



**Standard Locknut, Inc.  
Improves On-Time Performance  
and Decreases Inventory  
using nMetric Software**

## Company Profile

Founded in 1949 by Mr. R. F. Waddell, Standard Locknut is one of North America's largest manufacturers of bearing accessories and precision turned steel components. The company produces a full line of bearing mounting products for the industrial markets (the bearing, heavy construction, steel, paper, mining, oilfield, and energy industries), and also provides contract CNC turning and machining services for the industrial, automotive, and heavy truck markets. Standard Locknut operates a 125,000 square foot facility located just north of Indianapolis, Indiana.

Standard Locknut enjoys long-term supply relationships of greater than fifteen years with some of the best known companies in industry, including The Timken Company, Torrington, Dana & GM Service, SKF, Applied Industrial Technologies, Motion Industries, Applied Industrial Technologies, and Rexnord.

## Challenges

At the beginning of 2005, Standard Locknut confronted serious changes to their traditional business model. While the company's business was growing, customers were placing smaller, more frequent orders for a wider range of products. Lead times were becoming noticeably shorter. Forward visibility into demand was becoming impossible. The company's largest customer was also increasing its volume of raw material consignment orders.

The outcome was increasing chaos on the shop floor. There were more shop orders to process, and run times were shorter with more machine change-over. Control seemed to be slipping away.

### **Limitations of Existing IT Systems**

The situation called for nimble, flexible shop floor operations, but the company faced serious hurdles in that regard. Shop order data was scattered in disparate databases, resulting in zero real-time visibility into order status and operations. The ERP system's MRP capabilities were of no practical use due to unreliable forecasts and the lack of a detailed production schedule. In addition, there was no way to query the schedule information that was available. To obtain order-related information required to create a daily production dispatch list, personnel had to go through multiple screen inquiries, delaying critical decisions.

Raw material status was not linked to the shop order, so floor personnel couldn't tell if raw material was in-house without physically locating it, resulting in order delays. Information about supplier order lateness was available only through less-than-timely ERP paper reports. Increasing consignment orders and the associated material delivery compounded these material management challenges.

Manufacturing operations performed by outside vendors used variable lead times, further complicating scheduling. The status and management of vendors was handled through accounts payable and not linked to the Bill of Material (BOM) item or router step, effectively leaving plant personnel in the dark.

Standard Locknut's shop management software was of limited help. It used overnight batch processing that provided a once-daily snapshot report of what could be done – that is, if there were no changes to demand or machine availability. Bottlenecks were often identified too late to make adjustments. To compensate, planners padded the scheduled completion time, resulting in an unrealistic expansion of lead time. In turn, this affected the company's ability to estimate expected deliveries to customers.

### **Manufacturing Process Difficulties**

Standard Locknut also faced a number of process issues that hindered its efficiency and flexibility. Routings had evolved over time and were therefore not based on a set of standard operations. Alternate routes were based on "tribal" knowledge of machine capabilities, not on actual machine capabilities and attributes.

Schedules did not take into account the characteristics of different work areas. While most areas required sequential operations, some had effectively unlimited capacity. Similarly, some areas needed load leveling across multiple machines and others were machine-specific.

Effective capacity changed frequently due to unplanned machines down time, scheduled maintenance, shift changes, or overtime. The plant struggled with constantly changing resource availabilities, both planned and unplanned, with little if any advance knowledge.

### **Effects**

The situation resulted in unacceptable on-time shipment metrics and too many expedited orders. Inventories were higher than desired. Visibility had become so limited that customer service wasn't notified of late orders until the promised ship date. There was also no way to establish meaningful scheduled due dates that could be communicated to customers.

## **Solution**

To address its challenges, Standard Locknut chose the nMetric manufacturing performance optimization software suite.

With its patented technology, the nMetric solution takes a unique approach to the manufacturing process. It breaks down each order into a series of Smart Jobs™ that establish the routing steps and resources needed to complete each step of the order's production path. The Smart Jobs then provide the system and its users with real-time intelligence of floor activity and conditions, enabling real-time visibility.

## **Addressing Data Issues**

Standard Locknut's first step was addressing the data gaps and inconsistencies in its disparate legacy systems. This involved dynamically integrating the data into nMetric databases with the assistance of an nMetric implementation team.

Customer order- and shop order-based data was collected from the company's ERP, purchasing and inventory systems using nMetric integration tools. This included data related to operational routing, outside vendor requirements, standard run times, BOM requirements, and material inventory part and PO numbers and status. Non-standard operational routings were converted into standard protocol as the data was integrated.

Changes to order due dates and quantities, as well as operational routing changes, were captured and updated in real time, including operation completions entered on the shop floor. In the process, routings were standardized. Consolidating all operationally-related data established the foundation for creating Smart Jobs. The consolidation of disparate databases resulted in a single query reference database for critical operations information.

## **Creating the Smart Job™ Framework**

The next step was creating the Smart Job Framework, which was necessary to allow Smart Jobs to schedule or arrange themselves when needed resources would be available. The capabilities of each work center or machine were captured as attributes. Work centers and machines that could do like work were recognized and linked, allowing each area's availability calendar or shift schedule to be set.

The team next determined the scheduling characteristic of each work area, including outside vendor virtual work centers. Each area was assigned as either individually sequential, load leveled or infinite in capacity. System-configurable rules for overlap, transport time and maximum wait time between operations were also set.

To ensure that raw materials were in-house and available at the start of each operation, nMetric created a configurable time span in which all needed materials must be present. If any material is not available, including consignment materials, then the operation would be held back until the material arrived.

After the framework was constructed, all orders were converted to their Smart Job equivalents. Each operation in the routing sequence of every order became a Smart Job, and was arranged according to due date priority. Guided by the framework, each job would be able to reserve available work areas or machine time required for completion, accounting for prior operations which had already been completed.

## nMetric at Work

With the nMetric software suite, Standard Locknut's operational execution data is collected as each operation is completed, including start, stops, scrap, and quantities completed or partially completed. This completion information then updates the schedule in real time, and data is available for immediate analysis. On-line inquiry, standard screen access and consolidated reports provide instant information concerning the status of all operations.

Smart Job scheduling creates forward demand visibility for bottleneck identification and resolution. Manual nMetric tools allow schedule override, so operations can be rearranged and anchored as needed. When jobs are moved from one machine to another, the scheduler can change the set-up and run time to better reflect the alternate choice. Operations are not scheduled to work centers when materials are not available.

The nMetric scheduling board and work center dispatch screens provide a detailed production schedule for all operations in the order routing using due date priority. Operational completion tracking provides real-time updates to the status of each order's progress in the routing. Standard Locknut can now address the changes in machine availability due to both planned and unplanned down time, and identify and resolve bottlenecks by adding resource availability as needed.

As each of these changes is made, it will cause the schedule to be dynamically adjusted to accommodate the new shop floor reality and all information is available for review and inquiry in real time.

## Benefits

With nMetric, Standard Locknut has been able to overcome the majority of their process challenges and can now address business challenges with a nimble, make-to-order model. The company can efficiently respond to greater demand variability, shorter lead times and increased consignment material requirements. Managers operate with a realistic, real-time representation of shop floor activities, which has allowed them to improve performance overall.

Since Standard Locknut first implemented nMetric's software solution:

- Overall sales revenue has increased 14%
- Line item order quantity per product line has grown 14% to 18%

At the same time, critical performance metrics have improved dramatically:

- On-time performance has increased 13%, from 85% to 98% on-time completions
- Throughput has increased 8%
- Sales per employee has increased 24%
- Finished goods inventories dropped 38%
- WIP and raw material inventories have flattened and are trending down

The combined results from Standard Locknut's investment in nMetric's solution yielded a Return on Investment (ROI) over two years of greater than 200%.

## About the nMetric Software Suite

With its patented Smart Job technology, the nMetric software suite takes a unique approach to optimizing the manufacturing process. It disaggregates each order into a series of Smart Jobs™ that establish the routing steps and resources needed to complete each step of an order's production path. The system arranges each Smart Job according to its due date priority and in accordance with other Smart Jobs requiring similar resources. The jobs reserve all resources necessary for their on-time completion and react to changes in the floor environment, rerouting themselves as needed to stay on schedule.

The nMetric system tracks the progress of each Smart Job as it moves along its self-supervised path. Smart Jobs provide the system and its users with real-time intelligence of floor activity and conditions. Each change made to the integrated databases or to any Smart Job is updated in real time. This self-supporting feedback loop allows the nMetric solution to provide current shop floor status and visibility into all manufacturing operations, replicating the real-world capabilities and availability of resources at any point in present or future time.

As a result, manufacturing management can proactively manage the availability of resources, and arrange operations to optimize efficiency and ensure that all orders are progressing towards on-time shipment