

Carbide Tipped Heavy Duty End Mills

- All material can be machined with these ultra micrograin end mills at high or low cutting speeds, and feeds with increased wear resistance.
- Specially designed with a 25° right hand helix.
- Tough carbide grade allows high speed milling operations.
- Ultra Fine. For General Purpose.

Two Flute Center Cutting

- Suited for the rough machining, heavy cutting and grooving machining as this allows larger chip pocket and increased feeding.



Three Flute Center Cutting

- Especially three flutes type vibrates less when entering and as result can increase feed rate over two flutes type.



Four Flute Center Cutting

- Allows better balance for machining.
- Suited for finish and side surface machining as this is less likely to tilt.



Size	Shank Dia.	Flute Length	Overall Length	Two Flute Order No.	Three Flute Order No.	Four Flute Order No.
5/8"	5/8"	1-3/16"	3-1/2"	243-2040	243-2240	
3/4	3/4	1-27/64	3-3/4	243-2048	243-2248	243-2448
7/8	3/4	1-27/64	3-3/4	243-2056	243-2256	243-2456
1	1	1-29/64	4-1/8	243-2064	243-2264	243-2464
1-1/8	1	1-9/16	4-1/2	243-2072	243-2272	
1-1/4	1-1/4	1-27/32	5-1/8	243-2080	243-2280	243-2480
1-1/2	1-1/4	2-1/4	5-1/2	243-2096	243-2296	243-2496
1-3/4	1-1/4	2-5/8	6-1/8	243-2112	243-2312	243-2512
2	1-1/4	2-5/8	6-1/8	243-2128	243-2328	243-2528

3 Flute Carbide Tipped End Mills

with Weldon Shank

- Use in finishing operation.
- Three flute's vibration is less than two flute when milling.



Size	Shank Dia.	Flute Length	Overall Length	No. of Flute	Order No.
1/2"	1/2"	1-1/4"	3-1/2"	3	244-1203
1/2	1/2	2	4-1/4	3	244-1206
1/2	1/2	3	5-1/4	3	244-1209
9/16	1/2	1-3/8	3-5/8	3	244-1212
5/8	5/8	1-5/8	4	3	244-1215
5/8	5/8	2-1/2	4-7/8	3	244-1218
5/8	5/8	4	6-3/8	3	244-1221
11/16	5/8	1-5/8	4	3	244-1224
3/4	5/8	1-5/8	4-5/32	3	244-1227
3/4	3/4	3	5-21/32	3	244-1230
3/4	3/4	4	6-21/32.4-27/	3	244-1233
13/16"	5/8"	1-7/8"	64"	3	244-1236
7/8	7/8	1-7/8	4-17/32	3	244-1239
7/8	7/8	3-1/2	6-5/32	3	244-1242
7/8	7/8	5	7-21/32	3	244-1245
1	7/8	1-7/8	4-11/16	3	244-1248
1	1	2	5-1/16	3	244-1251
1	1	4	7-1/16	3	244-1254
1	1	6	9-1/16	3	244-1257
1-1/8	1	2	5-1/16	3	244-1260
1-1/8	1	4	7-1/16	3	244-1263

2 Flute Carbide Tipped End Mills

with Weldon Shank

- 2 flutes are used for machining aluminum alloys, magnesium alloys etc.
- Center Cutting suitable for plunge cutting.
- Carbide tipped cutting edge can be resharped with diamond grinding wheel.



Center Cutting

Size	Shank Dia.	Flute Length	Overall Length	No. of Flute	Order No.
5/8"	5/8"	1-5/16"	3-11/16"	2	244-1109
5/8	5/8	1-3/8	4-5/8	2	244-1112
11/16	5/8	1-5/16	3-11/16	2	244-1115
3/4	5/8	1-5/16	3-27/32	2	244-1118
3/4	3/4	1-5/8	5-3/8	2	244-1121
13/16	5/8	1-1/2	4-1/32	2	244-1124
7/8	7/8	1-1/2	4-5/16	2	244-1127
1	7/8	1-1/2	4-5/16	2	244-1130
1	1	1-5/8	4-11/16	2	244-1133
1	1	2-1/2	7-1/4	2	244-1136
1-1/8	1	1-5/8	4-11/16	2	244-1139
1-1/4	1-1/4	1-5/8	4-11/16	2	244-1142
1-1/4	1-1/4	3	7-1/4	2	244-1145
1-3/8	1	1-5/8	4-11/16	2	244-1148
1-1/2	1-1/4	1-5/8	4-25/32	2	244-1151
1-3/4	1-1/4	1-5/8	4-25/32	2	244-1154
2	1-1/4	1-5/8	4-25/32	2	244-1157

Non Center Cutting

Size	Shank Dia.	Flute Length	Overall Length	No. of Flute	Order No.
1/2"	1/2"	1"	3-1/4"	2	244-1003
9/16	1/2	1-1/8	3-3/8	2	244-1006
5/8	5/8	1-5/16	3-11/16	2	244-1009
5/8	5/8	1-3/8	4-5/8	2	244-1012
11/16	5/8	1-5/16	3-11/16	2	244-1015
3/4	5/8	1-5/16	3-27/32	2	244-1018
3/4	3/4	1-5/8	5-3/8	2	244-1021
13/16	5/8	1-1/2	4-1/32	2	244-1024
7/8	7/8	1-1/2	4-5/16	2	244-1027
1	7/8	1-1/2	4-5/16	2	244-1030
1	1	1-5/8	4-11/16	2	244-1033
1	1	2-1/2	7-1/4	2	244-1036
1-1/8	1	1-5/8	4-11/16	2	244-1039
1-1/4	1-1/4	1-5/8	4-11/16	2	244-1042
1-1/4	1-1/4	3	7-1/4	2	244-1045
1-3/8	1	1-5/8	4-11/16	2	244-1048
1-1/2	1-1/4	1-5/8	4-25/32	2	244-1051
1-3/4	1-1/4	1-5/8	4-25/32	2	244-1054
2	1-1/4	1-5/8	4-25/32	2	244-1057

Multiple Flute Carbide Tipped End Mills

Combination Shank

- Use in finishing operation
- multi-flute can efficiently mill a wide range of materials:
non ferrous materials and ferrous materials, including titanium alloy,
cast iron, alloy steel, stainless steel, plastic and magnetic material etc.
- Heavy duty machining.



Size	Shank Dia.	Flute Length	Overall Length	No. of Flute	Order No.
1-1/2"	1-1/2"	2-1/2"	6-1/8"	4	244-1406
2	2	3	7	6	244-1409
2	2	4	8	4	244-1412
2	2	4	8	6	244-1415
2	2	5	9	4	244-1418
2	2	5	9	6	244-1421
2	2	6	10	4	244-1424
2	2	6	10	6	244-1427
2	2	8	12	4	244-1430
2	2	8	12	6	244-1433
2	2	10	14	6	244-1436

Multiple Flute Carbide Tipped End Mills

Weldon Shank

- Use in finishing operation
- multi-flute can efficiently mill a wide range of materials:
non ferrous materials and ferrous materials, including titanium alloy,
cast iron, alloy steel, stainless steel, plastic and magnetic material etc.
- Heavy duty machining.



Size	Shank Dia.	Flute Length	Overall Length	No. of Flute	Order No.
1"	7/8"	1-7/8"	4-11/16"	4	244-1303
1	1	2	5-1/16	4	244-1306
1	1	4	7-1/16	4	244-1309
1	1	6	9-1/16	4	244-1312
1-1/8	1	2	5-1/16	4	244-1315
1-1/8	1	4	7-1/16	4	244-1318
1-1/4	1-1/4	2	5-1/16	4	244-1321
1-1/4	1-1/4	4	7-1/16	4	244-1324
1-1/4	1-1/4	6	9-1/16	4	244-1327
1-3/8	1	2	5-1/16	4	244-1330
1-1/2	1-1/4	2	5-5/32	4	244-1333
1-1/2	1-1/4	4	7-5/32	4	244-1336
1-1/2	1-1/4	8	11-5/32	4	244-1339
1-3/4	1-1/4	2	5-5/32	4	244-1342
1-3/4	1-1/4	2	5-5/32	6	244-1345
1-3/4	1-1/4	4	7-5/32	4	244-1348
1-3/4	1-1/4	4	7-5/32	6	244-1351
2	1-1/4	2	5-5/32	4	244-1354
2	1-1/4	2	5-5/32	6	244-1357
2	1-1/4	4	7-5/32	4	244-1360
2	1-1/4	4	7-5/32	6	244-1363

"CREST" Cutting Edge Carbide Tipped End Mills

3 Flute with Weldon Shank



- Use in roughing milling operation.
- Machining carbon steel, cast iron, alloy steel.
- Heavy duty machining.
- Crest cutting edges compensate cutting forces, minimum vibration and chatter, and offer maximum end mills life.

Size	Shank Dia.	Flute Length	Overall Length	No. of Flute	Order No.
5/8"	5/8"	1-5/8"	4"	3	244-1515
5/8	5/8	2-1/2	4-7/8	3	244-1518
5/8	5/8	4	6-3/8	3	244-1521
11/16	5/8	1-5/8	4	3	244-1524
3/4	5/8	1-5/8	4-5/32	3	244-1527
3/4	3/4	3	5-21/32	3	244-1530
3/4	3/4	4	6-21/32	3	244-1533
13/16	5/8	1-7/8	4-27/64	3	244-1536
7/8	7/8	1-7/8	4-17/32	3	244-1539
7/8	7/8	3-1/2	6-5/32	3	244-1542
7/8	7/8	5	7-21/32	3	244-1545
1	7/8	1-7/8	4-11/16	3	244-1548
1	1	2	5-1/16	3	244-1551
1	1	4	7-1/16	3	244-1554
1	1	6	9-1/16	3	244-1557
1-1/8	1	2	5-1/16	3	244-1560
1-1/8	1	4	7-1/16	3	244-1563

4 & 6 Flute with Weldon Shank



Size	Shank Dia.	Flute Length	Overall Length	No. of Flute	Order No.
1"	7/8"	1-7/8"	4-11/16"	4	244-1603
1	1	2	5-1/16	4	244-1606
1	1	4	7-1/16	4	244-1609
1	1	6	9-1/16	4	244-1612
1-1/8	1	2	5-1/16	4	244-1615
1-1/8	1	4	7-1/16	4	244-1618
1-1/4	1-1/4	2	5-1/16	4	244-1621
1-1/4	1-1/4	4	7-1/16	4	244-1624
1-1/4	1-1/4	6	9-1/16	4	244-1627
1-3/8	1	2	5-1/16	4	244-1630
1-1/2	1-1/4	2	5-5/32	4	244-1633
1-1/2	1-1/4	4	7-5/32	4	244-1636
1-1/2	1-1/4	8	11-5/32	4	244-1639
1-3/4	1-1/4	2	5-5/32	4	244-1642
1-3/4	1-1/4	2	5-5/32	6	244-1645
1-3/4	1-1/4	4	7-5/32	4	244-1648
1-3/4	1-1/4	4	7-5/32	6	244-1651
2	1-1/4	2	5-5/32	4	244-1654
2	1-1/4	2	5-5/32	6	244-1657
2	1-1/4	4	7-5/32	4	244-1660
2	1-1/4	4	7-5/32	6	244-1663

4 & 6 Flute with Combination Shank

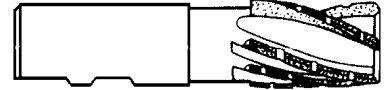


Size	Shank Dia.	Flute Length	Overall Length	No. of Flute	Order No.
1-1/2"	1-1/2"	2-1/2"	6-1/8"	4	244-1706
2	2	3	7	6	244-1709
2	2	4	8	4	244-1712
2	2	4	8	6	244-1715
2	2	5	9	4	244-1718
2	2	5	9	6	244-1721
2	2	6	10	4	244-1724
2	2	6	10	6	244-1727
2	2	8	12	4	244-1730
2	2	8	12	6	244-1733
2	2	10	14	6	244-1736

"CHIPBREAKER" Cutting Edge Carbide Tipped End Mills

4&6 Flute with Weldon Shank

- Use in semi-finishing operation.
- multi-flute can efficiently mill a wide range of materials: non ferrous materials and ferrous materials, including titanium alloy, cast iron, alloy steel, stainless steel, plastic and magnetic material etc.
- Heavy duty machining.



Size	Shank Dia.	Flute Length	Overall Length	No. of Flute	Order No.	Size	Shank Dia.	Flute Length	Overall Length	No. of Flute	Order No.
1"	7/8"	1-7/8"	4-11/16"	4	244-1803	1-1/2"	1-1/4"	4"	7-5/32"	4	244-1836
1	1	2	5-1/16	4	244-1806	1-1/2	1-1/4	8	11-5/32	4	244-1839
1	1	4	7-1/16	4	244-1809	1-3/4	1-1/4	2	5-5/32	4	244-1842
1	1	6	9-1/16	4	244-1812	1-3/4	1-1/4	2	5-5/32	6	244-1845
1-1/8	1	2	5-1/16	4	244-1815	1-3/4	1-1/4	4	7-5/32	4	244-1848
1-1/8	1	4	7-1/16	4	244-1818	1-3/4	1-1/4	4	7-5/32	6	244-1851
1-1/4	1-1/4	2	5-1/16	4	244-1821	2	1-1/4	2	5-5/32	4	244-1854
1-1/4	1-1/4	4	7-1/16	4	244-1824	2	1-1/4	2	5-5/32	6	244-1857
1-1/4	1-1/4	6	9-1/16	4	244-1827	2	1-1/4	4	7-5/32	4	244-1860
1-3/8	1	2	5-1/16	4	244-1830	2	1-1/4	4	7-5/32	6	244-1863
1-1/2	1-1/4	2	5-5/32	4	244-1833						

Common Terms in Quality Control

Accuracy: Conformity of an indicated value to the true value, i.e. an actual or an accepted standard value.

Allowance: The degree of variation permitted from a nominal specification; the total tolerance.

Axis: A designated line on a drawing machine, gage or part used to denote a linear direction from measurement or reference.

calibrate: To graduate a measuring instrument into appropriate units. To determine accuracy of a gage at given point over a gaging area.

Clearance: The space between mating parts. On a cutting tool, the angle between the cutting edge and perpendicular axis of the work.

Concentricity: The amount of conformity with one another between the centers of two circles.

Datum: A point of reference.

Deviation: Error, variation, or departure from a standard.

Dimension: Any measurable extent or magnitude as length, breadth, or thickness.

Division: A mark or graduation denoting an incremental value of a scale, dial or gage.

Eccentricity: The deviation of the centers of 2 circles from each other.

Fit: The type and closeness of contact between 2 surfaces, usually in reference to mating parts.

Flatness: The degree of conformity of a plane or axis to a master or to a specified standard (mean or reference plane).

Floating Zero: A characteristic of a machine or gaging system that permits the less than zero reference point on an axis to be established at any point in the travel.

Graduate: To mark in a regular manner the increments of measurement, as a rule, scale or dial.

Graduation: One of the marked increments described above.

Interchangeable: Sufficiently alike in size as to permit replacement without modification.

Limit: A specified dimension beyond which variation in size is not permissible for acceptance as to conforming to size.

Mean: An average. An intermediate value between two or more values.

Master: Any type of gages that is used to check the accuracy of the other gages.

Precision: The quality of being sharply or clearly determined; strictly accurate, exact. In a gage, usually one capable of discrimination to .010" or smaller.

Resolution: The smallest increment into which a gage is divided. Used interchangeably with discrimination. Also, the least: interval two adjacent discrete

details, which can be distinguished from 1 another.

Squareness: The degree of conformity of a plane or axis to a corresponding perpendicular axis.

Straightness: The degree of conformity of an axis along its length to a standard.

T.I.R.(Total Indicator Reading): The difference between the maximum and minimum indicator readings obtained usually in measurement of roundness.

Tolerance: The total permissible amount by which a dimension may vary above or below a specified size, usually expressed as plus and/or minus an amount greater or less than the specified dimension.