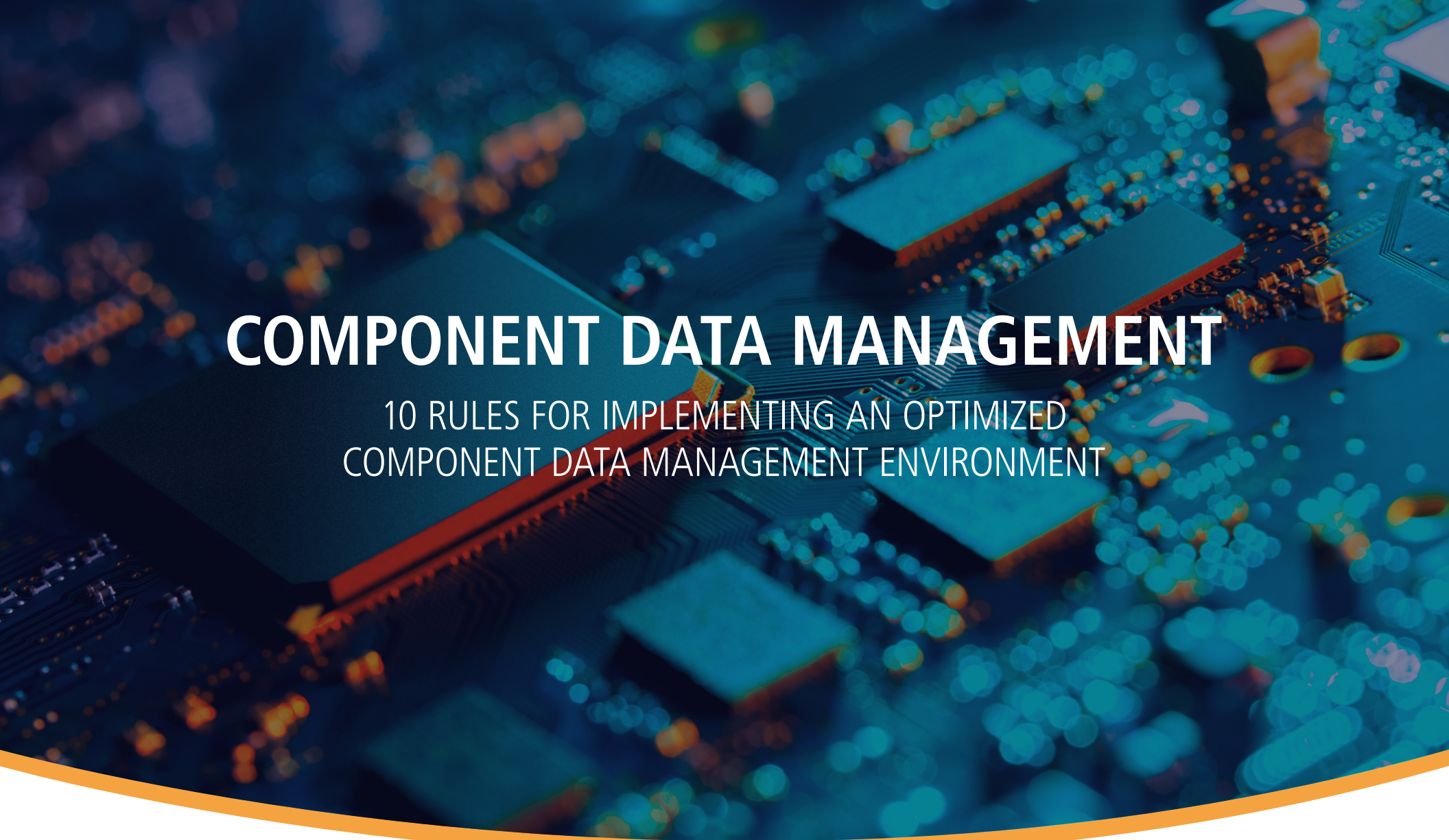




COMPONENT DATA MANAGEMENT

10 RULES FOR IMPLEMENTING AN OPTIMIZED
COMPONENT DATA MANAGEMENT ENVIRONMENT

HOW TO MAKE YOUR COMPONENT LIBRARIES AN ASSET INSTEAD OF A LIABILITY

Design teams often see component data management as a necessary evil that just “needs to be done” as part of the design process. While we agree managing your component data is necessary, when done properly it can also be a significant asset to help differentiate you from the competition.

This e-book will walk you through some best practices to implement a component data management environment that will help you increase collaboration, reduce costs, and avoid errors.

“72% of best-in-class organizations see their component libraries and data as IP critical to their organization.”

— Source Aberdeen group

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COMPONENT DATA MANAGEMENT

WHAT IS A DATABASE-DRIVEN LIBRARY?

Component libraries contain the building blocks for your PCB designs. Like building a home, one crack in the foundation can cause a myriad of issues, the same goes for libraries. Your current process for component library creation and management may consist of various methods:

Individual Machines

Each engineer having their own locally hosted library of symbols and footprints.

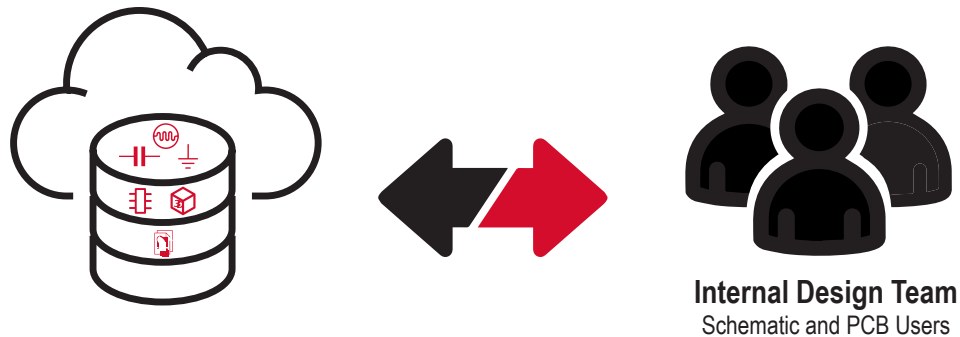
Shared Drives

A shared server location containing folders of component data, symbols, and footprints.

Piecemeal Component Management

A combination of methods such as a spreadsheet containing component data and a repository for symbols and footprints.

Through these manual methods for component library management, there is no way of tracking part approval, revisions, or linking the correct symbols, footprints, 3D models, or datasheets. This increases the possibility of errors and the likelihood of designing with unapproved parts or mismatched symbols and footprints. These issues and more can be solved with a database driven library. Let's first take a look at the typical flow and environment of a database driven library.



First, you have your database which contains the component information and links to part data, symbols, footprints, 3D Models, and datasheets. Then you have your design team, comprised of electrical engineers, PCB designers, component engineers, contract manufacturers, and other team members. With a database driven library, a link is provided between your database and your design team, providing efficient access, preferably within your CAD tool, to verified and approved component data. Properly managing component data through the creation of a centralized, database driven library system empowers teams to effectively collaborate and minimizes errors. Determining and managing the contents of the database can seem like an overwhelming task, so we've compiled our top 10 rules for Implementing an Optimized Component Data Management Environment.

1. PLAN FOR GROWTH AND CHANGE

Your component database must be able to adapt as your designs evolve, your team grows, and technology advances. Often as designs grow in complexity, additional information is required to successfully implement components into a PCB, such as associated models for simulations or 3D representations, supply chain information, and purchasing data. By implementing a library schema that can be modified to accommodate your increasing needs, you can plan for growth while creating consistency for your component library. This can be achieved by incorporating:

Your Specific Data Needs

The first step in implementing a component data management solution is determining your database schema. This is comprised of the data that will be required for your designs. To determine this, you should consider what part attributes are important for component selection as well as what information is required to purchase the components. At a minimum, fields should include information such as company part numbers, part life cycle, distributor information, and critical parametric information but can be expanded to include PLM part numbers, compliance data, component risk, and more.

Customizable Data Structure

Be sure your library schema is set up for growth by establishing additional fields that can be utilized in the future. Since the required fields for components may change in the future, ensure the additional fields in your database schema are customizable to allow for what the future holds.

Customizable Tables and Views

The information designer's need to review for part selection may change over time. Ensure the tables and views in your component database are customizable so user's can always see what's important upfront.

Standard Incremental Part Numbers

☒ Enable Incremental Part Numbers For Each View ▼			
	View	Prefix	Digit Width
	Capacitors	CAP-	8
	Connectors	CON-	8
	Crystals and Oscillators	XTL-	8
	Diodes	DIO-	8
	ICs	IC-	8
	Inductors	IND-	8
	Mechanical	MECH-	8

Create consistency in the way parts are numbered. This will set your component database up for success, regardless of what the future holds. Create a standard prefix for each type of component as well as a standard allocation of digits for the numerical portion of the part number. **Example:** RES-00000001



Note: A system that will automatically increment your part numbers is the best way to eliminate duplicates and ensure everything stays in sync.

2. LEVERAGE KNOWN-GOOD COMPONENTS WHILE GETTING RID OF THE JUNK

Many companies hoard years of data containing a plethora of obsolete parts. When transitioning to a streamlined component data management environment, you must determine what data is necessary. Maintaining components that are no longer used, whether they are obsolete or not the latest technology, can create an expansive component database. Instead of bogging down the design process and having engineers sort through useless components, accelerate part selection by providing access to only known-good components. This can be achieved by:

Bulk Import

If you are starting from scratch, there is no need to consider legacy data or previous parts used and you can build your database with real-time data from the ground up; however, if you are coming from an existing database, perform a bulk import of known-good component data to start your database on the right track.

Conditional Display

Admin - Users, Roles & Permissions

UsersRolesField PermissionsHide Rule

	Enable	Hide Part Field	Values	Apply to Roles	Comment
 	☐	Company Part Status	Obsolete	Read Only	Do not display obsolete parts for part selection.

Display ONLY active and approved parts in the component database to ensure users don't choose obsolete or unavailable parts for their designs.

Bulk Delete

Delete obsolete components or legacy data in bulk to keep your component database optimized and up to date.



Note: Beginning a component database with a subset of recent or active designs and BOMs is a good place to start migrating known-good component data.

Data Validation

Configuration☒ SimulateAdd OnlyAdd and Update

8%

New Component Parts:	0	New Manufacturer Parts:	5
Updated Component Parts:	0	Updated Manufacturer Parts:	904
Parts Processed:	435	New Distributor Parts:	827
		Updated Distributor Parts:	0
Start Time:	2024-02-09T06:57:14.2577192-05:00		
End Time:			
Processing Time:			
Last Error:			

Importing data can be a time-consuming process. Obtain a preview of the bulk import before moving forward to verify part additions and changes prior to commitment.

3. MANAGE CHANGE

Once the component database is created, it is going to be subject to constant change in the form of new components added to the database, modifications to existing components, changes to part status and availability, or the addition of new team members. It's important to manage this change to keep a consistent and reliable component database. Successful change management can be achieved by implementing:

User Roles

[illegible]

Create roles for librarians, designers, administrators, or stakeholders to ensure only users with specific access can modify and approve component data.

Customizable Permissions

By defining permissions such as read only access and the ability to delete or update components, you can guarantee accuracy and maintain data integrity.

Required Component Fields

When new components are added to the database, guarantee specific fields are completed to create a robust and thorough library.

Detailed History and Revision Tracking

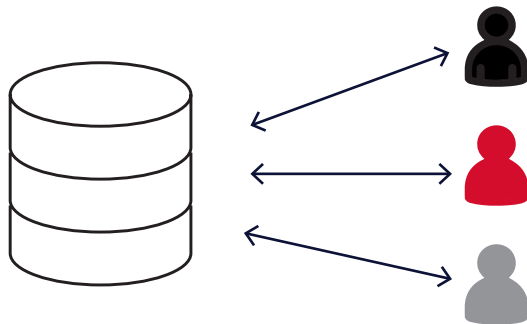
Component History		Component to Manufacturer History
Last Modified	2/9/2024 9:09:53 AM	2/8/2024 2:58:33 PM
Last Modified By	Admin	Admin
PART_NUMBER	IC-00000001	TMP-1
Part Type	General Purpose\General Purpose	Unassigned Part Type
Description	IC COMPARATOR 4 DIFF 14DIP	IC COMPARATOR 4 DIFF 14DIP
Value	LM339N	LM339N
PCB Footprint	n14	n14
Schematic Part	ULdownloads\LM339N	ULdownloads\LM339N
Number of Pins		
Operating Temperature Maximum	0C ~ 70C	0C ~ 70C
Operating Temperature Minimum	0C ~ 70C	0C ~ 70C
Package Size	14-DIP (0.300", 7.62mm)	14-DIP (0.300", 7.62mm)
Package Height		
Package Type	Through Hole	Through Hole
Company Part Status	Approved	

Detailed history and revision tracking allows you to review component modifications including the fields changed, modification date, and the user who completed the change. If an incorrect change to the database occurs, detailed history and revision tracking will help you determine where or how defects were introduced.

4. ENABLE COLLABORATION

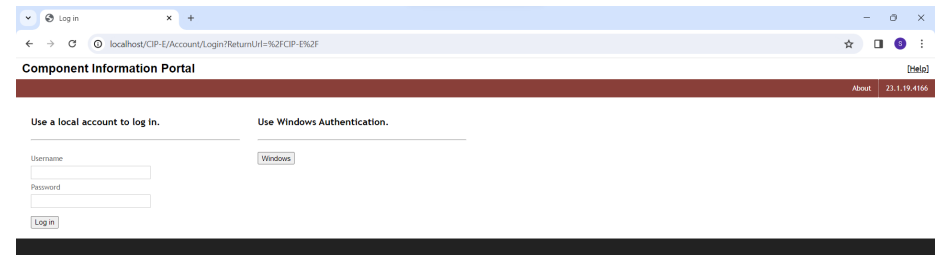
All libraries and component data should be accessible for all team members. A shared, centralized library can break down silos, reduces the time spent redundantly creating parts, drive consistency, and improve productivity. Enable efficient collaboration for all team members with:

Centralized, User-Based Access



Instead of each user hosting and managing their own component databases, providing centralized access with a server or cloud configuration ensures all users are sourcing approved, validated data.

Web Access



Controlled access through permissions should be given to design partners such as Original Design Manufacturers (ODMs), Contract Manufacturers (CMs), and service bureaus so everyone is pulling parts from a common dataset. A web-based portal allows them to easily access your component data.

5. DATA-DRIVEN PART SELECTION

An optimized component data management environment contains more than just component parametrics. It is important to include simulation models, datasheets, 3D MCAD models, parametric data, and other relevant attributes. A centralized parts database should provide a one-stop-shop for any data or model you may need for your design efforts. This data must be easily searchable and display the information designer’s need to facilitate better choices. A robust ECAD library needs to enable intelligent part choices early in the design cycle with:

Searchable Metadata

	Value	Equals (=)	10k
	Company Part Status	Does Not Equal (!=)	Obsolete
	Package Type	Contains	SMD

☐ Include Additional Fields in Search Results

DRAFT

1000000

Designers need to efficiently find the parts they are looking for in the component database. With expansive databases, search capabilities are required to quickly find parts based on part type, component value, company part status, approved manufacturers, cost, lead time, and more.

Centralized Location for Data

To make informed part decisions, designer’s need to review all the associated part data including part parameters, purchasing information, datasheets, simulation models, symbols and footprints, compliance data, and more. Streamline this process by providing a centralized location for all part data.

Saved Search Configurations

Select a Search

Saved Search		Default Search
Obsolete	Delete	Set Clear

Personal

Obsolete

RoHS Compliance

To accelerate the part selection process, allow designers to save search configurations. This will expedite the search process for commonly used components.

Example: Saving a search configuration for approved components that comply to RoHS standards will guarantee the components being selected are available and meet the environmental standards required for your project.

6. ENABLE FASTER PART RESEARCH

Engineers spend hours researching the components required for a PCB design. This includes searching manufacturers or distributor's websites, reviewing and comparing component information and datasheets, and analyzing purchasing information to determine which part is the optimal design choice. Since this is a large time-sink in the design process, it should be streamlined when implementing an optimized component data management environment. Enable faster part research with:

Integrated Access to Multiple Distributors



Minimize the time spent searching the websites of multiple distributors and manufacturers by implementing software that provides integrated access to distributor data. This integration will allow you to perform a single search across multiple distributors directly in your CAD tool so you can quickly review and compare component information.

Intelligent Searching

Distributor Search

Distributors

☐ Arrow ☒ DigiKey ☐ Future ☒ Mouser ☒ Newark

Search Type

Keyword

Search Text

1uf cap 0402

Search

Options

☒ In Stock ☒ RoHS Compliant ☒ Lead Free

Intelligent searching allows you to search by keyword or manufacturer and automatically filters components that are in stock, RoHS compliant, or lead free. This will save time by providing you with only the components that adhere to your project requirements and timeline.

Real-Time Purchasing Information

Review real-time purchasing information from multiple manufacturers without leaving your CAD tool to determine if the price, quantity on hand, and lead time for the selected component align with your project requirements.

Quantity On Hand	Price
12279025	USD 0.00191
12282786	USD 0.1
12282786	USD 0.1
3750000	USD 0.00185
3763950	USD 0.1

7. STREAMLINE THE NPI PROCESS

With the constant influx of new electronic components into the market, it is impossible for your component database to remain unchanged. Your component data management solution should not only accommodate the new part introduction (NPI) process but optimize it.



Standard New Part Introduction (NPI) Process

Typically, when a new component is required for a design, the designer must research the component and create a part request. The part must then be reviewed and approved before the component models can be made and incorporated into the PCB design. If not optimized, this can be a lengthy process resulting in design delays, especially when multiple new parts are required for a design.

To streamline the NPI process within your component data management solution, you should employ:

User Roles and Permissions

Temporary Parts

Parts

Configure Display

☐ Include Assigned Parts

Username: All

	Component View	Original TMP Number	Creation Time	Username
Place	ICs	TMP-1	February 08, 2024, 14:58:33	Admin

Ensure user role and permissions are configured to guarantee only librarians or administrators are reviewing and approving the parts. This will guarantee the accuracy of the data entered into your component database.

Temporary Parts

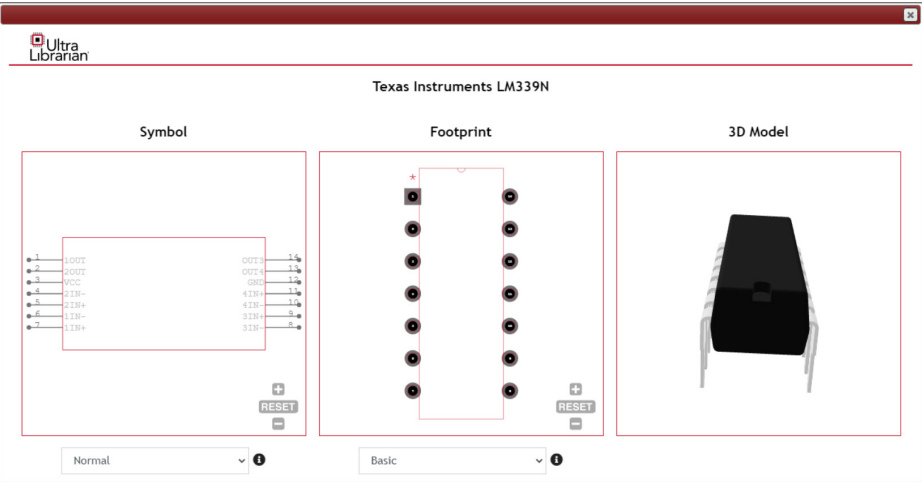
Temporary parts allow users to continue with the design process as the new part request is reviewed and approved by a librarian or administrator.

Automatic Notifications

Configure automatic notifications to keep the new part introduction process flowing. Email notifications can alert librarians to new part requests as well as alert designers once a part has been approved.

7. STREAMLINE THE NPI PROCESS

Pre-Built CAD Models



CAD model creation can be a time-consuming aspect of the NPI process, especially for large pin count or complex components. Integrated access to pre-built symbols, footprints, and 3D models can accelerate this process and allow you to associate verified CAD models to new database components.

Automated Data Entry

When creating a new part request, parametric data such as part number, description, manufacturing information, part attributes, and more need to be provided. This is a monotonous, error-prone process that can result in confusion and additional time spent reviewing and correcting issues. With automatic data entry, all part information is pulled automatically from distributors, eliminating human errors and saving time.

Database Synchronization

Distributor Sync				
☒ Arrow	☒ DigiKey	☒ Future	☒ Mouser	☒ Newark
Last Start	Last End	Progress		
Sync				

Schedule Sync				
Enable	Distributors			Schedule Sync
☒ Save	☒ Arrow	☒ DigiKey	☒ Future	Every x Days
	☒ Mouser	☒ Newark		Start Time
				1
				12:00 AM

Once the new part is approved, the information must be synchronized between the schematic design and component database. Implement seamless integration between your component database and CAD environment, to automatically identify component changes and quickly update the design.

8. INTEGRATE SUPPLY CHAIN RESILIENCE

Reviewing parametric information alone is not enough to ensure component procurement. Supply chain information (from trusted, reliable sources like SiliconExpert) needs to be analyzed throughout part selection to guarantee design resiliency and longevity. Take this a step further and integrate the following information into your component data management solution to provide the best chance of design success:

Part Availability

To ensure supply chain resiliency, more than just quantity on hand and price need to be evaluated. Inventory risk and multi-sourcing risk should be analyzed to ensure the components can be sourced from multiple distributors or manufacturers. Accurate lead times should also be reviewed to guarantee components can be purchased within the time constraints of the project.

Part Status and Lifecycle

Property	Value
LifeCycleData - PartStatus	ACTIVE
LifeCycleData - LifeCycleRiskGrade	LOW
LifeCycleData - PartLifecycleStage	MATURE
LifeCycleData - EstimatedEOLDate	2034
LifeCycleData - EstimatedYearsToEOL	9.9

Part status and lifecycle needs to be considered during part selection as well as predicted obsolescence and years to end of life. When selecting a component, you need to make sure the component is active and in the beginning stages of its lifecycle to ensure the part will be available for the duration of your product's life. Selecting a component that is Not Recommended for New Designs (NRND) or one that is listed as Last Time Buy (LTB) may result in premature design revisions.

Compliance Data

The components selected for the design must adhere to the environmental and regulatory standards outlined for the project requirements. Make sure to analyze compliance to relevant industry standards which can include RoHS, Conflict Minerals, Reach, Lead Free, and/or Halogen Free.

Component Risk

RiskData - InventoryRisk	HIGH
RiskData - LifecycleRisk	HIGH
RiskData - LifecycleStage	OBSOLETE
RiskData - MultiSourcingRisk	HIGH
RiskData - RohsRisk	HIGH

Overall component risk is a good way to gauge supply chain resiliency for your designs. This combines common risk categories such as counterfeit risk, inventory risk, lifecycle risk, and more to provide guidance for your part selection.

9. CONSIDER PURCHASING

Once a Bill of Materials (BOM) is submitted, component procurement begins. If a BOM is rejected or there are errors, it can lead to delayed time to market and redesign/re-spins. If you have access to the right data, BOM generation should be a simple file export, not a laborious manual process that takes focus away from the design. Your library and CAD tools should contain all the information needed by purchasing and manufacturing prior to BOM upload into the enterprise business system (ERP, MRP, or PLM). To ensure successful component procurement, consider purchasing in your component data management solution by implementing:

Multi-Sourcing

Distributor	Distributor PN	Quantity	Cost	Unit Price
Digi-Key	399-17254-1-ND	99239	USD 0.1 (1-9), 0.061 (10-49), 0.0352 (50-99), 0.0272 (100-499), 0.0205 (500-999), 0.01611 (1000-2499), 0.01464 (2500-4999), 0.01347 (5000-)	0.1
Mouser	80-C0603C103K5R7411	102687	USD 0.100 (1-9), 0.034 (10-99), 0.020 (100-999), 0.016 (1000-2499), 0.013 (2500-9999), 0.011 (10000-14999), 0.010 (15000-44999), 0.009 (45000-)	0.1
Newark	68AC4769	90000	\$ 0.022 (1-14999), 0.022 (15000-999999999)	0.022

Define multiple distributors and manufacturers for components to provide purchasing options. Deploying a relational database schema will allow you to associate multiple sources to parts without creating a redundant, expansive component library.

Zero Touch BOMs

Integrate real-time distributor and supply chain information into your component database to produce a BOM that requires no adjustment or a “Zero Touch BOM”. All information should be pulled directly from your component library, saving time and minimizing errors common with manual entry.

PLM Integration

Enterprise System



Distributor Data
Part Quantities
Manufacturing Data

ECAD Database



Bi-directional integration with your company's PLM, ERP, or MRP system will ensure all part data in your component database is in sync and up to date, streamlining the purchasing process.

10. ACTIVELY MANAGE THE LIBRARY

Once the component database is created, it needs to be actively managed and updated. While your library should provide an area to store all qualified symbols, it needs to be a source of up-to-date information. The electronics supply chain changes rapidly; if your data isn't updated in the component database, designers could be basing their component selection off incorrect information. For example, if the quantity on hand for a component was updated a month ago and it is no longer available, the lead time associated with purchasing the component may result in a delayed time to market. Managing library information manually can be a job on its own. To efficiently manage your component library, you should incorporate:

Automatic Updates

Distributor Sync

☒ Arrow ☒ DigiKey ☒ Future ☒ Mouser ☒ Newark

Last Start

Last End

Progress

Sync

Schedule Sync

Enable

Distributors

Every x Days

Start Time

Save

☒

☒ Arrow ☒ DigiKey ☒ Future ☒ Mouser ☒ Newark

1

12:00 AM

Instead of manually researching and updating purchasing or supply chain information, automatically synchronize your component database with distributors based on your preferences (hourly, daily, weekly, etc.).

Real-Time Information

Part Data	
Property	Value
DigiKey PN	296-1393-5-ND
Description	IC COMPARATOR 4 DIFF 14DIP
Manufacturer Name	Texas Instruments
Manufacturer Part Number	LM339N
Category	Linear - Comparators - Comparators
Quantity On Hand	76396
Primary Datasheet	https://www.ti.com/general/docs/superoorderinfo.tsp?distid=108&otolUrl=https://www.ti.com/2Ffile%2Fgon%2Fm339
Standard Pricing	USD 0.46 (1-9), 0.398 (10-24), 0.3712 (25-99), 0.2969 (100-249), 0.27572 (250-499), 0.23332 (500-999), 0.18028 (1000-2499), 0.16438 (2500-4999), 0.15377 (5000-)
RoHS Info	ROHS3 Compliant
Unit Price	0.46
Primary Photo	https://mm.digikey.com/Volume0/qsasdata/d220001/medias/images/4846/296_14-DIP.jpg

Real-time information from distributors, manufacturers, and supply chain experts during the new part introduction process will guarantee accurate, up-to-date data. Real-time information should include:

☒

Quantity On Hand

☒

Quantity On Order

☒

Unit Price

☒

Manufacturer Lead Time

☒

Distributor Lead Time

☒

Minimum Order Quantity

☒

Product Status

13

ACHIEVING AN EFFECTIVE COMPONENT DATA MANAGEMENT SOLUTION

If you make component data management too hard for your users, THEY WON'T DO IT. Your PCB design environment needs to automate repetitive tasks in the design flow and keeps users in their CAD tools to eliminate working across multiple systems. With an effective library management strategy in place, your library can give you a competitive advantage- designers can work more efficiently, improve collaboration, reduce costs, and expedite your time to market.

Accelerate your design process with centralized, shared access to your component library with OrCAD CIP. OrCAD CIP helps you build a solid foundation with a well-structured library to reduce costs, eliminate manual errors, maintain data integrity, and speed product development. OrCAD CIP has the necessary tools to optimize your component data management with:

- ✓ A Starter Library and Database Schema
- ✓ Real-Time Distributor and Supply Chain Integration
- ✓ Customizable User Roles and Permissions
- ✓ Zero Touch BOM Generation
- ✓ Integrated New Part Introduction Process
- ✓ Access to Pre-Built, Verified CAD Models

For more information on integrating component data management to your PCB design process visit:



info@ema-eda.com



go.ema-eda.com/CIP

EMA Design Automation is a leading provider of the resources engineers rely on to accelerate innovation. Based on decades of engineering expertise, we provide solutions that include cutting-edge PCB design and analysis packages and customized integrations to optimize your electronic development workflow and create more efficiently.