



## **Shortening the Supply Chain: The Benefits of a Global Contract Manufacturing Partner**

---

# Shortening the Supply Chain: The Benefits of a Global Contract Manufacturing Partner

March 22, 2024

A key lesson of this decade has been that shorter supply chains add flexibility to support varying market demand. They also reduce logistics costs and the inventory pipeline otherwise tied up in transit or “just in case” regional warehousing. Comparatively, some regions offer significant cost labor advantage. Ignoring that strategy for price-sensitive products can cost market share. There is middle ground. When manufacturing is outsourced to a supplier with a global footprint, it is easier to develop regional outsourcing strategies that make sense for specific market characteristics such as local content requirements, cost sensitivity, degree of demand variability and dominant market location.

Forefront Medical Technology, a vertically-integrated specialty contract manufacturer with a focus in disposable diagnostic, drug delivery systems and medical device systems with facilities in North America, Asia and the United Kingdom (UK), provides its customers with the benefits of regional manufacturing options, significant design and commercialization expertise, standardized key processes, and vertically integrated fabrication capabilities. This whitepaper looks at the key benefits of a regionalized supply strategy through a single contract manufacturer:

- Ability to leverage resources in lower labor cost areas globally
- Access to a broader set of vertically-integrated manufacturing capabilities
- Simplified logistics
- Ability to evolve strategy over time.

## **Ability to Leverage Resources in Lower Labor Cost Areas Globally**

One of the benefits of technological advances in videoconferencing and collaborative computing is that resources no longer need to be replicated in all facilities. Many lower cost labor markets have highly experienced engineering and technical resources who can support multiple facilities.

Headquartered in Singapore, Forefront Medical leverages engineering expertise in its US technical center, and Mexico and UK manufacturing facilities with its engineering resources in Singapore and China. Standardized systems and processes help ensure continuity among teams.

For example, Forefront Medical’s team uses a standardized process in which customer requirements are assessed and a Design Development Plan (DDP) is created. The DDP is followed by a customer specification and collection of market inputs. This approach enables Forefront’s team to rapidly assess customer requirements, present design and manufacturing options and move forward with a design that incorporates all customer requirements and utilizes the optimum manufacturing technology or technologies for those requirements. Variables such as the feel of a device in a surgeon’s hand, the ease of keeping tubing arranged by a hospital bed and patient comfort are all considered as these choices are made.

On the custom parts side of the equation, once the customer specification is approved, 3D CAD models are developed and analyzed, helping to optimize tooling performance prior to fabrication. Design

reviews which include functional analysis and risk evaluation are completed. After a customer's team approves the design, prototyping and verification began.

To help shorten product development cycles, Forefront Medical also 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.

On the electromechanical side of the equation, Forefront's design team provides electronics design and PCB layout, as well as software development services. Mechanical and packaging design can be supported. Prototyping and validation are also provided.

Design for manufacturability (DFM) recommendations are made 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.

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 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.

As part of the new product introduction (NPI) effort, Forefront collaborates with its customers on identifying any needed suppliers; risk management; machine, tools and process validation; product biocompatibility and stability validation; sterilization validation including sealing integrity; and packaging ship testing.

While much of this effort is done via teams in Singapore or China, they can work with teams in the UK and Mexico on new programs. Forefront also operates a U.S. Technical Center to make it easier for U.S. customers to communicate with personnel in a time zone convenient to their normal work schedule, with similar support in the UK for European customers.

This comprehensive approach helps ensure that both the customer and contract manufacturer teams are considering all design options and eliminating defect opportunities and unnecessary cost drivers prior to product qualification.

### **Access to a Broader Set of Vertically-Integrated Manufacturing Capabilities**

Not surprisingly, contract manufacturers with one core manufacturing competency and a group of associated suppliers tend to recommend manufacturing technology most closely aligned with their internal manufacturing competency. Comparatively, a vertically integrated contract manufacturer can

evaluate multiple manufacturing technology options, making design recommendations based on the optimum technology for the product's form, fit, function and cost requirements.

Forefront Medical's capabilities within Asia include Selective Laser Sintering (SLS) and Multi-Jet Modeling (MJM) systems, injection and blow molding, extrusion, metal fabrication, electromechanical assembly, and clean room assembly capabilities.

Forefront Medical's capabilities in Juarez, Mexico include injection molding, extrusion, clean room assembly and packaging, and automated high volume production.

Its Arrow Medical subsidiary in the UK offers manual and semi-automated assembly and sterile packaging of instruments and critical devices in class 7 cleanrooms. Labelling, logistics, product validation and pre-production trials are also provided. The Company also has dedicated facilities for silicone injection molding and clean room silicone molding, including liquid silicone rubber systems, and compression and injection molding for components and small parts with over-molding. These capabilities include combinations of rubbers, silicones and a variety of other polymers. Arrow Medical's capabilities also include textiles assembly utilizing the latest sewing techniques, precision assembly, cutting welding, adhesive bonding and sealing using films and advanced fabrics. The facility can also support projects requiring RF welding, cutting and forming of PU and PVC with complete assembly of multi-layer laminations, pressure testing and process validation.

While not all capabilities are resident in all facilities, Forefront has the ability to become an internal supplier of fabricated parts to a different facility without those fabrication capabilities or utilize existing expertise to rapidly add the capability to that facility.

### **Simplified Logistics**

Shortening the supply chain simplifies logistics both in terms of finished goods inventory in transit or in warehouses, and in terms of flexibility for variable demand.

Forefront Medical's Asia facilities' locations have been selected for their proximity to major shipping hubs and support infrastructure such as contract sterilizers.

Forefront Medical's facility in Juarez, Mexico offers the shortest transit time to a major US city, international airport, rail and U.S. interstates. El Paso has three sterilization facilities capable of gamma and/or ethylene oxide (EO) sterilization. An EO sterilization facility is also available at the adjacent port of entry in Santa Teresa, New Mexico. Depending on border crossing/customs wait times, products with no sterilization requirement leaving a Juarez factory can be on a U.S. interstate heading towards their end destination in as little as 24 hours.

Its Arrow Medical subsidiary in Kington, UK provides a regional manufacturing location to support UK and/or EU requirements.

### **Ability to Evolve Strategy Over Time**

Manufacturing programs often evolve over time. Assembly processes that made sense at initial volumes may be inefficient at higher volumes. Demand variability may also drive a need to change production assumptions. Competitive pressures may drive a need to reduce costs. Demand may shift among regions.

Forefront Medical's team supports these changes in multiple ways. Its focus on Six Sigma philosophy gives its teams tools to evaluate continuous improvement opportunities when project characteristics are evolving. Its level of vertical integration can help when moves to among regions are considered, as that minimizes the external supply chain. Its purchasing team also has extensive experience in re-aligning regional supply chains for supplies and components not manufactured within Forefront Medical facilities.

Selecting a contract manufacturer with global capabilities provides an ability to regionalize strategy and shorten the supply chain. It also enables OEMs to plan an outsourcing strategy that can encompass multiple regions while managing a single supplier. Most importantly, it opens the door to a strategy that can evolve over time with a partner who can help outline the costs and benefits of various manufacturing locations.

### **About Forefront Medical Technology**

*Forefront Medical Technology is a global medical device contract manufacturer with five manufacturing locations. Singapore is Forefront's headquarters, as well as home to our Design Engineering Center and specialty manufacturing. JiangSu and Xiamen, China, are additional manufacturing locations and are also China FDA Registered. A new manufacturing facility in Juarez, Mexico will be operational in August 2024. Arrow Medical, Kington, Herefordshire, UK, is now a part of the Forefront global capability, specializing in wound care products. Regional Business Development offices are in Singapore, Farmington, CT USA, and Shanghai, China, and assure our technical sales teams are close to our customers for local, responsive assistance.*

*We have developed extensive capabilities with laryngeal mask airways, diagnostic devices, drug delivery systems, enteral feeding catheters, infusion sets, wire reinforced tubes, optically clear components, patient monitoring devices, electromechanical devices and other specialty products. Each of our locations has state of the art manufacturing capabilities that include class 100K clean rooms for extrusion and injection molding, complimented by class 10K clean rooms for assembly.*

*Forefront Medical's integrated technical approach provides customers with a total manufacturing solution and global supply chain. Our facilities are TUV ISO 13485:2016 and FDA Registered. Forefront is a wholly owned subsidiary of VicPlas International Ltd, who is listed on the SGX Main Board, Singapore stock exchange.*

Visit <http://forefrontmedical.com/> to learn more about our capabilities.

For a confidential review of your project, please complete our enquiry form at: <http://forefrontmedical.com/contact-us/>, email us at: [appl\\_dev@forefrontmedicaltechnology.com](mailto:appl_dev@forefrontmedicaltechnology.com), or call +1 (860) 830-4637 (Americas) / +86 21 6062 7177 (Asia).

For Arrow Medical (U.K and Europe), email [enquiries@arrowmedical.co.uk](mailto:enquiries@arrowmedical.co.uk) or call +44(0)1544 231760. Arrow Medical's capabilities can be viewed at <https://arrowmedical.co.uk/>