- AUPEQ
- AUPES
- AUCES
- AUCDS
- MHCDS

Think threads with YAMAWA

CENTERING TOOLS

Single-ended coated centering tools for high accuracy multi-processing

AUCES - AUCDS

High helix angle - A type 60°
Single-ended coated center drills, h7 shank

• Sharp edge for good surface finish

AUCES HSS Coating

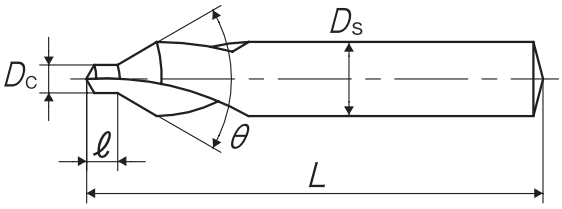
Low helix angle - A type 60°
Single-ended coated center drills, h7 shank

• Strong edge for stable and long life

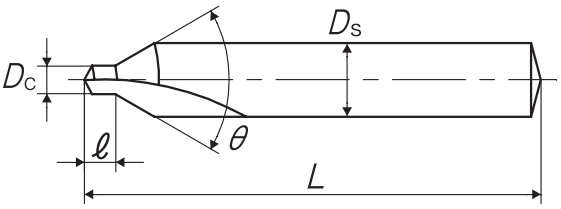
AUCDS HSS Coating

Dimensions and sizes

AUCES



AUCDS



High helix angle - A type 60°
for low hardness materials

Size Dc x Ø x Ds	Dc	Ds	L	ℓ	Product code
1 x 60° x 4	1	4	35	1.1	YH61.00ZNEVD
1.5 x 60° x 5	1.5	5	30	1.6	YH61.50ZNEVE
2 x 60° x 6	2	6	35	2.1	YH62.00ZNEVF
2.5 x 60° x 8	2.5	8	50	2.7	YH62.50ZNEVI
3 x 60° x 8	3	8	50	3.2	YH63.00ZNEVI
4 x 60° x 10	4	10	55	4.3	YH64.00ZNEVJ
5 x 60°x 12	5	12	65	5.3	YH65.00ZNEVM
6 x 60° x 16	6	16	70	6.4	YH66.00ZNEVP

Low helix angle - A type 60°
for medium hardness materials

Size Dc x Ø x Ds	Dc	Ds	L	ℓ	Product code
1 x 60° x 4	1	4	35	1.1	YL61.00ZNEVD
1.5 x 60° x 5	1.5	5	30	1.6	YL61.50ZNEVE
2 x 60° x 6	2	6	35	2.1	YL62.00ZNEVF
2.5 x 60° x 8	2.5	8	50	2.7	YL62.50ZNEVI
3 x 60° x 8	3	8	50	3.2	YL63.00ZNEVI
4 x 60° x 10	4	10	55	4.3	YL64.00ZNEVJ
5 x 60° x 12	5	12	65	5.3	YL65.00ZNEVM
6 x 60° x 16	6	16	70	6.4	YL66.00ZNEVP

Parameters

AUCES

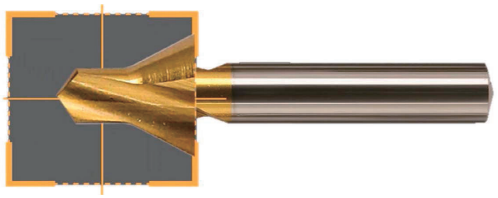
Work-materials	Feed (mm/rev)	Vc (m/min)
Soft steel	0.05 - 0.10	10 - 40
Carbon steel	0.05 - 0.20	20 - 40
Alloy steel	0.05 - 0.10	20 - 40
Stainless steel	0.05	10 - 20
Aluminium	0.10 - 0.20	20 - 60
Ductile cast iron	0.05 - 0.20	10 - 40

AUCDS

Work-materials	Feed (mm/rev)	Vc (m/min)
Carbon steel	0.05 - 0.20	20 - 40
Alloy steel	0.05 - 0.15	20 - 40
Hardened steel	0.05 - 0.20	30 - 40
Ductile cast iron	0.05 - 0.20	10 - 40

Characteristics

- Single-Ended Drills developed to offer higher accuracy in center hole drilling.
- Single-Ended Coated Center Drills provide excellent quality and stable processing of center holes.
- Compared to the Double-Ended Drills, Single-Ended Drills can be easily installed and result in stable drilling.

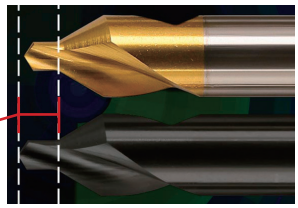


The Single-Ended Drills cutting edge and shank accuracy have been considerably improved compared to Double-Ended Drills.

The shank marking position has been moved to the rear of the drill to ensure the collet or holder does not grip on the uneven surface of the markings.

For higher speed and higher feed

Old type with longer drill length

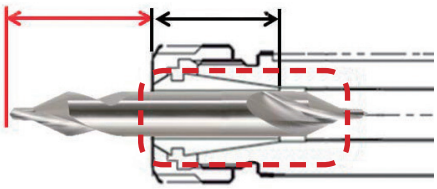


Higher speed and higher feed drilling is now possible thanks to the shorter drill length.

Double-ended type

Smaller flexibility in the overhang portion

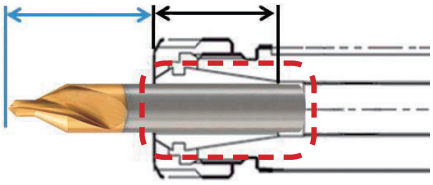
Minimum clamping length



Single-ended type

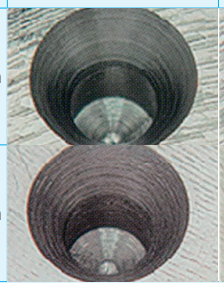
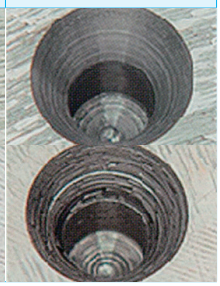
The extended shank gives more overhang flexibility

Minimum clamping length

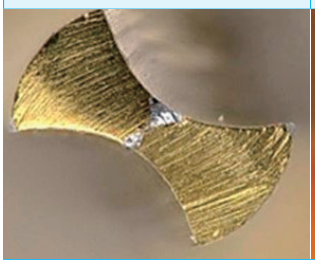
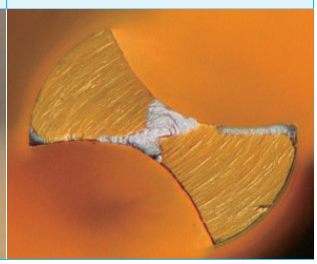


Process data

PRODUCT	AUCES, single-ended Coated Center Drills	CE-S, double-ended Coated Center Drills
Size	Ø3x60°x8	
Workpiece material	Ck50 (96-98HRB)	
Drilling speed	30m/min	10m/min
Feed	0.12mm/rev	0.05mm/rev
Drilling length	6mm	6.5mm
Drilling fluid	Water soluble FX30 chlorine free (emulsionx20)	
Machine	Maching center vertical type	

Conditions	AUCES	CE-S
S50C Cutting Speed: 10m/min Feed:0.5mm/rev		
S50C Cutting Speed: 30m/min Feed:0.12mm/rev		

Size	Ø1x60°x4
Workpiece material	Ck50
Drilling Length	30m/min
Feed	0.04mm/rev
Drilling fluid	Water soluble oil (emulsionx20)
Machine	Machining center vertical type

AUCES	CE-S
	

AUPEQ - AUPES

Single-ended coated point drills PEQ-90°

AUPEQ HSS Coating

Single-ended coated point drills PES-60°

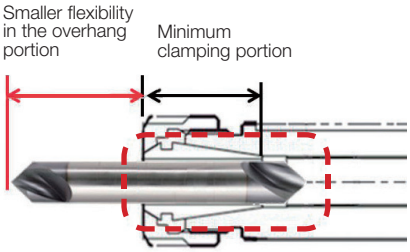
AUPES HSS Coating

Characteristics

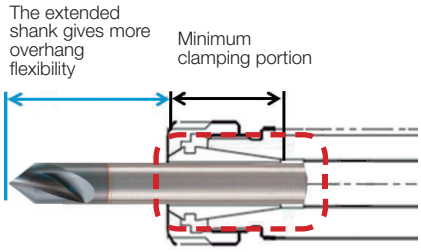
- Excellent surface finish thanks to the sharp cutting edge and the high accuracy of Single-Ended Drill design.
- High speed drilling can now be achieved thanks to high rigidity.
- Reduced drill breakage problem.
- Simultaneous hole positioning and chamfering, straight edge chamfering and multi-purpose processes such as slotting and channeling can now be achieved with one tool.
- 125° wide centering angle allows high accuracy and stable process.
- Smooth chip ejection is performed thanks to longer overhang portion.

Difference in clamping and overhang portion

Double-ended type

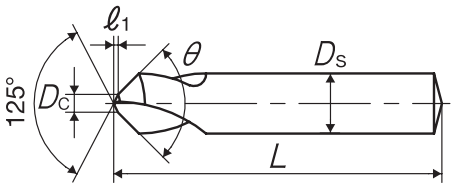


Single-ended type



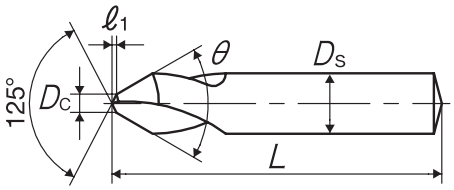
Dimensions and sizes

AUPEQ (90°)



Size DsxDcxØ	Ds	Dc	L	ℓ1	Product code
3 x 0.5 x 90°	3	0.5	35	0.13	PZ93.00ZNETZ
4 x 1 x 90°	4	1	35	0.26	PZ94.00ZNETZ
6 x 2 x 90°	6	2	45	0.52	PZ96.00ZNETZ
8 x 2.5 x 90°	8	2.5	50	0.65	PZ98.00ZNETZ
10 x 3 x 90°	10	3	55	0.78	PZ910.0ZNETZ
12 x 3.5 x90°	12	3.5	65	0.91	PZ912.0ZNETZ
16 x 4 x 90°	16	4	70	1.04	PZ916.0ZNETZ
20 x 5 x 90°	20	5	80	1.30	PZ920.0ZNETZ

AUPES (60°)



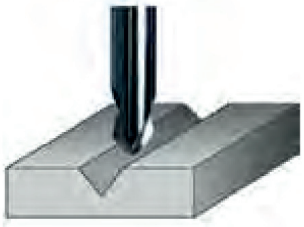
Size Ds x Dc x Ø	Ds	Dc	L	ℓ1	Product code
3 x 0.5 x 60°	1	0.5	35	0.13	PZ63.00ZNETZ
4 x 1 x 60°	1.5	1	35	0.26	PZ64.00ZNETZ
6 x 2 x 60°	2	2	45	0.52	PZ66.00ZNETZ
8 x 2.5 x 60°	2.5	2.5	50	0.65	PZ68.00ZNETZ
10 x 3 x 60°	3	3	55	0.78	PZ610.0ZNETZ
12 x 3.5 x 60°	4	3.5	65	0.91	PZ612.0ZNETZ
16 x 4 x 60°	5	4	70	1.04	PZ616.0ZNETZ
20 x 5 x 60°	6	5	80	1.30	PZ620.0ZNETZ

Applications

- Hole centering or chamfering

- Corner chamfering

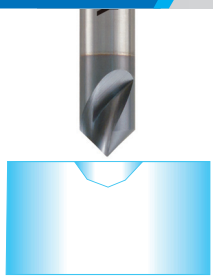
- Channel processing



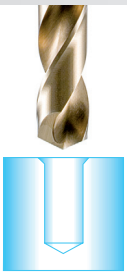
Production process

Point drilling

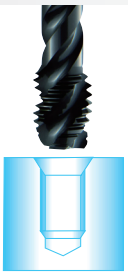
Hole centering and chamfering performed at the same time



Drilling



Tapping

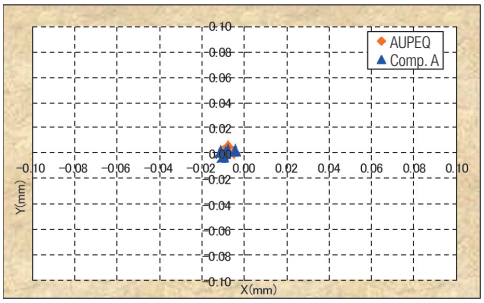


Process data

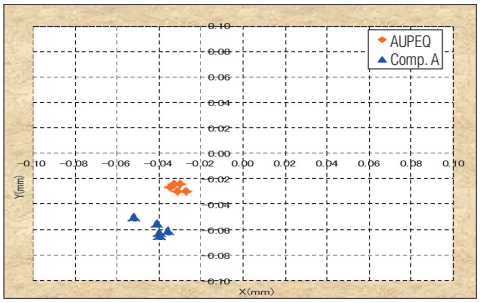
Size	Ø12x90°
Product	AUPEQ, competitor's item
Workpiece material	42CrMo4 (alloy steel)
Part for process	Flat surface, 15° slant surface
Drilling speed	25m/min

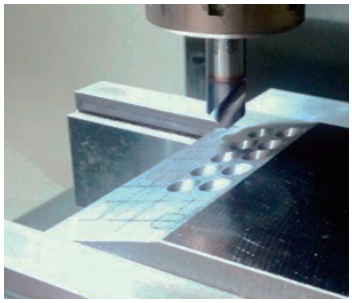
Feed	0.15mm/rev
Chamfered hole dia	Ø8 (on the flat surface)
Drilling Fluid	Water soluble (emulsion x 20)
Machine	Machining center vertical type

Positioning accuracy on flat surface



Positioning accuracy on 15° slant surface





Parameters

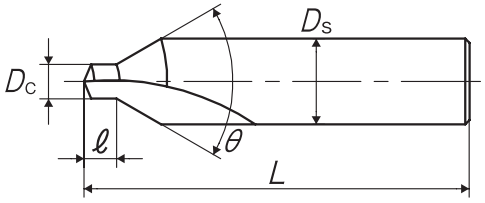
AUPEQ, AUPES HSS+TiCN

Workpiece Material	Soft Steels 1.0044 - St.44-2		Carbon steels 1.1206 - Ck50		Alloy steels 1.7225 - 42CrMo4		Thermal refined steels		Stainless steels 1.4301 - X5XrNi18-9 - AISI304		Aluminium alloy castings G-AlSi8Cu3 - A380	
Vc (m/min)	38-48		28-38		26-33		13-17		13-20		84-120	
Diameter (mm)	RPM (min-1)	Feed (mm/rev)	RPM (min-1)	Feed (mm/rev)	RPM (min-1)	Feed (mm/rev)	RPM (min-1)	Feed (mm/rev)	RPM (min-1)	Feed (mm/rev)	RPM (min-1)	Feed (mm/rev)
3	4550	0.04-0.08	3500	0.04-0.08	3150	0.04-0.08	1800	0.03-0.06	1750	0.04-0.08	10800	0.10-0.22
4	3400	0.05-0.10	2650	0.05-0.10	2350	0.05-0.10	1200	0.04-0.08	1300	0.05-0.10	8100	0.12-0.26
6	2300	0.06-0.12	1750	0.06-0.12	1550	0.06-0.12	800	0.05-0.10	900	0.06-0.12	5400	0.15-0.30
8	1700	0.08-0.15	1300	0.08-0.15	1150	0.08-0.15	600	0.06-0.12	650	0.08-0.15	4050	0.18-0.35
10	1350	0.10-0.18	1050	0.10-0.18	950	0.10-0.18	500	0.08-0.15	500	0.10-0.18	3250	0.21-0.40
12	1150	0.12-0.22	900	0.12-0.22	800	0.12-0.22	400	0.10-0.18	450	0.12-0.22	2700	0.25-0.45
16	850	0.16-0.26	650	0.16-0.26	600	0.16-0.26	300	0.12-0.22	350	0.16-0.26	2050	0.32-0.50
20	700	0.20-0.35	500	0.20-0.35	450	0.20-0.35	250	0.16-0.26	250	0.20-0.35	1800	0.40-0.60

MHCDS

Center drills for high speed in carbon steels of medium hardness

MHCDS HSS Coating



Characteristics

- High positioning accuracy thanks to h7 shank tolerance and compact design
- The cutting edge length (ℓ) is made as short as possible to increase toughness, rigidity and accuracy.
- To increase centrality, the drill point has “3 rakes” and “X thinning design”, which enables high speed cutting and feeding.
- Increased centrality leads to great improvement of surface finish and circularity of center-drilled hole.

Dimensions and sizes

Size Dc x Ø x Ds	Ds	Dc	L	ℓ	Product code
1 x 60° x 4	4	1	30	1.0	VMHCD1.0S
1.5 x 60° x 5	5	1.5	30	1.5	VMHCD1.5S
2 x 60° x 6	6	2	30	1.9	VMHCD2.0S
2.5 x 60° x 8	8	2.5	40	2.4	VMHCD2.5S
3 x 60° x 8	8	3	40	2.8	VMHCD3.0S
4 x 60° x 10	10	4	45	3.8	VMHCD4.0S
5 x 60° x 12	12	5	55	4.6	VMHCD5.0S
6 x 60° x 16	16	6	65	5.5	VMHCD6.0S

Parameters

- Material: Carbon steel (Ck50) - Alloy steel (42CrMo4)

Size Dc x Ø x Ds	Feed f (mm/rev)	RPM n (min^{-1})
1 x 60° x 4	0.1	3,800
1.5 x 60° x 5		2,400
2 x 60° x 6	0.15	1,900
2.5 x 60° x 8		1,500
3 x 60° x 8		1,200
4 x 60° x 10	0.2	1,000
5 x 60° x 12		800
6 x 60° x 16		600

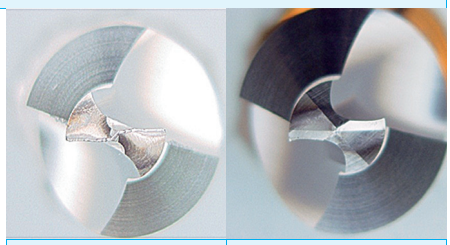
Cutting data

Great extension of tool life with MHCDS

The pictures on the right show the different damage of CD-S and MHCDS cutting edges after 480 holes machined at the same cutting condition. As shown, the MHCDS has smaller wear and edge damage allowing the MHCDS to run much further than a standard center drill.

Cutting Condition

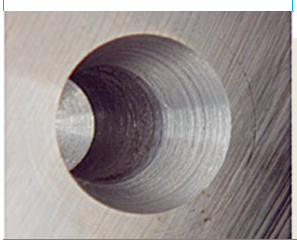
Size: 3x60°x8
Material: Ck55
Machine: NC lathe
Cutting speed: 30m/min (1,200min^{-1})
Feed: 0.15mm/rev
Coolant: water soluble



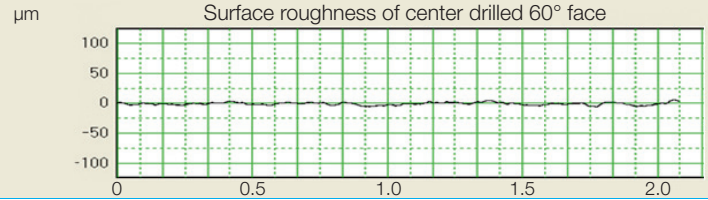
CD-S | MHCDS

Great improvement in surface roughness and circularity with MHCDS

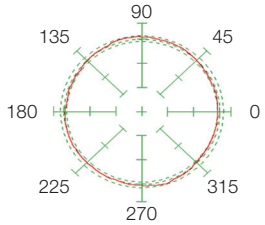
Enlarged picture



Under the cutting condition stated above, the surface finish of center-drilled hole has been greatly improved. Circularity of center drilled hole as well as run-out tolerance of turning axis has been improved.



Circularity of center drilled 60° face



Associated Product

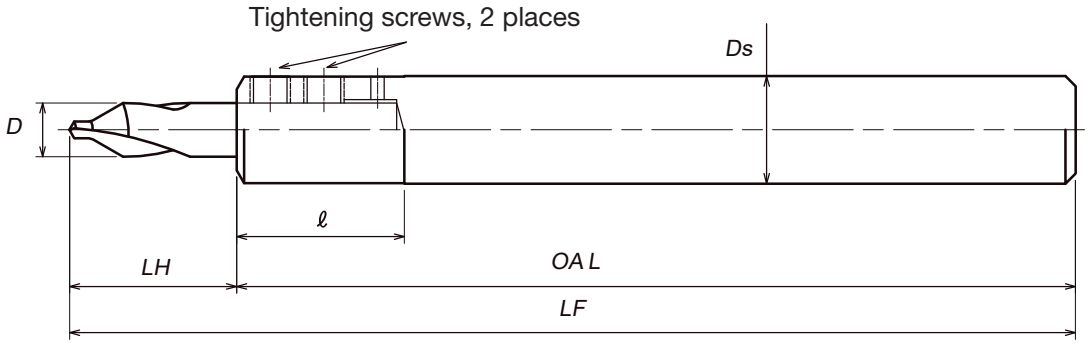
SHANK EXTENSION

Characteristics

• Shank Extensions designed for the Single-Ended Coated Center Drill AUCES, AUCDS, AUPES and AUPEQ now make long shank processing achievable.
• Shank diameters of Ds:16, Ds:20 available for the general tooling.

Dimensions and sizes

• Total Overall Length LF:150mm for the Single-Ended Coated Center Drill AUCES, AUCDS, AUPES and AUPEQ.



Size DxDsxLF	D	Ds	OAL	LF	LH	ℓ	Product code
SHANK EXTENSION D06 DS16 LF-150	6	16	128	150	22	23	YH61.00ZNEVD
SHANK EXTENSION D08 DS16 LF-150	8	16	125	150	25	25	YH61.50ZNEVE
SHANK EXTENSION D10 DS20 LF-150	10	20	123	150	27	28	YH62.00ZNEVF

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