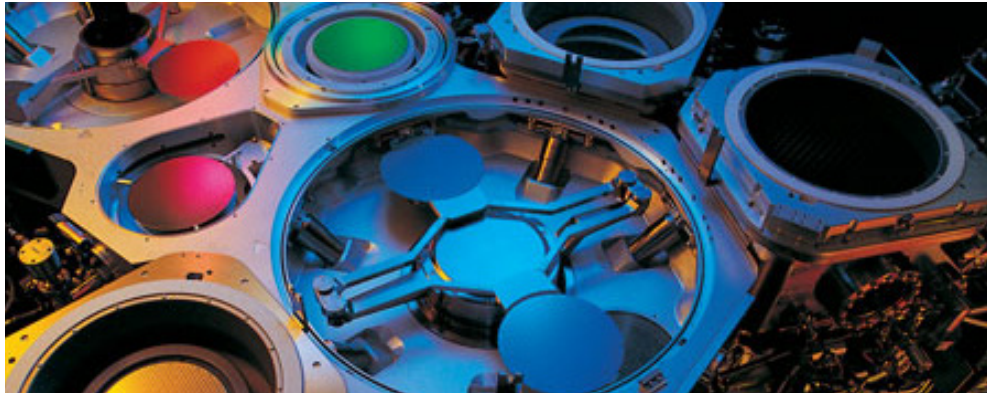


## The True Benefits of Gems Lean Manufacturing

In today's competitive marketplace, most sensor manufacturers know that simply having in-house capabilities are not enough. True market success hinges upon a proven, consistent track record of developing standard and custom products that can effectively address complex measurement challenges.

Sensors must consistently perform at or above published specifications. They must be able to withstand the rigors of in-house and in-field testing. Manufacturers themselves must have proven in-depth problem-solving expertise within multiple industries. And, they must deliver solutions that are highly effective, consistently on time and to agreed price points —not just the first time, but every time. Sound like a tall order? For Gems Sensors & Controls, this is simply the norm.

Since its earliest days of making level sensors for marine ballast tank monitoring, Gems has continuously evolved its standard catalog offerings. Each new product introduction stems from another technology breakthrough or customer success story. The unrivaled industry experience of Gems engineers, built upon thousands of successful applications, focuses on design ingenuity, continuous quality improvements, smart engineering, cost optimizations, waste reductions, and an unwavering commitment to quality.



### Lean manufacturing for global cost reductions

For nearly sixty years, Gems has designed and manufactured a full range of standard and custom liquid level, flow and pressure switches, miniature solenoid valves, and preassembled fluid systems for medical, mass transportation, automotive, off-highway, pharmaceutical, marine, mining, industrial and process control requirements. Special manufacturing processes allow Gems customers to receive field-proven OEM volume parts that meet or exceed published specifications. They are available within short lead times and with a 95% on-time delivery metric.

For customer convenience, Gems maintains complete manufacturing facilities in North America, Europe, and Asia, in addition to its global sales, engineering and service offices. In some cases, Gems manufactures products for a single customer in multiple locations simultaneously. Each is produced to uniform specifications and tested according to the same rigorous quality standards.

Lean manufacturing is uniformly implemented at each Gems global development site. Implementation metrics and progress notes are closely tracked and monitored over the full global supply chain. In this way, Gems lean manufacturing acts as a powerful unifying force across all company operations. It brings to all customers the direct benefits of streamlined operations, optimized efficiencies, cost and lead time reductions, and rapid response. A customer is assured of these benefits, regardless of order size, geographic location, market sector, or end requirement.

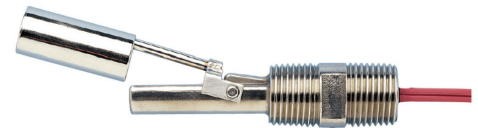


## Listening to the voice of the customer

Gems not only hears the voice of the customer, they truly listen. Beyond supplying a finished part, the sales team ensures that real-time customer feedback is integral. In fact, Gems customers receive full transparency to the full custom sensor design and development process. This ensures that each supplied end product consistently exceeds expectations.

When Gems engineers collaborate with a customer, they also hope to better understand the application. Many times, certain application nuances can reveal external challenges within the installation environment, independent of the sensor, affecting overall measurement accuracy. Their correction is many times simple and allows for the specification of a standard catalog product at a lower price point and shorter lead time.

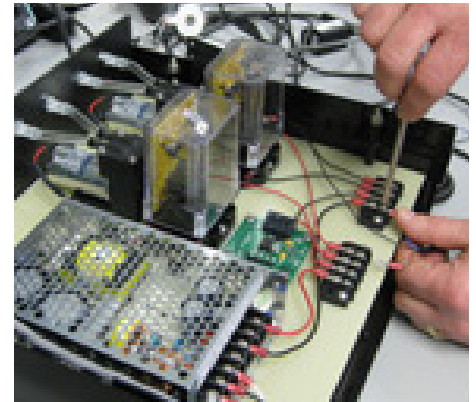
Once a solution is implemented, customer suggestions for next-generation product enhancements begin. In listening closely to the customer, Gems ensures that the company product portfolio remains an ever-evolving and invaluable resource for addressing universal measurement challenges.



## Applying value analysis/value engineering (VA/VE)

VA/VE can significantly expedite OEM volume manufacturing without compromising quality. Gems engineers understand that, by applying VA/VE to the production element with the longest lead time, lean manufacturing may be implemented more effectively across the entire product development cycle.

VA/VE is further implemented via the direct collaboration of Gems and an OEM customer's own in-house engineering team. Results are typically a well-planned product design with enhanced reliability and streamlined production costs. By adopting an interdependent problem-solving approach, Gems is able to maintain razor-sharp focus on engineering ingenuity and rapid customer response. VA/VE is also applied to manufacturing planning. Here, Gems extends the operational improvement synergies achieved on one technology across multiple other product lines.



## Sourcing globally for expedited lead times

Successful lean manufacturing techniques allow Gems to offer its customers high-reliability OEM volume products with shorter lead times than many industry off-the-shelf solutions. Any one of thousands of standard catalog parts can be modified for a customer's own unique requirements and shipped in just a few business days. To help achieve this rapid response, Gems stocks many semi-finished items. These require only the addition of connectors, specialty housings, or supplemental components. Their conversion into delivery-ready final products is fast and simple. Further supporting these efforts, the Gems strategic sourcing group works to identify multiple reliable component suppliers who share the company's unwavering commitment to quality and on-time delivery. By having such a diverse and well-qualified supply chain, manufacturing can usually proceed on-schedule.

## Reducing time to market

In one example, an OEM customer was specifying Gems switches for a critical system platform upgrade. By listening carefully to overall application and target performance goals, Gems recognized that the proposed higher flow rates could create too great of an overall system pressure drop.





Upon learning of this, the customer changed their initial scope of inquiry from a half dozen standard flow switches to a custom engineered integrated flow sensor subassembly. The Gems engineering team applied VA/VE to the proposed new subassembly, integrating both the sensors and manifold into a single, streamlined part. During the VA/VE process, the Gems strategic sourcing team identified alternative component suppliers who could maintain quality with faster delivery times. This reduced what had previously been a 120-day standard lead time on prior subassemblies to just three business days, a nearly 98% reduction in time to market. The new product also exceeded target performance requirements with lower overall manufacturing costs.

### Self-contained, dedicated manufacturing

Once a sensing solution is approved, Gems manufactures a small batch lot for in-application prototype testing. To do this, the operations team sets up a fully dedicated manufacturing cell. The cell includes sufficient tooling for a pilot run. The pilot run itself offers upfront identification of any potential problems prior to full-scale OEM volume production. Each production step occurs right inside of that same dedicated manufacturing cell, allowing Gems to monitor and control both quality and costs.

An example of this self-contained approach may be found with the Gems CAP-300 coolant level sensor. As a point level device compatible with a broad range of media, it has been designed and manufactured for high-reliability within critical power generation equipment, off-highway vehicle and backup generator applications. Proper device development required six months of self-contained manufacturing evaluation. During this time, Process Failure Mode Effects Analysis (PFMEA) was applied to all components, helping to proactively resolve every possible failure mode scenario. Gems takes this type of measured approach across all manufacturing operations to ensure absolute product reliability, as well as seamless, full-scale on-time product manufacturing to agreed customer promise dates.

### Leaner, faster, better

By adopting an integrated, collaborative and quality-focused lean manufacturing approach, Gems can focus entirely on customer needs. Whether a requirement calls for a basic off-the-shelf product or a highly customized design, each new project receives the same level of attention to detail, application of VA/VE, and commitment to engineering excellence. This relentless focus on quality, efficiency and innovation also enables Gems to provide some of the most reliable, trusted bread-and-butter products for multiple industries. The company is also uniquely able to provide them on a global scale, with astonishingly short lead times and a 95% average on-time delivery metric. Most OEM volume standard products can ship the very next day. Leaner, faster, better. They are not simply buzzwords at Gems. It's the norm.

