LMT • FETTE

DHC

Differential Helix Cutter

Universal Short and Long End Mills for the Highest Productivity in Roughing and Finishing Applications (Standard & with Corner Radius)

www.lmtusa.com

DHC (Differential Helix Cutter) End Mills—Short & Long

Reducing tool vibration not only improves surface quality but also results in remarkably increased tool life.

The LMT-Fette DHC-End Mill (DHC = Differential Helix Cutter) counteracts vibration tendencies due to a varying helix angle of the consecutive flutes and a variable pitch within each flute. The design ensures that variable chip cross sections will be generated which eliminates harmonics and reduces vibration.

The uneven helix angles reduce the cutting forces and improve the cutting performance. Therefore, the LMT-Fette DHC-End Mills are well suited for removing large chip volumes in roughing applications.

The multi-functionality is the outstanding characteristic of the DHC-End Mill: roughing, finishing, plunging and slotting with the same tool. The long version is especially suited for milling of deep slots up to 2 x d.

LMT-Fette offers the DHC-End Mills in long and short versions.

Features:

- Continuous variable pitch
- Stable cutting edge geometry with micro cutting edge preparation
- Optimized chip space
- Tough micro grain carbide grade
- Wear resistant and temperature stable PVD coating AL2Plus
- Starting from 0.187" diameter

Advantages:

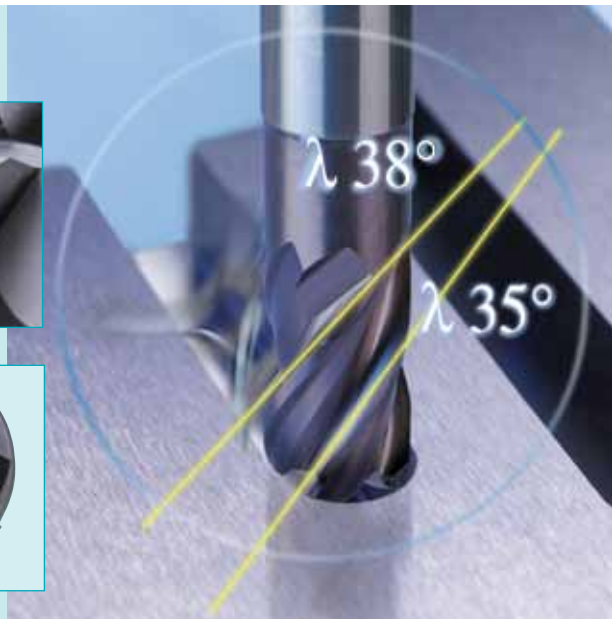
- High feed rates
- Higher depths of cut (deep slotting)
- Increased metal removal rate
- Extended tool life
- Roughing and finishing with the same cutter
- Better chip evacuation
- Good surface quality on the work piece
- Less vibration

Benefit of the short version:

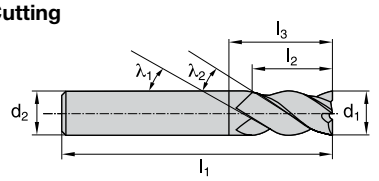
- Increased feed rates
- Reduced tool costs
- Higher productivity
- Increased process safety
- Still less vibrations

Double edge protection chamfer and also corner radius version

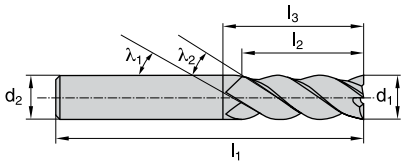
Variable pitch flutes



Solid Carbide
Center Cutting



z = 4 teeth



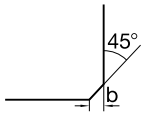
z = 4 teeth

Cat.-No.	1521C
Type	DHC
Standard	DIN 6527 A / DIN 6528
Helix angle	λ_1 / λ_2 = 35° / 38°
Straight shank	DIN 6535 HA (Cylindrical)
Coating	AL2 Plus (TiAlN)
Cutting materials	LC630T
Special features	Edge protection chamfer or corner radius

d1	Std Cutter EDP #	.015" Radius EDP #	.030" Radius EDP #	.060" Radius EDP #	d2 (h6)	l1	l2	l3
short								
0.187 (3/16)	**18954**	19322*	19334*	–	0.187 (3/16)	2.00	0.375	0.630
0.250 (1/4)	**18955**	19323*	19335*	–	0.250 (1/4)	2.00	0.500	0.709
0.375 (3/8)	**18956**	19324*	19336*	–	0.375 (3/8)	2.00	0.625	0.906
0.500 (1/2)	**18957**	19325*	19337*	19346*	0.500 (1/2)	2.50	0.625	1.000
0.625 (5/8)	**18958**	19326*	19338*	19347*	0.625 (5/8)	3.00	0.750	1.181
0.750 (3/4)	**18959**	19327*	19339*	19348*	0.750 (3/4)	3.00	1.000	1.260
long								
0.187 (3/16)	**18960**	19328*	19340*	–	0.187 (3/16)	2.00	0.500	0.787
0.250 (1/4)	**18961**	19329*	19341*	–	0.250 (1/4)	2.50	0.625	1.024
0.375 (3/8)	**18962**	**19330**	**19342**	–	0.375 (3/8)	2.50	1.000	1.181
0.500 (1/2)	**18963**	19331*	**19343**	**19349**	0.500 (1/2)	3.00	1.000	1.378
0.625 (5/8)	**18964**	19332*	19344*	19350*	0.625 (5/8)	3.50	1.250	1.732
0.750 (3/4)	**18965**	19333*	**19345**	**19351**	0.750 (3/4)	4.00	1.500	2.126

*Note: Check for availability

Edge protection chamfer (Standard Cutters)



d_1	b
0.187	0.004
0.250–0.500	0.008
0.625–0.750	0.012

Roughing-Finishing End Mills Type DHC
Cutting Data Recommendations

	Material	HBN Brinell	Cutting speed v_c [SFM]	Coolant	Feed per tooth f_z = (inches) Cutter diameter (inch) 3/16	1/4	5/16	3/8	1/2	5/8	3/4
P	Plain carbon steel (1018, 1025)	90-150	755	☼ 💧	.0024	.0028	.0035	.0043	.0051	.0071	.0087
	Free cutting steel (1212, 12L13, 12L14)	105-238	755	☼ 💧	.0024	.0028	.0087	.0043	.0051	.0071	.0087
	Structural alloy steel (1040, 4130)	150-280	656	☼ 💧	.0020	.0024	.0079	.0039	.0047	.0063	.0079
	Heat-treatable steel, medium strength (4140, 6150)	150-280	525	☼ 💧	.0020	.0024	.0079	.0039	.0047	.0063	.0079
	Cast steel (4340, 8740)	-280	427	☼ 💧	.0016	.0020	.0067	.0035	.0039	.0055	.0067
	Case hardening steel (52100, 8620)	-280	525	☼ 💧	.0020	.0024	.0079	.0039	.0047	.0063	.0079
	Heat-treatable steel, high strength (4140, 8740)	280-410	394	☼ 💧	.0016	.0020	.0059	.0031	.0035	.0047	.0059
	Nitriding steel (A355)	280-410	361	☼ 💧	.0016	.0020	.0059	.0031	.0035	.0047	.0059
	Tool steel (H13, D2, A2, P20)	280-410	328	☼ 💧	.0016	.0016	.0055	.0028	.0031	.0043	.0055
M	Stainless steel, austenitic (303, 304, 316, 316L)	150-280	328	💧	.0012	.0012	.0039	.0020	.0024	.0031	.0039
	Stainless steel, ferritic, martensitic (431)	150-280	328	💧	.0016	.0020	.0059	.0031	.0035	.0047	.0059
	Stainless steel, martensitic steel (403, 420, 430)	238-300	394	💧	.0012	.0016	.0051	.0028	.0031	.0039	.0051
K	Grey cast iron (No.20B, No.25B, No.30B, No.35B, No.40B, No.45B)	120-260	591	☼ 💧	.0028	.0031	.0110	.0055	.0067	.0087	.0110
	Alloyed grey cast iron	160-230	525	☼ 💧	.0024	.0028	.0094	.0047	.0055	.0075	.0094
	Nodular cast iron (60-40-18, 80-55-06)	120-310	492	☼ 💧	.0024	.0028	.0087	.0043	.0051	.0071	.0087
	Malleable cast iron (32510, 40010, 50005)	150-280	394	☼ 💧	.0024	.0028	.0087	.0043	.0051	.0071	.0087
N	Aluminium alloys, short chipping (6061-T6, 7050)	-120	984	💧	.0024	.0031	.0098	.0051	.0059	.0079	.0098
	Aluminium alloys, short chipping	-150	820	💧	.0020	.0024	.0079	.0039	.0047	.0063	.0079
S	Titanium alloys, medium strength (Ti6Al V4)	-280	262	💧	.0012	.0016	.0051	.0028	.0031	.0039	.0051
	Titanium alloys, high strength	266-410	197	💧	.0012	.0012	.0039	.0020	.0024	.0031	.0039
	Nickel based alloys, medium strength (Inconel 718, Hastelloy C, Monel 400)	-280	131	💧	.0012	.0016	.0051	.0028	.0031	.0039	.0051
	Heat resisistant nickel based alloys, high strength	266-410	98	💧	.0012	.0118	.0039	.0020	.0024	.0031	.0039

☼ Dry machining, air-blast cooling is advantageous

💧 Wet machining, sufficient emulsion volume required

Feed correction factor f_1

$$v_f = n \cdot z \cdot f_z \cdot f_1$$

WOC a_e	DOC a_p	DHC long f_1	DHC short f_1
0.1 · d_1	1 x d_1	2.2	2.4
	1.5 x d_1	2	–
	2 x d_1	1.6	–
0.25 · d_1	1 x d_1	1.6	2
	1.5 x d_1	1.4	–
	2 x d_1	1.2	–
0.50 · d_1	1 x d_1	1.1	1.5
	1.5 x d_1	1	–
	2 x d_1	0.8	–
0.75 · d_1	1 x d_1	0.8	1
	1.5 x d_1	0.7	–
1 · d_1	1 x d_1	0.6	0.7
	1.5 x d_1	0.5	–
	2 x d_1	0.4	–

a_e = Width of cut in (in)
a_p = Depth of cut in (in)
d_1 = Cutter diameter in (in)
f_1 = Correction factor for v_f
f_z = Feed per tooth in (in)
n = Speed in rpm
Q = Chip volume in cm^3/min
v_c = Cutting speed in (SFM)
v_f = Feed rate in (in/min)
z = No. of teeth

Typical Applications

1. Shoulder Milling

FETTE
DHC Solid Carbide
End Mill – Long

Catalog Number: 1522 C
d_1 = 12mm, z = 4
Grade: LC630T

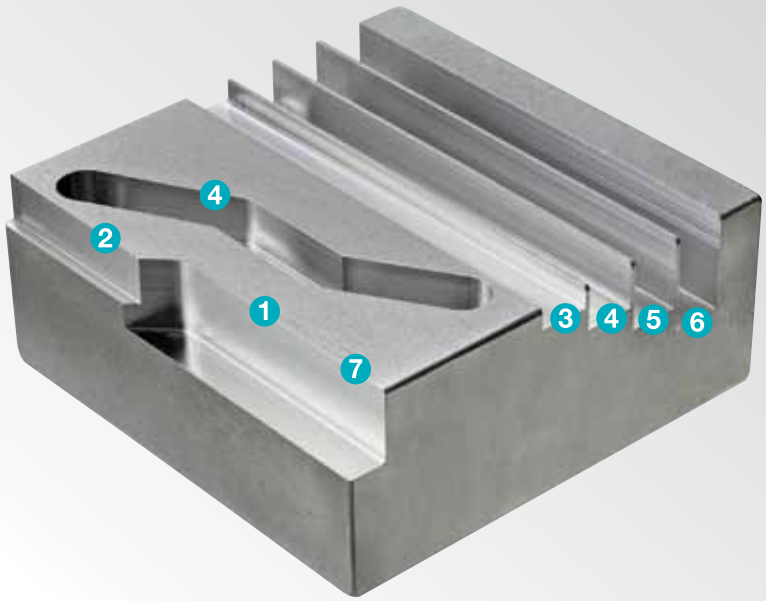
Cutting Data:
v_c = 655 sfm v_f = 70 ipm
n = 5,300 rpm woc = .354"
f_z = .0033" fpt doc = .709"

2. Shoulder Milling

FETTE
DHC Solid Carbide
End Mill – Short

Catalog Number: 1522 C
d_1 = 12mm, z = 4
Grade: LC630T

Cutting Data:
v_c = 655 sfm v_f = 199 ipm
n = 5,300 rpm woc = .118"
f_z = .0094" fpt doc = .472"



Material: 4140 (28-30 HRC)
z = # Teeth

3. Slot Milling

FETTE
DHC Solid Carbide
End Mill – Short

Catalog Number: 1522 C
d_1 = 12mm, z = 4
Grade: LC630T

Cutting Data:
v_c = 590 sfm v_f = 107 ipm
n = 4,775 rpm woc = .472"
f_z = .0056" fpt doc = .236"

5. Slot Milling

FETTE
DHC Solid Carbide
End Mill – Long

Catalog Number: 1522 C
d_1 = 12mm, z = 4
Grade: LC630T

Cutting Data:
v_c = 590 sfm v_f = 45 ipm
n = 4,775 rpm woc = .472"
f_z = .0023" fpt doc = .708"

4. Slot Milling

FETTE
DHC Solid Carbide
End Mill – Short

Catalog Number: 1522 C
d_1 = 12mm, z = 4
Grade: LC630T

Cutting Data:
v_c = 590 sfm v_f = 92 ipm
n = 4,775 rpm woc = .472"
f_z = .0048" fpt doc = .472"

6. Slot Milling

FETTE
DHC Solid Carbide
End Mill – Long

Catalog Number: 1522 C
d_1 = 12mm, z = 4
Grade: LC630T

Cutting Data:
v_c = 590 sfm v_f = 38.2 ipm
n = 4,775 rpm woc = .472"
f_z = .0020" fpt doc = .944"

7. Shoulder Milling

FETTE
DHC Solid Carbide
End Mill – Long

Catalog Number: 1522 C
d_1 = 12mm, z = 4
Grade: LC630T

Cutting Data:
v_c = 740 sfm v_f = 80 ipm
n = 6,000 rpm woc = .020"
f_z = .0033" fpt doc = .709"

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