Maximo Asset Management for Manufacturing Industries

Transcript

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Introduction

IBM provides Enterprise Asset and Service Management solutions for more than 1000 major Manufacturing organizations worldwide. Our Industrial Sector customers in Aerospace & Defense, Automotive, Electronics, Industrial Products and Life Sciences use Maximo to manage a wide range of assets, equipment and supporting business processes.

Executive Point of View

Manufacturers today are looking for ways to increase Top Line Revenue and decrease Bottom Line Costs at the same time. This mission is rife with risk – lack of visibility to information about how their asset portfolios are aligned to meet mission creates exposure. The recent changes in our economy have created an awareness of conservation like never before. It is no longer acceptable to insure against failure by overstocking backup supplies or extra equipment and people. Enterprises must be efficient to survive.

Manufacturers Globalize to take advantage of cost reductions and local market presence, but this too brings risk of its own. Maintaining consistency, quality, and compliance across maintenance and operations is critical to ensure product quality and supply in the market. At the same time, work forces are aging, regulatory requirements become more rigid and budgets become smaller.

Value creation through new revenue streams often focus on the capture of additional business from existing customers through Aftermarket Services. Risks associated with failure is high. Bad service delivery can cost future equipment sales so the incentive to get it right the first time is high. Customer satisfaction depends on meeting expectations on delivery and exceeding expectations on quality. And the Enterprise must make a profit at the same time.

Advances in technology – sensors and controls, wireless communications, distributed intelligence – have created new abilities to "sense and respond" - driving real time information into operational processes. As the multiple relationships between the physical and IT assets become more visible, and their *relationships* in the supply chain provided on the manufacturing floor or in the service bay create an opportunity like never before to optimizing the service and performance of these assets.

Significant productivity improvements have been gained by automating work and asset management processes to mitigate these risks. Now, companies are looking to catch the next wave of productivity improvements by adopting an integrated approach to achieve business results. By creating visibility of asset performance and workforce productivity, Manufacturing Enterprises can better control and govern their assets. Then, they can build agility into their operations through automation, resulting in best practices in asset management such as integrated safety, reliability and asset life cycle programs. This will help companies achieve their business objectives for optimization of capital expenditures and achieve cost reduction targets.

In this series of demonstrations, learn how IBM Maximo for Manufacturing can help you

- Continue to drive safety, reliability and productivity improvements into your organization's business processes
- Improve visibility of asset performance across your organization, and
- Align your Operations, Engineering, Maintenance ***and*** IT strategies to support best practices in asset management

Repair Depot Rebuild Asset

In today's economy, some manufacturing enterprises are taking advantage of their capabilities as original equipment manufacturers, or OEMs, through lines of business that are focused on rebuild services for the assets they build. Rebuild activities require a certain specialty of their own. OEMs must be able to capture the costs of the asset based on the investment to rebuild. They need to trace the movement of components to keep track and keep custody. And they need to manage multiple work streams to result in a completed rebuild and delivery.

In this scenario, we'll see how a landing gear assembly is inducted at a service site, inspected and disassembled. Each component has a different path it will follow before meeting up for final assembly and configuration at the end.

Scene 1: Notification and work plan
The shop manager at the Cincinnati Repair Depot #75 has received a notification regarding impending arrival of an assembly that has reached its 200,000-touchdown mark and is now due for overhaul. The work plan has been created automatically, based on the landing count meter reaching its execution threshold. Specifications for the full job routine are illustrated as a related set of work that can be viewed at once from the top level and then reviewed at each detail step, capturing finely grained information about each task in the project.

Scene 2: Inspection and modification
Drilling into the first task — the inspection — the technician modifies one of the tasks on the list. He adds a step to replace another part that he discovered needs repair. Because the part is not one normally kept in stock, the order is placed and the task is updated to reflect an outstanding part order. The work plan is updated to the delay some of the follow-on tasks until the part is received.

Scene 3: Disassembly
The next task calls for disassembly of the unit. As parts are disassembled, instructions appropriate for the disposition of the item are attached to the work activity and tracked through completion. Maximo captures costs associated with the repair of this item. Estimated and actual work costs are retained at each step in the project.

Scene 4: Replacement and substitution
The next task of the work order indicates replacement for the brake pads. A service bulletin was previously received and grouped with the overhaul tasks. The bulletin calls for a part substitution and identifies the new part, which has been delivered to the work site as part of the planning process. The new part is scanned as it is entered, capturing the new assembly structure. Maximo can also send these updates to PLM tools and ERP suites through native SOA capabilities.

Scene 5: New assembly and asset configuration
As each of the components progress through the rebuild process, a new assembly emerges. Full component updates have been completed and captured in a newly updated asset configuration. Any other business tools associated with asset configurations are updated as well — such as the ERP, PLM business systems, or documentation management systems such as Filenet. For more information on asset configuration updates, please see the part of this presentation dedicated to the PLM to Asset Management integration story.

Condition Monitoring and Work Management
IBM Maximo® uses integration frameworks that give customers the ability to loosely couple business solutions — solutions selected to support the desired maintenance and operations strategies necessary to achieve the mission. As assets become more instrumented, interconnected and intelligent, businesses need enterprise asset management solutions like IBM Maximo® to help manage this growing complexity and harness important operational data. Critical failure points on assets are often designed with sensing technology. IBM provides the capability to monitor sensing points, to link together specialized sensing tools and to correlate data against other data and against modeled performance so that intelligent response strategies can be deployed.

In this scenario, we highlight the event correlation of several performance variables gathered from several points on a jet engine through sensors mounted on the engine, both in flight and on the ground. Telematic technology sends the data to a collecting point where it is correlated against several other monitored readings, such as-designed performance models and historical data. IBM analytic tools turn terabytes of data into information by calling out exception conditions that are trending outside acceptable performance range. The need for response is determined and a work order is generated to begin the process of preparing for response.

Scene 1
The maintenance manager of the Aircraft Repair Center is using an IBM WebSphere® Portal to keep track of what is happening with the fleet of assets. This portlet is displaying charts generated by the Cognos reporting tool. Cognos is extracting information from a variety of different systems, including IBM Tivoli® Maximo. Broker technology such as WebSphere's MQTT product is monitoring data, correlating error code data and producing fault alerts when the business rules associated with the error codes reach

action limits. The Portal publishes the fault on the screen and simultaneously publishes a notification to the maintenance manager's cell phone, alerting him to the issue.

Scene 2
The maintenance manager reviews the Fault data and, based on criticality of the fault and type of asset and customer commitments, he determines that this repair should take precedence over some of the backlog items on the schedule. The maintenance manager initiates scheduling of the work and the proper technical team is alerted so they can begin planning for response.

Scene 3
Each of the technicians on the response team has received an alert and copy of the work order on the Toughbooks they carry. They are already reviewing the criteria sent with the alert, along with historical activity on the asset, current configuration of the asset, suggested mediation plans, parts that might be required, labor skills that might be needed and other information. The lead technician initiates an inspection activity so he can validate and adjust tasks in the plan and checks availability of parts needed for the repair. Resources are alerted that their support will be needed, along with an approximate time frame for the work.

Scene 4
Workflow has sent a notification to the Safety Manager with a link to the work order. The work order contains several documents that have been gathered from a number of sources. These include the IBM Filenet tool, training videos and documents from part vendors containing special handling requirements for EPA-regulated materials.

Scene 5
The aircraft arrives in its bay and teams begin their work. Inspection results and subsequent testing of reading points against asset specifications associated with the landing gear reveal that the problem is a faulty sensor. The inspectors update the work order with the results of the inspection, and the associated list of parts needed to replace the sensor is validated and then submitted for order. Again, Maximo workflow routes the notification to areas of the business that will support the next actions.

Scene 6
The parts manager has received notification of the demand for the items through his portal. Any parts covered under manufacturer warranty are automatically identified for reclamation. Remaining 0rders are organized according to the priority of the work — automatically based on the criteria the organization has developed for this type of asset. In this way, technology is helping to align all layers of the organization against the goals of the enterprise, based on relative importance of this asset and this work to meet mission objectives.

Scene 7
When its time to issue the parts, Store attendants recheck components for Quality Control. Part Kits are assembled in preparation for issue. One of these parts is serialized. The attendant reviews available substitutions and selects an approved substitute for the part. The kit is assembled on a cart and is delivered to the job site.

Scene 8
The shift Supervisor receives notification that the parts are due to arrive at the bay in two hours. He activates response team, consisting of a lead technician, an electrician and a mechanic, are assigned to the work. This work requires review by a certified calibration specialist to tune and validate settings once the part is installed. A technician currently certified to this level is chosen to help and is notified with information about the timing and location of his assignment.

Scene 9
When the job is started, labor resources are accruing time for the work and the asset automatically. As the work is performed, the faulty part is removed from the landing gear assembly. The new parts are scanned as they are installed, updating aircraft configurations and charging the part usage to the asset. Because one of the serialized parts is a substitution for the original part configuration, this change is documented and updated to the asset configuration contained in both the asset management and the PLM tool used to design the craft.

Scene10
The work is completed, service is restored, and investigations for root cause ensue. Reliability teams engage to investigate root cause of the failure. Impact of the failure is measured against the Operational Asset systems, other incidents related to similar failures, policies for management of change and regulations. As mitigation strategies are developed, corrective actions are identified to eliminate potential defects in other similar assets, and appropriate change procedures are initiated.

Scene 11
Quick restoration of service and elimination of similar failures demanded by leading manufacturers are two mission critical business processes well supported by IBM Asset Management Solutions.

Service Management
Focusing on post-sales service is an increasingly important market differentiator and revenue opportunity for manufacturing companies. According to AMR Research Group, post-sale service can represent 50 to 70 percent or more of profits for industrial manufacturing companies. Harvard Business Review estimates businesses and consumers spend more than one trillion dollars a year maintaining assets they already own. With revenue and margin contribution from new product sales declining, manufacturers are looking to capitalize on service opportunities.
Companies need to be innovative in their approach to services and shift from traditional approaches of standardizing common processes/ infrastructure to outsourced models of commoditized services and products. Companies who have successfully completed this transformation are now leveraging a service management strategy underpinned by key leading practices. These leading practices and resulting service efficiencies are key differentiators in a competitive landscape.

This is where Enterprise Asset Management, also known as EAM, can help Customer focused teams across operations, engineering, maintenance and IT take a strategic role in managing field assets and service performance. And that's where IBM Maximo® for service management comes in. IBM Maximo is a leading Service Management solution designed to provide enterprises who deliver value added services to customers in support of performance of their critical assets, creating opportunity to add value to service delivery and providing a platform to support a solution capable of supporting any sized business.

This scenario illustrates how IBM Maximo technology supports key capabilities that those who provide services need to be innovative and successful.

Scene 1: The service request
Jane Boudreau is working in the production department and has noticed that there is a condensate return pump that is leaking. She creates a Service Request. The request is routed automatically to the maintenance planner at Acme Pump Service, who sees the new notification on his dashboard.

Scene 2: Customer management
The technician checks the details of the work request and sees that customer contract information including company and department details, contacts, existing service level agreements with specific terms and conditions or performance requirements. A clear understanding and agreement at initiation phase is critical to managing customer expectations related to Contract Terms and Billing.

Scene 3: The response plan
Automated response to the service request is based on the business processes defined based on your goals for customer management. Maximo supports via its Workflow rules engine, which determines the appropriate response in a given situation based on any combination of characterics.

For example:
- Service commitments made to the customer
- The person or group responsible for this location or asset or vendors to whom work should be assigned
- A job plan or standard processing steps to be used for work on an asset
- The persons or group to be notified about an asset

The incoming work order or incident is enhanced to include customer and service address, a calculation of prices and additional miscellaneous fees and charges. The resulting work reflects agreed -to price quotes — for example fixed, or not to exceed a certain amount.

The planner analyzes the request and identifies the skills required and technicians that might be available to respond.

Scene 4: Service or maintenance work order execution
This work has been assigned to a maintenance engineer who receives the notification on his handheld PDA. He receives information about necessary spart parts needed to make the repair and their location, the procedures and safety information related to the type of work and location he'll be working in, and the quality procedures the enterprise has determined are necessary to ensure quality delivery.

Completion
After the work has been finalized, the work order can be closed and the customer will be notified that the service request has been closed using standardized templates for communication.

Billing Process
The customer will be billed based on agreed terms and conditions, such as purchasing agreements, delivery fees, permits, outside fees and so on.

Billing is a circular and repetitive process. The process goes like this:

1. Create a bill batch – all completed work orders and tickets (as of a cut off date) associated with an agreement are collected into a batch
2. Service provider first reviews the work waiting for invoice. They adjust or correct if necessary. Some work may place the bill on hold. Work approved for invoicing is released to the customer.
3. The customer reviews their invoice and may approve all the transactions for payment. Sometimes further clarification is necessary so the customer can choose to question one of the invoices in the batch.
4. The Service provider reviews the customer comments and may adjust or explain the disputed items. If not resolved, these will carry forward to the next time this agreement is billed.

All approved and resolved transactions are forwarded to the service provider's accounting system, streamlining the payment process and reducing opportunity for failure.

Enterprises that use IBM Maximo to support aftermarket service benefit from detailed and accurate billing, supported with customer review and approval cycles designed to reduce DSO and receive timely payment of services. These industry leaders have also found Maximo further helps them reduce costs by using a single instance to manage multiple customers with many physical locations. Excellence in one organization is quickly deployed across the enterprise, enabling the growth opportunity expected for Aftermarket Services Revenue streams.

PLM Asset Management Integration
In today's manufacturing environment, high costs of development and investment in marketing new products are a key concern for new products. They must perform according to promise when released; weakness in this area is opportunity for competitors.

For those who are also engaged in aftermarket services contracts based on performance, the level of effort to deliver service is an issue. Organizations that design efficiency into finished product during manufacturing experience higher levels of profit during services engagements.

This is where IBM Maximo® can help. Maximo provides detailed failure analysis for each component on an asset in a form that is easily communicated to PLM systems.

In this scenario, we will explore how close relationships between product design functions and field service can help improve overall product performance and competitive position in the field.
Scene 1
A thermo-sensor has detected a temperature elevation. This raises an alarm on the control room application. The alarm triggers a maintenance activity through the integrated information framework. The maintenance manager logs on in to Maximo to analyze the work order, accessing business systems that manage PLM data, collecting documentation necessary to support the job.

The resulting work order now contains references to specifications, test criteria, and drawings that have been developed for the product in final design.

Scene 2

One of the maintenance technicians receives a message about the pending work. He can reference all available information about the incident, including history, other incidents, as well as original design specification and other information added by the manager from the PLM system. The technician can now complete his work and can feed back information regarding the incident. Some of the information he might share could be related to the type of failure, surrounding conditions, calibration results and suggestions for improvement. Information related to the type of failure, cause of the failure and resulting remedies that were executed are key indicators of asset performance in the field. Visibility to this information is a key enabler for product design teams.

Scene 3

The maintenance manager notices that key performance indicators, or KPIs, associated with the asset reflects an excessive failure rate for this component. The maintenance manager creates a Recommendation for Improvement which is communicated to the PLM System to be managed through Engineering review process.

In this way, information from the field is automatically integrated into continuous improvement processes.

Scene 4

The engineer responsible for design receives the information generated by the Field Maintenance team, advising of the incident in the field and remedial action taken.

He consults the asset's maintenance history retrieved from Maximo. Different views of the asset (functional, geographic, engineering bill of materials and so on) allow the engineer to understand the case and to decide to change the faulty supplier part. The engineer selects a new supplier part presenting the same "FFF" (Fit-Form-Functions) but more tolerant to environmental constraints.

Scene 5

The engineer updates the design documents, triggering notification to the Surgical Strike teams to change out the affected parts across the fleet.

Scene 6

High visibility to failure frequencies allow a manufacturer to control how the asset performs in the field. Information such as this helps organizations to fine-tune the cost-to-benefit decisions that are inevitable parts of competitive positioning and future product roadmap. Even more fine-grained information about asset performance, degradation and overall health is available when direct connection to Asset Health is monitored against performance models. For more information on this topic, please see the track entitled Condition Monitoring and Work Management.