

SAP Solution in Detail
SAP Product Lifecycle Management

Product Lifecycle Management: Bringing Sustainable Products to Market Faster



The Best-Run Businesses Run SAP™

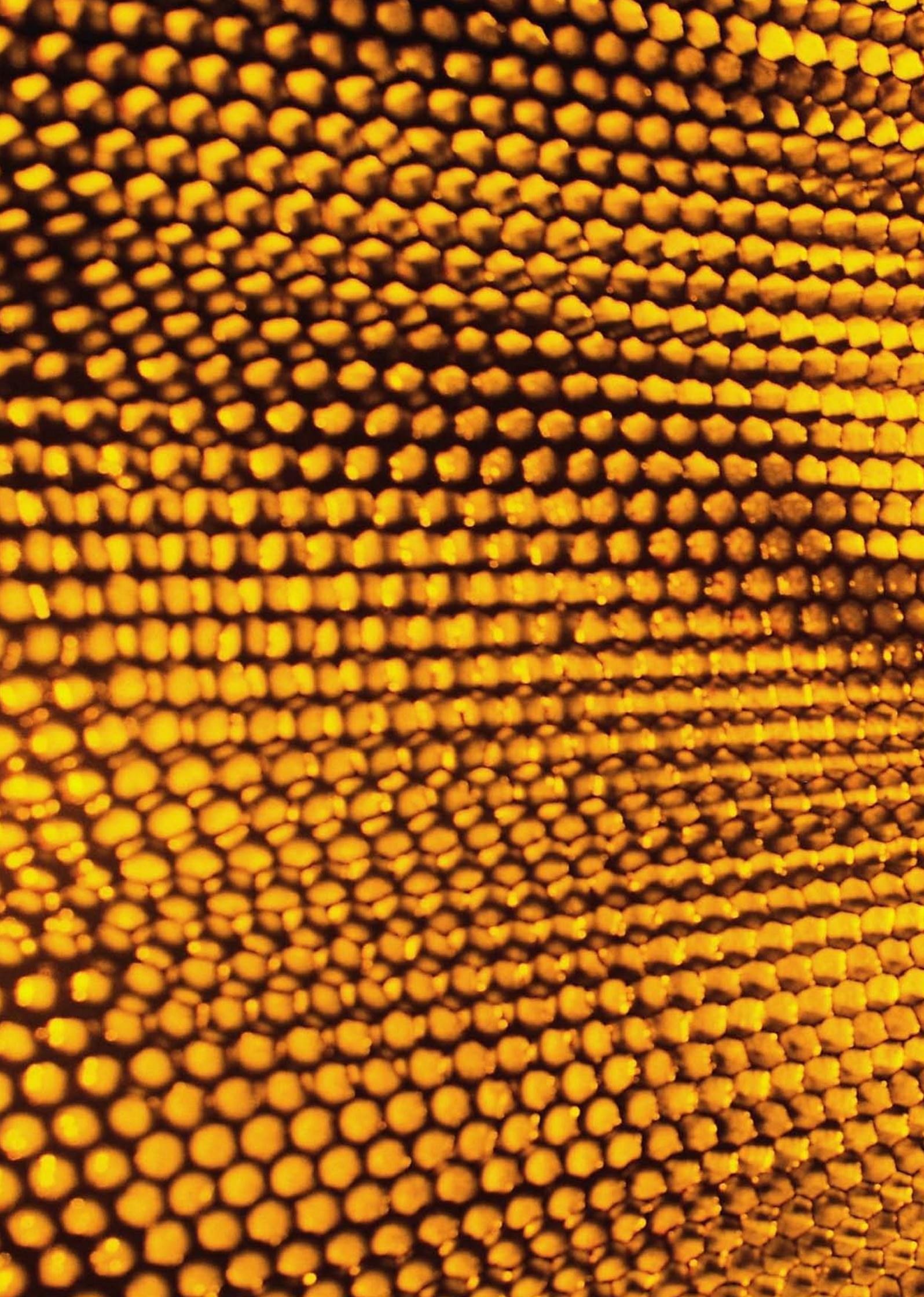


Table of Contents

4	Quick Facts	17	Implementation of Total Quality Management
5	Turning Challenge into Opportunity		Total Quality Management
	Why Product Lifecycle Management?		Compliance Issues in TQM
6	Cross-Functional Support for Product Managers	19	Meeting Today's Toughest Business Challenges
	Portfolio and Project Management		Benefits of Using SAP Applications
	Benefits of Good Portfolio and Project Management		For More Information
	Project Information Synchronized with Outside Sources		
	Innovation Management		
10	Optimization of Research and Development Efforts		
	Product Data Management		
	Formula Development and Specification Management		
	The Visual Enterprise for Engineers and Technicians		
	Visual Enterprise Strategy from SAP		
	Aligning Automated Engineering BOMs and Manufacturing BOMs		
	Product Intelligence with Business Context		
	Product Development and Collaboration		
	Product Change Management		
	Regulatory Compliance		
	Critical Functions in Managing Documents		

Quick Facts

Summary

Today's demanding economy rewards nothing less than the highest quality produced at the lowest cost. Solutions for use in product lifecycle management from SAP can help you achieve both excellence and efficiency. They empower your product-related efforts from conception through retirement, across all the design, development, engineering, manufacturing, testing, and marketing maintenance steps in between.

Business Challenges

- Increase transparency over all processes and operations
- Encourage continuous innovation
- Enhance communications with visual rendering and document management
- Boost collaboration between research and manufacturing
- Make change integral to operations and comfortable to stakeholders
- Enforce compliance and quality throughout the lifecycle

Key Features

- **Portfolio and project management** – Align product development processes with company objectives
- **Collaboration** – Enable all stakeholders to share documents and drawings
- **Comprehensive data and structure management** – Store all product-related information in one location
- **Business intelligence** – Use dashboards to display business analytics
- **Product visualization** – Visualize business processes to cooperate and communicate more easily and therefore more efficiently

- **Change management** – Institute continuous improvement through streamlined detection and resolution of deficiencies
- **Embedded quality and compliance management** – Reduce risk by building the steps for compliance into product design and planning phases

Business Benefits

- **Enhanced efficiency** through continuity among product management, R & D, and quality management
- **Improved decision support** with powerful analytics
- **Tighter risk mitigation** through alignment of tactics to strategy
- **Increased ROI** through operational excellence

For More Information

Visit www.sap.com/solutions/business-suite/plm or www.sap.com/lines-of-business/research-development/solutions-overview.epx.

Turning Challenge into Opportunity

The 21st-century enterprise cannot thrive without expert integration of business processes for product management, R & D, and quality management. You must offer the best in products and services to remain competitive, while streamlining operations under mounting cost pressures. You must **optimize your potential for innovation**, maintain complex product structures, and design in continuous improvement. Solutions for product lifecycle management from SAP help you meet these challenges.

WHY PRODUCT LIFECYCLE MANAGEMENT?

Our business climate is increasingly defined by change. No enterprise can possibly understand and manage all the evolving technologies and functions that affect corporate profitability without extensive process integration. You need a single, consistent overview that extends from product concept, through research and development, into production and quality management, and past sales and marketing to field service. Only with the depth of knowledge in that overview can you effectively establish performance targets, analyze current operations, and determine profitable next steps.

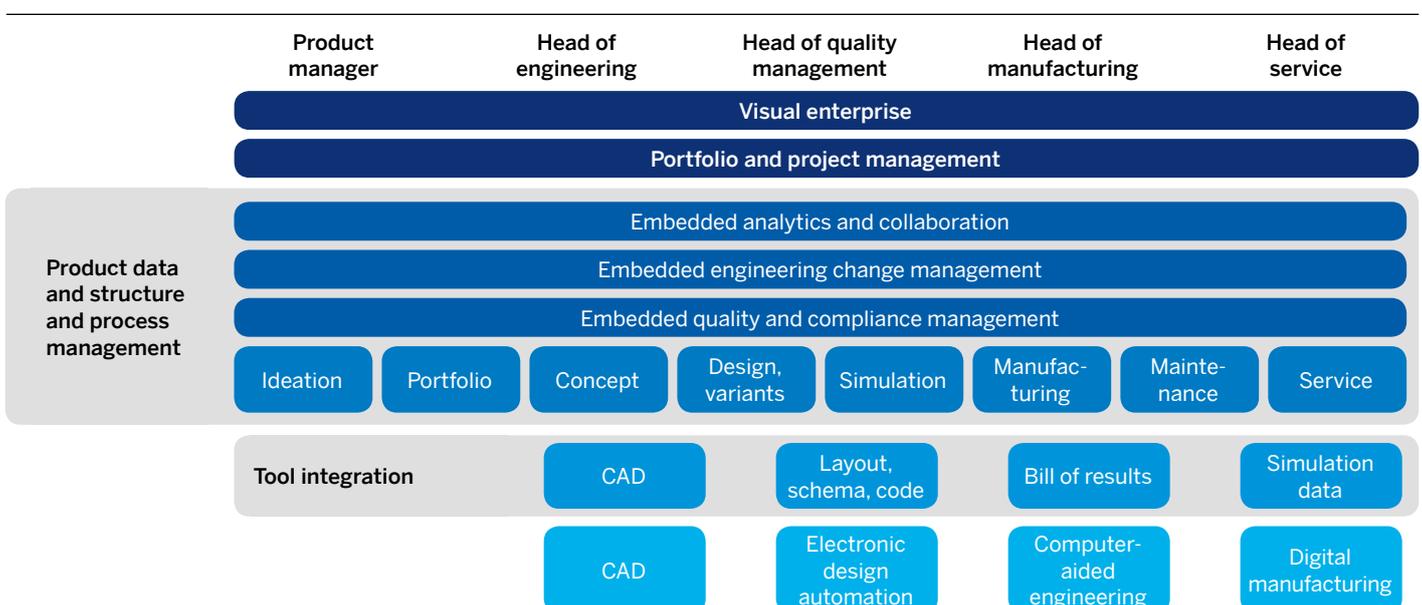
The SAP® Product Lifecycle Management (SAP PLM) and SAP Portfolio and Project Management applications help by enabling cross-functional portfolio and project management, innovation management, product data management, workgroup collaboration, change management, and quality management. With SAP PLM, product managers, R & D managers, and quality managers can work together in a continuous transparent process, using consistent product data and structure management across the product lifecycle (see Figure 1).

To support holistic visualization and collaboration, SAP combines an advanced 3-D visualization technique with SAP Business Suite solutions and mobile apps,

which enables customers to realize the “visual enterprise.” With this strong commitment to visualization, the alignment between engineering and manufacturing becomes more efficient, leading to a faster time-to-market approach and cost reduction when (re)engineering products and portfolios.

Recognizing customer need for instant value from the software, SAP has developed rapid-deployment solutions, based on preconfigured content and support for best-practice scenarios and delivered at a fixed price. You can start quickly, implementing the most important features and functions from the solution in as little as six weeks (depending on your company’s circumstances), and then expand later as your business needs require.

Figure 1: Solutions for Product Development



Cross-Functional Support for Product Managers

PORTFOLIO AND PROJECT MANAGEMENT

Managing your portfolios and projects optimally means maximizing their value, balance, and alignment with the corporate vision. To ensure that you invest your resources in the right projects and that you complete those projects on time and within budget, you need a clear portfolio strategy and streamlined project processes. The SAP Portfolio and Project Management application, part of SAP PLM, can help you define and display many different types of portfolios, including product innovations, services, capital assets, and IT initiatives. And the application gives you a full, consistent overview of the entire lifecycle, keeping you current on project status and tracking trends and key financial indicators automatically.

With SAP Portfolio and Project Management, you can standardize and improve your project management activities – ultimately reducing administrative

overhead – through functionality that can stand alone or integrate with existing back-end software.

Planning, Execution, and Control

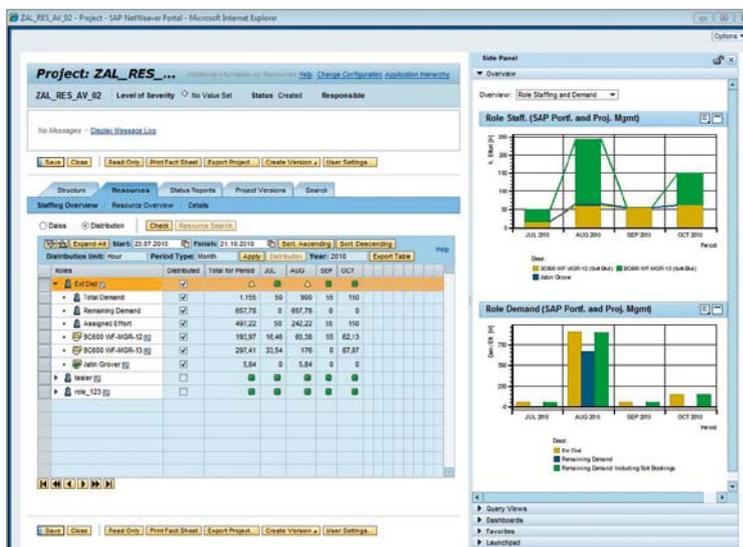
SAP Portfolio and Project Management offers you a wide range of functions for planning, executing, and controlling your portfolio and project management processes.

Portfolio management functionality forms the strategic and operational cornerstone of the application, allowing you to exercise optimal control over all your projects, processes, products, and services. Through the tight integration of data from project management, HR, and financial applications, you always have ready access to a current overview of resource availability. And resource management functionality supports you in using available time and money efficiently and assigning staff to suitable initiatives according to their qualifications and your strategic needs.

Project management functionality enables you to plan, implement, and control project processes in your organization as a whole. It supports structuring, scheduling, and visualization, as well as operational and financial planning and execution.

Sophisticated graphical analysis and flexible dashboard interfaces help you keep a tight rein on all portfolio and project activities. Information always at hand includes views of project status and comparisons of planned budgets and deadlines with actual outcomes. In addition, there are intuitive dashboards for employee planning, cost and risk analysis, and calculation of expected commercial value, along with a suite of summary management reports. Figure 2 illustrates a sample analytical display.

Figure 2: Typical Analytics in SAP® Portfolio and Project Management



Targeted Investments

SAP Portfolio and Project Management helps you align activities and budgets with business objectives, so that you deploy people and funds appropriately. Because you can monitor your business performance in real time, you can make sound decisions more quickly and channel investments to the most promising programs and initiatives.

The application can also be integrated with the SAP ERP application and the SAP NetWeaver® technology platform, as well as with any similar software from other providers that you may be running. This helps ensure that you are always up-to-date on the current status of project costs, forecasts, and baselines for all portfolios. Finally, because of the scalability in the data and process model, you stay ready to adapt to fluid compliance requirements, standards, and best practices, thus mitigating your risk of miscalculation.

Delivery Within Budget and on Time

SAP Portfolio and Project Management brings transparency across all your projects and planned activities. You can also encourage cross-project collaboration with internal and external organizations, enhancing your overall control of project performance. You can integrate project management with business processes for purchasing, development, manufacturing, and servicing to improve your operational efficiency and lower costs. Since the application is scalable, you can support business scenarios and workflows in several languages to accommodate your global growth. And with the full bank of progress-monitoring functions, you can track your projects in real time and intervene early to avoid cost and time overruns.

BENEFITS OF GOOD PORTFOLIO AND PROJECT MANAGEMENT

Your organization can gain substantial benefits by implementing SAP Portfolio and Project Management, such as:

- **Increased execution speed and lower project costs** through the use of templates to standardize execution processes, optimize tasks, and reduce overhead
- **Tighter alignment with organizational objectives** through the accurate assessment of the strategic success of initiatives to help you raise their value to the business
- **Maximized portfolio value with optimal balance** through selection and retention of desirable business by balancing portfolios based on acceptable risk, business objectives, and investment types
- **Increased transparency and smarter decisions** through integration of information from all your applications, enabling stakeholders to correct underperformance, overlap, risk, and bottlenecks sooner
- **Better resource utilization** through capturing demand for resources, prioritizing it, and matching it to available human and financial capital internally or through offshoring or outsourcing
- **Improved, expedited portfolio governance** through streamlined approval for funding, resource assignments, gate decisions, ongoing evaluations, and Sarbanes-Oxley compliance
- **Lower total cost of ownership** through leveraging your existing investment in IT systems and skills with prebuilt, services-based integration to SAP and non-SAP back-office applications

PROJECT INFORMATION SYNCHRONIZED WITH OUTSIDE SOURCES

Effective project management – whether for capital projects, maintenance, or shutdowns and turnarounds – requires a holistic view of all relevant information. You need to see information from enterprise resource planning components such as finance, HR, materials, and assets to gain a wide-angle perspective on the portfolio and project management ecosystem.

Companies have often been forced to rely on manual processes or point-to-point solutions to integrate information in applications from multiple vendors. Those solutions typically only replicated data between systems, rather than preserving context and supporting the end-to-end business processes.

Expanded Information Exchange for Project Management

To help integrate project management information from outside sources, the SAP Enterprise Project Connection application can enable exchange of data among multivendor portfolio and project management applications while maintaining crucial local context. It encapsulates knowledge of best practices gained from hundreds of projects into a solution that is intuitive to deploy, use, and maintain. And it can help you minimize:

- The number of manual or slow processes
- Duplicated effort
- Schedule and cost variances
- Inconsistent data in reporting

With SAP Enterprise Project Connection, you can synchronize project planning, execution, resource, expense, and actual cost information across applications with interactive workflows and automated business rules. You can help ensure that data for decision support is always timely, accurate, and complete – reducing risks due to budget and schedule glitches.

Intelligent and Rapid Integration

SAP Enterprise Project Connection includes connectors and prebuilt data mappings, workflows, and business process templates that support best practices. You can quickly install the application and configure it to synchronize information among SAP applications for project systems or plant maintenance.

Easier Shutdowns, Turnarounds, and Routine Maintenance

Data needed for executing shutdowns, turnarounds, and regularly scheduled maintenance is typically maintained in multiple stovepiped applications. Planners, schedulers, and maintenance workers have relied on manually reentered data or inflexible and aging data exchange solutions. That means their projects become labor intensive and error prone, and you stand to lose millions of dollars in downtime.

But with SAP Enterprise Project Connection, people have the accurate and timely data they need to effectively plan, schedule, and execute plant maintenance projects. SAP Enterprise Project Connection integrates application management, project management, and enterprise resource planning applications to bridge the gaps among plant maintenance planning, scheduling, and execution activities. You improve planner productivity, minimize maintenance costs, and maximize system uptime – and you help everybody take changing business requirements in stride.

Capital Projects and Service Delivery Projects

You probably manage project budgeting, actual costs, and scope changes separately from essential financial data. But such silos of information degrade your organization's ability to calculate earned value across projects and assess overall project financial health. To help ensure accurate project budgeting and costs, you must synchronize data among silos without risky manual reentry and standardize business processes all along the chain.

SAP Enterprise Project Connection helps you keep fiscal period data and project metrics current and readily available for trending, forecasting, and analysis.

Project managers benefit from on-demand earned value snapshots for their respective projects, process-specific workflows to create project schedules, and timely and accurate budget and projection information. And you can use the data modification audit trails in the application to organize and improve regulatory compliance documentation and make change management reporting a routine housekeeping chore.

Schedulers and resource managers no longer have to copy stovepiped data and transfer it by hand or copy customized code across application boundaries in order to generate and maintain cross-project relationships, detail planning, and what-if scenarios. SAP Enterprise Project Connection helps smooth process and information flow among project managers and decrease risk and overhead.

INNOVATION MANAGEMENT

One of the greatest challenges for today's enlightened business leader is establishing an innovation community in which participants can freely brainstorm, capture ideas, and collaborate on bringing the best initiatives to fruition. You need to encourage your entire workforce to join – and incorporate your partners, suppliers, and customers as well. You need to choose the right ideas to pursue

Best practices in R & D require reliable configuration control, integration of graphic design and collaboration software, and management of engineering changes. SAP PLM gives R & D teams [a powerful tool set](#) to help ensure that those requirements are met.



and act early enough to seize the biggest market share. And you must help ensure information transparency for your innovators but also secure your confidential data and IT infrastructure. SAP software for idea management can help you resolve these issues with functionality for soliciting, organizing, developing, and realizing ideas.

The idea management functionality within SAP PLM can be used alone or with other product lifecycle management functionality from SAP as part of an integrated solution for purposeful innovation from strategy through execution. With idea management functions, you can:

- Harness the innovation potential inside your walls and elsewhere in your ecosystem
- Identify promising ideas and move them from strategy to ideation to execution
- Bring innovative products and services to market more quickly
- Grow your business

Figure 3 shows how idea management functionality in SAP PLM helps ensure that newborn innovation initiatives grow into revenue-generating products and services.

Functions of Idea Management

With SAP PLM you can address idea management through the following functions:

- Defining ideation needs and soliciting input from the appropriate audience
- Collecting, consolidating, categorizing, and managing all ideas in one application
- Documenting and formalizing reviews and evaluations
- Promoting ideas to initiate development of prototypes, business cases, projects, or products

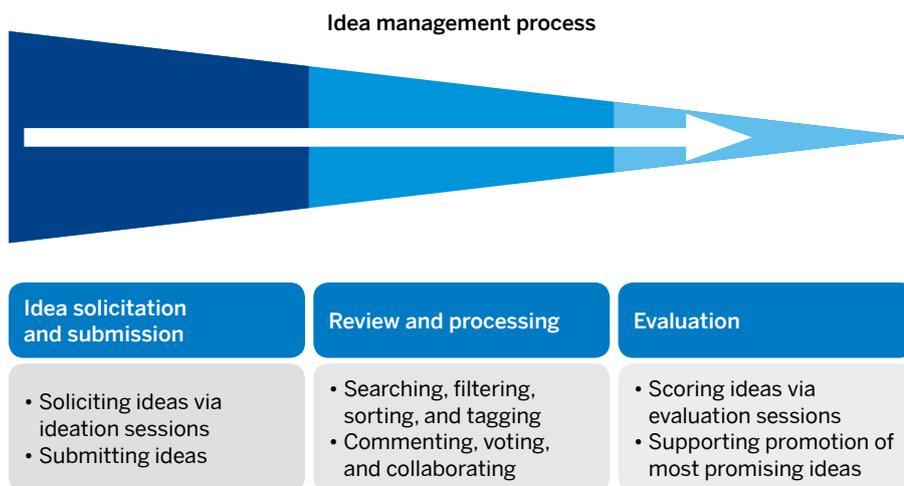
What Idea Management Can Do for Your Business

With idea management functions, you can make the most of the potential for

innovation locally and anywhere within your extended enterprise. You can encourage thoughtful selection of ideas for promotion into prototypes, which helps you lower development times and capture new markets. The functions help you:

- **Increase growth and profitability** by widening the innovation funnel to generate more ideas and improve selection and evaluation processes
- **Save costs** through reuse of knowledge and transparency for continuous improvement
- **Reduce time to market** by providing the process support and integration to accelerate ideas to execution and focus resources quickly on the right ideas

Figure 3: Managing Ideas in the Context of Continuous Innovation



Optimization of Research and Development Efforts

PRODUCT DATA MANAGEMENT

Best practices in product data management require reliable configuration control, integration of graphic design and collaboration software, and management of engineering changes. The SAP PLM application gives R & D teams a powerful tool set to help ensure that those requirements are met.

Product Master and Structure Management

Product manufacturers typically use multiple bills of materials (BOMs) to structure a product – from strategic concept BOMs that capture high-level user requirements to engineering design BOMs that capture details of materials and operations. And since each BOM usually has its own user interface, you can spend considerable time just navigating the structure of the product.

SAP PLM brings you deep product structure and assembly management functionality to help configure and maintain your complex product structures. With this functionality you can define types of BOMs and combine variant-driven product management with CAD-driven product assembly management. You can enter and monitor all configuration data in consistent structures for smooth integration into manufacturing processes such as shop-floor scheduling and resource management processes such as production control. A powerful workbench helps you maintain all product and process data and map your navigation path, even in multilayered product structures.

If you need product information quickly, you can retrieve it in a Web browser. You can click your way through even the most elaborate BOM – quickly and in a user-friendly interface, using filters to restrict the data flow to the information you need for the task at hand. You can also process BOMs and routings

simultaneously to influence the production process without leaving the product structure, for example, by scheduling the work order.

With functionality for integrated product structure management, you can process your product data and structures more efficiently by standardizing processes and monitoring them electronically. A powerful business workflow tool can keep your frequently recurring tasks running smoothly in a framework that stays flexible for rapid adaptation.

Illustration and Collaboration

With SAP PLM, you can also use digital mock-up functions for virtual product development, simulating and analyzing your product even before you have invested in the first prototype. The integrated viewer lets even project partners without CAD tools monitor the new product – in the form of a scale drawing or a 3-D model. Redlining functions promote more efficient communication among project participants. When customers follow the product at this stage, any changes they request simply inspire new user requirements while you are still planning for development, rather than jeopardizing manufacturing schedules later. If your customer base is splintered, you can adapt BOMs and product processes into multiple variants with minimal effort, tailoring the final product to each customer's wishes and managing sales order by order.

The know-how collected in your product data becomes available to appropriate employees by a range of drill-down reporting options. The reports can link and classify material numbers, documents, BOMs, routings, and other project-relevant data in a logical system that helps eliminate the frustration of random unsuccessful searches for product data. Powerful search and selection functions are available for intranet and Internet workstations.

Integration technologies enable the controlled exchange of consistent product data with all players in your extended enterprise, including customers and suppliers. Since you can exchange data transparently with all third-party systems, your stakeholders in all departments and locations have the same current information.

FORMULA DEVELOPMENT AND SPECIFICATION MANAGEMENT

SAP PLM includes a rich set of features for formulation development and management, helping you specify the inputs and processes required to develop a final product. The user interface is designed for product development professionals in the process industry who want to effectively manage data while maintaining a high level of personalization. With this recipe development functionality, you can optimize formulations; create and manage product specifications; evaluate real-time calculations of key measurements like nutrients, chemical properties, and costs; and prepare product labeling data.

Additional features for product developers include:

- An intuitive object navigation tool to investigate relationships among product development objects
- Cross-object, plain-text searches for product data
- A user-defined change management record that specifies the proper workflow for review and approval of the change request
- An integrated analytical viewer that displays context-relevant information about the current object to enable better-informed business decisions
- Attractive and intuitive user interfaces for data used frequently in the process industries, such as recipes, specification, and classifications

- Formulation tools to help you make accurate assessments of formula properties

User interfaces are configurable to various levels of user expertise and various roles, and any user can create ad hoc workflows as needed. Checking compliance and validating formulations become consistent and efficient tasks and can begin early in the development process and continue throughout the product lifecycle. By leveraging these functions, the consistency of the data increases dramatically, which improves the compliance, safety, and quality of the information for downstream users.

Visual Assembly Planning

Planning the assembly of complex products can be an extremely time-consuming effort and is very error-prone due to the extensive amount of data that must be dealt with. Keeping engineering BOMs, manufacturing BOMs, and routing in sync

requires an excellent knowledge of the product and the manufacturing processes. When it comes to managing changes, which may be initiated by product engineering and subsequently handed over to manufacturing engineering, this task may become extremely difficult to achieve and is likely to produce inconsistent production master data.

The most recent version of SAP PLM offers the following benefits:

- Graphical support of the assembly planning process (Figure 4)
- Perfect concurrent engineering between product engineering and manufacturing engineering (the assembly planning may start very early, as soon as a minimum of product engineering data is available)
- Routing for the assembly that is developed concurrently with the product development – no need to wait for the manufacturing BOM

- Automatic creation of the manufacturing BOM and the assignment of its components to the routing based on the planning process
- Extended visual support in validation of the planning process

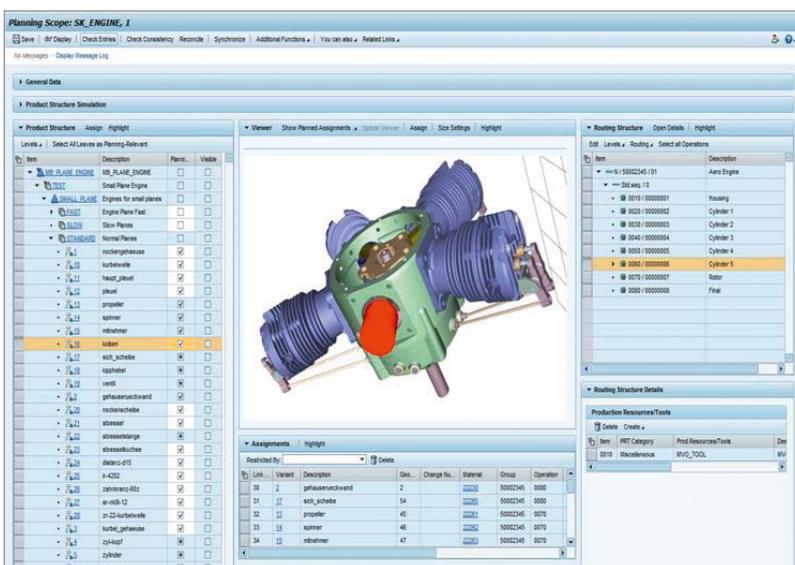
While easier to use because of the visual support, the software still has the ability to manage complex relationships between engineering and manufacturing master data.

THE VISUAL ENTERPRISE FOR ENGINEERS AND TECHNICIANS

Sharing 3-D representations with all stakeholders makes your product-based communications vastly more effective. And videos simplify instructions as well, increasing the speed and quality of communication with field personnel and customers.

SAP PLM delivers very powerful holistic 3-D visualization functionality for design and manufacturing process review, configuration control and management, quality inspection, and reporting – without requiring any additional CAD software. You can configure views of a product to fit various user roles, providing engineers with functional diagrams and service technicians with assembly instructions, for example. You can virtually fly through complex products to see every single component of your product. This allows you to perform measurements on a visual representation, use sectioning techniques to analyze product composition, and select from various rendering styles. You won't require powerful hardware for performing calculations – even the most complex products can be processed on regular laptops. Built-in transformation matrixes automatically facilitate visual assembly driven by product structure, so you can conveniently display ranges of options for BOMs with multiple variants.

Figure 4: Visual Assembly Planning



VISUAL ENTERPRISE STRATEGY FROM SAP

By bringing 3-D visualization and business data together, SAP sets a new standard in helping companies increase decision-making speed, enhance productivity, and improve quality across the entire enterprise value chain. The addition of 3-D visualization and publishing technologies enables intuitive navigation of an entire product and its associated data in one unified environment, helping customers break down the traditional walls between lines of business.

The visual enterprise strategy from SAP effectively unifies product information from appropriate systems such as CAD, PLM, manufacturing execution systems (MES), digital asset management (DAM), and ERP. The information is then synchronized to help ensure accuracy and maximum transparency to individuals throughout the extended enterprise depending on their role and workflow. The solutions supporting this strategy are designed to maximize productivity and improve process efficiency and quality while reducing cost and product life-cycle time by the use of holistic visual communication.

SAP Business Suite software is enhanced with 3-D visualization technology to give business users relevant and up-to-date product information across workgroups. The symbiosis of holistic 3-D visualization and business data optimizes processes such as visual manufacturing work instructions, sales and marketing imagery, technical publications, training, and maintenance. It also facilitates global collaboration within the supply chain.

The Benefits of Visualization

Using visual information offers key benefits for organizations.

Faster Decision Making Across Lines of Business

Animated views of products and assets will help development, manufacturing, and service personnel to more easily design, assemble, and service complex products and assets. Business users will be able to make decisions faster across all lines of business thanks to instant access to contextual and reliable visual information such as design collaboration, assembly instructions, and up-to-date service procedures and manuals.

Greater Productivity with Visual Access

The abundance and continuous expansion of information requires new ways of navigating and visualizing business data. Combining visualization technology with critical data used in SAP Business Suite applications will help users work more accurately and efficiently. In addition, intuitive visual access to a variety of associated information – such as price per part, stock availability, quality reports, or manufacturing cycle times – will enhance overall productivity across multiple departments and processes in the enterprise.

Improved Product Quality with Visual Communication

Visual communication is particularly useful for companies that rely on a network of partners, such as suppliers and customers, for product innovation, manufacturing, and service delivery. With integrated visualization of products and processes, design and process changes can be communicated immediately across an extended team. Instead of relying on static images, companies have an intuitive visual format, giving all workers across geographies complete, up-to-date visual assembly and maintenance instructions and variant simulations, resulting in fewer errors and delays.

Tool and Work-Group Interconnectivity

CAD integration in SAP PLM lets you edit document-based structures using a CAD interface, both in the CAD product and from the SAP application. You can thus manage CAD files directly in the SAP software and leverage 3-D design information for costing, sourcing, and manufacturing processes. You maintain a single consistent look and one source of the truth for all participants, wherever they sit and whatever their function.

Integration into the change process and the release process is controlled and transparent. You lower your total cost of ownership by avoiding third-party data management software and working with one central interface and user management system.

ALIGNING AUTOMATED ENGINEERING BOMS AND MANUFACTURING BOMS

Handing off an engineering BOM to manufacturing without strong product lifecycle management can involve a lot of rework, since the two departments use BOMs differently. Companies have often had to restructure the BOM entirely to facilitate the start of manufacturing – and then undo and redo the process if engineering changes arise.

But product structure synchronization features in SAP PLM let you guide the transition of engineering data structures into manufacturing production processes, ultimately reducing time to market. Cross-functional synchronization of BOMs keeps all changes during the handoff from engineering to manufacturing transparent across the network and cataloged in the software, so that resynchronizing after change is largely automated. Increased flexibility and efficiency means a smaller number of incorrect or outdated BOMs, and support for product synchronization processes is automatically integrated with all your back-office applications.

PRODUCT INTELLIGENCE WITH BUSINESS CONTEXT

Development efficiency depends directly on the amount and quality of information available to team members during engineering and manufacturing. To avoid costly errors, you must open traditional department borders and integrate data from diverse sources.

SAP PLM boosts the development process by offering functionality for viewing business context directly in the application interface. You can see advanced product information – like product costs, quality notifications, and component inventories – in side panels or individually defined dashboards as seen in Figure 5. Product-related information from all sources is woven into intelligence in the business context viewer so that workers can make informed decisions based on accurate details without losing the big picture. Additionally, a cockpit-like page can be personalized by the user to

access the most important reports with predefined variants. Authorization features let you control access to sensitive data, and data-provisioning and query-handling functions help you manage joins and filters.

Within this context-aware framework, you can use a configuration wizard to organize your own analytic content, including operational data from enterprise resource planning applications as well as data extracted from a warehouse or business intelligence software system. You can use that content to create reusable reports, choosing among a variety of charts, tables, and other formats for graphical representation; end users can personalize their displays to match their roles. A predefined set of connectors and reports covers such topics as stock levels, sales records, purchasing history, production status, and quality testing, and export and printing functionalities are built in. All the reports can be set up to appear in the side panel area for the

corresponding Web-based PLM applications as well as for your SAP GUI transactions.

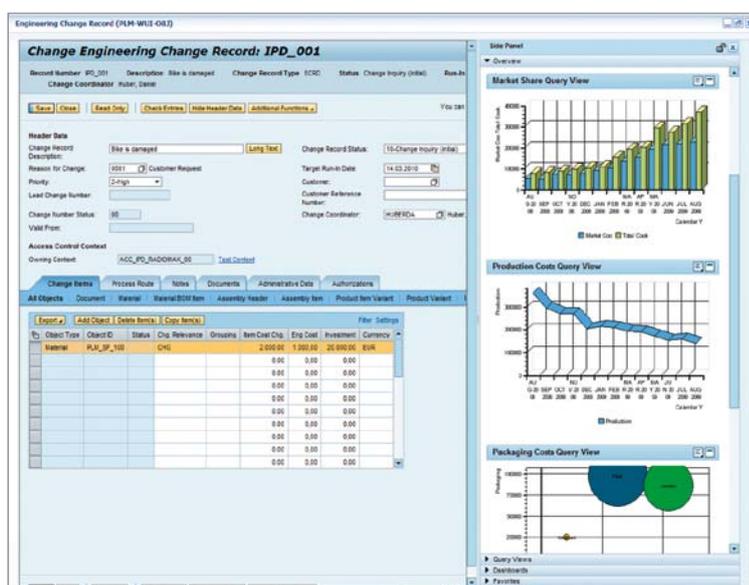
PRODUCT DEVELOPMENT AND COLLABORATION

When you help ensure collaborative product lifecycle management with SAP PLM, you take an important step toward maintaining high quality and driving continuous innovation from internal and external feedback. You can empower internal stakeholders, development partners, customers, and suppliers to share mission-critical project plans, technical drawings, product structures, product documentation, service bulletins, audit results, and change orders across virtual teams. And that lays the groundwork for products that are engineered, tested, maintained, and enhanced for market leadership.

Engineering groups use product lifecycle management functionality internally to manage change, design and manage product models, and administer versioning. As lifecycles grow shorter and margins smaller, you must also collaborate closely with the supply chain, factory floor, and quality and service groups to keep costs down.

SAP PLM meets these challenges by combining support for development processes with a central data store and tools for collaboration. For collaboration with fully trusted partners, SAP PLM enables controlled access to your data through the SAP Collaborative Product Development application. For collaboration with less-trusted partners, the application offers controlled access to copies of your data on a separate server running the Collaboration Folders application outside the firewall.

Figure 5: Business Context Viewer



Product Structure Setup

The first phase in collaborative development is typically establishing BOMs and product variant structures. SAP PLM helps you set up new development projects cost-effectively by letting you apply a general template or reuse structures from previous projects.

Functional Specifications

The project manager typically compiles strategic requirements such as target costs and markets and builds them into a draft of functional specifications. SAP PLM saves specifications for product function and product configuration as documents in a requirements structure. Financial personnel add monetary detail and create a plan for reconciling target prices with actual prices.

New development projects need regular reviews, for which SAP PLM helps you extract requirements summaries and status overviews from the product structure. Developers can update the structure to

reflect change processes and corrective measures – for example, by linking specification documents into the structure or by adding technical attributes such as weight and volume.

Technical Specifications and CAD Documents

When functional specification is complete, technical specialists refine details like volume metrics and tolerance ranges. A specialist from engineering enters material numbers into the structure, completing the BOM for testing and simulation. The BOM from SAP PLM, complete with CAD content, drives production and procurement with minimal synchronization effort and eventually underpins even go-to-market planning and evaluation of logistics options. You can use an engineering workbench, a product structure browser, or an object navigator to direct the cross-functional review process.

Virtual Prototyping

Discrete manufacturing products must often undergo simulation before being released from engineering to production. SAP PLM lets you pull extracts from the product structure by configuration or status for this detailed technical analysis. You can save both the extracted data and the extraction criteria to the product structure, with a link to results.

PRODUCT CHANGE MANAGEMENT

Changes in customer requirements, design requirements, or raw materials requirements can disrupt a production environment, but they are becoming commonplace. Engineering change management in SAP PLM lets you tailor product change processes to integrate change smoothly into your daily operations. Comprehensive functionality supports both planned and forced changes, providing immediate visibility into inventory levels,

SAP Enterprise Project Connection helps you keep fiscal period data and project metrics current and readily available for trending, forecasting, and analysis.



open production orders, related change requests, costing information, and change history.

When users request product changes through the Web-based portal, a notification alerts the responsible employee to check feasibility. Leveraging a flexible workflow-based change management process, and armed with the decision-making support of analytics in a business context, engineers can determine how and when to make necessary modifications with minimal footprint. They can release changes step-by-step to enable simulations one at a time in selected departments – for example, to determine cost changes piecemeal before full production begins. The application maintains integrated access-control mechanisms and a complete audit trail, so that you always know who ordered a change, who authorized the action, and which validity conditions apply to the modification.

Furthermore, the change management is taken to the next level, where it is now easier for the stakeholders to collaborate directly on the BOM. Stakeholders can now redline a BOM and suggest items to be included, deleted, or updated. Tightly integrated with the authorizations and engineering change management, the color-coded BOM redlining facilitates easier and more efficient collaboration on BOM changes among the stakeholders (see Figure 6).

Change Order Preparation

With SAP PLM, viewing and redlining features support document review and provide electronic feedback throughout the ensuing review cycle. Once all approvals are complete, the engineering change request becomes an engineering change order, which initiates the physical alterations to the product. With the release of the order, the change automatically

becomes applicable to the product within a specified range of parameters. If you release changes that affect running production orders, the order change management functionality adopts changes to those orders in a controlled sequence by order status.

REGULATORY COMPLIANCE

With SAP PLM, you can change the technical or aesthetic makeup of a product as often as the market demands. That helps you boost customer satisfaction while meeting or exceeding standards set by regulatory agencies. You can augment approval procedures as regulations evolve and establish service levels that keep your response time in an emergency in line with industry expectations. And integration with claims management functions helps you document the resolution of problems with customers and suppliers.

CRITICAL FUNCTIONS IN MANAGING DOCUMENTS

Document management encompasses creation, storage, and transfer of physical files and digitized information. Now SAP PLM lets you manage documents in folder structures, supported by the document browser functionality, which adds even more clarity and makes the process easier. The main functionality includes:

- Digitizing the paper trail, especially for design drawings
- Working with a single secured vault with multiple storage options
- Protecting confidentiality of documents when displaying results of a search
- Enabling workflow-based collaboration for enrichment of document details
- Creating neutral files for manufacturing, marketing, and sales departments that don't have CAD access

Figure 6: Example of Color-Coded Bill of Materials Redlining

The screenshot displays the 'Change Redlining for Material BOM' interface. At the top, it shows the material 'INT_MV0_ROBOT' and the redlining name 'REDLIN01'. Below this is a 'Header' section with administrative data, including the name 'REDLIN01 - In Work', status 'Completed', and description 'Redlining for change of Material'. A 'Validity' section shows 'Engineering Record: 683' and 'Eng Record Status: Change Request in Process'. The main part of the interface is a table of BOM items, color-coded by redlining status. The table has columns for Item, Item Category, Indicator, Redlining Notes, Component, Component Description, Quantity, Line, Assembly, Substems, MPRs, Valid From, Valid To, and Change Number. The items are: 0010 Stock Item (Central Hand), 0020 Stock Item (Arm complete), 0030 Stock Item (Lnk Arm), 0040 Stock Item (Rotating Column complete), 0050 Stock Item (Base Frame), and 0060 Stock Item (New Link Arm). The 'New Link Arm' item is highlighted in green, indicating a new addition, while others are in yellow or red, indicating changes or deletions.

Item	Item Category	Indicator	Redlining Notes	Component	Component Description	Quantity	Line	Assembly	Substems	MPRs	Valid From	Valid To	Change Number
0010	Stock Item			201	Central Hand	1	EA	✓			10/3/2011	12/31/9999	
0020	Stock Item			202	Arm complete	1	EA	✓			10/3/2011	12/31/9999	
0030	Stock Item		Create Subst	203	Lnk Arm	1	EA				10/3/2011	12/31/9999	
0040	Stock Item			204	Rotating Column complete	1	EA	✓			10/3/2011	12/31/9999	
0050	Stock Item			205	Base Frame	1	EA	✓			10/3/2011	12/31/9999	
0060	Stock Item		Change Notes	202_NEW	New Link Arm	1	EA						

The SAP Easy Document Management user interface brings Microsoft Office-like features and functionality for discrete and process manufacturers and professional services firms alike – in an intuitive and customizable interface, illustrated in Figure 7.

Integration with Microsoft Applications

With SAP Easy Document Management, you create private and public folders that look and act like those in Microsoft Windows Explorer. You can link from documents in these folders to other files and folders and use special search functions to locate other SAP software objects to link to. Document search functions include options to supply validity dates and display results in a temporary folder, and you can also catalog e-mail messages and maintain long texts. You can work offline with documents and update them automatically once you log on again.

SAP Easy Document Management is directly integrated with Microsoft Windows Explorer. You can move documents among folders with drag-and-drop or cut-and-paste techniques, and you can check documents in and out from Microsoft applications with the “save as” function. The application also lets you define and manage versions of documents and group and personal document structures, defining authorizations at both the document and folder level. You can search for documents and add them to work lists, create and maintain classification data to add context, and exchange documents with optical archives and scanning and plotting devices.

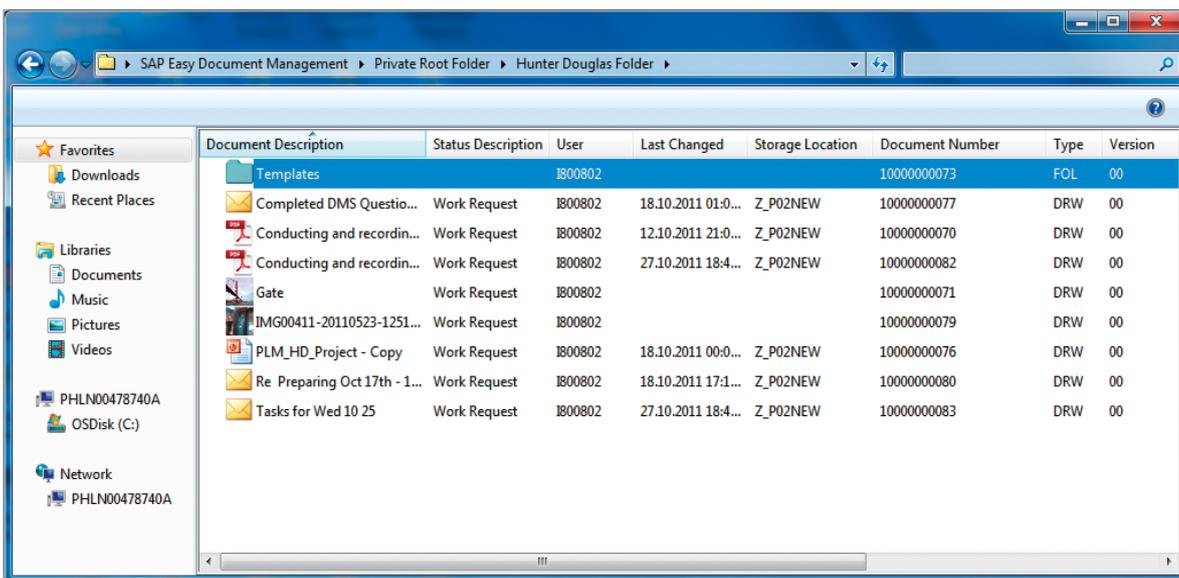
Familiarity and Security

The complete document management software system appears as just another hard drive in your Microsoft Windows Explorer. Thus, a wide range of project

participants, including occasional users with little experience, can make full, effective use of sophisticated document management tools without leaving familiar office applications. SAP Easy Document Management delivers further benefits to SAP customers by integrating directly with SAP ERP and reducing the time and effort required to handle documents in all SAP applications.

In today’s integrated design teams, contract manufacturers for OEMs and employees from subsidiaries with limited clearance often work closely with your in-house staff. To help ensure proper access to central software infrastructure for all participants, SAP Easy Document Management enforces layered network security; no data is available in the presentation layer.

Figure 7: Look and Feel of SAP® Easy Document Management



Implementation of Total Quality Management

TOTAL QUALITY MANAGEMENT

As a robust and integrated solution, SAP PLM also empowers quality managers with a thorough, broad-based approach to total quality management (TQM). This solution is generations beyond isolated, computer-aided quality systems or laboratory information management systems.

Successful corporate strategy demands collaboration for continuous process improvement and sustainable quality control to prevent deficiencies in the first place. And you need to react immediately to unplanned quality-related events, involving all affected parties early and initiating sound follow-up actions to solve or control an issue. Quality management functionality in SAP PLM addresses these challenges with support for integrated business processes that tighten control and contain costs.

As you streamline budgets to achieve financial success, you must also avoid risks that might lead to unexpected expenditures. You know that mismanaging or ignoring quality issues can bruise your brand and impair cost control. The best answer is to put in place a comprehensive approach to quality management along the entire value chain.

SAP PLM helps you manage quality efficiently, differentiating your products and services from competitor offerings and establishing a reputation for excellence. It includes functions for enterprise-wide audit management, quality engineering, quality assurance and control, continuous quality improvement, and compliance monitoring. Because project management and quality management functions are integrated in SAP ERP, you can run Six Sigma projects to further enhance quality, improve processes, and lower costs. You can increase your revenues by raising customer loyalty and increase your efficiency by improving asset utilization.

Continuous Improvement

With SAP PLM, you can quickly identify and analyze problems so that you can eliminate their root causes. With the quality notifications functionality, you help ensure that all unplanned events are captured directly as they occur and that all actions are monitored for maximum effectiveness. A service-oriented approach allows both employees and business partners to create quality notifications and to work together online to record information, dispatch problem

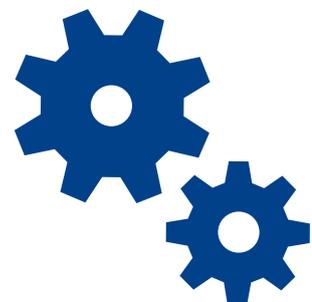
reports, and track the status of requests. Full integration with the analytic functionality of SAP ERP and the SAP NetWeaver Business Warehouse component enables you to monitor quality performance and adjust quality strategies as required. Using the flexible quality management cockpit in SAP ERP, you can evaluate both online and archived quality data to support your company's TQM efforts, including the Six Sigma projects.

Audit Management

The audit management functions included in SAP NetWeaver let you plan, conduct, and evaluate audits all along your value chain. They help you perform internal or external audits of equipment, applications, processes, products, and environmental conditions and help you conduct a range of assessments and reviews.

This depth of support means you can more easily comply with legal requirements, institute benchmarking efforts, and uncover opportunities for improvement. And audit management functions supporting a wide range of industry standards, such as ISO 9000, QS 9000, good manufacturing practices, ISO 14011, and ISO 19011.

SAP PLM offers [deep product structure and assembly management functionality](#) to help configure and maintain your complex product structures. You can define types of BOMs and combine variant-driven product management with CAD-driven product assembly management.



Top-Notch Quality Control

In an interconnected world, the ability to exchange quality-related data across applications and with various partners is rapidly becoming as important as statistical process control and test equipment interfaces. SAP PLM can integrate with other SAP and non-SAP applications, specifically with SAP ERP to give you quality control functionality for strategic planning, continuous monitoring, and quick problem resolution. Figure 8 shows how quality notifications can be displayed in the SAP PLM environment. You have tools to plan, conduct, and manage quality inspections – and integrate them into processes throughout the product lifecycle.

You can:

- Track results and defect data
- Record and charge inspection costs
- Manage laboratory data related to samples, tests, and stability studies

- Create quality certificates automatically for customers
- Exchange certification information with business partners
- Connect, monitor, and maintain test equipment to help ensure data accuracy

Closed-Loop Inspection Planning

Companies face mounting pressure to reduce time in the product development process through the independent development of components. Outside component suppliers play an increasingly significant role, and they must not only complete components on time but also adhere to standards such as ISO/TS 16949 and keep costs under control. Closed-loop inspection planning helps you control the quality of externally sourced components by integrating processes for both goods-receipt inspection and inspection during production. The planning begins right in new-product development, when a cross-functional

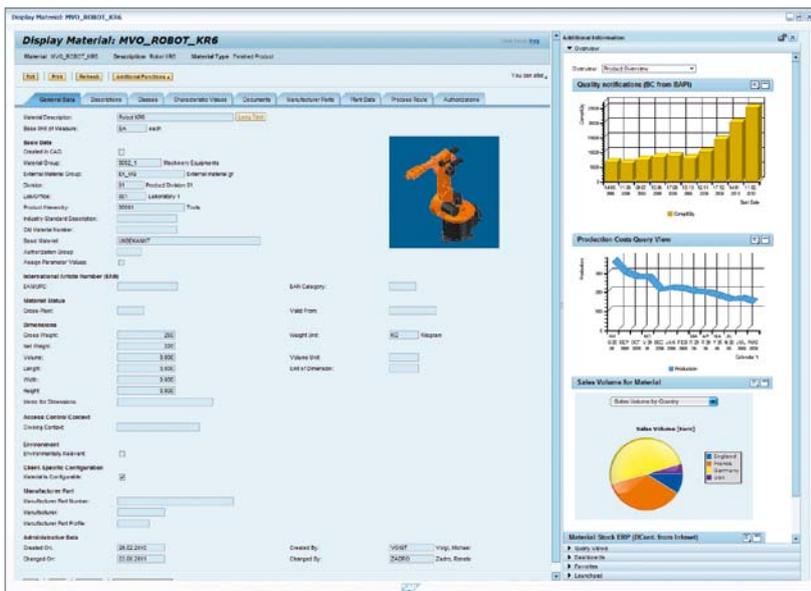
team of experts highlights product and process characteristics that carry a high safety risk in a failure modes and effects analysis plan. Then quality engineers transfer that assessment into a control plan that outlines all inspections for the final product and its components.

COMPLIANCE ISSUES IN TQM

Assessment procedures and results are key elements of the auditable evidence you need for reporting purposes. Before you release the designed product to the shop floor, SAP PLM mandates a semi-automated check against compliance records to verify the compliance status for each material. The application retrieves the information from the SAP Environment, Health, and Safety Management application and displays it as a side panel.

Since compliance information is transparently integrated among processes for purchasing, production, sales, and distribution, you can see that quantities remain at safe levels and approved handling methods apply throughout. You can provide comprehensive audit trails for regulatory authorities, detect compliance gaps in your portfolio, establish workable timelines, and coordinate documentation. And that means you can more effectively manage the impact of regulations on your operations and lower your overall risk at the enterprise level.

Figure 8: Quality Notifications Displayed in a Business Context



Meeting Today's Toughest Business Challenges

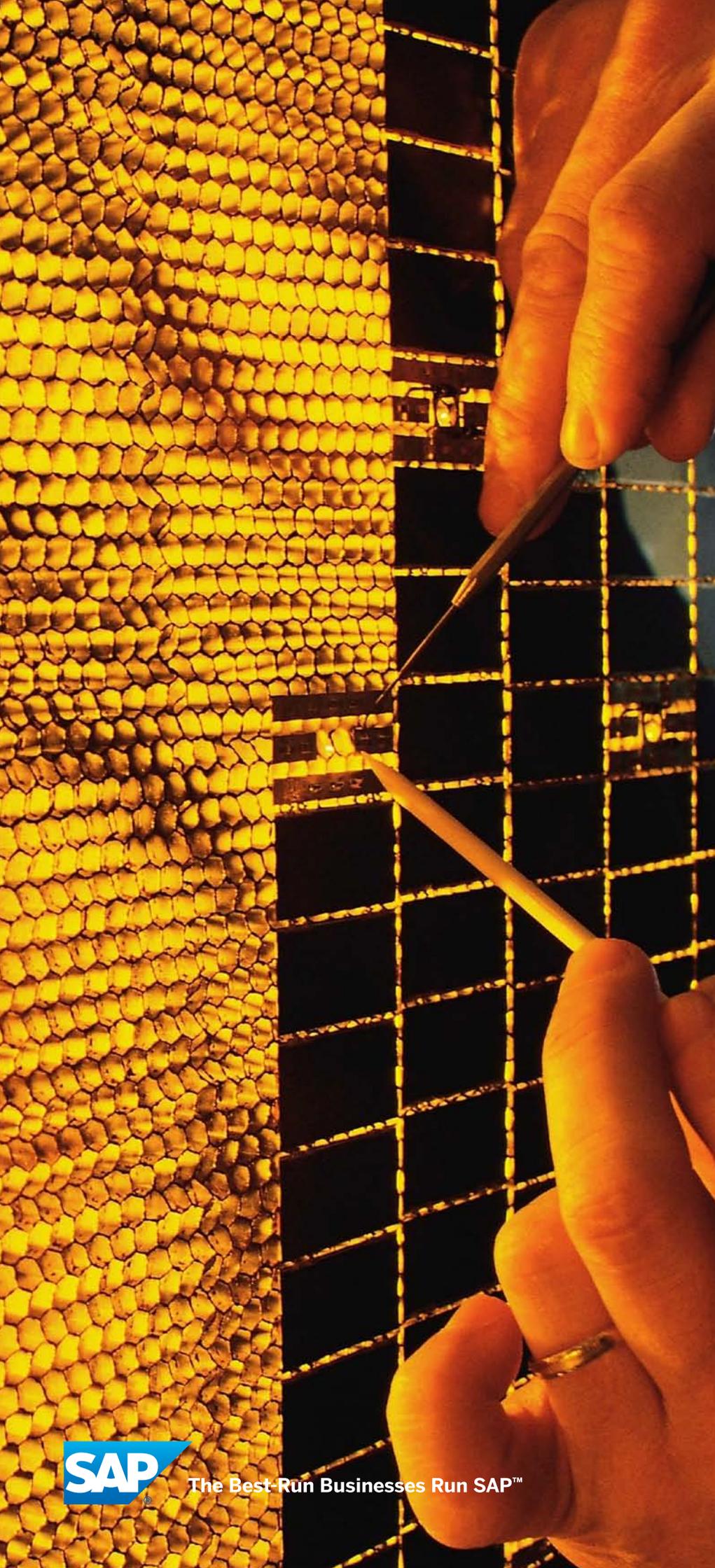
BENEFITS OF USING SAP APPLICATIONS

Implementing the powerful SAP applications for use in product lifecycle management helps you:

- Manage portfolios and projects for maximum efficiency
- Lower costs and increase overall transparency
- Promote comprehensive idea management
- Design and control intricate product structures
- Enable the visual enterprise
- Collaborate in product development across teams
- Manage manifold changes across the product lifecycle
- Provide enterprise information for the engineer
- Enhance communications with visual rendering
- Synchronize information between engineering and manufacturing
- Collaborate across teams to manage change
- Create, track, and exchange engineering documents
- Control quality and enforce product compliance

FOR MORE INFORMATION

To find out more about product lifecycle management with SAP applications, call your SAP representative or visit us on the Web at www.sap.com/solutions/business-suite/plm/index.epx or www.sap.com/lines-of-business/research-development/solutions-overview.epx.



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