

Deep Hole Drilling

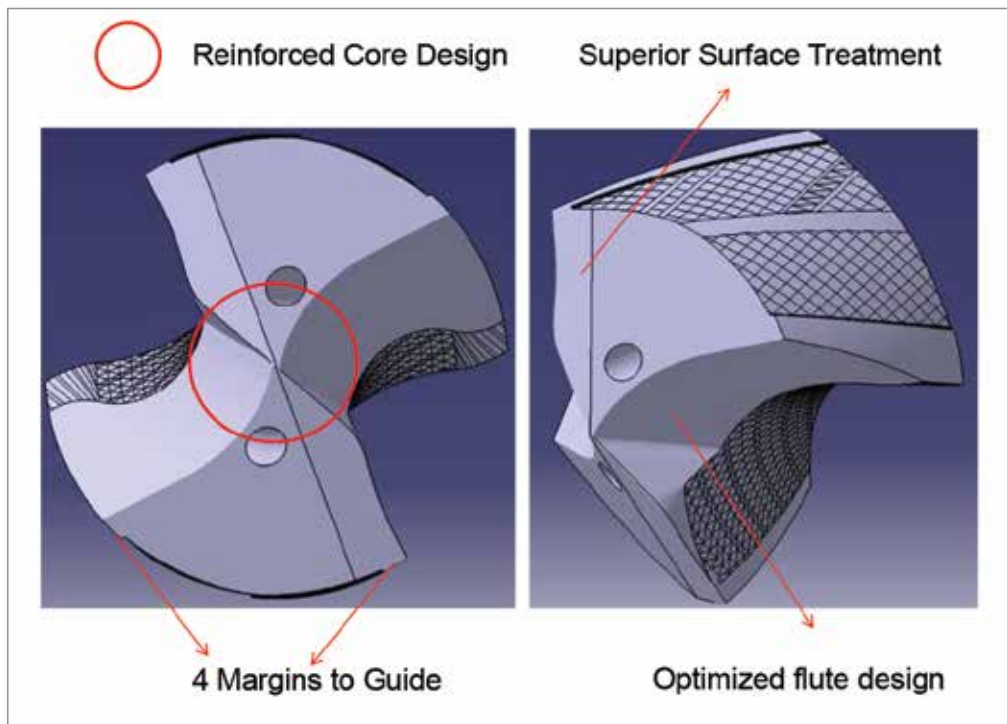


Features

- Reinforced Core Design
- Superior Surface Treatment
- 4 Margins to Guide
- High Performance Coating
- Optimized Flute Design

Benefits

- Stable cutting edge
- Better Chip Evacuation
- Better Hole Straightness
- Superior Tool Life
- Eliminated Breakages





Case Studies

Challenge	Reduction in CPC
Component	Crank Shaft
Material	Forged Steel- 30 HRc
Competition	Mitsubishi
Solution	DRILL 8.00MMX240X290 SH8 T/C DHD PT
Machine	HMC
Vc	80m/min
RPM	3200
Feed in mm/min	230 @ entry/ 350 /220 @ exit
Depth	160 X 1 Hole
Existing Tool Life	64 meters
Tool Life Achieved	66 meters
Result	Better tool Life
Benefit	15% reduction in CPC

Challenge	Reduction in breakage of oil hole drill
Component	Crankshaft 4 Cyliner
Material	Forged Steel
Competition	Guhring
Solution	DRILL 5.50MMX84X125 SH6 T/C DHD PT
Machine	SPM
Vc	65m/min
RPM	3760
Feed in mm/min	200 @ entry/ 500 /1000 @ exit
Depth	78 X 4 Holes
Existing Tool Life	187 meters
Tool Life Achieved	190 meters
Result	No Breakage
Benefit	10% reduction in CPC

Challenge	Reduce burr folding at exit
Component	Cylinder Head
Material	Aluminium ADC-7% Si
Competition	OSG Korea
Solution	DRILL 6.00MMX118X175 SH6 T/C DHD
Machine	HMC HSK63A
Vc	188m/min
RPM	10000
Feed in mm/min	500 @ entry/ 1200 /500 @ exit
Depth	80 X 4 Holes
Existing Tool Life	800 meters
Tool Life Achieved	800 meters
Result	Negligible wear and burr folding
Benefit	10% reduction in CPC

Challenge	Reduction in breakage of oil hole drill
Component	Crankshaft 2 Cyliner
Material	Forged Steel SAE 1541B
Competition	Sumitomo
Solution	DRILL 4.97X115X165MM SH5 T/C DHD PT
Machine	HMC
Vc	73m/min
RPM	4700
Feed in mm/min	200 @ entry/ 700 /500 @ exit
Depth	95 X 2 Holes
Existing Tool Life	34.2 meters
Tool Life Achieved	38 meters
Result	No Breakage
Benefit	10% reduction in CPC

Challenge	Reduction in CPC
Component	Crankshaft 4 Cyliner
Material	Forged Steel 38 MnSiV6 30-32 HRc
Competition	OSG
Solution	DRILL 6.00MMX115X 165 SH6 T/C DHD PT
Machine	Angular SPM
Vc	55m/min
RPM	2400
Feed in mm/min	150 @ entry/ 450 /150 @ exit
Depth	85 X 4 Holes
Existing Tool Life	150 meters
Tool Life Achieved	162 meters
Result	No Breakage
Benefit	10% reduction in CPC

Challenge	Reduction in CPC
Component	Crankshaft 6 Cyliner
Material	Forged Steel 38 MnSiV6 30-32 HRc
Competition	OSG
Solution	DRILL 7.00MMX110X160 SH8 T/C DHD PT
Machine	Angular SPM
Vc	55m/min
RPM	2800
Feed in mm/min	150 @ entry/ 500 /150 @ exit
Depth	80 X 4 Holes
Existing Tool Life	150 meters
Tool Life Achieved	172 meters
Result	No Breakage
Benefit	15% reduction in CPC

Challenge	Reduction in CPC
Component	Crankshaft 4 Cyliner
Material	Forged Steel EN19B 280-320 BHN
Competition	OSG
Solution	DRILL 5.95MMX120X 192 SH6 T/C DHD PT
Machine	HMC
Vc	55m/min
RPM	2934
Feed in mm/min	150 @ entry/ 480 /150 @ exit
Depth	105 X 4 Holes
Existing Tool Life	110 meters
Tool Life Achieved	124 meters
Result	No Breakage
Benefit	10% reduction in CPC

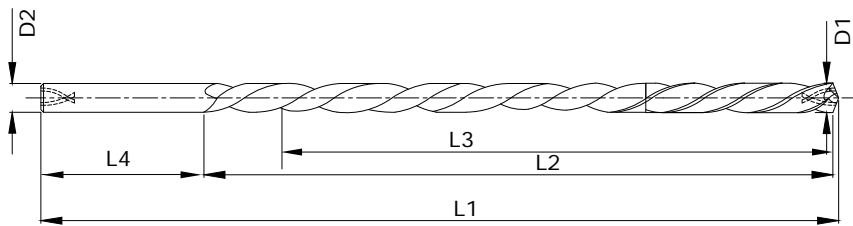
Challenge	Reduction in CPC
Component	Cam Shaft
Material	Forged Steel 16MnCr5 20-25 HRc
Competition	Walter
Solution	DRILL 7.00MMX110X 160 SH8 T/C DHD PT
Machine	SPM
Vc	55m/min
RPM	2500
Feed in mm/min	400 @ entry/ 550 /400 @ exit
Depth	68 X 1 Holes
Existing Tool Life	68 meters
Tool Life Achieved	123 meters
Result	No Breakage
Benefit	50% reduction in CPC

12X

Solid carbide 12X high performance deep hole drill with coolant feed



DRILLS



P0-P6

K1-K3

M1-M3

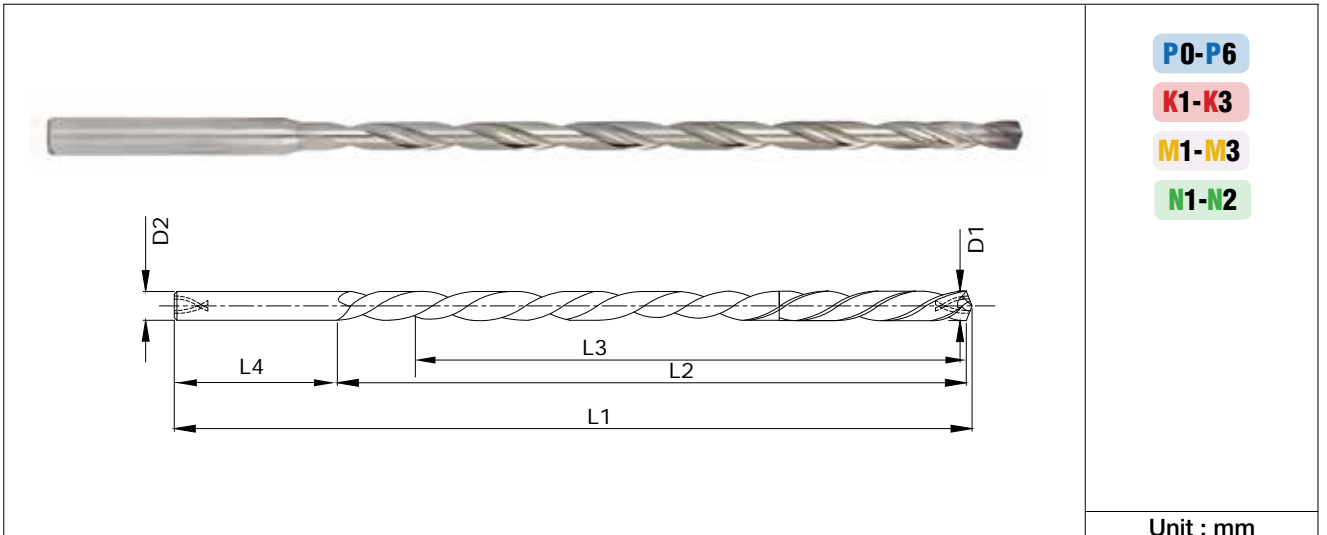
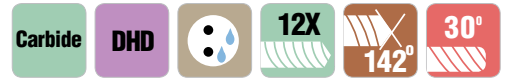
N1-N2

Unit : mm

Diameter	Flute Length	Cutting Length	Overall Length	Shank Length	Shank Diameter	Bright - Polished	TiAIN
ØD1	L2	L3	L1	L4	D2	EDP No	EDP No
3.00	52	44	93	36	4	FBJ0504114	FBJ0504035
3.175	52	44	93	36	4	FBJ0504115	FBJ0504036
3.264	53	44	93	36	4	FBJ0504116	FBJ0504037
3.50	53	44	93	36	4	FBJ0504117	FBJ0504038
3.970	66	56	107	36	4	FBJ0504118	FBJ0504039
4.00	66	56	107	36	6	FBJ0504119	FBJ0504040
4.50	67	56	107	36	6	FBJ0504120	FBJ0504041
4.60	68	57	107	36	6	FBJ0504121	FBJ0504042
4.763	82	69	125	36	6	FBJ0504122	FBJ0504043
4.80	82	69	125	36	6	FBJ0504123	FBJ0504044
4.90	83	70	125	36	6	FBJ0504124	FBJ0504045
5.00	83	70	125	36	6	FBJ0504125	FBJ0504046
5.10	83	70	125	36	6	FBJ0504126	FBJ0504047
5.20	83	70	125	36	6	FBJ0504127	FBJ0504048
5.30	84	71	125	36	6	FBJ0504128	FBJ0504049
5.41	84	71	125	36	6	FBJ0504129	FBJ0504050
5.50	84	71	125	36	6	FBJ0504130	FBJ0504051
5.558	84	71	125	36	6	FBJ0504131	FBJ0504052
5.60	85	72	125	36	6	FBJ0504132	FBJ0504053
5.70	85	72	125	36	6	FBJ0504133	FBJ0504054
5.80	85	71	125	36	6	FBJ0504134	FBJ0504055
5.90	85	71	125	36	6	FBJ0504135	FBJ0504056
6.00	86	72	125	36	6	FBJ0504136	FBJ0504057
6.20	97	82	139	36	8	FBJ0504137	FBJ0504058
6.35	98	83	139	36	8	FBJ0504138	FBJ0504059
6.50	98	83	139	36	8	FBJ0504139	FBJ0504060

12X

Solid carbide 12X high performance deep hole drill with coolant feed



- P0-P6
- K1-K3
- M1-M3
- N1-N2

DRILLS

							Unit : mm
Diameter	Flute Length	Cutting Length	Overall Length	Shank Length	Shank Diameter	Bright - Polished	TiAIN
ØD1	L2	L3	L1	L4	D2	EDP No	EDP No
6.528	98	83	139	36	8	FBJ0504140	FBJ0504061
6.60	99	84	139	36	8	FBJ0504141	FBJ0504062
6.746	99	83	139	36	8	FBJ0504142	FBJ0504063
6.80	99	83	139	36	8	FBJ0504143	FBJ0504064
6.909	100	84	139	36	8	FBJ0504144	FBJ0504065
7.00	100	84	139	36	8	FBJ0504145	FBJ0504066
7.145	111	94	153	36	8	FBJ0504146	FBJ0504067
7.50	112	95	153	36	8	FBJ0504147	FBJ0504068
7.541	112	95	153	36	8	FBJ0504148	FBJ0504069
7.70	113	96	153	36	8	FBJ0504149	FBJ0504070
7.80	113	95	153	36	8	FBJ0504150	FBJ0504071
7.938	114	96	153	36	8	FBJ0504151	FBJ0504072
8.00	114	96	153	36	8	FBJ0504152	FBJ0504073
8.10	136	116	185	40	10	FBJ0504153	FBJ0504074
8.334	137	117	185	40	10	FBJ0504154	FBJ0504075
8.433	137	117	185	40	10	FBJ0504155	FBJ0504076
8.50	137	117	185	40	10	FBJ0504156	FBJ0504077
8.70	138	118	185	40	10	FBJ0504157	FBJ0504078
8.733	138	117	185	40	10	FBJ0504158	FBJ0504079
9.00	139	118	185	40	10	FBJ0504159	FBJ0504080
9.10	139	118	185	40	10	FBJ0504160	FBJ0504081
9.129	139	118	185	40	10	FBJ0504161	FBJ0504082
9.50	140	119	185	40	10	FBJ0504162	FBJ0504083
9.525	140	119	185	40	10	FBJ0504163	FBJ0504084
9.921	142	120	185	40	10	FBJ0504164	FBJ0504085
10.00	142	120	185	40	10	FBJ0504165	FBJ0504086

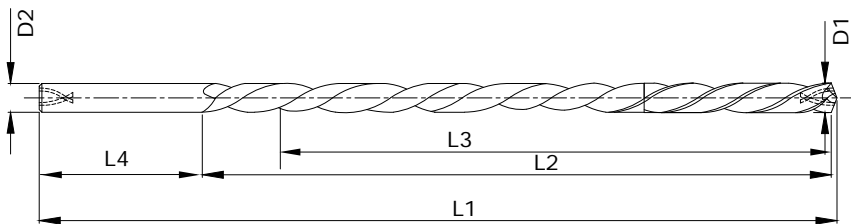
Application data on page no 3.027

12X

Solid carbide 12X high performance deep hole drill with coolant feed



DRILLS



P0-P6

K1-K3

M1-M3

N1-N2

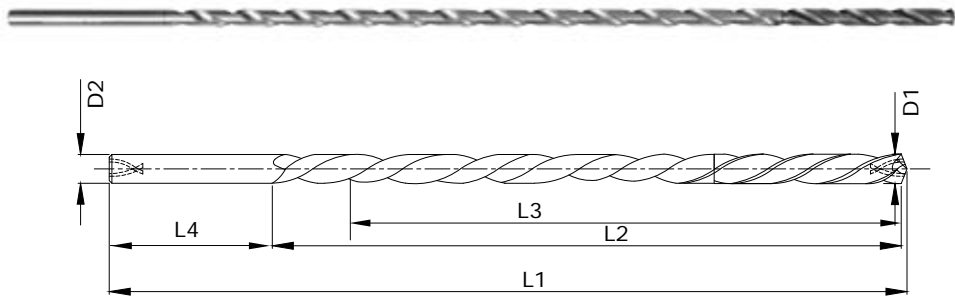
Unit : mm

Diameter	Flute Length	Cutting Length	Overall Length	Shank Length	Shank Diameter	Bright - Polished	TiAIN
ØD1	L2	L3	L1	L4	D2	EDP No	EDP No
10.20	164	140	218	45	12	FBJ0504166	FBJ0504087
10.30	165	141	218	45	12	FBJ0504167	FBJ0504088
10.32	165	141	218	45	12	FBJ0504168	FBJ0504089
10.50	165	141	218	45	12	FBJ0504169	FBJ0504090
10.716	166	142	218	45	12	FBJ0504170	FBJ0504091
10.80	166	141	218	45	12	FBJ0504171	FBJ0504092
11.00	167	142	218	45	12	FBJ0504172	FBJ0504093
11.113	167	142	218	45	12	FBJ0504173	FBJ0504094
11.50	168	143	218	45	12	FBJ0504174	FBJ0504095
11.80	169	143	218	45	12	FBJ0504175	FBJ0504096
12.00	170	144	218	45	12	FBJ0504176	FBJ0504097
12.10	192	164	246	45	14	FBJ0504177	FBJ0504098
12.304	193	165	246	45	14	FBJ0504178	FBJ0504099
12.50	193	165	246	45	14	FBJ0504179	FBJ0504100
12.70	194	166	246	45	14	FBJ0504180	FBJ0504101
13.00	195	166	246	45	14	FBJ0504181	FBJ0504102
13.10	195	166	246	45	14	FBJ0504182	FBJ0504103
13.50	196	167	246	45	14	FBJ0504183	FBJ0504104
14.00	198	168	246	45	14	FBJ0504184	FBJ0504105
14.10	220	188	277	48	16	FBJ0504185	FBJ0504106
14.288	220	188	277	48	16	FBJ0504186	FBJ0504107
14.50	221	189	277	48	16	FBJ0504187	FBJ0504108
14.684	222	190	277	48	16	FBJ0504188	FBJ0504109
15.00	223	190	277	48	16	FBJ0504189	FBJ0504110
15.50	224	191	277	48	16	FBJ0504190	FBJ0504111
15.875	225	192	277	48	16	FBJ0504191	FBJ0504112
16.00	226	192	277	48	16	FBJ0504192	FBJ0504113

Application data on page no 3.027

15X

Solid carbide 15X high performance deep hole drill with coolant feed



- P0-P6
- K1-K3
- M1-M3
- N1-N2

DRILLS

							Unit : mm
Diameter	Flute Length	Cutting Length	Overall Length	Shank Length	Shank Diameter	Bright - Polished	TiAIN
ØD1	L2	L3	L1	L4	D2	EDP No	EDP No
3.00	67	58	105	32	4	FBJ0504245	FBJ0504193
3.175	67	58	105	32	4	FBJ0504246	FBJ0504194
3.20	67	58	105	32	4	FBJ0504247	FBJ0504195
3.50	68	59	105	32	4	FBJ0504248	FBJ0504196
3.970	70	60	105	32	4	FBJ0504249	FBJ0504197
4.00	70	60	105	32	6	FBJ0504250	FBJ0504198
4.50	85	74	124	34	6	FBJ0504251	FBJ0504199
4.623	86	75	124	34	6	FBJ0504252	FBJ0504200
4.763	86	75	124	34	6	FBJ0504253	FBJ0504201
4.90	87	75	124	34	6	FBJ0504254	FBJ0504202
5.00	87	75	124	34	6	FBJ0504255	FBJ0504203
5.260	102	89	143	36	6	FBJ0504256	FBJ0504204
5.41	102	89	143	36	6	FBJ0504257	FBJ0504205
5.50	102	89	143	36	6	FBJ0504258	FBJ0504206
5.558	102	89	143	36	6	FBJ0504259	FBJ0504207
5.80	103	89	143	36	6	FBJ0504260	FBJ0504208
5.90	104	90	143	36	6	FBJ0504261	FBJ0504209
6.00	104	90	143	36	6	FBJ0504262	FBJ0504210
6.20	118	103	162	38	8	FBJ0504263	FBJ0504211
6.35	119	104	162	38	8	FBJ0504264	FBJ0504212
6.50	119	104	162	38	8	FBJ0504265	FBJ0504213
6.528	119	104	162	38	8	FBJ0504266	FBJ0504214
6.746	120	104	162	38	8	FBJ0504267	FBJ0504215
6.909	121	105	162	38	8	FBJ0504268	FBJ0504216
7.00	121	105	162	38	8	FBJ0504269	FBJ0504217
7.145	135	118	181	40	8	FBJ0504270	FBJ0504218

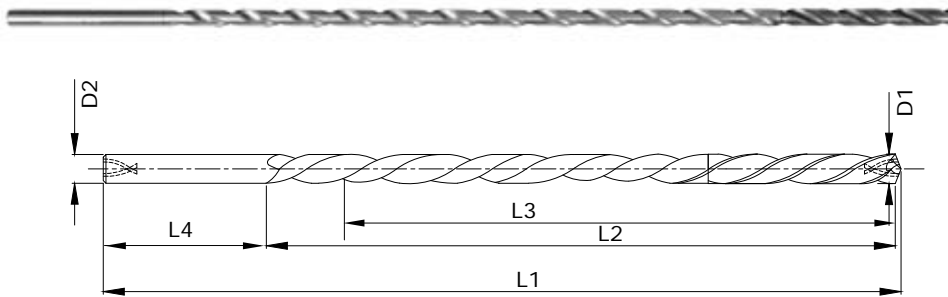
Application data on page no 3.027

15X

Solid carbide 15X high performance deep hole drill with coolant feed



DRILLS



P0-P6

K1-K3

M1-M3

N1-N2

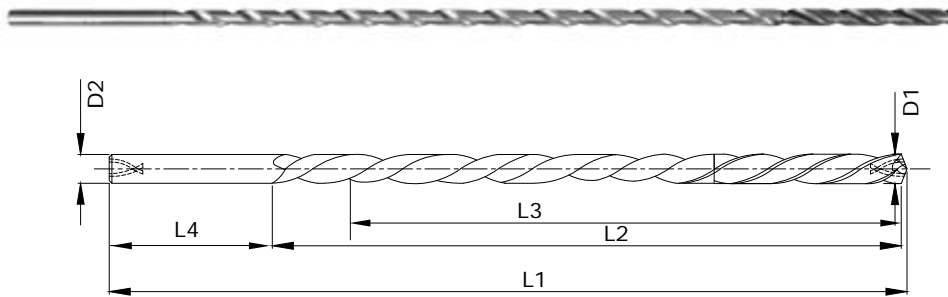
Unit : mm

Diameter	Flute Length	Cutting Length	Overall Length	Shank Length	Shank Diameter	Bright - Polished	TiAIN
ØD1	L2	L3	L1	L4	D2	EDP No	EDP No
7.50	136	119	181	40	8	FBJ0504271	FBJ0504219
7.541	136	119	181	40	8	FBJ0504272	FBJ0504220
7.938	138	120	181	40	8	FBJ0504273	FBJ0504221
8.00	138	120	181	40	8	FBJ0504274	FBJ0504222
8.334	153	134	200	42	10	FBJ0504275	FBJ0504223
8.433	153	134	200	42	10	FBJ0504276	FBJ0504224
8.50	153	134	200	42	10	FBJ0504277	FBJ0504225
8.733	154	134	200	42	10	FBJ0504278	FBJ0504226
9.00	155	135	200	42	10	FBJ0504279	FBJ0504227
9.10	169	148	219	44	10	FBJ0504280	FBJ0504228
9.50	170	149	219	44	10	FBJ0504281	FBJ0504229
9.525	170	149	219	44	10	FBJ0504282	FBJ0504230
9.75	171	149	219	44	10	FBJ0504283	FBJ0504231
10.00	172	150	219	44	10	FBJ0504284	FBJ0504232
10.20	186	163	238	46	12	FBJ0504285	FBJ0504233
10.50	187	164	238	46	12	FBJ0504286	FBJ0504234
10.72	188	165	238	46	12	FBJ0504287	FBJ0504235
11.00	189	165	238	46	12	FBJ0504288	FBJ0504236
11.50	204	179	257	48	12	FBJ0504289	FBJ0504237
12.00	206	180	257	48	12	FBJ0504290	FBJ0504238
12.50	221	194	276	50	14	FBJ0504291	FBJ0504239
12.70	222	195	276	50	14	FBJ0504292	FBJ0504240
13.00	223	195	276	50	14	FBJ0504293	FBJ0504241
13.10	237	208	295	52	14	FBJ0504294	FBJ0504242
13.50	238	209	295	52	14	FBJ0504295	FBJ0504243
14.00	240	210	295	52	14	FBJ0504296	FBJ0504244

Application data on page no 3.027

20X

Solid carbide 20X high performance deep hole drill with coolant feed



- P0-P6
- K1-K3
- M1-M3
- N1-N2

DRILLS

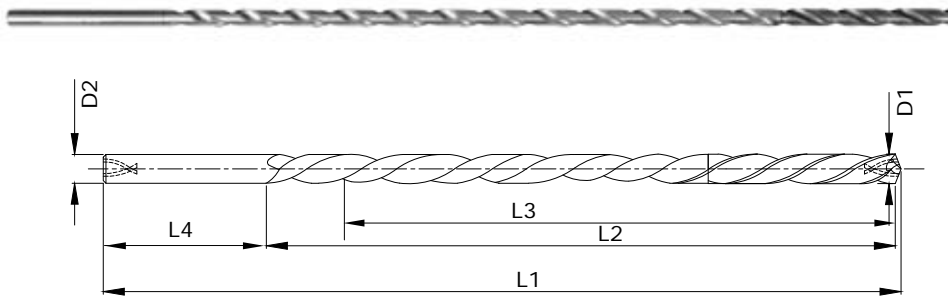
							Unit : mm	
Diameter	Flute Length	Cutting Length	Overall Length	Shank Length	Shank Diameter	Bright - Polished	TiAIN	
ØD1	L2	L3	L1	L4	D2	EDP No	EDP No	
3.00	83	74	125	32	4	FBJ0504341	FBJ0504297	
3.175	83	74	125	32	4	FBJ0504342	FBJ0504298	
3.30	84	75	125	32	4	FBJ0504343	FBJ0504299	
3.50	86	77	125	32	4	FBJ0504344	FBJ0504300	
3.97	89	79	125	32	4	FBJ0504345	FBJ0504301	
4.00	90	80	125	32	6	FBJ0504346	FBJ0504302	
4.50	108	97	149	34	6	FBJ0504347	FBJ0504303	
4.623	109	98	149	34	6	FBJ0504348	FBJ0504304	
4.763	110	99	149	34	6	FBJ0504349	FBJ0504305	
4.90	112	100	149	34	6	FBJ0504350	FBJ0504306	
5.00	112	100	149	34	6	FBJ0504351	FBJ0504307	
5.26	128	115	173	36	6	FBJ0504352	FBJ0504308	
5.41	129	116	173	36	6	FBJ0504353	FBJ0504309	
5.50	130	117	173	36	6	FBJ0504354	FBJ0504310	
5.558	130	117	173	36	6	FBJ0504355	FBJ0504311	
5.80	132	118	173	36	6	FBJ0504356	FBJ0504312	
5.90	134	120	173	36	6	FBJ0504357	FBJ0504313	
6.00	134	120	173	36	6	FBJ0504358	FBJ0504314	
6.20	149	134	197	38	8	FBJ0504359	FBJ0504315	
6.35	151	136	197	38	8	FBJ0504360	FBJ0504316	
6.50	152	137	197	38	8	FBJ0504361	FBJ0504317	
6.528	152	137	197	38	8	FBJ0504362	FBJ0504318	

20X

Solid carbide 20X high performance deep hole drill with coolant feed



DRILLS



- P0-P6
- K1-K3
- M1-M3
- N1-N2

Unit : mm

Diameter	Flute Length	Cutting Length	Overall Length	Shank Length	Shank Diameter	Bright - Polished	TiAIN
ØD1	L2	L3	L1	L4	D2	EDP No	EDP No
6.746	154	138	197	38	8	FBJ0504363	FBJ0504319
6.909	155	139	197	38	8	FBJ0504364	FBJ0504320
7.00	156	140	197	38	8	FBJ0504365	FBJ0504321
7.145	171	154	221	40	8	FBJ0504366	FBJ0504322
7.50	174	157	221	40	8	FBJ0504367	FBJ0504323
7.541	174	157	221	40	8	FBJ0504368	FBJ0504324
7.938	177	159	221	40	8	FBJ0504369	FBJ0504325
8.00	178	160	221	40	8	FBJ0504370	FBJ0504326
8.334	194	175	245	42	10	FBJ0504371	FBJ0504327
8.433	195	176	245	42	10	FBJ0504372	FBJ0504328
8.50	196	177	245	42	10	FBJ0504373	FBJ0504329
8.733	198	178	245	42	10	FBJ0504374	FBJ0504330
9.00	200	180	245	42	10	FBJ0504375	FBJ0504331
9.10	215	194	269	44	10	FBJ0504376	FBJ0504332
9.50	218	197	269	44	10	FBJ0504377	FBJ0504333
9.525	218	197	269	44	10	FBJ0504378	FBJ0504334
9.75	220	198	269	44	10	FBJ0504379	FBJ0504335
10.00	222	200	269	44	10	FBJ0504380	FBJ0504336
10.20	237	214	293	46	12	FBJ0504381	FBJ0504337
10.50	240	217	293	46	12	FBJ0504382	FBJ0504338
10.72	242	219	293	46	12	FBJ0504383	FBJ0504339
11.00	244	220	293	46	12	FBJ0504384	FBJ0504340



FEED RATE CHART

Series DHD-12X/DHD-15X/DHD-20X METRIC TiAlN

		Cutting Speed Vc (m/min)			Diameter in mm							
					Recommended feed in mm/rev							
					3.00	4.00	6.00	8.00	10.0	12.0	16.0	
Steel	P	0	50	80	fz	0.10-0.12	0.12-0.13	0.14-0.16	0.16-0.18	0.18-0.20	0.20-0.22	0.22-0.24
		1	50	80	fz	0.10-0.12	0.12-0.13	0.14-0.16	0.16-0.18	0.18-0.20	0.20-0.22	0.22-0.24
		2	50	80	fz	0.10-0.12	0.12-0.13	0.14-0.16	0.16-0.18	0.18-0.20	0.20-0.22	0.22-0.24
		3	40	60	fz	0.10-0.12	0.12-0.13	0.14-0.16	0.16-0.18	0.18-0.20	0.20-0.22	0.22-0.24
		4	40	60	fz	0.10-0.12	0.12-0.13	0.14-0.16	0.16-0.18	0.18-0.20	0.20-0.22	0.22-0.24
Stainless Steels	M	1	40	60	fz	0.05-0.09	0.07-0.12	0.09-0.14	0.10-0.15	0.11-0.16	0.12-0.17	0.14-0.19
		2	30	50	fz	0.04-0.08	0.06-0.11	0.08-0.13	0.09-0.14	0.10-0.15	0.11-0.16	0.13-0.18
		3	30	50	fz	0.04-0.08	0.06-0.11	0.08-0.13	0.09-0.14	0.10-0.15	0.11-0.16	0.13-0.18
Cast Iron	K	1	60	100	fz	0.10-0.12	0.12-0.13	0.14-0.16	0.16-0.18	0.18-0.20	0.20-0.22	0.22-0.24
		2	60	80	fz	0.10-0.12	0.12-0.13	0.14-0.16	0.16-0.18	0.18-0.20	0.20-0.22	0.22-0.24
		3	60	80	fz	0.10-0.12	0.12-0.13	0.14-0.16	0.16-0.18	0.18-0.20	0.20-0.22	0.22-0.24

Bright polished

		Cutting Speed Vc (m/min)			Diameter in mm						
					Recommended feed in mm/rev						
					3.00	4.00	6.00	8.00	10.0	12.0	16.0
N	1	120	300	fz	0.12 - 0.17	0.13 - 0.18	0.15 - 0.24	0.19 - 0.29	0.26 - 0.35	0.31 - 0.40	0.41 - 0.51
	2	120	300	fz	0.12 - 0.17	0.13 - 0.18	0.15 - 0.24	0.19 - 0.29	0.26 - 0.35	0.31 - 0.40	0.41 - 0.51

Tips

- 1) Ensure surface is prepared/machined before drilling
- 2) Use the special Forbes Pilot drill for pre drilling
- 3) Check for wear on Pilot drill during operation, which can lead to premature failure of the DHD tool
- 4) Ensure adequate coolant pressure and good filtration of coolant
- 5) For long chipping steel, it may be necessary to increase feed rate by 10–20% to provide optimal chip control.
- 6) For drill retraction, drop the cutting parameters: 50 RPM and feed rate 2 m/min

Case Studies

Challenge	Reduction in CPC	Challenge	Reduction in CPC
Component	Crank Shaft	Component	Crank Shaft
Material	Forged Steel SAE1541	Material	Forged Steel 35 HRC
Competition	OSG	Competition	Mitsubishi/Sumitomo/Walter
Solution	DRILL 5.00MMX135X185 SH6 T/C DHD PT	Solution	DRILL 5.97MMX160X210 SH6 T/C DHD PT
Machine	SPM	Machine	HMC
Vc	59m/min	Vc	66m/min
RPM	3800	RPM	3500
Feed in mm/min	150 @ entry/ 480/150 @ exit	Feed in mm/min	420mm/min
Depth	105 X 2 Holes	Depth	138 X 6 Holes
Existing Tool Life	26 meters	Existing Tool Life	33 meters
Tool Life Achieved	32 meters	Tool Life Achieved	33 meters
Result	No Breakage	Result	No Breakage
Benefit	10% reduction in CPC	Benefit	10% reduction in CPC