



MIROKU



GUNDRILL & REAMER

MIROKU MACHINE TOOL, INC.

World famous Miroku can be delivered immediately.

Custom-sized Drills are available within one month after order.

Sufficient tool inventory is for your order.

Tools listed on page 1 will be shipped in one or two days after order.

D φ mm	L mm
2	254
2.5	254
3	800
4	800
4	1000
4.5	800
4.5	1000
5	800
5	1000
5.5	800
5.5	1000
6	914
6	1219
6	1450
6	1650
6.2	1650
6.3	1650
6.5	914
6.5	1219
6.5	1650
7	914
7	1219
7	1450
7	1650
7	2150
8	914
8	1219
8	1450
8	1650
8	2150
8.1	1450
8.2	1650
8.3	1650
8.5	914
8.5	1219
8.5	1650
9	914
9	1219
9	1450
9	1650
9	2150
9.1	1450
9.2	1650
9.3	1650
9.5	914
9.5	1219
9.5	1650
10	1219

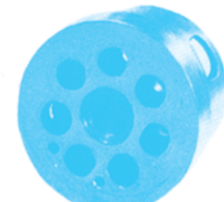
D φ mm	L mm
10	1450
10	1650
10	1829
10	2150
10.1	1450
10.2	1650
10.3	1650
10.5	1219
10.5	1650
11	1219
11	1450
11	1650
11	1829
11	2150
11.1	1450
11.2	1650
11.3	1650
11.5	1219
11.5	1650
12	1219
12	1450
12	1650
12	1829
12	2150
12.1	1450
12.2	1650
12.3	1650
12.5	1219
12.5	1650
13	1219
13	1450
13	1650
13	1829
13	2150
13.1	1450
13.2	1650
13.3	1650
13.5	1219
13.5	1650
14	1219
14	1450
14	1650
14	1829
14	2150
14.1	1450
14.2	1650
14.3	1650
14.5	1219
14.5	1650
15	1219
15	1450

D φ mm	L mm
15	1650
15	1829
15	2150
15.1	1450
15.2	1650
15.3	1650
15.5	1219
15.5	1650
16	1219
16	1450
16	1650
16	1829
16	2150
16.1	1450
16.2	1650
16.3	1650
16.5	1219
16.5	1650
17	1650
17	2150
18	1219
18	1450
18	1650
18	1829
18	2150
18.1	1450
18.2	1650
18.3	1650
18.5	1219
18.5	1650
19	1219
19	1450
19	1650
19	1829
19	2150
19.1	1450
19.2	1650
19.3	1650
20	1219
20	1450
20	1650
20	1829
20	2150
20.1	1450
20.2	1650
20.3	1650
21	1219
21	1450
21	1650
21	1829
21	2150

D φ mm	L mm
21.1	1450
21.2	1650
21.3	1650
22	1219
22	1450
22	1650
22	1829
22	2150
22.2	1650
22.3	1650
23	1219
23	1450
23	1650
23	1829
23	2150
23.2	1650
23.3	1650
24	1219
24	1450
24	1650
24	1829
24	2150
24.2	1650
24.3	1650
25	1219
25	1650
25	2150
25.2	1650
25.3	1650
26	1219
26	1650
26	2150
27	1219
27	1650
27	2150
28	1219
28	1650
28	2150
29	1219
29	1650
29	2150
30	1219
30	1650
30	1829
30	2150
31	2150
32	2150

■ When ordering, please advise:

- 1) Work material
- 2) Work configuration (preferably in drawing)
- 3) Hardness
- 4) Hole diameter and tolerance
- 5) Hole depth (through or blind hole)
- 6) Accuracy requirement (surface finish, straightness, cylindricity etc)
- 7) Predrilled diameter (in case of gunboring)



FEATURE

- ★ Wide size range from ϕ 1.4mm to ϕ 50.8mm
- Carbide blanks are made of high abrasion resistant materials, K type
Various kinds of carbide blanks are also available depending on the materials to be drilled.
- Shank is one of the most important elements in Gundrill.
We make it more rigid by special heat treatment under strict quality control.
- ★ Finely aligned to assure long tool life under hard machining torque, thrust and centrifugal force
- ★ Excellent repeatability of machining accuracy promises successful subsequent machining processes.

SIZE RANGE

- ★ Any size in a micron order increment can be manufactured in the range from ϕ 1.4mm upto ϕ 50.8mm.
- ★ Maximum tool length according tool diameter:

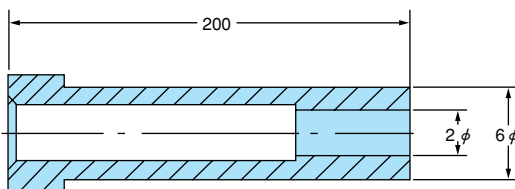
Tip dia.	Tool length (max.)
Upto ϕ 1.4mm	300mm
Upto ϕ 2mm	558mm
Upto ϕ 2.5mm	711mm
Upto ϕ 3mm	1000mm
Upto ϕ 4mm	1300mm
Upto ϕ 5mm	1400mm
Upto ϕ 6-7mm	2150mm
Upto ϕ 8-16mm	2500mm
Upto ϕ 16mm or larger	over 2500mm *

*Please consult us when an extra long tool is required.

TYPICAL WORKS

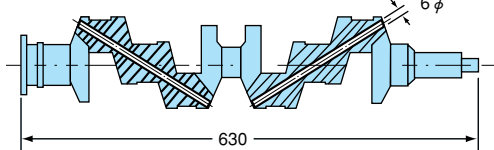
A) Ejector pin for mold

Work material : SACM



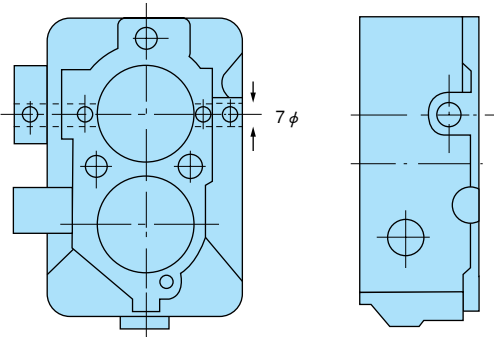
B) Crankshaft

Work material : Carbon steel



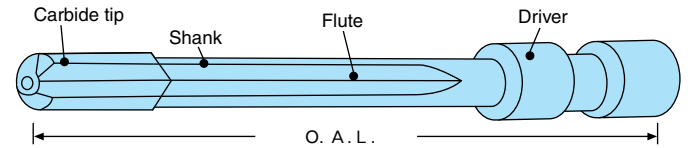
C) Carburetor

Work material : F C-25

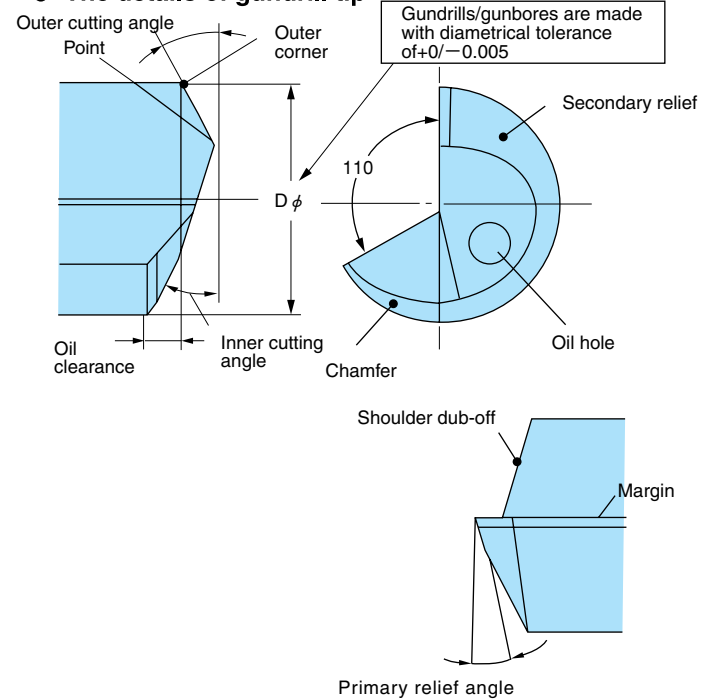


SPECIFICATION AND NORM

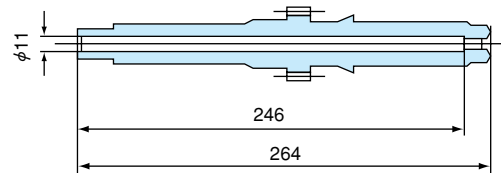
Normenclature



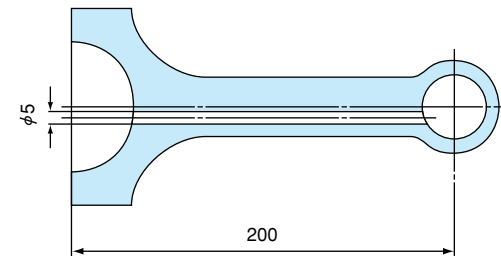
The details of gundrill tip



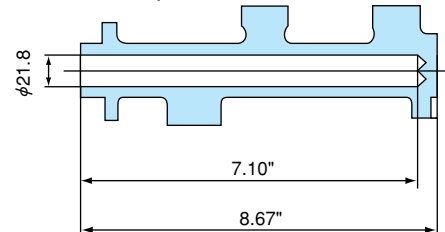
Accelerated main shaft (SCM22)



Connecting rod (S45C)



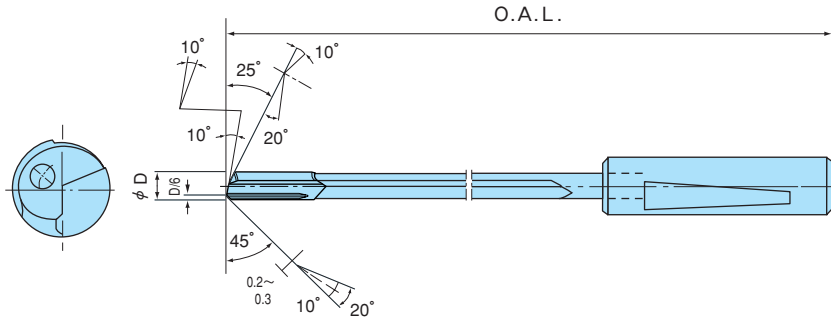
Master cylinder (AC2A, FC20)



■ PRINCIPAL APPLICATION

- ★ Hole making that needs multiple machining (drilling, reaming, honing etc) to satisfy a certain level of accuracy requirements (straightness, roundness, surface finish etc).
- ★ Hole making that takes a long time.
- ★ Overlapping or paralleling holes that need strict parallel accuracy
- ★ Blind holes that needs bottom finishing
- ★ Concentric, stepped or interrupted holes
- ★ Any hole hard to make by ordinary drilling

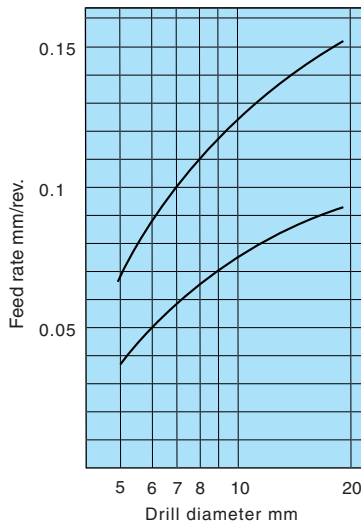
■ V-ROAD GUNDRILLS



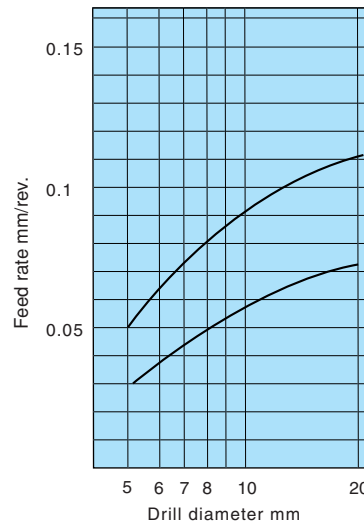
High feed gun drills that can be used on machining centers.

■ V-ROAD GUNDRILL CASE STUDY

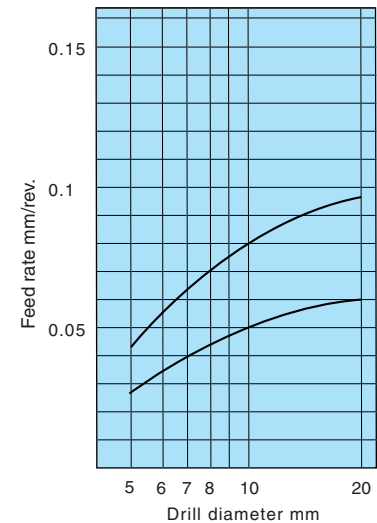
Works material: Medium carbon steel
Low carbon alloy steel
Hardness: < Hb200
Speed: $V \approx 70$ m/min.



Medium-high carbon steel
Alloy steel
Hb200-250
 $V \approx 60-70$ m/min.



Medium-high carbon steel
Alloy steel
Hb250-300
 $V \approx 60$ m/min.

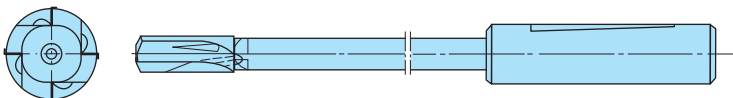


■ GUNREAMER

- TYPE
- 1) by application—for blind holes, for through holes
 - 2) by number of flutes—single, two, four, six
 - 3) by hole diameters—single, ~ four stepped

■ TWO-FLUTE GUNDRILL

Two-fluted gun drills are available for high feed hole making in cast irons or aluminum alloys.



■ COATING GUNDRILLS

TiN, TiCN, and TiAlN coating are available to improve the accuracy of hole diameter and the tool life for machining high hard materials.

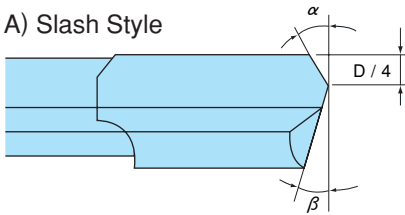
■ DIAMOND COMPAX GUNDRILLS / GUN REAMERS

These tools are used to improve the tool life for machining aluminum diecasts. Miroku can provide DIAMOND COMPAX GUNDRILLS and GUN REAMERS whose tool life is 50-100 times longer than tungsten carbide tools. CBN type tools are also available.

■ Nose Style

(The drill tip usually has a back taper of 0.05mm/100mm)

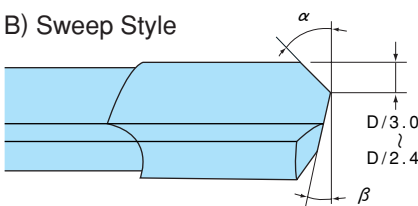
A) Slash Style



Style	Outer angle α	Inner angle β
N 4	15°	20°
N 8	30°	20°
N 13	40°	20°
N -126	0°	5°

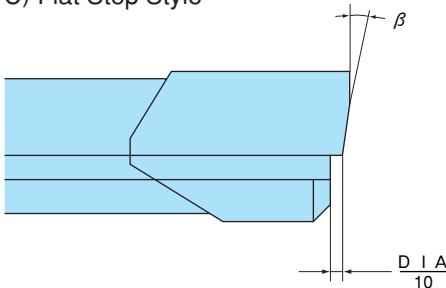
※ Point D/2.5

B) Sweep Style



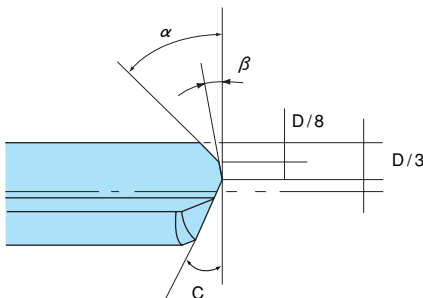
Style	Outer angle α	Inner angle β
N 73 E	30°	10°
N -123	45°	5°

C) Flat Step Style



Style	Outer angle α	Inner angle β
N -100	0°	2°

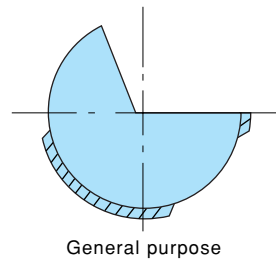
D) Stugpoint Style.



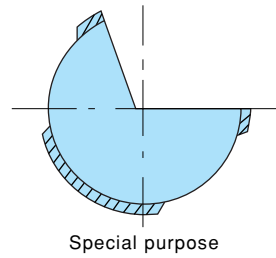
Outer angle α	Outer angle β	Inner angle C
45°	10°	25°

■ Wear Pad Style

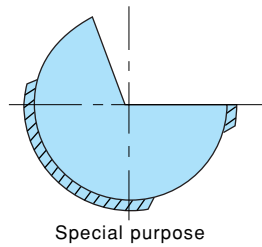
A) R-1 Standard



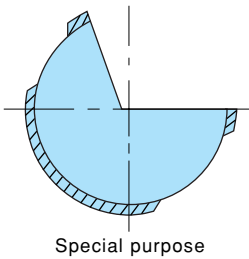
B) R-2 Standard + Top



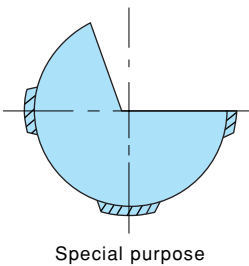
C) R-3 High



D) R-4 High + Top

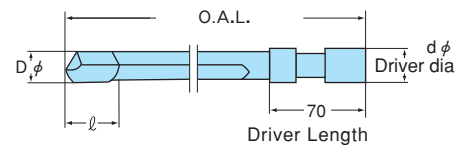


E) R-9 High Interrupted



■ Standard specification

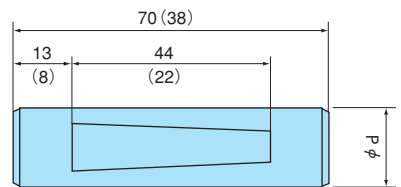
A) Tip Length



$D\phi$	l
1.4 ~ 1.90	13
1.91 ~ 2.91	19
2.92 ~ 3.30	20
3.31 ~ 4.09	22
4.10 ~ 4.89	24
4.90 ~ 5.28	25
5.29 ~ 5.68	27
5.69 ~ 6.08	29
6.09 ~ 6.47	30
6.48 ~ 6.97	31
6.98 ~ 10.05	33
10.06 ~ 12.03	35
12.04 ~ 13.61	38
13.62 ~ 15.60	40
15.61 ~ 17.19	41
17.20 ~ 21.95	45
21.96 ~ 26.32	48
26.33 ~ 31.87	51
31.88 ~	55

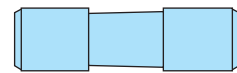
B) Drive Style

● TF Style(standard)

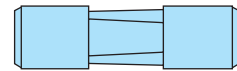


Parenthesized dimensions are applied to STF style

● TU Style(optional)



● TX Style(optional)



$D\phi$	$d\phi$	Style
1.4 ~ 3.174	12.70	S T F
3.175 ~ 12.700	19.05	T F
12.701 ~ 19.050	25.40	T F
19.051 ~ 25.400	31.75	T F
25.401 ~ 32.000	38.10	T F
32.001 ~ 50.800	50.80	T F

■ Trouble Shooting Guide on Gundrilling

Tool Failure

Time of failure	Cause	Countermeasure
Hole entrance	• Machine	· Check if the feed is properly set · Check if part is properly clamped · Check if whip guide is properly set
	• Tool	· Check if tip is properly sharpened
	• Drill bush	· Check if there is oil leak or entangled chips
Hole midway	• Machine	· Check if the head is evenly fed
	• Damaged tip	· Refer to Tool Life section
Hole exit	• Feed rate	· Reduce feed-rate at hole exit
In retract	• Part shape	· Check if hole exit is made way out by inclined endface of part
	• Burnishing torque	· Reduce the cutting speed

Tool Life

Trouble	Cause	Countermeasure
Poor tool life	• Improper machining Variables	· Check if the speed is properly set · Check if feed-rate is proper
	• Machine	· Check if the spindle runs out excessively · Check if the spindle and drill bush are properly aligned · Check if the guide bore of drill bush is worn beyond limit · Check if whip guides are properly set
	• Tool	· Check if proper nose angles or guide pad are selected · Check if the drill OAL is proper · Check if the drill is properly reground
	• Coolant	· Check if proper coolant is used · Check if coolant is properly filtered · Check oil temperature. Change to a tank of larger capacity if necessary
	• Work material	· Check if material is of uniform quality

Machining Accuracy

Trouble	Cause	Countermeasure
Poor surface finish	• Improper feedrate	· Reduce feed rate
	• Machine	· Check for spindle runout, erratic feed oversized bush bore, clamping error
	• Tool	· Check if drill is firmly secured
	• Coolant	· Check if proper coolant is used · Check if coolant is properly filtered
Hole out of round Hole out of size	• Machining variable	· Select proper feed rate
	• Machine	· Make guide bush clearance closer · Align spindle and guide bush more closely
	• Tool	· Check if proper nose style is selected
	• Coolant	· Select proper coolant
Hole runout	• Machine	· Make guide bush clearance closer · Align spindle and guide bush more closely
	• Tool	· Check if proper nose style is selected
	• Work material	· Check for blowholes or uneven wall thickness · Check if the drill enters at right angle

Chip Formation

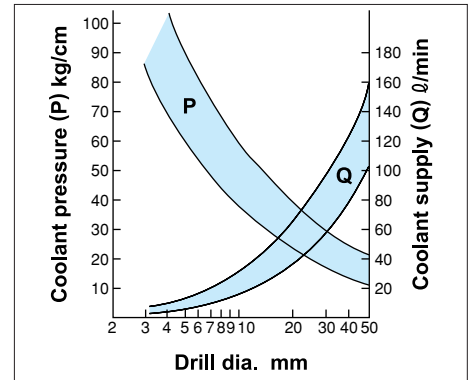
Trouble	Cause	Countermeasure
Clogged chips	• Low oil pressure	· Select proper coolant pressure
	• Insufficient coolant flow	· Select proper coolant flow · Check for coolant viscosity
	• Poor chip formation	· Reduce feed rate · Select proper nose style
	• Machine	· Employ large chip box
Entangled chip	• Stringy chips	· Increase cutting speed · Check for excessive tip wear at outer corner · Check for chipping at outer cutting edge or corner · Check if grinding wheel grit is proper · For stringy chips generated when drilling a guide bore, increase oil pressure and reduce feed rate
	• Bellow-like chips	· Check for chipping at apex point or its vicinity

Recommended Cutting Conditions for Gundrilling

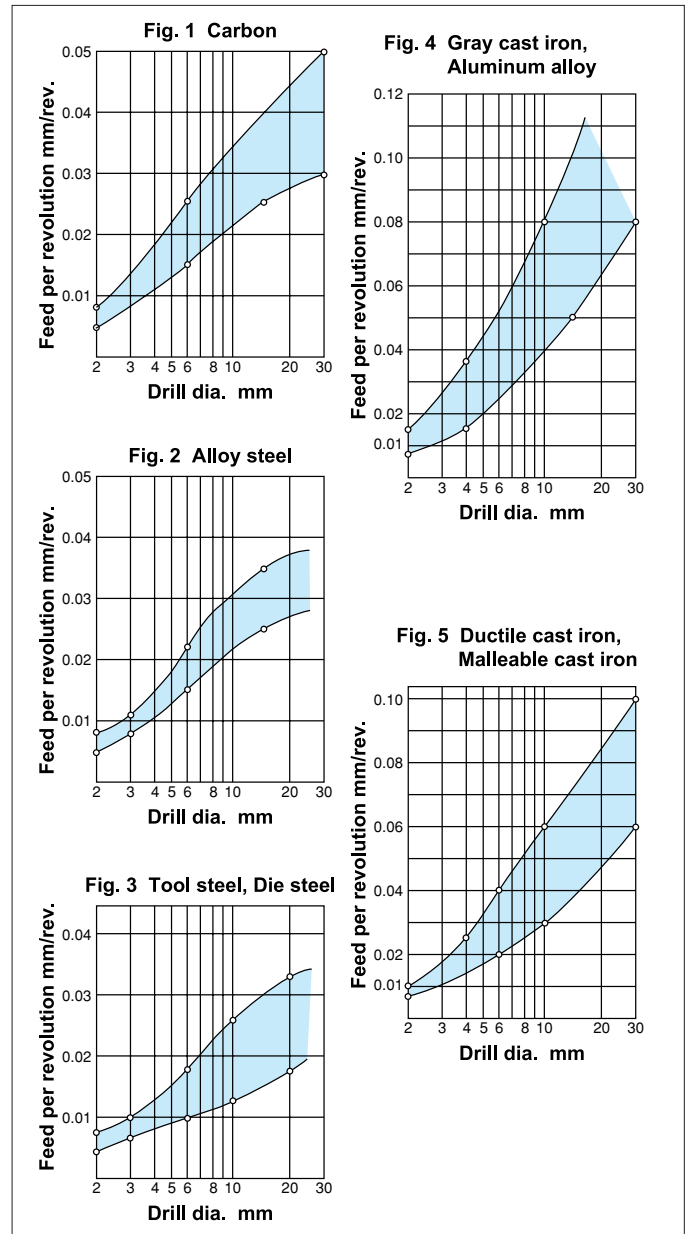
Machining Variable

Work material	Heat treatment	Hardness		Speed (m/min)	Feed (mm/rev)
		Hb	HRC		
Free cutting carbon steel S10C~S15C S30C~S50C S35C~S50C	Cold drawn Cold drawn Quenched & tempered	160~190 200~230 250~300	(5)~(11) (12)~20 25~32	130 100 80	Fig.1
Carbon steel S10C~S35C S10C~S50C S50C~ S20C~S30C S30C~S55C	Annealed Annealed Quenched & tempered	110~120 120~185 170~200 210~250 260~310	~(9) (5)~(13) (16)~24 26~33	130 120 100 90 70	
S50C~S55C~	Quenched & tempered	320~375 380~440	34~40 41~47	50 40	
Alloy steel SCr.SNC SNCM, SCM SMn etc.	Annealed	150~230	~(20)	90	Fig.2
Alloy steel SCr.SNC SNCM, SCM SMn etc.	Annealed or Quenched & tempered	240~310 315~370 380~440 450~500	23~33 34~40 40~47 48~51	70 50 40 30	Fig.2 Fig.3
Cast steel SC etc.	Quenched & tempered	140~180 190~240	~(8) (11)~22	100 90	Fig.2
Tool steel SKS, SKD etc.	Annealed Annealed	150~200 210~300	~(13) (16)~32	70 50	Fig.3
Stainless steel Ferrite SUS405-430 Austenite SUS304-305 Martensite SUS403-410	Annealed Annealed Annealed Quenched & tempered	150~200 160~220 160~220 300~350	~(13) ~(18) ~38 32~38	70 50 70 50	Fig.3
Bearing steel	Annealed	150~210		70	
Heat-resisting alloy steel				20	
High speed steel	Annealed	210~285	(16)~30	50	
Gray iron casting FC10~35		110~180 190~220 220~260		90 80 70	Fig.4
Ductile iron casting FCD10~35		120~170 180~240 240~280 260~320		80 65 55 40	Fig.5
Malleable iron casting FCMB FCMP		110~180 190~220 220~260		90 80 70	
Aluminum alloy casting Cast iron AC3A etc. Die casting ADC		500kgLoad 40~100		180 180	Fig.4
Copper alloy		120~160 160~205		<105 <120	Fig.4 Fig.5

Oil Flow Rate & Oil Pressure



Feed Rate Chart



MIROKU Nose Grinding Fixture for Gundrill

- Nose Grinding Range: ϕ 1.5— ϕ 44mm
- Available for all sizes at one chuck.
Collet is not necessary.
- You can fix outer/inner angles at any angle.



MIROKU MACHINE TOOL, INC.

Cincinnati : 110 Boggs Lane, Suite #151 Cincinnati OH 45246
TEL : (513) 771-0666 **FAX :** (513) 771-2666
E-mail : miroku-usa@miroku-gd.co.jp

Tokyo Office : Meijiyasudaseimei Bldg 12F 1-5-2 Irifune, Urayasu
Chiba 279-0012 JAPAN

Tool Factory : TEL : 81-(47) 355-5505 FAX : 81-(47) 355-5552
600-1 Shinohara, Nankoku City, Kochi 783-0006 JAPAN
TEL : 81-(88) 880-6969 FAX : 81-(88) 880-6878

Specifications subject to change without notice.