Optimizing asset and service performance
To meet overall business goals and objectives

Tivoli® software

IBM

Maximo Asset Management for the aerospace and defense industry.

Maximo Asset Management enables aerospace and defense organizations to:

- Optimize asset performance as they help improve availability and lower the cost of construction, maintenance, services and disposal.
- Manage and document efforts to comply with government and industry regulations for aerospace and defense.
- Consolidate multiple asset management systems for improved oversight of aerospace and defense-related assets and services.
- Leverage built-in industry best practices.
- Improve management of service level agreements and performance based contracts.

Managing complex, high technology assets and services in the aerospace and defense industry has become increasingly complex due to advances in technology, changes in business processes, increased security, heightened competition and rising costs. Maximizing the availability and performance of assets and asset-based services is more critical to success than ever before.

Today, engineering, maintenance and services management must make immediate and strategic decisions, requiring effective data analysis capabilities and reporting. They also need to get asset management information into the hands of maintenance technicians and overall service providers rapidly.

IBM Maximo® asset and service management solutions offer companies in aerospace and defense organizations:

- Advanced information and product capabilities to better support people, maintenance and services processes, and technology.
- Insight into critical aspects of each asset's lifecycle while providing key capabilities to help support all phases of the asset lifecycle, with a focus on asset acquisition, operation, maintenance, services management and disposal.
- Capabilities such as configuration management, campaigns, contract management, lifecycle accounting, labor certification, service level agreements (SLAs), automated alerts, and warranty management.
- Tools to manage and monitor efforts to address the stringent requirements of regulatory bodies, while also adhering to governmental or industry-standard coding structures common to the aviation, aerospace and defense industry.
- Best practices that are built into the solution to help extend asset life, optimize spare parts management, increase planned maintenance, and gain insight into service delivery after the sale of the product. The Maximo Asset Management solution portfolio is designed to help you respond to your business needs where you are—in the air or on the ground, for you or your customer.

Supporting requirements to manage assets and asset-based services

Maximo software solutions and best practices have been used for more than 20 years by many organizations to track, manage and maintain their business-critical assets.

With IBM solutions for asset and services management, senior management in a complex and regulated industry such as aerospace and defense can manage asset performance and asset-based services from a holistic perspective—an approach that can help reduce costs, facilitate and automate common processes, and improve response to tough challenges. Maximo Asset Management can help organizations to:

- Gain greater visibility and better control of assets.
- Achieve higher levels of asset performance through increased availability and reliability.
- Improve accountability and utilization.
- Manage and document regulatory compliance efforts.
- Standardize business processes.
- Increase business system consolidation.
- Address complex supply chain demands.
- Standardize and share data.
- Drive performance levels of service providers (both internal and external).

Using Maximo Asset Management, aerospace and defense organizations are better able to track and manage the assets and performance levels that are critical to the overall performance of the organization. These assets may include:

- Production assets such as production tools and equipment, robots, etc.
- Moving assets such as cars, trucks, vessels, weapon systems and aircraft.
- Fixed assets, including buildings, maintenance facilities and stations.
- IT assets, ranging from mobile devices to networked devices to servers.

Support of IT assets becomes increasingly important as there are more and more “intelligent assets” or assets requiring software assets that must be tracked in conjunction with physical hardware assets (e.g., control systems, versions, etc.).

In the aerospace and defense industry, the management of the product or component lifecycle presents a unique challenge to aircraft or defense-system operators, owners and maintenance organizations. These configurations are the most complex and dynamic and must be managed throughout the entire lifecycle. This is essential in order to better manage and document efforts to meet safety requirements, to minimize maintenance costs, to optimize asset life and to help address government regulations or requirements such as Government Furnished Equipment (GFE) or Unique Identification (UID—the Department of Defense program to capture business intelligence through technology). In order to address these complex requirements, companies have invested heavily in multiple software systems to provide the necessary information.

Product and Service Lifecycle Management
Particularly in aerospace and defense industries, Lifecycle Management is broken up into two main segments: Product Lifecycle Management (PLM) and Service Lifecycle Management (SLM).

Product Lifecycle Management (PLM)
PLM business processes focus on digitizing the entire development or engineering process, from creation or design to the final manufacturing phase or product assembly.

Service Lifecycle Management (SLM)
The SLM segment focuses on after-market ("service-after-sales") business processes, managing all the asset-based services on behalf of the manufacturer (or Original Equipment Manufacturer) after the end product has been sold to the client. In these processes, the asset's status, utilization and history will be tracked, monitored and managed so visibility is provided to all parties with a vested interest in the asset.

The enhanced capabilities and functionalities of Maximo Asset Management support aerospace and defense organizations in managing and supporting requirements for full enterprise asset management in a manufacturing environment, as well as providing the ability to leverage configuration data from most common and industry-standard PLM systems.

Organizations can also use Maximo Asset Management to support requirements for managing asset-based services in a service-centric business model and to improve situational awareness to take advantage of the SLM approach. This business model encourages partnerships between the maintenance organization and its internal customers. It broadly supports third-party service providers by tracking relevant activities and monitoring asset and service performance against agreed service levels.

Maximo Asset Management allows executive and operational management to view asset-related information and manage asset performance from a single repository. When operational and maintenance managers control critical assets more closely, the solution can help:

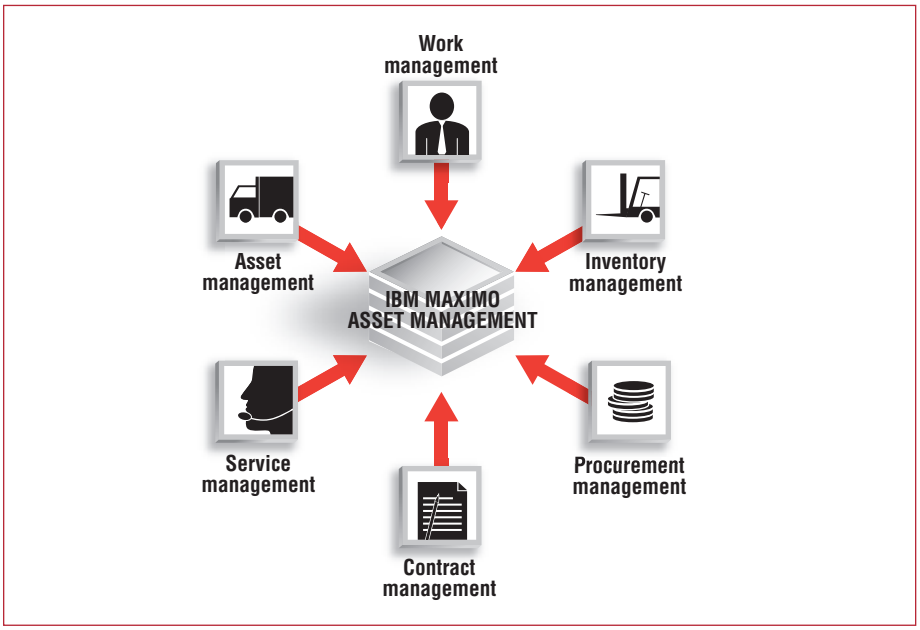
- Increase uptime of critical revenue-generating assets.
- Reduce costs of acquiring, maintaining, servicing and even disposing of assets.
- Optimize shareholder value.

Drive competitive advantage for the aerospace and defense industry
The Maximo Asset Management solution for aerospace and defense offers rich functionality to help optimize core and strategic assets and services. The solution consists of the following Maximo software components and capabilities.

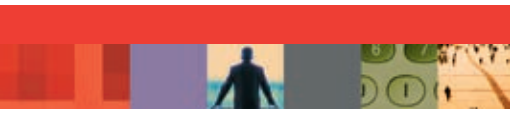
Maximo Asset Management
Maximo Asset Management is comprised of six key management disciplines: work management, asset management, inventory management, procurement management, contract management and service management. Maximo Asset Management integrates with most business information systems, helping users work in ways they are comfortable and productive with.

- **Work Management.** Plan, review, and approve work orders for assets and locations, and report the number of hours of work performed by external contractors or internal employees. Workflow capabilities allow you to define and manage all maintenance business processes such as work requests or preventative maintenance tasks, log all activities, and analyze maintenance procedures to determine where efficiencies can be gained. Roles can be defined within the application, and actions can be defined to manage the administrative functions such as creating actions and action groups within workflow, escalation, and SLA processes.
- **Asset Management.** Manage all types of assets with corresponding information such as parent, location, vendor, status, maintenance cost and policy for each asset.
- **Inventory Management.** Manage all information linked to items that will be stocked in storerooms. These inventory items can include items used to define and manage purchased services as well as tools used to perform work. Tools are typically non-consumable items for which you charge an hourly rate for their use. Information about the storeroom location can be added, and users can view the items stocked within a storeroom.
- **Procurement Management.** Manage all purchasing requisitions, orders and receiving. Users can also view full information on manufacturers, vendors and other companies that do business with you.
- **Contract Management.** Manage all information linked to the different types of contracts, modify and view contracts with outside vendors, define rental agreements, define multiple labor rates for specific crafts and skills, track warranties and define payment schedules, and maintain a library of terms and conditions that can be added to a purchasing document or contract.
- **Service Management.** Submit service requests, as well as track and update open service requests, manage service-level agreements and contracts.

IBM Maximo Asset Management



IBM Maximo Asset Management provides a single, unified platform that supports a wide range of asset and service management functions.



IBM Maximo Asset Configuration Manager

Maximo Asset Configuration Management provides additional capabilities by offering active management of the configuration of complex assets, or components with complex assets hierarchies. It provides effective, automated asset lifecycle management in a complex operational environment. This solution helps manage the configuration of aircraft assets, complex weapon systems and their components. Key capabilities include:

- **Configuration management.** This build configuration management system manages the as-designed configurations of complex assets, such as aircraft, locomotives and vessels, as well as associated roles, variants, missions and maintenance plans.
- **Component life accounting.** A successful lifecycle support strategy relies directly on an efficient underlying maintenance plan. In turn, the maintenance plan relies on the accurate accounting of component life.
- **Operational status management.** By comparing an asset's actual build to its intended configuration (or configurations) and by evaluating the current status of the asset's maintenance plan, an overall operational status can be calculated.

Other key features include historical transactional changes, historical asset build and component life views, high-tolerance data conversion, distributed data management and advanced maintenance forecasting. Maximo Asset Configuration Manager also offers capabilities to manage weapon systems for support and sustainability, providing insight to help manage the status and configurations of weapon systems to be deployed.

IBM Maximo Calibration

Maximo Calibration is a comprehensive, customizable solution that can be used fully integrated with Maximo Asset Management to automate calibration processes across the enterprise. Maximo Calibration can help improve operational efficiency while reducing downtime and operating costs by allowing organizations to:

- Leverage full traceability and reverse traceability to help manage regulatory compliance efforts.
- Enable technicians to perform mobile calibration using handheld computers to streamline work tasks.
- Enhance accuracy and reporting of instrument calibration to help document regulatory compliance efforts.

IBM Maximo Mobile

The Maximo Mobile software portfolio includes Maximo Mobile Work Manager, Maximo Mobile Inventory Manager and Maximo Mobile Work Manager with Calibration. These solutions can help mobile workers complete more planned work and increase efficiencies while enhancing data-input quality and reducing labor. With Maximo Mobile solutions, mobile workers can:

- Perform inspection routes/rounds (inventory), meter readings, observations and inspections.
- Electronically capture signatures for work orders and other completed tasks.
- Utilize bar code and RFID capabilities for asset tracking and management.
- Store and forward data when continuous connections are not feasible.

IBM Tivoli Service Management

IBM Tivoli® Asset Management for IT and IBM Tivoli Service Desk can provide you with a holistic view of your IT infrastructure. Tivoli Asset Management for IT can help you more cost-effectively manage the complete lifecycle of both your IT hardware and software assets, while Tivoli Service Desk can help you control costs, increase service availability and streamline processes for your service desk.

In combination with the extended enterprise asset management capabilities in the Maximo software portfolio, these solutions can help service providers to:

- Align potentially conflicting goals within IT to reduce IT labor costs, improve service levels and maximize IT investments.
- Effectively monitor SLAs and key performance indicators (KPIs).
- Standardize procedures as well as planning and scheduling implementations.
- Monitor, manage and document corporate and regulatory compliance efforts using comprehensive contract management, automated reconciliation processes of authorized and deployed assets, and real-time performance monitoring.

Supporting manufacturing and logistical concepts

Reliability Centered Maintenance

Maintenance today, especially in aerospace and defense, is based on the concept of Reliability Centered Maintenance (RCM). Derived from commercial airline maintenance practices (“MSG-3”), RCM is an analytical process intended to determine optimum maintenance strategies for critical and strategic assets. It is seen as an Advanced Maintenance Strategy to increase asset availability by minimizing downtime caused by failure(s), reducing an asset’s total cost of ownership and increasing the Overall Equipment Effectiveness (OEE).

RCM uses the concept of Failure Modes, Effects and Criticality Analysis (FMECA) to determine what can go wrong with critical assets. It seeks to identify only the maintenance required to defend against important failures with significant consequences, and thus claims to avoid expensive, non-productive maintenance tasks that create high costs and consume resources without raising equipment reliability and performance or safety.

The interaction of maintenance with the supply chain depends on the maintenance type (e.g., hard time replacement, on condition, failure finding, condition monitoring, in-service failure, redesign, etc.). A healthy and efficient logistics supply chain requires connectivity to real-time, organization or department-wide maintenance data. More recent RCM-based maintenance programs can make the logistician’s job even harder, due to a lesser proportion of hard time replacement tasks.

The challenge of maintenance in aerospace and defense is compounded by the need for serialized tracking and configuration management (i.e., tracking of the "as flown," "as used" or "as maintained" configuration). Maximo Asset Management supports all phases of the RCM approach and helps leverage the benefits of RCM in your organization.

Performance Based Logistics (PBL)

More and more, companies think in terms of buying a service instead of a product. For example, people don't buy a car—they buy flexibility or mobility; likewise, a printer facilitates or provides an efficient stream of documents. People want to pay for performance to secure the things they need or expect and to use the products and services that help meet their overall performance requirements.

In aerospace and defense, you see that more and more Department of Defense organizations are contracting with private industrial companies to provide varying levels of in-service support for aviation components, engines or aircrafts. These contracts resemble "power by the hour" arrangements that have long been used for aircraft engines in both commercial and defense aerospace or aviation organizations. This performance-based acquisition strategy is increasingly used for weapon system sustainment, and its goal is to:

- Enable organizations to buy performance, rather than the traditional approach of buying individual parts or services (e.g. maintenance / repair).
- Provide an integrated solution that supports performance-based metrics such as availability, reliability, affordability, logistics footprint and response time.
- Provide critical elements including workload allocation, supply chain management, performance-based agreements and business-case analysis.

PBL is not a "one-size-fits-all" approach. The application of a PBL strategy to a specific program or commodity must be highly tailored to the operational and support needs of the organization.

One major consequence of PBL is the shifting of responsibility for much of the supply chain from the operator to a private organization (often the manufacturer). Along with the shift in responsibility, there is the need for improved field data collection and supply chain collaboration in order to help meet the performance required at all levels and the requirements of service level agreements. This requires access to more accurate and timely data on asset and fleet utilization and reliability. PBL projects are therefore causing support organizations (e.g. OEMs) to invest in software tools for asset maintenance data management (or asset-service data management).

Maximo Asset Management provides full capabilities for providing visibility of key information to support this concept: from information on utilization and performance of assets to information about asset-maintenance service level agreements based on contracts with the parties involved. While just about any asset type can be supported in Maximo software, the application fits very well in the supply chain information that is needed to utilize the benefit of this concept.

Condition Based Maintenance (CBM)

Condition Based Maintenance is used more and more in the industry to assess the condition of an asset while in operation and with the intention of making conclusions—whether there is a need for maintenance and at what time the maintenance action needs to be executed in order to prevent a breakdown or malfunction. With Maximo Asset Management, the relevant maintenance information can be tracked and monitored, with condition monitoring to define unlimited measurement points for the assets and to specify alarm limits as well as the associated work to be performed after reaching those limits.

Property Management

There is more pressure and need today to effectively track and manage government-owned assets and to have the ability to associate an asset to a government agency owner and contract. Personal property visibility is critical, along with a need to provide personal property details and historical information and to support UID requirements. Information needs to be allocated and linked with codes such as for CAGE (Commercial and Government Entity), DoDAAC (Department of Defense Activity Address Code) and MAPAC (Military Assistance Program Address Code), and specific property details need to be available for the organization, for both contractors and sub-contractors. Maximo Asset Management provides capabilities to track and manage the data associated with personal property and government-owned assets in order to better manage increasing requirements.

Radio Frequency Identification (RFID)

Radio Frequency Identification (RFID) technology has been evolving for over a decade. Projects in the industry and in the Department of Defense were designed to force suppliers to adopt RFID and have brought this technology to the forefront of supply chain and asset management discussions. More projects are underway to implement real-time tracking of a variety of products, promising huge benefits in supply chain logistics.

Combining Maximo Asset Management with RFID technology can enable benefits in the areas of asset identification, inventory management and work planning. And from a business process perspective, there are four primary business processes involved: monitoring and managing tools, managing spare parts, managing mobile assets, and managing the structured requirements of fit, form and function. Maximo Asset Management supports different ways to integrate information and enables the capturing and leveraging of RFID information, which can help make asset and service management business processes more efficient and effective.

Convergence of assets

Intelligent technology is increasingly being integrated into all different types of assets. Today IT assets are used in production in combination with software-based systems. All these assets need to be tracked and managed by the asset owner or asset service providers. Maximo Asset Management fully supports the critical and strategic assets in your organization, including technology-based assets.

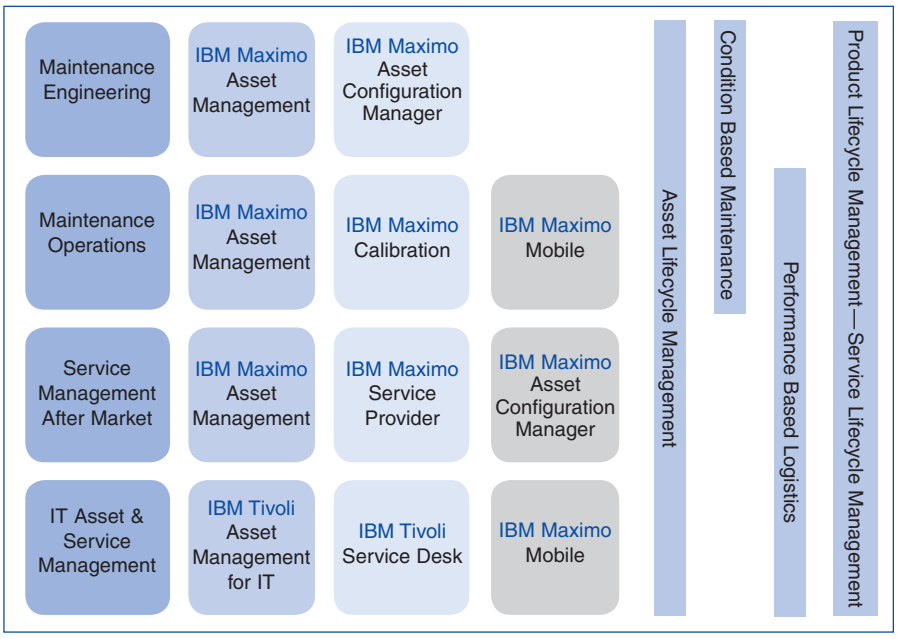
Rely on a solution that can adapt to your organization

No matter the size of your organization or the number of your sites, the Maximo Asset Management software portfolio can help you manage your unique business processes relating to asset and service management with greater agility.

Built entirely on a Java™ 2 Enterprise Edition (J2EE™) component–based Internet architecture, the Maximo solution integrates more easily into most existing business systems.

The solution is based on a service-oriented architecture (SOA) which enables loosely coupled business services that are provided in an interoperable and technology agnostic manner. SOA is an integration architecture approach that is based on the concept of services. The business and infrastructure functions that are required to build distributed systems are provided as services that deliver application functions individually or collectively to either user applications or to other services to better enable integration with enterprise resource planning (ERP), customer relationship management (CRM), performance monitoring, supply chain management (SCM) and many more applications. This exceptional level of flexibility helps you configure Maximo Asset Management around your key business requirements in the area of aerospace and defense.

Maximo Asset Management for Aerospace and Defense



This diagram provides an overview of the IBM Maximo Asset Management software components that support aerospace and defense requirements and concepts.

Additionally, the flexibility of the underlying technologies within the Maximo Asset Management solution make it easier to tailor without programming, helping you work the way you want to work, with fewer limitations and constraints imposed by the solution's capabilities. Its SOA technology also helps streamline the upgrade process to help you avoid being locked in from one application release to another.

Leverage IBM's commitment to the aerospace and defense industry

IBM is committed to supporting the aerospace and defense industry in its realization of operational excellence and service performance. The company actively works to understand the complex and evolving issues facing the industry through a variety of programs designed to shape the direction and functionality of the Maximo solution portfolio for aerospace and defense. Customer support and feedback, development-partner programs and close cooperation and interaction with external and internal industry experts are key ingredients to deliver a combination of applications that can help our customers and the industry in general meet their requirements.

A growing list of the most important organizations in the aviation, aerospace and defense industries globally rely on Maximo Asset Management solutions to help optimize their asset management and asset-based services organizations, decrease the amount of time it takes to schedule and assign work, monitor and manage their efforts to meet safety and quality requirements, and reduce administrative time.

For more information

To learn more about how the IBM Maximo Asset Management solution portfolio for aerospace and defense can help drive performance and availability, contact your IBM representative or IBM Business Partner, or visit **ibm.com**/tivoli or maximo.com

About Tivoli software from IBM

Tivoli software provides a set of offerings and capabilities in support of IBM Service Management, a scalable, modular approach used to deliver more efficient and effective services to your business. Helping meet the needs of any size business, Tivoli software enables you to deliver service excellence in support of your business objectives through integration and automation of processes, workflows and tasks. The security-rich, open standards-based Tivoli service management platform is complemented by proactive operational management solutions that provide end-to-end visibility and control. It is also backed by world-class IBM Services, IBM Support and an active ecosystem of IBM Business Partners. Tivoli customers and business partners can also leverage each other's best practices by participating in independently run IBM Tivoli User Groups around the world—visit www.tivoli-ug.org

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