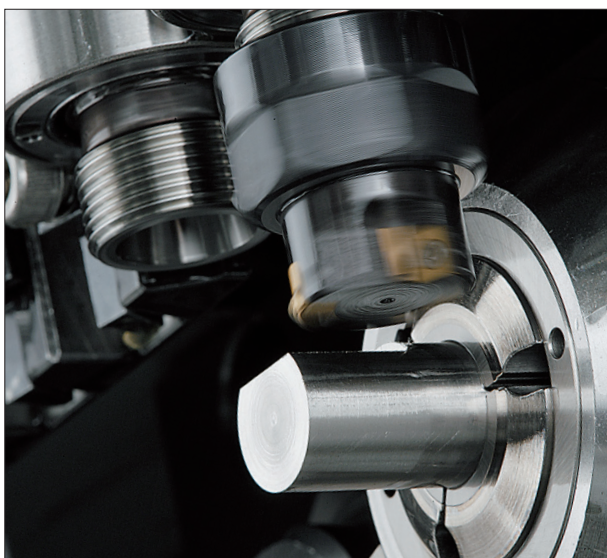
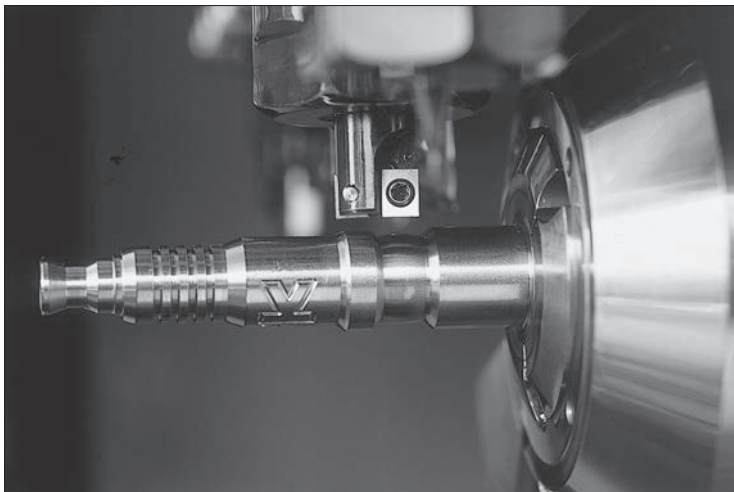


Small Diameter Indexable Endmills



Features

- Attach 20mm end mills in ER16 collet
- Just change inserts to index. No need to make any adjustments
- High quality surface finish, as low as 1um (Rz) when wiper inserts are used
- Corner radius as small as 0.05mm
- In addition to D cut, ramp machining can be performed*

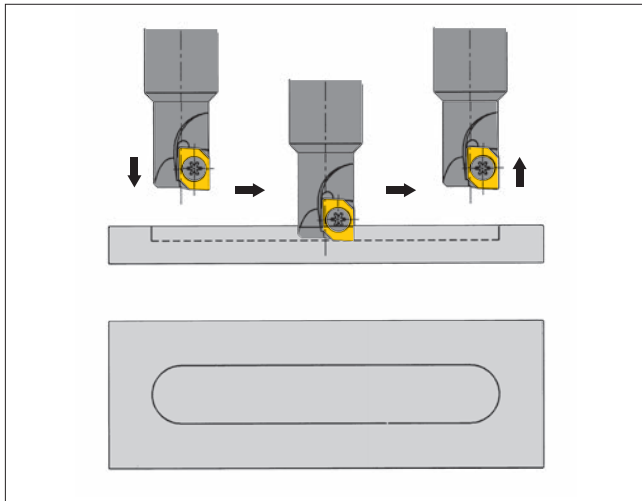
*A combination of single-blade type endmills and inserts with center blade is required

[Recommended Cutting Conditions]

Work Material	Speed (m/min)	Axial feed (mm/t)	Traverse feed (mm/t)	Depth of cut (mm)	Width of cut
Steel	80 - 120	~0.03	~0.05	~3.0	~50% of cutter diameter
Stainless Steel	40 - 60	~0.02	~0.04	~2.0	~50% of cutter diameter

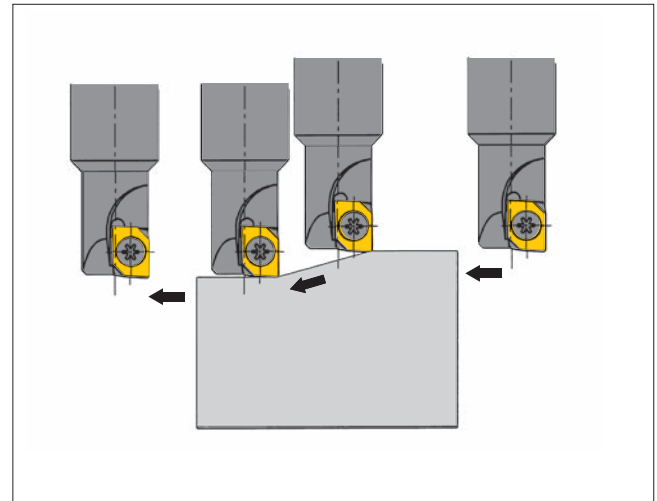
Application Example

Application Example-1



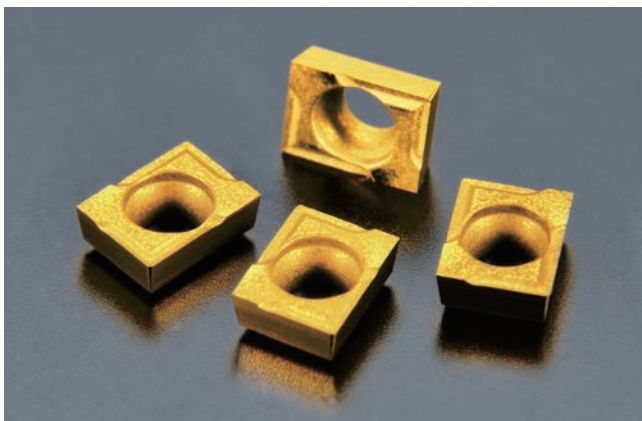
- A single tooth endmill equipped with a center cutting edge insert can be used for both plunge and side cut operations.

Application Example-2



- A single tooth endmill equipped with a center cutting edge insert can be used for slope milling operations.

Insert



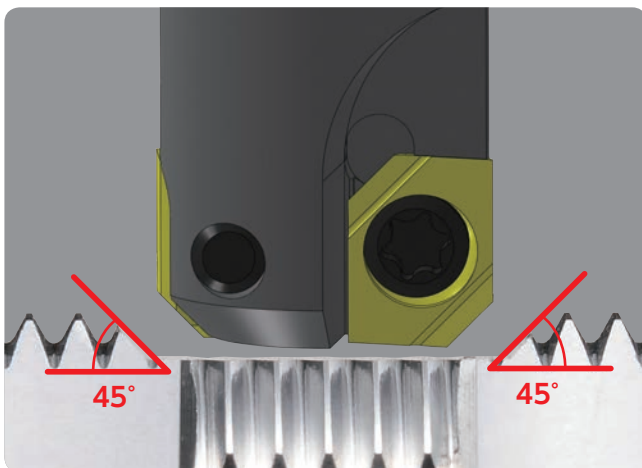
Wiper

- Excellent surface finish obtained with new wiper insert

Chipbreaker

- Less tool pressure with chipbreaker

45°



Chamfered surface finish insert

S45C	
Speed : 95 m/min	
Feed : 0.14 mm/rev	
DOC : 1.0 mm	
WET	
NTK : QM3 C45 type	700 pcs
Competitor's solid endmill	500 pcs

Endmills

REZ Series

REZ

<D cutting = lead angle 90 type end milling tool>

<D cutting = lead angle 45 type end milling tool>

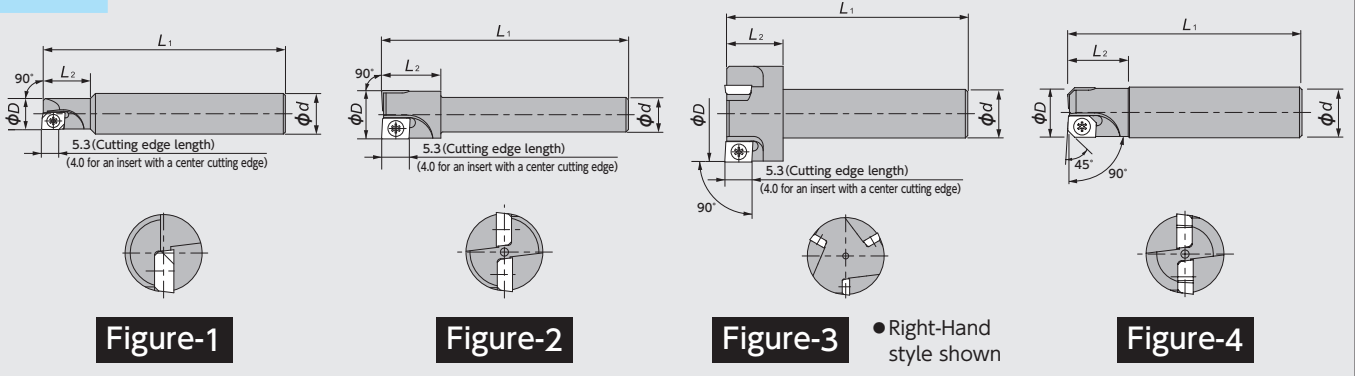


Figure-1

Figure-2

Figure-3

Figure-4

● Right-Hand style shown

REZ Series - Toolholders

Figure	Code No.	Item Number	Stock		No. of teeth	Dimensions (mm)				Gage insert	Spare Parts			
			R	L		ϕD	ϕd	L_1	L_2		Clamp screw	Wrench		
1	5276498	REZ080C1R212	●		1	8	10	60	12	CZH04: : CFR: :	FS102-2.2 * 4.0	T-07		
	5285812	100C1R218	●										75	
2	5520317	REZ100B2R329	●		2	10	5	40	10	CZH04: : CFR: :	FS102-2.2 * 4.3	T-07		
	5120936	100C2R133	●										6	
	5120951	100C2R132	●										7	
	5137971	100C2R141	●										50	12
	5355458	120C2R141	●											
	5355466	140C2R141	●											
3	5520325	REZ150B3R330	●		3	15	5	40	10	CZH04: : CFR: :	FS102-2.2 * 4.3	T-07		
	5496088	200M3R319	●										7	
	5496096	200M3R320	●										10	
4	5880281	REZ100C2R461	●		2	10	10	50	12	CZH0400CFR-C45 CZH04: : CFR: :	FS102-2.2 * 4.3	T-07		
	5880299	100C2R466	●										7	

REZ Series - Inserts

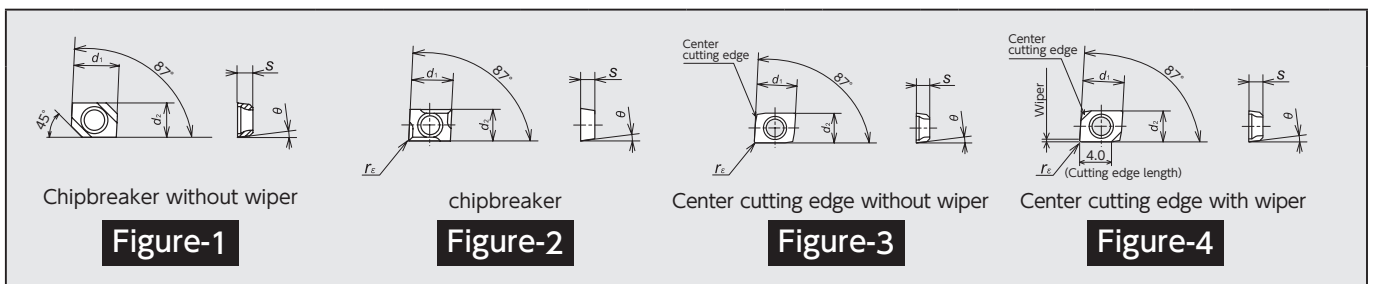


Figure-1

Figure-2

Figure-3

Figure-4

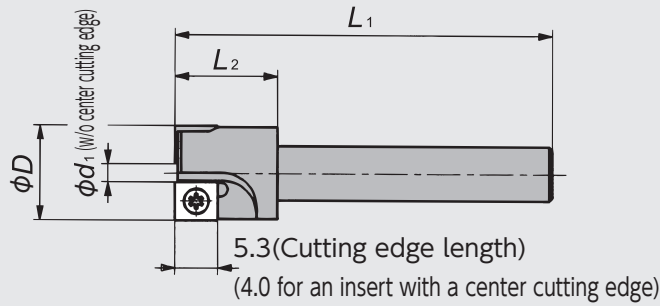
Figure	Item Number	Dimensions (mm)					PVD Coated Carbide									
		d_1	d_2	s	θ	C or r_e	ZM3	Stock	TM4	Stock	DT4	Stock	QM3	Stock	DM4	Stock
1	CZH0400CFR-C45 ※	5.56	4.20	1.88	7°	C1.35					5880315	●	5880307	●		
2	CZH04005CFR-BL 0402CFR-BL	5.56	4.20	1.88	7°	0.05			5819008	●					5900907	●
									5818984	●				5900915	●	
3	CZH04005CFR-070 0402CFR-070	5.56	4.20	1.88	7°	0.05	5230479	●	—	—	5849815	●				
							5120944	●	—	—	5849823	●				
4	CZH04005CFR-140 0402CFR-140	5.56	4.20	1.88	7°	0.05	5310883	●	—	—	5849831	●				
							5310958	●	—	—	5849849	●				
	CZH05005CFR-141 0502CFR-141	5.28	5.56	2.18	10°	0.05	5310925	●	—	—						
							5310909	●	—	—						

※ Must be used with REZ100C2R461/466Cutters.

REL Series

REL

Standard type end milling tool
Cutter diameter : $\phi 10$

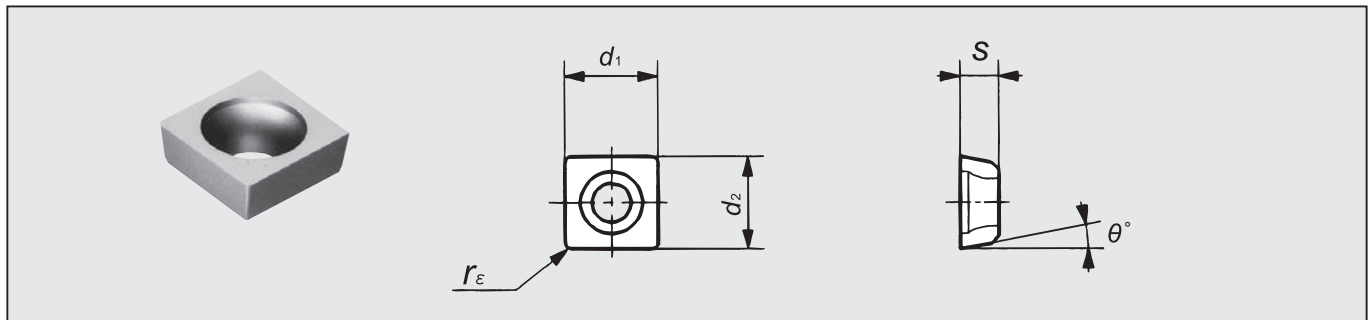


● Right-hand style shown

REL Series - Toolholders

Code No.	Item Number	Stock		No. of teeth	Dimensions (mm)					Gage insert	Spare Parts		
		R	L		ϕD	ϕd	ϕd_1	L_1	L_2		Clamp screw	Wrench	
5092358	REL100C2R107	●		2	10	7	(1.2)	50	12	CLH04 CFN-045		FS102-2.2*4.3	
5092374	100C2R106	●				10							

REL Series - Inserts



Item Number	Dimensions (mm)					PVD coated carbide	
	d_1	d_2	s	θ	r_ϵ	ZM3	Stock
CLH04005CFN-045	5.56	4.20	1.88	7°	0.05	5101894	●
0402CFN-045					0.2	5066535	●

Precaution for using REL type

When using the REL type end milling tool, tapering will occur on the side machined area of the work piece by the following amount:

Depth of cut (mm)	Top face machining dia - Bottom face machining dia (mm)
2	0.05
3	0.08
4	0.12
5	0.15

New Products
 Tool Materials / Selection Guide
 Micrograin Carbide, BIDEIMCS, PCD
 PVD/CVD-coated Carbide, CBN and Ceramics
 Insert Item List
 General Turning Toolholders
 Unique Swiss Tooling
 Grooving / Side Turning
 Threading
 Shaper
 ID Tooling
 Application Introduction
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RCL type rectangular tooth chamfering type



Features

- Cycle time can be reduced by using micro-grain carbide grade inserts. (Compared with the high-speed steel (HSS) end milling tools).
- Improved surface finish

① Cutter diameter and machining conditions

Cutter diameter	Recommended module	Recommended feed rate
φ 14	2.25 or less	0.3mm /rev or less
φ 12	2.15 or less	0.3mm /rev or less

If the recommended module or the recommended feed rate is exceeded, the clamping screw should be re-tightened at least once or twice a day to prevent loss of secure clamping.

Precautions

- ① When mounting the end milling tool, ensure a minimum amount of overhang from the chuck to the tool nose in order to prevent run out during machining (Target value: approx. 20 mm)
- ② As is probably known, gear tooth chamfering applies shock loading due to interrupted cutting. For this reason, the holder and clamping screw may deteriorate quicker than normal. Therefore, we request that you replace the holder and clamping screw periodically with new ones for safer and more stable operation.
- ③ In addition, please re-tighten the clamping screw regularly to avoid loss of clamping force during machining.

[Actual examples]

Gear tooth chamfering on sleeve	
Work material : SCM415	
Cutting speed (m/min) = 154	
No. of revolutions (min ⁻¹) = 3,500	
Cutting oil : WET	
NTK : ZM3 2-insert	2,000 pcs
Competitor's PVD-coated carbide Single insert	200 pcs

Gear chamfering on speed gear	
Work material : SCr420 (HB140 ~ 230)	
Cutting speed (m/min) = 42	
No. of revolutions (min ⁻¹) = 955	
Cutting oil : WET	
NTK : ZM3 2-insert	1,500 pcs
SKH55 Solid	100 pcs

RCL Series

RCL Gear tooth chamfering type

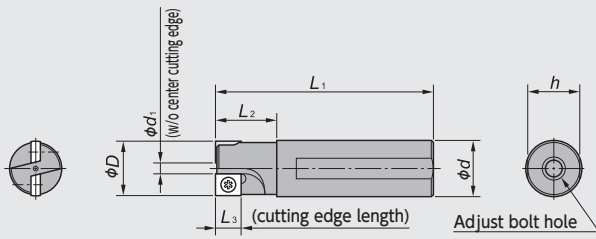


Figure-1

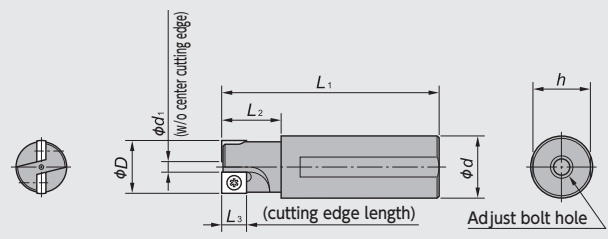


Figure-2

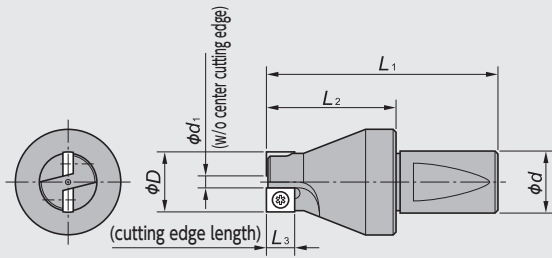


Figure-3

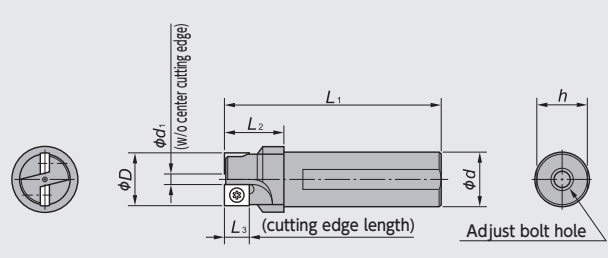


Figure-4

● Right-hand style shown

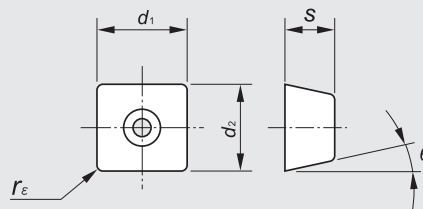
RCL Series - Toolholders

Figure	Code No.	Item Number	Stock		Dimensions (mm)							Adjust bolt hole	Gage insert	Spare Parts	
			R	L	ϕD	ϕd	ϕd_1	h	L_1	L_2	L_3			Clamp screw	Wrench
1	5025952	RCL120D2R050	●		12	12	($\phi 3$)	11	60	15	(5)	M4 * 20L	CLH0402C□□□□-004	FS101-2.5 * 5	CLR-15S (A)
	5025945	L050		●											
	5005046	RCL140D2R021	●		14	14	($\phi 4$)	13	55	(6)	M6 * 20L	CLH050□□CFN			
	5005053	L021		●											
2	5034913	RCL120D2R059	●		12	14	($\phi 3$)	13	55	15	(5)	M6 * 20L	CLH0402C□□□□-004	FS101-2.5 * 5	CLR-15S (A)
	5034921	L059		●											
3	5005236	RCL140Z2R020	●		14	14	($\phi 4$)	-	54	30	(6)	-	CLH050□□CFN	FS101-2.5 * 5	CLR-15S (A)
	5005228	L020		●											
4	5051792	RCL100D2R066	●		10	10	($\phi 3$)	9.5	60	18	(5)	M4 * 20L	CLH0402C□□□□-035	FS104-2.0 * 4.3	T-06 (B)
	5051784	L066		●											

[Cutting edge process]

FN	Sharp edge
TNB	T00525

RCL Series - Inserts



Item Number	Dimensions (mm)					PVD Coated Carbide			
	d_1	d_2	s	θ	r_e	ZM3	Stock	DM4	Stock
CLH0402CFN-035 CTNB035 CFN-004 CTNB004	5.56	4.20	1.88	7°	0.2	5051750	●	5846951	●
						5084819	●	5847744	●
						5027123	●	5847736	●
CLH0502CFN CLH0504CFN	6.35	5.56	2.18	11°	0.2	5019351	●	5827381	●
						5992201	●	5847710	●
						5996186	●	5847702	●

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