

# Johnson Controls Inc.

Milwaukee, Wisconsin USA



## The Company

Founded in 1885, Johnson Controls (NYSE: JCI) has its corporate headquarters in Milwaukee, Wisconsin. The company's sales for 2003 totaled \$22.6 billion, and fiscal 2003 marked its 57th consecutive year of sales increases, 13th consecutive year of earnings increases, and 28th successive year of dividend increases.

Johnson Controls consists of three divisions and is the world's largest supplier of integrated seating and interior systems for the automotive industry. The company's Automotive Group has over 275 locations in 35 countries worldwide, with American headquarters in Plymouth, Michigan and European headquarters in Burscheid, Germany. The Automotive Group supplies seats, interiors and battery products to original equipment manufacturers (OEMs). It also provides batteries to the automotive aftermarket. The division manufactures all elements of complete automotive interiors, including overhead systems, floor consoles, door systems, instrument panels and seat systems.

Since 2002, Johnson Controls has been recognized as the most admired automotive supplier by Fortune's annual survey of America's most admired companies. Every year since 1998, it has been listed on Industry Week's annual list of 100 Best-Managed Companies. Information Week and Cap Gemini Ernst & Young also rank Johnson Controls as one of the top 100 companies for use of information technology to serve customers.

## The Challenge

As automotive consumers seek greater customization in their vehicles, the ramifications for OEMs and their suppliers are far-reaching. "Fueled by the dramatic increase in features and options, the number of vehicle configurations is exploding," says Guus Dekkers, Vice President Information Technology Europe & International, Johnson Controls. "This makes it increasingly difficult for automotive manufacturers and suppliers to control the flood of material and to maintain low levels of inventory."

Further complicating this situation is the challenge of balancing supply and demand. The further down the supply chain a company is situated, the greater the difficulty in reacting to continuous changes in demand by the OEM and keeping supply and demand in synch. Historically, automotive manufacturers and suppliers have tried to balance supply and demand through buffer stocks and

manually driven planning forecasts aimed at predicting future customer demand. These tactics have proven to be inaccurate thereby adding cost to the final product. In an age where suppliers are required to cut costs by 5-7 percent annually, this approach is highly problematic.

"The pressure is on suppliers and manufacturers to maintain low levels of inventory while guaranteeing direct reactivity to demand variations for a vast product-variety," says Guus Dekkers. "That means ontime delivery, exceptional product quality and attractive pricing. In other words, you must keep your supply chain and inventory well under control."

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*Guus Dekkers, Vice President Information Technology Europe & International, Johnson Controls*

To reduce inventory levels and increase inventory accuracy, it is important to accurately forecast what the OEM is likely to do, both short term (within hours) and longer term (within days). Traditionally, OEM's provide the tier one suppliers with a 90+ percent accurate forecast for the upcoming three to eight days, but unfortunately this level of accuracy may not always be adequate to get the job done. Driving the shop-floor and fine-tuning the supply chain demands a combination of this traditional OEM forecast information with sequenced vehicle information processed real-time directly from the OEM's assembly line. Such so-called "broadcasts" provide information updates to the supplier on how fast the line is moving, what options each specific car is planned to

have and whether the sequence of vehicles has changed for some unforeseen reason (e.g., a faulty assembly that had to be removed from the line for rework).

### **The Solution**

JCI has been a QAD customer since 1991, and today QAD MFG/PRO is one of JCI's corporate enterprise resource planning (ERP) standards.

"We selected the QAD MFG/PRO solution for its deep automotive industry functionality and for its low total cost of ownership," says Guus Dekkers. "QAD has proven to be a flexible solution for the automotive industry and their software tools allow for fast implementation." While JCI operated legacy systems and other software packages for business applications for many years, it is currently increasing its focus to standardize on "out-of-the-box" solutions to reduce support costs, increase upgrade flexibility and improve integration across its global enterprise. To address the challenge of just-in-time (JIT) sequencing, JCI decided to work with QAD as a means of leveraging its automotive experience in the just-in-time arena with QAD's quarter of a century experience in developing cost-effective solutions. The result of that collaboration is the new QAD JIT Sequencing module.

***"One of our first implemented plants doubled its inventory turns using QAD JIT Sequencing."***

*Yves Wullaert, IT Director Operations and Logistics Europe, Johnson Controls*

The bolt-on solutions JCI evaluated in the past for JIT sequencing and supply chain management could not deliver the seamless integration between planning and execution JCI was looking for. For this reason, QAD JIT Sequencing was developed to integrate seamlessly with QAD MFG/PRO while allowing maximum flexibility to adapt quickly to the ever changing requirements in the automotive industry. The application helps automotive suppliers produce and deliver vehicle components in exact sequence with vehicles moving down the OEM's assembly line. It does this while maintaining full control over production and inventory. QAD JIT Sequencing balances supplier schedules with on-hand inventory levels and forecasted supplier delivery times through calculated delivery patterns. It then manages the sequential manufacturing—even for several independent manufacturing lines—and assures the on-time delivery of those items.

"QAD JIT Sequencing combines planning, execution and dispatching functionalities," says Yves Wullaert, IT Director Operations and Logistics Europe, Johnson Controls. "It also provides one of the key functions we were looking for in a standard sequencing solution—modeling enhanced forecast of real customer demand, which allows us to build in two shifts, but to deliver in three because we know what the customer is likely to do."

***"QAD JIT Sequencing pays for itself through fast reductions in supply chain costs, both in freight and in inventory,"***

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QAD JIT Sequencing primary drivers are broadcast messages transmitted from the customer's assembly line directly to the JIT Sequencing application. These broadcasts include sequence number, vehicle identification number and product configuration data that allows the JIT supplier to build and deliver the module in sequence for a specific car. Broadcasts are triggered from different points on the customer assembly line as the vehicle moves through as a work in process.

QAD JIT Sequencing has the capability to extract products from an existing (automated) finished good warehouse to buffer against a suppliers' short response time or a supply model that is based on finished good replenishment. It also drives production of parts needed to fulfill the customer demand in a JIT manner or to refill the finished good stock inventory, allowing a decoupling of supply chain and production if desired.

"The broadcast message can be split up for our manufacturing operations to drive different production lines such as, instrument panels, door panels and seat sets. In the end, it comes together in such a way that we can deliver just-in-time all modules uniquely built for the specific car for which it was ordered," says Yves Wullaert.

In order to assure maximum reactivity, the JIT Sequencing planning is done online. QAD JIT Sequencing reacts to any trigger it receives from the supply chain, whether it be a change in customer demand, a suppliers shipment noted to be received late or a Bill-of-Materials (BOM) change. It is the first online driven supply chain management planning tool available on the market. To assure a proper response time and reactivity, the product's BOM

is loaded into memory allowing a quick “beyond MRP” processing of any change, which allows the system to display any changed demands in raw and semifinished goods immediately. “We even added a new schedule type called ‘JIT pipeline,’ which shows the demand in sequence car-by-car, basically modeling the real-time vehicle flow at the OEM. The JIT pipeline is maintained by online broadcasts received from the OEM’s production line,” says Yves Wullaert. “The QAD JIT Sequencing online planning engine ‘predicts’ material shortages. A logistics cockpit shows critical components running out of stock in a timely order. This new concept has led to significant cost savings and increased inventory turns,” he continues. “One of our first implemented plants doubled its inventory turns by using JIT Sequencing.”

“Prior to this solution, expeditors would have to react after facing a material shortage - usually with an express shipment involving premium freight and in most cases just shortly before production might break off,” notes Guus Dekkers. “Thanks to the early warning QAD JIT Sequencing provides, and the integration with supplier schedules, we can now quickly respond to increases in the size of regularly scheduled shipments and avoid the premium freight costs associated with expedited shipments. This means we moved from a reactive towards a proactive way of thinking and working.”

The module also allows for optimization of truckloads and even ‘milk runs’ to ensure that trailers are fully loaded, further driving down shipping costs. “If you

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look at the design of QAD JIT Sequencing, you can see how the solution has been structured to drive ongoing improvements in the production and planning process,” says Yves Wullaert.

## Highlights

### Company

<b>Company Name</b>	Johnson Controls, Inc.
<b>Industry</b>	Automotive Products, Facility Management/Controls
<b>Products</b>	Automotive: integrated seating and interior systems; batteries

### Solutions

<b>QAD Solutions</b>	QAD MFG/PRO; QAD JIT Sequencing; QAD AIM
<b>Sites</b>	Multiple sites in Europe and North America.
<b>Implementation Time</b>	6-8 weeks per site
<b>Platform</b>	QAD JIT Sequencing: Windows NT server 2003. MFG/Pro: HP-UX Windows XP clients

### Results

- Improved inventory control and increased inventory turns
- Reduced support costs
- 100 percent partner connectivity
- Improved and enhanced supply chain collaboration
- Better leverage of enterprise knowledge assets through tight integration with ERP Integrated solution for automotive industry

The rules engine also allows radical changes such as moving to a two shift production model to support a three shift customer assembly plant. “The savings from dropping a night shift can be substantial,” continues Yves Wullaert. “The changes to the production logic, however, are not trivial. Fortunately, JIT Sequencing was designed to allow such flexibility.”

Another improvement built into QAD JIT Sequencing is the support of small production sites. While JIT Sequencing is fully integrated with QAD MFG/PRO software, it does not have to run together with the ERP system-and/or on the same platform. The MFG/PRO solution can run locally with JIT Sequencing or run remotely at the corporate office while JIT Sequencing runs locally at a plant. The module can locally maintain its on-hand inventory balances, broadcast production builds and planning parameters. It processes all transactions and then updates appropriate counters for batch transmission upstream to the ERP system as required.

This flexibility allows small plants to operate with minimal IT support on site.

### The Benefits

According to Guus Dekkers, the return on investment for QAD JIT Sequencing is rapid. "QAD JIT Sequencing pays for itself through fast reductions in supply chain costs, both in freight and in inventory," he says. He adds that in addition to these savings, JCI can now react much faster to changes, as the configuration of the system is no longer being hardcoded as in the past, but is truly rule-based. "Creating your own standardized rule-data-base helps you to deploy JIT Sequencing quickly and cost-effectively in your organization," he says.

The rules engine allows for changes in the sequencing logic to easily accommodate new line configurations and improvements. "In our previous hard-coded solution, the cost of reprogramming the solution could outweigh the benefits of the change being implemented," says Yves Wullaert.

Further, because of seamless integration across the supply chain, suppliers are able to better support JCI. When sequences differ from medium-term customer schedules, these variances are reflected in the next supplier schedule—assuring that each node in the supply chain is apprised of the current status of the OEM assembly line. If suppliers lack EDI integration, they can view the updated information on a secure Web site. Content on the site may include alerts, kanban signals, min/max inventory levels or simply supplier schedules.

### The Future

Currently JCI Europe has installed QAD JIT Sequencing at four facilities and will have four additional facilities completed by the end of this year. Over the next few years, JCI envisions rolling out QAD JIT Sequencing to over fifty sites in Europe. "We wait for a model change-over when replacing an old system with the new QAD JIT

Sequencing module in order to take advantage of ramp-up volumes," says Guus Dekkers.

According to Yves Wullaert, the next frontier consists of cascading both sequencing production and delivery multiple levels down the supply chain. "In Rastatt for instance, we are already ordering component parts from

***QAD JIT Sequencing allows maximum flexibility and adaptability . . . the application helps auto suppliers produce and deliver vehicle components in exact sequence with vehicles moving down the OEM's assembly line.***

our suppliers in sequenced containers, which we feed sequenced directly into the production process," he says. "The QAD JIT Sequencing solution plays a critical role in this process. The sequencing solution keeps track of the inventory and automatically triggers the next delivery as soon as it forecasts that the current build-stream will have consumed the inventory in the near future."

"Of course, we can introduce rules to dynamically rebalance the line as the mix and grouping of products require change," says Guus Dekkers. "This is the kind of flexibility that sets QAD JIT Sequencing apart from any other JIT sequencing tool."

*Story prepared by Johnson Controls, Inc. in cooperation with QAD.*



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