

TOP THREE BENEFITS OF WORKING WITH AN INTEGRATED TUBING SUPPLIER



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By Mark Broadley

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INTRODUCTION

Imagine you're finally going to get that knee-replacement surgery you've been putting off. Let's say you have the option of setting it up yourself: scheduling the operating room (OR), orthopedic surgeon, nurses, and other staff; ordering the implant and instruments; arranging for lab work and physical therapy ... and don't forget about billing your insurance.

Or, you could work with the hospital's surgical coordinator who could make all the arrangements for you. Which would you choose?

Now, imagine that instead of planning a surgical procedure, you're looking for a medical tubing supplier. You could spend time researching the companies that could handle one or more of the processes you need to create your finished tube. Or, like the surgical coordinator example, you could partner with an integrated tubing supplier that could manage the entire process under one roof.

This white paper will discuss the top three benefits of working with an integrated tubing supplier throughout the product lifecycle and suggest key considerations at each phase.

THREE BENEFITS OF WORKING WITH AN INTEGRATED TUBING SUPPLIER

BENEFIT #1: FASTER TIME TO MARKET

Working with one partner from the earliest phase allows teams to take a more holistic view of the project and mitigate risk by preventing potential problems in later stages. Customers also save time when a supplier has multiple capabilities in-house.

REAL-LIFE EXAMPLE

A large surgical technology company needed to rapidly re-engineer an energy-based device to lower the cost of use. Viant delivered DoE tube fabrication prototypes every 3-4 weeks, which enabled the customer to analyze and test design concepts and rapidly iterate. Design freeze for the tubing components was achieved 3-4 months before the other components.

BENEFIT #2: REDUCED COST

The goal of an integrated partner is to optimize tube properties for the fabrication process and performance, from the very beginning. Optimizing the design in the early stage allows you to make better decisions with proper specifications for your ultimate outcome, with fewer iterations.

REAL-LIFE EXAMPLE

A global surgical supply company was considering a two-piece welded assembly for a new energy-based device. Viant devised a tube with an expanded end to allow a one-piece design. This solution reduced cost by an estimated 10%, as well as reducing assembly strength issues and supply chain complexity.

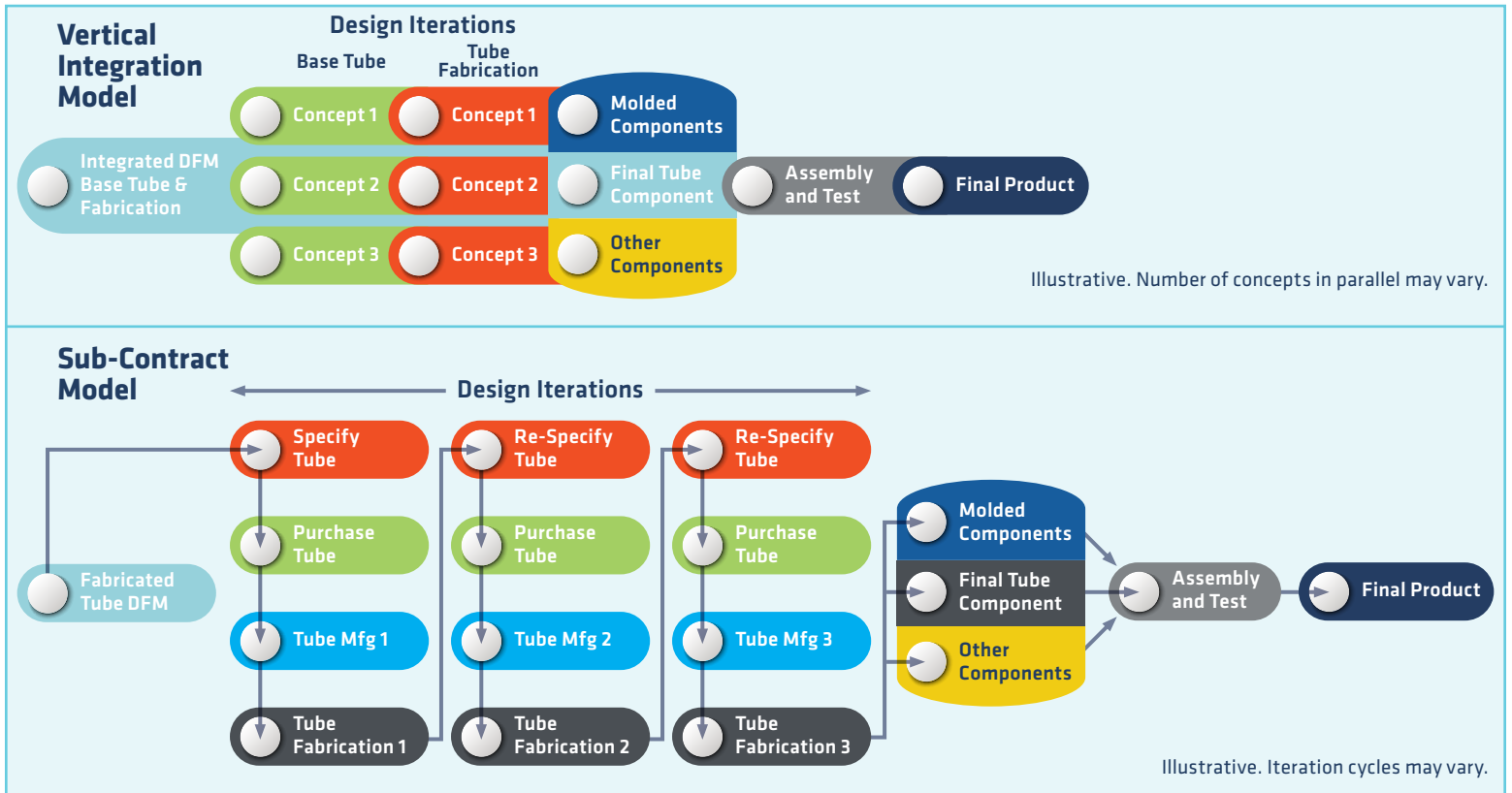
BENEFIT #3: ENHANCED PERFORMANCE & RELIABILITY

An integrated supplier has the ability to control the process output of the tube production to extremely tight tolerances. The result is less variability in the tube that could impact the fabrication downstream.

REAL-LIFE EXAMPLE

A global surgical technology company with an advanced energy device was seeking to tighten tube straightness and clamp-related tolerances by up to 50%, which required a technical leap forward in already extreme tolerances. The Viant team designed a custom tube-straightening system that enabled a 50% increase in straightness tolerance. The team also was able to reduce dimensional variation by 33% to improve clamp force, which delivered increased burst pressure and sealing strength.

Figure 1. Workflow comparison of a vertically integrated model (top) and a sub-contractor model (bottom)



What's an integrated tubing supplier?

A vertically integrated supplier means that one company controls a large portion of the supply chain. For example, the raw material, tube drawing, cutting, cleaning, machining, inspection, and packaging.

As shown in Figure 1, controlling the supply chain means customer benefits including faster time to market, reduced cost, and enhanced performance and reliability.

A CLOSER LOOK AT THE BENEFITS

Benefit #1: Faster time to market

An integrated supplier that takes a robust design for manufacturing (DFM) approach can help ensure that the project makes a smooth transition from design to manufacturing, without iterations that add to your timeline.

Customers also save time when a supplier has multiple capabilities in-house. This eliminates the time-consuming transactional work necessary when a project moves to each additional supplier, such as getting quotes, procurement, shipping and receiving, bringing the supplier up to speed, inspection, etc. When you work with an integrated supplier, you have less work in process (WIP), less inventory, and shorter lead times.

In the Development phase, an integrated tubing supplier has the capability to offer quick-turn prototypes that enable rapid design iterations to keep tubes off the project critical path.

For example, Viant's Tubing Center of Excellence offers a toolbox approach where we make multiple size variants around a nominal target. This enables design teams to rapidly gather data and optimizes performance to avoid later-stage issues. Dedicated laser-cutting cells and a rapid tooling strategy also keep the project moving forward.

In the Validation + Ramp phase, an integrated supplier uses production-equivalent equipment for a seamless transfer through prototype, engineering build, design verification build, design validation, and process validation. An integrated team learns from every build how tubing interacts with fabrication and how parts perform in the finished design. This knowledge enables early risk analysis and mitigation to proactively solve problems and prevent qualification delays.

REAL-LIFE EXAMPLE

A major OEM wanted to extend its line of biopsy products from a radiologic imaging environment to an MRI environment. It needed a non-magnetic material that also had good edge retention for soft tissue cutting. Viant recommended a tube material available from stock that met both criteria. The team made the tube from the new alloy using existing dimensional specifications and fabricated samples using existing tooling. The OEM was able to avoid an estimated 4 months of material testing and selection trials and move directly to product development using its existing product design with the new tube material.

Benefit #2: Reduced cost

Working with a single partner allows product design teams to take a holistic approach to the project and apply design for manufacturing (DFM) principles to optimize tolerances, reduce total parts count, and specify tubing features that are more economical to scale.

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In the Design phase, working with an integrated tubing supplier gives you access to a wider range of tubing materials to optimize material selection with economical custom options such as lower-cost alloys, or using a welded-and-drawn tube rather than a seamless tube.

In the Production phase, integrated suppliers can leverage labor-saving tools such as automated laser cutting and forming with automated straightening to enable cost-efficient, US-based manufacturing. In-house tube manufacturing also avoids the cost of purchased parts typical of many fabricators.

In addition, procuring tubing through an integrated supplier that manufactures the tubing is less costly than purchasing it from a tubing fabricator with a cost mark-up. Plus, an integrated supplier is intimately familiar with the specifications of its own product and can make tubing for the actual process for which it's needed, with very tight tolerances.

REAL-LIFE EXAMPLE

A global surgical supply company was looking to reduce costs on an endomechanical laparoscopic device. Viant was able to substitute a hard-drawn tube of its proprietary 304 HS alloy to replace a machined 17-4 PH bar. Savings from eliminating machining of the hole and the reduced cost of the metal were estimated at 50%.

Figure 2. How specific tubing capabilities affect product performance

Capability Driving Performance & Reliability	Impact on Product Performance & Reliability					
	Arthroscopic Shavers	Arthroscopic Instruments	Energy-Based Devices	Endomechanical Devices	Endoscopic & Other Reusable Instruments	Drug Delivery Devices
Uniform tube strength (through weld)	Less shedding Improved fluid flow with thinner walls High torque-load performance Reduced costs	Lower risk of suture fraying Better clinical positional accuracy Better bending-load performance and torque transfer Higher drivetrain efficiency Reduced costs	Improved clamp force Higher drivetrain efficiency Reduced costs	Replace multipart subassemblies Higher drivetrain efficiency Reduced costs	Tight tolerances & surface finishes support highest-quality optics Better corrosion resistance Pristine outer surfaces Improved nitinol-to-stainless-steel strength Increased fatigue strength	Improved inhalation for respiratory devices Flawless capillary action Uncompromised medication flow
Custom alloys						
Tube microstructure						
Custom shapes: ID and OD						
Ovality						
Straightness						
Aqueous & ultrasonic cleaning						
Tube properties tailored to fabrication process						
Laser-cutting dross removal						
Automated optical inspection						

Benefit #3: Enhanced performance & reliability

A single-source tubing partner allows development teams to optimize device performance without tradeoffs; for example, by offering better-than-industry-standard tubing fabrication tolerances and tighter control of tubing material properties.

An integrated supplier also offers more finishing processes in-house. For example, Viant’s proprietary custom chemical dross removal for laser-cut components produces cleaner surfaces with no slag residue. It gives you better edge quality in holes, parts with less friction, and better load-bearing and actuation reliability compared with the typical process, for better overall device performance.

Another advantage of an integrated supplier is that team members communicate with one another and ensure a smooth transition from one operation to the next. For example, because the tube team member knows what the fabrication team member will be doing with the tubing, they know what level of cleanliness is needed. If the finished component requires grit-free IDs and burr-free ends, the tube maker will specify electrochemical cutting and aqueous final cleaning.

In-house domestic tube manufacturing also allows for rapid response to demand changes and avoids uncertainty due to international trade relations and global supply chain risks.

REAL-LIFE EXAMPLE

An arthroscopic device OEM was purchasing a heavy-wall tube and broaching to produce a hex drive for a suture driver. Viant designed a tube with a hex-shaped inner diameter (ID), eliminating the need for broaching, a secondary fabrication operation. In addition to saving time, this solution reduced cost and increased reliability by eliminating a 5% loss that resulted from rejected broached parts.

KEY CONSIDERATIONS THROUGHOUT THE PRODUCT LIFECYCLE

Design

- Can we use custom tube designs or materials to save real estate, reduce parts count, or improve performance, reliability, or lifecycle costs of the finished device?
- Can we substitute a laser-welded-and-drawn tube for a seamless tube?
- Can the tube design be coil drawn rather than bench drawn?

Development

- Can the supplier provide alternate design configurations in parallel for rapid performance evaluation?
- Will the development team have the tube and fabrication experience to execute the design build into a fully functioning component using processes that can scale to production?
- Are the tooling and manufacturing processes for the engineering build capable of being ramped?

Validation + Ramp

- Will the validation samples be built using the same processes as the production parts, allowing a seamless transition from hand-fed development equipment to automatic integrated production equipment?
- Does this supplier have both tube manufacturing and fabrication capacity, and can it seamlessly ramp to full production?
- If the supplier does not have both tube manufacturing and fabrication capacity, does the base tube supplier have ISO 13485?

Production

- Are the tube and fabrication supply chains isolated from international trade risks, political risks, and health risks?
- Is there a product cost roadmap throughout the lifecycle of the device?
- Does manufacturing have the ability to quickly accommodate unexpected market changes, such as a spike in demand?

CONCLUSION

The tube is the foundation of many medical devices, particularly minimally invasive devices. Working with an integrated partner to optimize tube properties for the fabrication process and end performance can help you avoid costly missteps.

Look for a partner with both tube manufacturing and tube fabrication capabilities. A strong supplier will bring both depth and breadth of skills to the table, as well as a culture of quality. Good communication with your tubing supplier is also essential. Your tubing partner should understand your objectives and work with you to optimize and balance your priorities, such as speed, cost, and performance.

Just as a capable surgical coordinator can reduce the anxiety of a surgical procedure, an integrated tubing supplier can give you peace of mind by reducing risk throughout the product lifecycle. You'll also reap the benefits of faster time to market, reduced cost, and enhanced performance and reliability.

ABOUT MARK BROADLEY



Mark Broadley is Product Solutions Director at Viant. He provides technical support for Viant's

operations and commercial teams in metals and tube applications. Mark has a master's degree in Materials Engineering.

ABOUT VIANT

Viant is a global strategic manufacturing partner that helps medical device OEMs bring complex medical devices and components to market. Our deep materials expertise, combined with our experience in design and development, manufacturing, assembly, and packaging, allow us to bring our customers' medical technology solutions to life. With nearly 6,000 associates across 24 locations worldwide, we are a unique combination of big-company scale and small-company attention. For more information, visit www.viantmedical.com.