

# On the FOREFRONT

A Quarterly Compilation of Outsourcing Best Practices and Case Studies

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## Teaming For Improved Product Competitiveness

Contract manufacturers are often viewed simply as factory locations for building product in lower cost regions. While some contract manufacturers fit that “no frills” definition, there are also companies whose design and manufacturing expertise can be leveraged in ways that may enhance product functionality or ease of use, improve quality through greater levels of automation, or reduce cost by eliminating inefficiency. When vertical integration is added to that equation, the options for product improvement benefits increase because the contract manufacturer has a wider range of manufacturing technology options to recommend.

Designing an innovative product is only half the



*Forefront Medical's Engineering team works to optimize tooling design to support customer requirements cost effectively.*

product development equation. The end design needs to be manufacturable to meet both

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## Best Practices in Eliminating Unnecessary Costs

While the supply-demand imbalances of the last few years may have made cost reduction seem to be an unachievable goal, the reality is that even in an environment of rising cost there are opportunities to eliminate inefficiencies.

The largest potential area of cost reduction in product development is unleveraged contract manufacturer expertise. Contract manufacturers with product development capability have a much broader perspective of best manufacturing solutions to achieve desired product form, fit and function. They also understand manufacturability and testability best practices, which may be overlooked by third-party design firms or a medical OEM's product development team. Finally, it is possible to leverage shared contract manufacturer resources such as design & simulation tools, pre-approved material databases and regional regulatory relationships to reduce time and cost in the design process.

To help shorten product development cycles, Forefront Medical maintains a database of approved materials which includes a full range

of medical-grade polymers. While the best material will vary depending on application, cost considerations and desired functionality, the product development team is often able to recommend pre-approved materials choices to reduce product development time. Using materials that have previously been tested and approved within the regulatory environments associated with the product can cut 4-5 months from a product development cycle.

Industry-standard software is used for tool, hot runner and cooling system designs. Mold-flow software is used for mold-flow analysis and to support Design of Experiments (DoEs) to optimize the design and molding parameters when those parameters are not resident in Forefront's existing library. State-of-the-art software is utilized for molding process simulations to test assumptions prior to tool fabrication. Forefront maintains a detailed library of injection parameters related to the best mix of injection pressure, temperature, speed and

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## Competitiveness

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quality and cost targets. This is an area where contract manufacturer expertise can be invaluable, because engineers with manufacturing experience are able to analyze best production technologies, as well as tooling and automation considerations. When this discussion occurs early in the design process, the costs of incorporating these recommendations is much lower.

Forefront Medical makes design for manufacturability (DFM) recommendations to ensure minimal secondary processing. Tooling and assembly lines are optimized for efficiency. Prior to tooling fabrication, simulation software is used to ensure the tooling design will achieve the desired cost and quality targets.

Forefront's team also analyses manufacturing and assembly automation options through its Design Development Plan (DDP) process, since the ability of the product to meet its volume price target is heavily dependent on the manufacturing and automation strategy meeting cycle times and minimizing labor when production volumes are achieved. While manufacturing processes such as molding, extrusion or metal fabrication and any concomitant tooling are defined by the product design, the automation process can evolve over time as volumes increase.

Forefront's team also utilizes a standard DDP for automation. The team evaluates the product, its projected volumes, the fixed costs associated with an automated line and the anticipated length of the project to determine if the benefits provided by automation will outweigh the costs.

When product volumes are difficult to forecast, the team will often start the program with more manual assembly volumes, often for the first year. Once volumes become consistent, the team begins the automated production line design process.

While no contract manufacturer can completely eliminate the issues caused by supply/demand imbalance in global markets, it is possible to mitigate that impact by improving internal efficiencies in the manufacturing process.

Six Sigma Green Belt training is in place in all Forefront facilities, creating teams with enhanced problem solving skills to lead continuous improvement focus in each facility. The core tools used to drive this process include:

- 7S Workplace Organization
- Poka Yoke mistake proofing technique
- 8D systematic approach problem solving methodology
- Risk management & Process Failure Modes and Effects Analysis (PFMEA)
- Statistical process control.

The teams start by developing a project charter which defines the problem statement, clear business objectives and benefits drivers. A Gemba workshop is then conducted with participation from various functions to identify potential areas of improvement, together with a time study to pinpoint bottlenecks. The Green Belt teams learn from observing the process and talking with production operators about their perspectives. Following Gemba, a focused DMAIC (Define, Measure, Analyze, Improve, Control) methodology is used to initiate the improvement process.

A DMAIC spreadsheet is used to capture information in a concise form. The benefit of this approach is that each identified improvement opportunity is thoroughly analyzed and tested to ensure root causes are correctly identified and the magnitude of the improvement benefit of implementing



**Forefront Medical takes a scalable approach to automation, letting volumes determine when full automation is feasible.**

the corrective action is thoroughly understood.

To better address the challenge of ensuring cost reduction over the life of the product, Forefront Medical developed a continuous improvement value-added process to identify opportunities for cost reduction and/or improvement in the overall competitiveness of the products it produces by evaluating internal processes and surveying end users. Internally the focus is on identifying production bottlenecks and long lead-time issues, and includes feedback from operators and technicians. Externally, the focus is on ease-of-use. The team develops a list of potential improvements and then selects the top priorities. A timeline is developed and progress is tracked. The project is closed once 80-90% of the improvements have been achieved. This process, the goal is to eliminate non-value added cost and increase the customer's market share.

Teaming with your contract manufacturer throughout the life of your product to determine best options for optimizing the product helps enhance product competitiveness over its entire lifecycle.



# On the FOREFRONT



## A Quarterly Compilation of Outsourcing Best Practices and Case Studies

Forefront Medical Technology focuses exclusively on the medical device industry and thoroughly understands the needs of this market. As a specialty contract manufacturer with a focus in disposable diagnostic, drug infusion and medical device systems, Forefront Medical has extensive expertise with injection molding, extrusion, assembly and packaging of specialty medical disposable devices. In addition, Forefront Medical Technology's technical expertise extends into collaborative product design and development, rapid SLS prototyping, in-house tool making and isolated clean rooms for manufacturing, assembly and packaging. Capabilities also include sterilization and global logistics to provide one integrated source for the total supply chain. This world class supplier has the expertise to custom design a new product... or redesign the current one...from a conceptual drawing into a completely manufactured, packaged and sterilized product, ready for global shipment.

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## Cost Reduction

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other variables based on materials used. With standard molds and resins, developing optimal injection parameters utilizing this library typically takes two hours when injection molding is part of the production strategy.

This standardized approach enables tool designers to easily demonstrate the likely performance of the tool under review to the customer's team during the product development process.

Manufacturing programs evolve over time. Competitive pressures may drive a need to reduce cost. A continuous improvement process that documents proposed changes and tests assumptions is important in defining best next steps, given the regulatory requirements of medical manufacturing.

For example, a Forefront Six Sigma team utilized a DMAIC (Define, Measure, Analyze, Improve, Control) methodology to identify potential improvements in throughput and cost on a project. Demand spikes had driven a need to switch to air shipment. The team's

goal was to implement improvements that lowered overall project cost and also improved throughput to the point where surges in demand could be accommodated within the regular sea shipment schedule.

The team plotted a scattergram over two axes focused on opportunity impact and the effort associated with corrective action and created a current state process map that mapped the production process flow, personnel, cycle time and takt time. They modeled a re-layout of the line for continuous flow vs a work cell arrangement. They then focused their efforts on two steps in the process: packaging the product in a tray and final sealing operation. The workstations were rearranged to enable operators to work with components more efficiently in a smaller space by utilizing stackable, color-coded bins to store raw material. From a throughput standpoint, the best opportunity for improvement was redesigning the automated sealing machine's sealing plate to have six cavities on each side instead of four. They also worked with the equipment manufacturer to develop a process that utilized

both sides of sealing plate, instead of just a single side. The specification for the outer tray was also reviewed with the customer to better identify which visual defects should signal a rejected product. Discussions were also held with the tray supplier to minimize the opportunity for handling or shipping related cosmetic defects. The result was a 50 percent improvement in throughput and a reduction in the need for air shipments.

The supply-demand imbalances driven by COVID drove unprecedented cost increases within the supply chain and transportation/freight providers. Forefront Medical's team is expert in supply chain realignment to reduce logistics costs. Its facility locations are in close proximity to major shipping hubs and support infrastructure such as contract sterilizers. This increases the options it can consider when logistics constraints are impacting delivery times. Its level of vertical integration may also eliminate the need for some custom component suppliers.

Partnering with a contract manufacturer to identify opportunities for eliminating unnecessary cost is one way to balance the impact of rising costs.