



Selecting a Product Data Management System

**"The product data management selection process requires planning, consideration, and commitment."
Ed Miller,
President of
CIMdata, Inc.**

Do you know what it takes to select a product data system? How do you get started? What issues are critical to success? The truth is that you can't choose a vendor in a few hours by filling out a simple checklist, define system requirements in a weekend brainstorming session, or select a technology in an afternoon meeting. While coordination of efforts should be the prerequisite for any project, product data management requires particular attention because the technology manages organizational workflow and business processes threaded through so many different groups and disciplines in the enterprise. According to Mr. Miller's recent articles published in *Computer-Aided Engineering* magazine and summarized here, many organizations progress through the individual steps discussed below.

Assemble a Core Team

You'll need the same core team of people throughout the process to drive the implementation, maintain continuity, and ensure that everyone has an input. The group should not be so large that it gets bogged down in bureaucracy, but all areas should be adequately represented including user groups and information technologists. User members should include people who can understand and represent the breadth of the organization's product development and production processes.

Educate the Organization

Education is a continuing process that is particularly important at the outset to understand business issues addressed by product data management. You can't send your organization to a class to learn this. The core team should participate in courses, attend industry conferences, read articles, and ask questions. They should learn about the technology, about the benefits obtained from using a product data management system, and about what problems are involved. The knowledge gained by the core team should be communicated to the rest of the organization.

Establish Objectives

Your team must clearly establish objectives in terms of why your organization wants to get into product data management. What do you want your product data management system to do for your company? Ask yourself what business problems you are trying to solve. Do you want to improve manufacturing quality by reducing re-work? Would you like to reduce time to market by streamlining your operations? Determine metrics to gauge product data management performance. Use measurable parameters such as cost to process an engineering change order or time to develop a product. The actions that you take in this step will provide guidelines to prioritize factors for evaluating alternative systems.

Create a System Vision

The system vision outlines the scope of the system (the specific technology needed to meet your objectives) by using a realistic list of milestones to define the path you'll take to product data management. Identify the system capabilities that are absolutely essential in reaching your particular business objectives. Keep the list short and use this list to eliminate any vendor who does not offer these "must have" capabilities. Make a list of your "want to have" capabilities and assign a relative priority to each one.

Determine in detail how the system should perform to meet your objectives and satisfy your vision. This includes defining individual capabilities (workflow, data/document access support, integration with CAD, bills of material needs, etc.) that will help you determine which type of product data management technology is appropriate for your company.

Analyze Costs and Benefits

Now is the time for performing a general cost/benefit analysis to determine if the time and expense required are justified. Costs must include not only software and technical infrastructure, but also customization, installation, training, education, business process impacts, meetings, travel, etc. Be sure to include internal costs as well as external expenditures.

Selecting a Product Data Management System (cont'd)

Select a System

Now that you've defined what the system will do, start evaluating products and vendors to see how their capabilities match your needs. When selecting the system, talk with many vendors to find one you feel comfortable with. Remember that you're not buying off-the-shelf software; you are entering into a long-term partnership with a company that will help tailor the system and continue to improve it over time. Attend a vendor demonstration to see, for example, how engineering would release a change order to manufacturing, or how manufacturing suggests engineering changes. By comparing this information against your requirements, you can narrow your choices down to a short list (three to five) of the best candidates. When you have arrived at a decision, enlist the support of the selection team. Their approval and enthusiasm will be invaluable when pilot systems are launched and further expanded into full production.

Launch the Implementation

Now you can purchase a system and put it in place. Start with a pilot system on a limited basis, expand to a full production system when kinks are worked out, then integrate product data management into the work process. Continually monitor metrics to keep the process on track.

These steps offer a consistent set of actions you may use to launch successful product data management implementations.



Function Checklist

LCSIS' flexibility
is essential
in today's
competitive
marketplace.

Product Data Management (PDM)

- Product Identification
- Change Control
- Status Accounting
- Workflow
- Electronic Document Management
- Multiple Data Vaults
- Field Modifications

Product Identification

Bills of Material

- As-Planned
- As-Built

Baselines

- As-Planned
- As-Built
- As-Modified

Indented Parts Structures

- Family Trees
- Parts Hierarchies
- Where Used Data

Parts Catalog

- Comprehensive Tables
- Customized Listings

Configuration Item Data

- Standard Details
- Customized Attributes

Item/Part/Document Cross Reference

- Alternate Parts
- Equivalent Parts
- Superseding/Superseded Parts

Product Serialization

- Assemblies
- Subassemblies
- Parts

Vendor/Customer Information

Data Vault Access

- Viewing
- Redlining
- Security Controls

Change Control

Automated Processing

- Problem Reports
- Change Requests/Proposals
- Variances (Deviations and Waivers)

Electronic Workpackage Folders

- Data Vault Access
- Local/Network Access

Change Impact Assessment

- Baseline Effectivity
- Part/Documents Affected
- Serial/Date Break-in Effectivity

Status Accounting

On-Demand Reports

- Bills of Material
- Baselines
- Family Trees
- Change Status
- Part Status
- Where-Used
- Document Location and Status
- Serialized Parts Tracking
- Maintenance History
- Revision History
- Customer Data
- Metrics

Electronic Document Management

Access-Controlled Electronic Data Vaults

- Product
- General
- User
- Multi-Criteria Search Capability
- Check-in/Check-out of Files
- Version Control
- Local Copy of Files
- View and Redline

Preliminary and Formal Document Processing

- Revision Histories
- Current Status of Changes
- Version Control
- Automated Report Generation

Query and Search Capabilities

- Product/Parts Catalog
- Data Vaults
- Change Documentation
- Serialization Location and Status
- Workflow

System Administration

- Group Management
- Access Controls
- User Profiles
- Utilities

Workflow

Electronic Workbasket Routing

Workflow Management

- Workflow Critical Path Creation
- Task Definition and Modification

Project Management

- Project Creation and Launch
- Workflow Assignment and Tracking
- Electronic Workpackage
- Statusing and Metrics

Implementation Planning and Direction

Work-in-Process Status Tracking and Metrics



Standards Compliance

LCSIS is a proactive step toward ISO 9000 compliance.

LCSIS, with its comprehensive data control, tracking, and reporting functionality, is a cost-effective way to implement quality and configuration management standards compliance in a complex environment. LCSIS was designed to be compliant with a number of commercial, government, and educational standards and was developed in accordance with the curriculum requirements of the Institute for Configuration Management (ICM) at Arizona State University. Specific attention was paid to the details of ICM's *CM Software Input and Output Requirements*. This document describes the software requirements needed to support a CMII oriented CM process. Physical item hierarchy, physical item-to-document linkage, baseline, and the change process were closely followed.

LCSIS follows the models contained in Electronic Industries Association (EIA) draft Interim Standard EIA/IS-649, *Configuration Management*, including the Change Management and Configuration Management Sophistication Models. LCSIS manages the data specified in *Typical Status Accounting Information Across the Product Life Cycle*. Because many LCSIS users are engaged in international business, the contents of the International Organization for Standardization publication ISO 10007, *Quality Management - Guidelines for Configuration Management*, were examined in detail to ensure that LCSIS complies with required international quality standards. To ensure that the system could be used in a military environment, both as a production tool and as an auditing tool, MIL-STD-973, requirements were incorporated. Close attention was paid to multiple concurrent baseline management and detailed configuration status accounting.

In keeping with the *management responsibility* clause of ISO 9000, LCSIS embeds relevant company policy in change control and workflow features and makes it available throughout the organization. The LCSIS vaults, workflow task templates, and

workflow folders help ensure that *quality systems* are documented. In the same way, production, installation, inspection, and testing procedures are available to product designers. The *contract review* procedures, embodied in a workflow template with its associated narratives, are stored in the LCSIS vault. These procedures are available to designated reviewers, including customers who are given LCSIS access.

Regulatory requirements, industry standards, and existing engineering notebooks are linked to product structures under development through vault entries, supporting ISO 9000 *design control* goals. LCSIS also offers comprehensive, automated change control through BOM, as-planned, as-built, and as-modified baselines. LCSIS workflow user/role assignments and tasking in workflow templates clearly define responsibility and authority for design and development matters, satisfying numerous *design control* requirements. For example, a workflow task could direct production to examine drawings attached to the workflow for realistic production tolerances, queue the drawing package to a checker, or initiate a design review by third parties given LCSIS access. Checklists and reference documents, such as regulatory requirements, industry standards, and existing engineering notebooks are attached to these workflows (or to product structures under development, using vault entries).

LCSIS baseline and parts features support ISO *purchasing* requirements. LCSIS maintains an approved vendor list against each part in the database. Parts data can be retrieved for specific baseline line items, or through a powerful query against the entire parts database. Inspection records for *customer-and-purchaser-supplied products* can be entered into the LCSIS electronic vault against the appropriate baseline item.

Standards Compliance (cont'd)

The LCSIS vaults provide rigorous *document control* by linking related digital objects. In LCSIS, the term “documents” means digital objects • word processing files, scanned image files, CAD drawing files, audio or video files etc. Designated users may update vaulted documents by using the automated LCSIS change control process. Because users are referencing the same electronic copy of the document, changes are instantly available. LCSIS configuration baselines establish clear *product identification and traceability* for each product, permitting unique, unambiguous marking of components, assemblies, and products. The as-built product serialization tracking feature can also be used for product batch tracking.

Product structure and as-built serialization data ensure that the product undergoing *inspection and testing* is adequately identified. Relevant *inspection, measuring, and test equipment* standards are instantly available from the LCSIS vault. Workflows can also be used to schedule periodic calibration of measurement devices used in product development. Folders contain *inspection and testing* plans; test plans, results, and inspection records can be attached electronically to the workflow folder. These workflows ensure that only goods that have passed all inspections are released to the customer, in accordance with *inspection and test status* requirements. Product baselines also provide data for *handling, storage, packaging and delivery* functions to identify the product in sufficient detail.

Handling, storage, packaging, and delivery workflows can be used to ensure that stored products are inspected for deterioration on a regular basis. LCSIS change control processes and related folders help ensure that the *quality system* is complete and documented. The task initiation and flow of information controlled by defined processes ensure that the intent of the Quality Manual is realized in practice. *Quality records* are saved in the LCSIS vault or in electronic folders linked with workflows and automated processes. These files can be backed up onto reliable media for long-term, tamper-free storage. *Internal quality audits* can be regularly scheduled with workflow templates. Templates designed to route the audit task

Finally, in support of ISO 9000 *servicing* clause requirements, LCSIS permits authorized users (in the service department, for example) to submit a trouble report to design engineering, initiating a workflow process. Users can monitor the status of submitted reports, and receive a workbasket message regarding the disposition of their trouble report. LCSIS offers an automated formal review and approval process for deviations and waivers to support *control of nonconforming products*.