is not significant which is basic to any improvement strategy.

Collaboration is another key tenet of effective Supply Chain Operational Excellence. Collaboration provides the means to align and synchronize continuous operations and supports improvement of overall supply chain performance. Collaboration should be considered as a tool for improvement across all process interfaces. For example, product design sets many of the parameters that will determine supply chain performance in manufacturing and delivering the final products. Collaborating across functions at the design stage ensures operational tradeoffs are properly considered and Operational Excellence is facilitated. Collaboration on forecasts of supply and demand will also synchronize operations that affect inventory levels. Collaborative solutions for supply chain Operational Excellence will recognize the need for collaboration across many interfaces, exploit the internet for seamless flow of information, and support collaboration at the execution, planning and strategic planning levels.

ADEXA Is “Doing the Right Things”

ADEXA has long been recognized as a leader in supply chain management for the challenging semiconductor and textile industries. Possibly less known is their recent success in industries such as CPG, electronics, and automotive, where companies are recognizing the value of ADEXA’s solutions and their collaborative approach to solving difficult supply chain problems.

ADEXA’s newest offering, Enterprise GPS, is a broad suite of supply chain management solutions that effectively address the needs of companies focusing on Supply Chain Operational Excellence. Enterprise GPS helps a company to identify “The Right Things to Do” and then tells them the best course to take to achieve those goals. They are then able to exploit the power of Enterprise GPS planning, execution and collaboration solutions to keep their supply chains aligned and synchronized while individual processes work to optimize their own local performance. With their native, web-based design and common data model, these solutions also effectively address the key issues of scalability, interoperability and global interconnectivity.



Corporate and Strategic Planning Sets the Right Course

Enterprise GPS provides a unique set of tools and services to support the topmost needs of a supply chain Operational Excellence program. While many suppliers provide basic network design solutions that optimize on supply chain network costs, Enterprise GPS provides a scenario-based, long term planning environment that recognizes the impact of strategic decisions on KPIs that drive real business success. Strategic plans are therefore made with a global perspective and incorporate metrics such as Perfect Order Fulfillment Rate, Overall Lead Time, Overall Costs, etc.

Using Enterprise GPS a company is able to identify those metrics which are really important to success in their industry and evaluate different scenarios according to all of these criteria. Comparing performance with industry averages and major competitors is a key part of the process and guides development of strategies that can remove performance gaps and capitalize on competitive strengths. At the same time the system’s capability to optimize according to measures such as asset utilization and capital expenditures ensures that investments are made where they count, not just

where short-sighted, parochial ROI calculations are most attractive.

Focus	Solution
Identify Goals	Corporate Planning
Plan	Sales, Operations and Inventory Planning Supply Chain Planning Factory Planning and Scheduling
Execute	Order Fulfillment Order Life Cycle Management Supplier Management
Measure/Improve/React	Event Management and Analytics
Collaboration	Collaborative Demand Planning Collaborative Supply Planning Product Lifecycle Management

ADEXA Enterprise GPS Solutions

Recognizing the complexity of supply chains, the Enterprise GPS solution can aggregate data from multiple enterprise systems and databases and perform calculations and correlations that present real information on supply chain performance. Users can also “drill-down” into information to examine root causes as they resolve performance issues.

Measuring Real Performance Factors

Measurement of performance is basic to the continuous improvement goals of Operational Excellence and ADEXA offers a comprehensive solution that is focused on measuring the real performance factors. Enterprise GPS supports the real-time collection and analysis of a complete catalog of industry accepted KPIs.

Supply Chain Planning and Execution Ensures Efficiency and Reliability

Operationally, Enterprise GPS supports planning in the three areas most important to supply chain Operational Excellence. Sales, Operations and Inventory Planning extends high-level, strategic corporate planning into the world of tactical, operational realities by establishing specific operational objectives and plans that are aligned and synchronized across all supply chain arenas. Supply Chain Planning maintains alignment across the sup-

ply chain as real orders are entered, changed, and completed. Finally, Factory Planning and Scheduling provides constraint-based planning for local operations that ensures predictable, efficient factory performance and high asset utilization.

Flawless execution is the other side of the coin in achieving the goals of Operational Excellence and Enterprise GPS provides support in this arena as well. The Order Fulfillment solution helps companies improve order execution in complex environments that span multiple groups, departments, plants, and companies. Order Lifecycle Management extends this capability by providing customers with up-to-the-minute status information on their orders. Supplier Management provides similar functionality for procurement in multi-tier supply chains.

Collaborative Solutions Synchronize Actions

Collaboration is basic to Operational Excellence and to Enterprise GPS. Both recognize the role of collaboration in maintaining supply chain alignment and synchronization. Enterprise GPS addresses this with solutions for Collaborative Demand Planning, Collaborative Supply Planning and Collaborative Product Lifecycle Management. In each case the goal is to foster enhanced visibility and cooperation among supply chain partners. But rather than just providing passive visibility, that enables partners to know when they are already out of synch, these tools support a true collaborative planning environment where partners can share views on current and future situations and jointly develop plans that can guarantee future success.

Event Management that Maintains the Course

With continuous, real-time analysis of performance against plan, ADEXA's Enterprise GPS Event Management maintains a company's focus on Operational Excellence. Variances are rapidly detected and alerts are initiated to ensure that significant deviations are addressed immediately. Deviations can include unexpected changes and variances in current performance, as well as trends that indicate a problem may be developing.

Conclusion

Manufacturers are facing increasingly challenging markets today. Survival demands that they consider new business models and operational strategies that will distinguish them from the crowd. They have to become preferred suppliers and establish strategic partnerships with their customers to preserve and expand their market positions.

Manufacturers that achieve preferred status recognize what is really important to their customers and focus on consistently doing these things better than their competitors. They reduce their costs while simultaneously improving their performance by eliminating activities that bring no value to their customers. And recognizing that preferred relationships can be fickle, they implement continuous improvement programs to keep them ahead of their competitors.

Operational Excellence supports these goals and should be considered by all manufacturers. But implementing Operational Excellence can be challenging for even the most advanced organizations. Solutions, like ADEXA's Enterprise GPS, will help organizations make this transition and achieve the coveted competitive advantage.

Analyst: Sid Snitkin

Acronym Reference: For a complete list of industry acronyms, refer to our web page at www.arcweb.com/arcweb/Community/terms/indterms.htm

AI	Artificial Intelligence	ERP	Enterprise Resource Planning
ANSI	American National Standards Institute	HMI	Human Machine Interface
API	Application Program Interface	IT	Information Technology
APS	Advanced Planning & Scheduling	LAN	Local Area Network
B2B	Business-to-Business	MIS	Management Information System
BPR	Business Process Reengineering	MRP	Materials Resource Planning
CAGR	Compound Annual Growth Rate	MSPC	Multivariate Statistical Process Control
CAN	Controller Area Network	OLE	Object Linking & Embedding
CMM	Collaborative Manufacturing Management	OPC	OLE for Process Control
CNC	Computer Numeric Control	PAS	Process Automation System
CPG	Consumer Packaged Goods	PLC	Programmable Logic Controller
CPM	Collaborative Production Management	ROA	Return on Assets
CRM	Customer Relationship Management	ROI	Return on Investment
EAI	Enterprise Application Integration	SCE	Supply Chain Execution
EAM	Enterprise Asset Management	TMS	Transportation Management System
		WAH	Web Application Hosting
		WMS	Warehouse Management System

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