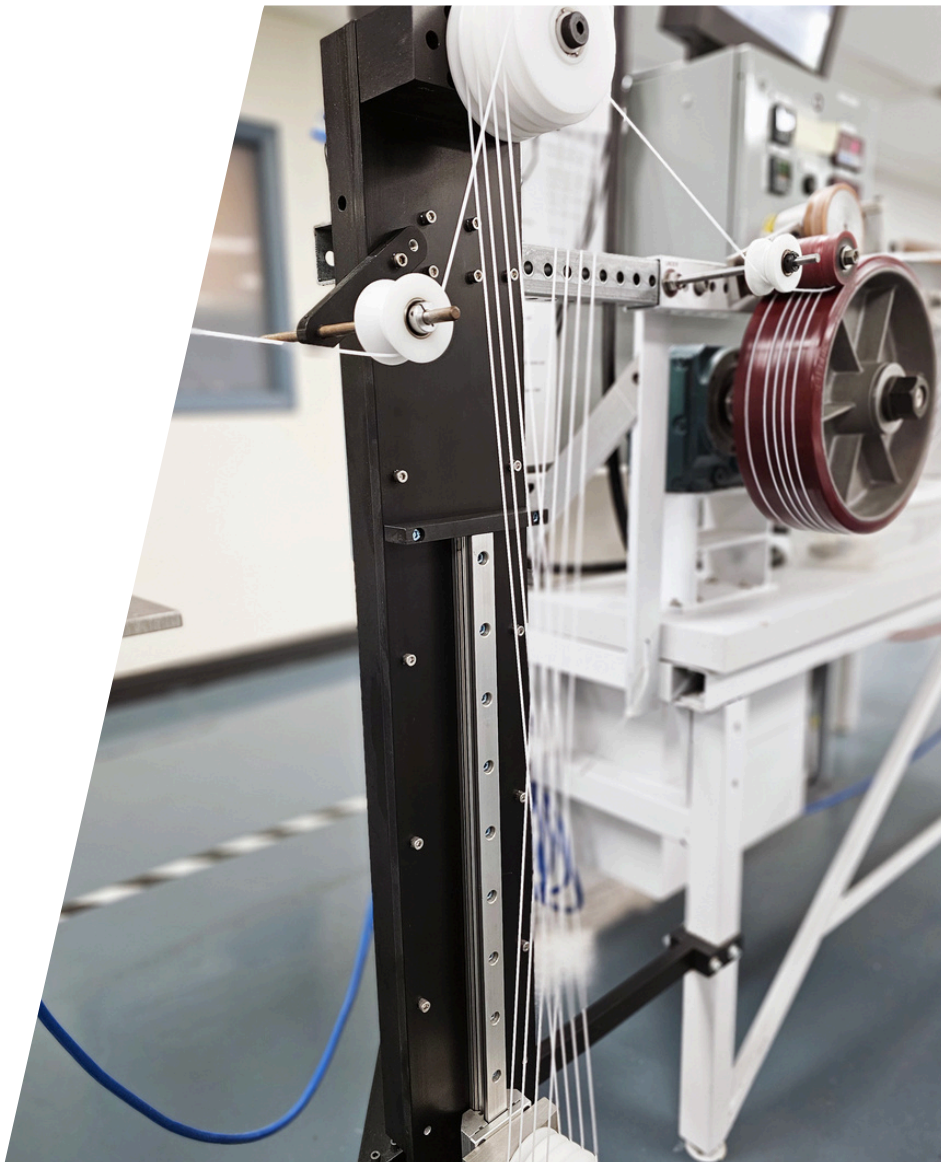
APTYX™

Making it happen

Delivering Precision & Performance:

Aptyx Acetal Core Mandrel in Medical Device Manufacturing



By Patrick Daly
Director, Global Extrusion

Executive Summary

As the medical device industry continues to push the boundaries of miniaturization and functionality, component precision and reliability have never been more critical. Acetal core mandrels, widely used in the manufacturing of catheter shafts and other tubular medical devices, are essential to achieving tight dimensional tolerances and repeatable processing results.

Aptyx offers advanced acetal core mandrel capabilities that support the stringent requirements of today's interventional and diagnostic devices. With surface finishes engineered for optimal release characteristics, tensile strength greater than or equal to 6000 psi/32 lbs of force (lbf), and outer diameter (OD) tolerances held to as tight as ±0.0003", Aptyx empowers medical device OEMs to innovate confidently.

Introduction

Mandrels serve as internal supports during the extrusion, reflow, and heat-shrink forming of medical tubing. Among various mandrel materials, acetal stands out for its balance of rigidity, thermal resistance, machinability, and cost-efficiency.

This white paper outlines the advantages of acetal core mandrels and how Aptyx's precision capabilities make them indispensable in producing next-generation medical devices.

The Value of Acetal Core Mandrel

Acetal (polyoxymethylene or POM) offers several characteristics that make it a superior material for mandrels in medical applications:

- High dimensional stability
- Low moisture absorption
- Excellent machinability
- Smooth surface characteristics
- Moderate thermal resistance (up to 180°F / 82°C)

In high-performance catheter production, these properties translate into consistent tubing dimensions, reduced material defects, and lower tooling costs.

Processing Excellence Delivers Unmatched Yields

At Aptyx, we deliver engineered mandrels to match the exacting requirements of our medtech customers. Our acetal core mandrel are optimized for performance and processability through the following key capabilities:

1 Optimal surface finish for catheter builds

2 Tensile strength that ensures high yields for catheter manufacturing

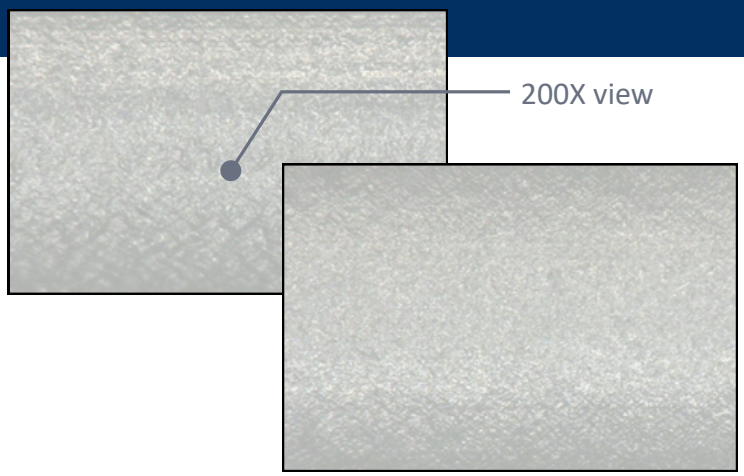
3 Unmatched OD and ovality tolerances support precision stackups for the most complex catheters

1 Surface Finish

Achieved through precision proprietary techniques.

Enables low friction removal after extrusion or heat-shrink processing.

Reduces the risk of lumen deformation or sticking.



Optimal surface finish from beginning to end of 25,000 ft. run.

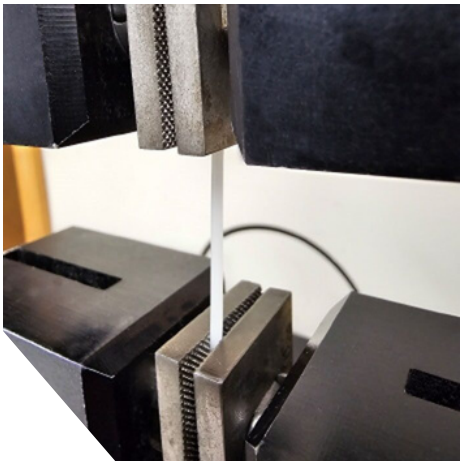
2 Tensile Strength: Greater than or equal to 6000 psi/32 lbs of force (lbf)

Withstands demanding processing steps such as vacuum forming and high-temperature reflow.

Maintains structural integrity during long-length tubing assemblies.

Reduces breakage risk during high-speed manufacturing.

Pull test	Result
Start Sample 1	36.47
Start Sample 2	35.73
Start Sample 3	35.11
Start Sample 4	36.18
Start Sample 5	35.21
End Sample 1	35.10
End Sample 2	35.57
End Sample 3	35.25
End Sample 4	35.69
End Sample 5	35.29
Average	35.6



Pull test result exceeding 32 psi across a 25,000 ft. run.

3 OD Tolerances of ±0.0003" to ±0.0005"

Ovality less than or equal to 0.001

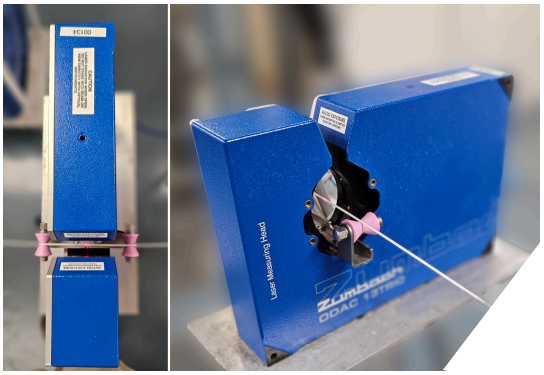
Critical for producing tight-tolerance lumens in multi-layer or thin-wall constructions.

Supports device applications such as:

- Neurovascular and coronary catheters
- Electrophysiology introducers
- Delivery systems for structural heart implants

OD Readings	Specification	Result
Min	0.0712"	0.0714
Max	0.0718"	0.0714
Range Avg	<=0.0006"	0.0001
XYZ Avg (calulcated OD)	0.0715"	0.0714
Calculated OD Cpk	>1.0	2.28
Ovality Readings	**Specification**	**Result**
Min	N/A	0.0002
Max	N/A	0.0005
XYZ Calculated Ovality Avg (X)	N/A	0.0003
StDev (S)	N/A	0.0000

Proven process control in-line & post-inspection.



Applications in Medical Device Manufacturing

Aptyx acetal mandrels are widely used across multiple product lines, including:

Balloon Catheters › Maintaining balloon wall concentricity during formation.

Multi-Lumen Tubing › Acting as internal supports that preserve lumen geometry.

Laser-Cut Hypotubes › Providing internal rigidity for precise cutting or welding.

Heat-Shrink Reflow › Used as a forming core during lamination of thermoplastics.

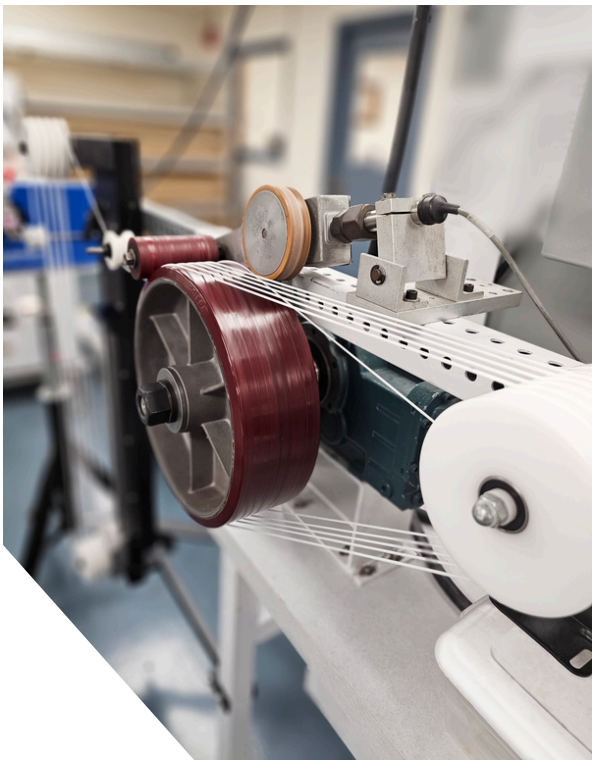
Why Partner with Aptyx?

With decades of expertise in extrusion and catheter manufacturing, Aptyx is uniquely positioned to deliver turnkey mandrel solutions:

- Rapid prototyping with customizable diameters and lengths.

- Scalable production from pilot runs to high-volume programs.

- Material science support to optimize mandrel selection and surface treatment.



Conclusion

Acetal core mandrels are vital in the pursuit of excellence in catheter and medical tubing manufacturing. Aptyx's commitment to precision, reliability, and innovation positions us as a trusted partner for the most demanding medical applications.

With surface finishes that ensure easy release, tensile strength greather than or equal to 6000 psi/32 lbs of force (lbf), and ultra-tight tolerances as low as ±0.0003", Aptyx delivers mandrels that medical device manufacturers can rely on—every time.

Contact Us

To learn more about our acetal mandrel capabilities or request a custom quote, please contact us at:

info@aptyx.com www.aptyx.com