

## Punches

SYNEO MANUFACTURERS VERY PRECISE, SUPER SHARP, DURABLE, HOLE-MAKING CUTTERS FOR PLACING HOLES IN CATHETER-BASED MEDICAL DEVICES. SYNEO CUTTERS ARE MANUFACTURED TO VERY TIGHT TOLERANCES TO ENSURE REPEATABILITY AND PERFORMANCE. SYNEO WORKS CLOSELY WITH ITS CUSTOMERS TO EVALUATE CATHETER HOLE AND SKIVING APPLICATIONS TO DETERMINE THE BEST CUTTING TOOL TO ACHIEVE THE DEVICE SPECIFICATIONS. SYNEO WILL ANALYZE THE OPTIMUM CUTTER RAW MATERIAL, TIP STYLE, DIMENSIONS, COATING, IF REQUIRED, AND RECOMMEND DRILLING, PUNCHING OR SKIVING TO ACHIEVE THE BEST RESULT FOR EACH APPLICATION.

SYNEO, the leading edge in medical automation solutions, is pleased to announce the ISO 9001:2008 certification of its Texas manufacturing facility. An ISO certification is a significant achievement as it signifies a commitment to quality, process controls and customer satisfaction.

## Materials

C-Series | 304 stainless steel

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C-Series hard temper, stainless steel punches are a cost-effective choice when applications require extremely sharp edges or resultant holes as small as 0.005" (0.15mm) in diameter. This series is available in a wide range of gauge sizes and can be further modified to yield different inside diameters, wall thicknesses and tip configurations. When application requirements are more demanding, the addition of titanium nitride (TiN) and titanium carbonitride (TiCN) coatings increase durability and lubricity to the C-Series cutters.

B-Series | engineered metal

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Combining highly engineered materials with precision manufacturing processes results in a robust line of cutters for braided catheter tubing applications. The B-series punches are available in a limited number of standard diameters or can be manufactured to meet specific requirements.

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### H-Series | 17-4 stainless steel

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H-Series punches are furnace-hardened for maximum durability. This iron-chromium-nickel alloy couples high corrosion resistance with heat-treat capability for high strength. H-Series offer the best balance between cost and durability for automated punching, drilling and skiving applications with hole sizes greater than 0.020" (0.5mm).

### T-Series | 465 stainless steel

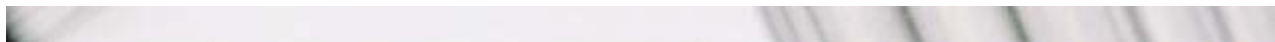
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Like the H-Series, these punches are furnace-hardened for maximum durability. These application-specific punches combine high strength, superior wear resistance and size availability to make them the practical choice for high-volume production or demanding applications.

## Coatings

Titanium nitride

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Titanium nitride (TiN) is the most common coating requested. This coating bonds molecularly with the metal surface to prevent blistering, flaking or chipping. The coating substantially reduces friction and increases material hardness for increased tool life.

TiN is rated 85 on the Rockwell C hardness scale, indicating that it is even harder than the carbide commonly used in metalworking tools.

#### TiN COATINGS:

- typically extend tool life five to seven times
- will not corrode
- will not leave residue
- are FDA-compliant for use in medical instruments

TiN is particularly well-suited for razor-sharp tools like SYNEO punches because the micro-thin coating (two to three microns or .001 inches) is thick enough to add toughness, but too thin to reduce sharpness.

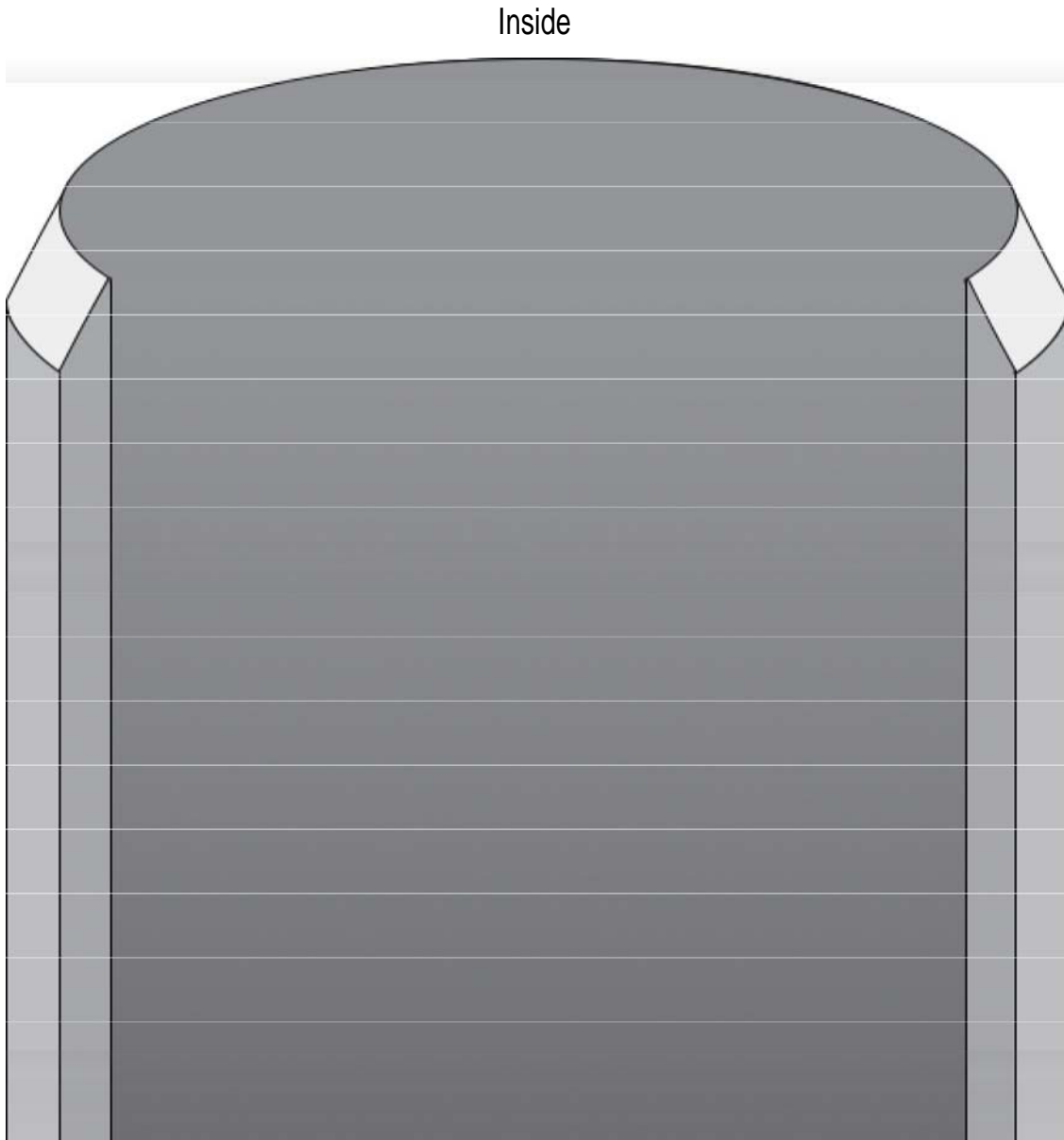
The ID of the tools are coated to the depth of the cutter diameter, reducing friction on the ID as well as the OD of the tool.

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## Tip Styles

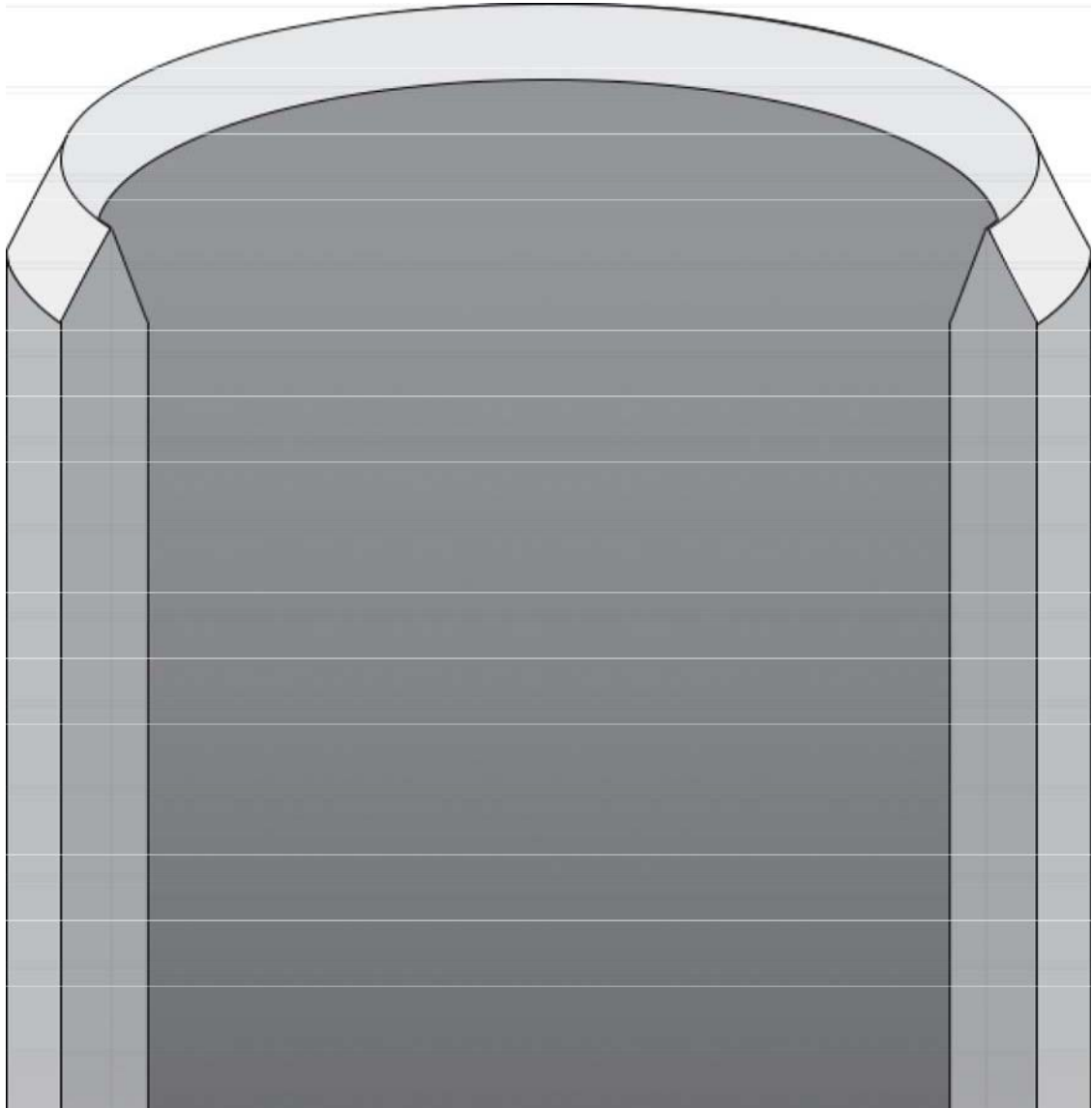
### Cutter edge

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The inside edge has a straight inside bore diameter and a taper on the outside diameter, which yields a cutting edge at the inside diameter of the punch.

## Middle



The middle edge is achieved by tapering the outside and inside diameter which yields a cutting edge approximately in the middle of the punch wall.

Outside



The outside edge has a straight outside diameter and a taper on the inside bore diameter, which yields a cutting edge at the outside diameter of the punch.



## Cutter shape

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Round

Oval

Formed

Custom

With over twenty years of development and manufacturing experience, our team will work with you to meet the specific needs of your project.

# Punch Life

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Like any cutting tool, SYNEO punches will become dull after repetitive use. Below are some of the factors affecting the durability of these tools.

- Physical characteristics such as tube material, durometer, wall thickness and radiopacifiers
- Drill speed, feed rates or punch impact rates
- Type of beading or internal tubing support used
- Fixturing characteristics and how securely the drill is held in relation to the tubing wall
- Care and handling
- Methods of inspection and handling
- Size and type
- Tip configuration

# Standard punch list

Part number	Description									Cutting edge diameter
CR0180115N26R4	Material:	Shape:	OD:	ID:	Length:	Coating:	Shaft:	Wall:	Tip style:	.013" (0.33mm)
	304SS	Round	.018 in	.011 in	1.5 in	TiN	26 Gauge	Regular	Drilled	
CR0220145N24R4	Material:	Shape:	OD:	ID:	Length:	Coating:	Shaft:	Wall:	Tip style:	.017" (0.43mm)
	304SS	Round	.022 in	.014 in	1.5 in	TiN	24 Gauge	Regular	Drilled	
CR0250165N23R4	Material:	Shape:	OD:	ID:	Length:	Coating:	Shaft:	Wall:	Tip style:	.019" (0.48mm)
	304SS	Round	.025 in	.016 in	1.5 in	TiN	23 Gauge	Regular	Drilled	
CR0280205N22R4	Material:	Shape:	OD:	ID:	Length:	Coating:	Shaft:	Wall:	Tip style:	.022" (0.56mm)
	304SS	Round	.028 in	.020 in	1.5 in	TiN	22 Gauge	Regular	Drilled	
CR0280215N22T4	Material:	Shape:	OD:	ID:	Length:	Coating:	Shaft:	Wall:	Tip style:	.023" (0.58mm)
	304SS	Round	.028 in	.021 in	1.5 in	TiN	22 Gauge	Thin	Drilled	
CR0320225N21R4	Material:	Shape:	OD:	ID:	Length:	Coating:	Shaft:	Wall:	Tip style:	.026" (0.66mm)
	304SS	Round	.032 in	.022 in	1.5 in	TiN	21 Gauge	Regular	Drilled	
CR0320245N21R4	Material:	Shape:	OD:	ID:	Length:	Coating:	Shaft:	Wall:	Tip style:	.027" (0.69mm)
	304SS	Round	.032 in	.024 in	1.5 in	TiN	26 Gauge	Regular	Drilled	
CR0350255N20R4	Material:	Shape:	OD:	ID:	Length:	Coating:	Shaft:	Wall:	Tip style:	.028" (0.71mm)
	304SS	Round	.035 in	.025 in	1.5 in	TiN	20 Gauge	Regular	Drilled	
CR0350275N20R4	Material:	Shape:	OD:	ID:	Length:	Coating:	Shaft:	Wall:	Tip style:	.030" (0.76mm)
	304SS	Round	.035 in	.027 in	1.5 in	TiN	20 Gauge	Regular	Drilled	
CR0420285N19R4	Material:	Shape:	OD:	ID:	Length:	Coating:	Shaft:	Wall:	Tip style:	.033" (0.84mm)
	304SS	Round	.042 in	.028 in	1.5 in	TiN	19 Gauge	Regular	Drilled	
CR0420305N19R4	Material:	Shape:	OD:	ID:	Length:	Coating:	Shaft:	Wall:	Tip style:	.034" (0.86mm)
	304SS	Round	.042 in	.030 in	1.5 in	TiN	19 Gauge	Regular	Drilled	
CR0420315N19R4	Material:	Shape:	OD:	ID:	Length:	Coating:	Shaft:	Wall:	Tip style:	.035" (0.89mm)
	304SS	Round	.042 in	.031 in	1.5 in	TiN	19 Gauge	Regular	Drilled	
CR0420325N19R4	Material:	Shape:	OD:	ID:	Length:	Coating:	Shaft:	Wall:	Tip style:	.036" (0.91mm)
	304SS	Round	.042 in	.032 in	1.5 in	TiN	19 Gauge	Regular	Drilled	
CR0420335N19R4	Material:	Shape:	OD:	ID:	Length:	Coating:	Shaft:	Wall:	Tip style:	.037" (0.94mm)
	304SS	Round	.042 in	.033 in	1.5 in	TiN	19 Gauge	Regular	Drilled	
CR0500335N18R1	Material:	Shape:	OD:	ID:	Length:	Coating:	Shaft:	Wall:	Tip style:	.038" (0.97mm)

CR0500355N18R4	304SS	Round	.050 in	.033 in	1.5 in	TiN	18 Gauge	Regular	Drilled	
	Material:	Shape:	OD:	ID:	Length:	Coating:	Shaft:	Wall:	Tip style:	.040" (1.02mm)
CR0500365N18R4	304SS	Round	.050 in	.035 in	1.5 in	TiN	18 Gauge	Regular	Drilled	
	Material:	Shape:	OD:	ID:	Length:	Coating:	Shaft:	Wall:	Tip style:	.041" (1.04mm)
CR0500375N18R4	304SS	Round	.050 in	.036 in	1.5 in	TiN	18 Gauge	Regular	Drilled	
	Material:	Shape:	OD:	ID:	Length:	Coating:	Shaft:	Wall:	Tip style:	.042" (1.07mm)
CR0500385N18R4	304SS	Round	.050 in	.037 in	1.5 in	TiN	18 Gauge	Regular	Drilled	
	Material:	Shape:	OD:	ID:	Length:	Coating:	Shaft:	Wall:	Tip style:	.042" (1.08mm)
CR0500405N18R4	304SS	Round	.050 in	.038 in	1.5 in	TiN	18 Gauge	Regular	Drilled	
	Material:	Shape:	OD:	ID:	Length:	Coating:	Shaft:	Wall:	Tip style:	.043" (1.11mm)
CR0500415N18R4	304SS	Round	.050 in	.040 in	1.5 in	TiN	18 Gauge	Regular	Drilled	
	Material:	Shape:	OD:	ID:	Length:	Coating:	Shaft:	Wall:	Tip style:	.044" (1.12mm)
CR0500425N18R4	304SS	Round	.050 in	.041 in	1.5 in	TiN	18 Gauge	Regular	Drilled	
	Material:	Shape:	OD:	ID:	Length:	Coating:	Shaft:	Wall:	Tip style:	.045" (1.14mm)
CR0580445N17R4	304SS	Round	.050 in	.042 in	1.5 in	TiN	18 Gauge	Regular	Drilled	
	Material:	Shape:	OD:	ID:	Length:	Coating:	Shaft:	Wall:	Tip style:	.049" (1.25mm)
CR0580475N17R4	304SS	Round	.050 in	.044 in	1.5 in	TiN	17 Gauge	Regular	Drilled	
	Material:	Shape:	OD:	ID:	Length:	Coating:	Shaft:	Wall:	Tip style:	.051" (1.30mm)
CR0650495N16R4	304SS	Round	.058 in	.047 in	1.5 in	TiN	17 Gauge	Regular	Drilled	
	Material:	Shape:	OD:	ID:	Length:	Coating:	Shaft:	Wall:	Tip style:	.055" (1.40mm)
CR0650515N16R4	304SS	Round	.065 in	.049 in	1.5 in	TiN	16 Gauge	Regular	Drilled	
	Material:	Shape:	OD:	ID:	Length:	Coating:	Shaft:	Wall:	Tip style:	.056" (1.42mm)
CR0720555N15R4	304SS	Round	.065 in	.051 in	1.5 in	TiN	16 Gauge	Regular	Drilled	
	Material:	Shape:	OD:	ID:	Length:	Coating:	Shaft:	Wall:	Tip style:	.062" (1.58mm)
CR0720605N15R4	304SS	Round	.072 in	.055 in	1.5 in	TiN	15 Gauge	Regular	Drilled	
	Material:	Shape:	OD:	ID:	Length:	Coating:	Shaft:	Wall:	Tip style:	.065" (1.65mm)
CR0830655N14R4	304SS	Round	.060 in	.055 in	1.5 in	TiN	15 Gauge	Regular	Drilled	
	Material:	Shape:	OD:	ID:	Length:	Coating:	Shaft:	Wall:	Tip style:	.072" (1.83mm)
CR0830705N14R4	304SS	Round	.083 in	.065 in	1.5 in	TiN	14 Gauge	Regular	Drilled	
	Material:	Shape:	OD:	ID:	Length:	Coating:	Shaft:	Wall:	Tip style:	.075" (1.91mm)
CR0890735N1354	304SS	Round	.083 in	.070 in	1.5 in	TiN	14 Gauge	Regular	Drilled	
	Material:	Shape:	OD:	ID:	Length:	Coating:	Shaft:	Wall:	Tip style:	.080" (2.03mm)
	304SS	Round	.089 in	.073 in	1.5 in	TiN	13 Gauge	Regular	Drilled	

CR0950765N13R4	Material: 304SS	Shape: Round	OD: .095 in	ID: .076 in	Length: 1.5 in	Coating: TiN	Shaft: 13 Gauge	Wall: Regular	Tip style: Drilled	.083" (2.11mm)
CR0950785N13R4	Material: 304SS	Shape: Round	OD: .095 in	ID: .078 in	Length: 1.5 in	Coating: TiN	Shaft: 13 Gauge	Wall: Regular	Tip style: Drilled	.086" (2.18mm)
CR1090875N12R4	Material: 304SS	Shape: Round	OD: .109 in	ID: .087 in	Length: 1.5 in	Coating: TiN	Shaft: 12 Gauge	Wall: Regular	Tip style: Drilled	.098" (2.49mm)
CR1200945N11R1	Material: 304SS	Shape: Round	OD: .120 in	ID: .094 in	Length: 1.5 in	Coating: TiN	Shaft: 11 Gauge	Wall: Regular	Tip style: Drilled	.106" (2.69mm)
CR1341065N10R1	Material: 304SS	Shape: Round	OD: .134 in	ID: .106 in	Length: 1.5 in	Coating: TiN	Shaft: 10 Gauge	Wall: Regular	Tip style: Drilled	.119" (3.02mm)
HS1251135P1183	Material: 17-Apr	Shape: Round	OD: .125 in	ID: .113 in	Length: 1.5 in	Coating: None	Shank: 1/8 in		Tip style: Outside	.125" (3.18mm)
HS1871730P1183S	Material: 17-Apr	Shape: Round	OD: .187 in	ID: .173 in	Length: .812 in	Coating: None	Shank: 1/8 in		Tip style: Outside	.187" (4.75mm)
HS2502380P1183S	Material: 17-Apr	Shape: Round	OD: .250 in	ID: .238 in	Length: .812 in	Coating: None	Shank: 1/8 in		Tip style: Outside	.250" (6.35mm)
HS3122810P1183S	Material: 17-Apr	Shape: Round	OD: .312 in	ID: .281 in	Length: .812 in	Coating: TiN	Shank: 1/8 in		Tip style: Outside	.312" (7.93mm)
HS3753480P1183S	Material: 17-Apr	Shape: Round	OD: .375 in	ID: .348 in	Length: .812 in	Coating: TiN	Shank: 1/8 in		Tip style: Outside	.375" (9.53mm)
HS5004101P1183	Material: 17-Apr	Shape: Round	OD: .500 in	ID: .410 in	Length: 1 in	Coating: TiN	Shank: 1/8 in		Tip style: Outside	.500" (12.70mm)