



# Contents

- Introduction** 3
  - Why Move Away from Spreadsheets? 3
  - Limitations of Document-Based Systems 4
  - When Is It Time to Upgrade? 5
- Effective Bill-of-Materials (BOM) Management** 6
  - Best Practices 6
  - Key Use Cases of a BOM Management System 7
  - Tips to Select the Right Tool 10
- Introducing Alitum BOM Portal** 11
  - Capabilities Overview 12
  - ROI Calculations 13
  - BOM Portal in Altium 14
- Ready to Build Supply Chain Resilience?** 15

## Introduction

In the high-stakes world of electronics design, success depends on both engineering excellence and supply chain resilience. While teams invest heavily in perfecting technical designs, many still manage their Bills of Materials (BOMs) using basic spreadsheets and fragmented systems - a practice increasingly out of step with today's complex supply chain realities.

The global component shortage that began in 2020 resulted in an estimated \$121 billion in lost revenue for the electronics industry [1]. Lead times extend from the typical 12-16 weeks to 40+ weeks for many semiconductors [2]. Nearly 750,000 electronic parts went end-of-life in 2022 alone [3], creating persistent challenges for hardware teams.

This whitepaper examines why leading electronics companies are moving beyond spreadsheets to implement dedicated BOM management solutions that strengthen supply chain resilience, reduce costs, and accelerate time-to-market.

## Why Move Away from Spreadsheets?

Spreadsheets have been the default BOM management tool for decades - they're familiar, flexible, and seemingly cost-effective. Yet this approach introduces significant hidden costs and risks:

1. **Data Currency Problems:** Component availability, pricing, and lifecycle status change continuously. A BOM spreadsheet becomes outdated almost immediately after creation, leading to procurement errors and delays.
2. **Manual Error Risks:** Industry data shows 80% of PCB designs require component replacements, with each taking 40 hours to resolve [4]. Spreadsheet-based BOMs amplify these errors through manual entry and tracking.
3. **Collaboration Friction:** BOM spreadsheets are typically emailed between departments, leading to multiple versions circulating simultaneously with no clear "source of truth."
4. **Limited Component Intelligence:** Spreadsheets contain only manually entered data without integration into supplier databases, visibility into compliance, or lifecycle status.
5. **Time-Consuming Maintenance:** Engineers report spending up to 30% of their time researching and selecting parts in traditional workflows [5] - time that could be devoted to design innovation.

The true cost of spreadsheet-based BOM management emerges when considering both direct costs (engineering hours) and opportunity costs (delayed product launches, suboptimal component selections, and reactive—rather than strategic—procurement).

# Limitations of Document-Based Systems

Beyond simple spreadsheets, some organizations use document management systems, general PLM tools, or ERP modules for BOM management. While these systems offer improvements over basic spreadsheets, they still present significant limitations for electronics teams.



## Poor Scalability

Spreadsheets and documents may work for small projects but fail when managing multiple initiatives or complex products with hundreds of components. As project complexity grows, manually tracking changes becomes increasingly difficult.



## Outdated Specifications

Without up-to-date information or connections to authoritative data sources, teams risk making decisions based on outdated information, resulting in design mistakes, rework, and production delays.



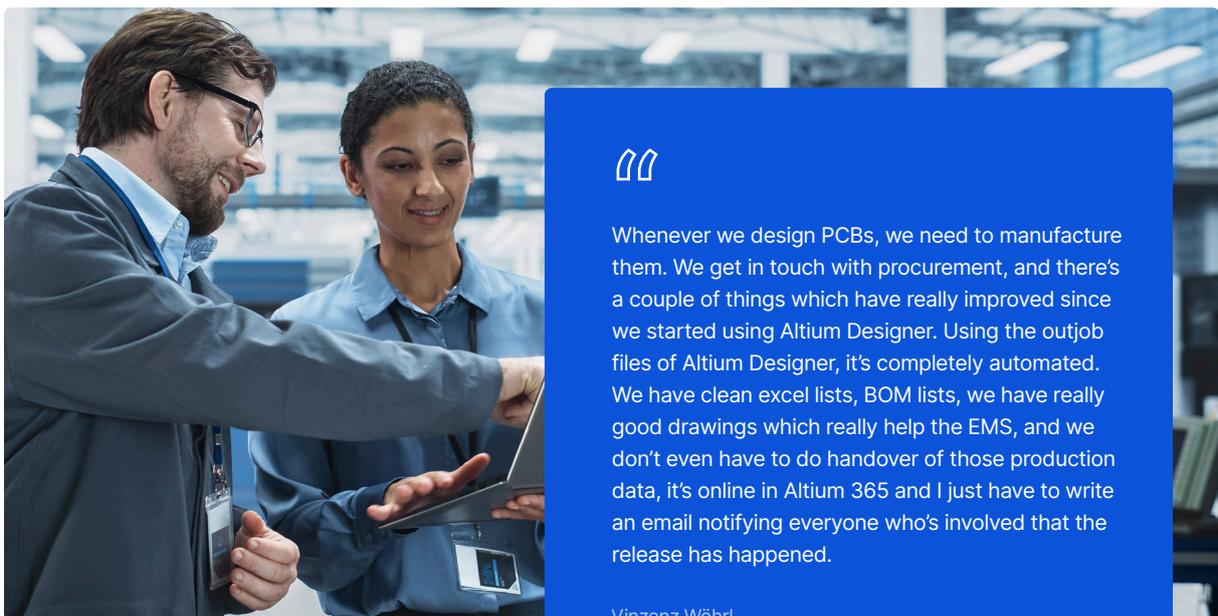
## High Maintenance Burden

The hidden costs include manual data entry, cross-checking information across systems, creating reports, and resolving discrepancies between engineering and procurement data.



## Fragmented Supply Chain Visibility

Document-based systems fail to provide integrated supply chain intelligence: no automatic flagging of high-risk components, limited visibility into global stock levels, and poor traceability of component decisions.



Whenever we design PCBs, we need to manufacture them. We get in touch with procurement, and there's a couple of things which have really improved since we started using Altium Designer. Using the outjob files of Altium Designer, it's completely automated. We have clean excel lists, BOM lists, we have really good drawings which really help the EMS, and we don't even have to do handover of those production data, it's online in Altium 365 and I just have to write an email notifying everyone who's involved that the release has happened.

Vinzenz Wöhrle,  
Teamlead Electronics, Quantum Systems

# When Is It Time to Upgrade?

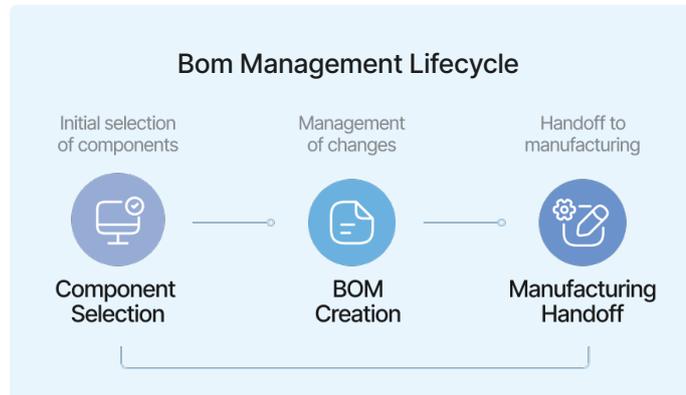
While no universal threshold exists for transitioning from spreadsheets to a dedicated BOM management solution, several indicators suggest your organization would benefit from upgrading:

1. **You've experienced costly redesigns due to component availability issues:** Industry data shows a single PCB respin costs approximately \$46,000 on average [6], with companies averaging 2.8 respins per project.
2. **Your engineering team has grown beyond 10 members:** The informal processes that worked for smaller groups break down as teams grow.
3. **You regularly manage BOMs with 100+ unique components:** The complexity of manually tracking availability, pricing, and lifecycle information grows exponentially with component count.
4. **Your team spends 2+ hours weekly just managing BOM data:** If engineers dedicate significant time to BOM maintenance rather than design work, it represents both direct and opportunity costs.
5. **Your products must comply with regulatory standards:** Maintaining compliance documentation manually introduces a significant risk for products subject to RoHS, REACH, or industry-specific regulations.
6. **Production delays due to BOM errors have impacted your business:** If miscommunications between engineering and procurement have resulted in wrong parts being ordered or assembly delays, these represent the visible costs of an inadequate BOM management process.
7. **Components represent a significant percentage of your product cost:** When components constitute a major portion of your COGS (Cost of Goods Sold), even small improvements in procurement efficiency or component selection can substantially impact margins.

For organizations experiencing three or more of these indicators, the ROI for implementing a dedicated BOM management solution becomes compelling. The cost of the status quo—in terms of engineering inefficiency, procurement challenges, and production delays—typically exceeds the investment required for modernizing BOM processes.

# Effective Bill-of-Materials (BOM) Management

Transforming BOM management from a static documentation exercise into a dynamic, collaborative process requires adopting both best practices and purpose-built tools. This section outlines proven approaches that leading electronics companies implement to reduce costs, accelerate time-to-market, and build supply chain resilience.



## Best Practices



### Establish a “Single Source of Truth” for BOM Data

Centralize BOM data in a cloud-based platform accessible to all stakeholders. This eliminates conflicting versions and ensures everyone works with current information. Key implementation steps include deploying a cloud-based platform with controlled access, establishing clear roles and permissions, and implementing version control.



### Integrate Up-to-Date Component Intelligence

Incorporate live data on component lifecycle status, availability, pricing, lead times, and compliance status. This intelligence enables informed decisions throughout the design process.



Right when we start the design we can already make the decision about if the part is good for the designs. With Octopart and now with the new procurement module in Altium 365, we have all the information we need, we don't have to look it up, it's all there.

Vinzenz Wöhrl,  
Teamlead Electronics, Quantum Systems



### Implement Formal Alternate Part Management

Identify and qualify multiple sources during the design phase, document approved alternates directly in the BOM, and track alternates' availability. This approach creates flexibility to navigate supply constraints without compromising product integrity.



### Establish Cross-Functional Collaboration Workflows

Involve procurement early in the component selection process, create standardized handoff procedures, and use data-driven metrics to track BOM health. Component decisions balance technical requirements, cost, and supply chain resilience when engineering and procurement collaborate from the earliest design stages.

# Key Use Cases of a BOM Management System

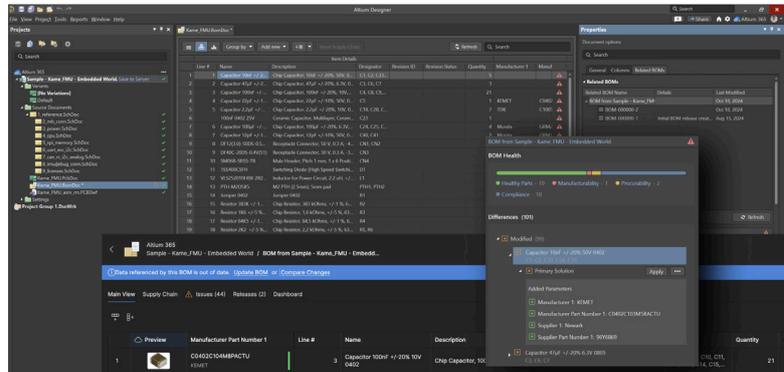
Modern BOM management solutions address specific challenges that spreadsheets cannot effectively handle. Understanding these use cases helps organizations identify where dedicated tools deliver the greatest value.

## Engineering-Procurement Collaboration

Cloud-based BOM management systems bridge the traditional gap between engineering and procurement teams, creating a unified workspace for both disciplines.

They eliminate disconnected workflows where procurement typically joins too late in the process, often discovering issues after design completion when changes are most expensive.

A user-friendly interface simplifies BOM management by making critical data accessible to all stakeholders throughout the product development lifecycle.

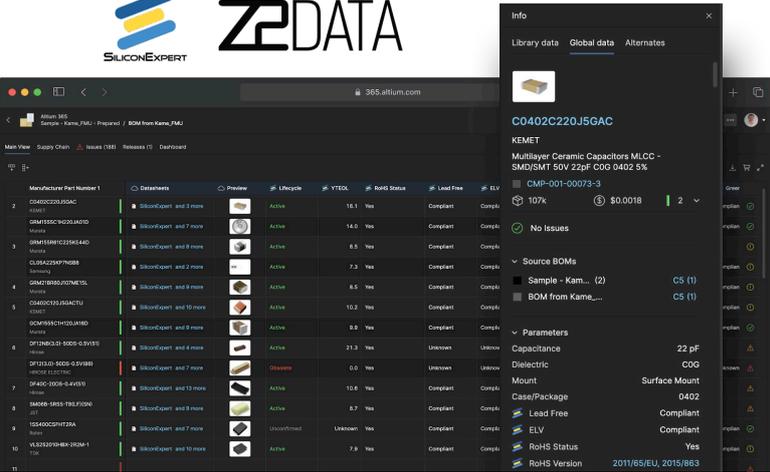


Cloud-based BOM Portal enabling real-time collaboration between engineering and procurement

““

Usually there are questions when you start producing stuff, the EMS has questions, and the PCB production house has questions. Since we started using Altium Designer, the smart guys in procurement, they noticed they can look at the designs themselves using Altium 365, and maybe some of these questions they can answer themselves. It's amazing right?

Vinzenz Wöhrl,  
Teamlead Electronics, Quantum Systems



BOM Dashboard highlighting component lifecycle state, availability, and compliance risks

## Supply Chain Intelligence & Risk Management

Effective BOM management is a rigorous and data-driven process.

BOM management systems facilitate access to comprehensive component data, including lifecycle status, compliance information, inventory availability, and pricing from multiple sources.

These systems also support the identification and qualification of alternative components, ensuring continuity when supply chain disruptions occur.

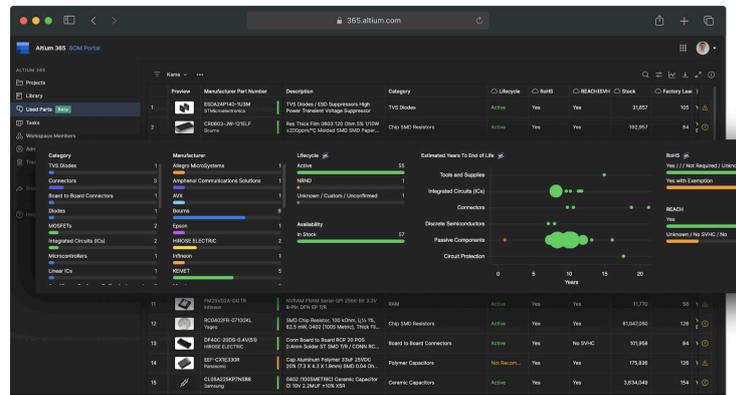
## Cross-Project Parts Visibility & Management

Hardware teams need visibility across projects to maintain consistency and maximize efficiency.

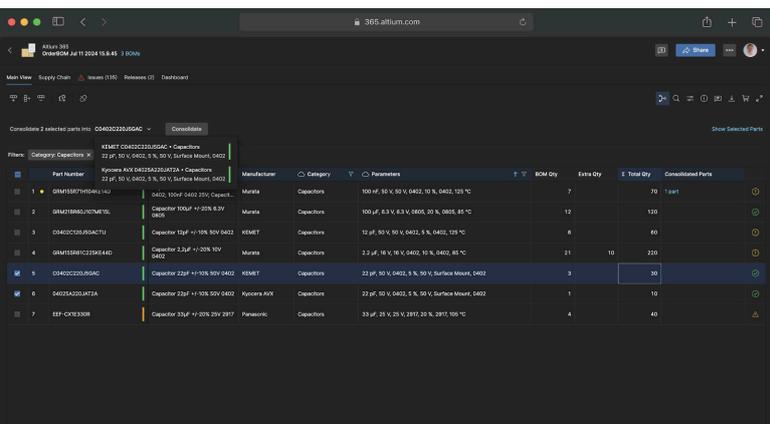
BOM management systems provide centralized visibility into every component used across all projects, including lifecycle statuses, availability, and compliance.

By identifying opportunities to consolidate similar parts across designs, organizations can reduce complexity, cut costs, and enhance design consistency.

Comprehensive part usage tracking enables better planning, faster decision-making, and more effective component obsolescence management.



Cross-project component tracking showing where parts are used, their status, and consolidation opportunities



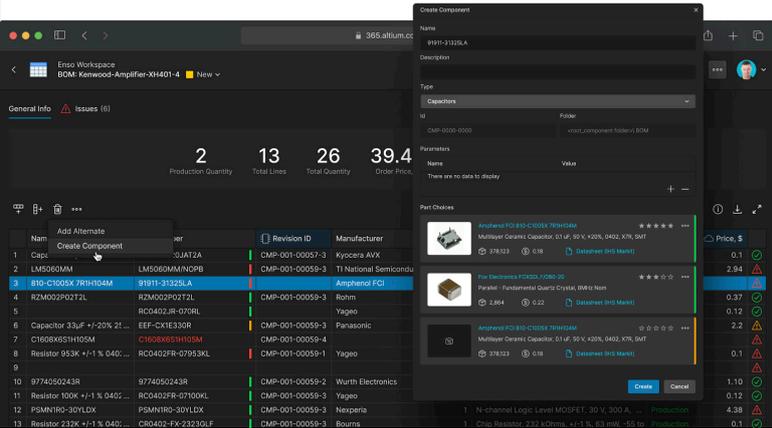
Consolidated BOM view showing aggregated components across multiple projects

## Consolidated Multi-Project Management

Hardware development rarely involves just a single board—most products have multiple PCBAs that must be managed collectively.

BOM management systems enable the consolidation of components across multiple projects, identifying opportunities for standardization and volume-based cost savings.

They streamline procurement for complex products by automatically aggregating similar parts, optimizing order quantities, and providing total cost visibility across the entire bill of materials.



Centralized component library showing part traceability across designs and approved vendor information

## Centralized Component Library Integration

Modern BOM systems connect seamlessly with centralized component libraries to ensure consistency and compliance.

These integrations enable teams to track BOM revisions, assess part risks, and manage lifecycle states from a single platform, eliminating scattered part data.

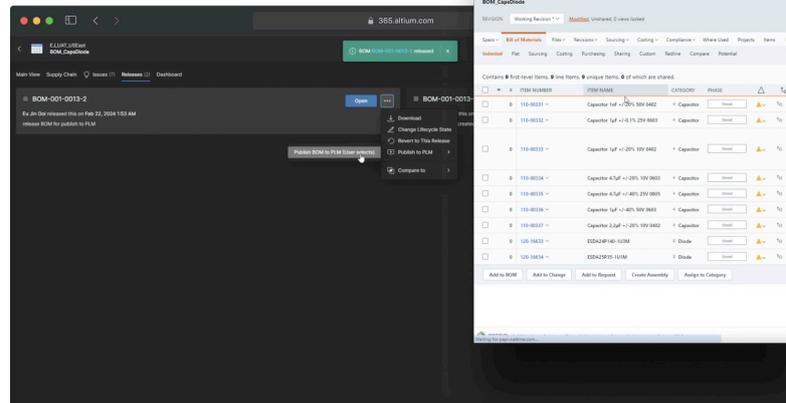
In-browser editing capabilities and “where-used” tracking help manage obsolescence effectively while ensuring all project parts remain up-to-date, compliant, and sourced from approved vendors.

## PLM and ERP System Connectivity

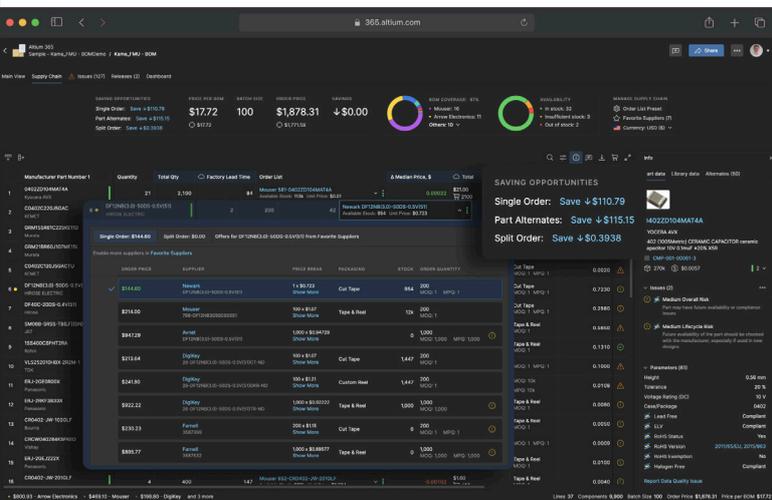
Electronics development doesn't exist in isolation—it must connect to broader business systems.

Leading BOM management solutions integrate with cloud PLM and ERP systems to enable bi-directional data exchange, ensuring BOMs, part data, and lifecycle information remain synchronized.

This connectivity minimizes errors, enhances collaboration, and accelerates time-to-market by ensuring all stakeholders work with the most current and accurate data throughout the product lifecycle.



Bidirectional BOM data synchronization between electronic design and enterprise systems



## Find Cost Savings on Every BOM

BOM Portal automatically identifies saving opportunities across your entire BOM — comparing pricing across hundreds of distributors, surfacing lower-cost part alternatives, and flagging split-order options that reduce total spend.

Potential savings are calculated and displayed before you commit to an order, so your procurement team can make informed decisions in seconds before applying them with a single click.

# Tips to Select the Right Tool

With numerous BOM management solutions available, selecting the right platform requires careful evaluation of both technical capabilities and organizational fit. Consider these key criteria when assessing potential tools:



## Integration with Your Design Environment

The ideal BOM management solution should integrate seamlessly with your existing ECAD tools. Look for native, bidirectional integration that automatically synchronizes design changes to the BOM and allows procurement feedback to influence design decisions in real-time, eliminating manual exports and data duplication.



## Supply Chain Data Quality and Currency

The value of a BOM system depends heavily on its component data ecosystem. Evaluate both the breadth (number of suppliers/distributors covered) and depth (parameters tracked) of component intelligence. The most effective solutions combine multiple authoritative data sources and provide proactive alerts when component status changes.



## Collaboration and Workflow Support

Review how the solution connects engineering and procurement teams throughout the design process. Look for platforms that enable procurement to participate from the earliest design stages rather than just at handoff. Consider notification systems, commenting capabilities, and approval workflows that maintain clear accountability.



## Scalability and Performance

Consider both current and future needs when evaluating performance with large BOMs and support for multiple projects. For complex products with multiple PCBAs, assess how efficiently the solution can consolidate and manage components across boards while optimizing quantity requirements.



## Implementation and Adoption Requirements

Evaluate training needs, interface design for occasional users, and data migration tools. The most successful implementations offer intuitive interfaces that procurement teams can use without specialized training, while providing deeper functionality for power users.



## Total Cost of Ownership

Look beyond license fees to understand implementation costs and compare against quantifiable benefits: fewer redesigns, reduced engineering time, accelerated time-to-market, and improved supply chain resilience. Consider how the solution helps avoid costly production delays from component shortages.



## Introducing Altium BOM Portal®

- Cloud-Based Collaboration • Up-to-Date Supply Chain Data
- Comprehensive Part Intelligence • Seamless Engineering-Procurement Workflow
- Multi-BOM Consolidation • Issue Detection & Resolution
- PLM/ERP Integration • Component Library Traceability • Lifecycle Management

Altium BOM Portal represents a significant advancement in electronics BOM management, offering a purpose-built solution that addresses the core challenges of today's supply chain environment.



### Faster Bill of Materials Completion with Enriched Supply Chain Data

Design boards faster with enriched parts and supply chain data. BOM Portal brings the latest part specifications, compliance information, manufacturer lifecycles, availability, and pricing data into your BOM. With accurate and up-to-date BOM management information, your engineering and procurement teams can work together to reduce expensive rework and delays.



### Data-Driven BOM Analysis for Supply Chain Risk Mitigation

Find supply chain problems before they cost you money and time. Altium BOM Portal analysis provides warnings and errors based on real-time supply chain data. Electronics design teams can account for component shortages, price fluctuations, and end-of-life issues before they disrupt production.



### BOM Management with Spreadsheet Simplicity

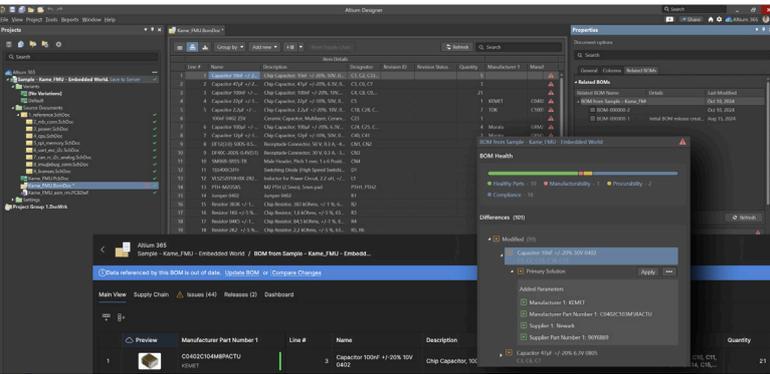
Manage and edit your BOMs with the ease of a spreadsheet and the visibility of an advanced document control system. Share BOMs securely with internal and external stakeholders. Create and store BOM releases as separate revisions with customizable lifecycle states.



### Comprehensive Part Library and Traceability

Improve your part management with a component library that fosters reusability and traceability. Create and edit components from BOM items, adapt part choices, track part usage across designs and BOM documents, and share predictive reporting on BOM and library health.

# Capabilities Overview

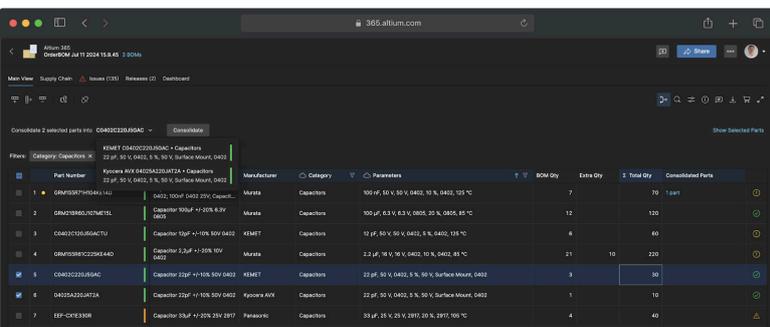
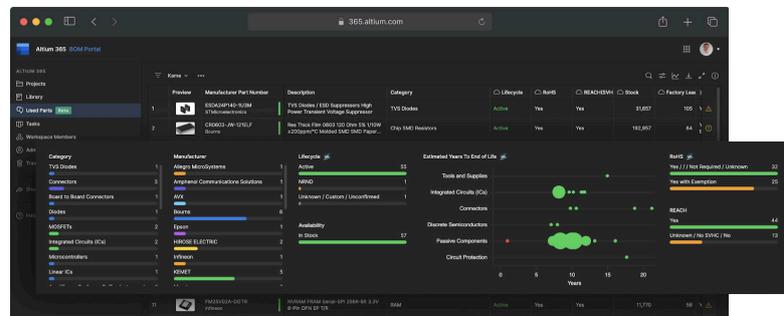


## Bridge Engineering and Procurement with Real-Time Collaboration

- ✓ Single Source of Truth
- ✓ Early Procurement Involvement
- ✓ Bi-Directional Communication
- ✓ Secure Sharing
- ✓ Flexible Import/Export

## Mitigate Supply Chain Risks with Up-to-Date Component Intelligence

- ✓ Comprehensive Data Integration
- ✓ Automated Issue Detection
- ✓ Advanced Alternative Management
- ✓ Compliance Verification
- ✓ Visual Risk Dashboard

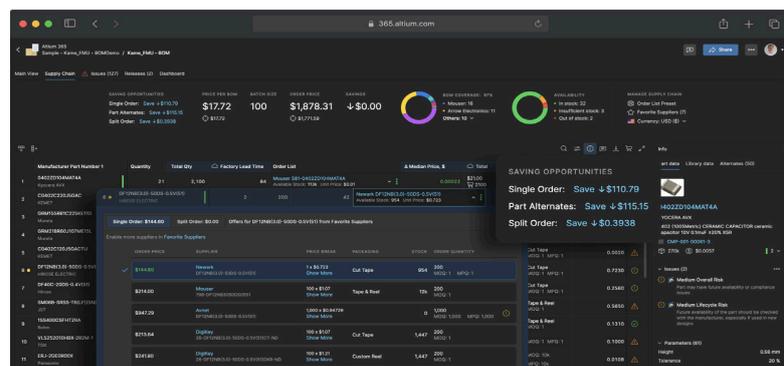


## Optimize Multi-Board Management with Intelligent BOM Consolidation

- ✓ Multi-BOM Aggregation
- ✓ Smart Part Matching
- ✓ Quantity Optimization
- ✓ Cost Analysis
- ✓ Where-Used Tracking

## Reduce Procurement Costs with Saving Opportunities

- ✓ Automated Saving Opportunities Detection
- ✓ Pricing Comparison Across Distributors
- ✓ Part Alternate Cost Analysis
- ✓ Split-Order Optimization
- ✓ One-Click Savings Application



Learn More: <https://www.altium.com/capabilities/supply-chain/bom-management>

# ROI Calculations

Implementing Altium BOM Portal improves efficiencies and produces real savings for your business. Here are three ways to quantify the return on your investment.

## Reduce Avoidable Design Respins

Component availability and compliance issues often trigger costly respins. BOM Portal identifies these risks early in the design process, helping engineers make informed decisions before PCB layout begins.

<b>ROI Calculation</b>	(Cost per PCB respin)	× (Average respins avoided per project)	=	(Savings per project)
<b>Example</b>	\$46,000*	× 1.4	=	\$64,400 / project

\*Industry data shows a single PCB respin costs approximately \$46,000 on average [6], with companies averaging 2.8 respins per project, with an estimation of 50% reduction of respins with using BOM Portal in the product development workflow.

## Optimize Engineering and Procurement Time

Engineers spend significant time researching components and finding alternatives when availability issues arise. BOM Portal automates this process with up-to-date component data and suggested alternatives.

<b>ROI Calculation</b>	(Hours saved per design)	× (Designs per year requiring alternatives)	× (Engineering hourly rate)	=	(Annual savings)
<b>Example</b>	32 hours*	× 16 designs	× \$90/hour	=	\$46,080 / year

\* «Before the composite used Altium 365, 80% of the designs produced annually required alternative sourcing for non-critical components. When this occurred before Altium 365, it would take 40 hours to complete the sourcing process from identification through approval and application. With Altium 365, the composite organization not only reduces the volume of designs requiring alternative components by 65%, but it also reduces the time required to source alternatives to 8 hours.» A commissioned study conducted by Forrester Consulting on behalf of Altium in 2023. Results are based on a composite organization [4]. Estimated time reduction of 75% with BOM Portal (40 hours \* 75% = 32 hours saved).

## Accelerate Time-to-Market

Delays due to late-stage component issues directly impact revenue. BOM Portal helps identify and resolve these issues during design rather than during production.

<b>ROI Calculation</b>	(Annual product revenue)	× (Profit margin)	× (Revenue loss per week of delay)	× (Weeks saved)	=	(Profit protected)
<b>Example</b>	\$5,000,000	× 35%	× 2% per week*	× 5 weeks*	=	\$175,000

\*100% divided 52 weeks per year with 5 weeks saved based on the customer quote



Nowadays because there's so much supply chain disruption, maybe the boards take 6-8 weeks to come back. And so when you have an error there, the real cost is burning those 6-8 weeks. Because you're using these tools, using Altium 365, you're looking at maybe an 80% reduction in time to market.

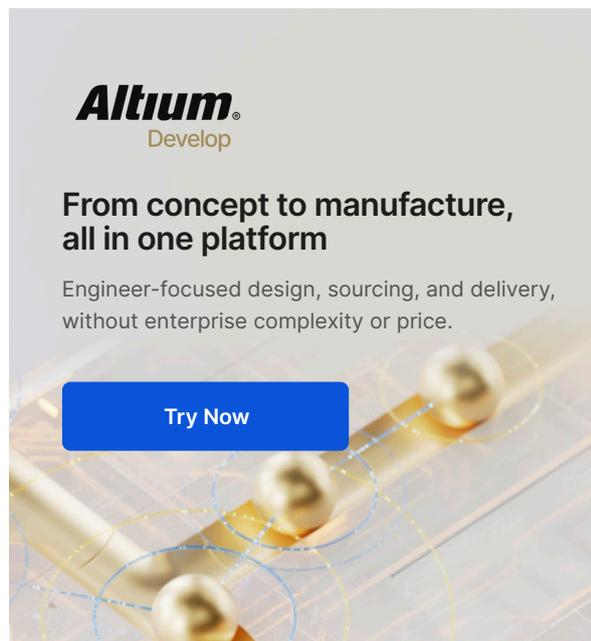
Brandon Gilles,  
Founder/CEO, Luxonis

## BOM Portal in Altium

Altium's BOM management capabilities are purpose-built for electronics teams. Available in Altium Develop and Altium Agile, they replace scattered spreadsheets with a connected, real-time supply chain management environment that integrates directly with your engineering and procurement workflows.

[Learn More](#)

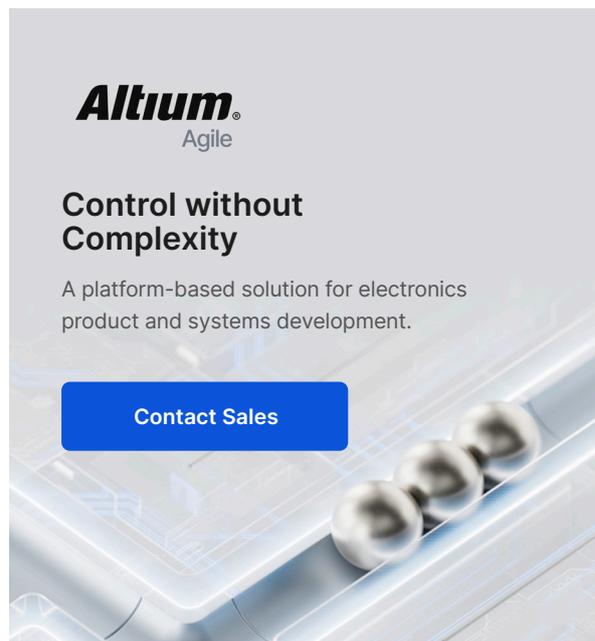
### Available In



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### Key Capabilities

- ✓ AI-Assisted Requirements Management
- ✓ Centralized Component Libraries
- ✓ Faster Design Reviews with Better Traceability
- ✓ Supply Chain Resilience with BOM Portal
- ✓ Seamless ECAD-MCAD Collaboration
- ✓ PLM Integration for Streamlined Manufacturing

## Ready to Build Supply Chain Resilience?

In an era of unprecedented supply chain volatility, electronics manufacturers can no longer afford fragmented approaches to BOM management. The costs of component shortages, last-minute redesigns, and delayed launches are too high to sustain.

Altium BOM Portal transforms static BOMs into dynamic, data-rich assets that guide decisions throughout the product development lifecycle. By connecting engineering and procurement in real-time and providing continuous visibility into component availability, lifecycle status, and costs, it enables teams to:

- Anticipate and prevent supply chain problems before they impact production
- Collaborate efficiently across departments and locations
- Make informed decisions based on comprehensive, up-to-date component data
- Accelerate development by eliminating sourcing-related delays

### Take the Next Step

Create an Altium Develop or Altium Agile Teams account to start your free 30-day trial.

[Try Now](#)[Contact Sales](#)

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