



Fort Wayne Wire Die

## **Poly-Di<sup>®</sup>** Polycrystalline Diamond Dies

Superior Die Life for Optimum  
Production Efficiency





# Fort Wayne Wire Die



## A High-Speed Efficiency Breakthrough

Partner with Fort Wayne Wire Die—a technical leader and die manufacturer that has stayed ahead of the industry's scientific curve for more than 80 years.

Today, with the proliferation of high-speed multiwire drawing equipment, Fort Wayne Wire Die is advancing a paradigm shift that identifies die elongation, properly matched

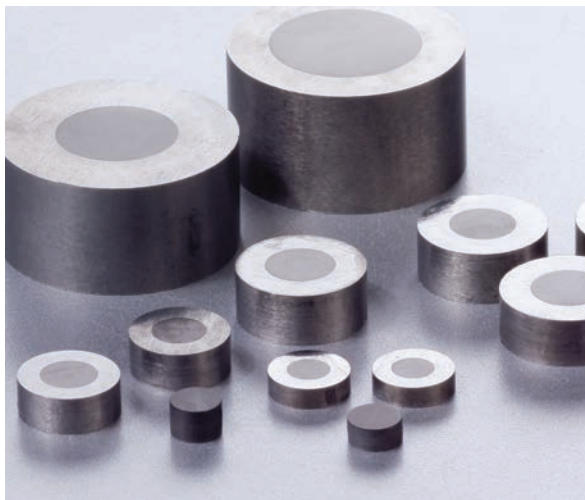
to the machine, as the primary variable for maximizing wire production efficiency through the elimination of wire breaks.

Using proprietary software, Fort Wayne Wire Die can calculate a complete, integrated die set with hole tolerances precisely matched to your wire drawing machine's elongation, to effectively:

- Eliminate wire breaks
- Reduce downtime
- Minimize wire slip on the machine capstans for optimum wire surface finish and reduced capstan wear
- Reduce fine generation/die "packing"



# Draw More Wire With Less Downtime



## The Highest Quality Diamond Material

Poly-Di polycrystalline diamond dies start with the very best die blank materials available in the world, such as Compax® from Sandvik and Sumidia® from Sumitomo Electric.

Polycrystalline diamond is a synthetic material, produced by sintering diamond powder in the presence of a metal catalyst, using extreme heat and pressure, to fuse the diamond particles together.

This process results in a random diamond particle orientation that yields an outstanding material, ideal for wire drawing, stranding and compacting, because it is:

- Exceptionally resistant to die wear, cracking and breakage
- Characterized by an even wear that maintains wire roundness
- Available in a wide range of blank sizes for hole diameters from .0009 in (0.023 mm) to 1.18 in (30 mm)

## Pioneering Technical Expertise

With Poly-Di diamond dies, you have the assurance of high-quality products from a company that has an unrivaled history of developing its own groundbreaking manufacturing equipment and processes.

In fact, most of the production machinery and all of the production processes in use at Fort Wayne Wire Die were designed and built by FWWD engineers, including the software-based wire measurement system in use, company-wide. Such standardized machinery, production processes and management systems ensure consistency of quality, regardless of the plant location.

Combining all this with its own ISO9001:2015 quality systems, Fort Wayne Wire Die controls the die shape, finish diameter and surface finish like no other.

## The Most Comprehensive Support

Only with Poly-Di diamond dies do you receive a technically sound and highly cost-effective die program that's developed just for your needs. It includes:

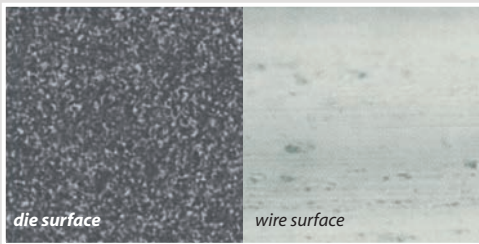
- Applications consulting
- Computerized die set calculations
- Die recutting services
- Educational seminars and other employee training tools

—and more

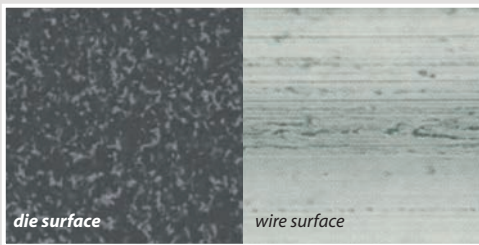
## Invaluable Applications Experience

The ongoing evolution of the wire drawing industry and, in particular, the development of new die materials, continues to make the die selection process more complex.

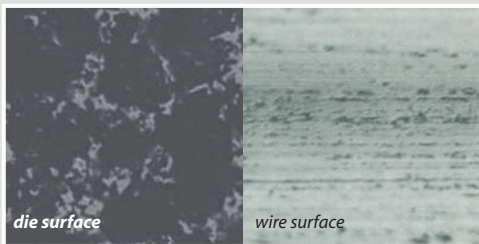
With Poly-Di diamond dies, you can leverage Fort Wayne Wire Die's 80+ years of industry-leading experience to make the die material grain size and composition selections that are so critical to your product performance and profitability.



1  $\mu\text{m}$  ultrafine diamond grain size—for maximum impact strength and high-quality wire surface finish, where galling is not a problem.



5  $\mu\text{m}$  fine diamond grain size—for strong wear resistance, a good wire surface finish and resistance to galling.



25  $\mu\text{m}$  medium diamond grain size—for applications in which wear resistance is more important than wire surface finish. Especially good for rod breakdown sizes.

In consultation with you, Fort Wayne Wire Die will identify the proper die profile for your application, then implement a proprietary manufacturing process to maintain optimum control of that profile for long-lasting, reliable and consistent die performance.

## Applications:

Polycrystalline diamond dies are excellent for drawing nonferrous wire, such as aluminum, copper, stainless steel and tire cord—and are especially well-suited for larger wire sizes where die life is more important than wire surface finish.

## Poly-Di Material Selection Table

Material Characteristic	AVERAGE GRAIN SIZE		
	Ultrafine (1 $\mu\text{m}$ )	Fine (5 $\mu\text{m}$ )	Medium (25 $\mu\text{m}$ )
Surface finish	***	**	*
Resistance to "galling"	*	**	***
Ease of polishing/recutting	**	***	*
Resistance to particle pull-out	*	**	***
Toughness/impact strength	***	**	*
Generation of microfines	*	**	***
Wear resistance/die life			
• Nonferrous alloys (Cu, Al)	*	**	***
• Stainless steel, welding wire	**	***	*
• Brass- or Zinc-plated steel	***	**	*
Die Blank Configuration	Thermal Stability	Strength of Mount	Purchase Price
Self-supported/Metal-filled	630°–700°C	*	***
Self-supported/Metal absent	1000°–1200°C	**	**
W.C. supported/Metal-filled	630°–700°C	***	*

Key: \* Good \*\* Better \*\*\* Best

Precise bearing length and hole size ensures proper wire diameter and long die life, controlling your product quality and material costs

Highly polished die surface finish minimizes friction and imparts a good finish to the wire surface

Polycrystalline diamond core is securely mounted to give exceptional support, reducing breakage

Back relief, at the same angle as the reduction angle, prevents the generation of fines due to shaving that can be caused by:

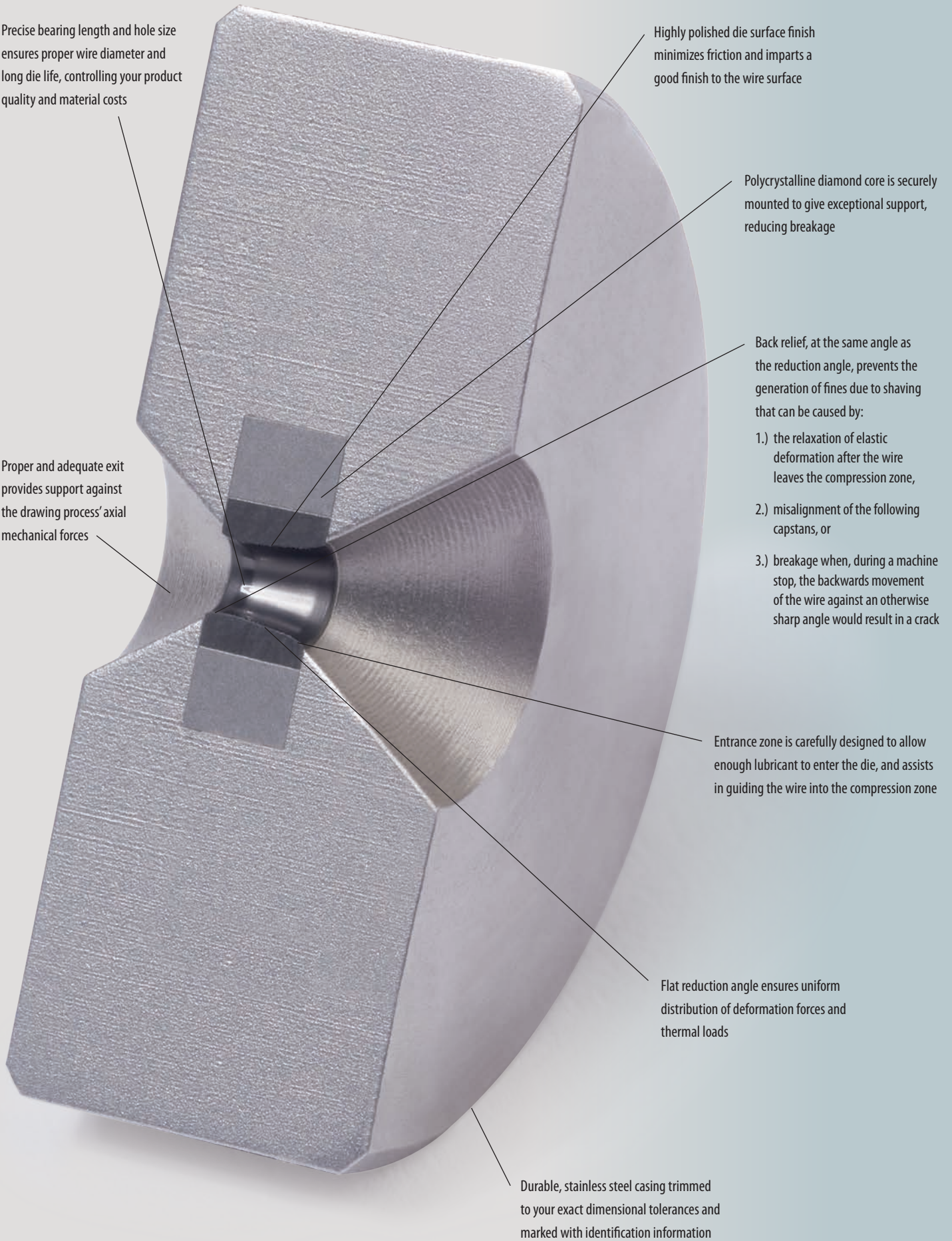
- 1.) the relaxation of elastic deformation after the wire leaves the compression zone,
- 2.) misalignment of the following capstans, or
- 3.) breakage when, during a machine stop, the backwards movement of the wire against an otherwise sharp angle would result in a crack

Proper and adequate exit provides support against the drawing process' axial mechanical forces

Entrance zone is carefully designed to allow enough lubricant to enter the die, and assists in guiding the wire into the compression zone

Flat reduction angle ensures uniform distribution of deformation forces and thermal loads

Durable, stainless steel casing trimmed to your exact dimensional tolerances and marked with identification information





Fort Wayne Wire Die

# Poly-Di® Polycrystalline Diamond Dies / SPECIFICATIONS

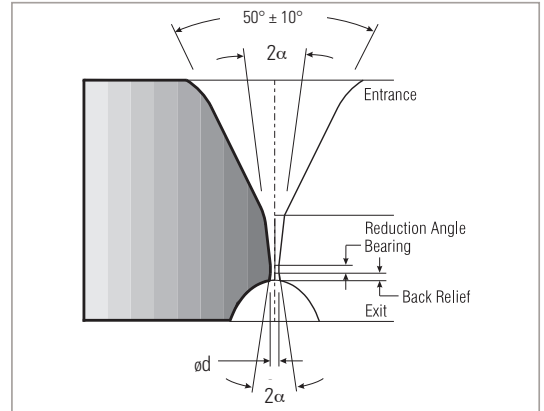
Poly-Di® polycrystalline diamond dies from Fort Wayne Wire Die provide remarkably predictable even wear and extended life for greater wire drawing production efficiency.

## Total Bore Diameter Tolerances PCD Wire Drawing Dies—New and Recuts

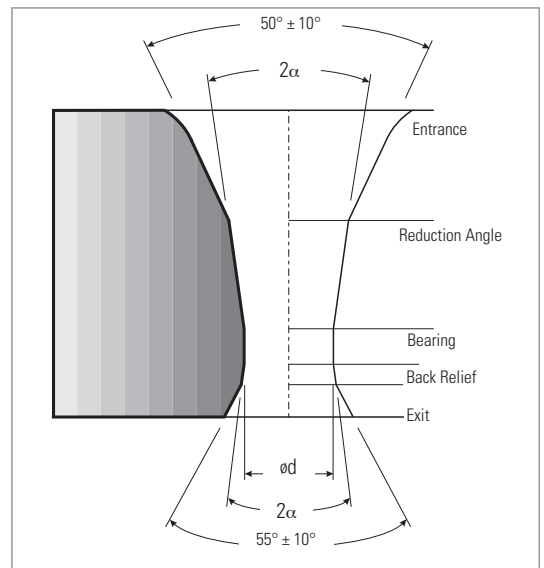
INCH			
Size Range	Standard Hole Size Tolerance STD102	Standard Ovality Tolerance STD102	Min. "Tightest" Hole Size Tolerance STD301
.0006 or less	.000024	.000020	.000010
.00061-.0008	.000024	.000020	.000012
.00081-.0010	.000028	.000020	.000014
.00101-.0020	.000036	.000020	.000016
.00201-.0030	.000040	.000020	.000020
.00301-.0040	.000050	.000030	.000030
.00401-.0080	.000060	.000040	.000040
.00801-.0100	.000080	.000040	.000040
.01001-.0160	.000080	.000040	.000050
.01601-.0200	.000120	.000080	.000060
.02001-.0300	.000120	.000080	.000080
.03001-.0400	.000160	.000100	.000080
.04001-.0600	.000160	.000100	.000100
.06001-.1500	.000200	.000120	.000120
.1501-.5000	.000500	.000500	.000500

MILLIMETER			
Size Range	Standard Hole Size Tolerance STD102	Standard Ovality Tolerance STD102	Min. "Tightest" Hole Size Tolerance STD301
0.015 or less	0.0006	0.0005	0.00025
0.0151-0.020	0.0006	0.0005	0.0003
0.0201-0.025	0.0007	0.0005	0.00035
0.0251-0.050	0.0009	0.0005	0.0004
0.0501-0.075	0.0010	0.0005	0.0005
0.0751-0.100	0.0012	0.0008	0.0008
0.101-0.200	0.0015	0.0010	0.0010
0.201-0.250	0.0020	0.0010	0.0010
0.251-0.400	0.0020	0.0010	0.0012
0.401-0.500	0.0030	0.0020	0.0015
0.501-0.750	0.0030	0.0020	0.0020
0.751-1.000	0.0040	0.0025	0.0020
1.001-1.500	0.0040	0.0025	0.0025
1.501-3.80	0.0050	0.0030	0.0030
3.801-12.70	0.0127	0.0127	0.0127

### Typical Die Profile



Typical Profile of New Polycrystalline Diamond Dies under .004" (0.100 mm)



Typical Profile of New Polycrystalline Diamond Dies over .004" (0.100 mm)

### Typical Die Specifications for Various Wire Materials

WIRE MATERIAL	DEGREE OF BLENDING	REDUCTION ANGLE (2α)	BEARING LENGTH
Bare Copper	Well Blended	18° ± 2°	25% ± 10%
Aluminum	Well Blended	20° ± 2°	25% ± 10%
Tin or Silver Plated Copper	Very Well Blended	20° ± 2°	20% ± 10%
Stainless Steel	Slightly Blended	15° ± 2°	35% ± 10%
Tungsten	Slightly Blended	14° ± 2°	30% ± 10%
Brass or Copper Covered Steel	Slightly Blended	10° ± 2°	30% ± 10%



Fort Wayne Wire Die

# Poly-Di® Polycrystalline Diamond Dies

## / SPECIFICATIONS

### Standard Casing Sizes

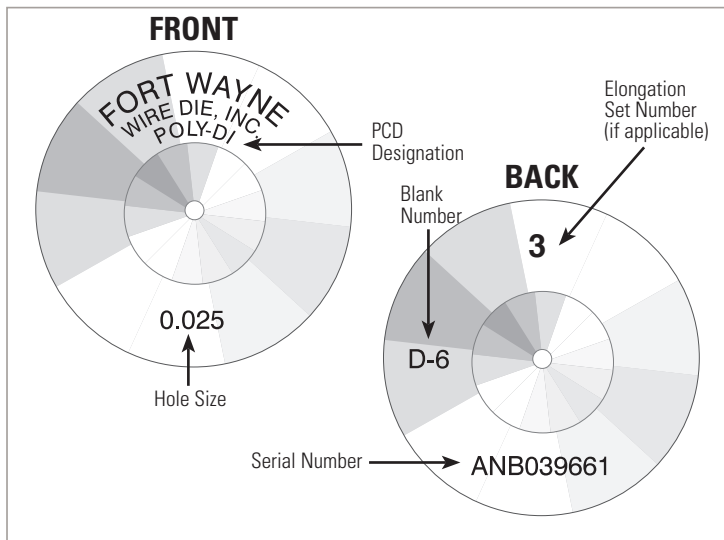
	INCH	MILLIMETER
BLANK SIZE	CASING SIZE D X T	CASING SIZE D X T
D-6 thru D-12	1 or 1 1/8 x 3/8	25 or 28 x 10
D-15 thru D-24	1 or 1 1/8 x 1/2	25 or 28 x 12
D-27 thru D-30	1 1/2 x 7/8	38 x 22
D-33	2 x 1 1/8	51 x 28
D-36	3 x 2	76 x 51

\*Special casing sizes available upon request.

### Suggested Microscope Viewing Ranges

INCH	MILLIMETER	
HOLE SIZE	HOLE SIZE	MAGNIFICATION
.002 and smaller	0.05 and smaller	120–160X
.00201–.004	0.0501–0.10	90–120X
.00401–.010	0.101–0.25	60–90X
.0101–.090	0.2501–2.30	30–45X
.0901 and larger	2.301 and larger	10–20X

### Standard Die Stamping



### Ordering Information

Fort Wayne Wire Die drawing dies provide the quality needed for optimum wire drawing efficiency. For enhanced order processing, please verify your product requirements for the following die specifications.

- 1 Blank Number \_\_\_\_\_
- 2 Casing Dimensions \_\_\_\_\_
- 3 Hole Size \_\_\_\_\_
- 4 Hole Size Tolerance \_\_\_\_\_
- 5 Reduction Angle \_\_\_\_\_
- 6 Bearing Length \_\_\_\_\_
- 7 Quantity per Hole Size \_\_\_\_\_
- 8 Wire Material \_\_\_\_\_

### Typical Die Sizes by Wire Type

WIRE TYPE	DIE SIZE RANGE											
Stainless Steel	[Bar chart showing die size range for Stainless Steel]											
Tungsten	[Bar chart showing die size range for Tungsten]											
Brass Covered Steel	[Bar chart showing die size range for Brass Covered Steel]											
Copper Coated Steel	[Bar chart showing die size range for Copper Coated Steel]											
Bare Copper	[Bar chart showing die size range for Bare Copper]											
Tinned Copper	[Bar chart showing die size range for Tinned Copper]											
Aluminum	[Bar chart showing die size range for Aluminum]											
INCHES	.0005	.001	.002	.004	.008	.016	.032	.064	.128	.256	.512	
MILLIMETERS	0.0125	0.025	0.05	0.10	0.20	0.40	0.80	1.60	3.20	6.40	12.80	



Operating from facilities in the United States, Canada, Germany, China and the Philippines and through representative offices located throughout the world, Fort Wayne Wire Die brings global expertise to service its international customer base. Experienced people and innovative ISO 9001-registered processes build quality assurance into every die. When you need great wire, begin with one call to **Fort Wayne Wire Die**—*your source for innovative, global solutions to wire drawing needs.*



Fort Wayne Wire Die



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