



For more information

Indexable drill

TUNGDRILLTWISTED

Tungaloy Report No. 377-G

Indexable drills with 4 edge inserts now offer an **increased range of insert grades dedicated to drilling applications**







TUNGDRILL TWISTED



Excellent surface finish and stable chip evacuation due to increased coolant flow with twisted drill body

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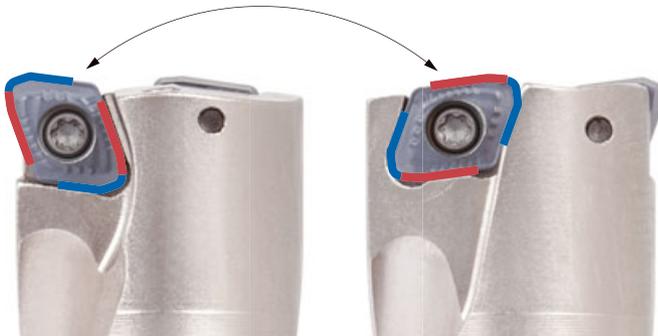
Extremely versatile indexable drills

- Light-cutting 4-edge positive inserts
- Drilling diameters from 12.5 mm to 54.0 mm
- Drilling depths of 2xD, 3xD, 4xD, and 5xD
- Multiple grades for various material groups

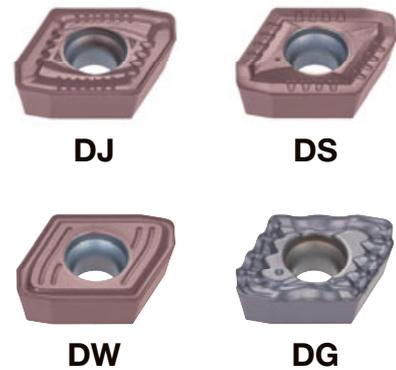


Features

1 A single insert is interchangeable for the center cutting edge and peripheral cutting edge. This reduces tool inventory and investment.

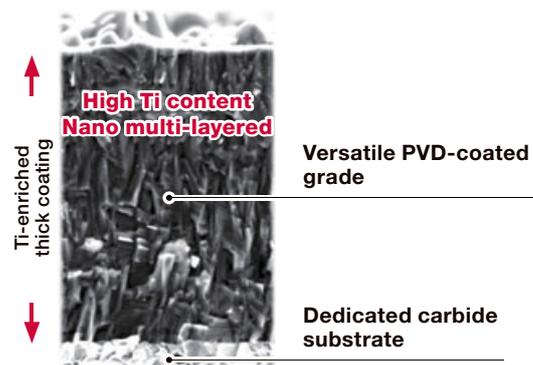


2 Four different styles of chipbreakers to cover various applications.



3 New insert grades developed specifically for drilling applications for prolonged insert tool life.

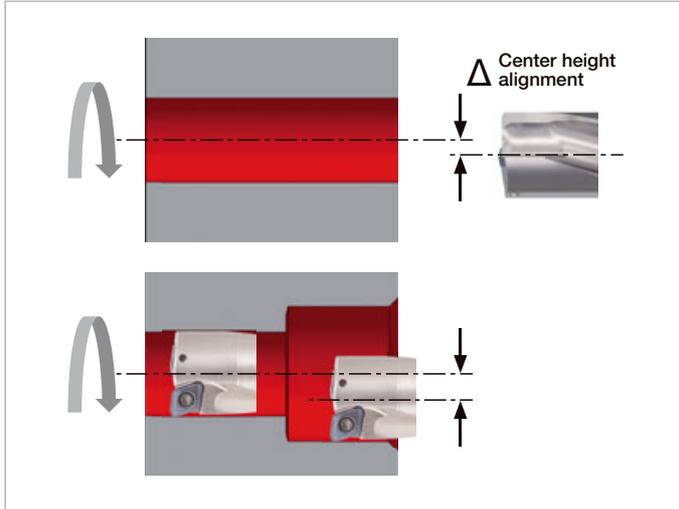
New AH7020, AH7030



Versatility and stability for reduced tool investment and inventory

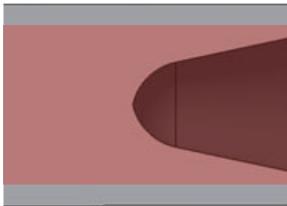
The combination of a strong tool body and light-cutting geometry provides versatility and stability, making **TungDrillTwisted** an all-rounder indexable drill solution for various hole-making applications, from standard drilling to single-point boring operations.

Stable solution for drilling on lathe machine



- Sufficient alignment of the drill with the center line of the machine is critical for successful non-rotating drilling applications on a lathe or turning center.
- **TungDrillTwisted** allows much easier drill center height alignment with the work center, compared with solid or exchangeable-head drills.
- By offsetting the drill using X-axis of the machine, fine adjustments of the drill diameter can be achieved. This allows the indexable drill to be used for boring operations, enabling a single tool to perform multiple operations.

Machining of cast or pre-drilled holes



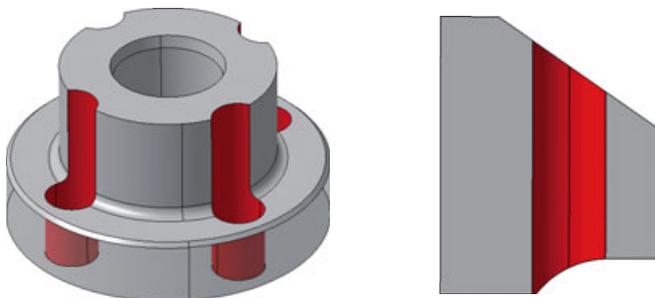
Opening a hole into a pre-cast or pre-forged hole or concave surface



Enlarging a pre-drilled hole

- **TungDrillTwisted** enables drilling to concave or convex surfaces or enlarging of the cast or pre-drilled holes.
- The chipbreaker optimizes chip control and evacuation.

Drilling irregular or asymmetric surfaces

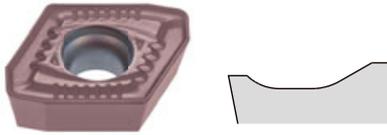


- **TungDrillTwisted** can drill irregular surfaces, such as inclined entry/exit, convex or concave surfaces, and edge plunging.
- Due to extremely high body stiffness, the drill is able to engage in the material with no or little body deflection. Strong insert geometry also contributes to tool life stability during machining involving aggressive interruptions.

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4 styles of chipbreakers for optimal chip control and maximum machining stability

DJ



First-choice chipbreaker for a wide range of applications in ISO P and M material groups, featuring light cutting action with stability.

P SCM440 / 42CrMo4 Drill diameter: 20 mm
Machine : Vertical M/C

Cutting speed: Vc (m/min)	200			
	150			
	100			
		0.08	0.1	0.15
Feed: f (mm/rev)				

P SCM420 / 18CrMo4 Drill diameter: 20 mm
Machine : Lathe

Cutting speed: Vc (m/min)	200			
	150			
	100			
		0.08	0.1	0.15
Feed: f (mm/rev)				

M SUS304 / X5CrNi18-9 Drill diameter: 20 mm
Machine : Vertical M/C

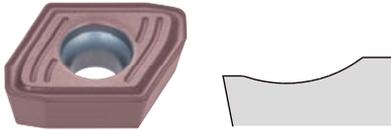
Cutting speed: Vc (m/min)	200			
	150			
	100			
		0.04	0.08	0.13
Feed: f (mm/rev)				

P SS400 / E275A Drill diameter: 20 mm
Machine : Vertical M/C

Cutting speed: Vc (m/min)	250			
	200			
	150			
		0.04	0.06	0.1
Feed: f (mm/rev)				

Not recommended

DW



Produces tightly-curved chips compared with DJ chipbreaker. Wiper creates excellent surface quality and enables higher feed rates. Superior resistance to fracture.

P **SCM440 / 42CrMo4** Drill diameter: 20 mm
Machine : Vertical M/C

Cutting speed: Vc (m/min)	200			
	150			
	100			
		0.08	0.1	0.15
	Feed: f (mm/rev)			

P **SCM420 / 18CrMo4** Drill diameter: 20 mm
Machine : Lathe

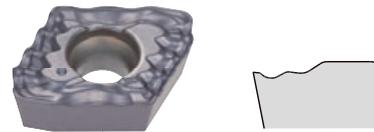
Cutting speed: Vc (m/min)	200			
	150			
	100			
		0.08	0.1	0.15
	Feed: f (mm/rev)			

DS



Developed specifically for machining stainless steel, DS can handle heat-resistant superalloys. Performs best when used in turning applications.

DG



Developed for soft steel machining. The unique geometry eliminates chip bird-nesting. Delivers excellent performance when used at low feed rates.

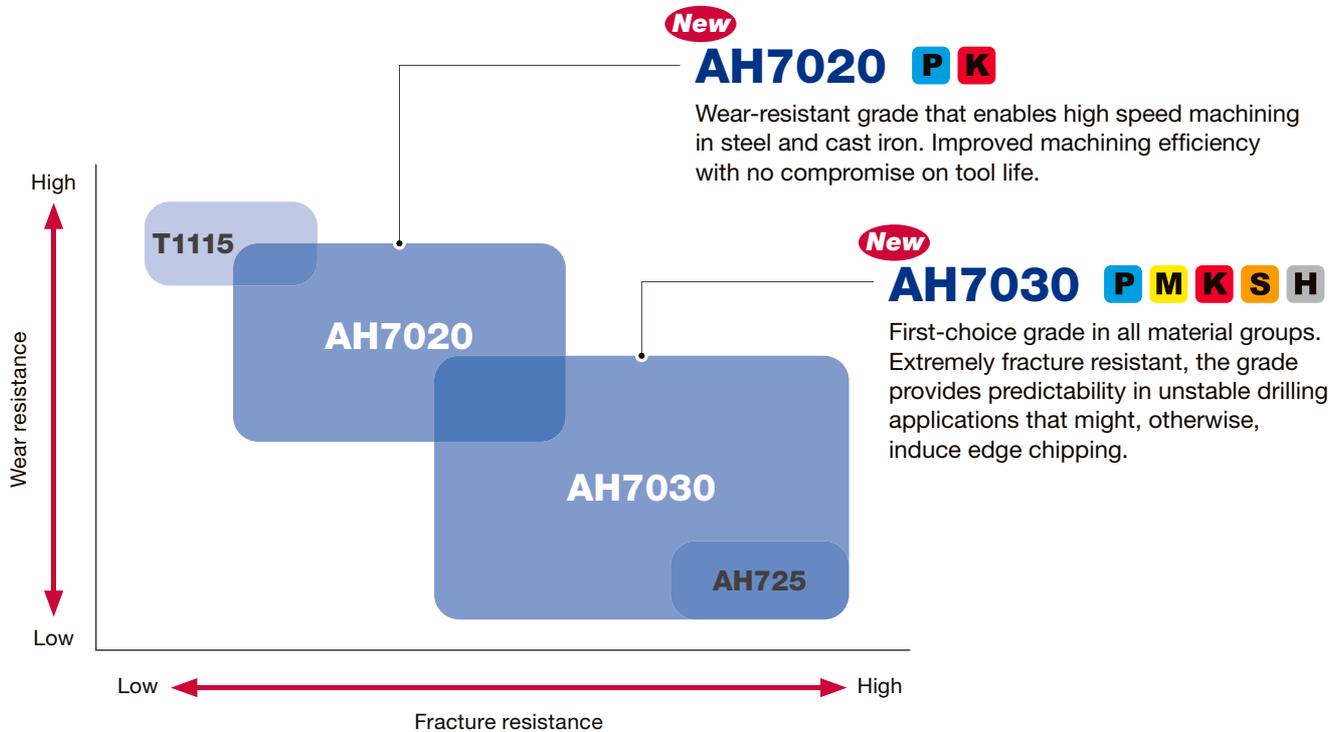
M **SUS304 / X5CrNi18-9** Drill diameter: 20 mm
Machine : Vertical M/C

Cutting speed: Vc (m/min)	200			
	150			
	100			
		0.04	0.08	0.13
	Feed: f (mm/rev)			

P **SS400 / E275A** Drill diameter: 20 mm
Machine : Vertical M/C

Cutting speed: Vc (m/min)	150			
	100			
	60			
		0.04	0.06	0.1
	Feed: f (mm/rev)			

New insert grades developed specifically for drilling applications bring increased tool life and reduced cost per part



Versatile PVD-coated grade

Ti-enriched coating

- Thick Ti-enriched PVD coating for enhanced thermal shock resistance.
- Reduced crater wear.

High Ti-content nano-structured multilayer coating

The outer layer consists of a high Ti-content nano-structured multilayer made possible by Tungaloy's latest coating technology. Its high hardness and nano structure provide the grade with a good balance of wear and fracture resistance, enhancing tool life and predictability.

Dedicated carbide substrate

AH7020

Thanks to high thermal conductivity of the substrate, heat generated during machining is dissipated, efficiently reducing temperature on the cutting edge. This provides edge toughness, while reducing plastic deformation of the cutting edge. Ideal for continuous cuts.

AH7030

AH7030 incorporates a tough substrate that provides process security during interrupted machining. This tough substrate provides the grade with added reliability during interrupted cuts.

AH725 P M

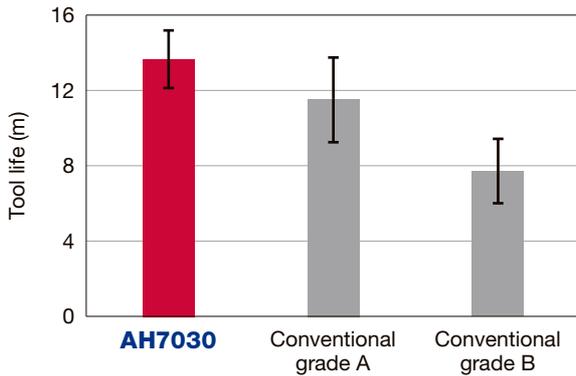
- Excellent wear and fracture resistance delivered by (Ti, Al)N coating and tough substrate.
- Suitable for steel and stainless steel machining.

T1115 K

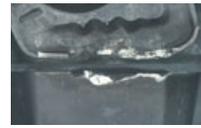
- Strong resistance to wear due to hard carbide substrate and multi-layered compound coating.
- Ideal grade for drilling of cast iron.

CUTTING PERFORMANCE

Tool life test results in peck drilling application



AH7030

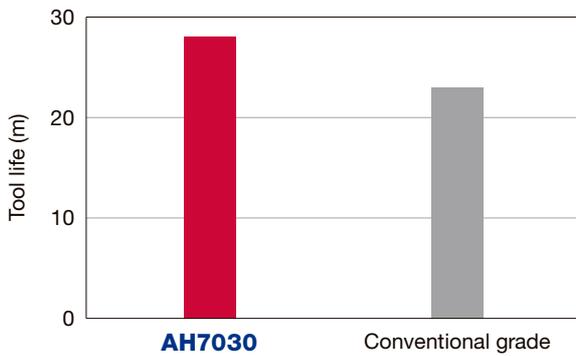


Conventional grade A

P	Drill	: TDX250F25-3
	Insert	: XPMT07H308R-DJ AH7030
	Workpiece material	: Alloy steel (30HRC)
	Cutting speed	: $V_c = 150$ m/min
	Feed	: $f = 0.12$ mm/rev
	Drilling depth	: 60 mm
	Coolant	: Wet (Internal supply)
	Peck cycle	: 2 mm/peck

Increased wear and chipping resistance compared to conventional tools. Improved tool life stability.

Tool life test results in stainless steel



AH7030

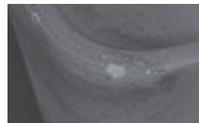
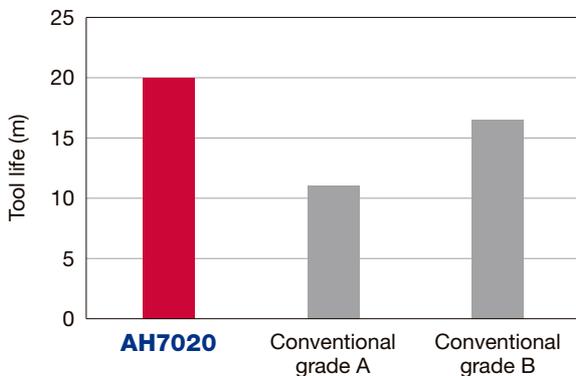


Conventional grade

M	Drill	: TDX250F25-3
	Insert	: XPMT07H308R-DS AH7030
	Workpiece material	: Austenitic stainless steel
	Cutting speed	: $V_c = 150$ m/min
	Feed	: $f = 0.08$ mm/rev
	Drilling depth	: 65 mm
	Coolant	: Wet (Internal supply)

Provided wear and fracture resistance in stainless steel and increased tool life.

Wear resistance



AH7020



Conventional grade A

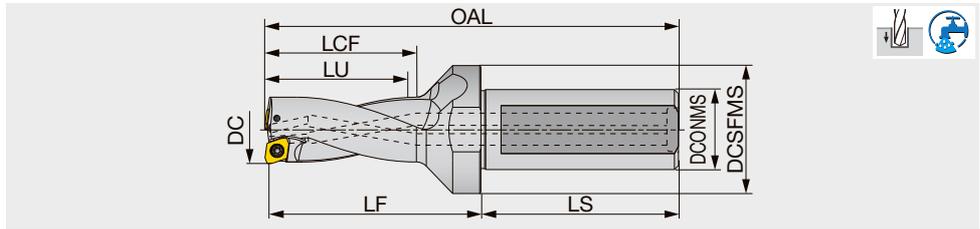
P	Drill	: TDX250F25-3
	Insert	: XPMT07H308R-DJ AH7020
	Workpiece material	: Carbon steel
	Cutting speed	: $V_c = 200$ m/min
	Feed	: $f = 0.08$ mm/rev
	Drilling depth	: 65 mm
	Coolant	: Wet (Internal supply)

New coated grade provided improved wear resistance and long tool life at an increased cutting speed.

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TDX-F L/D=2

Indexable drill, L/D = 2, flat cotter



Designation	DC	DCONMS	DCSFMS	LU	LS	LCF	LF	OAL	Max. offset (radial)	WT(kg)	Insert
TDX125F20-2	12.5	20	25	25.4	49	28.4	41	90.4	0.8	0.2	XPMT040104R-D*
TDX130F20-2	13	20	25	26.4	49	29.4	42	91.4	0.7	0.2	XPMT040104R-D*
TDX135F20-2	13.5	20	25	27.4	49	30.4	43	92.4	0.6	0.2	XPMT040104R-D*
TDX140F20-2	14	20	25	28.4	49	31.4	44	93.4	0.5	0.2	XPMT040104R-D*
TDX145F20-2	14.5	20	25	29.4	49	32.4	46	95.4	0.4	0.2	XPMT040104R-D*
TDX150F20-2	15	20	25	30.5	49	33.5	47	96.5	0.9	0.2	XPMT050204R-D*
TDX155F20-2	15.5	20	32	31.5	49	34.5	49	98.5	0.8	0.2	XPMT050204R-D*
TDX160F20-2	16	20	32	32.5	49	35.5	51	100.5	0.6	0.2	XPMT050204R-D*
TDX165F20-2	16.5	20	32	33.5	49	36.5	52	101.5	0.5	0.2	XPMT050204R-D*
TDX170F20-2	17	20	32	34.5	49	37.5	53	102.5	0.4	0.2	XPMT050204R-D*
TDX175F25-2	17.5	25	32	35.5	54	38.5	55	109.5	1.2	0.3	XPMT06X308R-D*
TDX180F25-2	18	25	32	36.5	54	39.5	56	110.5	1.1	0.3	XPMT06X308R-D*
TDX185F25-2	18.5	25	32	37.5	54	40.5	57	111.5	0.9	0.3	XPMT06X308R-D*
TDX190F25-2	19	25	32	38.5	54	41.5	58	112.5	0.8	0.3	XPMT06X308R-D*
TDX195F25-2	19.5	25	32	39.5	54	42.5	60	114.5	0.7	0.3	XPMT06X308R-D*
TDX200F25-2	20	25	32	40.5	54	45.5	61	115.5	0.5	0.3	XPMT06X308R-D*
TDX205F25-2	20.5	25	32	41.5	54	46.5	62.5	117	0.4	0.3	XPMT06X308R-D*
TDX210F25-2	21	25	32	42.5	54	47.5	64	118.5	0.3	0.3	XPMT06X308R-D*
TDX215F25-2	21.5	25	32	43.5	54	48.5	65	119.5	0.2	0.3	XPMT06X308R-D*
TDX220F25-2	22	25	32	44.6	54	49.6	66	120.6	1.2	0.3	XPMT07H308R-D*
TDX225F25-2	22.5	25	37	45.6	54	50.6	67.5	122.1	1.1	0.3	XPMT07H308R-D*
TDX230F25-2	23	25	37	46.6	54	51.6	69	123.6	0.9	0.4	XPMT07H308R-D*
TDX235F25-2	23.5	25	37	47.6	54	52.6	70	124.6	0.8	0.4	XPMT07H308R-D*
TDX240F25-2	24	25	37	48.6	54	53.6	71	125.6	0.7	0.4	XPMT07H308R-D*
TDX245F25-2	24.5	25	37	49.6	54	54.6	72.5	127.1	0.5	0.4	XPMT07H308R-D*
TDX250F25-2	25	25	37	50.6	54	55.6	74	128.6	0.4	0.4	XPMT07H308R-D*
TDX255F25-2	25.5	25	37	51.6	54	56.6	75.5	130.1	0.3	0.4	XPMT07H308R-D*
TDX260F25-2	26	25	37	52.6	54	57.6	77	131.6	0.2	0.4	XPMT07H308R-D*
TDX270F32-2	27	32	40	54.7	59	59.7	79	138.7	1.5	0.6	XPMT08T308R-D*
TDX280F32-2	28	32	40	56.7	59	61	82.3	142	1.2	0.6	XPMT08T308R-D*
TDX290F32-2	29	32	40	58.7	59	63	84.3	144	1	0.7	XPMT08T308R-D*
TDX300F32-2	30	32	40	60.7	59	65	87.3	147	0.7	0.7	XPMT08T308R-D*
TDX310F32-2	31	32	40	62.7	59	67	90.3	150	0.4	0.7	XPMT08T308R-D*
TDX320F32-2	32	32	40	64.7	59	69	92.3	152	0.2	0.8	XPMT08T308R-D*
TDX330F40-2	33	40	50	67.1	69	71.7	95.6	165.7	2.3	1.2	XPMT110412R-D*
TDX340F40-2	34	40	50	69.1	69	73.7	98.6	168.7	2.1	1.2	XPMT110412R-D*
TDX350F40-2	35	40	50	71.1	69	75.7	101.6	171.7	1.8	1.2	XPMT110412R-D*
TDX360F40-2	36	40	50	73.1	69	77.7	104.6	174.7	1.5	1.3	XPMT110412R-D*
TDX370F40-2	37	40	50	75.1	69	79.7	105.6	175.7	1.3	1.3	XPMT110412R-D*
TDX380F40-2	38	40	50	77.1	69	81.7	108.6	178.7	1	1.3	XPMT110412R-D*
TDX390F40-2	39	40	50	79.1	69	83.7	110.6	180.7	0.7	1.4	XPMT110412R-D*
TDX400F40-2	40	40	50	81.1	69	85.7	113.6	183.7	0.5	1.4	XPMT110412R-D*
TDX410F40-2	41	40	50	83.1	69	87.7	117.6	187.7	0.2	1.5	XPMT110412R-D*
TDX420F40-2	42	40	55	85.6	69	90.6	120	190.6	3.1	1.6	XPMT150512R-D*
TDX430F40-2	43	40	55	87.6	69	92.6	123	193.6	2.9	1.6	XPMT150512R-D*
TDX440F40-2	44	40	55	89.6	69	94.6	125	195.6	2.6	1.7	XPMT150512R-D*
TDX450F40-2	45	40	55	91.6	69	96.6	128	198.6	2.3	1.7	XPMT150512R-D*
TDX460F40-2	46	40	55	93.6	69	98.6	131	201.6	2.1	1.8	XPMT150512R-D*

Designation	DC	DCONMS	DCSFMS	LU	LS	LCF	LF	OAL	Max. offset (radial)	WT(kg)	Insert
TDX470F40-2	47	40	55	95.6	69	100.6	133	203.6	1.8	1.9	XPMT150512R-D*
TDX480F40-2	48	40	55	97.6	69	102.6	136	206.6	1.5	1.9	XPMT150512R-D*
TDX490F40-2	49	40	55	99.6	69	104.6	138	208.6	1.3	1.9	XPMT150512R-D*
TDX500F40-2	50	40	55	101.6	69	106.6	141	211.6	1	2	XPMT150512R-D*
TDX510F40-2	51	40	55	103.6	69	108.6	145	215.6	0.7	2.1	XPMT150512R-D*
TDX520F40-2	52	40	55	105.6	69	110.6	147	217.6	0.5	2.2	XPMT150512R-D*
TDX530F40-2	53	40	55	107.6	69	112.6	150	220.6	-	2.3	XPMT150512R-D*
TDX540F40-2	54	40	55	109.6	69	114.6	152	222.6	-	2.4	XPMT150512R-D*

Tool diameter	Tool diameter tolerance	Hole diameter tolerance*
ø12.5 - ø17	+ 0.1 / 0	+ 0.25 / 0
ø17.5 - ø54	+ 0.2 / 0	+ 0.3 / 0

*Just for reference

SPARE PARTS



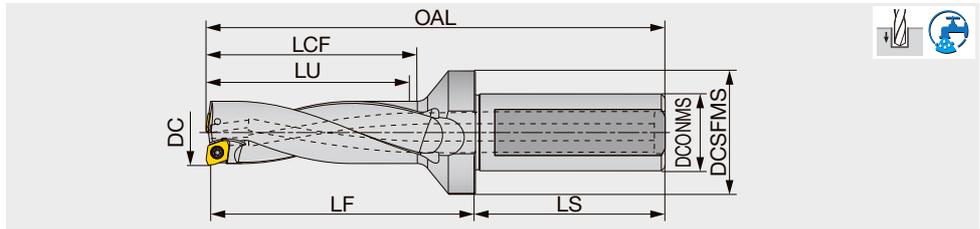
Designation	Clamping screw	Wrench
TDX125 - 145	CSPB-2H	IP-6DB
TDX150 - 170	CSPB-2L043	IP-6DB
TDX175 - 215	CSPB-2.2	IP-7D
TDX220 - 260	CSPB-2.5	IP-8D
TDX270 - 320	CSTB-3	T-9D
TDX330 - 410	CSTB-4	T-15D
TDX420 - 540	CSTB-5	T-20D

Recommended clamping torque (N·m): CSPB-2H/CSPB-2L043 = 0.7, CSPB-2.2 = 1, CSPB-2.5 = 1.3, CSTB-3 = 2.3, CSTB-4 = 3.5, CSTB-5 = 5

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TDX-F L/D=3

Indexable drill, L/D = 3, flat cotter



Designation	DC	DCONMS	DCSFMS	LU	LS	LCF	LF	OAL	Max. offset (radial)	WT(kg)	Insert
TDX125F20-3	12.5	20	25	37.9	49	40.9	53	102.4	0.8	0.2	XPMT040104R-D*
TDX130F20-3	13	20	25	39.4	49	42.4	55	104.4	0.7	0.2	XPMT040104R-D*
TDX135F20-3	13.5	20	25	40.9	49	43.9	56	105.4	0.6	0.2	XPMT040104R-D*
TDX140F20-3	14	20	25	42.4	49	45.4	58	107.4	0.5	0.2	XPMT040104R-D*
TDX145F20-3	14.5	20	25	43.9	49	46.9	60	109.4	0.4	0.2	XPMT040104R-D*
TDX150F20-3	15	20	25	45.4	49	48.4	62	111.4	0.9	0.2	XPMT050204R-D*
TDX155F20-3	15.5	20	32	46.9	49	49.9	64	113.4	0.8	0.2	XPMT050204R-D*
TDX160F20-3	16	20	32	48.4	49	51.4	66	115.4	0.6	0.2	XPMT050204R-D*
TDX165F20-3	16.5	20	32	49.9	49	52.9	68	117.4	0.5	0.2	XPMT050204R-D*
TDX170F20-3	17	20	32	51.4	49	54.4	69	118.4	0.4	0.2	XPMT050204R-D*
TDX175F25-3	17.5	25	32	53	54	56	72	126.5	1.2	0.3	XPMT06X308R-D*
TDX180F25-3	18	25	32	54.5	54	57.5	73	127.5	1.1	0.3	XPMT06X308R-D*
TDX185F25-3	18.5	25	32	56	54	59	75	129.5	0.9	0.3	XPMT06X308R-D*
TDX190F25-3	19	25	32	57.5	54	60.5	76	130.5	0.8	0.3	XPMT06X308R-D*
TDX195F25-3	19.5	25	32	59	54	62	79	133.5	0.7	0.3	XPMT06X308R-D*
TDX200F25-3	20	25	32	60.5	54	65.5	81	135.5	0.5	0.3	XPMT06X308R-D*
TDX205F25-3	20.5	25	32	62	54	67	82	136.5	0.4	0.3	XPMT06X308R-D*
TDX210F25-3	21	25	32	63.5	54	68.5	84	138.5	0.3	0.3	XPMT06X308R-D*
TDX215F25-3	21.5	25	32	65	54	70	86	140.5	0.2	0.4	XPMT06X308R-D*
TDX220F25-3	22	25	32	66.6	54	71.6	87	141.6	1.2	0.4	XPMT07H308R-D*
TDX225F25-3	22.5	25	37	68.1	54	73.1	90	144.6	1.1	0.4	XPMT07H308R-D*
TDX230F25-3	23	25	37	69.6	54	74.6	91	145.6	0.9	0.4	XPMT07H308R-D*
TDX235F25-3	23.5	25	37	71.1	54	76.1	93	147.6	0.8	0.4	XPMT07H308R-D*
TDX240F25-3	24	25	37	72.6	54	77.6	95	149.6	0.7	0.4	XPMT07H308R-D*
TDX245F25-3	24.5	25	37	74.1	54	79.1	97	151.6	0.5	0.5	XPMT07H308R-D*
TDX250F25-3	25	25	37	75.6	54	80.6	99	153.6	0.4	0.5	XPMT07H308R-D*
TDX255F25-3	25.5	25	37	77.1	54	82.1	100	154.6	0.3	0.5	XPMT07H308R-D*
TDX260F25-3	26	25	37	78.6	54	83.6	102	156.6	0.2	0.5	XPMT07H308R-D*
TDX270F32-3	27	32	40	81.7	59	86.7	105	164.7	1.5	0.6	XPMT08T308R-D*
TDX280F32-3	28	32	40	84.7	59	89	109.3	169	1.2	0.7	XPMT08T308R-D*
TDX290F32-3	29	32	40	87.7	59	92	112.3	172	1	0.7	XPMT08T308R-D*
TDX300F32-3	30	32	40	90.7	59	95	117.3	177	0.7	0.8	XPMT08T308R-D*
TDX310F32-3	31	32	40	93.7	59	98	121.3	181	0.4	0.8	XPMT08T308R-D*
TDX320F32-3	32	32	40	96.7	59	101	124.3	184	0.2	0.9	XPMT08T308R-D*
TDX330F40-3	33	40	50	100.1	69	104.7	128.6	198.7	2.3	1.3	XPMT110412R-D*
TDX340F40-3	34	40	50	103.1	69	107.7	131.6	201.7	2.1	1.3	XPMT110412R-D*
TDX350F40-3	35	40	50	106.1	69	110.7	135.6	205.7	1.8	1.3	XPMT110412R-D*
TDX360F40-3	36	40	50	109.1	69	113.7	139.6	209.7	1.5	1.4	XPMT110412R-D*
TDX370F40-3	37	40	50	112.1	69	116.7	142.6	212.7	1.3	1.4	XPMT110412R-D*
TDX380F40-3	38	40	50	115.1	69	119.7	146.6	216.7	1	1.5	XPMT110412R-D*
TDX390F40-3	39	40	50	118.1	69	122.7	149.6	219.7	0.7	1.6	XPMT110412R-D*
TDX400F40-3	40	40	50	121.1	69	125.7	153.6	223.7	0.5	1.6	XPMT110412R-D*
TDX410F40-3	41	40	50	124.1	69	128.7	157.6	227.7	0.2	1.7	XPMT110412R-D*
TDX420F40-3	42	40	55	127.6	69	132.6	161	231.6	3.1	1.8	XPMT150512R-D*
TDX430F40-3	43	40	55	130.6	69	135.6	165	235.6	2.9	1.8	XPMT150512R-D*
TDX440F40-3	44	40	55	133.6	69	138.6	168	238.6	2.6	1.9	XPMT150512R-D*
TDX450F40-3	45	40	55	136.6	69	141.6	173	243.6	2.3	2	XPMT150512R-D*
TDX460F40-3	46	40	55	139.6	69	144.6	177	247.6	2.1	2.1	XPMT150512R-D*

Designation	DC	DCONMS	DCSFMS	LU	LS	LCF	LF	OAL	Max. offset (radial)	WT(kg)	Insert
TDX470F40-3	47	40	55	142.6	69	147.6	180	250.6	1.8	2.2	XPMT150512R-D*
TDX480F40-3	48	40	55	145.6	69	150.6	184	254.6	1.5	2.3	XPMT150512R-D*
TDX490F40-3	49	40	55	148.6	69	153.6	187	257.6	1.3	2.3	XPMT150512R-D*
TDX500F40-3	50	40	55	151.6	69	156.6	191	261.6	1	2.4	XPMT150512R-D*
TDX510F40-3	51	40	55	154.6	69	159.6	195	265.6	0.7	2.5	XPMT150512R-D*
TDX520F40-3	52	40	55	157.6	69	162.6	198	268.6	0.5	2.6	XPMT150512R-D*
TDX530F40-3	53	40	55	160.6	69	165.6	202	272.6	-	2.7	XPMT150512R-D*
TDX540F40-3	54	40	55	163.6	69	168.6	205	275.6	-	2.9	XPMT150512R-D*

Tool diameter	Tool diameter tolerance	Hole diameter tolerance*
ø12.5 - ø17	+ 0.1 / 0	+ 0.25 / 0
ø17.5 - ø54	+ 0.2 / 0	+ 0.3 / 0

*Just for reference

SPARE PARTS



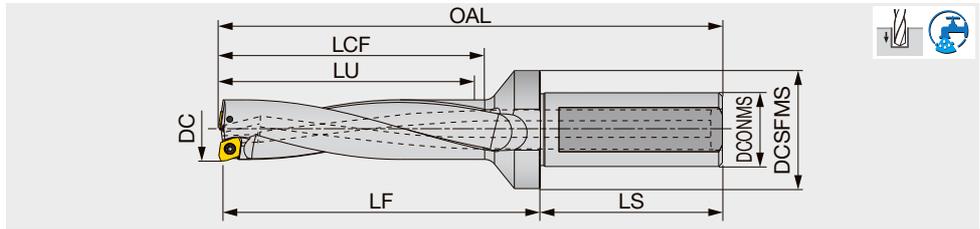
Designation	Clamping screw	Wrench
TDX125 - 145	CSPB-2H	IP-6DB
TDX150 - 170	CSPB-2L043	IP-6DB
TDX175 - 215	CSPB-2.2	IP-7D
TDX220 - 260	CSPB-2.5	IP-8D
TDX270 - 320	CSTB-3	T-9D
TDX330 - 410	CSTB-4	T-15D
TDX420 - 540	CSTB-5	T-20D

Recommended clamping torque (N·m): CSPB-2H/CSPB-2L043 = 0.7, CSPB-2.2 = 1, CSPB-2.5 = 1.3, CSTB-3 = 2.3, CSTB-4 = 3.5, CSTB-5 = 5

TUNGDRILLTWISTED

TDX-F L/D=4

Indexable drill, L/D = 4, flat cotter



Designation	DC	DCONMS	DCSFMS	LU	LS	LCF	LF	OAL	Max. offset (radial)	WT(kg)	Insert
TDX125F20-4	12.5	20	25	50.4	49	53.4	66	115.4	0.8	0.2	XPMT040104R-D*
TDX130F20-4	13	20	25	52.4	49	55.4	68	117.4	0.7	0.2	XPMT040104R-D*
TDX135F20-4	13.5	20	25	54.4	49	57.4	70	119.4	0.6	0.2	XPMT040104R-D*
TDX140F20-4	14	20	25	56.4	49	59.4	72	121.4	0.5	0.2	XPMT040104R-D*
TDX145F20-4	14.5	20	25	58.4	49	61.4	75	124.4	0.4	0.2	XPMT040104R-D*
TDX150F20-4	15	20	25	60.4	49	63.4	77	126.4	0.9	0.2	XPMT050204R-D*
TDX155F20-4	15.5	20	32	62.4	49	65.4	79	128.4	0.8	0.2	XPMT050204R-D*
TDX160F20-4	16	20	32	64.4	49	67.4	82	131.4	0.6	0.2	XPMT050204R-D*
TDX165F20-4	16.5	20	32	66.4	49	69.4	84	133.4	0.5	0.2	XPMT050204R-D*
TDX170F20-4	17	20	32	68.4	49	71.4	86	135.4	0.4	0.2	XPMT050204R-D*
TDX175F25-4	17.5	25	32	70.5	54	73.5	89	143.5	1.2	0.3	XPMT06X308R-D*
TDX180F25-4	18	25	32	72.5	54	75.5	91	145.5	1.1	0.3	XPMT06X308R-D*
TDX185F25-4	18.5	25	32	74.5	54	77.5	93	147.5	0.9	0.3	XPMT06X308R-D*
TDX190F25-4	19	25	32	76.5	54	79.5	95	149.5	0.8	0.3	XPMT06X308R-D*
TDX195F25-4	19.5	25	32	78.5	54	81.5	99	153.5	0.7	0.4	XPMT06X308R-D*
TDX200F25-4	20	25	32	80.5	54	84.5	101	155.5	0.5	0.4	XPMT06X308R-D*
TDX205F25-4	20.5	25	32	82.5	54	86.5	103	157.5	0.4	0.4	XPMT06X308R-D*
TDX210F25-4	21	25	32	84.5	54	88.5	105	159.5	0.3	0.4	XPMT06X308R-D*
TDX215F25-4	21.5	25	32	86.5	54	90.5	107	161.5	0.2	0.4	XPMT06X308R-D*
TDX220F25-4	22	25	32	88.6	54	92.6	109	163.6	1.2	0.5	XPMT07H308R-D*
TDX225F25-4	22.5	25	37	90.6	54	94.6	111.5	166.1	1.1	0.5	XPMT07H308R-D*
TDX230F25-4	23	25	37	92.6	54	96.6	114	168.6	0.9	0.4	XPMT07H308R-D*
TDX235F25-4	23.5	25	37	94.6	54	98.6	116.5	171.1	0.8	0.4	XPMT07H308R-D*
TDX240F25-4	24	25	37	96.6	54	100.6	119	173.6	0.7	0.4	XPMT07H308R-D*
TDX245F25-4	24.5	25	37	98.6	54	102.6	121.5	176.1	0.5	0.6	XPMT07H308R-D*
TDX250F25-4	25	25	37	100.6	54	104.6	124	178.6	0.4	0.6	XPMT07H308R-D*
TDX255F25-4	25.5	25	37	102.6	54	106.6	126	180.6	0.3	0.6	XPMT07H308R-D*
TDX260F25-4	26	25	37	104.6	54	108.6	128	182.6	0.2	0.6	XPMT07H308R-D*
TDX270F32-4	27	32	40	108.7	59	112.7	132	191.7	1.5	0.6	XPMT08T308R-D*
TDX280F32-4	28	32	40	112.7	59	116.7	137	196.7	1.2	0.8	XPMT08T308R-D*
TDX290F32-4	29	32	40	116.7	59	120.7	141	200.7	1	0.7	XPMT08T308R-D*
TDX300F32-4	30	32	40	120.7	59	124.7	147	206.7	0.7	0.9	XPMT08T308R-D*
TDX310F32-4	31	32	40	124.7	59	128.7	152	211.7	0.4	0.9	XPMT08T308R-D*
TDX320F32-4	32	32	40	128.7	59	132.7	156	215.7	0.2	1	XPMT08T308R-D*
TDX330F40-4	33	40	50	133.1	69	137.1	161	231.1	2.3	1.4	XPMT110412R-D*
TDX340F40-4	34	40	50	137.1	69	141.1	165	235.1	2.1	1.4	XPMT110412R-D*
TDX350F40-4	35	40	50	141.1	69	145.1	170	240.1	1.8	1.4	XPMT110412R-D*
TDX360F40-4	36	40	50	145.1	69	149.1	175	245.1	1.5	1.5	XPMT110412R-D*
TDX370F40-4	37	40	50	149.1	69	153.1	179	249.1	1.3	1.5	XPMT110412R-D*
TDX380F40-4	38	40	50	153.1	69	157.1	184	254.1	1	1.7	XPMT110412R-D*
TDX390F40-4	39	40	50	157.1	69	161.1	188	258.1	0.7	1.8	XPMT110412R-D*
TDX400F40-4	40	40	50	161.1	69	165.1	193	263.1	0.5	1.8	XPMT110412R-D*
TDX410F40-4	41	40	50	165.1	69	169.1	198	268.1	0.2	1.9	XPMT110412R-D*
TDX420F40-4	42	40	55	169.6	69	173.6	202	272.6	3.1	2	XPMT150512R-D*
TDX430F40-4	43	40	55	173.6	69	177.6	207	277.6	2.9	2	XPMT150512R-D*
TDX440F40-4	44	40	55	177.6	69	181.6	211	281.6	2.6	2.1	XPMT150512R-D*
TDX450F40-4	45	40	55	181.6	69	185.6	217	287.6	2.3	2.3	XPMT150512R-D*
TDX460F40-4	46	40	55	185.6	69	189.6	222	292.6	2.1	2.4	XPMT150512R-D*

Designation	DC	DCONMS	DCSFMS	LU	LS	LCF	LF	OAL	Max. offset (radial)	WT(kg)	Insert
TDX470F40-4	47	40	55	189.6	69	193.6	226	296.6	1.8	2.5	XPMT150512R-D*
TDX480F40-4	48	40	55	193.6	69	197.6	231	301.6	1.5	2.7	XPMT150512R-D*
TDX490F40-4	49	40	55	197.6	69	201.6	235	305.6	1.3	2.7	XPMT150512R-D*
TDX500F40-4	50	40	55	201.6	69	205.6	240	310.6	1	2.8	XPMT150512R-D*
TDX510F40-4	51	40	55	205.6	69	209.6	245	315.6	0.7	2.9	XPMT150512R-D*
TDX520F40-4	52	40	55	209.6	69	213.6	249	319.6	0.5	3	XPMT150512R-D*
TDX530F40-4	53	40	55	213.6	69	217.6	254	324.6	-	3.1	XPMT150512R-D*
TDX540F40-4	54	40	55	217.6	69	221.6	258	328.6	-	3.4	XPMT150512R-D*

Tool diameter	Tool diameter tolerance	Hole diameter tolerance*
ø12.5 - ø17	+ 0.1 / 0	+ 0.4 / 0
ø17.5 - ø54	+ 0.2 / 0	+ 0.45 / 0

*Just for reference

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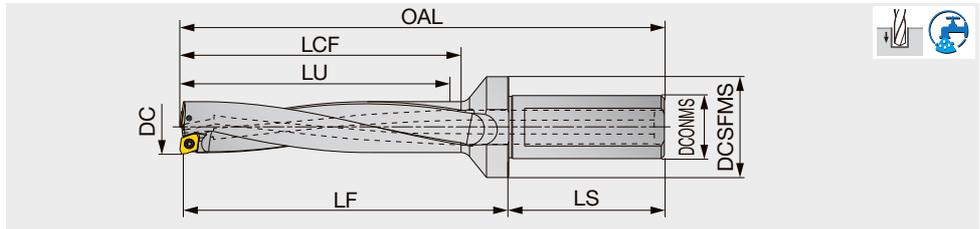
Designation	Clamping screw	Wrench
TDX125 - 145	CSPB-2H	IP-6DB
TDX150 - 170	CSPB-2L043	IP-6DB
TDX175 - 215	CSPB-2.2	IP-7D
TDX220 - 260	CSPB-2.5	IP-8D
TDX270 - 320	CSTB-3	T-9D
TDX330 - 410	CSTB-4	T-15D
TDX420 - 540	CSTB-5	T-20D

Recommended clamping torque (N·m): CSPB-2H/CSPB-2L043 = 0.7, CSPB-2.2 = 1, CSPB-2.5 = 1.3, CSTB-3 = 2.3, CSTB-4 = 3.5, CSTB-5 = 5

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TDX-F L/D=5

Indexable drill, L/D = 5, flat cotter



Designation	DC	DCONMS	DCSFMS	LU	LS	LCF	LF	OAL	Max. offset (radial)	WT(kg)	Insert
TDX125F20-5	12.5	20	25	62.9	49	65.9	78.5	127.9	0.8	0.2	XPMT040104R-D*
TDX130F20-5	13	20	25	65.4	49	68.4	81	130.4	0.7	0.2	XPMT040104R-D*
TDX135F20-5	13.5	20	25	67.9	49	70.9	83.5	132.9	0.6	0.2	XPMT040104R-D*
TDX140F20-5	14	20	25	70.4	49	73.4	86	135.4	0.5	0.2	XPMT040104R-D*
TDX145F20-5	14.5	20	25	72.9	49	75.9	89.5	138.9	0.4	0.2	XPMT040104R-D*
TDX150F20-5	15	20	25	75.4	49	78.4	92	141.4	0.9	0.2	XPMT050204R-D*
TDX155F20-5	15.5	20	32	77.9	49	80.9	94.5	143.9	0.8	0.2	XPMT050204R-D*
TDX160F20-5	16	20	32	80.4	49	83.4	98	147.4	0.6	0.2	XPMT050204R-D*
TDX165F20-5	16.5	20	32	82.9	49	85.9	100.5	149.9	0.5	0.2	XPMT050204R-D*
TDX170F20-5	17	20	32	85.4	49	88.4	103	152.4	0.4	0.2	XPMT050204R-D*
TDX175F25-5	17.5	25	32	88	54	91	106.5	161	1.2	0.3	XPMT06X308R-D*
TDX180F25-5	18	25	32	90.5	54	93.5	109	163.5	1.1	0.3	XPMT06X308R-D*
TDX185F25-5	18.5	25	32	93	54	96	111.5	166	0.9	0.4	XPMT06X308R-D*
TDX190F25-5	19	25	32	95.5	54	98.5	114	168.5	0.8	0.4	XPMT06X308R-D*
TDX195F25-5	19.5	25	32	98	54	101	118.5	173	0.7	0.4	XPMT06X308R-D*
TDX200F25-5	20	25	32	100.5	54	104.5	121	175.5	0.5	0.4	XPMT06X308R-D*
TDX205F25-5	20.5	25	32	103	54	107	123.5	178	0.4	0.4	XPMT06X308R-D*
TDX210F25-5	21	25	32	105.5	54	109.5	126	180.5	0.3	0.4	XPMT06X308R-D*
TDX215F25-5	21.5	25	32	108	54	112	128.5	183	0.2	0.4	XPMT06X308R-D*
TDX220F25-5	22	25	32	110.6	54	114.6	131	185.6	1.2	0.6	XPMT07H308R-D*
TDX225F25-5	22.5	25	37	113.1	54	117.1	134	188.6	1.1	0.6	XPMT07H308R-D*
TDX230F25-5	23	25	37	115.6	54	119.6	137	191.6	0.9	0.4	XPMT07H308R-D*
TDX235F25-5	23.5	25	37	118.1	54	122.1	140	194.6	0.8	0.4	XPMT07H308R-D*
TDX240F25-5	24	25	37	120.6	54	124.6	143	197.6	0.7	0.4	XPMT07H308R-D*
TDX245F25-5	24.5	25	37	123.1	54	127.1	146	200.6	0.5	0.7	XPMT07H308R-D*
TDX250F25-5	25	25	37	125.6	54	129.6	149	203.6	0.4	0.7	XPMT07H308R-D*
TDX255F25-5	25.5	25	37	128.1	54	132.1	151.5	206.1	0.3	0.7	XPMT07H308R-D*
TDX260F25-5	26	25	37	130.6	54	134.6	154	208.6	0.2	0.7	XPMT07H308R-D*
TDX270F32-5	27	32	40	135.7	59	139.7	159	218.7	1.5	0.6	XPMT08T308R-D*
TDX280F32-5	28	32	40	140.7	59	144.7	165	224.7	1.2	0.9	XPMT08T308R-D*
TDX290F32-5	29	32	40	145.7	59	149.7	170	229.7	1	0.7	XPMT08T308R-D*
TDX300F32-5	30	32	40	150.7	59	154.7	177	236.7	0.7	1	XPMT08T308R-D*
TDX310F32-5	31	32	40	155.7	59	159.7	183	242.7	0.4	1	XPMT08T308R-D*
TDX320F32-5	32	32	40	160.7	59	164.7	188	247.7	0.2	1.1	XPMT08T308R-D*
TDX330F40-5	33	40	50	166.1	69	170.1	194	264.1	2.3	1.5	XPMT110412R-D*
TDX340F40-5	34	40	50	171.1	69	175.1	199	269.1	2.1	1.5	XPMT110412R-D*
TDX350F40-5	35	40	50	176.1	69	180.1	205	275.1	1.8	1.5	XPMT110412R-D*
TDX360F40-5	36	40	50	181.1	69	185.1	211	281.1	1.5	1.6	XPMT110412R-D*
TDX370F40-5	37	40	50	186.1	69	190.1	216	286.1	1.3	1.6	XPMT110412R-D*
TDX380F40-5	38	40	50	191.1	69	195.1	222	292.1	1	1.9	XPMT110412R-D*
TDX390F40-5	39	40	50	196.1	69	200.1	227	297.1	0.7	2	XPMT110412R-D*
TDX400F40-5	40	40	50	201.1	69	205.1	233	303.1	0.5	2	XPMT110412R-D*
TDX410F40-5	41	40	50	206.1	69	210.1	239	309.1	0.2	2.1	XPMT110412R-D*
TDX420F40-5	42	40	55	211.6	69	215.6	244	314.6	3.1	2.2	XPMT150512R-D*
TDX430F40-5	43	40	55	216.6	69	220.6	250	320.6	2.9	2.2	XPMT150512R-D*
TDX440F40-5	44	40	55	221.6	69	225.6	255	325.6	2.6	2.3	XPMT150512R-D*
TDX450F40-5	45	40	55	226.6	69	230.6	262	332.6	2.3	2.6	XPMT150512R-D*
TDX460F40-5	46	40	55	231.6	69	235.6	268	338.6	2.1	2.7	XPMT150512R-D*

Designation	DC	DCONMS	DCSFMS	LU	LS	LCF	LF	OAL	Max. offset (radial)	WT(kg)	Insert
TDX470F40-5	47	40	55	236.6	69	240.6	273	343.6	1.8	2.8	XPMT150512R-D*
TDX480F40-5	48	40	55	241.6	69	245.6	279	349.6	1.5	3.1	XPMT150512R-D*
TDX490F40-5	49	40	55	246.6	69	250.6	284	354.6	1.3	3.1	XPMT150512R-D*
TDX500F40-5	50	40	55	251.6	69	255.6	290	360.6	1	3.2	XPMT150512R-D*
TDX510F40-5	51	40	55	256.6	69	260.6	296	366.6	0.7	3.3	XPMT150512R-D*
TDX520F40-5	52	40	55	261.6	69	265.6	301	371.6	0.5	3.4	XPMT150512R-D*
TDX530F40-5	53	40	55	266.6	69	270.6	307	377.6	-	3.5	XPMT150512R-D*
TDX540F40-5	54	40	55	271.6	69	275.6	312	382.6	-	3.9	XPMT150512R-D*

Tool diameter	Tool diameter tolerance	Hole diameter tolerance*
ø12.5 - ø17	+ 0.1 / 0	+ 0.4 / 0
ø17.5 - ø54	+ 0.2 / 0	+ 0.45 / 0

*Just for reference

SPARE PARTS



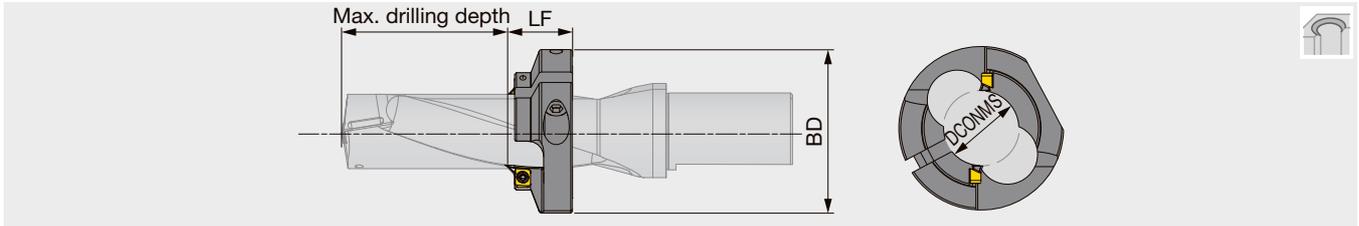
Designation	Clamping screw	Wrench
TDX125 - 145	CSPB-2H	IP-6DB
TDX150 - 170	CSPB-2L043	IP-6DB
TDX175 - 215	CSPB-2.2	IP-7D
TDX220 - 260	CSPB-2.5	IP-8D
TDX270 - 320	CSTB-3	T-9D
TDX330 - 410	CSTB-4	T-15D
TDX420 - 540	CSTB-5	T-20D

Recommended clamping torque (N·m): CSPB-2H/CSPB-2L043 = 0.7, CSPB-2.2 = 1, CSPB-2.5 = 1.3, CSTB-3 = 2.3, CSTB-4 = 3.5, CSTB-5 = 5

TUNGDRILLTWISTED

TDXCF chamfering tool

Chamfering tool for TungDrillTwisted and TungSix-Drill



Designation	DCONMS	BD	LF	Application drill	Max. drilling depth			
					L/D = 2	L/D = 3	L/D = 4	L/D = 5
TDXCF180L25	17.3	49	25	TDX175*25-*	13	30.5	48	65.5
TDXCF180L25	17.3	49	25	TDX180*25-*	14	32	50	68
TDXCF190L25	18.1	49	25	TDX185*25-*	15	33.5	52	70.5
TDXCF190L25	18.1	49	25	TDX190*25-*	16	35	54	73
TDXCF200L25	19.1	49	25	TDX195*25-*	17	36.5	56	75.5
TDXCF200L25	19.1	49	25	TDX200*25-*	20	40	59	79
TDXCF210L25	20.1	49	25	TDX205*25-*	21	41.5	61	81.5
TDXCF210L25	20.1	49	25	TDX210*25-*	22	43	63	84
TDXCF220L25	21.1	49	25	TDX215*25-*	23	44.5	65	86.5
TDXCF220L25	21.1	49	25	TDX220*25-*	24	46	67	89
TDXCF230L25	22.1	49	25	TDX225*25-*	25	47.5	69	91.5
TDXCF230L25	22.1	49	25	TDX230*25-*	26	49	71	94
TDXCF240L25	23.1	49	25	TDX235*25-*	27	50.5	73	96.5
TDXCF240L25	23.1	49	25	TDX240*25-*	28	52	75	99
TDXCF250L25	23.95	49	25	TDX245*25-*	29	53.5	77	101.5
TDXCF250L25	23.95	49	25	TDX250*25-*	30	55	79	104
TDXCF260L30	24.95	64	30	TDX255*25-*	26	51.5	76	101.5
TDXCF260L30	24.95	64	30	TDX260*25-*	27	53	78	104
TDXCF270L30	25.9	64	30	TDX270*32-*	29	56	82	109
TDXCF280L30	26.9	64	30	TDX280*32-*	30.3	58.3	86	114
TDXCF290L30	27.9	64	30	TDX290*32-*	32.3	61.3	90	119
TDXCF300L30	28.9	64	30	TDX300*32-*	34.3	64.3	94	124
TDXCF310L30	29.9	64	30	TDX310*32-*	36.3	67.3	98	129
TDXCF320L30	30.9	64	30	TDX320*32-*	38.3	70.3	102	134

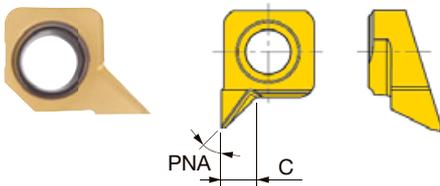
SPARE PARTS

Designation	Screw for insert	Screw for ring	Wrench for insert	Wrench for ring
TDXCF180... - TDXCF250...	CSPB-4S	CM6X16	IP-15D	P-5
TDXCF260... - TDXCF320...	CSPB-4S	CM8X1.25X20-A	IP-15D	P-6

Recommended clamping torque (N·m): CSPB-4S = 3.5

INSERT

XHGX-45A



P Steel	★								
M Stainless	★								
K Cast iron	★								
N Non-ferrous	☆								
S Superalloys	★								
H Hard materials	★								

★ : First choice
☆ : Second choice

Designation	PNA	C	Coated							
			GHI30							
XHGX090700R-45A	45°	2.5	●							

● : Line up

Caution in mounting the chamfering tool on the drill body

- ① Place the ring on the drill body and match the positions of flutes on drill and ring. Temporarily clamp the ring with the ring screw tightened lightly.
- ② Place the inserts, and tighten the insert screw lightly.
- ③ Adjust the ring position with a presetter, height gauge, or Vernier caliper, and securely tighten the ring screw, then the insert screw.



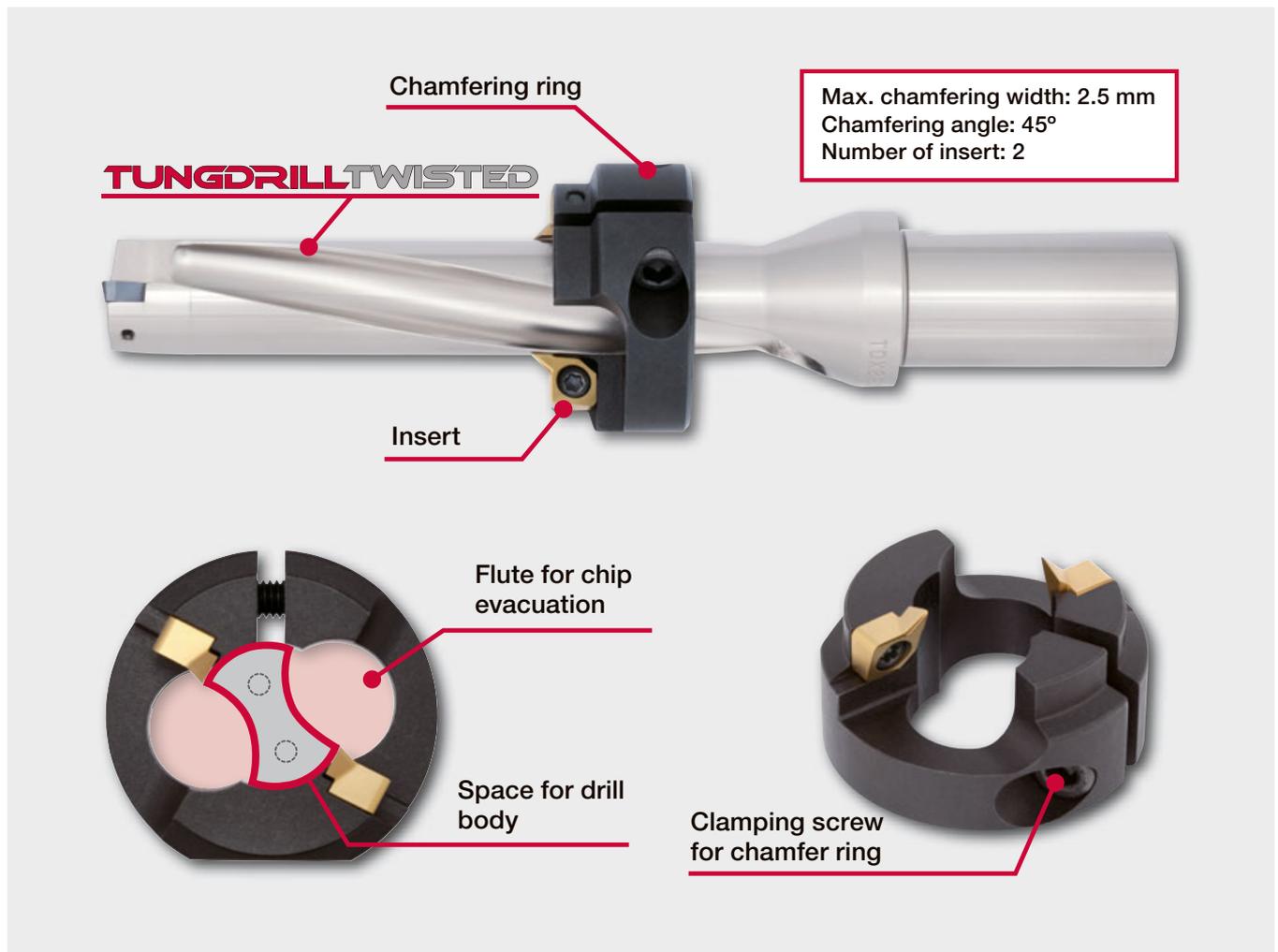
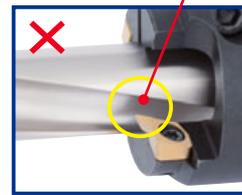
Match the positions of flutes on drill and ring.

(Inserts will be automatically set to the right positions.)

The cutting edge of the insert is in the ring flute.



The flutes on drill and ring do not match.



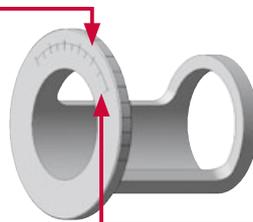
EZ sleeve (Eccentric sleeve)

The function of EZ sleeves

Adjusting the hole diameter when drilling

Adjusting the hole diameter in tool-rotating applications.

By using EZ sleeve, the hole diameter can be adjusted in the range from **+0.6 mm to -0.2 mm**.



Scale for adjusting the hole diameter in milling machine (Periphery of sleeve)

Adjusting cutting edge height on lathe

Adjusting the cutting edge height in rotating work applications.

By using EZ sleeve, the cutting edge height can be adjusted in the range from **+0.3 mm to -0.2 mm**. That reduces troubles caused by improper cutting-edge height.

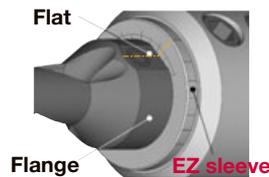


Scale for adjusting cutting edge height in turning (Front face of sleeve)

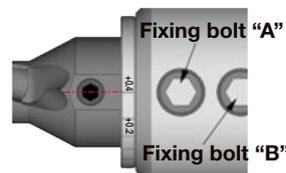
Setting of EZ sleeve

Adjusting the hole diameter on M/C

Set the EZ sleeve between the drill shank and the holder. Align the scale on the periphery of EZ sleeve with the center of the flat on drill flange.



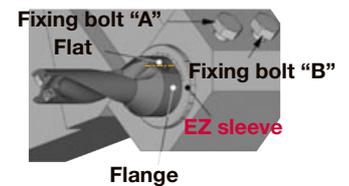
In the figure shown on right, the sleeve is set and the hole diameter will be increased by 0.4 mm.



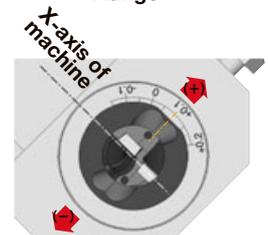
When rotating EZ sleeve, fixing bolts "A" and "B" have to be loosened. After setting the hole diameter, fix the drill body with bolt "A". Then lightly tighten the bolt "B" to fix EZ sleeve. If the bolt "B" is over tightened, EZ sleeve may be damaged.

Adjusting cutting edge height on lathe

Set the EZ sleeve between the drill shank and the toolblock. Align the scale on the front face of the EZ sleeve with the center of the flat on drill flange.



In the figure shown on right, the sleeve is set and the center of the drill will shift by 0.1 mm to the plus (+) direction.

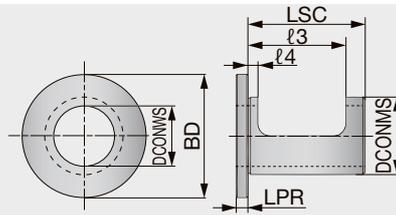


Cautious points

- Cannot be used for collet chuck holders.
- For adjustments over $L/D = 4$, please reduce feed rate.
- For smaller adjustment, the drill itself will interfere with the hole diameter. It is recommended that the hole diameter should be adjusted to a larger diameter than the drill diameter.

EZ sleeve

Eccentric sleeve for TungDrillTwisted and TungSix-Drill



Designation	DCONWS	DCONMS	BD	LSC	LPR	ℓ3	ℓ4	Hole diameter adjustment	Cutting edge height adjustment
EZ2025	20	25	46	49	5	32.5	4	+0.4 ~ - 0.2	+0.2 ~ - 0.15
EZ2532	25	32	51	52	5	38	4	+0.4 ~ - 0.2	+0.2 ~ - 0.15
EZ3240	32	40	54	62	5	43	4	+0.4 ~ - 0.2	+0.2 ~ - 0.15
EZ4050	40	50	69	63	5	55	4	+0.6 ~ - 0.2	+0.3 ~ - 0.2

SPARE PARTS

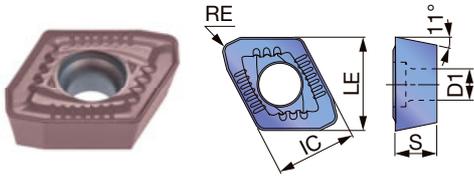


Designation	Wrench
EZ...	P-2.5

TUNGDRILLTWISTED

INSERT

DJ



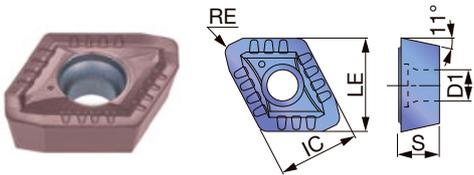
P Steel			☆	★	★	☆							
M Stainless	☆			★	★								
K Cast iron		☆	★	☆	☆	★							
N Non-ferrous	★			☆	☆								
S Superalloys	☆		☆	★	★	☆							
H Hard materials	☆		☆	★	★	☆							

★ : First choice
☆ : Second choice

Designation	IC	LE	Coated					S	D1	RE	DCN	DCX	
			AH725	T1115	AH7020	AH7030	AH6030						AH9030
XPMT040104R-DJ	4.3	4.5	●	●	●	●	▲	▲					
XPMT050204R-DJ	5.2	5.4	●	●	●	●	▲	▲					
XPMT06X308R-DJ	6	7	●	●	●	●	▲	▲					
XPMT07H308R-DJ	7	8.2	●	●	●	●	▲	▲					
XPMT08T308R-DJ	8.5	9.9	●	●	●	●	▲	▲					
XPMT110412R-DJ	11.2	12.5	●	●	●	●	▲	▲					
XPMT150512R-DJ	15	16.1	●	●	●	●	▲	▲					

● : New product
● : Line up
▲ : To be discontinued

DS



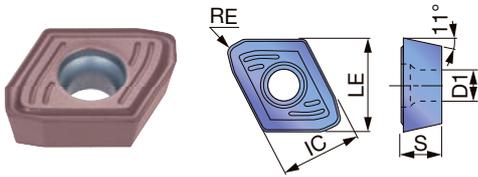
P Steel	☆	☆	★	★									
M Stainless	☆	☆	★	★									
K Cast iron													
N Non-ferrous	☆												
S Superalloys	☆	☆	★	★									
H Hard materials													

★ : First choice
☆ : Second choice

Designation	IC	LE	Coated				S	D1	RE	DCN	DCX	
			AH725	AH7020	AH7030	AH6030						
XPMT040104R-DS	4.3	4.5	●	●	●	▲						
XPMT050204R-DS	5.2	5.4	●	●	●	▲						
XPMT06X308R-DS	6	7	●	●	●	▲						
XPMT07H308R-DS	7	8.2	●	●	●	▲						
XPMT08T308R-DS	8.5	9.9	●	●	●	▲						
XPMT110412R-DS	11.2	12.5	●	●	●	▲						
XPMT150512R-DS	15	16.1	●	●	●	▲						

● : New product
● : Line up
▲ : To be discontinued

DW



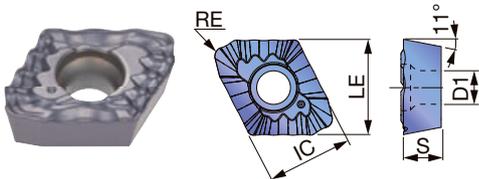
P Steel	☆	☆	★	★	☆							
M Stainless	☆	☆	★	★	☆							
K Cast iron			★	☆	★							
N Non-ferrous	☆		★	★								
S Superalloys	☆	☆	★	★	☆							
H Hard materials	☆	☆	★	★	☆							

★ : First choice
☆ : Second choice

Designation	IC	LE	Coated					S	D1	RE	DCN	DCX
			AH725	AH7020	AH7030	AH6030	AH9030					
XPMT040104R-DW	4.3	4.5	●	●	●	▲	▲	1.59	2.3	0.4	12.5	14.5
XPMT050204R-DW	5.2	5.4	●	●	●	▲	▲	2.38	2.3	0.4	15	17
XPMT06X308R-DW	6	7	●	●	●	▲	▲	3	2.5	0.8	17.5	21.5
XPMT07H308R-DW	7	8.2	●	●	●	▲	▲	3.6	2.8	0.8	22	26
XPMT08T308R-DW	8.5	9.9	●	●	●	▲	▲	3.97	3.4	0.8	27	32
XPMT110412R-DW	11.2	12.5	●	●	●	▲	▲	4.76	4.4	1.2	33	41
XPMT150512R-DW	15	16.1	●	●	●	▲	▲	5.56	5.5	1.2	42	54

● : New product
● : Line up
▲ : To be discontinued

DG



P Steel	★											
M Stainless	☆											
K Cast iron												
N Non-ferrous	★											
S Superalloys	☆											
H Hard materials												

★ : First choice
☆ : Second choice

Designation	IC	LE	Coated					S	D1	RE	DCN	DCX
			AH725									
XPMT08T308R-DG	8.5	9.9	●					3.97	3.4	0.8	27	32
XPMT110412R-DG	11.2	12.5	●					4.76	4.4	1.2	33	41
XPMT150512R-DG	15	16.1	●					5.56	5.5	1.2	42	54

● : Line up

RECOMMENDED INSERT

ISO	Workpiece material	First choice	Wear resistance	Chip control
P	Low carbon steel (C ≤ 0.3%)	DJ AH7030	DJ AH7020	DW AH7030 / DG AH725
	Carbon steel (C > 0.3%), Low alloy steel, Alloy steel	DJ AH7030	DJ AH7020	DW AH7030
M	Stainless steel	DS AH7030	DS AH7020	DJ AH7030
K	Grey cast irons	DJ AH7020	DJ T1115	-
	Ductile cast irons	DJ AH7030	DJ AH7020	-
N	Aluminium alloy	DJ AH725	-	DG AH725
S	Heat-resistant alloys, Titanium alloys	DJ AH7030	DJ AH7020	-
H	Hardened steel	DJ AH7030	DJ AH7020	-

STANDARD CUTTING CONDITIONS

ISO	Workpiece material	Hardness	Cutting speed Vc (m/min)	Series L/D	Feed: f (mm/rev)				
					ø12.5 ~ ø14.5	ø15 ~ ø17	ø17.5 ~ ø26	ø27 ~ ø32	ø33 ~ ø54
P	Low carbon steels (C < 0.3) SS400, SM490, S25C, etc. st42-1, St52-3, C25, etc.	- 200 HB	160 - 320	2D, 3D	0.02 - 0.06	0.02 - 0.06	0.04 - 0.1	0.04 - 0.1	0.04 - 0.1
				4D, 5D	0.02 - 0.06	0.02 - 0.06	0.04 - 0.1	0.04 - 0.1	0.04 - 0.1
	Carbon steels (C > 0.3) S45C, S55C, etc. C45, C55, etc.	- 300 HB	80 - 250	2D, 3D	0.04 - 0.1	0.04 - 0.12	0.06 - 0.13	0.06 - 0.15	0.08 - 0.18
				4D, 5D	0.04 - 0.08	0.04 - 0.08	0.06 - 0.1	0.06 - 0.12	0.08 - 0.14
M	Low alloy steels SCM415, etc.	- 200 HB	160 - 250	2D, 3D	0.04 - 0.08	0.04 - 0.08	0.06 - 0.12	0.06 - 0.12	0.06 - 0.14
				4D, 5D	0.04 - 0.08	0.04 - 0.08	0.06 - 0.12	0.06 - 0.12	0.06 - 0.14
	Alloy steels SCM440, SCr420, etc. 42CrMo4, 20Cr4, etc.	- 300 HB	80 - 200	2D, 3D	0.04 - 0.1	0.04 - 0.12	0.06 - 0.13	0.06 - 0.15	0.08 - 0.18
				4D, 5D	0.04 - 0.08	0.04 - 0.08	0.06 - 0.1	0.06 - 0.12	0.08 - 0.14
	Stainless steels (Austenitic) SUS304, SUS316, etc. X5CrNi18-9, X5CrNiMo17-12-2, etc.	- 200 HB	100 - 200	2D, 3D	0.02 - 0.08	0.02 - 0.08	0.04 - 0.1	0.04 - 0.12	0.04 - 0.12
				4D, 5D	0.02 - 0.08	0.02 - 0.08	0.04 - 0.1	0.04 - 0.12	0.04 - 0.12
Stainless steels (Martensitic and ferritic) SUS430, SUS416, etc. X6Cr17, X20Cr13, etc.	- 200 HB	100 - 220	2D, 3D	0.02 - 0.08	0.02 - 0.08	0.04 - 0.1	0.04 - 0.12	0.04 - 0.12	
			4D, 5D	0.02 - 0.08	0.02 - 0.08	0.04 - 0.1	0.04 - 0.12	0.04 - 0.12	
K	Grey cast irons FC250, etc., 250, etc.	150 - 250 HB	80 - 250	2D, 3D	0.06 - 0.12	0.06 - 0.12	0.06 - 0.15	0.06 - 0.18	0.08 - 0.2
				4D, 5D	0.06 - 0.1	0.06 - 0.1	0.06 - 0.12	0.06 - 0.14	0.08 - 0.16
N	Aluminium alloy A2017, ADC12, etc. AlCu4SiMg, AlSi11Cu3, etc.	-	200 - 400	2D, 3D	0.1 - 0.12	0.1 - 0.15	0.15 - 0.2	0.15 - 0.2	0.15 - 0.25
				4D, 5D	0.08 - 0.12	0.08 - 0.12	0.12 - 0.16	0.12 - 0.16	0.12 - 0.2
S	Heat-resistant alloys Inconel 718, etc.	- 40 HRC	20 - 60	2D, 3D	0.04 - 0.08	0.04 - 0.08	0.04 - 0.1	0.04 - 0.1	0.04 - 0.1
				4D, 5D	0.04 - 0.08	0.04 - 0.08	0.04 - 0.1	0.04 - 0.1	0.04 - 0.1
	Titanium alloys Ti-6Al-4V, etc.	- 40 HRC	40 - 120	2D, 3D	0.06 - 0.1	0.06 - 0.1	0.06 - 0.12	0.06 - 0.12	0.06 - 0.12
4D, 5D				0.06 - 0.08	0.06 - 0.08	0.06 - 0.1	0.06 - 0.1	0.06 - 0.1	
H	Hardened steel	- 50 HRC	40 - 100	2D, 3D	0.04 - 0.08	0.04 - 0.08	0.04 - 0.1	0.04 - 0.1	0.04 - 0.1
				4D, 5D	0.04 - 0.08	0.04 - 0.08	0.04 - 0.08	0.04 - 0.08	0.04 - 0.08

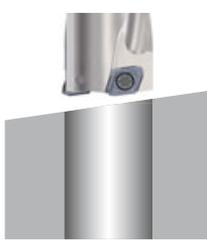
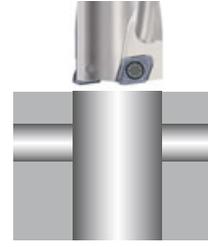
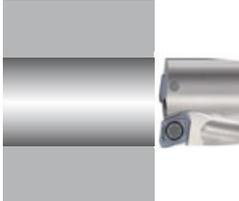
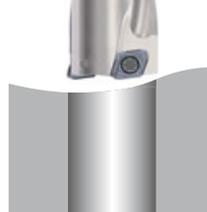
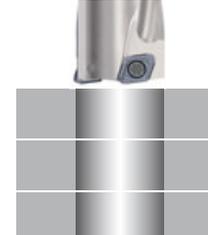
STANDARD CUTTING CONDITIONS FOR DG CHIPBREAKER

ISO	Workpiece material	Hardness	Cutting speed Vc (m/min)	Series L/D	Feed: f (mm/rev)	
					ø27 ~ ø32	ø33 ~ ø54
P	Low carbon steels (C < 0.3) SS400, SM490, S25C, etc. st42-1, St52-3, C25, etc.	- 200 HB	60 - 180	2D, 3D 4D, 5D	0.04 - 0.1	

- When using the smaller side of the diameter range, the feed rate should be set lower.
- When using DW chipbreaker for work materials of 40 HRC, the feed rate should be set below 50%.
- For difficult-to-cut materials (heat-resistant alloys, etc.), the cutting speed should be set 25% below that of carbon steels.
- High speed machining means cutting speeds over 150 m/min.

- For high-feed machining, apply a feed rate that is approximately 1.5 times the standard feed conditions.
- When using DW chipbreaker for troubleshooting, use it within the range of standard cutting conditions.
- DG chipbreaker is suitable for heavy machines that have low-rpm spindles. If chatter occurs, a lower feed rate is recommended.

APPLICATION RANGE

Feed <i>f</i> (mm/rev)	See page 24	0.05	0.05	0.05
Application	OK Plane surface 	OK Slant surface 	OK Cross hole 	OK Plunging 
	Feed <i>f</i> (mm/rev)	0.1	0.05	Disapprove
Application	OK Boring 	OK Round surface 	X Stacked plate 	X Back boring 

In case of Interrupted cutting, feed should be decreased.

Maximum drilling diameter and maximum offset amount for each diameter

The drilling diameter can be adjusted by offsetting the drill using the X-axis of the machine or with the eccentric sleeve. Refer to the list below for the maximum drilling diameter and maximum offset amount available for the individual drill diameters.

DC	Max. drilling diameter	Max. offset amount	DC	Max. drilling diameter	Max. offset amount	DC	Max. drilling diameter	Max. offset amount
12.5	14.1	0.8	22	24.4	1.2	37	39.6	1.3
13	14.4	0.7	22.5	24.7	1.1	38	40	1
13.5	14.5	0.5	23	24.8	0.9	39	40.4	0.7
14	14.8	0.4	23.5	25.1	0.8	40	41	0.5
14.5	15.1	0.3	24	25.4	0.7	41	41.4	0.2
15	16.8	0.9	24.5	25.5	0.5	42	48.2	3.1
15.5	17.1	0.8	25	25.8	0.4	43	48.8	2.9
16	17.2	0.6	25.5	26.1	0.3	44	49.2	2.6
16.5	17.5	0.5	26	26.4	0.2	45	49.6	2.3
17	17.8	0.4	27	30	1.5	46	50.2	2.1
17.5	19.9	1.2	28	30.4	1.2	47	50.6	1.8
18	20.2	1.1	29	31	1	48	51	1.5
18.5	20.3	0.9	30	31.4	0.7	49	51.6	1.3
19	20.6	0.8	31	31.8	0.4	50	52	1
19.5	20.9	0.7	32	32.4	0.2	51	52.4	0.7
20	21	0.5	33	37.6	2.3	52	53	0.5
20.5	21.3	0.4	34	38.2	2.1	53	-	-
21	21.6	0.3	35	38.6	1.8	54	-	-
21.5	21.9	0.2	36	39	1.5			

Special Indexable Tooling Competency —

Tungaloy's customized indexable combination drills for higher productivity

We at Tungaloy design and produce indexable combination drills tailored to meet your specific application needs. In addition to lower tooling cost thanks to indexable solution, one of the key benefits of these custom combination tools is the ability to perform several different operations such as drilling, chamfering, and counterboring in a single pass, thereby providing increased machine uptime and reduced cost per part.

Drilling + Counter boring



Drilling + Counter boring + Chamfering



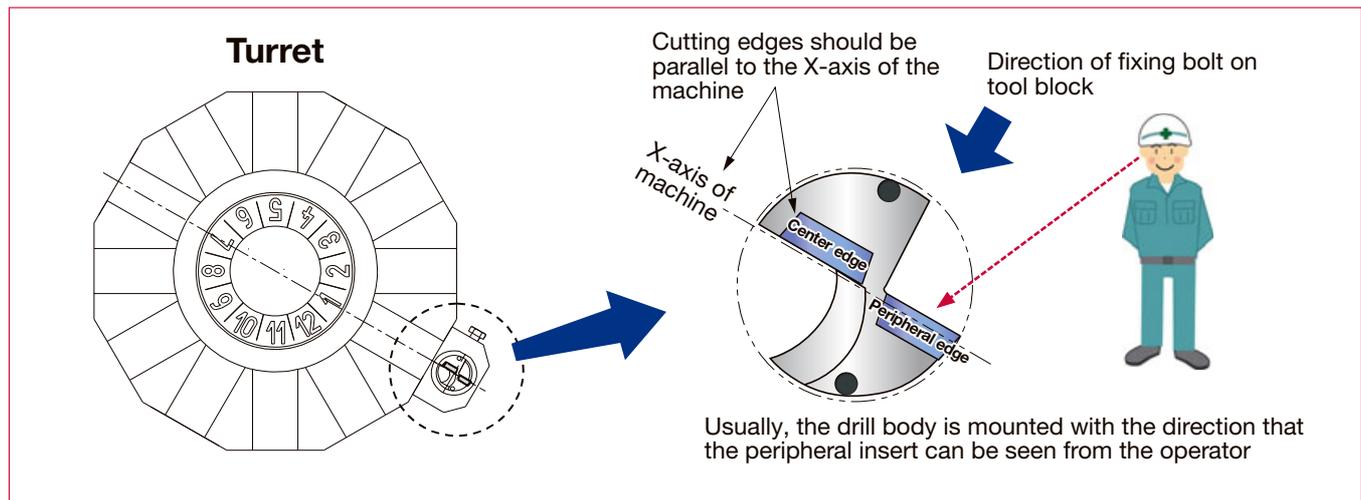
L/D = 7 Deep drilling



■ Use of TungDrillTwisted on lathes Setting of drill body is critical for successful machining

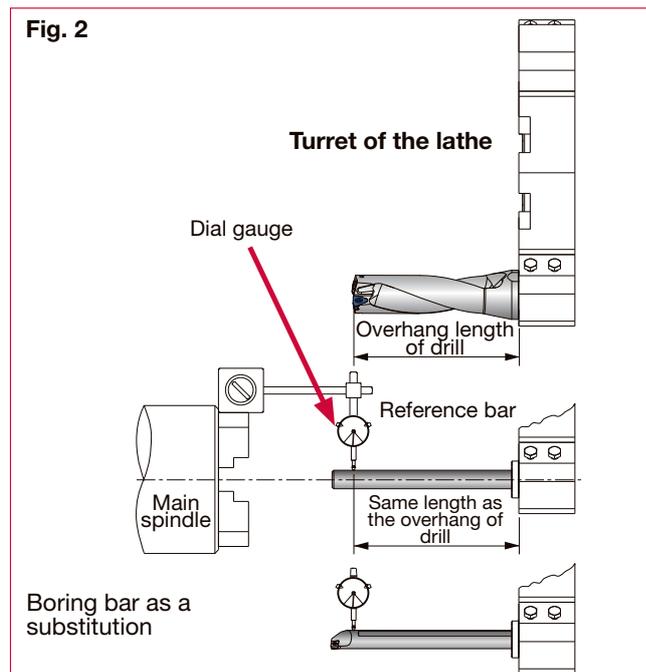
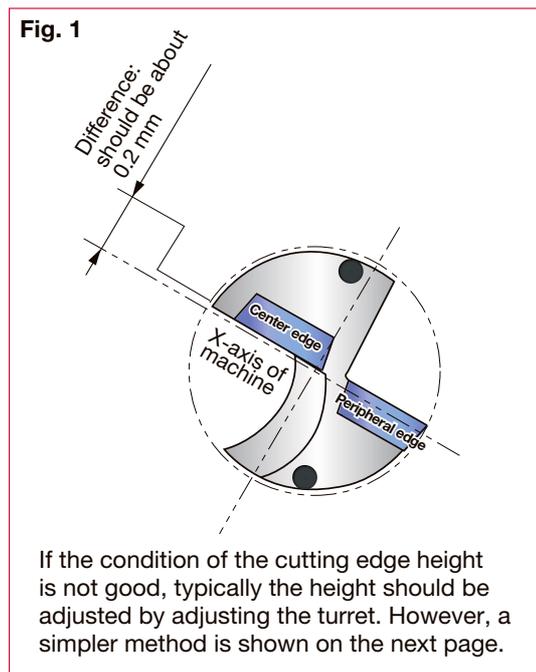
Mounting the drill on turret (tool post)

- When mounting drill body, the cutting edges should be parallel to the X-axis of the machine.
- Usually, the drill body is mounted in the direction that the peripheral insert can be seen by the operator.
- As the flat on the shank is parallel to the cutting edges, the clamping of the drill ensures that the cutting edges are parallel to the X-axis of the machine.



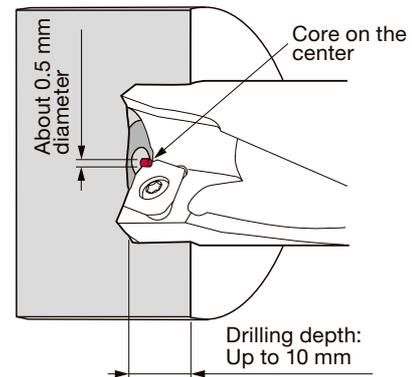
Checking of cutting edge height

- The cutting edge height is an important factor for stable machining.
- The cutting edge of center insert should be 0.2 mm lower than the rotating axis of machine.
- For checking the difference between rotating center and the tool block, please use a reference bar from ground solid bar. (Fig. 2)
- In this case, the checking of the center height should be measured at the same position as the overhang length of the drill required.
- When there isn't a reference bar, the ground part of a boring bar can be used as a substitute.



Checking of setting conditions by trial cutting

- After mounting the drill body, the tool center should be checked by trial cutting before production.
- When the drill body is properly set, a core with about $\phi 0.5$ mm diameter is left on the bottom of hole.
- If there is no core, the drill is "above center". If the core diameter is larger than $\phi 1$ mm, it is "excessively below center". In these cases, the cutting edge height has to be checked again.
- When trial cutting, the feed should be 0.1 mm/rev or less, drilling depth should be up to 10 mm.



Adjusting of cutting edge height

When the condition of the cutting edge height is incorrect, the height should be adjusted with the following methods.

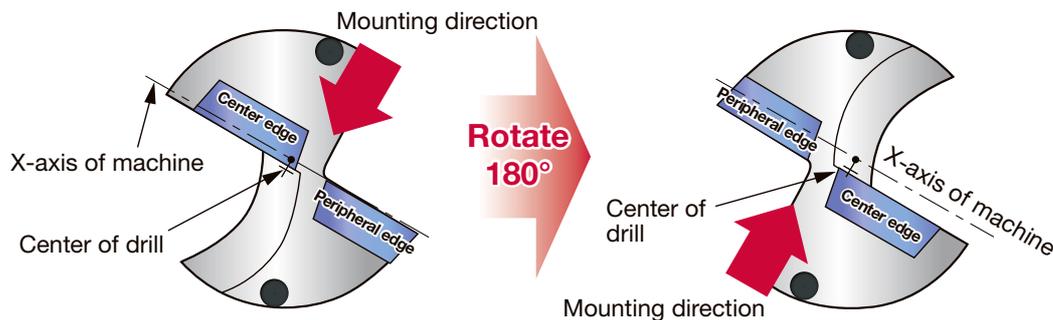
① In the case of "above-center"

When machining with such condition, the center cutting edge may be easily chipped. So this condition has to be rectified.

Solution #1: Change the mounting direction.

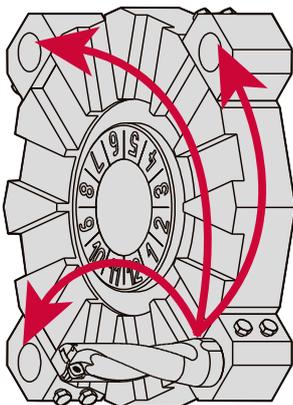
Solution #2: Rotate drill body 180°

In #2, additional cotter is required on the opposite side.



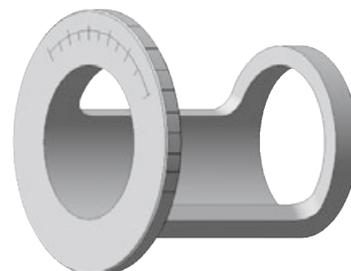
② In the case of "slightly above-center" (about 0.05 mm)

In this case, shifting the mounting position may improve the condition.



③ In the case of "excessive below-center" (0.2 mm or more)

When this occurs, the large diameter of the core remains and heavy vibration may occur. To improve this situation: Use EZ sleeve (the eccentric sleeve) and adjust the cutting edge height to correct value. Information on EZ sleeve, is on page 20.



Machining with offset on the lathe

A larger hole than the drill diameter can be machined!

Drilling with offset

- When drilling on the lathe, the hole diameter can be adjusted by offsetting the drill body along the X-axis of machine.
- When drilling with offset, the drill body must be correctly mounted with cutting edges parallel to the X-axis of the machine. "Mounting the drill on the turret" can be viewed on page 27.

Interferences

Offsetting direction to achieve smaller diameters

Offset value must be less than 0.1 mm.

Hole diameter machined with offset are roughly calculated as following.

Drilled diameter = Drill diameter + offset value x 2

Example:
 Drill diameter: $\varnothing 20$ mm
 Offset value: 0.2 mm
 Drilled hole diameter = $20 + 0.2 \times 2 = \varnothing 20.4$ mm

X-axis of machine

Direction to achieve larger diameters

Direction of decreased diameters

Offset value (+) depends on each drill body.

Offsetting direction to achieve larger diameters

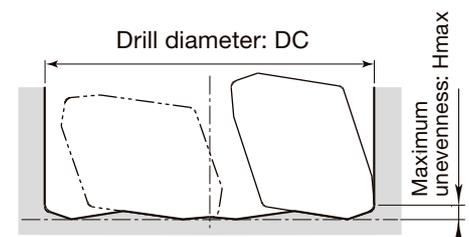
SHAPE OF THE HOLE BOTTOM

Un-evenness of the hole-bottom face when machined with **TungDrillTwisted** is smaller than with HSS drills!

The shape of the hole bottom machined with **TungDrillTwisted** is closer to flat compared with those machined with HSS drills.

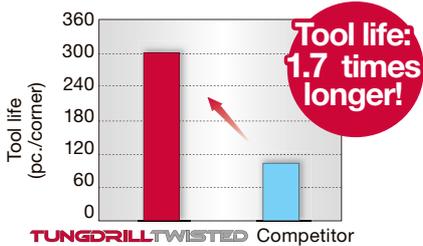
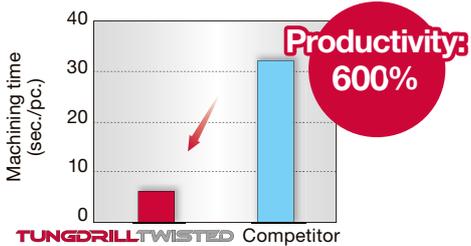
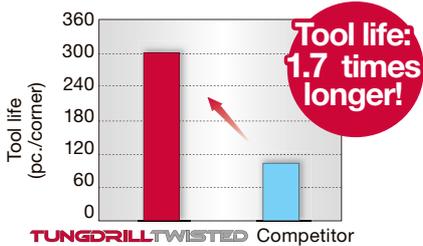
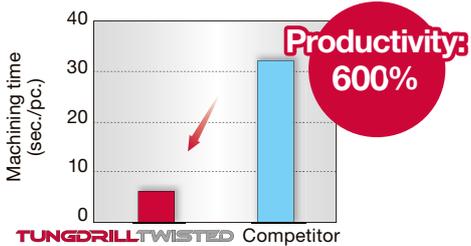
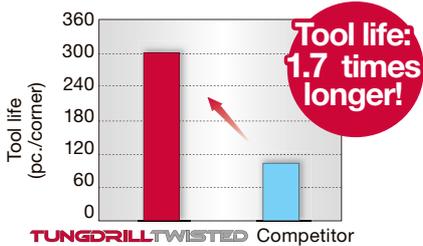
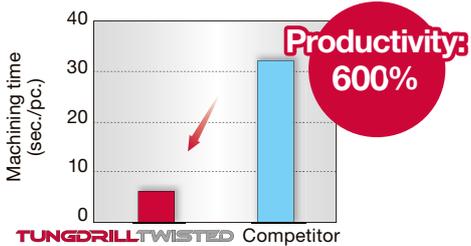
Drill diameter DC (mm)	$\varnothing 12.5 - 14.5$	$\varnothing 15 - 17$	$\varnothing 17.5 - 21.5$	$\varnothing 22 - 26$	$\varnothing 27 - 32$	$\varnothing 33 - 41$	$\varnothing 42 - 54$
Insert	XPMT 04...	XPMT 05...	XPMT 06...	XPMT 07...	XPMT 08...	XPMT 11...	XPMT 15...
Hmax (mm)	0.6	0.8	1.0	1.1	1.3	1.9	2.3

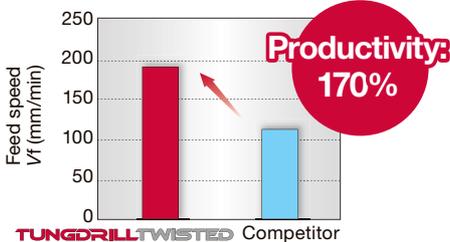
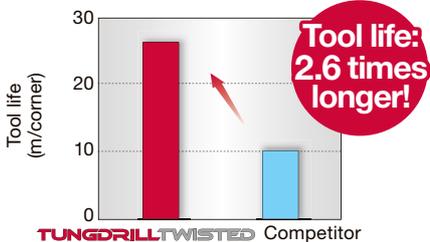
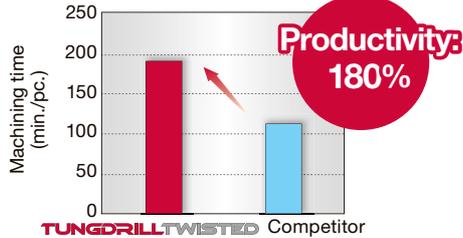
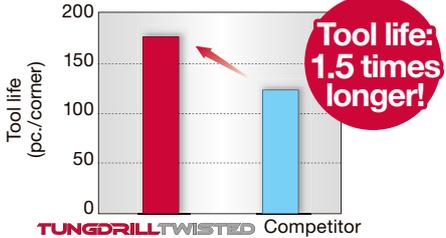
■ Hole bottom shape obtained with **TungDrillTwisted**



TUNGDRILLTWISTED

PRACTICAL EXAMPLES

Workpiece type		Pinion	York																																													
Drill		TDX185F25-2	TDX200F25-3																																													
Insert		XPMT06X308R-DW	XPMT06X308R-DJ																																													
Grade		AH7020	AH725																																													
Workpiece material		SCM435 / 34CrMo4	S33C																																													
		 P	 P																																													
Cutting conditions	Cutting speed: V_c (m/min)	160	138																																													
	Feed: f (mm/rev)	0.11	0.06																																													
	Feed speed: V_f (mm/min)	300	132																																													
	Drilling depth: H (mm)	18	25																																													
	Machine	NC lathe	Special-purpose machine																																													
	Coolant	Wet	Wet																																													
Results		 <p>Productivity: 300%</p> <p>Due to strong resistance against oxidation at high temperature, coating layer prevents damage on tools from expanding even at increased feed. Therefore, productivity is improved without shortening the tool life of cutting edges.</p>	 <p>Tool life: 1.2 times longer!</p> <p>Competitor's tool had a problem with frequent insert chipping because of low clamping rigidity. However, stable machining is possible with AH725 due to its excellent balance between wear and fracture resistance.</p>																																													
		<table border="1"> <thead> <tr> <th colspan="2">Workpiece type</th> <th>Connecting rod</th> <th>Bearing cover</th> </tr> </thead> <tbody> <tr> <td colspan="2">Drill</td> <td>TDX200F25-3</td> <td>TDX180F25-2</td> </tr> <tr> <td colspan="2">Insert</td> <td>XPMT06X308R-DW</td> <td>XPMT06X308R-DS</td> </tr> <tr> <td colspan="2">Grade</td> <td>AH725</td> <td>AH7030</td> </tr> <tr> <td colspan="2" rowspan="2">Workpiece material</td> <td>S55C / C55</td> <td>S45C / C45</td> </tr> <tr> <td> P</td> <td> P</td> </tr> <tr> <td rowspan="6">Cutting conditions</td> <td>Cutting speed: V_c (m/min)</td> <td>90</td> <td>140</td> </tr> <tr> <td>Feed: f (mm/rev)</td> <td>0.06</td> <td>0.06</td> </tr> <tr> <td>Feed speed: V_f (mm/min)</td> <td>86</td> <td>148</td> </tr> <tr> <td>Drilling depth: H (mm)</td> <td>22</td> <td>13</td> </tr> <tr> <td>Machine</td> <td>Special-purpose machine</td> <td>Vertical lathe</td> </tr> <tr> <td>Coolant</td> <td>Wet</td> <td>Wet</td> </tr> <tr> <td colspan="2" rowspan="2">Results</td> <td>  <p>Tool life: 1.7 times longer!</p> <p>DW chipbreaker with tough cutting edges provides stability even during interrupted machining upon hole entry and exit. Sudden insert damages are drastically reduced and tool life is 1.7 times longer than the competitor.</p> </td> <td>  <p>Productivity: 600%</p> <p>DS chipbreaker's good hole entry enables stable machining of workpiece materials with low rigidity. Even at double the cutting speed and triple the feed rate, no problems occur during operation, and tool life is increased by 3 times.</p> </td> </tr> <tr> <td colspan="2"> </td> </tr> </tbody> </table>		Workpiece type		Connecting rod	Bearing cover	Drill		TDX200F25-3	TDX180F25-2	Insert		XPMT06X308R-DW	XPMT06X308R-DS	Grade		AH725	AH7030	Workpiece material		S55C / C55	S45C / C45	 P	 P	Cutting conditions	Cutting speed: V_c (m/min)	90	140	Feed: f (mm/rev)	0.06	0.06	Feed speed: V_f (mm/min)	86	148	Drilling depth: H (mm)	22	13	Machine	Special-purpose machine	Vertical lathe	Coolant	Wet	Wet	Results		 <p>Tool life: 1.7 times longer!</p> <p>DW chipbreaker with tough cutting edges provides stability even during interrupted machining upon hole entry and exit. Sudden insert damages are drastically reduced and tool life is 1.7 times longer than the competitor.</p>	 <p>Productivity: 600%</p> <p>DS chipbreaker's good hole entry enables stable machining of workpiece materials with low rigidity. Even at double the cutting speed and triple the feed rate, no problems occur during operation, and tool life is increased by 3 times.</p>
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Workpiece type		Link	Shaft
Drill		TDX230F25-3	TDX190F20-3
Insert		XPMT07H308R-DW	XPMT06X308R-DJ
Grade		AH7030	AH7030
Workpiece material		S45C / C45	SUS316L
		 P	 M
Cutting conditions	Cutting speed: V_c (m/min)	150	150
	Feed: f (mm/rev)	0.10	0.12
	Feed speed: V_f (mm/min)	208	310
	Drilling depth: H (mm)	34	33
	Machine	Vertical M/C	NC lathe
	Coolant	Wet	Wet
Results		 <p>Productivity: 170%</p> <p>DW chipbreaker with tough cutting edges prevents damages on tools in the operation of casting skin. Compared to the competitor, the feed in machining is increased by 1.7 times, resulting in drastically improved productivity.</p>	 <p>Tool life: 2.6 times longer!</p> <p>AH7030 with thick coating and oxide layer prevents wear and welding on tools and achieves 2.6 times longer tool life than the competitor.</p>
		<p>TUNGDRILLTWISTED Competitor</p>	
Workpiece type		Valve	Brake rotor
Drill		TDX230F25-2	TDX235F25-2
Insert		XPMT07H308R-DS	XPMT07H308R-DJ
Grade		AH725	AH7020
Workpiece material		SUS316L	FC250 / 250
		 M	 K
Cutting conditions	Cutting speed: V_c (m/min)	140	148
	Feed: f (mm/rev)	0.10	0.08
	Feed speed: V_f (mm/min)	194	160
	Drilling depth: H (mm)	25	35
	Machine	NC lathe	Vertical M/C
	Coolant	Wet	Wet
Results		 <p>Productivity: 180%</p> <p>Special surface technology, PremiumTec, and DS chipbreaker extremely improves chip evacuation. Also, lowered cutting force enables the operation with increased speed (1.4 times) and feed (1.25 times), resulting in machining efficiency which is 1.8 times higher than the competitor.</p>	 <p>Tool life: 1.5 times longer!</p> <p>The combination of highly rigid body and DJ chipbreaker with low cutting force prevents unusual damages on cutting edges. These features lead to long and stable tool life.</p>
		<p>TUNGDRILLTWISTED Competitor</p>	

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