SYNEO SOLUTIONS FOR THE HOLE WORLD

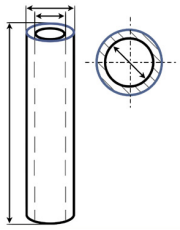
SYNEO manufactures precision cutting tools with unparalleled sharpness for drilling, punching, and skiving holes in catheter tubing and for coring and punching holes in tissue-cutting applications. SYNEO's cutting tools featuring SYNEO's proprietary Hollow Core Sharpening Technology are manufactured to the tightest of specifications, offering a wide-array of round, oval and odd-form coring blade or punch styles to create ***flash-free, burr-free holes as small as .005".***

Polymer Tubing and Catheter Manufacturing Applications - SYNEO works closely with customers to evaluate hole making and skiving applications to determine the best cutting tool to achieve device specifications. SYNEO will analyze the optimum blade raw material, tip style, dimensions and coating, and recommend punches or coring blades to achieve optimal hole quality, eliminate risk of burr formation, and maximize tool durability for each hole application.

Tissue Cutting and Surgical Device Applications - Coring blades featuring SYNEO's Hollow Core Sharpening Technology minimize undercut tissue distortion, create a superior wound architecture for quicker healing, minimize downward pressure needed for the incision, maximize tissue separation and increase the probability of complete plug extraction.

PUNCH CONCEPTION

1. Shape Choice

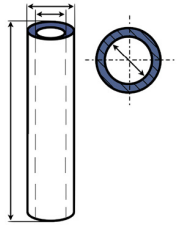


- ☐ ROUND
- ☐ OVAL
- ☐ FORMED
- ☐ CUSTOM

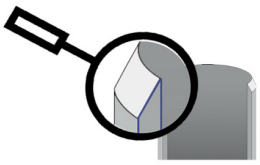
OPTIMIZED HOLE MAKING SOLUTIONS

Not all holes are created equally. Specialized punching tools are required to make polymorphic geometries ranging from triangles, rectangles, diamonds, ovals, and others. SYNEO's 20+ years of punch design and manufacturing experience combined with robust internal machining capabilities can address the most challenging hole making applications. Regardless of punch geometry, all SYNEO punches feature cutting edges sharpened with SYNEO's Hollow Core Sharpening Technology.

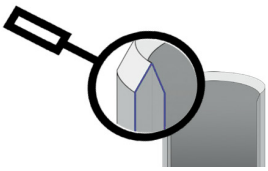
2. Tip Profile



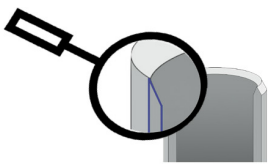
☐ **INSIDE CUTTING EDGE**:
- Smallest hole per inside diameter
- Ideal plug removal tip profile



☐ **MIDDLE CUTTING EDGE:**
- Longest blade life
- Most durable cutting edge



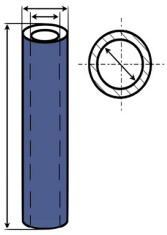
☐ **OUTSIDE CUTTING EDGE:**
- Largest hole per outside diameter
- Ideal plug capture tip profile



SYNEO HOLLOW CORE SHARPENING TECHNOLOGY

SYNEO's Hollow Core Sharpening Technology was developed in response to customer demands for sharp edges on tubular products with enhanced durability to weather rigorous use. Through 20+ years of research and experimentation, SYNEO's cutting edges are the sharpest, most-durable edge on any hollow core product in the world.

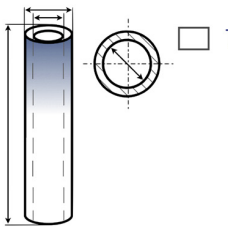
3. Material Choice



MATERIAL	COATED CAPABLE	HOLE SIZE RANGE	HEAT TREATABLE	POLYMORPHIC GEOMETRY
C-SERIES 304 SS	✓	0.006≥		R,O
B-SERIES REX 76	✓	0.018≥	✓	R,M
H-SERIES 17-4 SS	✓	0.012≥	✓	R,O,F,M
T-SERIES 465 SS	✓	0.012≥	✓	R,O,F,M

*__R__= ROUND; __O__=OVAL; __F__=FORMED; __M__=MACHINED GEOMETRY

4. Edge Coating



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Titanium Nitride Coating

- Extends tool life
- Will not corrode
- Medical grade coating
- Ultra-thin coating for toughness without sacrificing sharpness

PART NUMBER CONFIGURATION

SYNEO partners with customers to ensure punches are optimized for their specific application. SYNEO applications specialists use the chart below to facilitate the specification of the optimal cutting tool for the application while minimizing unnecessary design revisions:

C	R	042	028	5	N	19R	4
MATERIAL	SHAPE	TIP DIAMETER	TIP DIAMETER	LENGTH	COATING	SHAFT	CUTTING EDGE
C=304 SS	**R=Round**	**Round OD**	**Round ID**	1=1“	P=No Coating	**19R= 19 Gauge**	1= Near Middle
H=17-4 SS	O=Oval	Oval Width	Oval Length	2=1 1/8“	**N=Titanium Nitride**	Reg. Wall	3= At OD
S=440C SS	S=Skiver			3=1 1/4“	C=Titanium	118=1/8“	**4= Near Middle**
T=465 SS	F=Formed			4=1 3/8“	Carbonitride		5= At ID
B=REX 76	C=Custom			**5=1 1/2“**			
				6=1 5/8“			
				7=1 3/4“			

MATERIAL EXPERTISE

C-Series	**304 Stainless Steel**	SYNEO’s all-around performer. Yields a hole as small as 0.005” (0.15mm). Material used in the majority of catheter hole punching applications.
H-Series	**17-4 Stainless Steel**	Iron-chromium-nickel alloy couples high corrosion resistance with heat-treat capability for high strength.
T-Series	**T-Series: 465 Stainless Steel**	Tailored to the most demanding applications. Application-specific punches combine high strength and superior wear resistance.
B-Series	**REX 76 Crucible Tool Steel**	Used in cutting braided catheter tubes. Material hardness permits maximum tip edge life.

SYNEO’s catheter tubing application history includes:

Pebax Nylon Silicone PTFE FEP
Urethane PDMS Polyurethane PEEK PVC

SYNEO’s tissue and surgical application history includes:

Aortic Coring Blades
Corneal Trephine Blades
Follicular Excision Blades
Breast Biopsy Punches

APPLICATION PROCESS

DRAWING
Customer Application Review- Drawings & Material

ANALYZE
Hole Properties, Application Materila, Volume, Press or Drill, Surgical or Industrial

RECOMMENDATION
SYNEO Punch Recommendation

TESTING
Test Punch On Application Mater

FEEDBACK
Customer Feedback, Final recomendation

SYNEO’s application review process is designed to ensure that customers receive proper hole outcomes with minimal iteration. SYNEO applications specialists review customer drawings and material properties to ensure that each cutting tool specified creates the desired hole on the first use.

CONTACT SYNEO TODAY – THE SPECIALISTS IN CUTTING TOOL SOLUTIONS FOR THE HOLE WORLD

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