



# How nMetric<sup>®</sup> Meets the 10 Classic Challenges of Manufacturing with Smarter Scheduling<sup>™</sup>.



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**nMetric<sup>®</sup>**  
Smarter scheduling<sup>®</sup>



## The 10 Challenges

Manufacturers of practically every stripe face the same ten basic challenges in running a production operation:

1. Visibility
2. Bottleneck Identification
3. Optimize/Level Throughput
4. Minimize Inventory
5. Tracking and Traceability
6. Operational Data Analysis
7. Supplier Management
8. Timely Investments
9. Organizational Alignment
10. Customer Satisfaction

Many of the technology and process initiatives of the last twenty-plus years have been an attempt to address one or more of these challenges, with mixed results. Indeed, factory managers and workers have tried so many “solutions” that many assume their often inefficient, chaotic and inconsistent environment is as good as it gets. Their experience suggests this is a reality that cannot appreciably be improved, no matter what the claims of the latest cure-all. This is hardly the case.



## nMetric's Unique Approach

nMetric® software delivers better results in all ten of the challenge areas by taking a unique approach to factory floor scheduling and management. While other software planning and scheduling solutions (ERP, MRP, etc.) are deterministic, centralized and theory-based, nMetric is probabilistic, heuristic, distributed and reality-based. The nMetric Smarter Scheduling™ system breaks down each order into its actionable components, creating a series of task-oriented software objects called Smart Jobs®. These intelligent objects find and reserve all of the available resources necessary for their on-time completion, including equipment, material, labor and tools. Smart Jobs are capable of responding in real time to shop floor developments, including changes in resource availability or delays in prior dependent tasks. They effectively reroute themselves.

Using nMetric's built-in manufacturing execution (MES) functionality, Smart Jobs also track operational task status and resource availability in real time, allowing the software to provide unprecedented current and forward visibility into workload, orders and constraints. The schedule rearranges tasks, provides event-based alerts and reports on activities as they occur, providing visibility of the entire environment and also each step to accommodate actual situations.

# Meeting the Challenges

nMetric allows manufacturers to meet the ten classic challenges as never before, helping them realize a high level of efficiency, productivity, quality and reliability.

## 1. Visibility

The number one challenge for manufacturing leaders is understanding what is happening in the operation at any given moment. Lack of visibility makes it difficult to give timely and accurate answers to some common and reasonable questions:

- What is the in-process status of a given order?
- Will that order be completed on time? If not, when?
- What resources are active and which are down for maintenance today?
- How many orders will be completed today? Which ones?

nMetric provides answers to all these questions and more through its real-time Gantt chart display. Users have visibility of all orders and tasks assigned to all resources. With nMetric, every time a new order is added or the status of resources or work in process (WIP) changes, the system adjusts the schedule.

At the point of order entry, the nMetric system knows the actual real-time demand loads for machinery, tools and individual skilled workers, all of which are continually collected from Smart Jobs already on the floor. Smart Jobs resulting from the new order use this information to ascertain resource availability and make resource reservations. Quick search capabilities easily identify orders within the Gantt chart and provide onscreen operational details and status, including on-time and lateness status (which also display graphically on the Gantt chart).

When a resource becomes unavailable (planned or unplanned), the schedule is automatically adjusted. The Gantt chart immediately displays both the available and unavailable time for each resource. This makes demand for each resource and its availability clearly visible in real time. Alternate resources are highlighted and can be utilized automatically, or manually, when high demand creates bottlenecks for specific resources.

Landing page widgets graphically display lateness, cycle time, throughput and capacity utilizations summaries, including drill-down details for performance analysis and individual order information.

nMetric delivers real-time visibility into orders, on-time status, resource status and availability, and actual and likely performance for the day.

## 2. Bottleneck Identification

The second challenge for high-mix and high change manufacturing is identifying the shifting and often elusive resource constraints that inhibit production flow. Big bottlenecks are easy to find: they are spots where work in process (WIP) piles up. Bottlenecks that change week to week are not so obvious. Fixing the bottlenecks is not easy either, since it's equally difficult to identify resources that are underutilized and whether they could help.

nVironment capacity utilization graphics flag peak and valley utilization for the entire facility, with drill down to resource areas and individual resources. The resulting visibility into current and upcoming demand for all resources reveals current and developing bottlenecks relating to individual machine work centers, assembly work centers, skilled labor, tools and fixtures.

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This visibility provides management the opportunity to proactively take action. They can add targeted overtime, manually reroute some jobs to alternate resources or, if the overutilization is long term, invest in or train additional resources to keep all orders on schedule.

With nMetric's nVironment, both over- and underutilized resources are easy to spot.

### 3. Optimize/Level Throughput

Traditional planning and scheduling solutions assign work to specific resources, making it challenging to create a level load across all resources. nMetric uses the attributes (skills and capabilities) of resources when making task assignments. Thus, an entire group of resources with the same attributes are considered in the schedule. For this reason, load leveling and optimization happens inherently for work requiring the same attributes.

In addition to natural load distribution, Smart Jobs reserve available resources in advance, allowing for proper staging of materials, reduced set-up times and reduced changeover times. Smart Jobs communicate with each other to automatically minimize both the impact of bottlenecks and wait times. Each Smart Job® knows its priority relative to other Smart Jobs as it encounters real-time floor situations, and is able to "shift" lower-priority jobs in order to ensure its own on-time completion.

nMetric's approach of scheduling resources based on attributes and reserving them in advance helps processes flow smoothly.

### 4. Minimize Inventory

Balancing inventory to meet demand yet keep costs low is a perennial goal. Inventory takes three main forms: raw material, work in process (WIP) and finished goods, each with an optimal level for efficient operations. Inventory shortages and excesses can cause problems and generate the headaches. nMetric addresses each area separately.

For **raw materials**, nMetric communicates with an ERP, Supply Chain or other inventory management system to confirm materials are in house. If materials are not in house, the scheduling system prevents orders from entering the dispatch zone. Additionally, orders without material can be easily identified using dispatch screens and reports for expediting and follow-up by purchasing.

For **WIP**, Smart Job scheduling uses a combination of backward and forward scheduling of dependent tasks (Ping Pong scheduling) to ensure orders are processed according to due date priority and as late as possible to be completed on time.

**Finished goods inventory** is often used as a buffer to mitigate risk. The main risk is from uncertainty. Once these risks are addressed through increased visibility and improved cycle times with nMetric, the need for high finished goods inventory goes away. Sales and customer service don't need extra inventory because they can see what is happening on the shop floor.

nMetric helps keep inventory low at every stage. It eliminates fruitless searches for raw materials that have not arrived, minimizes traffic jams on the production floor and keeps customers supplied with a minimum of finished goods on hand.

### 5. Tracking and Traceability

Tracking and traceability are critical in recall and warranty situations, and an increasing number of customers want to see a full genealogy of each product. Operational information captured on paper travelers exacerbates the problem. Trying to pour through reams of paper is not only inefficient, it tends to lead to errors and omissions.

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nMetric's Smart Job scheduling technology includes basic MES-type operational execution and tracking; the status and location of every order is entered and tracked from the floor. The schedule collects data continuously during production, making it clear what was produced when, by whom, with what materials, using which tools, on which machine or work center. It also tracks scrap and rework and incorporates notes for operation and order levels, storing special requirements and valuable feedback for each order.

With nMetric, traceability data is immediately available through reports to specifically target and limit the ramifications of defects and non-conformances. Customers can get the pedigree they seek with no additional effort in the plant.

## 6. Operational Data Analysis

Data and performance analysis is traditionally a backward-looking process, examining past events in an effort to predict future ones. What companies really need is a future view of what is scheduled to happen, given the current availability and task demands on resources.

At nMetric, we are dedicated to providing as much future visibility as possible. nMetric's landing page graphically displays current and predictive Key Performance Indicators (KPIs) in real time. These graphical widgets display KPIs for current and expected lateness, cycle time, throughput and capacity utilization, including drill-down details and analysis of trends critical to managing operations. For historical analysis, reports are available to show performance.

nMetric delivers current as well as predictive future analysis of operations status and performance based on a realistic, dynamic view.

## 7. Supplier Management

Suppliers missing shipments can cause pain for both the plant and customers. Supply chain challenges are often due to a lack of forward visibility. When materials are not available, the result is reactive expediting and delayed production.

nMetric's schedule visibility can be extended to the supply chain and purchasing organizations to track order progress and communicate with suppliers about upcoming material demands, enabling Just-In-Time (JIT) delivery of materials and consumable products. nMetric's system continually communicates with ERP or inventory management systems via the nMetric nTegrator® module to provide material availability confirmation for each Smart Job in the schedule.

Additionally, a configurable "material in house" threshold holds orders back in the schedule if the materials are not in house by a certain time before work is scheduled. This eliminates the fire drill when material is missing for an order to be produced. When these delays occur, e-mail alerts can be sent to appropriate personnel for proactive resolution.

nMetric can extend visibility and level loading out to the supply base to enable JIT supplier confidence and schedule compliance.

## 8. Timely Investments

Making timely investments in machinery, tools and skilled labor can be a bit of a guessing game. Investing too late results in bottlenecks arising, and investing too early consumes cash unnecessarily.

The reliable forward visibility of nMetric's nVironment capacity utilization graphics and Gantt chart scheduling board lets customers intelligently postpone or accelerate decisions on investments in work center machinery, tools and fixtures until truly necessary. Customers can also better time hiring and focus cross-training of employees to meet demand.

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## 9. Organizational Alignment

How often do customer service and sales have a different view of an issue than operations management? In most cases, this is caused by limited and separate information unequally available to different functions.

Because nMetric is web-based, it delivers universal visibility. Everyone in the company – manufacturing, sales, customer service, management and operations – views the same schedule and are on the same page. All parties have consistent, common data for analysis and access to real-time production status and metrics. Role-based security ensures that only those with authority can make changes to the schedule.

Getting everyone on the same page goes a long way towards aligning the interests of the organization.

## 10. Customer Satisfaction

All of the above allow a company to meet the ultimate challenge for success: customer satisfaction. nMetric shows what an operation can produce and by when, so it can make realistic commitments to customers. In addition, Smart Job technology maximizes on-time shipments. If an order cannot be shipped on time, the company can limit the inconvenience to customers by communicating with the customer in advance, while the order is still in production.

### Benefits

By meeting these ten classic manufacturing challenges, nMetric delivers proven financial, operational and organizational benefits.

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#### Financial Benefits

- Lower inventory costs
- Reduced overtime costs
- Limited recall expenses
- Improved cash-to-cash cycle times
- Higher return on net assets (ROA/RONA)
- Lower manufacturing costs as percentage of revenue

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#### Operational Benefits

- Reduced cycle times
- Increased throughput
- Real-time and forward-looking visibility
- Improved percentage of on-time shipments
- Shorter lead times
- Elimination of paper travelers for execution data and tracking

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#### Organizational Benefits

- Increased customer satisfaction
- Streamlined internal communications
- Better vendor/supplier communication
- Everyone working to the same, executable schedule