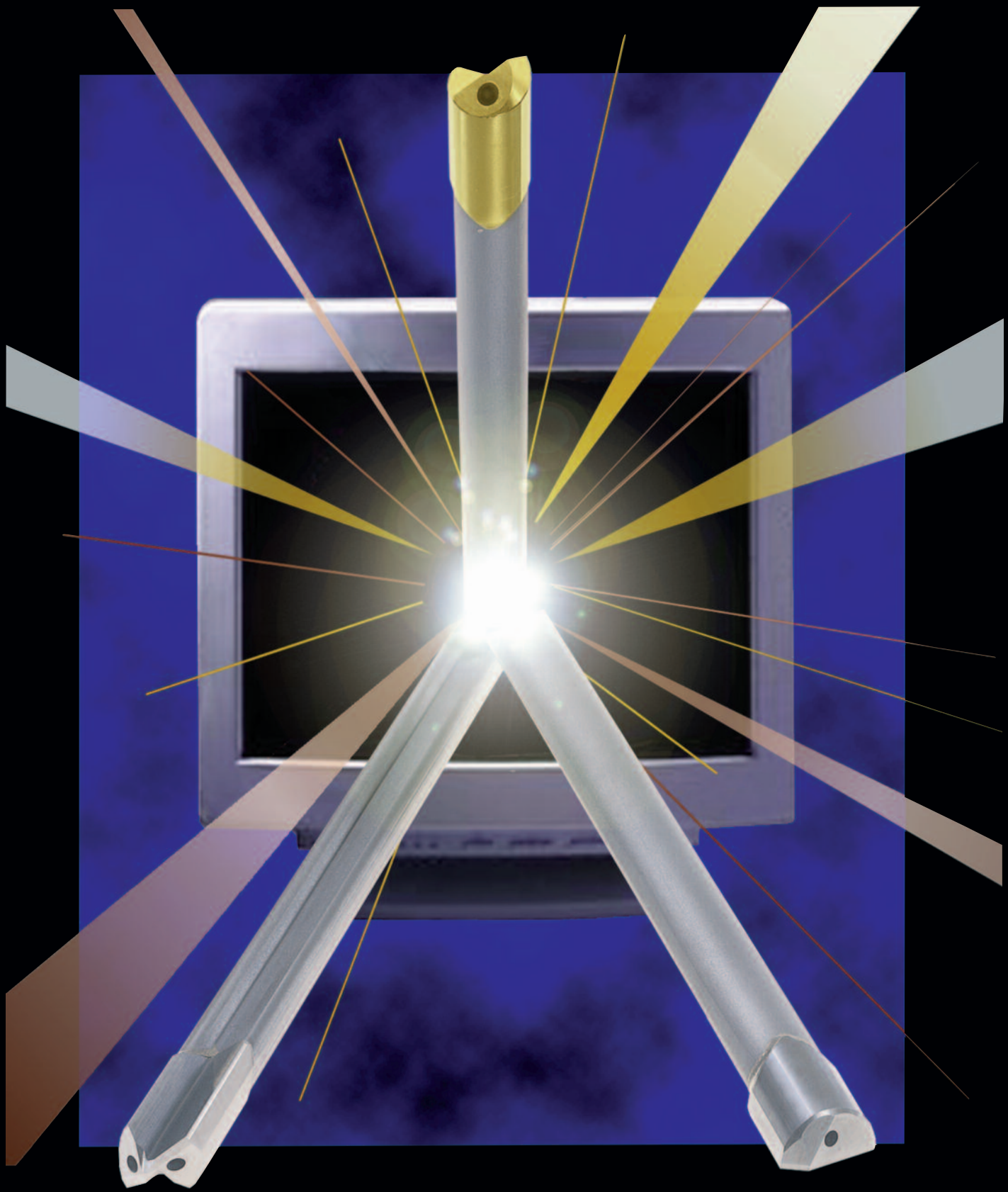
# Sterling Gun Drills



## Deep Hole Gun Drills and Drilling Systems

STERLING GUN DRILLS

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STERLING GUN DRILLS

# An Introduction to Gun Drilling

Deep hole drilling was first developed for the manufacturing of firearms, hence the name gun drilling. Originally a time-consuming and costly process, today's technological advances make it a highly efficient manufacturing operation in all metal cutting industries including automotive, aircraft and aerospace, construction, medical, mold and tool and die, hydraulics, pneumatics, and more.

Gun drilling is an ideal solution for most deep and precision drilling projects. This high precision operation produces accurate, repeatable holes, with excellent surface finishes. Gun drills hold location to precise tolerances, are sized to exact specifications, produce burr-free holes, and can be formed to produce specific shapes in blind holes with minimal machine adaptation.

As a leading manufacturer of deep hole drills, Sterling Gun Drills continues to build its reputation for personal service and practical solutions for production requirements, large and small. We match the correct drill, whether standard or specialized, to the intended material and application. All of our customers can depend on us for prompt, efficient response and quality products that attest to our expertise in engineering and manufacturing. As part of our scrupulous inspection procedure, we test 100% of our drills of .375" diameter and under for assembly integrity, leakage, and specified oil flow.

If you need assistance in planning or solving technical problems, our staff is on hand to provide support. All our services are provided with one goal in mind:To supply the finest gun drills and the best service at the most reasonable cost.

## The gun drill and its function

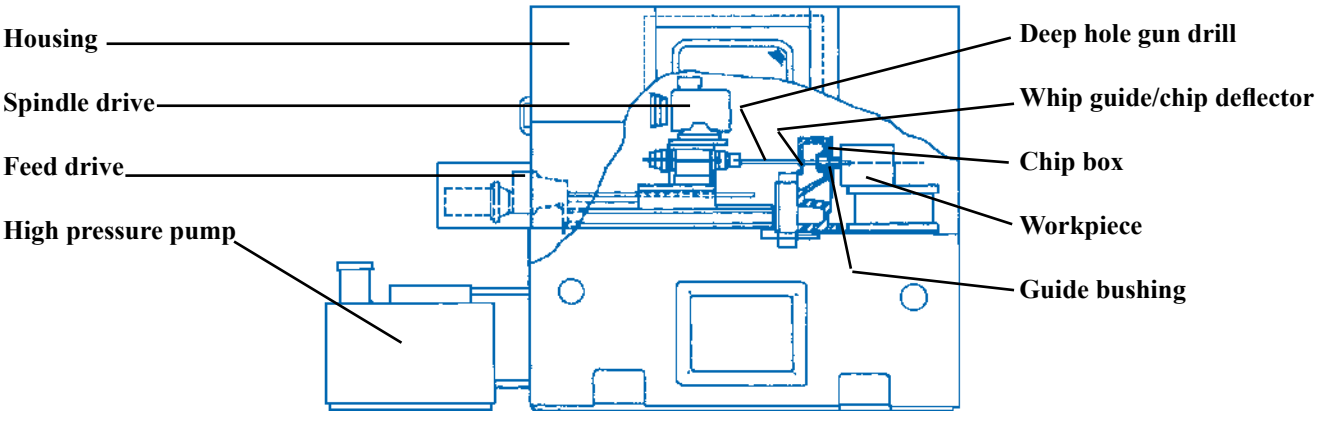
A typical gun drill consists of three parts: a carbide tip, a heat treated alloy shank, and a steel driver. All are typically silver brazed together, and are designed to allow coolant to pass through its entire length. The shank must be properly formed, heat treated, and aligned to absorb cutting torque, sagging, and the whipping associated with high RPMs. Any size, feature, or length configuration can be obtained from .053" to 1.625" diameter.

The drill is positioned and held in the spindle nose, then guided into the workpiece through a prestarted hole or guide bushing that prevents vibration and ensures accuracy. Gun drill cutting edges form thin, curled chips that are carried away from the bore by high pressure lubricant. The off-center design of the cutting edges creates pressure within the bore that is carried by pads behind the drill tip. The coolant that flushes the chips also lubricates these pads, which burnish the surface and develop the fine finish for which gun drilling is known.

## The gundrilling machine

Specifically designed to provide the optimum conditions for operating the gun drill, the gundrilling machine is equipped with a high pressure pump that delivers lubricant to the rear of the drill. The drill can be driven by the spindle or held stationary if the workpiece is being rotated. During drilling, advancement can be either by drill or workpiece movement.

The gun drill is supported by anti-whip devices along the shank length and at the rear of the chip box. The chip box contains a chip deflector and a front end bushing which guides the drill into the workpiece. The chip box also contains escaping chips and lubricant, which are separated and filtered. Gundrilling machines come in many variations from single spindle manual models to CNC units with multiple spindles of different designs.They can be integrated into transfer lines or be part of a machining or turning center. Gun drilling is also becoming popular as a retrofit package for both conventional and CNC machines.



STERLING GUN DRILLS

# Gun Drill Components

## Driver

Drivers are manufactured to industry standards as well as any specified diameter, length, or feature, such as flats, "O" ring groove, and ID or OD threads. Standard drivers have an undercut to .750" diameter and two "whistle notch" flats above.

## Shank

Sterling Gun Drills shanks are manufactured from aircraft grade alloy steel tubing that is formed, heat treated, and trued to exacting specifications.

## Drill Tip

Single flute solid carbide drill tips are supplied in all diameters from .078" to 1.625" in a number of styles. Sterling Gun Drills' standard tip has a round or kidney oil hole. Twin hole tips or other variations are available. Our smallest drills (.045" to .160") can be ordered with a solid carbide shank/tip. Standard pad form (contour) is the R-1 low-land, non-micable style.

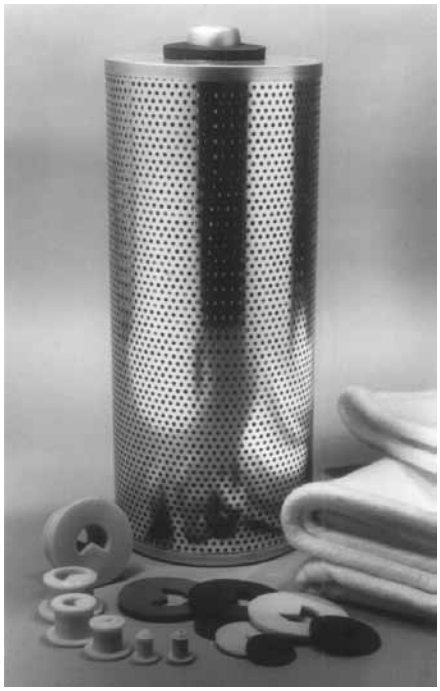
Other styles are available as conditions warrant. Retipping, reconditioning, resharpening, resizing, and surface coatings are available.

Standard drills can be ordered by just specifying drill diameter and overall length. All will be supplied with R-1 (low land) contour and N-8 (30° x 20°) nose grind,* either facet or sweep grind.

* 40° x 30° in solid flute

| Diameter (inches) | OAL | Driver | D//A | Length |
|---|---|---|---|---|
| 0.045" - 0.1249" | | A | 0.500" | 1.50" |
| 0.1250" - 0.5000" | | B | 0.750" | 2.75" |
| 0.5001" - 0.7500" | | C | 1.000" | 2.75" |
| 0.7501" - 1.0000" | | D | 1.250" | 2.75" |
| 1.0001" - 1.375" | | E | 1.500" | 2.75" |
| 1.3751" - 1.625" | | F | 2.000" | 2.75" |

# Accessories



Sterling Gun Drills supplies a complete selection of accessories for deep hole drilling machines.

**A) Pump filters:** 5 and 15 micron filter elements for the Mega Flow deep hole drilling systems. Removes particles too fine to be trapped by filter bags (5" OD x 12 7/16" OAL x 25/32").

**B) Filter bags:** Upper and lower filter bags for the Mega Flow deep hole drilling systems. Traps larger chips and prevents then from returning into tank. Upper bag supplied with rope.

**C) Chip deflectors:** Metal faced polypropylene chip flippers keep oil and chips in the chip box (sizes from .078" to 2.000").

**D) Anti-whip guides:** Molded vinyl deep hole drilling liners provide relief from whipping and bowing, permitting higher speeds without vibration (sizes from .078" to 2.000").



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# Deep Hole Gun Drill Styles

## Single Flute Gun Drills

A round or kidney oil hole is Sterling Gun Drills standard, and are available from stock in diameters from .1250 to to .3020". Round oil hole styles are available from .3030" to 1.500". Twin hole variations of similar construction are available upon request.

## Gun Reamers

Round tube reamer and custom drill configurations are available upon request. Contact Sterling Gun Drills' technical department for recommendations on all your precision deep hole requirements.

## Solid Carbide Flute, Single Flute Gun Drills

One piece carbide tip and flute gun drills offer the advantage of strength and rigidity over tubular construction drills, and with it, better overall performance. These drills are manufactured in the USA here at our facility, and are available in diameters from .0450" to .1600" with overall lengths to 13.5"*. While most applications that use this style gun drill require specific diameters and lengths, we do stock fractional diameters in 6" and 10" overall lengths. We are proud to introduce a program which allows expedited delivery (smaller lots, please!) with a choice of a three day premium, or two week standard delivery for any diameter and length combination listed above. A small premium applies for the expedited service. Our solid carbide flute gun drills are manufactured to international standards with inch (our standard) and metric drivers, 40° x 30° "facet" nose grind, and a "D" or "teardrop" coolant hole where applicable to the diameter.

* Including 1 1/2" long driver

STERLING GUN DRILLS

# Nose Grind-Contour Combinations

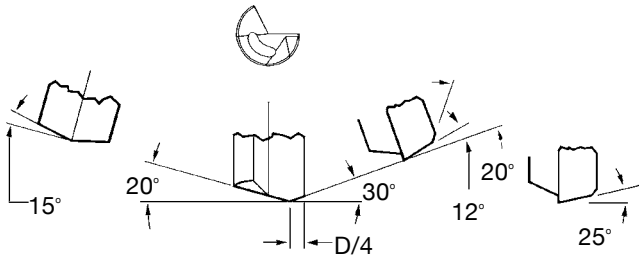
Optimum drilling performance is achieved by the proper combination of nose grind and contour. For the widest variety of drilled holes, the Sterling Gun Drills standard 30° x 20° N-8 nose grind combined with the R-1 low land contour will prove best. However, any single or combination of variables, such as angled entry, exit, cross holes, very deep holes, reaming, stepped holes, even large diameter or material specifications may lead us to recommend a non-standard combination, with or without surface coatings. Please consult Sterling Gun Drills for the best combination suited for your application.

## COMMON GRIND-CONTOUR COMBINATIONS

### Nose grinds

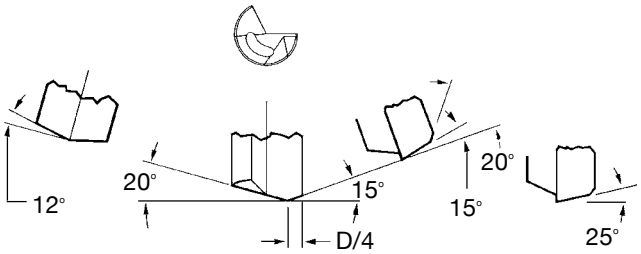
#### N-8: General Purpose, sweep or facet

Standard nose grind used for most materials



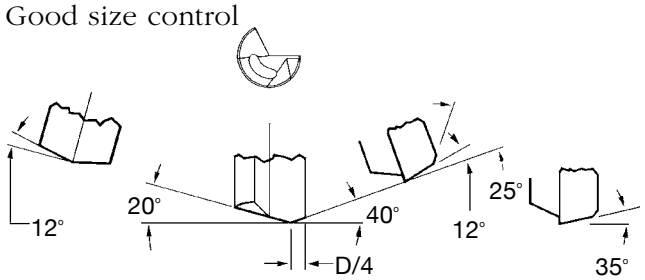

#### N-4: Aluminum grind, sweep or facet

Allows more oil to flute



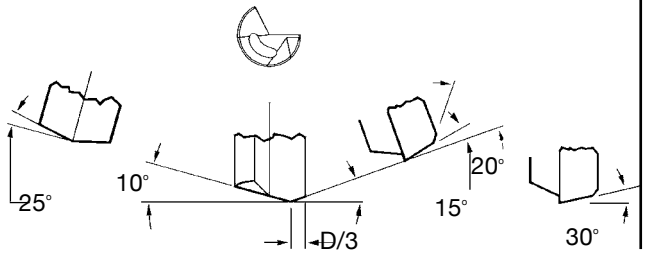

#### N-13: Cast iron grind, sweep or facet

Good size control




#### N-73: Stack grind, sweep or facet

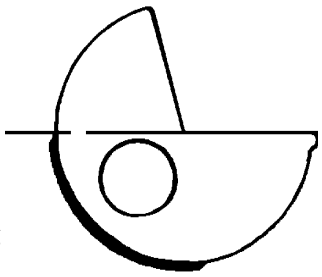
Good for layered materials




### Contours

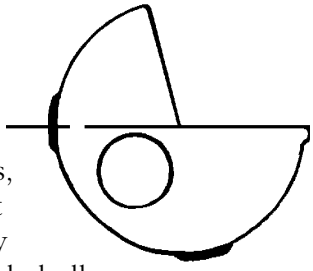
#### R1: Low Land

Non-micable, for most solid drilling applications.



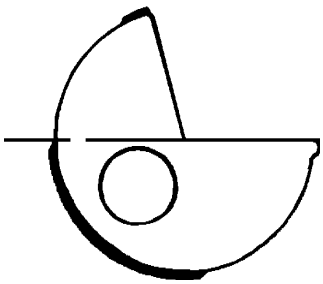
#### R3: High Land

Micable, for cross holes, very deep holes, angled entry, exit. Not recommended for very short holes or high nickel alloys.



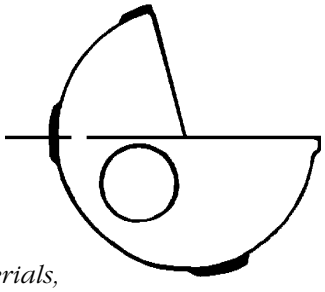
#### R-2: Low Land and top

Non-micable, for reaming and non ferrous metals.



#### R-4: High Land and top

Micable, cross drilling and reaming. Not for high nickel materials.



***NOTE:*** *For special materials, please consult your Sterling Gun Drills representative.*



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# Resharpening Gun Drills and Half Round Drills

## DM-41 & DM-42 Gun Drill Regrind Fixture

**Capacity: .156 - 1.25" (DM41) .750 - 2.125 (DM42)**

The Sterling Gun Drills manual regrind fixture provides a fast and easy method of resharpening gun drills and half round drills with the popular facet style grind. Drills of a large diameter range are positioned and ground without the need of expensive bushings or collets. The universal nature of the fixture allows standard or custom regrinds.

## The Sterling Gun Drills Gun Drill Regrinding Fixture consists of three elements:

**1) The workhead** with clamping device to hold either a single flute gun drill or half round drill in position.

**2) A scale,** graduated in degrees, to allow the drill to be aligned in the vertical plane. This scale is mounted on the vertical member of the fixture that holds the workhead.

**3) A scale** mounted on the diamond-shaped base of the fixture to allow the drill to be angled in the horizontal plane. This scale is also graduated in degrees.

Both scales have locking levers to maintain vertical and horizontal positioning, and when used together allow compound angles to be ground on the nose of the drill mounted in the workhead.

The fixture is normally used on a tool and cutter grinder equipped with a 11V9 or 11A2 style diamond wheel (120 - 150 grit). Some may choose a metal or plated bond wheel with concentric roughing and finishing faces, the roughing face having a coarser grit than the finishing one. The spindle of the grinding wheel will start at 90 degrees to the table slideway.

# Resharpening Gun Drills and Half Round Drills

## DM-43 Sharpening System

**Versatile • Convenient • Productive**

These words best describe the DM-43 sharpening system from Sterling Gun Drills. Designed as a compact, self-contained unit, it can easily be located next to work in progress, enabling operators to properly maintain gun drills and half round drills while remaining at their work stations.

The DM-43 sharpening system services drills from .100" to .700" in diameter and comes complete with everything necessary to maintain and maximize tool life and efficient hole production. With the drill grinding table removed, a protractor table is revealed, allowing the resharpening of carbide inserts and lathe tools.

**Standard items include:**

- Portable grinding machine
- Protractor and drill regrind tables
- Toolholder for gun drills and half round drills
- 360 grit wheel
- Wheel wrench
- Cleaning stick, spray bottle and wetting agent

## Sharpening system and accessories

| Part no. | Description |
|---|---|
| DM-43 | Sharpening system (120V, 60Hz) |
| DM-43A | Sharpening system (220V, 50Hz) |
| DM-44-01 | 260 grit wheel (coarse) |
| DM-44-02 | 360 grit wheel (standard) |
| DM-44-03 | 600 grit wheel (medium) |
| DM-44-04 | 1200 grit wheel (fine) |

| Part no. | Description |
|---|---|
| DM-44-05 | Wetting agent concentrate |
| DM-44-06 | Spray bottle |
| DM-44-07 | Wheel cleaning stick |
| DM-43-08 | Drill regrind plate and tool holder |
| DM-43-09 | Drill regrind plate |
| DM-43-10 | Drill tool holder for DM-43 |



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STERLING GUN DRILLS

# Sterling Gun Drills Deep Hole Drilling System

Sterling Gun Drills' deep hole drilling system provides a complete package, attractively priced and technically serviced, that allows any facility to set up a deep hole drilling operation on their own equipment. The system consists of these items:

**Gun drills and half round drill** operate on the same principle to produce precision and deep holes and can be easily applied to conventional and CNC machinery.

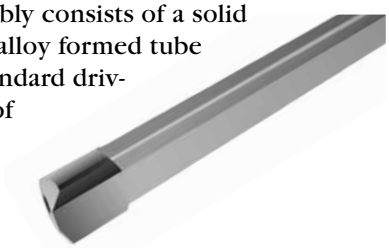
**Spraymist kits** require only shop air, and deliver Sterling Gun Drills' high "EP" lubricant internally to the cutting edge and burnishing pads while clearing chips through the open flute section of the half round drill.

**Stationary or rotary toolholders** adapt the half round or gun drill to the spindle/turret and lubricant supply.

**Resharpening** is provided by a variety of fixtures that duplicate factory methods, or by Sterling Gun Drills' resharpening and retipping services.

## Gun drills and half round drills

This three piece assembly consists of a solid carbide tip, an aircraft alloy formed tube shank, and industry standard drivers sized to allow use of available toolholders. The off-center point configuration and hollow core allow the drill to produce precision and/or very deep holes on standard or CNC machinery.



## Spraymist Kits

When attached to standard shop air pressures of 100 to 125 psi, these units deliver lubricant as an atomized mist directly to the cutting edge, forcing chips out of the bore. Lubricant usage is typically less than one gallon for four hours drilling with a ½" diameter gun drill.

DM2000: One gallon capacity.

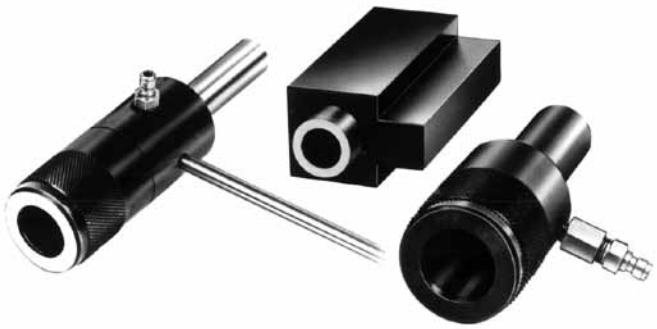
DM3000: Four gallon capacity.

**DM2000**

**DM3000**

## Lubricant

As an atomized mist, this specially developed water soluble oil with "EP" additives achieves maximum tool life and the best surface finishes possible.



## Stationary and Rotary Toolholders

A complete selection of stationary and rotary toolholders fit standard and CNC machine tools. Most Sterling Gun Drills' can adapt to these toolholders with available reduction sleeves.

DM-41/DM-42

DM-43

## Regrind Fixtures

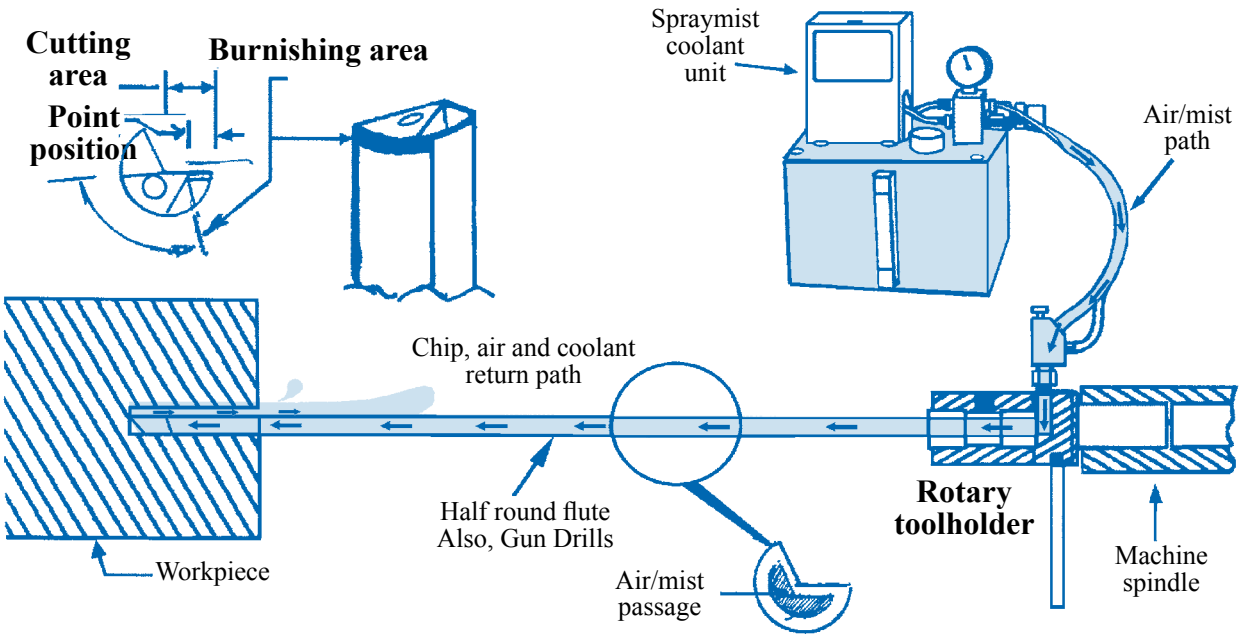
Three styles of regrind fixtures are available from Sterling Gun Drills:

DM-41 and DM-42: A regrind fixture for tool and cutter grinding machines for drills from 4 to 54mm.

DM-43: A machine complete with the toolholder and diamond wheel for drills from 2.5 to 18mm.

Either style of regrinding fixture can be used to re-sharpen gun drills and half round drills, or, use Sterling Gun Drills' re-sharpening service with fast turnaround.

# Sterling Gun Drills Deep Hole Drilling System




## The Deep Hole Drilling System Setup Procedure:

The gun drill and half round drill standard drill point position is offset to 1/4 of the drill's diameter. This does not allow the drill to start unless guided by either a gun drill bushing or a pilot hole. On conventional machinery, a pilot hole is usually the most practical.

Should you have any questions regarding materials, speed and feed, machine application or operation, contact Sterling Gun Drills for assistance.

**Step 1:** Mix lubricant at a 10:1 ratio in a separate container, and fill the reservoir.

**Step 2:** Prepare a pilot hole for the gun drill or half round drill to a diameter of +.001", -0, by 1/2 to 1 diameter deep. If tolerances require, keep the pilot hole diameter closer but *NEVER* undersize. NOTE: Standard gun drills are not measurable, prepare the pilot hole as above to the label diameter.

**Step 3:** Secure drill in toolholder mounted in the spindle, turret, or toolpost, true to the part or spindle center line. Connect nozzle from the Spraymist kit to the male fitting of the toolholder, or transfer block on a CNC.

**Step 4:** Connect the Spraymist kit to shop air at 100-120 psi. Select the proper running parameters from the Sterling Gun Drills' Speeds and Feeds Chart.

**Step 5:** Insert the drill tip into the prepared pilot hole just short of the bottom. Start the spraymist by opening up the slide valve, adjust the mist jet needle to create a fine mist. (A white ring will be visable at the bore opening during the drilling.) *Caution:* **NEVER** rotate the drill outside of the hole.

**Step 6:** Turn on the spindle, then start the feed. Chips should clear the bore continuously. to depth. If packing occurs, reduce the feed. At depth, back off the bottom slightly if a blind hole then stop everything and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# The Deep Hole Drilling System:
## Gun Drills and Half Round Drills

Gun drills and half round drills operate on the same princple to produce precision and deep holes, and can easily be applied to conventional and CNC machinery.

Gun drills and half round drills are three piece assemblies consisting of a solid carbide tip, an aircraft alloy formed tube shank, and industry standard drivers sized to allow use of available toolholders. The off-center point configuration and hollow core allow the drill to produce precision and/or very deep holes on standard or CNC machinery.

The Gun drill and Half Round drill have a solid carbide tip that cuts on one side of the hole. Thrust forces are greatly reduced compared to twist drills and are transferred to the pad or pads on the drill tip's rear periphery. This creates a burnished finish when used with a lubricating mist. The drill tip's outer and inner cutting edges cause chips to split into two separate coils. The coils converge upon themselves, breaking up further into smaller pieces. Air pressure and lubricant from the Spraymist Kit clear the chips, forcing them back along the open side of the gun drill or half round drills flute section.

Gun drills and can be ordered by specifying drill diameter and overall length. We recommend a diameter range of about 1/8" to 1½" diameter for use with our Spraymist System. Gun drills above 1" diameter should be ordered with inner tubes to maintain the atomized mist*. In addition to 600 in-stock gun drills drill sizes we also include many number, letter, and metric sizes. Special diameters, lengths, drivers, step drills, special form nose grinds, and tip coatings can be manufactured to order. Standard gun drill nose grind- contour is R-1 / N-8. Refer to our Nose Grind – Contour Combinations chart with additional choices for specific applications..

Half round drills are ordered by specifying drill diameter and flute length. See the Half Round Drill Sizing chart for available diameters, lengths and driver sizes on our Website www.sterlinggundrills.com

Sterling Gun Drills offer a complete deep and precision hole drilling package including Spraymist Kits, Stationary and Rotary Toolholders, Reduction Sleeves, Lubricant, and Regrinding Systems backed by industry leading technical service. We also re-sharpen and re-tip gun drills of any manufacture.

**The single flute Gun Drill** (described as overall length)
Manufactured to Industry standards and metric diameters

**Driver** (inch)

Manufactured from aircraft grade alloy steel tube
**Shank**

Example: GA 02500 2200

Drill type Diameter Overall length

| Diameter | Driver | Dia. | Length |
|---|---|---|---|
| 125" - .500" | B | .750" | 2.75" |
| .501" - .750" | C | 1.00" | 2.75" |

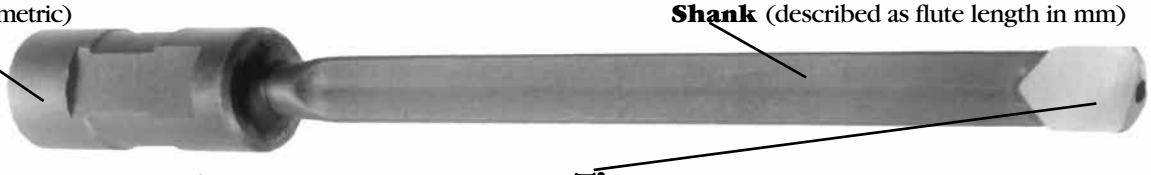
**Tip**
Solid carbide tip with round or kidney hole. Standard is an R-1 Contour, N-8 nose grind. Other grinds available.

1.001" – 1.50" (max.) To fit toolholder *With Spraymist, specify inner tube construction above 1 1/8" diameter.

**The Half Round Drill** (described as flute length or drill depth)

**Driver** (metric)

**Shank** (described as flute length in mm)



Example: HA 02500 0180

Drill type Diameter Overall length

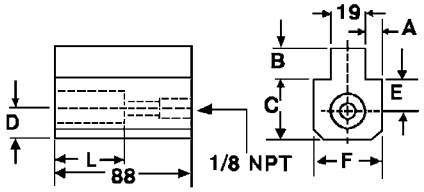
**Tip** (drill diameter described as inch)

STERLING GUN DRILLS

# The Deep Hole Drilling System: Toolholders

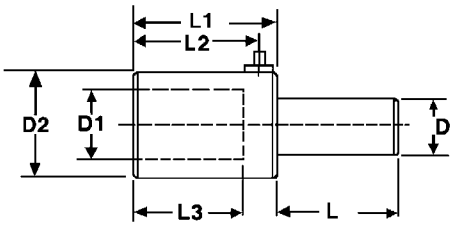
Sterling Gun Drills stocks a complete assortment of toolholders to suit conventional and CNC equipment. Standard reduction sleeves are stocked to help keep toolholders to a minimum; special toolholders and reduction sleeves can be made to order.

## Stationary: Engine lathe



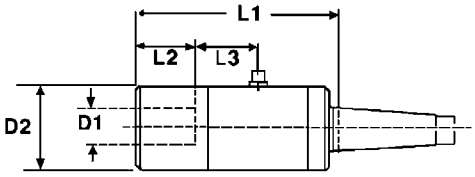

| Part# | D mm | L mm | A | B | C | E | F |
|---|---|---|---|---|---|---|---|
| TH-12 | 25 | 50 | 0.354 | 0.750 | 1.614 | 0.750 | 1.457 |
| | 35 | 60 | 0.551 | 0.886 | 2.106 | 0.984 | 1.988 |

## Stationary: Turret lathe and CNC



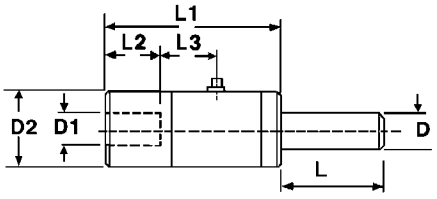

| Part# | $D_1$ mm | $L_2$ mm | D | L | $D_2$ | $L_1$ | $L_2$ |
|---|---|---|---|---|---|---|---|
| TH-16 | 25 | 50 | 0.750 | 2.50 | 1.81 | 2.75 | 2.36 |
| TH-17 | 25 | 50 | 1.000 | 2.50 | 1.81 | 2.75 | 2.36 |
| TH-18 | 35 | 60 | 1.000 | 2.50 | 2.28 | 3.15 | 2.75 |

## Rotating: Morse taper



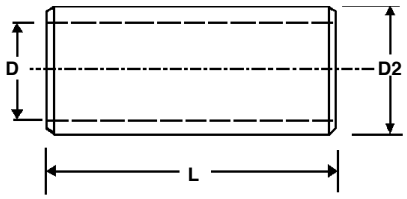

| Part# | $D_1$ mm | $L_2$ mm | $D_2$ | $L_1$ | $L_3$ | Morse taper |
|---|---|---|---|---|---|---|
| TH-32 | 25 | 50 | 1.81 | 4.45 | 1.22 | 2 |
| TH-33 | 25 | 50 | 1.81 | 4.45 | 1.22 | 3 |
| TH-34 | 35 | 60 | 2.28 | 4.84 | 1.10 | 4 |
| TH-31 | 16 | 40 | 1.25 | 3.50 | 0.95 | 1 |

## Rotating: Plain shank




| Part# | $D_1$ mm | $L_2$ mm | D | L | $D_2$ | $L_1$ | $L_3$ |
|---|---|---|---|---|---|---|---|
| TH-30A | 16 | 40 | 0.625 | 1.60" | 1.25 | 3.35 | 0.95 |
| TH-36 | 25 | 50 | 0.75 | 2.50 | 1.81 | 4.29 | 1.22 |
| TH-37 | 35 | 60 | 1.00 | 2.85 | 2.28 | 4.70 | 1.10 |
| TH-38 | 1.25 | 70 | 1.00 | 2.85 | 2.28 | 4.87 | 0.80 |

## Reduction sleeves




| Part# | D mm | $D_2$ mm | L mm |
|---|---|---|---|
| RS-52 | 16.0 | 25 | 50 |
| RS-53 | 25.0 | 35 | 60 |
| RS-54 | 0.75 | 25 | 70 |
| RS-55 | 1.00 | 35 | 60 |
| RS-56 | 16.0 | 35 | 60 |
| RS-57 | 0.75 | 1.25 | 70 |
| RS-58 | 1.00 | 1.25 | 70 |
| RS-59 | 0.75 | 35 | 60 |

Special reduction sleeves can be supplied to order.



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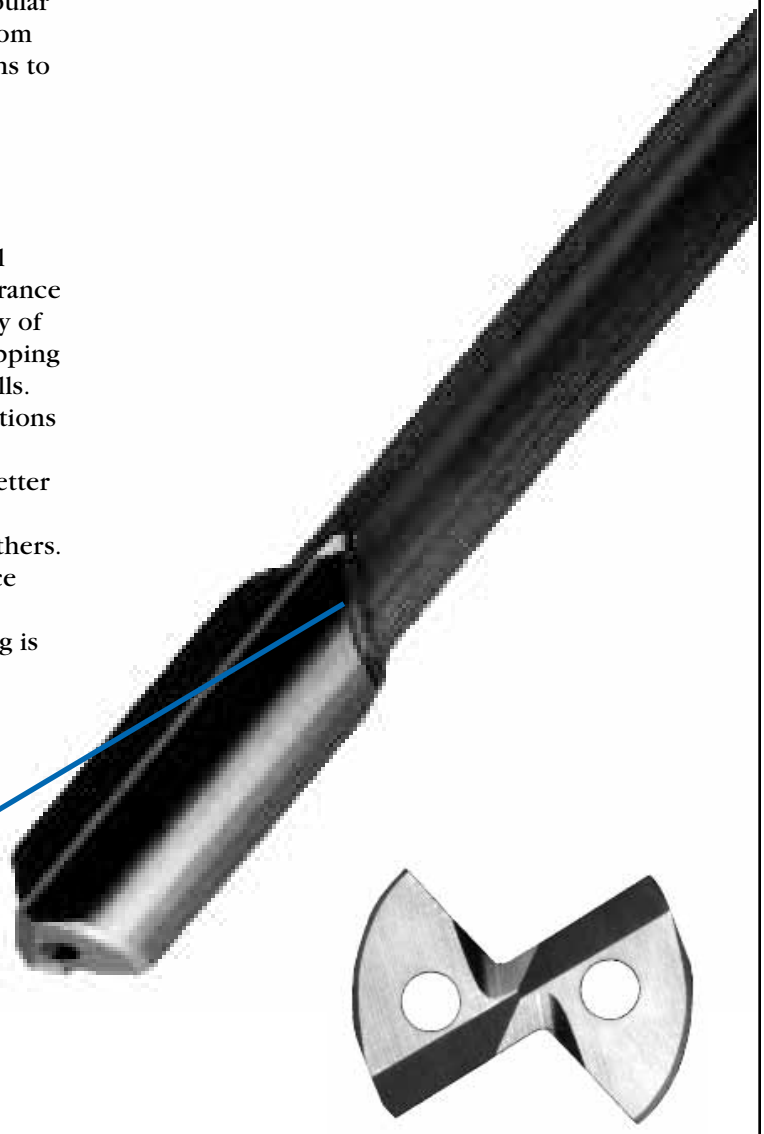
# TWINMASTER®
## Two Flute Deep Hole Drill

The TWINMASTER® two flute deep hole drill is a technologically superior, solid carbide tipped, tubular construction drill manufactured to any diameter from .20" (5 mm) to 1.00" (25.4 mm), with overall lengths to 36" (915 mm)

The TWINMASTER® drill offers a choice where the extreme accuracy of a single flute drill is not required, but a better penetration rate (and certainly a better method) than twist drilling is desired on virtually any machine tool *and* gun drill machine. The advanced tip geometry and chip clearance advantage allow deep hole drilling in a wide variety of materials- not in just the "gray cast iron or free chipping nonferrous material" as limited by competitor's drills. Typical accuracy on standard machine tool applications should maintain .002" on diameter and better than .002"/inch straightness, with good surface finish. Better accuracy can be achieved on gun drill machines. Optional surface coatings include TiN, TiAlN, and others.

Sterling Gun Drills offers a resharpening service with quick turnaround for all TWINMASTER® drills as well as our gun and half round models. Retipping is also possible at substantial savings.





### ROTA-V™ Brazed Joint

This innovative feature rotates and angles the brazed surfaces of the tip and tube at 45 degrees, providing back up to the carbide tip and greatly enhancing its strength. Testing showed such a positive lock that an *unbrazed* model was able to drill through solid steel... try *that* with any competitive tool!

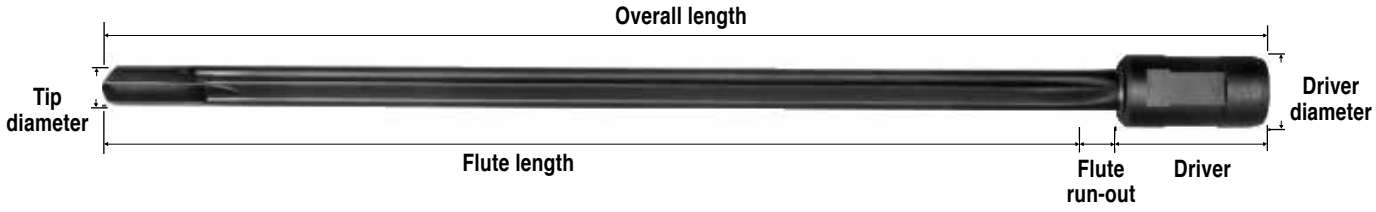
US Patent # 5,971,674

### Applications

The TWINMASTER® drill is designed for use on either gundrilling machines or standard machine tools with high pressure oil, coolant, or our spraymist system. Drill features are coordinated with application requirements, i.e., driver sizing for the tool holder or spindle, drill overall and flute length to fit, plus tip grinding specific to the material and machine for required accuracy. Coatings may be recommended to enhance tool life or improve surface finish. Refer to ***Sterling Gun Drills' Universal Speed and Feed Chart*** for single and twin flute speeds, feeds, and other machine parameters. Call Sterling Gun Drills engineering for more detailed information.

STERLING GUN DRILLS

# TWINMASTER®
## Two Flute Deep Hole Drill




## Ordering Information:

**Required information:**

- Drill diameter
- Drill overall length
- Driver style

Any detail, i.e., machine type, coolant pressure, tolerance, etc., is helpful for proper drill specifications.

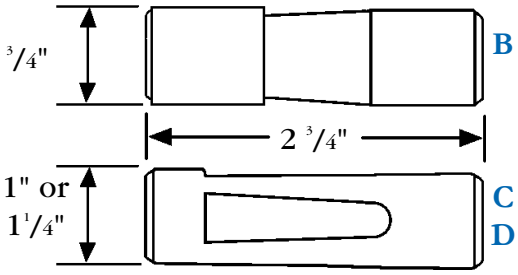
**FLUTE LENGTH (maximum drill depth)**

| Drill diameter Inch | Drill diameter mm | Flute run out Inch | Flute run out mm |
|---|---|---|---|
| .20 | 5 | .70 | 17 |
| .40 | 10 | .90 | 23 |
| .60 | 15 | 1.10 | 28 |
| .80 | 20 | 1.25 | 32 |
| 1.00 | 25 | 1.40 | 35 |

Flute length=OAL -- (driver + flute run out)

## Standard Drivers:

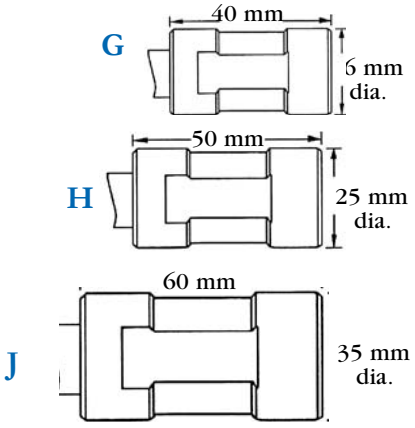
TAPERED UNDERCUT




TWO TAPERED FLATS

**Drill Diameters**

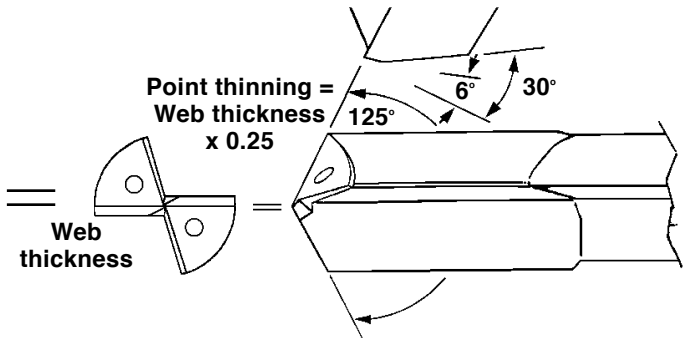
.197" - .500"
(5 mm-12.7 mm)
**B or G**
.501" - .750"
(12.8 mm-19.1 mm)
**C or H**
.751" - 1.00"
(19.2 mm-25.4 mm)
**D or J**




Non-standard drivers can be made to order

## Regrinding Information:

TWINMASTER® two flute drills can be resharpened many times, maintaining optimum performance, and used up drills or damaged drills with good tubes can be retipped. The grind can be reproduced on universal tool and cutter grinding equipment; this diagram shows basic geometries. Sterling Gun Drills offers regrinding services with next day turnaround.




## Other Sterling Gun Drills Products and Services:

- Single flute gun drills from stock
- Gun drill machine accessories
- Regrind fixtures, single flute
- Half round drills
- Spraymist kits
- Speed drills
- Gun reamers
- Toolholders, lubricant



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# Speeds and Feeds

## Gun Drill, Half Round Drill, and TWINMASTER® Twin Flute Drill

**RPM=SFM ÷ 0.262 ÷ Drill diameter**

The assumption is made that the proper bushing or pilot hole size, oil or coolant type and pressure, and general machine condition is acceptable. ***The information below is a starting reference only!***

High pressure (Hi Press.) refers to a gun drill machine or the equivalent pressure. Spraymist (S/Mist) refers to Sterling Gun Drills' DM2000/DM3000 kits, or high "EP" coolant at *no less* than one third gun drill machine pressure for the diameter.

| Material | Hardness RC | Hi Press SFM | S/Mist SFM |
|---|---|---|---|
| **Tool Steels** | | | |
| D, S, M, O, H, P series | | | |
| | 17-22 | 250 | 160 |
| | 22-27 | 200 | 130 |
| | 27-32 | 150 | 100 |
| | 32-37 | 100 | 70 |
| **Low to Medium Carbon Steel** | | | |
| C1010-1550 | | | |
| | 12-17 | 330 | 220 |
| | 17-22 | 280 | 190 |
| | 22-27 | 230 | 160 |
| | 27-32 | 180 | 130 |
| | 32-37 | 130 | 100 |
| | 37-42 | 100 | 70 |
| **Stainless Steel**[1] | | | |
| 400 series | | | |
| | 12-17 | 280 | 170 |
| | 17-22 | 240 | 150 |
| | 22-27 | 200 | 130 |
| | 27-32 | 160 | 110 |
| | 32-37 | 120 | 90 |
| | 37-42 | 100 | 80 |
| | Free machining: +30% | | |
| **Cast Iron** | | | |
| Ductile, Nodular | | | |
| | 12-17 | 300 | 200 |
| | 17-22 | 250 | 170 |
| | 22-27 | 200 | 140 |
| | 27-32 | 150 | 110 |
| | 32-37 | 100 | 80 |
| | Ductile Ni Resist: -50% | | |

| Material | Hardness RC | Hi Press SFM | S/Mist SFM |
|---|---|---|---|
| **Alloy Steels** | | | |
| 4000, 5000, 8000 series | | | |
| | 17-22 | 280 | 190 |
| | 22-27 | 230 | 160 |
| | 27-32 | 180 | 130 |
| | 32-37 | 130 | 100 |
| | 37-42 | 80 | 70 |
| **Stainless Steel**[1] | | | |
| 300 series & PH | | | |
| | 17-17 | 230 | 150 |
| | 17-22 | 200 | 130 |
| | 22-27 | 170 | 110 |
| | 27-32 | 140 | 90 |
| | 32-37 | 110 | 70 |
| | 37-42 | 80 | 50 |
| | Free machining: +30% | | |
| **Cast Iron** | | | |
| Grey | | | |
| | 12-17 | 400 | 260 |
| | 17-22 | 350 | 220 |
| | 22-27 | 300 | 180 |
| | 27-32 | 250 | 140 |
| | With free carbides: -50% | | |
| | Ni Resist: -60% | | |
| **Copper Alloys**[1] | | | |
| Berryllium, Ni based | | | |
| | 12-22 | 200 | 130 |
| | 22-32 | 130 | 90 |
| | 32-37 | 60 | 50 |
| **Titanium**[1] | | | |
| 6Al 4V; some others | | | |
| | 12-17 | 260 | 150 |
| | 17-22 | 220 | 130 |
| | 22-27 | 180 | 110 |
| | 27-32 | 140 | 90 |
| | 32-37 | 100 | 70 |
| | 37-42 | 60 | 50 |
| **High Temperature Alloys**[1] | | | |
| Nickel based | | | |
| | 12-22 | 120 | 80 |
| | 22-32 | 90 | 60 |
| | 32-42 | 60 | 40 |
| | Cobalt base: -40%, | | |
| | Iron base: +20% | | |
| **Soft Alloys** | | | |
| Non ferrous: Aluminum, copper, free brass, magnesium | | | |
| | All conditions | 600 | 400** |
| | **or toolholder limit | | |

1) Consult Sterling Gun Drills to verify application requirements



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# Speeds and Feeds

Gun Drill, Half Round Drill, and TWINMASTER® Twin Flute Drill

## Approximate Feed Rate (In./rev.)

Gun drills on gun drilling machines, also with Spraymist @100 + psi or high pressure, high "EP" coolant. Half round drills on spraymist: increase feed by 25%. TWINMASTER® twin flute drills with high pressure or spraymist: increase feed by 50-100%

| Dia. (inch) | Steels low, med Carbon | Steels Alloy Tool, 416 S.S. | Stainless* 300 series Titanium High temp Ni Alloys | Cast Iron Grey Aluminum Free cut | Cast Iron Ductile Nodular | Non-ferrous Alloys; Difficult to chip |
|---|---|---|---|---|---|---|
| .125"** | .00015" | .00015" | .0001" | .00015" | .00015" | .0001" |
| .187"** | .0003" | .0003" | .0002" | .0003" | .0003" | .0002" |
| .250" | .00045" | .00045" | .0003" | .0005" | .0005" | .0003" |
| .375" | .0007" | .0006" | .0005" | .0013" | .001" | .0005" |
| .500" | .0008" | .0007" | .0006" | .002" | .0015" | .0007" |
| .625" | .001" | .0009" | .0007" | .0025" | .002" | .0009" |
| .750" | .0013" | .0011" | .0008" | .003" | .0025" | .0011" |
| 1.00" | .0018" | .0015" | .001" | .004" | .003" | .0015" |

* Consult Sterling Gun Drills to verify application requirements.
** N/A Half round drills; below minimum manufacturing diameter.
Drill lengths over 30:1: reduce feed rate by 20%

## Oil Pressure, GPM, unsupported drill length

### Gun drill machine

| Dia. (inches) | Oil Pressure (PSI) | GPM (per spindle) | | Maximum unsupported length (inches) | |
|---|---|---|---|---|---|
| | | Single flute | Twin flute | High SFM | Low SFM |
| .125 | 1500 | 1.0 | N/A | 3 | 6 |
| .187 | 1150 | 1.8 | N/A | 6 | 12 |
| .250 | 925 | 2.3 | 3.0 | 8 | 16 |
| .375 | 675 | 4.5 | 6.0 | 12 | 24 |
| .500 | 525 | 7.0 | 7.5 | 16 | 32 |
| .625 | 450 | 9.0 | 9.0 | 20 | 40 |
| .750 | 400 | 11.5 | 11.0 | 24 | 48 |
| 1.000 | 250 | 17.0 | 14.0 | 32 | 64 |

# DM2000 and DM3000 Spraymist kits

## Operating and service instructions

**DM2000:**
One gallon (4 liter) capacity


**DM3000:**
Four gallon (15 liter) capacity


Each Spraymist kit includes:

- Spraymist kit
- 8 foot dual hose assembly
- High flow mist jet
- Full instructions

### Description

Spraymist kits are specifically designed for carbide tipped, coolant fed drills to produce precision and deep holes. The kit consists of a pneumatically operated piston pump delivering air and pressurized lubricant through a flexible dual hose assembly and a high flow mist jet. Spraymist is fed through one or more drills during operation. The system is manually operated by a slide valve at the air inlet.

Automatic control is achieved by substituting a solenoid valve (DM-66) in place of the slide valve and interconnection with a machine control.

### Principle of operation

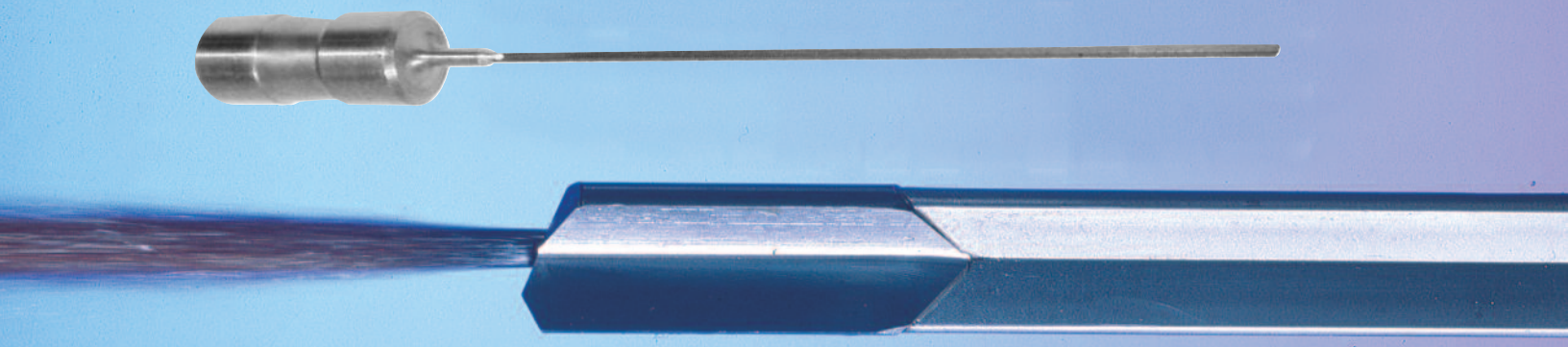
A portion of the incoming air supply operates an internal piston pump delivering lubricant at 1.5 times air line pressure into the air stream. The positive injection of lubricant creates a continuous atomized mist. In operation, the cooling and lubricating action of the spraymist draws heat from the surrounding material, cools and lubricates the drill tip, and forces chips out from the bore.

### Application

Sterling Gun Drills DM2000 and DM3000 Spraymist Kits are suitable for most machine tools from manual lathes and milling machines to CNC turning and machining centers. Some manual machines with a limited speed and/or feed range will be more suitable if modified to achieve a workable rate. Vertical machines must be measured for clearance between the work piece, drill and toolholder.

Spraymist Kits are an element of the Sterling Gun Drills deep hole drilling System along with gun drills, half round drills, and the Twinmaster drill used with Rotary and Stationary toolholders, Lubricant, and Re-sharpening Fixtures. The Sterling Gun Drills system is portable, allowing deep and/or precision holes to be completed in house without relocation of the workpiece during regular machining operations. Spraymist is often a practical and economical alternative to high pressure pumping system retrofits or farming out work to gun drilling contractors. An additional benefit is that experience gained by in-house deep hole and precision drilling allow manufacturers to expand their range of operations and quoting opportunities.

# STERLING GUN DRILLS



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## CARBIDE DEEP HOLE DRILLS

- Solid carbide head
- Solid carbide flute
- Gun reamers
- Half round drills
- "Twinmaster®" Two flute drills

## DRILLING SYSTEMS

- Spraymist kits
- Tool holders
- Lubricant
- Regrind machine and fixtures

## SERVICES

- Gun drill machine accessories
- Coatings: TiN, TiAlN, plus others
- Sharpening
- Retipping, resizing
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