Acumatica
The Cloud ERP

DSD
BUSINESS SYSTEMS

Manufacturing ERP Handbook

A Guide to Selecting the Right ERP Software for Your Industry

### SELECT THE PERFECT ERP SOFTWARE FOR YOUR BUSINESS

There are hundreds of ERP applications available today. Each has strengths and weaknesses. Some are **specialized by industry**, while others are more general. Some systems work better for smaller manufacturers, and others scale up for larger, multi-site manufacturing operations.

Established ERP applications provide robust features built on aging platforms that are challenging to integrate with modern business technologies. Newer products built for the **cloud and connectivity** provide a modern platform for growth with streamlined features providing simplicity, flexibility, and mobility.

Manufacturers have options including ERP systems designed for configure-to-order, engineer-to-order, make-to-stock, and other production methodologies.

This ebook provides a framework to **understand manufacturing ERP options**. Manufacturing methodology and industry profiles highlight vital features to consider when evaluating your next manufacturing ERP application.

FIND THE RIGHT MANUFACTURING ERP SOFTWARE
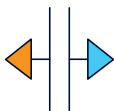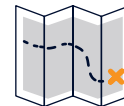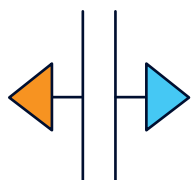
DISCRETE VERSUS PROCESS

Two Distinct ERP Options

There are two fundamental categories of manufacturing ERP—discrete and process. Both provide similar accounting, inventory management, purchasing, and order management features. However, they provide entirely distinct manufacturing functionality. Acumatica is one of the few ERP systems that support both discrete and process on a single platform.

Discrete ERP software centers on a bill of material comprised of solid materials formed or assembled into a finished good. Recipes or formulas are the cornerstones of **process ERP** systems where liquids, powders, or gases are mixed, blended, or combined to create finished goods. The table below highlights the key differences between discrete and process ERP systems.

Hear Acumatica customer stories on how manufacturers rely on Acumatica for their success.

Watch Videos

	DISCRETE ERP	**PROCESS ERP**
Disassembly	It is easy to disassemble finished goods back into the original bill of material components.	It is difficult or impossible to disassemble finished goods into the original ingredients.
Structure	Bill of Material	Recipe or Formula
Materials	Solids	Liquid, Powder, or Gas
Operations	Cut, bend, drill, assemble, mold, bore, ream, weld, etc.	Blend, mix, react, cook, reduce, hydrate, dehydrate, infuse, etc.
Quality and Compliance	Limited lot and serial tracking. Minimal industry quality regulations such as ISO, 21 CFR Part 820, and more.	Significant quality and compliance including lot attributes, hazardous materials, safety data sheets, EPA and FDA regulations, and more.
UOM Packaging	Typically managed in limited discrete units of measure (each, pound, feet, etc.). Simple product packaging.	Managed in multiple units of measure with complex UOM conversions and intricate packaging requirements.
Other Features	Engineering change orders, product configuration, estimating, installation, more.	Yield and loss, specific gravity, catch weights, concentrations, potency, expiration dates, more.

Manufacturing Methodology Impacts ERP

Every manufacturer is different, even if they make the same product. For example, two manufacturers make fasteners. The first makes general-use fasteners to stock at low prices. The other makes expensive, custom fasteners to order for the nuclear industry. The first manufacturer relies heavily on demand forecasts to drive MRP. They maintain safety stock levels to avoid stock-outs, and they manage engineering revisions for standard products. The second manufacturer relies on estimates and win percentages for material planning. They do not stock finished goods. They track fasteners by lot with attributes such as heat numbers and chemical composition.

Every manufacturing ERP system supports different production methodologies. Some are stronger for **make to stock** while others are specialized for **make to order**. The following production methodologies and features are available in specialized ERP applications.

CHEMICALS AND FABRICATED METAL PRODUCTS

"Acumatica provides all the fundamentals needed to run your business, so when you are ready to take the next step and expand or move into a new market, there are strong systems and processes in place to take that on."

- KEVIN BOYLE, DIRECTOR OF IT
SPECIFIED TECHNOLOGIES INCORPORATED

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MAKE TO STOCK (MTS)

MTS is a manufacturing philosophy where finished goods are produced to stock. Existing **stock fulfills customer orders** as opposed to fulfillment from manufacturing. Manufacturing proactively maintains adequate stock levels for forecasted customer orders.

- Demand Forecasting
- Inventory Replenishment
- Engineering Change Orders
- B2B or B2C Commerce

MAKE TO ORDER (MTO)

MTO manufacturers **rarely stock finished goods**. Instead, manufacturing is scheduled to fulfill direct customer orders. Variants of MTO manufacturing include ATO, CTO, ETO, and Job Shop manufacturing.

- Estimating
- Vendor Request for Quote (RFQ)
- CAD Bill of Material Integration
- Job Costing
- Product Configurator

ASSEMBLE TO ORDER (ATO)

ATO manufacturers assemble components to fulfill customer orders. ATO companies **rarely stock finished assemblies**. They have simple processes and production requirements.

- Demand Forecasting
- Kitting and Disassembly
- Light Manufacturing

CONFIGURE TO ORDER (CTO)

CTO manufacturing generates unique finished goods using a **rules-based product configurator** to define the bill of materials and routing based on options and values such as color, size, or other variables.

- Product Configurator
- B2B or B2C Commerce
- Matrix Items

REMANUFACTURING (REMAN)

Remanufacturing relates to "cores" or worn parts repaired for resale. Remanufacturing is common for transmissions, batteries, furniture, toner, and other products. **Recycling and disassembly are a form of remanufacturing** where products are broken down into salvageable components.

- Disassembly
- By-products and Co-products
- Core Management

ENGINEER TO ORDER (ETO)

ETO manufacturers **design products** based on customer specifications. Assemblies and raw materials are stocked, but they are not assembled until a customer order is received, and the part is designed by engineering.

- Engineering Change Orders
- Vendor Request for Quote
- CAD Bill of Material Integration

MIXED MODE (MM)

Mixed-mode manufacturers produce finished goods **both to stock (MTS) and to order (MTO)**. Also, companies that operate discrete and process operations are sometimes called mixed mode.

- Demand Forecasting
- Engineering Change Orders
- Bill of Materials and Recipes or Formulas

JOB SHOP

Job shops have minimal raw materials and finished goods inventory. Most orders begin with an **estimate**. Job shops purchase materials directly for customer orders. True job shops do not stock finished goods. Job shops ship directly from work in process to the customer.

- Estimating
- Vendor request for quote (RFQ)
- Job Costing

FABRICATED METAL PRODUCTS

"Acumatica gives us the capability to provide PO's, available raw material, and manufacturing modules to provide accurate available for sale inventories, including all pertinent costs."

**- YURI DUROVSKIKH, IT MANAGER
OFS INTERNATIONAL**

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REPETITIVE / CONTINUOUS FLOW

Repetitive Manufacturing (REM) is the production of goods in **rapid succession**. Repetitive manufacturing goes together with automated assembly. It is common when producing a standard product for a model year such as appliances or automotive products where there is a known or expected demand for the period. Many repetitive manufacturers operate assembly lines or fixed work centers where the same product is made continuously. Scheduling by the item is common. Materials are often backflushed at standard quantities and costs. Repetitive and continuous flow manufacturing often relies on Master Production Scheduling (MPS) and Rough-Cut Capacity Planning (RCCP).

- Demand Forecasting
- Material and labor backflush
- Engineering Change Orders
- MPS and RCCP
- Scheduling by Item

BATCH PROCESS

Batch process manufacturers use **formulas, recipes, and batches** as opposed to a discrete bill of materials and work order. The formula or recipe is either a discrete quantity or a percentage of the batch. Process manufacturers have many variables for production, including potency, specific gravity, concentration, and strength. Acumatica natively supports batch order types, lot tracking, picking by lot expiration date, and many other process manufacturing business requirements. Other process manufacturers use partner applications that extend Acumatica with more advanced process manufacturing features.

- Formulas or Recipes
- Scalable Batch Orders
- Loss / Yield Reporting
- Lot Tracking with Attributes
- By-products and Co-products

PLASTIC AND RUBBER PRODUCTS

"By utilizing the manufacturing edition of Acumatica, we were able to determine verifiable product costs that allowed us to put together a pricing model. This increased our gross margin percentage dramatically."

- PAT TREFUN, CFO
 OPFLEX ENVIRONMENTAL TECHNOLOGIES

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PROJECT-CENTRIC

Project-centric manufacturers build, schedule, and cost complex products in **phases**. This is common in aerospace and defense, capital equipment, and other labor-intensive industries.

- Project Management
- Product Configurator
- Engineering Change Orders
- CAD and PLM Integration

LEAN MANUFACTURING

Lean manufacturing minimizes waste in both materials and processes. Lean manufacturing often uses **just-in-time** pull systems to shorten lead times, reduce operating costs, and improve product quality.

- Kanban (Toyota Production System)
- Single Minute Exchange of Dies (SMED)
- Poka-Yoke (Error-Proofing)
- Value Stream Mapping

ERP OPTIONS

Specialized or General? Large or Small?

Manufacturing ERP software comes in many shapes and sizes. Smaller manufacturers use accounting applications like QuickBooks with plug-ins for manufacturing or entry-level ERP. These low-end applications historically support make to order with minimal functionality for make to stock. As manufacturers grow, they **move to more robust midmarket ERP applications like Acumatica**.

Some ERP systems are specialized for engineer to order, configure to order, and lean manufacturing. Other systems focus on repetitive, remanufacturing, job shop, or batch process manufacturing. Further, the ERP market provides specialized industry ERP applications and broader, general manufacturing ERP applications. The table below compares each type of ERP system.

ELECTRONICS AND ELECTRICAL PRODUCTS

"Without the Acumatica suite, we would certainly not have gotten ISO-certified . . . We framed our entire quality management framework around Acumatica, from document management to update processes."

- NATHANIAL FAIRWEATHER, MANAGING DIRECTOR TRIODE GROUP LIMITED

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	INDUSTRY ERP	**GENERAL ERP**
Technology	Generally, older technology. Difficult to integrate.	Typically, modern technology with easy connectivity.
Business Features	Simple accounting with limited business management.	Strong accounting with advanced business management features.
Manufacturing	Specialized industry features.	General manufacturing with limited industry-specific features.
Customization	Few customization or personalization tools.	Stronger customization and personalization tools.
Services	Direct consulting and support provided by the ERP vendor. Few, if any, other options.	Multiple consulting and support options including partners and independent consultants.

Standard Features Across ERP Systems

Today's ERP systems represent a homogenous collection of features that evolved from the industry's best ideas. As a result, most ERP systems provide similar functionality with as little as 10 to 20 percent difference between applications. The following are features common in midmarket ERP applications. However, **the way that each feature is supported is often different**. Manufacturers must pay careful attention to detail to differentiate between systems.

SPORTING GOODS, TOYS, AND HOBBY

"Acumatica helps us better analyze our sales and gives us the ability to analyze more categories with much more clarity . . . We have a lot more real-time visibility into what other entities are doing, which allows me to be more effective and keep better tabs on what's going on and helps us make more strategic financial decisions."

**- FRANKLIN SHIRAKI, CORPORATE CONTROLLER
  FIREWIRE SURFBOARDS**

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PLATFORM AND TOOLS

Every ERP system has multiple levels of database and user security and some capability to customize screens. Most systems provide user-defined fields (UDF). UDF functionality varies widely between applications. Most ERP systems also provide import and export utilities to manage data. Most ERP vendors restrict access to source code or charge fees for source code. All ERP applications provide reporting and inquiry tools. Mobile applications are critical for many manufacturers, especially for remote field service. Help files are available for all major ERP applications. Few systems offer customizable help in the form of built-in wikis. Support for multiple languages and localization for international regions varies widely across ERP applications.

ACCOUNTING

Every manufacturing ERP system provides general ledger, accounts payable, accounts receivable, and bank management (i.e. cash management or bank reconciliation). However, functionality varies widely for specific features in these modules. For example, some ERP systems are restricted to a limited number of account segments, and others do not support national or parent accounts or budgeting. Multi-company and multi-currency support are other common features. However, not all ERP systems support inter-company features. Nor do all systems provide tools for allocations or financial consolidations. Project accounting, fixed assets, and payroll are provided natively or through third-party applications.

SALES

All manufacturing ERP applications provide sales orders. Most systems support drop-shipments, returns and exchanges, blanket sales orders, sales commissions, quotes, and CRM. Commerce integration is available in most ERP systems with connections to leading commerce platforms. Retail point of sale (POS) and rental software are available with many ERP systems. Other common sales features include shipping, pricing, backorder management, and labeling.

INVENTORY

Standard inventory functionality includes stock and non-stock item management with unit of measure definitions, pricing, and packaging. Common inventory management features include physical inventory, warehouse transfers, and ABC Codes. Many also provide country of origin and advanced replenishment based on safety stock, lead times, reorder points, economic order quantities, or min/max stock definitions. Kitting, disassembly, barcoding, and labeling are also common. Lot and serial tracking, expiration dates, and inventory allocation for orders are less common across applications. Most systems support average and standard costing and inventory valuation. Some also support FIFO, LIFO, and actual or specific (lot-based) costing and inventory valuation methods.

PURCHASING

Purchasing includes blanket orders, receipt of goods processing, and put-away features. Other common features include landed costs, FOB definitions, vendor returns, and bar code scanning. Few systems like Acumatica natively support purchase order requisitions with approvals workflows. Those that do support requisitions often provide tools for vendor request for quote (RFQ) bidding processes.

MANUFACTURING

Every manufacturing ERP system supports either bill of materials and routings or a formula or recipe. Material issues and labor entry with backflushing automate data entry. Work orders or batch orders capture costs and transactions for work in process. Other core features include phantom bills of material, advanced planning and scheduling, material requirements planning, and engineering change orders. Make to order ERP systems support manufacturing estimates. Some systems provide rules-based product configurators and demand forecasting. Many systems also provide a light manufacturing module for fast, after-the-fact production reporting. Advanced capabilities such as manufacturing execution systems (MES), product lifecycle management (PLM), and Quality Management vary across ERP systems.

NONMETALLIC MINERALS

"When we talk about Acumatica, it's not just about accounting but about where we do all our business. We work in Acumatica and don't need to leave."

- SCOTT STARKWEATHER, PRESIDENT
  BOULDER CREEK STONE

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Specialized ERP Features by Industry

Manufacturing ERP is available from larger, general publishers, and smaller publishers focused on specific industries. General ERP solutions support multiple industries with strong cross-functional processes and applications. General ERP systems offer more specialized features today than ever before. Smaller ERP vendors focus on niche industries with specialized systems. Manufacturers must choose between the two options. Below is an overview of features common for each industry segment.

APPAREL, LEATHER, AND JEWELRY

"Having the entire ecosystem all together allows us to run more definitive reports and we can move forward based on that data rather than spending time going to multiple applications to verify the data."

- STEVE CATES, PRESIDENT, RAY ALLEN MANUFACTURING (PRIOR)

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FOOD AND BEVERAGE

Manufacturers of food and beverage products can be either discrete or process. They may require batch processing, lot tracking, and recipe or formula management. Catch weights, unit of measure conversions, expiration dates, and variable product packaging are also common. Route management for direct store delivery (DSD) is required for some businesses.

APPAREL, LEATHER, AND JEWELRY

Matrix items are an essential requirement for textile, leather, apparel, and jewelry products to manage pricing and availability across product families where style, color, and size combinations are difficult to manage. Commerce integration, retail sales, and product configuration are also popular. PLM is also a major requirement.

CHEMICALS AND LIFE SCIENCES

Chemical, petroleum, pharmaceutical, coatings, cosmetics, and similar businesses are predominantly process-based. Batch production, formula and recipe management, and lot tracking are essential. Advanced features include potency, concentrations, specific gravity, and yield and loss tracking. Compliance for the EPA, FDA, and other regulations are also common.

WOOD PRODUCTS

Few ERP systems support the wood, lumber, and building products industry well. Features such as matrix items are useful for managing items with slight variations such as dimensions or grade. Other requirements common in the industry include co-products, by-products, lot tracking, and point of sale for in-store sales.

ADDITIVE MANUFACTURING (AM)

Additive manufacturing is the process of building products by printing layers of materials on top of one another to create parts. Advances in 3D printing have lowered costs and improved product quality. AM system may be integrated with ERP applications to capture material costs, scrap quantities, process times, and finished goods quantities. Look for ERP systems with strong integration tools and Open APIs to ensure your system is ready to take advantage of new manufacturing technologies like AM.

FURNITURE AND HOME GOODS

Product configuration is a must-have for most furniture manufacturers. Commerce and retail sales are also increasingly common for manufacturers of furniture and home goods. Other requirements include CAD or PLM integration and serial tracking.

PLASTIC AND RUBBER

Lot tracking, co-products, and by-products are a major concern for plastic and rubber products manufacturers. They require traceability for regrind for recovered material and often schedule production by color to reduce clean-up between production runs.

FABRICATED METAL PRODUCTS

Many fabricated metal product manufacturers rely on manufacturing estimates. Stamping operations have co-product requirements. Open APIs and integration tools must support machine integration for data capture. Other requirements include lot tracking, job costing, and outside processing. Integrated CAD for bill of material management with engineering change orders are popular in some businesses.

PAPER PRODUCTS

Paper product manufacturers include paper mills and manufacturers of cardboard, envelopes, and publications. Paper mills have specialized requirements best suited for process-oriented ERP systems. There are specialized ERP systems for the publishing industry to manage writing and layout for books and magazines. Other companies in this industry rely on general manufacturing ERP systems for basic manufacturing capabilities.

NON-METALLIC MINERALS

Manufacturers of stone, clay, glass, concrete, tile, and other products commonly need lot traceability. Dimensional inventory and matrix item requirements are also common. Other requirements include lot attributes, co-products, by-products, and commerce integration.

INDUSTRIAL EQUIPMENT

Industrial machinery manufacturers rely heavily on serial tracking, engineering change orders, CAD and PLM integration, and product configuration. Many also require warranty and service management for installation and repair.

PRIMARY METAL PRODUCTS

"The leadership team of any small or medium business considering an ERP system is doing themselves a great disservice if Acumatica isn't on their list to investigate."

- BRAM KLEPPNER, CEO, DANFORTH PEWTER

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"We're currently using the full end-to-end suite, including raw material procurement, manufacturing, supply chain, and obviously all the associated financial functions . . . I would definitely recommend Acumatica to other businesses. It covers the full ERP functionality, it integrates with other products well, and it's cost-effective."

- DEREK SZABO, MANAGING DIRECTOR DEVIL'S PEAK BREWING COMPANY

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ELECTRONICS AND ELECTRICAL

Engineering change orders and integration with CAD and PLM applications are crucial for electronics, electrical, and high-tech manufacturers. Product configuration and commerce are both common for commercial and consumer products. Serial and lot tracking and warranties are common as well.

PRIMARY METALS

Primary metal manufacturers depend on lot tracking and often use lot attributes to manage lot characteristics such as heat numbers, mill certifications, and quality results. Tool and die management is also crucial for scheduling and production management.

AEROSPACE AND DEFENSE

Manufacturers of aerospace and defense equipment have complex requirements for work breakdown structure (WBS) reporting with progress and milestone billing. Compliance with DCAA and ITAR is partially supported by ERP data. Additional requirements include engineering change orders, TBLP (transfer/borrow-loan-payback), and material requirements flow-down.

INSTRUMENTS AND MEDICAL DEVICE

Instrument manufacturers have similar requirements to electronics and electrical manufacturers. Medical device companies face increased requirements to comply with 21CFR Part 820 for security and data-base audits.

OTHER INDUSTRIES

Tobacco and cannabis manufacturers face stiff regulatory compliance. Sign manufacturers often have serial numbers. Toy and hobby manu-facturers sell online via B2B or B2C storefronts. Non-manufacturing industries including distri-bution, agriculture, forestry, fishing, mining, and other industries often choose manufacturing ERP applications like Acumatica as the foundation for their businesses.

AUTOMOTIVE AND TRANSPORTATION

Repetitive, cellular, and lean manufacturing are common in the automotive industry. Cumulative demand forecasts and EDI are prevalent. Serial tracking and warranties are essential for component traceability to vehicle identifi-cation numbers (VIN). Project management applications help manage programs. Kanban, quality, and engineering change orders are also prevalent.
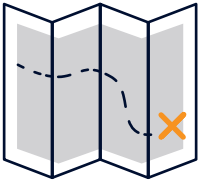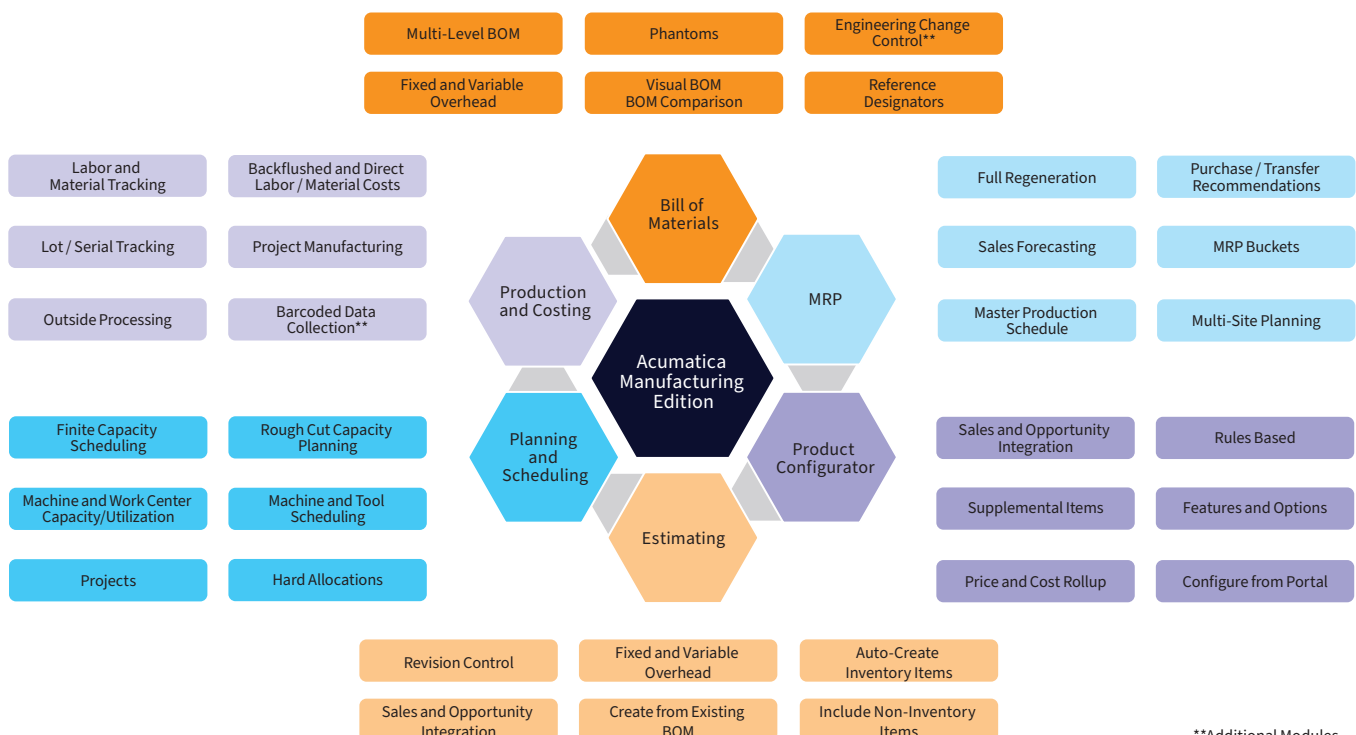
Manufacturing ERP—The Acumatica Way

Manufacturers **across industry segments** rely on Acumatica Manufacturing Edition to maximize resources, reduce costs, and improve profits. An extensive suite of connected and mobile business applications provides **unparalleled manufacturing depth** for production, estimating, engineering, material planning, scheduling, product configuration, and manufacturing data collection.

Last-mile features such as disassembly, engineering change control, demand forecasting, and outside processing streamline critical manufacturing processes. Acumatica supports make to stock, make to order, batch process, and other manufacturing methodologies. Project Accounting provides project-centric manufacturers with a comprehensive production and resource planning system.

Commerce and mobile field service extend Acumatica for manufacturers who sell online or provide on-site services. Balance supply and demand with inventory, sales, and purchasing on top of a comprehensive suite of accounting applications. Leverage automation, workflows, and document management to connect data and processes throughout all parts of the manufacturing business for improved customer service, customer retention, and growth.

Acumatica provides ease of use and rapid integrations to connect **modern technologies**, including cloud computing, big data and analytics, additive manufacturing, robotics, and the Industrial Internet of Things for streamlined processes and meaningful insights into manufacturing operations.

Acumatica Cloud ERP provides the best business and industry management solution for transforming your business to thrive in the new digital economy.

Bill of Materials: Multi-Level BOM; Phantoms; Engineering Change Control**; Fixed and Variable Overhead; Visual BOM / BOM Comparison; Reference Designators

Production and Costing: Labor and Material Tracking; Backflushed and Direct Labor / Material Costs; Lot / Serial Tracking; Project Manufacturing; Outside Processing; Barcoded Data Collection**

MRP: Full Regeneration; Purchase / Transfer Recommendations; Sales Forecasting; MRP Buckets; Master Production Schedule; Multi-Site Planning

Planning and Scheduling: Finite Capacity Scheduling; Rough Cut Capacity Planning; Machine and Work Center Capacity/Utilization; Machine and Tool Scheduling; Projects; Hard Allocations

Product Configurator: Sales and Opportunity Integration; Rules Based; Supplemental Items; Features and Options; Price and Cost Rollup; Configure from Portal

Estimating: Revision Control; Fixed and Variable Overhead; Auto-Create Inventory Items; Sales and Opportunity Integration; Create from Existing BOM; Include Non-Inventory Items

Acumatica Manufacturing Edition

**Additional Modules

Adaptable Manufacturing Industry ERP with Acumatica

Selecting the right ERP system for your business is difficult with hundreds of manufacturing ERP options. Should you partner with a larger publisher with a strong top-down ERP system or should you implement an industry-specific ERP from a smaller publisher? Does the system support your manufacturing methodologies and industry-specific requirements?

Acumatica Manufacturing Edition provides **unparalleled manufacturing depth** for production, estimating, engineering, material planning, scheduling, product configuration, and manufacturing data collection. Robust accounting and connected project accounting, field service, and commerce **extend the system** for other business areas.

Acumatica supports make to stock, make to order, and batch manufacturing methodologies making it a popular choice for companies **across industry segments**.

Acumatica Manufacturing Edition provides ease of use and rapid integrations to connect to modern technologies, including cloud computing, big data and analytics, additive manufacturing, robotics, and the Industrial Internet of Things for streamlined processes and meaningful insights into manufacturing operations.
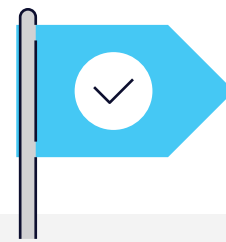
Carrying a multi-million-dollar inventory, you've got to have good controls for that . . . With the new controls that Acumatica has in place, our inventory is much more accurate."

– ROGER COLLINS, CFO, DEMTECH

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